

THE PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

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Arthur M. Hill, Editor

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VOL. XXXVII

FEBRUARY, 1951

No. 1

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EDITORIAL NOTES AND COMMENTS

Our New President. Harry P. Newton is another Texan who has made good! His academic background is impressive—both undergraduate and graduate work at Baylor University. He obtained his Master's degree in 1919. Teaching carried him from an instructor in chemistry at Baylor to the Head of the Chemistry Department at Georgetown College in Kentucky. He was also Chief Chemist of the College Inn Food Products Co., Chicago, Ill., then Assistant Chemist in the Bureau of Chemistry and Soils, U. S. Department of Agriculture.

In 1939 General Newton came to New Orleans to assist in the establishment of the Southern Regional Research Laboratory of which he became Assistant Director in 1945. In 1950 he was given

also the technical supervision of the laboratory's field stations at Raleigh, N. C., Winter Haven, Fla., and Weslaco, Texas.

General Newton served with distinction in both World Wars and remains active in the Reserve Corps. He rose to the rank of Captain in the first war and in the second World War General Newton commanded the Third and Eleventh Anti-Aircraft Artillery groups with the First Army, including landings at Utah Beach, the breakthrough at St. Lo, Aachen, the Ardennes, and Remagen. He received the Purple Heart, Bronze Star, Legion of Merit, and the French Croix de Guerre avec Palme.

He is a member of the Louisiana Engineering Society; American Chemical Society; American Oil Chemists Society; American Institute of Chemists; Louisiana Academy of Sciences; New Orleans Academy of Sciences; Alpha Chi Sigma; and Pi Kappa Alpha.

His publications are in the fields of asphalts and asphaltenes; unit processes of amination by ammonolysis, and the Friedel and Crafts Synthesis; organic synthesis, a publication in the Chemical Engineering Series of the McGraw-Hill Book Company; and motor fuels from farm products.

The Society is fortunate in having so able a man in the Presidency. General Newton is affable and easily approached. His many friends among the membership will lend a helping hand whenever possible, assuring a progressive and successful administration in his term of office.

A Message From Our President. I am grateful to the membership of the Louisiana Engineering Society for electing me their President. My qualifications for this high office appear very limited in relation to the responsibilities of the office to the Society. Nevertheless, I shall endeavor to compensate for these shortcomings by trying my level best to carry out the wishes of the membership. With your cooperation and the assistance of my fellow officers and members of the Board of Direction, I believe that we can move forward toward the goals of the Society.

During the administration of President Cucullu, a Section was established at Lafayette, and on February 15th a charter will be presented to the Alexandria Section. The bill for licensing of professional engineers was passed by the State Legislature and signed by the Governor. The Board has been appointed, and applications are being processed for licensing professional engineers. On Thursday evening, January 18th, the Society presented for the first time the Andrew M. Lockett Civic Activities Medal to Lester F. Alexander and the Society's Technological Accomplishment Medal to A. Baldwin Wood.

Our membership has increased, but so have our responsibilities. We will continue to strive for cooperation and participation in stu-

dent activities; to support civic projects and develop leadership in civic affairs by our membership; to develop an adequate program of activities through active committee planning, including coordination between the general committees and the State Section Committees; to continue cooperation with the national engineering societies, Engineers Joint Council, and Engineers Council for Professional Development; and to assist in the dissemination of professional and engineering knowledge among the membership of the Society.

HARRY P. NEWTON

Report of the Retiring President. Members and guests of the Louisiana Engineering Society: May I begin this report of my stewardship by expressing warm appreciation for the support and cooperation given so freely by many of you during the past year. To fellow officers and directors, to committee chairmen and members, I offer heartfelt thanks and the assurance that standing shoulder to shoulder with them in administering the Society's affairs has been a noteworthy experience. It is most refreshing, in these times of intense commercialization, to find so many people willing to give of themselves for the good of the engineering profession as a whole and the sole individual compensation of knowing that a job has been well done. The specific contributions of certain individuals will be mentioned elsewhere in this report, but I cannot refrain at this point from singling out some who have worked arduously throughout the year. Specifically, your Membership Qualification Committee, although its personnel remains anonymous, and your Technical Papers Committee, most ably handled by Mr. Waldemar S. Nelson as Chairman, have been called upon month in and month out for performance of their committee functions. Their response has been cheerfully and consistently evidenced.

The Secretary's report gives you statistical record of a continued healthy growth in the Society's membership during 1950, with total at year's end of 1,394. This has been stimulated by the organization of the Lafayette Section, which received its charter in October, and membership development will be given further impetus as the Alexandria Section begins to function. I am pleased to report that the Alexandria petition for charter has been received, the proposed Constitution and By-Laws reviewed by your Board of Direction, and issuing of a charter approved, subject to minor Constitutional revisions. This completes the organization of Sections in all of the Congressional Districts of the State, and it is gratifying that it has been accomplished before the retirement from your Board of Direction of the man who has been most instrumental in this work. As most of you know, I refer to Past

President Hermann L. Lehmann. And, in the case of these last two Sections, much credit is due to Prof. Hiram Mason of Lafayette, and Soule Butler of Alexandria, who were the guiding spirits in their formation. It should be noted, in passing, that the growth of the Society has added tremendously to the duties of the Secretary's office. Although the Secretary is a paid employee, money alone could never buy the type of services which John Fernandez has brought to this task. There has to be also a most liberal sprinkling, throughout his work, of that same ingredient which you who labor gratis bring to the Society.

During 1950, your Society, in cooperation with the Louisiana Council of Engineers, sponsored Senate Bill #18 in the State Legislature. This bill was enacted into law as Act #73 of 1950 to become the first profession-wide licensing measure for Louisiana engineers. Its administering body, the State Board of Registration for Professional Engineers and Surveyors is now functioning. As pointed out to you in the August "Proceedings", the job is not finished, but a substantial step forward has been taken. Louisiana, one of the very first states to recognize the vital role of competent civil engineers and surveyors in safeguarding public life, health and property, can now take its rightful place alongside the other states of the Union who have accepted the principle of engineering registration on a profession-wide basis as essential to the public welfare. And the credit for this achievement belongs to the Jimmie Todd's, and the Charlie Kerr's, and the others like Henri Molaison and John Fernandez and Dean Lassalle and other names too numerous to record here, who have worked for almost 20 years toward this goal. But I would indeed be remiss in my duty if I failed to point out to you the invaluable contributions during 1950 of men like Dean Roy Sessums, Louis Duclos, Stone Leake, Hermann Lehmann and Mike Flanakin. Above all, no reporting of the registration activities would be complete without recording the fact that full coordination of all engineering interests and societies in the State were essential. I am deeply grateful to the component organizations of the Louisiana Council of Engineers for demonstrating that such cooperation is possible.

We will award for the first time at this Annual Meeting the two medals established by the Society at the suggestion of James M. Todd. The Louisiana Engineering Society Civic Accomplishment Medal—The Andrew M. Lockett Award will be presented to a Louisiana engineer in recognition of distinguished civic service without compensation; and the Louisiana Engineering Society Technological Accomplishment Medal will be awarded for achievement in technological advancement or discoveries as contributions to the advancement of engineering. I believe this to be an im-

portant milestone in the Society's progress and trust that all of you here present, and many not present here, will be at Dixon Hall tonight to honor our medal recipients. The stimulation which such an occasion provides is not limited to the medalists, but instead should also be the source of professional consciousness which will inspire the deeds of our future medalists.

During the year 1950, the Society has been operated within the framework of the approved Budget, and with net operating revenue amounting to approximately 7% of gross receipts. However, we have considered it prudent to make certain capital expenditures during the year which resulted in a decrease of \$342 (about 3%) in liquid assets. These investments included replacement of a worn out typewriter, purchased of a badly needed slide projector, a portion of the cost of establishing the Technological Award Medal and new furnishings for the Headquarters Room. Medal costs include sculptural services for the design of the medal and preparation of plaster models from which the dies can be struck. In case of the Technological Medal, the Society has assumed all costs, but the Civic Award is being sponsored by the Lockett Company with no cost to L.E.S. In so far as the Society's headquarters, Room 422 of this hotel, is concerned a complete refurbishing of the room had become imperative. The hotel has had it refinished, provided air conditioning, and installed new bathroom fixtures, and the Society has purchased new furniture for it. I trust that all of you (and particularly those who are familiar with its former, let us say, "lack of distinction" will make a point of visiting it and using it during 1951,—not only for committee meetings, as in the past, but as a real headquarters through which our Constitution's provision for encouraging social contacts among engineers can be implemented. My thanks and yours have been earned by the special committee, headed by Past-President A. L. Dunlap, which carried out this project.

Also, during the past year, the Society, in cooperation with the Louisiana Council of Engineers, has canvassed its members to ascertain if sufficient interest existed in the formation of an Engineers' Club at New Orleans to warrant proceeding with such a project. This matter has been under discussion for some years but no conclusive answer was forthcoming. Our studies indicated that at least 400 members would be required for successful operation of such a club and our canvass to date records the fact that 224 engineers of the 467 who replied would be willing to support such a club. However, approximately 50% of the total number to whom mailings were addressed have not been heard from. Representatives of the Council have voted to press this survey to a more decisive answer and Mr. M. C. Abrahm will continue to serve as Chairman of the group

following up this matter. I am glad to express at this time my appreciation for the interest and careful attention he has given to this assignment.

While the events of 1950 are being recorded, mention must be made of our annual outing. The pattern for 1950 represented a departure from previous years which, in the minds of a substantial percentage of our membership, was a most wholesome one and in keeping with the high standard set by major professional societies in this country. I am truly grateful to those who have expressed commendation and also to those who contributed to the planning and conducting of the outing, in particular Mr. J. R. Rombach and his committee.

Before bringing to a close this record of the year's events, I wish to direct your attention to a recently appointed group whose activities are just beginning to get up steam but whose mission will have a most important bearing on future policy of the Society. This committee, headed by Past Presidents K. P. Kammer and F. N. Billingsley as Chairman and Vice-Chairman, respectively, and with statewide representation in its membership, has been assigned the task of reviewing our Constitutional requirements for voting membership in the Society. The factors giving rise to this assignment antedate 1950, but the problem is brought sharply into focus by the Engineering Registration Act of 1950. We are faced with the necessity for formulating a policy in the near future to insure the Society's status as the representative of the engineering profession in Louisiana. The committee's findings should assist greatly in the shaping of that policy.

This report has become rather lengthy but, even at the risk of taxing your patience a bit more, I wish to perform one more pleasant task, that of commending the General Chairman of our Annual Meeting, Mr. J. S. Janssen and all of his committee personnel. They have done a fine job, which represents no little sacrifice of time and personal convenience, and they deserve your thanks.

If my services have benefited the Society to some small extent, I am happy to have made that contribution. Certainly, I have been enriched by associations and experiences upon which I place a value far in excess of anything which lay in my power to give. It is my ardent hope that my successor and his associates may experience the fine cooperation which you have given me. Thank you! January 18, 1951

LIONEL J. CUCULLU

Our Annual Meeting. The total attendance at our 1951 Annual Meeting was four hundred thirteen. Sessions were well attended, with excellent papers presented. The climax of the affair was the banquet and dance.

General Chairman Janssen, together with his able assistants, are to be commended for providing such a splendid three day meeting.

Engineers Joint Council*. The Engineers Joint Council is a voluntary association of engineering societies organized to promote co-operation among the various branches of the engineering profession and to participate in the formulation of sound public policy in national and international affairs wherein the engineering profession has competence. It is composed of representatives of the following societies: American Society of Civil Engineers; American Institute of Mining and Metallurgical Engineers; The American Society of Mechanical Engineers; American Institute of Electrical Engineers; and the American Institute of Chemical Engineers.

The Engineers Joint Council evolved from an awareness among engineers that the engineering profession has a social responsibility which can best be fulfilled through co-ordinated planning and unified action by the major engineering societies. The roots of Engineers Joint Council go back to 1920, when, under the leadership of Herbert Hoover, The Federated American Engineering Societies, later known as American Engineering Council, was established to crystallize engineering thinking on problems of national and international nature as an aid to legislators and other interested groups.

More directly Engineers Joint Council stems from the Joint Conference Committee made up of the presidents in office and the secretaries of the Founder Societies, which was established in October, 1941, to consider some of the common problems facing the engineering profession. The following year AIChE was invited to join the Committee. During the war years the Committee served the Government as the Engineers Defense Board and contributed much to war production by suggesting substitute materials and methods for economizing and salvaging scarce war materials. In 1945 the Committee changed its name to Engineers Joint Council, and it was as Engineers Joint Council that the Committee issued its reports on the Industrial Disarmament of Aggressor States which were warmly acclaimed by the Allied Authorities.

As Engineers Joint Council began to take up postwar problems of the profession, it became evident that the informal nature of the Council was inadequate, for the business at hand. In 1949 a formal constitution was ratified by all member societies. The streamlined structure of this constitution resulted in reducing the work load on individual members of the Council and provided for admission of new members.

* By James M. Todd, President.

In the language of its Constitution, Engineers Joint Council has three objectives:

1. To advance the general welfare of mankind through the available resources and creative ability of the engineering profession;
2. To promote co-operation among the various branches of the Engineering Profession;
and
3. To develop sound and public policies respecting national and international affairs where the Engineering Profession can be helpful through the services of the members of the Engineering Profession.

Implied in these objectives is the ideal of a profession—that of administering to the public need; of co-operation among engineering societies as an essential ingredient of the professional spirit; and of public service as the proper path to economic and social status for the engineer.

To achieve these objectives, the Constitution directs the Council:

1. To act as an advisory and co-ordinating agency to seek out and study matters of mutual interest to the constituent societies of the Council and to recommend parallel action by them.
2. To represent the constituent societies of the Council in instances in which those societies deem such joint representation to be desirable;
and
3. To administer, on behalf of the engineering profession, those activities authorized by a majority of the societies represented on the Council.

Engineers Joint Council is composed of 25 representatives, approved by the member engineering societies. Fifteen are voting members; five are official alternates who vote only when substituting for a voting member; and five are ex-officio members who are the presidents in office of the five constituents societies. Each society therefore has five representatives on Council, three of whom have a vote. The voting members are the two most available past-presidents and the secretary of each society. Alternate members are chosen from the Governing Board of each society. From this structure you can see that Council represents a concentration of experience and ability, which, coupled with a devotion and loyalty to the profession, results in caution and mature judgment.

As its name implies Council is a deliberative and co-ordinating body. Its projects are carried out by working committees composed of members of the constituent societies who are qualified to undertake the task at hand. Engineers Joint Council standing committees are:

Committee on Constitution and By-Laws
General Survey Committee
Unity of the Engineering Profession

Labor Legislation Panel
Committee on Engineering Sciences
Engineers Co-operating in Medical Research
Engineers in Civil Service
Engineering Manpower
National Water Policy
Fuel Resources
National Engineers Committee, and
International Relations.

Engineers Joint Council has a representative on the U.S. Commission for UNESCO and a liaison representative to the United Nations. For its working members, Engineers Joint Council calls upon qualified members of its constituent societies and co-operates with other engineering groups who can contribute to the specific problems under consideration.

The Council meets usually on the third Friday of the odd-numbered months. Meetings are held in the Engineering Societies Building, New York, N. Y. The meetings are open and members of the societies are invited to attend them. During the interim periods, an executive committee composed of the President of the Council and a recent past-president of each constituent society, conducts Engineers Joint Council business.

The voluntary nature of the Council is apparent from the provisions in the Constitution for financing its operation and for terminating membership. Each society is asked to pay its share of the operating expenses which are prorated on the basis of the percentage of the dues each society receives. No member society is asked to contribute to any Engineers Joint Council project of which it does not approve. For example, if only three of the member societies vote for a project, it becomes an official Engineers Joint Council operation, but the cost of the project is met, not by assessing each of the five member societies, but only the three which voted for it.

Any engineering organization whose members constitute a generally recognized branch or group of the engineering profession is eligible for membership. Admission requires not less than a two-thirds affirmative vote of member organization. A society can resign from the Council simply by giving a 90-day written notice of its intention.

Engineers Joint Council is doing numerous things for the individual engineer and his profession to justify his support of its operation.

Engineers Joint Council has had an active 1950. Its most recent major activity, and perhaps its most important work of the year, was organization of the Engineering Manpower Commission. This

Commission arose from a request made early in September by Mr. Robert L. Clark, Director of the Manpower Office of the National Security Resources Board. Mr. Clark requested Engineers Joint Council to prepare a program "for the most effective utilization of engineers in the national effort and make recommendations as to how such a program could best be administered."

In the last World War scientific and engineering abilities were not utilized for the best interests of the country. Engineering schools were seriously crippled and in the years immediately following the war there was a great dearth of young engineering graduates. The NSRB and other agencies are making an intensive effort to prevent this situation from recurring in the present emergency. The Engineering Manpower Commission of Engineer Joint Council has been working actively in the last four months, and on December 20 made its report. It recommended legislation to provide for:

1. Registration by Selective Service of every man up to the age of 70 who is engaged in one of the critical fields of engineering, or is in training for such a field.
2. Establishment of a National Engineering Personnel Board, which shall classify the registrants and make selections of those with critical skills for military, civil defense, industrial allocation and including public and private works. It will administer the "Reserve" secured by registration. A further recommendation was for the establishment of training programs, and for methods to assure a continued flow of adequate technical personnel. The Commission is developing details that may be the basis of useful new legislation. Its twenty members are representative of many of the largest interests in the engineering field.

A second major accomplishment of 1950 was completion of a survey of selected engineering personnel for the national military establishment. The project assumed large proportions so a contract was made between the Office of Naval Research and The American Society of Mechanical Engineers to conduct the survey under the general supervision of Engineers Joint Council Committee on Survey of Selected Engineering Personnel. Those engaged in all the major fields of engineering were covered, and data secured on their fields of specialization. Data were secured on 63,689 engineers of high standing, classified according to 253 specialties in which they are competent and the ten major activities in the engineering field in which they are engaged. The records, which were forwarded to Washington in the fall of 1950, should be of great value in the selection of key personnel by the military establishment and other agencies concerned with the security of the nation. Writing definitions of the 253 fields of specialization was an important and necessary part of the project.

A third activity of Engineers Joint Council that came to fruition during 1950 was embraced in the report of the Water Policy Panel of Engineers Joint Council. This was issued in June under the title—"A Statement of Desirable Policy with Respect to the Conservation, Development, and Use of the National Water Resources." Engineers Joint Council first began directing its attention to the national water problem in 1947, and set up an action panel in 1949. Its comprehensive report had wide distribution, and provided a large amount of engineering information on the subject for "The President's Water Resources Policy Commission," which issued its general report in December, 1950, "A water policy for the American People." This is good evidence of Engineers Joint Council's interest and action in matters of vital interest to the engineering profession, that might otherwise be treated largely from the political point of view.

In still another matter has Engineers Joint Council been watchful of engineering's interest in governmental activities. Through its "Science Legislation Panel" it has been instrumental in seeing that engineers are properly represented on the National Science Foundation Board. This Board was set up by President Truman on May 10, 1950 and Engineers Joint Council then made every effort to have the engineering profession adequately represented. The personnel of the Board, which numbers 24, was announced in December, and of the engineers named by Engineers Joint Council as being highly qualified to serve on the Board, three were chosen.

From its diversified activities during the last several years in behalf of the Engineering Profession in national and international affairs, Engineers Joint Council has accumulated a fund of experience in united action, and has demonstrated its ability to crystallize engineering thinking on professional matters and to stimulate united decisions on common objectives. Today Engineers Joint Council is available to all who would use it for the betterment and advancement of the profession.

An Editorial. (The following editorial is reprinted from "It's Said and Done" edited and published by the Dictaphone Corporation.) This isn't going to be one of those light little "New Yorker-ish" issues. We've got some slugging to do. The chips are down. We're all living in an atmosphere right now wherein our whole future as a nation and a world is dangling from the unpredictable thread of the unknown plans and decisions of our enemies.

This writer is against Communism—and the Soviet government that peddles its red poison the world over. Since the depression-industrial-sit-down-strikes, which we know now were Communistic in their inspiration, and even before them, we have held a firm con-

viction that the fascination so many seemed to find in Communism was the most decadent and dangerous feeling that has ever swept over this country.

In the early twenties an associate of ours who had jumped from a \$50 a week job to an income of \$1000 a week bent our ear constantly with the song "Soak The Rich and Share The Wealth." He was so stingy he wouldn't pick up the cafeteria check of his starving mother. Right then we pegged this bunch of bleed-hearts as crafty peddlers of a theme that could ultimately destroy the old work-save-and-pray formula that had made America the finest and most prosperous country in the entire world.

Since then we have watched the fatal germ of Communism spread through homes, offices, factories, and fantastic as it would have seemed in our father's time, into the thinking of some of the policy-planners of the United States of America. This isn't a political scream. It is a statement of fact.

Whenever we see our national flag trying to remain proud in the breeze, we've imagined what a dull, sick feeling it must have knowing it is being betrayed by a gang of ungrateful, intellectually dishonest, godless gangsters who would poison our air, our milk, our water, and our minds, and have left no pressure or insinuation unused, no lie untold, nor any possible violence unperformed, to destroy the heart and soul and body of this country and every other free country in the world.

We realize that a long line of distinguished men, with nothing but the best interests of America at heart, have accepted the now-proved unwise premise: "Oh, we mustn't do anything to offend Russia." Dear, Holy Russia! And we speak now its ruling government and not its people. Look where this line of thought has placed us as a people! Old Joe's a good fellow—we've got to be patient with him!

We're just as truly at the mercy of any evil decision his Men In the Kremlin may make, or have made, as if we were living under this rule. Well, it's the pay-off, boys. The milk and blood is spilled—so what are we going to do about it? Have a new, expended Voice of America in which known fellow-travelers conceive and type out the "propaganda" that will save us? Relax what little hold we have on our form of government and allow Socialism or worse to become a model for our future life?

Cover up and hush up the facts about the outright traitors who have put us where we are? What is the matter with us anyway? Are we so hopelessly divided, as between a God-fearing, right-thinking people, and a sly, slimy bunch of murdering revolutionists, as to make any concerted action impossible? We're darned soon going to find out, and we have no doubt that the thousands of

party-liners will keep on poisoning our well. Why should they stop until we stop them?

We need to come out of the sheep-fold. The covered-up, secret manipulation that has blunted or wrecked every good-intentioned policy we may have followed has just about come to the point where we've got to stand up and be counted. Editorially speaking, we are doing that right now.

When kids were doing the "Charleston" because it was new—not because it is a silly reminder of the past—we didn't have the high-domes and theorists, with not an iota of practical experience or any record of success behind them, opening their frustration-and-failure-inspired poison vats and flooding our colleges—yes, even our churches!—and factories, and low and high government agencies, with the bitter bile from their vengeful, sour-grape minds.

Their phoney brand of class-consciousness was a pushover to exploit and has brought us to a point where nobody knows for sure just who his friends are, not only in the world, but, more tragically—here at home!

If lies and subtle pressures and downright brassy and traitorous utterances have accomplished all of this, here are a few pages of truth, as God has given us the light to see it.

It isn't pretty. Maybe it is not our job to say things that are 'way off the usual style we usually dictate for this little publication. But we felt we had to say them at the present moment. This is the story as we see it. It is tragic, and needless—and it is about time we got mad.

Of course we are always anxious and willing to give space to *your* side, if you differ. Or to a development of *our* side, if you agree!—From "*It's Said and Done*" Dictaphone Corp.

New Members. Our Society continues to grow. In the past ten years the membership has almost doubled. Following is the list of newly elected members, whom we welcome into the activities of the Society.

FOR MEMBER

OREN BAKER, New Roads; age 44. Endorsed: H. L. Lehmann, Louis Duclos, P. P. Angier. La. Highway Dept., Instrumentman, 1930-33. Forcum-James Co., Instrumentman, 1934-35. La. Highway Dept., Sr. Instrumentman, 1935-41; Sr. Project Engineer, 1941-date.

PHILIP W. BOHNE, New Orleans; age 32. Endorsed: E. A. McLellan, C. S. Williamson, F. M. Taylor. Tulane Univ., Chemical Engineering, B.E., 1939; M.S., 1942. N. O. Public Service, Jr. Engr., 1939-40. Southern Regional Research Lab., Asst. Engr., 1941-45. Blattman's Sheet Metal Works, Inc., Engr. in charge Process Equipment Dept., 1945-50. Member Tau Beta Pi, American Chemical Society.

HENRY BORDELON, Alexandria; age 56. Endorsed: Soule Butler, T. C. David, C. S. Myers. Chairman, Rodman, 1913-17; Instrumentman, 1917-20. City of Alexandria, full charge of field work, 1920 to date.

HUGH OWENS BOURQUE, New Orleans; age 30. Endorsed: B. P. Babin, J. O. Herpin, H. R. Mason. Southwestern Louisiana Institute, B.S.E.E., 1941. Westinghouse Electric Corp., Graduate Student Course, 1941-42; Field Engineer, 1942-44; Consulting & Application Engineer, 1947-date. U.S. Navy, Electronics Officer, 1944-46. Member AIEE.

- EDWIN B. DORAN, Baton Rouge; age 65. Endorsed: L. J. Lassalle, H. L. Lehmann, J. J. Munding. University of Illinois, Farm Mechanics (later changed to Agri. Eng.), B.S. 1906. Agri. Economics & Architectural Design, M.S., 1928-29. International Harvester Co., 1904-11, Intermittent work as machinery expert abroad. Louisiana State University, Instructor to Dept. Head, Agri. Engineering, 1911 to date. Member American Society Agri. Engrs., La. Agri. Eng. Ass'n.
- WILLIAM D. EDWARDS, JR., Baton Rouge; age 44. Endorsed: R. A. Matherne, J. D. Roberts, C. C. Barnard. University of Michigan, BA, 1928. University of Memphis Law School, LLB, 1940. Memphis Light, Gas & Water Div., 1928-42. U.S. Coast Guard, 1942-46. Nickey Bros., Inc., Memphis, Tenn., 1946-48. Barnard & Burk, Supervisor Gas Section, 1949-date. Member Southern Gas Association.
- SAM P. GULLATT, JR., Ruston; age 29. Endorsed: R. T. Sessums, C. T. Watts, R. S. Wynn. Louisiana Polytechnic Institute, B.S.E.E., 1942. Ga. School of Technology, M.S.E.E., 1947; work on Ph.D., 1948-49. U.S. Naval Reserve, Eng. Officer, 1943-46. Georgia Tech., Instructor E.E., 1946-47, 1948-49. Louisiana Polytechnic Institute, Asst. Prof. in E.E., 1947-48, 1949 to date. Member AIEE.
- LEWIS W. HENSLEE, JR., Lake Charles; age 29. Endorsed: V. M. Brown, R. S. Clark, E. M. Schwartz. Georgia Tech., B.S.Ch.E., 1947. Colorado Fuel & Iron Corp., Denver, Chemical Engr., 1947-48. Southern Alkali Corp., Chemical Engineer, 1948 to date.
- OSMOND D. JACKSON, Shreveport; age 37. Endorsed: T. F. Cash, J. S. Broyles, J. P. McCullough. Louisiana Polytechnic Institute, B.S. Eng. 1935. United Gas Pipe Line Co., Surveyman to District Engineer, 1935-date.
- ORISA D. JOHNSON, JR., Baton Rouge; age 28. Endorsed: F. A. Hannaman, Jr., T. J. Innes, Jr., C. S. Pugsley. Louisiana State University, B.S.E.E., 1943. Consolidated Aircraft Corp., Engineer, 1943. Esso Standard Oil Co., Mech. Eng. Dept., 1944 to date.
- GORDON A. MARSALIS, Shreveport; age 29. Endorsed: E. M. Freeman, C. A. Frey, L. H. Roeger. Louisiana Polytechnic Institute, B.S.C.E., 1941. United Gas Pipe Line Co., Asst. Engr., 1941-42. U.S. Navy CEC, Sr. Lt., 1943-46. Industrial Steel Products Co., Inc., Asst. Mgr. charge Eng. and Estimating Dept., 1946-date.
- JOSEPH R. MOONEY, New Orleans; age 34. Endorsed: J. R. Rombach, J. F. Vogt, F. H. Fox. Tulane University, B.E. in M.E., 1938; B.E. in C.E., 1939. Remington Arms Co., Process Engineer, Production Foreman, Sr. Engineer, Prod. Shift Supervisor, 1941-44. U.S. Army, Executive Officer, 1944-46. Gulf Refining Co., Supt. of Marketing Equipment, 1947-date.
- JOSEPH J. RANNA, New Orleans, age 26. Endorsed: G. R. Hammett, W. S. Leake, R. P. Lockett, Jr. Tulane University, B.S.M.E., 1947. A. M. Lockett & Co., Ltd., Field Service & Application Engineer, 1947-date. Member ASME.
- BENJAMIN C. SONES, Bogalusa; age 53. Endorsed: M. R. Guell, B. B. Pierce, C. J. Mayeux. Pearl River Jr. College, graduate 1916. I.C.S., Scranton, Pa., 1919-25, Railroad Engineering, Surveying & Mapping. N.O.G.N.R.R., Instrumentman, Draftsman, 1918-24; Asst. Engr., 1929-30. G.M.&O.R.R., Mobile, Ala., Asst. Engr., Acctg. Engr., Valuation Engr., 1930-37. City of Bogalusa, Project Engineer, 1938-42; City Engineer, 1942-48. L. O. Stocker Const. Co., Project Engr. for Gaylord Container Expansion Program, 1948-50.
- HAROLD MAC TAVISH SYLVESTER, New Orleans; age 47. Endorsed: Neville Levy, W. Horace Williams, C. G. Cappel. U.S. Naval Academy, B.S. 1924. Rensselaer Polytechnic Institute, C.E., 1928; M.C.E., 1929. U.S. Navy, Officer in charge 1st Construction Battalion, 1942-44. Head Public Works Dept., Naval Stations, 1945-48. Todd Shipyard Corp., San Francisco, Material Control & Work Order Supt., 1949-50. Equitable Equipment Co., Inc., Asst. Chief Engineer, present position. Registered Prof. Engr., New York; Calif., New Jersey; La. Member Sigma Xi, Associate Member ASCE, National Society Prof. Engrs.
- WILLIAM STEPHEN SYRETT, Baton Rouge; age 38. Endorsed: H. L. Landry, D. F. Latimer, A. J. Mary. Louisiana State University, B.S.E.E., 1934-37. United Fruit Co., Tropical Divisions. 1938-41. Freeport Sulphur Co., N.O., Electrician, 1941-42. Western Electric Co., Baltimore, Asst. Office Engineer, 1942. Nicaro Nickel Co., N.Y., Asst. Elec. Supt. Cuba Plant, 1942-44. La. Dept. of Education, Electricity Instructor, 1944-45. Geo. C. Hengy & Co., Shreveport, Resident Engineer, 1945-46. La. Public Service Commission, Engineer, 1947 to date. Member AIEE.

FOR AFFILIATE MEMBER

JOHN HERMAN JANSSEN, New Orleans; age 48. Endorsed: M. H. Caraway, J.H. Quinette, R. Earl. Tulane University, Civil Engineering, 3 years. University of Wisconsin, two correspondence courses in concrete design. Works Progress Administration, La. State Headquarters, Worked up to Asst. Examiner of Project Applications, 1935-41. U.S. Engineer Dist., Mobile, Chief Inspector, Engineer in charge of projects, 1941-45. M. H. Caraway Co., Estimator, 1945-date.

HAROLD SCHILL, New Orleans; age 40. Endorsed: Adloe Orr, Jr., T. Edward Ernst, A. J. Fransen. Louisiana State University, Civil Engineering, 1933-35. U.S. Army Engineers, 2 years. Operation of general contracting business, 15 years. President H & W Construction Co., Inc. Licensed by State License Board for General Contracting, La.

FOR JUNIOR MEMBER

ROBERT WILLIAM AMMON, Baton Rouge; age 28. Endorsed: F. A. Hannaman, Jr., T. J. Innes, Jr., C. S. Pugsley. Purdue University, B.S.M.E. 1948. La. State University, graduate work M.E., 1948-50. Esso Standard Oil Co., Project Coordinator, 2 yrs. Licensed Student Engr., Indiana. Member ASME.

NATHAN L. ANDERSON, Baton Rouge; age 26. Endorsed: F. A. Hannaman, Jr., O. R. Menton, C. S. Pugsley, La. State University, B.S.M.E. 1949. Esso Standard Oil Co., Mech. Eng. Dept., 1949 to date. Member Tau Beta Pi.

MILLARD R. BLUM, JR., New Orleans; age 28. Endorsed: A. M. Hill, J. K. Mayer, J. P. Fernandez. Tulane University, B.S.M.E., 1950. J. T. Gibbons, Inc., Industrial Engineer, June 1950 to date. Member ASME.

OLIVER L. BUHLS, Shreveport; age 30. Endorsed: E. M. Freeman, L. H. Roeger, C. A. Frey. Louisiana Polytechnic Institute, B.S.C.E., Aug. 1950. Junior Naval Architect, 1939-41, 1945-46. Licensed C.E., La. Jr. Member ASCE.

JOHN F. DAVIS, JR., Lake Charles; age 22. Endorsed: R. E. Burgess, J. H. Penny, F. E. Lesche. Louisiana Polytechnic Institute, B.S.E.E., Aug. 1950. Cities Service Refining Corp., present employer.

ALFRED N. GORDON, Baton Rouge; age 24. Endorsed: F. A. Hannaman, Jr., C. W. Tonkin, T. J. Innes, Jr. Mass. Institute of Technology, S.B.M.E., 1949. Esso Standard Oil Co., La. Div, Aug 1949 to date. Member ASME.

ALDEN M. HARPER, Baton Rouge; age 28. Endorsed: F. A. Hannaman, Jr., T. J. Innes, Jr., C. S. Pugsley, Virginia Polytechnic Institute, B.S.E.E., Dec. 1948. Esso Standard Oil Co., Engineer, 1948 to date. Member Tau Beta Pi, Eta Kappa Nu.

RICHARD C. HERRELL, Baton Rouge; age 27. Endorsed: T. J. Innes, F. A. Hannaman, Jr., O. R. Menton. Cornell University, B.S.M.E., Feb. 1947. Esso Standard Oil Co., Mech. Eng. Dept., 1947 to date.

JACK L. HICKS, Shreveport; age 24. Endorsed: E. M. Freeman, T. J. Rucker, R. S. Parker. Louisiana State University, B.S.C.E., 1950. Carnegie & Smith, Draftsman, 1948-50. E. M. Freeman & Associates, Inspector, June 1950 to date. Junior Member ASCE.

WALLACE E. KING, Alexandria; age 25. Endorsed: Soule Butler, T. C. David, C. A. Myers. Louisiana Polytechnic Institute, B.S.Ch.E., 1950.

ROBERT E. LEE, JR., Baton Rouge; age 27. Endorsed: F. A. Hannaman, Jr., T. J. Innes, Jr., W. A. Whitaker. Duke University, B.S.M.E., 1948. Esso Standard Oil Co., Coordinator, Mech. Eng. Dept., Aug. 1948-date.

ALEX S. MIJALIS, Shreveport; age 24. Endorsed: T. L. Aubin, Jr., T. F. Cash, Chris Demopoulos. Texas A & M College, B.S.M.E., 1946. United Gas Pipe Line Co., Draftsman, Jr. Asst. Engineer, 1947 to date.

HAROLD A. MILLER, New Orleans; age 28. Endorsed: S. H. McAfee, Jr., W. Leibe, E. Schneider. Louisiana State University, B.S.E.E., 1948. Westinghouse Electric Corp., Sales Asst., 1948-49. Edwards Engineering Corp., Engineer, 1949 to date.

MARSHALL E. NARON, Shreveport; age 24. Endorsed: T. F. Cash, R. J. Simmons, Jr., W. W. Wilson. Texas A & M College, B. S. Petr. Engr., 1950. United Gas Pipe Line Co., Engineering Dept., present employer. Student Associate, A.I.M.E.

- EDGAR H. PAVIA, New Orleans; age 25. Endorsed: B. T. Bogard, J. T. Knight, Jr., Ward Purdum. Louisiana Polytechnic Institute. B.S.M.E., 1950. Equitable Equipment Co., Eqpt. Application, Refrigeration & Air Conditioning, June 1950 to date. Member ASME, ASH&VE.
- THOMAS C. PONDER, Maplewood; age 29. Endorsed: V. M. Brown, R. S. Clark, W. S. Spalsbury. University of Arkansas, B.S.Ch.E., 1948. Arkansas State Hwy. Dept., Draftsman, summers 1936-41. U.S. Bureau of Mines, Chemist, periods totaling 15 mos. between 1942-46. Southern Alkali Corp., Chemical Engineer, June 1948-date.
- GEORGE WALLACE ROBERT, Baton Rouge; age 26. Endorsed: L. J. Lassalle, H. L. Landry, W. J. Evans. Louisiana State University, B.S.M.E., 1950. Louisiana Public Service Comm., Mech. Engineer, June 1950 to date. Jr. Member ASME.
- LOUIS C. ROUDANE, New Orleans; age 23. Endorsed: A. M. Hill, J. K. Mayer, A. P. Whitman, Jr. Tulane University, B.S.M.E., 1950. Simplex Mfg. Corp., Eng. Asst. & Mech. Draftsman, full and part time, 1947-49. Equitable Equipment Co., Sales Engr., 1950-date. Member ASME.
- JAMES L. SELF, Lake Charles; age 23. Endorsed: R. E. Burgess, F. E. Leshe, J. H. Penny. Louisiana State University, B.S.M.E., Aug. 1950. Cities Service Refining Corp., present employer.
- EUGENE E. SIKES, JR., New Iberia; age 24. Endorsed: G. G. Hughes, L. C. Landry, H. R. Mason. Southwestern Louisiana Institute, B.S.M.E., 1949. United Gas Corp., New Iberia, Jr. Engineer, 1 year.
- RODRIC M. SINGLETON, JR., New Iberia; age 24. Endorsed: A. M. Bujard, L. C. Landry, H. R. Mason. Southwestern La. Institute, B.S.M.E., 1945. U.S. Naval Academy, B.S.E.E., 1949. Airtronic Research, Inc., Research Engr., 6 mos. United Gas Corp., Project Engr., present employment.
- JAMES DAVIS SMITH, JR., New Orleans; age 24. Endorsed: L. J. Lassalle, W. P. Oster, Ward Purdum. Louisiana State University, B.S.M.E., 1950. Equitable Equipment Co., Sales Engineer, June 1950 to date.
- HARRY L. TABONY, New Orleans; age 23. Endorsed: L. R. Otto, Jr., G. E. May, J. S. Jannsen. Tulane University, B.S.E.E., 1950. N. O. Public Service Inc., Eng. Dept., summer 1949 and June 1950 to date. Member AIEE.
- RAYMOND J. THIBODEAUX, Bogalusa; age 25. Endorsed: M. R. Guell, C. J. Mayeux, C. H. Hundemer. Tulane University, B.S.C.E., 1947. U.S. Navy Construction Battalion, 15 mos. Gaylord Container Corp., Surveyor, 4 yrs. Licensed C.E., La.
- CHARLES EVERETT WHITE, Baton Rouge; age 31. Endorsed: F. R. Adams, Keith Morgan, W. D. Walthall, Southeastern La. College, A & S, 19 college hrs. 1936-37. Southern Bell Tel. & Tel. Co., Engineer, Dec. 1945 to date.

FOR TRANSFER FROM STUDENT TO JUNIOR MEMBER

- WILLIE RAY HARRIS, Enid, Okla., age 28. Southwestern Louisiana Institute, B.S.E.E., Aug. 1950. U.S. Air Force, Const. & Maint. Inspector, Engineering Office, Vance Air Force Base, present active duty assignment.

FOR STUDENT MEMBER

- CHARLES W. BREAUX, JAMES EMMIT BRUSSARD, CHARLES E. COLE, KENNETH C. FINSTER, LUIZ FIGUEIREDO, WILFRED F. HERBERT, H. A. PERKINS, BENJAMIN E. RITCHEY, JOHN P. SCHRODER. Chemical Engineering Students at Southwestern Louisiana Institute.
- ROBERT P. BINNINGS, CARROLL J. BOUTTE, HARRY DEKERLEGAND, WILLIAM E. EARLES, PHILIP J. PICCIONE, U. L. PITRE, FREDERICK SIMMONSON, JR., L. T. WATKINS. Civil Engineering Students at Southwestern Louisiana Institute.
- BENOIT A. ANDRUS, WESLEY J. BODIN, JR., THOMAS D. CLARK, JR., AUBIN COLEMAN, JR., CARL MARTIN, LLOYD J. NAPALUCH, DARRELL L. NEPREUX, TOM OWEN, SYLVIAN RAY, Electrical Engineering Students at Southwestern Louisiana Institute.
- EDEN BAILEY, NETARDUS NEIL BERGER, DONALD L. HAINWORTH, MILTON KUNTZ, PIERRE L. LARROQUE, ROBERT L. LEBLANC, PERSHING J. LEFORT, LOUIS B. MANN, CHARLES L. MELANCON, JR., WOODROW W. MORGAN, JAMES L. PELTIER, NELSON PIMENTEL, JOSE PRADO, H. P. PUYPER, CALVIN J. ROACH, MILTON S. ROBINSON. Mechanical Engineering Student at Southwestern Louisiana Institute.

PAPERS AND DISCUSSIONS

ENGINEERS IN INDUSTRY IN YEARS TO COME*

Before prying into the future, it is frequently helpful to go back into the past for a short space to lay a foundation from which to pry.

Most of you recall the little flurry in the early Thirties which has been recorded in our recent history as "the depression." Up to that time, a firm wedge seemed to have been driven between engineers on the one hand and men in other capacities in industry on the other hand, for example, construction superintendents and salesmen. In general, it was beneath the dignity of the engineer to condescend to human relations. He worked in the rarified atmosphere of higher mathematics applied to the various fields of engineering. He worked primarily as the designer, the imaginative creator of machines and structures. The construction superintendent, on the other hand, was noted for his ability to bellow like a bull and drive his men mercilessly on the job. He was a master of men who looked down upon the "long-haired, white collar" engineer and his theoretical knowledge. Let the engineer just tell him what the finished structure was to be and he would do the rest. The salesman was the smooth-talking, backslapping fellow who knew the doorman at most of the speakeasies. To him also the engineer was in another world.

Since then the picture has changed tremendously. There is today a great hue and cry, and has been for some years, for engineers who have a knowledge of human relations as well as technical knowledge. Perhaps the depression in the early Thirties has something to do with it. The supply of manpower was plentiful and the demand small. Competition was very keen. If it were possible to find a man who had both sales ability and technical knowledge, he could outdo an ordinary salesman in holding two jobs, so to speak. If it were possible to find an engineer who could boss men on the job, then he could do a better job than the old-time superintendent who was used to rule-of-thumb methods and would not or could not change as times and equipment changed. Employers could afford to be much more selective in a depression and perhaps they learned then that there is great value to an engineer with the knowledge of human relations.

However, it is likely that another factor has been more responsible for the changing picture. The growth in science and in tech-

* By Lee H. Johnson, Dean of the College of Engineering, Tulane University. Presented at the regular meeting of the Society, Dec. 11, 1950.

nology has been so rapid and so ever-accelerating in the last twenty to twenty-five years that no longer is industrial competition a simple matter. Highly competitive American industry has not been slow to apply science to the development of both new equipment and new techniques. For example in the construction industry, it is now very desirable for the construction superintendent to know something about engineering. His attitudes on human relations, especially with regard to labor, have also had to change. A similar thing is true of the salesman. His products have become increasingly more technical and his customers have become less able to understand the fine points of what he has tried to sell them. The salesman today frequently finds himself in a position of trying to explain engineering features of his equipment to a non-engineering customer. It becomes more necessary for the salesman not only to have a pleasing personality and a smooth approach, but also to know whether or not the technical features of his equipment fit the job to be done by the customer. In many instances the salesman who can make an engineering analysis of the customer's entire project will be the one to get the business. As our society and our industry have become technologically more complicated, we find many non-technical employees, such as the old style construction many industries. Our modern scientific world has become too much for them.

By way of illustration, approximate statistics have been gathered locally. Questionnaires were sent to a relatively small number of local firms who employ engineering graduates. Replies from 13 of these firms yield the following results with regard to the percentages of engineers employed for various types of jobs in recent years.

Recent Employment of Engineering Graduates by Local Industries

Type of Job	Approximate Percentages
1. Administration and Management	11%
2. Sales Engineering and Sales	32%
3. Highly Specialized and Complex Engineering Work	6%
4. Routine Engineering Work	44%
5. Routine Technical Work (Sub-Professional Work)	7%

The significant fact from this questionnaire is that about 43% of the engineers who have been employed in the past few years were employed either in administration or in sales.

This 43% represents about 102 engineers out of 237 who were reported in the questionnaires.

Projecting this trend into the future, what might we find? Quoting from a reknowned engineering educator, Dr. W. E. Wickenden:

"Looking to the future, the schools of engineering can scarcely limit their concern to the mathematical and physical sciences, to problems of design and construction, and to the specific details of engineering economy. Engineering will include in its tools any and all sciences as they become exact enough to yield economically predictable results. Various aspects of biology, especially bacteriology, are being incorporated into the working tools of engineering now, and technical psychology is fast approaching a similar stage of development. To fit new scientific materials into the scheme of engineering education involves more than a mere addition of conventional courses in zoology, physiology, bacteriology, or psychology to the curriculum. The new material needs to be functionalized. A large amount of practical research is still needed to work up biotechnics and psycho-technics into trustworthy tools of engineering."

His predictions are over fifteen years old. Evidence of their reliability is beginning to appear.

A new program was announced last summer by the City College of New York in Salesmanship for Engineers which was drawn up in collaboration with an advisory board of industrial leaders and is open only to graduates of schools of engineering by persons who qualify because of outstanding technical work experience. It is designed to equip engineers with the selling skills required to fill sales engineering positions and is sponsored by the Sales Executive Club of New York. A few schools of engineering have ventured to offer a sales option under some curriculum. Again, at the Massachusetts Institute of Technology, several options are being offered in Civil Engineering. (1) Theory and Design, (2) Planning and Administration, and (3) Construction and Management. Also at M.I.T. the degree of Bachelor of Science in Economics and Engineering is offered with two options, (1) a Human Relations Option, (2) Industrial Economics Option. A degree in Business and Engineering Administration is also offered, as well as the Bachelor of Science degree in Food Technology.

In April 1950, Dr. L. M. N. Bach of the Tulane Medical Faculty published a paper in the *Proceedings* of this Society outlining many problems on which engineers and doctors are working jointly. Along this line, I quote from an article in *Science* by Craig L. Taylor and L. M. K. Boelter. A new program has just been inaugurated at the University of California in the Department of Engineering, a program which "represents an effort to develop a biotechnology as a basic discipline in engineering education:

"(1) *Fundamental courses*: Basic in the program are two courses which cover the pertinent facts of human biology and the interaction of man with his environment in as concise, quantitative,

and practical a fashion as the present status of science permits. The first of these courses, *The Dynamics of Human Function and Behavior*, deals with the physical structure, thermodynamics, and machinery for the accomplishment of work of the body, and with practical psychology. The second, *The Influences of Environment on Man*, treats of his interactions with atmospheric, thermal, bacterial, radiational, and chemical aspects of the environment, and also the socio-economic setting. It may be noted that certain topics are predominantly physical and physiological, others psychological; but in so far as possible, an attempt will be made to avoid the common but regrettable separation of these aspects and to integrate them in the most rational manner possible.

“(2) *Applied instruction and research.* The possible ramifications of the biotechnical element throughout engineering research and practice are almost infinite, but it will suffice here to name some of the engineering fields in which the basic human aspect is of significant importance in design and control:

Acoustics	Industrial hygiene
Aeronautics	Personnel management
Architecture	Safety
Food technology	Sales
Illumination	Sanitation
Industrial design	Ventilation and air-conditioning
Production and fabrication	

It is our hope that the engineering student, prepared by instruction in the biotechnical courses, may approach these advanced specialties with as fundamental an understanding of the biological factors involved as he would undertake an advanced structural design problem with a background in mechanics and strength of materials. The biotechnical elements will also serve as the foundation for applications in other engineering courses. As examples, the effect of vibration on the human system will be incorporated in dynamics courses, skeletal kinematics and dynamics will underlie the study of certain nonmechanized operations, and the fields of acoustics and illumination will be placed upon psychological and physiological bases as well as the physical basis. Thus it will be sought to interweave the biotechnical material throughout the engineering curriculum.”

All of this points to the use of new techniques in industries—techniques which twenty years ago were never dreamed of as being engineering tools because they introduce the human factor into otherwise purely technical problems. As the knowledge of psychology becomes more precise and more reliable in its application, industry will undoubtedly find that such application by engi-

neers to production problems may increase production in a manner never before conceived.

What of industrial growth in the future? Technologically, we in America have been rushing along in the past fifty years or so at an ever-increasing pace until we are almost giddy with the rapidity of changes which occur from year to year. The pace will be even faster in years to come and the engineers will be instrumental in setting that pace. Let us take a look at the home, for example. More engineers are being employed in residential construction as pre-fabrication and mass production enter the picture. It is not but one step further until engineers have completely re-vamped home as we know it and have created new industries to supply such things as waterproof, fireproof, and vermin proof lumber, plastic plumbing, scratch-proof and sound proof plastic floors, walls, and ceilings, light-weight plastic doors and windows, opened by push-button or electronic controls, solar heating systems, centralized vacuum cleaning systems, transparent plastic or non-breakable glass with one-way vision for windows, nylon or other plastic window screens, giving more light and insect protection, color lighting adaptable to mental moods, fluorescent wall paints, which become luminous in various designs when activated by invisible ultra-violet rays, electronic stoves, woven glass or plastic fabrics, automatic electronic regulation of water temperature, and many more.¹ The proper design of many of these innovations involves human factors as well as the usual engineering factors.

Every other field gives rise to similar possibilities. To name some, there are farming, transportation, communications, foods, textiles and clothing, mining, and, yes, even fishing. Science has discovered that fish talk. It may not be long until fishermen, commercial or otherwise, will be using scientific instruments to locate their prey, haddock for instance, and snaring it by means of a haddock-call.

A new field of engineering has been born in the past ten years, nuclear engineering. Undoubtedly there is a host of industries yet unborn which will come from the development of applications of atomic energy and radiation, and these will be heavily manned by engineers. Atomic energy may be developed to generate power, to heat furnaces at temperatures far above those which can be attained at present from other sources, or to provide moderate heat for the home. Radiation may be used to perform miracles in medicine or to kill harmful bacteria in foods, in the air, or in water. Radiation may provide a new kind of sewage disposal. The developments in nuclear engineering will most certainly transcend present imagination.

1. *Industrial Science Looks Ahead*, Radio Corporation of America.

Possible Organization of Curricula

Options	CURRICULA				
	Ch. E.	C. E.	E. E.	M. E., etc.	Nuclear Eng'g.
Research and Design					
Production and Construction					
Management					
Sales					
Biotechnology					
Others					

The above blocks represent the possible combinations of curricula and options which a student might select.

In general it seems certain that in future years more industries will use more engineers in more ways than ever before.

Finally, what might be the effect of these changes upon engineering colleges in years to come? From what has been said, there may be some day the following organization of curricula in our engineering colleges. We shall, of course, have curricula according to fields, chemical engineering, civil engineering, mechanical engineering, electrical engineering, and such, with a new field in many colleges, nuclear engineering. Cutting across these curricula may be another set of fields, perhaps as options under these. These fields might well be management, sales, theory and design, production or construction, biotechnology, and perhaps others.

At present engineering colleges are reluctant to sacrifice any of the technical subjects for the technical subjects for the non-technical subjects. This point of view is understandable. How can an engineer be an engineer if he has not had any engineering subjects in his field? How to include other courses, such as sales, or management in sufficient quantity to produce a competent man in these fields upon graduation remains an unanswered question. It may be that engineers will agree on a common core of strictly engineering subjects required of all engineers which will yet leave room for required non-engineering subjects in the options in which the latter are emphasized. The answer will be obtained through the active cooperation of industry, the profession, and the colleges in pooling their resources to meet the demands of the future.

NEWS ITEMS

Past President of L.E.S. **James M. Todd** was recently elected to the presidency of Engineers Joint Council. A story about the aims and activities of this important organization appears in this issue, Mr. Todd is also a recent past president of the American Society of Mechanical Engineers.

Immediate Past President **Lionel J. Cucullu** of L.E.S. was recently elected as Director at Large, of the American Society of Mechanical Engineers.

Ernest M. Freeman, President of the Shreveport Section of L.E.S. was recently elected President of the Louisiana Section of the American Society of Civil Engineers.

Notice. The membership list usually included in the February issue will appear in the April publication.

Have you registered yet? A card or phone call to Prof. Frank Macdonald at Tulane University in New Orleans (Phone WALnut 0970) will bring you an application blank.

OBITUARY OF ROGER MAURICE SANDERFORD

Roger Maurice Sanderford was born in Temple, Texas, January 7, 1909, but was reared in South Waco, Texas. He was the son of Roger Monroe Sanderford and Willie Anderson Sanderford.

He attended the Waco Public Echools, graduating from High School in 1926. He was quite active in debating during his high school career, along with Boy Scout and Y.M.C.A. work. Short-wave radio was his hobby.

Principal college work was at Baylor, with summers spent at Citizen's Military Training Camp at San Antonio. He attended Port Arthur College to pass Government requirements in radio work, passing with very high grades.

Mr. Sanderford specialized in radio station and kindred activities until 1942, including, besides operation, designing and construction, being most proficient in his work. From 1937 until June, 1942, he attended Tulane University, completing Electrical Engineering while working for Mackay Radio and Telegraph Company in New Orleans. Along with all this activity he found time for solo flying, hoping to be of service to his country in the Navy, but, after volunteering, a lung weakness precluded this duty.

The General Electric Company obtained his services after his graduation, and he specialized in lighting and special radio equipment work at their plant in Schenectady, at the same time unselfishly giving his spare time for Border Air Patrol duty. Failing health caused him to give up inside work, but with the thought in mind of serving where he could for the best interests of this country, he worked on the relief ship Matthew Maury, of the Lykes Brothers line, which touched on the coasts of Europe and Africa, as radio and radar operator. Failing health and the serious illness of his father caused him to return to Waco in 1947. Although he courageously struggled, he could not regain his health, and passed away on October 12, 1950.

Roger Maurice Sanderford's devotion to his family, his country, and his faith was beautiful, and he counted many faithful friends. He was the type the Louisiana Engineering Society feels proud to have listed on their rolls, and it is fitting and proper that we spread these minutes upon our records, and send a copy to his devoted family.

ENGINEERING BRIEFS

Powerful Dreams. Today's automobile engine delivers 30 per cent more power than did its ancestor of the same size 20 years ago, and gives 40 per cent better mileage. Higher compression engines and the requisite higher octane gasolines have been primarily responsible for this improvement, and future gains are expected to be along these same lines. In addition, such engine modifications as a dual-fuel system for supplying the engine with high-octane gasoline for heavy load conditions and a lower-octane gasoline for less rigorous operation, are being considered. Interest in even more radical departures has led to at least two new types of engines not requiring high-octane gasoline which have advanced to the test stage recently.

The new Texaco Combustion Process avoids knocking by feeding the gasoline into the cylinder as it burns, to prevent its exploding all at once, thus making special anti-knock fuels unnecessary. In the conventional reciprocating engine, when the cylinderful of mixed fuel and air is ignited by the spark plug, a flame front advances rapidly through the cylinder, compressing and heating the unburned portion of the charge. If the fuel is not of sufficiently high anti-knock value, the unburned portion will ignite spontaneously in spots, causing the unpleasant sound known as "spark knock" or "ping." Severe knocking may cause loss of power and overheating of the engine. The TCP engine appears similar to the conventional engine, but the carburetor is replaced by a Diesel-type fuel injector. The fuel is injected directly into the cylinder, in which the air is made to swirl rapidly by a "shrouded" intake valve. The fuel burns as it enters the cylinder; consequently, the cylinder is never filled with a potentially explosive mixture of fuel and air. With proper design, the air "breathing ability" of the engine is comparable to that for conventional engines, except at very high speeds.

The driver controls speed by varying the rate of injection of fuel alone. With the air charge in the cylinder relatively constant, the engine has available a lean mixture for light loads and a rich mixture for heavy loads. In the conventional engine speed is controlled by throttling the mixed stream of fuel and air. Judging by experimental data, it is expected that a TCP engine comparable to a conventional engine with the same gear ratio would have at least as great power output, would save about 30 per cent on fuel under typical driving conditions, and would be able to use a wide variety of less highly refined fuels. It is difficult, however, to make

a small metering device to accommodate the great variation in speed encountered in passenger cars. A multitude of economic and design factors will probably prevent adoption of this type of engine for some time, since adoption would mean some retooling in the automotive industry, and reorientation of petroleum processing, but its development may have far-reaching effects.

GAS TURBINE

An even more radical step would be the use in automobiles of gas turbine engines similar to the aircraft turbine-prop, in which the products of combustion drive a turbine or "windmill," rather than a piston in a cylinder. A truck using a gas turbine has been operated on the Pacific Coast, as has a passenger car in England. The British Admiralty has recently ordered similar turbines for small harbor craft. The advantages of these engines include small size and weight, simplification of ignition and lubrication problems, and, of great importance, the fact that the gas turbine develops maximum torque, or pulling ability, at low speeds, achieving a virtual built-in automatic transmission, with elimination of gear-shifting and clutch. On the other hand, fuel consumption is high, although the fuel may be somewhat cheaper, and special provision must be made to prevent overheating and to connect the high-speed (50,000 r.p.m.) turbine to the low-speed wheels. The advance of the automatic transmission has heightened interest in the gas turbine for automobiles, but such turbines appear to be a development for the more distant future. Trucks and other large vehicles would be more probable users than passenger cars, since the turbine can handle much larger volumes of air than are needed for passenger cars.

Probably still farther in the future are compound engines, in which both the turbine and reciprocating principles are used. In a typical automotive engine, at 60 miles an hour about half the energy in the fuel is wasted in the exhaust, with a quarter used in the cooling system, and the remainder driving the wheels. By running the exhaust gas through a turbine, as in the aircraft supercharger, some of the exhaust energy could be recovered and used to pack more air into the engine or to supply power to the main shaft. In one recent extension of this principle, not yet considered for automotive use, the reciprocating portion of the engine merely supplies hot, compressed gas to the turbine, which supplies the driving power.—*From Industrial Bulletin of Arthur D. Little, Inc.*

* * *

Jute Mills Ills. Jute products remain one of the world's leading dollar-earning commodities, but current difficulties threaten their future. Dislocation of the jute industry upon the separation of

India and Pakistan, exchange difficulties between Pakistan and India, and the tremendous growth of the multiwall paper bag industry have reduced production from a prewar average of 10 million bales, or four billion pounds, to 8.5 million bales in 1949. Price rises, however, have more than compensated for the loss in trade volume. In 1949, United States imports of burlap fabrics and bagging materials, the leading jute products, were valued at \$103 million, compared with \$41 million in 1937, although volume had dropped by a third to 447 million pounds. Jute is still the cheapest of the major fibers and ranks second in volume of production, with a tonnage a little less than half that of cotton.

Three quarters of the world's supply of jute is raised in Pakistan, with most of the burlap mills which supply the United States located in India. The Indian government has devalued its rupee by 30 per cent and has placed a price ceiling on imported raw jute. Pakistan, which has not altered the par value of its rupee, has only recently reduced its price floor for raw jute to the level of India's price ceiling. Until a few weeks ago, there had been almost complete dislocation of jute trade between the two countries, relieved only by occasional trade agreements. To lessen dependence on an outside source, India has sought to increase its own jute plantings, although its food needs limit the acreage available for jute. Similarly, Pakistan, anxious to attain some industrial self-sufficiency, is starting to build weaving mills.

Burlap takes about 70 per cent of total U. S. jute imports, with the remainder going into twine, webbing, and other products. Before the war, about a third of the bags used in this country were of burlap, but this year the proportion has dropped to about a fifth. Use of cotton bags has also dropped off rapidly since the war, but shipping sack paper has shown a steady increase, with about 60 per cent of shipping bags now made of paper. Because conversion to use of multiwall paper sacks usually requires installation of special machinery, it is unlikely that burlap will never regain its dominant position in this market.

OTHER MARKETS OFF

Competition is not so keen in markets for other jute products, but alternative materials are gaining ground. About 120 million pounds of jute yarn are used annually by the carpet industry as a backing material. Paper twine, although weaker and stiffer than jute, is less expensive, and currently accounts for about a quarter of carpet backing materials. Jute cloth as a backing for linoleum has almost disappeared, as manufacturers have found paper and felts satisfactory.

Besides yarn for carpet backing, the United States uses 40 million pounds of jute twine, with 15 million pounds of this going into

electric rove, the fibrous packing material in electric wire and cable. This is meeting with increasing competition from paper and glass fibers, and combinations of the two. Before the war, a large quantity of jute twine was used for tying newspaper bundles by hand, but now most newspapers have shifted to steel wire which can be bound mechanically. As yet, a suitable jute tying machine has not been developed. Other miscellaneous uses of jute include webbing for upholstered furniture; scrim, a loosely woven fabric of fine yarn for reinforcing paper, and landing nets for the Armed Services. In all of these fields jute is meeting increased competition. Jute remains the only important material for the coarse, loosely woven, and inexpensive material used to cover bales of cotton. This market takes about 100 million pounds of jute annually. Another 20 million pounds is used in insulation and felting materials.—*From Industrial Bulletin of Arthur D. Little, Inc.*

* * *

Data For Design. Now machine designers have a Handbook of data on the human operators of their machines. Often the most powerful machine must wait for the operator to read dials, or it is damaged because he cannot understand warning signals. These limitations became particularly clear during World War II, and many experimental programs were launched to find out just what human capacities are and how new devices can best be designed to fit them. Now the results of these programs and others have been combined into a massive "Handbook of Human Engineering Data for Design Engineers," which is available through the Institute of Applied Experimental Psychology of Tufts College, which prepared the compendium for the Office of Naval Research.

The new Handbook gives a wealth of data on such influential factors as body size, vision, hearing, and the effects of motion, incentives, fatigue, temperature and humidity, and stimulants. Besides well defined data, the book includes general discussions of such subjects as vision, hearing, and intelligence, as well as extensive bibliographies and some solutions to past design problems.

Although many of the problems arose from military needs, much of the information can be applied to industrial situations. Indeed, this "human engineering" approach is an extension of the long-established industrial engineering studies of time and motion sequences in machine operations. For example, measurements of Air Force personnel, used to determine the most comfortable and efficient placement of foot pedals, might well be valuable to automobile manufacturers, or to those installing foot-operated machinery. Many measurements showed that an angle of 110° at the knee, with the pedal seven inches below the seat level, is the most comfortable.

It was also found that red light allows the eye to adapt to the dark much more quickly than white or other colors. Navy personnel wearing red goggles for dark adaptation avoided having to stay in a darkened room before going on watch. It takes about 30 minutes for the light-adapted eye to increase in sensitivity 15,000 times to become fully dark-adapted, but only two minutes when red goggles are worn for 45 minutes beforehand. When red lights were used to illuminate indicators and charts, no impairment of night vision occurred. Similarly, red light for automobile instrument panels would make less demand on the driver as he shifted his gaze from the instruments to the road ahead than the common green lighting.

ILLUMINATION PROBLEMS

Although a tremendous store of knowledge has been accumulated by illumination engineers over a number of years, the Handbook points out that the proper intensity of illumination is only one aspect of the problem. Also important are such factors as the colors in the light, the degree of diffusion, colors of objects in the surroundings, glare and shadows, contrast, and the ratio of brightness of the work area to its surroundings.

Other vision tests revealed that the driver of a car can perceive unexpected objects only about half as far away as expected ones. Although the perception distance increases rapidly for the first few thousand candlepower in the headlights, it increases more slowly thereafter; the driver of a car traveling at 50 miles an hour with 20,000 candlepower headlights sees ahead about 75 feet less than the distance required for stopping.

Another series of tests showed that glare significantly increases muscular tension, sometimes as much as 30 per cent. Although visual tasks may be carried on under severe handicaps with no immediate loss in accuracy, over a long period of time a decrease in efficiency accompanies nervous muscular tension. The energy required to type under the noise conditions usually encountered in a busy office has been measured by basal metabolism tests. When plaster walls were left bare to reflect noise, the typists showed a metabolic rate 71 per cent above the resting level; when the walls were covered with a sound-deadening material to absorb about half the noise, the metabolic rate was only 52 per cent above the resting level, and there was a 43 per cent increase in typing speed. In an experiment in a weaving room, the workers' speed increased about 12 per cent when they were wearing ear protectors. There is some evidence that even after years of work in noisy surroundings, workers do not become completely adapted to the noise, but have to adjust themselves daily.

Much of the data in the Handbook concerns the effect of physical variations in the environment on work performance. Many industrial situations involve environmental problems of head, humidity, or noxious gases. It was found, for instance, that, within the temperature limits which bring on stupor, lowered performance was due more to boredom or lack of incentive than to the physical conditions. Fatigue or broken sleep reduces performance in some tests, but has surprisingly little effect in others. Also covered in the Handbook are a variety of subjects not usually connected directly with production, such as readability of type (Garamond can be read most quickly, but readers like Cheltenham best), and the physiological effects of tobacco, alcohol, caffeine, and Benzedrine.—*From Industrial Bulletin of Arthur D. Little, Inc.*

* * *

New Finish Gives Aluminum Good Wear Resistance. A new scratch and wear resistant hard coating for aluminum which makes this light metal usable in many applications formerly restricted to steel alloys, has been developed by Glenn L. Martin Co., Baltimore, Md.

Standard tests have shown the new coating, known as "MHC" finish, to possess remarkable characteristics. After a 50,000 cycle test, MHC samples showed only half as much wear as did cyanide casehardened steel.

It has also been shown that a saving in weight can be effected through the use of aluminum with the new Martin finish, which has proved valuable in aircraft construction.

MHC coatings have been applied successfully to such widely dissimilar items as gears, pinions, surveying instrument parts, turbine impeller blades, band tools, swivel joints, friction locks, leading edges of high-speed airfoils, cams, pistons, etc.

The new coating is said to have excellent resistance to atmospheric and salt water corrosion, and to be superior to conventional anodized surfaces.

MHC finish ranges in color from light to dark gray. Coatings range from 0.0001 to 0.006 in. in thickness.

Technical details are given in the article "New Finish Gives Aluminum Good Wear Resistance," which appears in the August 24, 1950 issue of *Iron Age*, pages 73-75. *Aminco Laboratory News*.

* * *

Fibers Made From Zein. Fibers for fabrics from zein, an extract from corn, that have greater strength than those of wool, are obtained by a process which brought patent 2,521,704 to Cyril D. Evans, Chester W. Ofelt, and Allan K. Smith, Peoria, Ill., assignors to the United States government.

Zein is a protein extracted from the crude gluten residue obtained as a by-product in the wet milling of corn for the production of corn starch.

In the new process, the zein is treated in an alkali metal hydroxide, and then spun in an acid medium coating a strong mineral acid and an organic acid. The use of expensive organic solvent is eliminated and the elaborate solvent-recovery system used in dry spinning of the fibers is not required.—*Aminco Laboratory News*.

* * *

Metals Now Welded by Cold Pressure.—Welding many non-ferrous metals without the use of hot flames or electric arcs is possible with a cold-pressure process on which U.S. patent 2,522,408 was issued to Anthony B. Sowter, Wembley, England, assignor to General Electric Co., Ltd., London, England.

The metals to be welded are brought into contact with each other; then, by the application of pressure, the metals are caused to flow away from the welding point and into interleaved relation with the grains of the metals being welded.

Before welding, oxide films and other impurities on the metals are removed. In aluminum welding, a pressure of from 12 to 18 tons per square inch is used. With copper, two to four times this pressure is required. The process is carried on at room temperatures.—*Aminco Laboratory News*.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Joint Meeting of the Louisiana Engineering Society and Delta Section, American Institute of Mining & Metallurgical Engineers

November 13, 1950

The meeting was called to order by President Cucullu, with approximately 220 members and guests present. The President welcomed the A.I.M.E. its members and guests. Mr. Knost moved that reading of minutes be dispensed with, seconded by Mr. Nelson and carried.

The President announced the membership of the Nominating Committee and urged members to send their suggestions to the committee within ten days.

The President also reported that Governor Long had named the new Board of Registration for Professional Engineers and Land Surveyors as follows: Donald Derickson, A. D. Jackson, Ben T. Bogard, John J. Mundinger, Leo M. Odom, Charles Taylor, Jesse Coates.

The secretary read a letter from Mr. Mario Bermudez, Director of International Relations, inviting the membership of the Society to attend the Colombian Exhibit at the International Trade Mart. The president announced an invitation from the American Society of Refrigeration Engineers to attend their meeting, following which the chair was relinquished to Mr. Fred E. Simmons, Jr., Chairman, Delta Section, AIME, who called on one of his members to introduce the speaker of the evening, Mr. Neil J. Smith, Geophysicist, The California Company, who gave an illustrated lecture on "Accuracy Problems and Geophysical Prospecting."

Following the lecture the chair was returned to President Cucullu, who thanked Mr. Smith for his excellent paper and the A.I.M.E. for providing same, and adjourned the meeting with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction Held on Monday, Nov. 13, 1950

The meeting was called to order by President Cucullu with the following members present: Messrs. Abrahm, Hill, Knost, Lehmann, Newton and Fernandez. Minutes of the preceding meeting were accepted as read. Mr. Lehmann moved that the treasurer's third quarterly report be accepted as presented, seconded by General Newton and carried.

President Cucullu announced that the committee to study revision of the qualifications for membership had been appointed, with Mr. K. P. Kammer as Chairman.

Mr. Abrahm reported on the status of the Engineers Club, giving a gist of the meeting held by the Louisiana Council of Engineers on October 26.

President Cucullu reported that the designs for the Society's two award medals had been completed and Miss Gregory had assured him they would be ready for presentation at the 1951 Annual Meeting.

An invitation to the Society to attend the Columbian Exhibit at International Trade Mart was read. Mr. Lehmann moved that the secretary thank Mr. Bermudez, Director of International Relations, for the invitation, seconded by General Newton and carried.

A letter from Mr. Lamon L. Moody, President, L.E.S. Student Chapter No. 1 at Southwestern Louisiana Institute, was read. Mr. Lehmann moved that Mr. Moody be advised that the views of the board were the same as those expressed in a poll of board members taken last spring. The motion was seconded by Mr. Abrahm and carried.

Two petitions requesting that Messrs. C. Glenn Cappel and James M. Todd be made honorary members of the Society were presented. Mr. Knost moved that the petitions be referred to the Honorary Membership Committee, seconded by Mr. Hill and carried.

In view of the fact that Mr. John W. Hale (address unknown) and Mr. Elihu H. Nutt had not accepted their elections to membership, Mr. Lehmann moved that said elections be considered void in accordance with the constitution. The motion was seconded by Mr. Abraham and carried.

Messrs. Hill, Abraham and Cucullu were appointed a committee to write an obituary for the late Frank H. Clark. Mr. W. T. Hess was appointed chairman of a committee of his own choice to prepare an obituary for the late Charles F. Rantz. The secretary was instructed to try to secure some biographical data on the late R. M. Sanderford so that his obituary may be prepared.

A letter from Dean Johnson of Tulane University, recommending that David Elmer Anderson be the recipient of the Society's scholarship award. Mr. Lehmann moved that the recommendation be accepted and the treasurer be authorized to pay the bill. The motion was seconded by Mr. Knost and carried.

Mr. Abraham moved that applications for registration under the new Engineering Registration Act be mailed to all L.E.S. members, provided the Louisiana State Board of Registration for Professional Engineers and Land Surveyors is willing to supply them. The motion was seconded by General Newton and carried.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Regular Meeting of the Society Held on December 11, 1950

The meeting was called to order by President Cucullu in the Jackson Room of the St. Charles Hotel, with approximately 130 members and guests present. The president welcomed the gathering, and General Newton moved that the reading of minutes of the preceding meeting be dispensed with. The motion was seconded by Mr. Nelson and carried.

It was announced that cards for securing applications for registration would be mailed to the membership at large.

In accordance with Presidents' Night, General Newton then requested each former president of the Society to rise and take a bow. Mr. Henri J. Malochee, oldest living president, then gave a brief talk on the activities of his administration in the year 1900. President Cucullu then expressed the Society's appreciation for the work of those who have served as its leaders in the past.

Mr. H. L. Lehmann, Chairman of the Nominating Committee, presented the following recommendations for nominations:

For President	Harry P. Newton
For 1st Vice-President	John A. McNiven
For 2nd Vice-President	Michael C. Abraham
For Secretary-Treasurer	John P. Fernandez
For Director for two years	Roy T. Sessums
For Director for two years	Henri J. Molaison

Mr. Lehmann then moved that the recommendations be accepted and the names placed on the ballot. Mr. D. W. Godat seconded the nominations, following which the president called for nominations from the floor. None were offered, and the nominations were closed.

Mr. James S. Janssen, General Chairman of the Annual Meeting, gave an outline of the Society's fifty-third annual meeting to be held in January, 1951.

President Cucullu gave a report of the activities of the Engineers' Joint Council.



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Dr. F. M. Taylor then introduced the principal speaker of the evening, Dr. Lee H. Johnson, Dean of the College of Engineering of Tulane University, who gave a most interesting talk on "Engineers In Industry In Years to Come." An extremely lively and lengthy discussion followed the lecture, and the meeting adjourned with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction held on Monday, Dec. 11, 1950

The meeting was called to order by President Cucullu, with Messrs. Abrahm, Freeman, Hill, Knost, Lehmann, McNiven, Newton, Seago and Fernandez present. Mr. Knost moved that the minutes of the preceding meeting be accepted as read, seconded by General Newton and carried.

Mr. Lehmann, Chairman of the Nominating Committee, presented the following report of his committee's recommendations:

For President	Harry P. Newton
For 1st Vice-President	John A. McNiven
For 2nd Vice-President	Michael C. Abrahm
For Secretary-Treasurer	John P. Fernandez
For Director for two years	Roy T. Sessums
For Director for two years	Henri J. Molaison

The report was signed by the other members of the Nominating Committee, Messrs. K. P. Kammer and B. H. Grehan. Mr. Lehmann moved that the report be presented to the membership at the Society's regular meeting, seconded by Mr. Seago and carried.

President Cucullu reported that the Honorary Membership Committee had recommended unanimously that Messrs. C. Glenn Cappel and James M. Todd be elevated to honorary membership in the Society. The president stated that he had written to out-of-town board members and had received no objections to the recommendation from those not present. General Newton then moved that Messrs. Cappel and Todd be named honorary members, seconded by Mr. Lehmann and carried unanimously.

President Cucullu reported on the progress made by the committee appointed to study revision of the qualifications for full membership grade in the Society.

A letter from Mr. Lamon Moody, President of S.L.I. Student Chapter No. 1 was read.

Mr. Seago read a letter received from the Engineering Societies' Personal Service. Mr. Lehmann moved that the E.S.P.S. be informed that there is no need in this area for an employment agency at this time. The motion was seconded by Mr. Freeman and carried.

Mr. Lehmann moved that the Friday dinner honoring board members, contact representatives and local section presidents, vice-presidents and secretaries be made an annual affair. The motion was seconded by Mr. Knost and carried.

President Cucullu gave a resume of the activities of the Engineers' Joint Council.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction Held on Monday, January 8, 1951

The meeting was called to order by President Cucullu, with Messrs. Abrahm, Freeman, Knost, Lehmann, McNiven, Newton, Seago and Fernandez present. Mr. Lehmann moved that the minutes of the preceding meeting be accepted as read, seconded by Mr. Abrahm and carried.

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The secretary reported that 361 ballots had been cast in the December election and that all applicants named in the ballot had been elected.

The secretary-treasurer's annual report was presented, copy of which is attached to these minutes, and will be read at the Society's annual meeting. There was some discussion as to the manner of carrying the capital accounts. Mr. Lehmann moved that the method used in the past be continued, and that the report be accepted. The motion was seconded by Mr. Seago and carried.

Correspondence received from Mrs. Helen Clark Hughes and Mr. Lamon L. Moody was read.

Mr. Freeman moved that the resignations of the following members be accepted with regret; seconded by General Newton and carried: H. L. Henry, Jr., Leo W. Hough, William D. Maitland, Harluf C. Peterson, Albert F. Poor, Surey R. Slovenko, and Wesley H. Sowers.

The secretary presented biographical data on the late R. M. Sanderford, and Mr. Abraham volunteered to prepare an obituary for publication in the Proceedings.

A lapel button bearing the Society's emblem was shown, and discussion took place concerning the advisability of presenting such a pin or key to all former presidents. Mr. Freeman moved that the matter receive no further consideration, seconded by Mr. Lehmann and carried.

The proposed constitution for the Alexandria Section was reviewed, following which Mr. Abraham moved that same be accepted provided the recommendations in general suggested by the Board are accepted. (See copy of President Cucullu's letter to District Contact Representative Butler attached hereto.)

Mr. Abraham moved that the Board approve in principle the idea of making an album containing photographs and biographies of each past president, together with a history of the society. The motion was seconded by General Newton and carried.

Mr. Knost moved that Mr. John E. Walker be dropped from the roll for non-payment of dues; General Newton moved that Mr. Marcel Garsaud be reinstated to membership; both motions were seconded by Mr. Freeman and carried.

Mr. Freeman moved that the secretary be authorized to procure a suitable protective cover for the new table in the Society's headquarters. Motion was seconded and carried, and the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Annual Meeting of the Society Held on Thursday, January 18, 1951

The meeting was called to order by President Cucullu, with approximately 160 members and guests present. The Reverend Florence Sullivan, S. J., Pastor of the Church of the Immaculate Conception, gave the invocation. President Cucullu then welcomed those present, following which a motion to dispense with reading of minutes was carried.

President Cucullu introduced the presidents or chairmen of local chapters of societies participating in the annual meeting, and also the presidents of state sections of L.E.S. who were present in the audience.

Mr. Hal S. Dumas, President, Southern Bell Telephone and Telegraph Company, delivered the keynote address, entitled "Report of Progress in Communications."

The Secretary-treasurer then presented his annual report on finances and membership, a copy of which is attached to these minutes.

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The president gave his annual report and presented certificates of merit to the following speakers at the Student Conference:

P. A. Inbau, L.S.U., "Television Camera Tubes and Their Development."

F. S. Magaro, Tulane, "Electroplating."

C. E. Wood, S.L.I., "Oil Well Logging."

T. D. Delk, L.P.I., "The Electric Resistance Strain Gauge."

Certificates of Life Membership in the Society were presented by the president to the following who have been active members for the past thirty years: D. B. H. Chaffe, Joseph B. Converse, Charles C. Crawford, Allen S. Hackett, George R. Hammett, Lyman C. Reed, and Durald F. Woods.

Mr. David W. Godat then made an address of presentation of honorary membership to Mr. C. Glenn Cappel. This is the highest honorary award that can be given by the Society. It was announced that a similar award would be made to Mr. James M. Todd at the Society's annual banquet on January 20th.

Mr. John A. McNiven then introduced special resolutions, attached to these minutes, and moved that same be accepted, seconded by General Newton and carried.

Mr. H. L. Lehmann, Chairman of the Nominating Committee, then gave the Teller's Report and requested the following gentlemen to escort the respective newly elected officers to the rostrum:

Mr. Charles M. Kerr, escorting Mr. Charles P. Knost, incumbent board member.

Mr. David W. Stewart, escorting Mr. R. Mallard Seago, incumbent board member.

Prof. Charles S. Williamson, escorting Mr. Henri J. Molaison, newly elected board member.

(It was announced that Dean Roy T. Sessums of Louisiana Polytechnic Institute (Not Present) also was elected a member of the board.)

Mr. Clayton L. Nairne, escorting Mr. John P. Fernandez, Secretary-Treasurer.

Mr. Karl P. Kammer, escorting Mr. Michael C. Abrahm, Second-Vice-President.

Mr. F. N. Billingsley, escorting Mr. John A. McNiven, First-Vice-President.

Prof. R. A. Steinmayer, escorting General Harry P. Newton, President.

Retiring President Cucullu then handed the gavel to President-elect Newton, who accepted the office.

Mr. James S. Janssen, General Chairman of the Annual Meeting, made announcement of the highlights of the program, following which the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

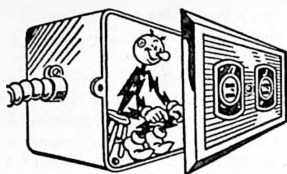
RESOLUTIONS

January 22, 1951

WHEREAS the Board of Commissioners of the Port of New Orleans, through their Chief Engineer, Mr. John A. McNiven, is so generous in furnishing the yacht "Good Neighbor" for the members and guests of the society, affording them an opportunity to see the facilities of the Port of New Orleans, and

WHEREAS the name of the yacht "Good Neighbor" carries out the motto as well as the sentiment prevalent in everyone's mind,

BE IT RESOLVED that the Louisiana Engineering Society extend to the Board of Commissioners of the Port of New Orleans its sincere thanks and appreciation for these courtesies, and



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BE IT FURTHER RESOLVED that this resolution be incorporated in the minutes of the Society and that a copy be sent to the Board of Commissioners of the Port of New Orleans.

LOUISIANA ENGINEERING SOCIETY

J. A. McNIVEN, 1st Vice-President

January 22, 1951

WHEREAS, the American Radiator and Standard Sanitary Corporation, in the spirit of cooperation, has kindly offered their plant for inspection during this annual meeting, and

WHEREAS this inspection trip will give the members and guests a better insight into the workings of the aforesaid plant,

BE IT RESOLVED that the Louisiana Engineering Society extend to the American Radiator and Standard Sanitary Corporation its sincere thanks and appreciation for this courtesy and privilege, and

BE IT FURTHER RESOLVED that this resolution be incorporated in the minutes of the Society and that a copy be sent to the American Radiator and Standard Sanitary Corporation.

LOUISIANA ENGINEERING SOCIETY

J. A. McNIVEN, 1st Vice-President

January 22, 1951

WHEREAS, the St. Charles Hotel, through its Manager, Captain J. J. O'Leary, and his associates have so graciously placed at the disposal of this Society, its services and facilities for this meeting and throughout the year, as in previous years, and

WHEREAS these services and courtesies have provided a meeting place for the annual meeting, monthly meetings, and the headquarters of the Society throughout the years; therefore,

BE IT RESOLVED that the Louisiana Engineering Society extend to our hosts our thanks and sincerest appreciation for services beyond their duty, and

BE IT FURTHER RESOLVED that a copy of this resolution be incorporated in the minutes of the Society and that a copy be sent to Captain O'Leary.

LOUISIANA ENGINEERING SOCIETY

J. A. McNIVEN, 1st Vice-President

Minutes of Meeting of the Board of Direction, State Section Officers and District Contact Representatives, held on January 19, 1951

The meeting was called to order by President Newton in a private dining room at Arnaud's Restaurant. Those present were Messrs. Abrahm, Burgess, Butler, Cucullu, Janssen, Jarman, Knost, Landry, Larkin, Mason, McCullough, McNiven, Mitchell, Molaison, Newton, Seago and Fernandez.

Following dinner, President Newton requested that each one present stand and introduce himself. It was announced that the constitution and by-laws of the proposed Alexandria Section had been revised in accordance with the suggestions made by the Board at its meeting January 8. Mr. Cucullu moved that the petition submitted by the Alexandria members to form a local section be accepted and a charter granted. The motion was seconded by Mr. Mitchell and carried.

President Newton announced that the object of the meeting was to obtain closer working relationships between the local sections and the parent organization, and with this in mind he requested the leaders of the various sections to present any problems confronting their particular groups.

Mr. Burgess of Lake Charles inquired to what extent the Society should participate in civic affairs. Discussion followed, in which it was brought out that the sections should be encouraged to enter into civic affairs and make

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Briggs Filtration Co.	E. J. Lavino & Co.
Bristol Co.	Lyon-Raymond Corp.
Buda Company	Mercoid Corp.
Carboloy Company, Inc.	Merrill Brothers
Clark Manufacturing Co.	Moeller Instrument Co.
Climax Engineering Co.	Moisture Register Co.
Cooper Alloy Foundry Co.	Moorehead Manufacturing Co.
Corning Glass Works	New York Belting & Packing Co.
Crane Co.	Nordstrom Valve Co.
Crescent Truck Company	Okonite Company
Crosby Steam Gauge & Valve Company	Ottumwa Iron Works
The Dayton Rubber Co.	Robbins & Myers, Inc.
DeVilbiss Company	Rockwell Manufacturing Co.
Durant Manufacturing Co.	Taylor-Wharton Iron & Steel Company
Eagle Iron Works	Trane Company
Ford Meter Box Co.	Tube Turns, Inc.
Foster Engineering Co.	Union Gear & Sprocket Co.
General Controls Co.	Weston Electrical Instrument Co.
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general engineering recommendations, but not to the extent that would interfere or compete with the practice of consulting engineers.

Mr. McCullough of Shreveport asked how many meetings and what type of meeting should be held by local sections. The recommendation was that new sections should have few meetings, possibly at quarterly intervals during the year, and that, as membership, interest and financial soundness increased, more frequent meetings could be held. It was also pointed out that regular fixed dates for meetings was almost a necessity, and that it was desirable to have one meeting place for all gatherings.

It was suggested that a liaison man from each section be appointed to the Technical Papers committee of the parent organization, whose duty would be to notify all other sections and the parent organization as soon as a speaker, title and date is obtained. In this manner it may be possible for one speaker to address several sections while he is in the state. The secretary stated that, if such information could be provided promptly enough, and with sufficient cooperation from all sections, a page in the Proceedings could be devoted to "Coming Events in the State Section."

It was also suggested that adjacent sections could hold joint meetings, just as the parent organization and the Baton Rouge Section hold a joint meeting each year. Monroe and Shreveport might combine their meetings once a year, alternating the meeting place from one section to the other. Lake Charles and Lafayette might do likewise. In addition, joint meetings with local chapters of ASCE, ASME, or other engineering societies might also be held.

Upon discussion of the types of meetings that should be held, it was concluded that each section should determine for itself what is most suitable to its own membership.

President Newton announced that a few routine motions were required at this time, due to the change in administration, in order that the society's business might run smoothly without interruption:

Mr. Knost moved that the Board recommend to the President for appointment to the Finance Committee, Messrs. John A. McNiven, Chairman, Lionel J. Cucullu and John P. Fernandez. Motion seconded by Mr. Abraham and carried.

Mr. Abraham moved that Professor R. A. Steinmayer be appointed Chairman of the Professional, Civic and Industrial Affairs Committee, seconded by Mr. McNiven and carried.

Mr. Knost moved that the President and Secretary-Treasurer be authorized to sign checks of the Society, and that the bank be so notified. Seconded by Mr. Molaison and carried.

Mr. Cucullu moved that the President or the Secretary-Treasurer have access to the safety deposit box, seconded by Mr. Abraham and carried.

Upon the unanimous recommendation of the Board, President Newton named the following District Contact Representatives for 1951:

Mr. Hiram R. Mason, 3rd Congressional District
Mr. Ernest M. Freeman, 4th Congressional District
Mr. Calvin T. Watts, 5th Congressional District
H. L. Lehmann, 6th Congressional District
G. B. S. Ricketts, 7th Congressional District.

The Board also recommended that the selection of personnel for the Legislative Committee receive careful consideration, as members of the committee must have the time and interest required to pursue all bills submitted to the legislature.

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It was also suggested that the committee on Qualifications of Members be informed of the activities of the Special Committee on Changes in the Constitution and the reasons therefor.

Mr. James S. Janssen received a rising vote of thanks for his splendid work in organizing the 1951 Annual Meeting. Mr. Lionel J. Cucullu thanked the Board for its excellent cooperation during his administration, and the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of Baton Rouge Section of the L.E.S. and Baton Rouge Sub-Section of A.I.E.E.

September 28, 1950 at L.S.U. Geology Auditorium, 7:30 p. m.

The meeting was called to order at 7:45 p. m. by Mr. Mary, President of the Baton Rouge Section L. E. S.

The reading of the minutes of the past meeting was dispensed with and there being no old business needing action the meeting was turned over to Mr. Adams, President of the Baton Rouge Sub-Section of the AIEE, who in turn held a short business session.

Mr. Adams then introduced the main speaker of the evening, Mr. Fred G. Hollins, Plant Extension Engineer for the Southern Bell Telephone Company and Chairman of New Orleans Section of AIEE. His subject was "The Engineering Approach to Telephone Transmission Problems." The talk was non-technical and outlined some of the problems facing the telephone engineer in designing telephone plants so that you may hear and be heard over various types of facilities. His talk was of much interest to the group which was evident by the number of interesting questions asked after the talk, and also the interesting answers.

The meeting adjourned at 9:30.

Approximately 78 members and guests attended the meeting.

H. L. LANDRY, Secretary-Treasurer
Baton Rouge Section of L. E. S.

Minutes of the Meeting of Baton Rouge Section of the L.E.S.

November 25, 1950, at the Baton Rouge High School.

The meeting was called to order at 7:00 o'clock by Vice-President, Louis Duclos, in the absence of Mr. Mary. Approximately 42 officers, members, and guests attended the meeting. The reading of the minutes of the past meeting was dispensed with, and there being no old business requiring action Mr. Duclos introduced the speaker, Mr. Leo Odom, who told the assembly of the progress of the Licensing Board, which was of much interest to the group. A number of questions were asked of Mr. Odom and there was much interest.

Mr. Duclos announced the appointment of the nominating committee for officers for the year 1951. This committee composed of Mr. W. P. Wallace, Chairman, Mr. T. Ellis Peak, and Mr. J. T. O'Brien. Any nominations to be referred to them before the next meeting tentatively set for December 14, 1950.

The meeting adjourned at 7:30 to the Production Power Show presented by Westinghouse Electric Company and sponsored at its Baton Rouge showing by the Gulf States Utilities Company. This program was attended by approximately 175 persons.

H. L. LANDRY, Secretary-Treasurer
Baton Rouge Section of L. E. S.

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Minutes of the Meeting of Baton Rouge Section of the L.E.S.

Held December 14, 1950 at 7:30 p. m., in Pallud's Restaurant. Officers present were President A. J. Mary; 1st Vice-President F. A. Hannaman, Jr.; 2nd Vice-President Louis Duclos and Past-President W. P. Wallace.

President Mary opened the meeting and introduced the guests. He then called for a report of the officers and committee chairmen which were reported.

In my absence Mr. Mary read the treasurer's report as follows:

Started year with a cash balance of \$75.00. Ended year with a cash balance of \$187.71.

Mr. F. G. Hornsby, Chairman of the Advertising and Publicity committee made a brief report of advertising and publicity for 1950 and suggested that more publicity be the goal of this committee for the year 1951.

Mr. Ellis, Chairman of the Entertainment and Arrangement committee made a brief report and thanked the members for their help in serving the refreshments.

Mr. T. J. Innes, chairman of the Membership Committee, gave a report of the activities of the membership committee.

Started year with a total of	200 members
Members added in year 16, lost 6, net gain	10 members
Junior Members added in year 18, lost 3, net gain	15 members
Aff. Members added in year 1, lost 0, net gain	1 member
Student Member, lost 1	- 1 member
Total at end of 1950	225 members

Mr. W. P. Wallace, Chairman of the committee for the nomination of officers for the year 1951. Reported their recommendation as follows:

For President	F. A. Hannaman, Jr.
For 1st Vice-President	Louis Duclos
For 2nd Vice-President	H. L. Landry
For Secretary-Treasurer	T. J. Innes

These officer candidates were duly nominated and seconded and there being no other nominations from the floor were elected unanimously.

There being no further business the meeting was declared adjourned by Mr. Mary.

Following the meeting those remaining enjoyed the showing of the LSU-Texas football game of 1950.

H. L. LANDRY, Secretary-Treasurer
Baton Rouge Section of L. E. S.

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RECAPITULATION OF 1950 MEMBERSHIP CHANGES

HONORARY MEMBER Deceased 1

MEMBERS:

Gains:

Elected	98	
Reinstated	6	
Transferred from Junior Membership	11	115

Losses:

Dropped for Delinquent Dues	14	
Resignations	6	
Deceased	4	24
Net Gain		91

AFFILIATE MEMBERS:

Gains:

Elected	26	
---------------	----	--

Losses:

Dropped for Delinquent Dues	1	
Net Gain		25

JUNIOR MEMBERS:

Gains:

Elected	79	
Transferred from Student Membership	42	
Reinstated	1	122

Losses:

Transferred to Full Member	11	
Dropped for Delinquent Dues	6	
Deceased	1	
Resignations	1	19
Net Gain		103

STUDENT MEMBERS:

Gains:

Elected	45	45
---------------	----	----

Losses:

Transferred to Junior Membership	42	
Resignation, Did not accept transfer	19	
Did not renew membership	8	69
Net Loss		24

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SAVANNAH
Savannah, Ga.

O. HENRY
Greensboro, N. C.

MEMBERSHIP REPORT FOR 1950

GAINS

Members Elected:

Members	98	
Affiliate Members	26	
Junior Members	79	
Student Members	45	
Total Elected		248

Members Reinstated:

Members	6	
Junior Members	1	
Total Reinstated		7
Total Gains		255

LOSSES

Resignations	26	
Dropped for Delinquent Dues	21	
Deceased	6	
Students that did not renew membership	8	
Total Losses		61
Net Gain		194
Membership beginning of Year		1200
Total Membership as of December 31, 1950		1394

SUMMARY

	1949	1950
Charter Members	1	1
Honorary Members	5	4
Life Members	56	56
Members	774	865
Affiliate Members	32	57
Junior Members	234	337
Student Members	98	74
Total	1200	1394

LOUISIANA ENGINEERING SOCIETY

1950 DUES

Collections and Rebates

Collections:

Baton Rouge	\$1,083.75	
Lake Charles	444.75	
Shreveport	462.00	
Monroe	337.75	
Lafayette*	65.25*	
Others Including New Orleans	5,013.75	\$7,447.25

Rebates:

Baton Rouge	\$ 519.00	
Lake Charles	200.75	
Shreveport	212.50	
Monroe	377.75	
Lafayette	77.50	\$1,178.25

NET INCOME FROM DUES

\$6,269.00

* Collection for Lafayette Section 4 months only.

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FINANCIAL REPORT OF THE SECRETARY-TREASURER FOR 1950

INCOME:

Advertising	\$ 691.84	
Certificates, sale of	27.66	
Dividends and Interest	209.12	
Dues \$7,447.25 — \$1,178.25	6,269.00	
Total		\$ 7,197.62

EXPENDITURES:

Annual Meeting Deficit	\$ 234.57	
Annual Outing Deficit	94.18	
Floral Offerings	21.13	
Monthly Meeting, cost of	307.19	
Library Service	48.00	
Miscellaneous		
Auditor's Fee	\$100.00	
Scholarship	75.00	
Printing Registration Act	148.50	
Others	78.99	402.49
Proceedings, cost of publishing	2,246.96	
Salaries	2,100.00	
Stationery, Printing and Postage	1,162.34	
Taxes	70.50	
Total		\$ 6,637.36

CAPITAL ACCOUNT:

Operating Increase for 1950	\$ 510.26
Net Expenditures (includes purchases of Type- writer, projector, Furniture for Headquarters and partial cost of Civic Award Medal)	\$ 853.14
Decrease in Liquid Assets	\$ 342.88

STATEMENT OF ASSETS December 31, 1950

Cash, Whitney National Bank Checking Account	\$ 3,995.21
U. S. Savings Bonds, Series F:	
1942	\$ 874.00
1943	\$ 861.00
1945	\$ 809.00
1946	\$ 786.00
1950	\$1,480.00
Homestead Investments:	
Columbia Homestead Association	\$ 368.21
Commonwealth Bldg. & Loan Association	306.15
Greater N. O. Homestead Association	1,702.22
Security Bldg. & Loan Association	500.00
Sixth District Bldg. & Loan Association	500.00
Union Savings & Loan Association	500.00
Total Liquid Assets Dec. 31, 1950	12,681.79
Total Liquid Assets Jan. 1, 1950	13,024.67
Decrease in Liquid Assets during Year 1950	\$ 342.88

PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

FEBRUARY, 1951

"PATRONIZE OUR ADVERTISERS"

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This Journal reaches the officials with whom rests the responsibility for the bulk of the municipal, state and industrial works in Louisiana and the surrounding territory. Its advertising pages afford you an effective and dignified means of cultivating a wider acquaintance among prospective buyers.

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Revision of the Constitution of the Society. At present, a committee is working on proposed revisions for our constitution and by-laws. Some features of the membership requirements will be revised and clarified. Certain provisions and features of the licensing law will provide some background for the proposed changes. Chairman Karl Kammer, of New Orleans Public Service, Inc., will be glad to have suggestions or comments from any interested members of the society.

New Members. The following were elected in March to membership in the society. It is hoped that they will take an active interest in the organization.

For Member

JOSEPH J. BARNWELL, Ruston; age 41. Endorsed: B. T. Bogard, H. D. R. O. O. H. Peebles, Jr., Georgia Inst. of Technology, BSCE, 1933. University of Tennessee, 12 hrs. credit to MSME, 1949. Barnwell-Shreveport, partner, 1935-41. La. Polytechnic Institute, 1941-51, now Associate Professor, M. E. Dept. Private consulting, 1941-date. Member ASEE.

THORNTON L. CAPPEL, JR., Baton Rouge; age 27. Endorsed: C. G. Cappel, F. A. Hannaman, Jr., J. P. Fernandez. Tulane University, B.E. in E.E., 1944. U.S. Naval Reserve, Electronics Specialist, 1944-46 Esso Standard Oil Co., Electrical Engineer, 1946-date. Member Tau Beta Pi.

- DANIEL V. CRESAP, Alexandria; age 39. Endorsed: Soule Butler, T. C. David, Leo Odom. Tulane University, B.E. in C.E., 1933. Gulf Research & Development Co., Engineer, 1934-41. Delta Shipbuilding Co., Foreman and Supt., 1941-45. La. Dept. Public Works, Area Engineer, 1945-date. Licensed C.E., La.
- LOUIS A. deLATOUR, Kenner; age 28. Endorsed: D. D. Fullmer, J. S. Gentilich, J. M. Scheyd. La. State University, BSME, 1948. N. O. District, Corps of Engineers, U.S. Army, Construction, Engineering and Operations Divisions, 1948-date.
- DOUGLAS A. DONALD, Baton Rouge; age 28. Endorsed: T. J. Innes, F. A. Hannaman, Jr., C. S. Pugsley. Georgia Institute of Technology, B.S.C.E., 1943; M.S. Industrial Management, 1948. Esso Standard Oil Co., Coordinating Engineer, 1948-date. U.S. Public Health Service, Sanitary Engineer, 1946-48.
- THEO G. EDWARDS, JR., Alexandria; age 38. Endorsed: Soule Butler, Eugene Levy, T. C. David. La. State University, BSEE, United Gas Corp., 1937-41. U.S. Engineer Corps, 1941-43. U.S. Maritime Commission, 1943-45. City of Alexandria, Engineer, 1945-date.
- HARDY BOOTH FOWLER, New Orleans; age 30. Endorsed: C. G. Cappel, R. E. Gosa, J. K. Woolf. Rice Institute, Chemical Eng., 1938-40. U.S. Naval Academy, BSME, 1943. New York University, Business Admin., 1947-48. U. S. Navy, Engineering Officer, 1944-46. Alcoa Steamship Co., Engineering Dept., 1947-48. Aluminum Co. of America, Head Mech. Dept. Port Lavaca, Tex., 1949. W. Horace Williams Co., Supt. of Construction, Member of Firm, 1950-date.
- BENJAMIN F. HATFIELD, New Orleans; age 45. Endorsed: F. R. Adms, F. H. Fox, T. J. Hogue. University of Tennessee, 1926-30, BSEE and BSME. Southern Bell Tel. & Tel. Co., Engineer, 1930-41. U.S. Army Signal Corps, Captain to Colonel, 1941-46. Southern Bell, Responsible charge all engineering in La., 1946-date. Licensed Prof. Engr., Ga. Member AIEE, Ga. Engineering Society.
- WILLIAM H. HENKEL, SR., New Orleans; age 57. Endorsed: J. M. Todd, W. T. Hogg, W. K. Becnel. Bliss Electrical School, E.E., 1913. International Correspondence School, E.E., 1915. LaSalle Extension University, Sales, 1928. Tulane University, Safety, 1942. Central Lt. & Power Co., Supt. of Distr., 1921-27. Private practice, E.E. & Contract Dealer, 1927-33. Works Progress Admin., various engineering positions, 1933-38. National Youth Admin., District Engr., 1938-42. U.S. Naval Air Station, M & E Inspector, 1942-43. Delta Shipbuilding Co., E.E., 1943-46. Solvay Process Co., Field Engr., 1946-47. Rust Engineering Co., M.E., 1947-48. Celotex Corp., M.E., 1948-49. Ewin Eng. Corp., M & E Engr., 1949-50. James M. Todd & Associates, May 1950-date.
- DONALD GRAHAM HUNTER, Alexandria; age 33. Endorsed: Eugene Levy, T. C. David, Soule Butler. Louisiana State University, BSEE, 1941. REA, Design & Construction Div., Washington, D. C., 1941-42. U.S. Army, Radar Officer, 1943-46.
- HAROLD LEROY KEATON, Bogalusa; age 34. Endorsed: M. R. Guell, C. H. Hundemer, B. B. Pierce. Louisiana State University, BSChE, 1948. Gaylord Container Corp., Chemical Engr., 1948 to date.
- STEPHEN L. KENNEDY, Lafayette; age 40. Endorsed: R. F. A. Benson, W. D. Holloway, M. F. Knost. Louisiana State University, B.E.E., 1930; MSEE, 1932. Louisiana Power & Light Co., 1934-46, Division Engr. Gulf Refining Corp., 1946-date, Asst. Dist. Manager, Lafayette, La. Member AIEE.
- SAMUEL B. KNAPP, Bogalusa; age 29; Endorsed: W. C. Barnwell, M. R. Guell, B. B. Pierce. Louisiana State University, B.S.Ch.E., 1947; M.S., 1949. Gaylord graduate fellowship, L.S.U., 1947-49. Gaylord Container Corp., Chemical Engineer, 1949-date.
- HENRY E. McDOWELL, Pineville; age 45. Endorsed: Soule Butler, R. N. Graham, Rudolf Hertzberg. Clemson A & M College, 1924-28, BS & CE degrees. Civil Engineering and Construction, 1928-51; present position, Area Engineer in charge flood control, U.S. Corps of Engineers, N. O. District.
- ARTHUR E. REED, Bogalusa; age 35. Endorsed: M. R. Guell, B. B. Pierce, J. E. Wallace. Louisiana State University, B.S.Ch.E., 1934; M.S., 1940. Gaylord Container Corp, 1940-42. U.S. Navy, Submarine Eng. Officer, 1942-45. Gaylord Container Corp., 1945-date. Member Tech. Ass'n Pulp & Paper Industry.
- JAMES E. REED, JR., Lafayette; age 41. Endorsed: S. W. Elbertson, J. R. Gaugler, T. A. Bonnet. Rice Institute, BSEE, 1934. Humble Oil and Ref. Co., Geophysicist, 1934-39. Navy Dept., Engineering Specialist, 1943-46. Gulf Public Service Co., Rate & Industrial Engineer, 1940-date, except for Naval Service.

- A. J. SHOUP, Shreveport; age 45. Endorsed: E. M. Freeman, C. A. Frey, J. C. Faulkner. Louisiana State University, BSCE, 1938. United Gas Pipe Line Co., Engineer, 1938-45. Minor & Shoup, Consulting Engr., 1945-47. Texas Eastern Trans. Corp., Asst. Chief Engineer, 1947-date. Licensed C.E., La. and Texas.
- ROBERT O. WILLIAMS, Shreveport; age 49. Endorsed: F. R. Adams, T. J. Hogue, Jr., W. D. Walthall, Jr. University of Kentucky, E.E., 1926. Southern Bell Tel. & Tel. Co., Fieldman, Jr. Engr., Exchange Engr., District Engr., 1926 to date, except for U.S. Army Signal Corps service, Captain to Colonel, 1941-46. Member AIEE.
- ROBERT B. WILLIAMSON, Shreveport; age 56. Endorsed: E. M. Freeman, C. A. Frey, L. H. Roeger. Southern Bell Tel. & Tel. Co., Western Electric Co., 1912-15. Cumberland Tel. & Tel. Co. & Southern Bell Tel. & Tel. Co., 1915-20. Eqpt. Supervisor, Local Man, Foreman, Wire Chief Supervisor, 1920-25. U.S. Army Signal Corps, Rating M.S.E., citation for meritorious and conspicuous service. Telephone engineering, 1925 to date, Field Engineer, Utility Electrical Equipment. Member AIEE, Who's Who in Electrical Engineering.

For Transfer From Affiliate To Member

- JAMES S. WARREN, Lafayette; age 35. Louisiana State University N.E. Center, 1932-34. Louisiana Polytechnic Institute, Electrical Engineering, 1934-36. Southern Bell Tel. & Tel. Co., various engineering duties, 1938-42; Exchange Plant Engineer, 1946-date.

For Affiliate Member

- BYRON E. CLARK, New Iberia; age 46. Endorsed: J. O. Herpin, J. E. Jarman, R. A. Osborn. La. Dept. of Highways, Instrumentman, 1929-33. U.S. Engineer Corps, Surveyman, Inspector, 1933-46. La. Dept. Public Works, Party Chief, 1947-48. Jahncke Service Inc., Civil Engr., 1948-49. La. Dept. Highways, Jr. Project Engr., 1949-date.
- H. C. GILLEN, Shreveport; age 41. Endorsed: J. H. Ellis, E. M. Freeman, A. A. Lyons. Louisiana State University, 1927-28. La. Dept. Highways, Instrumentman, 1930-33. Meriwether Supply Corp., 1934-48. Central Culvert Corp., Manager Pipe Plant, 1948-date.
- JOHN H. HUFFMAN, Monroe; age 33. Endorsed: A. M. Bujard, F. W. Adams, L. C. Landry, Jr., Texas College of Arts & Industries, Natural Gas Engineering, B.S., 1940. United Gas Corp., Jr. Engineer, 1940-41. U. S. Army, 1941-46. United Gas Corp., District Engineer, Division Engineer, 1946-date. Member NGEA.
- FRANCIS J. O'HALLORAN, Alexandria; age 32. Endorsed: Eugene Levy, Barnett Brezner, W. D. Roland. I.C.S. Refresher Course in Plumbing and Heating. Manager Wilkerson Plumbing & Heating Co., Alexandria. Associate Member A.G.C.

For Transfer From Junior To Member

- CLYDE CUCULLU, New Orleans; age 32. Tulane University, B.E., 1943. Westinghouse Electric Co., Ignition Laboratory, 3½ yrs. N. O. Public Service Inc., Property Accounting Engineer, 4 yrs.
- GARLAND O. EDELEN, Haynesville; age 29. Louisiana State University, B.S. Agri. Eng., 1943. U.S. Army, Radar Officer, 1943-45. Louisiana Power & Light Co., Commercial Service Rep., 1946-51.
- ARNOLD L. FARMER, New Orleans; age 29. Louisiana State University, B.S.E.E., 1938. U.S. Naval Research Lab., electronics school, 11 mos. Higgins Aircraft, Class A Draftsman, 8 mos. U.S. Navy, electronics technician, 2 yrs. N. O. Public Service Inc., Plant and Property Engineer, 4½ yrs.
- GEORGE C. FELTON, Baton Rouge; age 36. University of Minnesota, B.Met. Eng., 1941. Fairmont Railway Motors, Metallurgist, June-Sept. 1941. U.S. Army, 1941-44. Inland Steel Co., Metallurgist, 1944-45. Esso Standard Oil Co., Metallurgist and Maintenance, 1945-date.
- DONALD D. FULLMER, New Orleans; age 26. Louisiana State University, B.S.M.E. U.S. Army Corps of Engineers, Captain, 3½ yrs. U.S. Corps of Engineers, N.O. District, Engineer, 3½ yrs.
- JOHN MALLORY GRACE, Baton Rouge; age 39. Louisiana State University, B.S.M.E., 1947. Gulf States Utilities, Operation and Maintenance, 13 yrs. Esso Standard Oil Co., Meter and Instruments, 2 yrs.
- ROBERT J. GRUSH, New Orleans; age 32. Tulane University, B.E. in M.E. U.S. Navy, Chief Engineer, Destroyer, 2½ yrs. U.S. Govt., Machinery Inspector, 1½ years. F. N. Johnston Co., Application and Sales Engineer, 3½ years.
- J. O. HACHET, JR., LaPlace; age 32. Louisiana State University, B.S.E.E., 1941. U.S. Navy, Electronics Officer, 4 yrs. Shell Oil Co., general engineering duties, 5 years.

- LINDA REX HAYS, Lake Charles; age 26. A & M College of Texas, B.S.M.E. Petroleum Refinery, Cost control, Draftsman, Engineering inspection, 3½ years.
- A. E. HUTCHINSON, Baton Rouge; age 30. Louisiana State University, B.S. M.E. La. Dept. of Highways, Bridge Designer, 1946-date. Licensed C.E., La. by examination.
- OWEN V. LeBLANC, New Orleans; age 27. Tulane University, B.E. in C.E., 1944. U.S. Navy, 1944-46. City of New Orleans, Asst. City Engineer, 1946-48. W. Horace Williams Co., Engineer, 1948-date.
- JOSEPH T. MONTGOMERY III, New Orleans; age 29. Mississippi State College, B.S.C.E., 1941. T.V.A., Kentucky Dam, ½ yr. N.O. Public Belt RR., Asst. Engr., 1 yr. U. S. Naval Reserve, Eng. Officer, Destroyer, 3¼ yrs. V. J. Beuell Co., Field, Design and Drafting, 3½ yrs. 4th Jefferson Drainage Dist., Chief Engineer, 2 yrs.
- AARON M. ROSENTHAL, JR., Baton Rouge; age 38. Louisiana State University, B.S.E.E., 1935. La. Dept. of Hwys., Testing and Research, 1935-42. U.S. Army Air Corps, Signal Officer, 1942-45. La. Dept. of Highways, Soils Engr., 1946-date.
- HERBERT A. SCHAEFFER, JR., New Orleans; age 28. Louisiana State University, B.S.E.E. U.S. Army Signal Corps, Captain, 1943-46. The Flintkote Co., Electrical Engineer, Asst. Plant Engineer, 1946-date.
- EDWARD LOUIS SCHNEIDER, New Orleans; age 27. Tulane University, B.E. in Ch.E., 1944. Freeport Sulphur Co., Water control, mine and boiler, sulphur treatment, 3 years.
- GEORGE A. Seaver, Jr., New Orleans; age 27. Tulane University, B.E. in C.E., 1944. Boh Bros. Construction Co., Civil Engineer, 4 yrs. Navy Civil Engineer Corps, 2 yrs., now Lt. (j.g.) C.E.C., USNR.
- ALBERT L. SOULE III, New Orleans; age 29. Tulane University, B.E. in E.E., 1943. N.O. Public Service, Asst. Electrical Engineer, 1946-47; Relay and Communications Engr., 1947-date.
- EUGENE F. TIMS, St. Louis, Mo. Louisiana State University, B.S.E.E., 1943; M.S.E.E., 1949. Presently working for doctorate in E.E., Washington University, St. Louis. Signal Corps Schools, 1 yr., 1943-44. Signal Security Agency, Electrical Engineer, 1½ yrs. Panama Canal Dept., in charge Installation and Maintenance ground radio and radar, 8 mos. Louisiana State University, Instructor, Asst. Professor of E.E., 4 yrs., 1946-50.

For Junior Member

- DONALD R. DOWNS, Shreveport; age 24. Endorsed: E. M. Freeman, F. W. Grant, C. A. Frey. Louisiana Polytechnic Institute, B.S.C.E., 1948. E. M. Freeman & Associates, Rodman, Chairman, Instrumentman, 1948-date.
- CAREY J. HODGES, Baton Rouge; age 22. Endorsed: E. E. Evans, W. P. Wallace, W. A. Wintz. Louisiana State University, BSCE, 1950. Porter, Barry & Switzer, Resident Engineer, 1950-date. Licensed C.E., La. Member ASCE.
- BYRON PHELPS LYONS, JR., Baton Rouge; age 26. Endorsed: J. E. Jarman, H. L. Lehmann, A. G. Mundinger. Louisiana State University, B.S.M.E., Feb. 1948. J. B. Beaird Co., Sales & Service Engr., 1948. Dixie Bearing Co., Sales & Service Engr., 1949. R. P. Farnsworth Co., Inc., Construction Engineer, 1950-date.
- MAGEE J. MOSS, Abbeville; age 24. Endorsed: F. A. Consterdine, J. E. Jarman, Hampton Primeaux. Louisiana State University, Petroleum Engineering, 1943-44. Southwestern La. Institute, 1947-50, B.S.C.E. La. Dept. of Highways, Party Chief, 1950-date.
- RALPH S. SEGALL, Shreveport; age 24. Endorsed: E. M. Freeman, C. A. Frey, W. E. Fitzgerald. Texas A & M College, B.S.M.E., 1949. B. Segall Co., Associate Engineer, Chief Engineer, 1949-date. Member A.S.H.&V.E.
- JAMES T. TIGNER, Shreveport; age 23. Endorsed: E. M. Freeman, F. W. Grant, C. A. Frey. Louisiana Polytechnic Institute, B.S.C.E., 1950. R. L. Tatum, Draftsman-Surveyor, summer 1947. E. M. Freeman & Associates, Draftsman-Surveyor, summer 1949. La. Dept. Highways, Sr. Bridge Detailer, summer 1950. Licensed C.E., La. Junior Member ASCE.
- WALTER C. VINCENT, Kaplan; age 21. Endorsed: F. A. Consterdine, J. E. Jarman, H. L. Lehmann. Southwestern Louisiana Institute, Chemistry and Math., B.S. 1950. La. Dept. of Highways, Roadway Inspector, Nov. 1949-date.
- BILLY A. WEISFELD, New Orleans; age 31. Endorsed: A. M. Hill, F. W. Macdonald, C. W. Ricker. Tulane University, B.S.E.E. 1949. Graduate Radio Mat. School, U.S. Navy, Nov. 1942. Weisfeld & Son, Electrical Contractors, Foreman and Estimator, 1939-42. U. S. Navy, Chief Radio Technician, 1942-45. Tulane University, Student in E.E., 1946-49. Weisfeld &

Son, Estimator and Engineer, 1949-date. Delta Electrical School, Instructor, 1949-date. Certified Electrical Contractor, N.O. Member AIEE.
 ROGER C. WILKINSON, Shreveport; age 24. Endorsed: E. M. Freeman, F. W. Grant, J. C. McLemore. Centenary College, Pre-Engineering, 1946-47; 1947-48, $\frac{1}{2}$ day; 1948-49, night school. J. C. McLemore, Rodman, Chairman, Instrumentman, Party Chief, 1947-50.

Clearcut Manpower Directives Desirable. Those legislators, and there are some, who wish to provide safeguards requiring the maximum use of trained engineering personnel by the Armed Services are concerned lest government agencies again make no timely arrangements. Many members of Congress appreciate that a good Selective Service law should spell out the use of such persons even if some draft exemptions are involved, or service requirements modified. On the other hand a policy of universal service without exception is politically popular and profitable, and there seems to be an unfortunate tendency to avoid some of the problems involved in scientific manpower utilization. *Much remains to be done to impress the Congress that the proper use of technological manpower can be the hinge on which victory or defeat in war may hinge.*—From the Legislative Bulletin published by the National Society of Professional Engineers.

Again and again. The following remarks by Senator Byrd do not, perhaps, say anything that has not already been said. However, if enough people say it often enough, and do something about it at voting time, we may yet be saved from complete socialism.

The Grim Facts. We have only 6 percent of the world's population. We have assumed the responsibility for propping up the economy of half the world and defending more than half the countries of the world from military attack by Communist dictators who control the other half of the earth.

These are tremendous responsibilities which we have assumed at a time when our national debt is more than a quarter of a trillion dollars—more than any other nation ever dared to conceive, much less assume. Our taxes are already approaching confiscatory levels, and much greater taxation must yet come.

Our only hope to meet the responsibilities we have assumed and to preserve our free way of life lies in the capacity of the free-enterprise system to produce in mass quantities those goods, materials, and engines of war which are needed under such conditions in better quality and greater quantity than all of our adversaries combined. And there is no reason for us to expect much help from the nations who are associated with us, for they are more wards than allies.

Yet, the President and our leaders are still insisting upon expansion of socialistic legislation—socialized housing, socialized

medicine, socialized farming (the Brannan plan)—which, if adopted, will destroy the free-enterprise system. This free-enterprise system upon which we depend cannot survive in confiscatory taxes or overwhelming debt, or state socialism. What happens to free enterprise under socialism has been demonstrated by the British before our very eyes in these same 5 years since World War II.

In these 5 years the Federal Government has spent approximately \$40,000,000,000 for strictly domestic-civilian programs, exclusive of the cost of the interest on the debt, veterans, foreign assistance and defense. Since 1948 domestic-civilian expenditures by the debt-ridden Federal Government increased approximately 75 percent, exclusive of interest, veterans, foreign assistance and defense. At the same time, during these 5 years, we thought it was necessary to spend approximately \$100,000,000,000 to prop up our foreign friends economically, and defend them and ourselves militarily—roughly \$35,000,000,000 in foreign assistance and \$65,000,000,000 in our defense and in foreign military aid.

Whether our Communist adversaries will continue to weaken us by prolonging this series of sideline satellite wars breaking out here and there all over the globe, or whether they will risk committing themselves and their own resources to an all-out third world war, is to be their decision—not ours. Russia has the timetable—not us.—*Extension of Remarks of Hon. Harry Flood Byrd of Virginia, in the Senate of the United States.*

PAPERS AND DISCUSSIONS

INDUSTRIAL DEVELOPMENT OF THE MIDDLE SOUTH*

Industrial Development is an activity designed to aid a community in developing a better economic climate in order to promote the local expansion of its present industry and attract new industry. Broadly speaking, such an activity is one of enlightened self-interest firmly grounded on the fact that industry is the economic base upon which many of our communities depend for their survival and growth.

First and foremost, industrial development should concern itself with promoting the growth of existing industries by assisting them to operate in the most efficient manner. Beyond this it may involve assisting other agencies such as civic groups, trade associations, state development agencies, local government leaders, and public-spirited citizens in community planning and zoning, negotiations with industrialists contemplating new plants or relocations, advertising and promotion. Under some conditions it may involve direct negotiations and promotional work.

Industrial development benefits the community by:

Securing more employment and taxable property for a community and assuring population increases.

Assuring commercial and residential gains which depend to a great extent on industrial payrolls.

Helping to offset normal business failures.

Promoting stability of community through intelligent diversification of industry.

The more popular idea, in the sense of general public acceptance of industrial development is the securing of new industries—and we will confine our discussion mainly to this phase of the subject. Even more important however, is the problem of relocation of an existing industry to a new area.

Successful industrial management requires constant study, attention, and change to meet changing conditions of market, raw materials, labor, and many other factors affecting its economic condition. While there are cases when the relocation of an industry outside a particular territory may be economically justified, they should always be checked by engineering studies or surveys to weigh the relative merits of moving or staying put.

Industry relocates because markets or sources of raw materials shift, it outgrows existing facilities, it desires to decentralize, it believes other industrial climates to be more favorable, or its operations shrink so that existing facilities no longer produce

* Presented by J. Mason Gullory, Manager of Industrial and Commercial Engineering Division, N. O. Public Service Inc., at a joint meeting of the Louisiana Engineering Society and the American Society of Heating and Ventilating Engineers on February 12, 1951.

economical operations. Relocation of an industry may also be occasioned by the availability of other modern factory buildings, a more strategic location for national security reasons, transportation factors, or because of the personal desires of the individual in control of the company. Moving closer to related industries or suppliers is at times desirable, or the change may be influenced by financial aid offered from a given territory, or possibly the seeking of a more advantageous labor market.

More industries begin as small, hopeful, but not stable enterprises, and some of them progress through the diligent and efficient work of those who guide them. During the first stages of growth and development, it is generally economical to occupy small quarters which become inadequate at some later date. Hence, it becomes necessary to relocate as a result of normal healthy growth and progress.

It behooves those interested in this matter, therefore, to be assured that our existing industry is fully aware of all advantages of remaining in the community before making a decision to move away, which might not be based on a sound analysis of all factors involved.

Now to discuss for a moment the securing of new industry. There is a normal mortality in the industrial field which is beyond practical control and which must be offset by new industrial enterprises if an industrial area is to maintain the status quo. Products become obsolete; bankruptcies take a fairly heavy toll, particularly during periods of receding business activity. Sales of plants and equipment for various reasons take place also, as do mergers. Many times a sale or merger means the closing of a plant in an area because its production is absorbed by the other plant or plants of the purchaser.

It should be stressed here that American industry is dynamic, pushing out in many directions at one and the same time for a great variety of reasons. It also is withdrawing from some of the paths it once pursued. Witness the effect of water power on the beginnings of many of our basic industries. Sawmills, grist-mills, paper-mills, and textile plants located during the early 1800's where they could find water for power and water for processing. Water for power is no longer a determinant in plant location. Our vast network of electric power lines has relegated this once major factor to the limbo except in a very few special industries. The importance of this is not that water power is now relatively unimportant but rather that plants originally located because of this factor may not be uneconomically located. Their markets, raw materials, and labor may not be the most desirable for today's conditions. Other plants started from small beginnings in the home town of the founder to serve a local market, and, because of the

excellence of the product, the plant grew to large proportions. It may well be that under today's conditions the plant could be re-located or decentralized very profitably. The extreme fluidity of our industrial climate (labor, materials, and markets) makes for a mobile industrial structure.

What are the major factors influencing the selection of a specific location?

A survey by the Metropolitan Life Insurance Company indicated that the major reasons for plans locating in the South were markets, materials (or resources) transportation and labor supply—in that order.

Now, what has the Middle South to offer in these four categories?

In addition to this program, numerous other agencies are also promoting the advantages of New Orleans and the area for trade and industry. Among these are the Board of Commissioners of the Port of New Orleans, the New Orleans Chamber of Commerce, the Greater New Orleans Inc., Louisiana Power & Light Co., New Orleans Public Service Inc., and the Louisiana State Dept. of Commerce & Industry,

While the industrial development of our immediate area has been relatively slow, there are presently twice as many employees in industry as there was in pre-war years. In other words, we retained much of the gain in employment which came about during World War II. This is indicated by a chart which shows electrical usage in industry over the past 12 years, as compared with industrial employment. This chart verifies the comment that industrial employment has leveled off in the past few years to about double the prewar level. The increase in industrial electrical usage has been brought about by additional productive capacity in several of our major plants, the nature of which required relatively few added employees. It is anticipated, however, that the picture in industrial employment will show a decided change in the near future if present plans for industrial production materialize. To verify this, employment in January, 1951, has increased 4 percent. This should continue to increase since there is an urgent growing need for the manufacture of materials required by our Armed Forces for the defense of our country.

While the Russian industrial capacity is far less than ours, it is also true that they are rapidly increasing and have a head start on the U. S. in several respects. Russia did not completely demobilize as we did, they did not reconvert to civilian production, and they retained most of their war facilities. Furthermore, they have been for five years following a program of dispersion and relocation of industry to reduce exposure to attack. On the other hand—70% of our total industrial capacity is located in the 10 states mostly in the northern section, from Illinois to the East Coast—fine targets

for long range airplanes. In these congested areas, little imagination is needed to visualize the potential damage which could be caused by an atomic bomb when it is realized that everything within a radius of one-half mile would be completely destroyed—with very heavy damage up to a one mile radius.

Dispersion of civilian industries however is voluntary, and economic factors must be considered. We believe that our area, as shown previously, offers sufficient incentive to induce industries which are relocating, or new plants, to locate here. The knowledge and confidence of all of us in this fact and the recital of these facts where they will do some good, will assist in the objective of improving our industrial economy and participating in our country's defense production.

An even larger opportunity for industrial development in defense operations presents itself in the expanded production of existing local plants. In order to assist in this undertaking, the New Orleans Chamber of Commerce has set up what is known as the "Defense Production Council." This Council, which is staffed almost entirely by volunteer workers, consists of six divisions as shown on this chart. The primary function of this organization is to help existing manufacturers to obtain contracts for the production of defense materials or supplies. These contracts may stem from civilian prime contractors or various procurement agencies of the government. The Council is able to assist in obtaining manpower or defense loans, when needed, to perform on a contract. The two constantly active divisions are: the Procurement Liaison which is responsible for the securing of information as to contract opportunities, and the Facilities Survey & Contract Information whose primary responsibility is to disseminate information as to contract opportunities to local manufacturers.

This latter Division has completed a survey of all manufacturing facilities in this area. A staff of men representing six major industry groups is available for consultation each afternoon at the Chamber of Commerce Defense Production Council Office. While this Council has been in operation only a few days it has been instrumental in assisting a manufacturer to obtain a contract amounting to \$86,000, and has provided information to others which has made it possible for them to submit bids. It is felt that the operation of this Council is one of the most beneficial projects ever undertaken by the Chamber of Commerce in the development of the New Orleans area from an industrial point of view.

Any persons who are in the manufacturing business and who are not familiar with this operation are invited to visit the Council Office.

COMMUNITY DEVELOPMENT PROJECTS*

I'd be willing to bet that very few among our citizens have given much consideration to the vast resources we call ours in this particular section of our great country. You folks from that great profession, engineering, probably are much better informed on this subject than any other group, and, certainly, there are many in this group much more familiar with specific strata of these resources than others. I wouldn't accuse any of you, and hope you won't accuse me, of that characteristic attributed to another great profession represented by one—Archibald Strange. This lawyer it seems, was getting a bit concerned about his health and so one night he told his wife that he had made his will and while he didn't want to alarm her he did want to assure her that he had amply provided for her material welfare and then he added—"and I don't want any large monument erected on my grave, nor even my name, all I want is a small stone with a simple carving, 'Here lies an honest lawyer'. "And," he continued, "then my friends can pass and point it out saying — *That is strange!*"

Well, I'd like to explore with you for just a little while tonight, some of these great natural resources of this area, some of the progress that is being made in developing them through various construction projects. Perhaps touch on some developments of the near future, keeping in mind always that most important factor — the human beings who live in this area and are responsible for these developments.

You know this old world of ours seems to get more and more confusing all the time, and these controls and regulations don't help the situation a bit. I could hardly believe it, but I heard a preacher friend of mine say not long ago that it seemed to him like everything he liked to do was either illegal, immoral, or fattening. And you've heard of that man who just came back from Washing-

* Address delivered by Harold J. Bryant, General Manager, Shreveport Chamber of Commerce at Shreveport Section of the Louisiana Engineering Society, March 6, 1951.

ton and said he had never been so confused in all his life except the time when he was a kid and dropped his bubble gum in the chicken yard.

What is this great territory I mentioned in the beginning? It's the Ark-La-Tex, of course. That area of South Arkansas, North Louisiana, and East Texas, where the culture of the old south meets the spirit of the new west and creates an atmosphere of good living that just can't be beat. It has become the capital of producing and distributing of natural gas, but long before either gas or oil were discovered in this area, the great resources of timber and other products of the soil had made Shreveport a great trading center—with commerce moving on that other great resource, water.

And speaking of that water that flows down the great Red River Valley — there in that water and the fertile land of the valley are resources that are being developed through the work of the Army Engineers and the Public Works Departments in the various states. Denison Dam, first big dam built on the Red River, has already proved its worth in flood control, power, and recreation. Close by in Bossier Parish, Bodcaw Dam is nearing completion; and Wallace Dam in Caddo has played a part in the flood control program. The Sulphur River one of the Red's six big tributaries, north of Shreveport, is now being dammed between Atlanta and Texarkana. It is expected that this dam when completed will be larger than Denison and impound a greater amount of water. When the other dams on Millwood, Little River, Kiamichi, etc., are completed there will be a control not only of the water but of much of the soil erosion which has been a major problem and cause of great annual loss. The Overton Lateral Canal could well be completed almost as early as the Texarkana Dam, for the planning is well along and construction, when funds are made available, could move fast. No single development now in sight could mean so much to the future growth and development of the Ark-La-Tex and Shreveport.

Implemented by demands of War II, the iron and steel industry got off to a start in East Texas. The threat of new war has brought new impetus to this industry with almost a hundred million dollars being spent on new mill facilities. A survey is now being made to determine the justification of extending a navigation channel North of Shreveport to Jefferson and Daingerfield. This whole area will develop many related industries in the next few years, far beyond our present comprehension.

During War II this area took on the form of a great arsenal in many respects. Long Horn Ordnance at Karnak, Red River Arsenal and Ordnance at Texarkana, Army Proving Ground at Hope,

Louisiana Ordnance and Barksdale East of Shreveport, and Cedar Grove Depot—now Slack Air Force Base, all played an important role and now are in various stages of activity.

At Louisiana Ordnance a new operator, Remington Rand Inc., is preparing one or more lines for production. A contract for shell cases at the Beaird Plant complements that picture. At Barksdale Air Force Base, the expansion program of the Air Force is taking shape. This permanent Base, built in early 30's to fit the needs of a tactical unit of some 3500 strength, is today Headquarters of the 2nd Air Force with 3 Wings of the Strategic Air Command—more than three times the original size and equipped with some of the largest jet bombers used by the Air Force. Already work is under way on new housing for personnel, warehouses, storage, and extensive new aprons of concrete. It is quite possible that when the whole planned program has been completed, almost every type of facility will have been enlarged many times, and it will not be surprising if new additional facilities are brought into the picture.

All of this calls for new roads and bridges to serve Barksdale, Shreveport, and the Ark-La-Tex Area. Plans were announced, you will remember in 1947, for a new bridge across the Red River at Shreveport and an expressway that would let east and west traffic in, through, and out of Shreveport in a hurry. At that time its cost was estimated at 25 million dollars. What would it cost now! The Federal Bureau of Public Roads and the State of Louisiana had the survey made but practically no progress has been made since. The plans of the City of Shreveport for its street development and the railroad grade crossings all had to be considered. The State Highway Director and the District Engineer of the Bureau of Public Roads promised us three weeks ago that they would make a survey to determine the needs of Barksdale and Shreveport at this time. The building of a new bridge and the widening of traffic arteries to serve Barksdale are both essential to this important facility and to the safety of the traveling public. I have no doubt that the current defense needs, coupled with a renewed interest and support of these projects by citizens and officials both civilian and military, will bring about the building of these roads and bridges within the next two years. Contract was let just a few days ago for the sub-structure and approaches to the new bridge at Miller's Bluff. Contract for the super-structure will probably be let in the future when steel may be in a more plentiful supply. This bridge will be a great convenience and will prove a great saving to much local traffic in Northwest Louisiana, but the new bridge for Highway 80 will be of far greater importance in moving volume of traffic.

Other important highway projects in this area are making progress, such as U. S. 171 between the DeSoto Parish line and Shreveport. A four mile section of this Highway from the parish line north to Keithville, including a grade separation at that point, will soon be advertised for bids. The balance of that route into Shreveport will be advertised as soon as the right of way is secured, which is about 25% short at this time. This will be a 22 ft. slab of concrete with 200 ft. right of way acquired to provide for future four lane expressway.

What about that four lane highway across the State on Route U. S. 80? If you ask the governor, he will tell you that if the people had let his 150 million bond issue be voted, he'd be building a road. But, the bond issue was not submitted and personally, I believe, a four lane Highway 80 can be built with current revenues if the citizens demand it. I think the Highway Department is now doing what is most practical at the moment in widening sections four feet at the three most heavily traveled zones in North Louisiana. It must be recognized that such physical conditions as soil, drainage, and the abundance of streams makes road building an expensive operation in the State of Louisiana. Let us remember too that the State System is constantly being expanded by action of the State Legislature, at the request of local citizens and officials.

Citizens who have returned to Shreveport recently after an absence of ten years are usually astounded — not only at the increase in population, but also, in the new and expanded facilities to take care of this population. And well they may be impressed — for within the past five or six years, there have been added almost twenty million dollars in school buildings, and the varied municipal improvements provided in the Civic Development Program of 1947.

The six and a quarter million dollars voted for schools in 1945 built one high school for negroes, three junior high schools, and one elementary school for white children. How fortunate that the school and community leaders did not wait for costs to go down. This week we will be hearing a report on additional needs of the schools in Caddo Parish, which will undoubtedly call for expenditures at least three times as large as the earlier issue. The ten million dollar civic improvement program of 1947 has been carried to completion in its major phases. The city's water and sewer system has been enlarged and improved with over 2 million in expenditures. The drainage system has received almost a million in improvements; garbage and trash disposal received \$359,000; the fire department secured a new station and modernization of others as well as additional equipment at \$250,000. A like amount purchased a modernized system of traffic lights in the downtown area; streets are being widened, extended, and improved at a cost

of 2.5 million. Remodeling the City Hall cost \$50,000; and the new Airport is receiving \$2,400,000 as the city's share of its total cost. Shreveport's beautiful parks and play grounds have been equipped and improved with \$700,000. This includes the building of Ford Park and the zoo for children. This program has made an astounding impact on the development of the community.

Now, these developments don't just happen! It is dedicated to the commercial, industrial, the civic, and cultural development of Shreveport and the entire territory which it serves. It serves as a clearing house for ideas and the coordinating of efforts to accomplish worthwhile projects of community growth and development. It is the super-service station of the community, where you will find a storehouse of factual information to keep business men informed on problems connected with their business or to be used in selling the community and its advantages to prospective citizens. It provides the facilities through which ideas may be presented, analyzed, and carried forward if feasible to accomplish progress in the interest of the community. As the city grows in size and importance, the services of this organization take on more variety as well as greater importance and this calls for the active interest and participation of each and every man and woman in business or engaged in the practice of a profession. Yes, the resources of this area are immense and the progress that has been made is almost unbelievable but was are faced with some mighty tough competition. We are in competition with cities that keep us in the big league, so to speak. We are surrounded by them—Houston, Dallas, Ft. Worth, Oklahoma City, Tulsa, Little Rock, Memphis, Jackson, and New Orleans. They, too, realize that this is choice territory and they'd like to chew off as much of it as they can. But, it is ours and if we use our opportunities to the full, we will take advantage of this choice location. Strengthen our position in this great area and use the fact we are surrounded by these population centers to emphasize our own importance as a commercial, industrial and distributing center.

There is nothing within reason that can not be accomplished if the citizens of our community will apply themselves to working together in its support. Among the facilities for which Shreveport has great need are: additional hotel facilities, office buildings, and warehouse space. I made a trip a few days ago to a neighboring city with two Shreveport builders to see how things were being done there. We drove through a modern industrial district which has been developed in the past two years into what is probably the fastest growing wholesale and distributing district in the Southwest. A large acreage was carefully planned and laid out with drainage facilities, streets, sewers, rail lines and spurs to

serve each block, and utilities. Everything was ready for the building to be erected. Forty-six percent of each acre has been used for these necessary facilities. Building sites are going fast at 1.50 per sq. ft.—three times the price three years ago. But standard warehouse structures are being built there for sale or rent just as our folks are building two-bedroom homes. And they are being occupied as fast as they are built. I asked them how they could do it. The answer—We were told that a number of builders in that city had decided to make investments with small return now, but, with security for their investment in the future. That type of community building is really getting results. It is not surprising then, to find that there, too, additional hotels and office buildings are being built.

A CITIZEN'S CREED

I BELIEVE in my Community, my State and my Country
Thank God I am an American and a Louisianian.

I BELIEVE that MEN play a bigger part in town building
than natural resources, and that cities are what man make
them.

I am willing to give of my TIME, THOUGHT, ENERGY and
MONEY

To help advance the welfare of my community, in return for
the great blessings I enjoy.

I am NOT AFRAID that my competitor will make more
money than I will as the town grows.

I will not be a SPONGE, taking all I can get and giving as
little as possible.

I want to LIVE in my town so that I can leave as a heritage
the memory of some SERVICE for the benefit of the Com-
munity.

I believe that MY RECORD on earth will be largely my
record as a citizen of THIS TOWN.

I believe in the SUCCESS of my Community and want to
have it said of me that I PLAYED MY PART WELL.

I believe in the SINCERITY of other citizens, and will not
indulge in BACK BITING, SLANDER or "KNOCKING"
against my town or my neighbors. I am PROUD OF MY
TOWN and want to live so that the town may be PROUD
OF ME.

I will advance the fame of my town by doing MY JOB the
best I can and . . . perhaps better than it is being done
ANYWHERE ELSE.

I will INVEST MY LIFE where I make my LIVING.

With you of the Engineering fraternity I rest my case.

Shreveport will be just the kind of city we want it to be—
Let's give it the best we have.

ENGINEERING BRIEFS

Three-dimensional Color Television Set Patented. The latest entry in the field of color television is a system which not only produces images in natural color but also in three-dimensional perspectives.

Patent 2,529,485 has been issued for a set invented by Thornton W. Chew, a United States Navy scientist who has assigned his rights to the government on a royalty-free basis.

Unlike other color television methods which are based upon spinning color wheels or several electron-beam scanning rays in one set, the new system has a single projection tube with no outside mechanical adapters. Its screen is a bank of tiny fluorescent strips, with every third strip adapted to produce one of the three primary colors. A single electron beam scans each color group in split-second succession, synchronized with the transmitter. Because of so-called vision persistence in the human eye, the three images produced in different colors blend to form a single natural color image. To make certain the pinpoint beam falls on the proper color strip, magnetic lines of force act as guides within the tube, which is the secret of the new system.—*From Aminco Laboratory News.*

New Method Gives Accurate Knowledge of Soil Changes Under Paving. The accurate knowledge needed concerning soil conditions under airport runways and other types of paving is easily obtained by means of a new method developed at Cornell University, Ithaca, N. Y. under sponsorship of the U. S. Civil Aeronautics Administration.

In this method, an instrument containing a radioactive material determines both moisture content and the density of the soil under the pavement. Knowledge of the changes taking place will be an important factor in the design of future airports, and also of aid in building highways. In using the method, a hole large enough to hold a one-inch diameter pipe is drilled through the the paving and into the soil. The pipe remains permanently and is capped when not in use. When measurements are desired, the cap is removed and the instrument lowered to the desired depth. Moisture and density information is recorded automatically.

The measurement of water in the soil is based upon the unusually strong effect of hydrogen atoms from the radioactive material in scattering neutrons and causing them to lose energy, CAA scientists state. Similarly, the scattering of gamma rays by the radioactive source provides a measurement of the density of the soil.

Details concerning the construction of the instrument were not

available at the time of publication of this paper.—*From Aminco Laboratory News.*

Sugar Made Without Molasses By-product. Manufacturing white sugar without molasses as a by-product is promised by a process for which John P. Bartz, Fort Lauderdale, Fla., was awarded patent 2,526,111.

The sugar may be made from juices of sugar cane, sugar beets, and citrus fruits, and the product is claimed to have superior sweetening and improved nutritional properties as well as reduced fattening qualities.

The process includes the treatment of sugar-bearing fluids and juices by chemical and ion exchange methods. These remove salts present in the liquids and the excess of undesirable gums, pectins, dextrans, and proteins. Coloring matter is removed by activated charcoal or bone char. The aqueous sugar solution is then concentrated into crystalline or powdered sugar or into liquid sugar.—*From Aminco Laboratory News.*

Dross Profits. Strategic metals from former wastes are helping to meet wartime demand. Several new processes yield valuable materials from mining residues, flue dusts, soot deposits, and process liquors. Often such exploitation can turn a marginal source of metal into an economic producer, and many rare metals can be extracted from wastes, even though recovery directly from the ore would be impractical.

The Union of South Africa has recently agreed to sell to the United States and Great Britain the entire output of uranium recovered from gold ores. Almost all the gold ores of the region show small percentages of uranium compounds. Four recovery plants are planned, and production is expected to begin in about 2½ years. Both old waste dumps and fresh ores will be treated.

During the last war many of the huge slag dumps that accumulated around steel mills were combed for the masses of iron that sometime escaped when the molten slag was run off. One company recovered 150,000 tons of scrap iron in one year from such an operation. Dumps of iron ore, discarded in the days when only the highest-grade ores were shipped, are now being benefitted by various means to increase the iron content. The Bureau of Mines is carrying on a program, now in the pilot plant stage, to reclaim manganese from slag. An estimated 300,000 tons of manganese may be recovered annually, with a reduction of almost half our ore imports. Another process for recovering manganese from low-grade domestic ores has recently been announced.

The rise of the flotation processes, where finely crushed ore is treated with chemicals to make the minerals gather in a froth on top of the water, has caused re-examination of many dumps left by less efficient processes. During World War II large accumulations of fluorite "tailings" and waste rock were treated in this fashion, with more than 90 percent of the fluorite recovered. A somewhat older application of the technique has been used in reclaiming cobalt, tungsten, and chromium from grinding-wheel sludges. Lead, zinc, tin, and gold have also been recovered by flotation.

Slag fuming is also used to recover lead and zinc from waste piles. The desired metal is boiled up or "fumed" from the surface of a furnace-load of molten slag. The vapor is then converted to metallic oxides and cooled to a solid or a powder for further processing into finished metal. There are three such installations in North America now; the latest is for an 800,000-ton accumulation of residue estimated to contain 26 per cent zinc.

CONCENTRATES FROM ROASTING

Roasting of ore concentrates containing traces of the desired metal can result in concentrates thousands of times richer than the starting material. The richest source of rhenium is molybdenite ore, which contains from 0.6 to 0.7 per cent molybdenum and only 0.0001 to 0.05 per cent rhenium. The flue dusts from roasting contain up to several per cent of rhenium, and are the present source of supply. Rhenium is similar to tungsten and may be substituted for it in many applications.

Germanium is similarly obtained, mainly as a by-product from smelters handling zinc ores containing traces of the element. It is expected that flue dusts and ashes resulting from the burning of coal containing germanium will in time become the most important source. Germanium is used increasingly in the electronics industry in producing ultra-high-frequency or microwave currents, and in the new "transistors" which perform many of the functions of conventional vacuum tubes.

Flue dust was an important source of cadmium during the last war, but these reserves have now been exhausted, and cadmium is now obtained primarily as a by-product from the refining of cadmium-bearing zinc or lead ores. For many years, a minor source of vanadium has been flue deposits obtained from burning oils, such as those from Venezuela, containing traces of the metal. Boiler scale from ships burning Venezuelan crudes also contains usable amounts of the metal, which is sometimes recovered.—*From Industrial Bulletin of Arthur D. Little, Inc.*

1951

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C. M.: Charter Member
H. M.: Honorary Member
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J.: Junior Member

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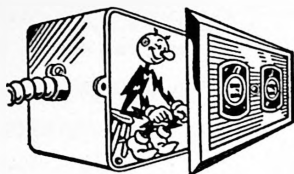
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R. S. Manley.....1921	W. Stone Leake.....1948
Donald Derickson1922	Herman L. Lehmann.....1949
*J. S. Bareli.....1923	Lionel J. Cucullu.....1950
James M. Robert.....1924	

* Deceased.

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MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction Held on Monday,

February 12, 1951

The meeting was called to order by President Newton, with Messrs. Abraham, Cucullu, Molaison, Seago and Fernandez present. Minutes of the special meeting of January 8 were read. Mr. Cucullu moved that they be accepted as corrected, seconded by Mr. Molaison and carried. Minutes of the meeting of the Board with District Contact Representatives and Officers of State Sections, held on January 19, were read and accepted.

Mr. Abraham moved that the reports submitted by the General Chairman and the Banquet Chairman for the 1951 Annual Meeting be accepted, seconded by Mr. Seago and carried.

Mr. Cucullu, acting for the chairman of the Finance Committee, presented the budget for 1951. Mr. Seago moved that the operating budget be accepted, and that the Finance Committee report on any changes to be made therein at the end of the first quarter. The motion was seconded by Mr. Abraham and carried. Mr. Cucullu moved that the remaining cost of furnishing the Society's headquarters, the cost of award medals, binding Proceedings and obtaining a new microphone should be paid during the year and charged to the capital account. The motion was seconded by Mr. Abraham and carried.

Correspondence between President Newton and Mr. L. L. Moody concerning the accrediting of the engineering school at Southwestern Louisiana Institute was read. A letter of thanks from the family of the late Harrison F. Carr also was read.

Mr. Seago moved that the dates for the 1952 Annual Meeting be set for January 10-11-12, 1952, seconded by Mr. Abraham and carried. A letter from the St. Charles Hotel confirming reservations for these dates was read.

Mr. Abraham moved that Mr. Allen Betz be named General Chairman of the 1952 Annual Meeting, seconded by Mr. Cucullu and carried. Mr. Cucullu moved that Mr. William J. Drawe, Jr., be named General Vice-Chairman, seconded by Mr. Molaison and carried.

Mr. Cucullu moved that Mr. H. M. Trott be reinstated as a member of the Society, seconded by Mr. Seago and carried. Mr. Molaison moved that Mr. Godfrey L. Marine be reinstated as a junior member, seconded by Mr. Seago and carried.

Mr. Abraham moved that the election of Clint C. Hamm to affiliate membership be considered void, seconded by Mr. Cucullu and carried.

Upon the recommendation of the Board, President Newton appointed the following personnel to standing committees for 1951:

Employment Committee, Raymond P. Bassich, Chairman; Entertainment and Outings, Claiborne Perrilliat, Chairman; Finance, John A. McNiven, Chairman; Membership, B. M. Dornblatt, Chairman; Legislative, Hubert A. Flanakin, Chairman; Waldemar S. Nelson, Vice-Chairman; Frank W. Macdonald; Professional Civic and Industrial Affairs, R. A. Steinmayer, Chairman; Publications, J. Robert Rombach, Chairman; Publicity, John S. Burke, Chairman; Technical Papers, Aaron Abramson, Chairman; John F. Vogt, Jr., Vice-Chairman; Student and Junior Activities, Lee H. Johnson, Jr. Chairman; Wiley D. Poole, Vice-Chairman.

President Newton announced that the presentation of a charter to the Alexandria Section would be held on February 15 in Alexandria and that members of the Board were invited to attend. There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society Held Jointly with the Delta Chapter, American Society of Heating and Ventilating Engineers February 12, 1951

The meeting was called to order by President Newton, with approximately 65 persons present. President Newton welcomed members and guests of the Delta Chapter. A.S.H.&V.E. Reading of minutes was dispensed with.

President Newton announced that presentation of a charter to the newly organized Alexandria Section of the Society would take place in Alexandria on February 15.

The chair then was relinquished to Mr. Ralph Elizardi, President, Delta Chapter, A.S.H.&V.E., who called on Mr. John Burke to introduce the main speaker of the evening, Mr. J. Mason Guillory, Manager, Industrial and Commercial Division, New Orleans Public Service Inc., who gave a most informative talk on the subject "Industrial Development of the Middle South".

After the usual question period, the chair was returned to President Newton and the meeting closed with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

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Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society and Student Chapter of American Society of Civil Engineers

January 17, 1951, 8:00 p. m., at Geology Auditorium, Louisiana State University. Officers present: Mr. F. A. Hannaman, Jr., President; Mr. Louis Duclos, 1st Vice-President; Mr. H. L. Landry, 2nd Vice-President; Mr. T. J. Innes, Jr., Sec'y. and Treasurer.

The meeting was called to order at 8:00 p. m. by Mr. Hannaman, President of the Baton Rouge Section of the Louisiana Engineering Society. Approximately sixty-six members and guests were present.

The reading of the minutes of the past meeting was dispensed with by a motion from one of the members and there being no old or new business requiring action, Mr. Hannaman introduced Dr. Leo J. Lassalle, Dean of the L.S.U. School of Engineering, who introduced Mr. Norman R. Moore.

Mr. Moore, Chief Engineering Division of the Mississippi River Commission at Vicksburg, Mississippi, made a very interesting talk on the Morganza Control Structure and how it fits into the adopted flood control plan. A general description of the principal hydraulic and structural features was presented together with photographs of the construction progress.

The meeting adjourned at 9:30 p. m. and refreshments were served.

T. J. INNES, JR., Secretary and Treasurer,
Baton Rouge Section of Louisiana Engineering
Society

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society

February 14, 1951, 8:00 p. m., at Geology Auditorium, Louisiana State University. Officers present: Mr. F. A. Hannaman, Jr., President; Mr. Louis Duclos, 1st Vice-President; Mr. H. L. Landry, 2nd Vice-President; Mr. T. J. Innes, Jr., Sec'y. and Treasurer.

The meeting was called to order by Mr. Hannaman, President of the Baton Rouge Section of the Louisiana Engineering Society. Thirty-three members and guests were present.

Mr. Hannaman had each member introduce his guests. A motion was made and passed to dispense with the reading of the minutes of the previous meeting. There being no old or new business, Mr. Hannaman turned the meeting over to Mr. Landry who introduced Mr. Ted Goldmann, speaker for the evening.

Mr. Goldmann, engineer from the Dow Corning Corporation, made a very interesting talk on "Silicons in Industry." The characteristics of silicons, their history, and many uses were presented and illustrated by slides and full scale models.

The meeting adjourned at 9:15 p. m. and refreshments were served.

T. J. INNES, JR., Secretary and Treasurer,
Baton Rouge Section of Louisiana Engineering
Society

Minutes of the Meeting of the Shreveport Section, Louisiana Engineering Society

A meeting of the Shreveport Section of the Louisiana Engineering Society was held at the Caddo Hotel, December 30, 1950, at 7:00 p. m. Eighteen members were present.

Mr. E. M. Freeman, President, presided.

Mr. T. F. Cash, Chairman of the Nominating Committee, placed the following names in nomination: President, J. P. McCullough; 1st Vice-President, W. E. Fitzgerald; 2nd Vice-President, J. H. Ellis; Secretary-Treasurer, L. H. Roeger; District Representative, E. M. Freeman; Directors, Lane Mitchell and E. M. Freeman. Moved by Mr. R. S. Parker, seconded by Frank Grant, that nominations be closed. Carried.

All above officers were elected unanimously.

Mr. Freeman gave a brief talk urging that all qualified engineers apply for a license as quickly as possible. He also asked that there be as large a representation from the Shreveport Section as possible at the Annual Meeting in New Orleans January 18, 19 and 20.

Moved by Mr. Frey, Seconded by Mr. Freeman that the newly elected President and Secretary-Treasurer be authorized to jointly sign checks. Carried.

A rising note of thanks was given J. H. Ellis for the preparation of the barbecue on the 16th. Mr. Ellis was requested to convey the thanks of the section to the Police Jury for the use of Camp Soda.

Moved by Mr. Frey and seconded by Mr. A. A. Lyons that the last meeting of each year shall be the Annual Meeting of the Shreveport Section and that the membership be notified at least thirty days in advance as to place and date of said meeting. Carried.

Moved by Mr. Freeman and seconded by Mr. Frey—adjourn. Carried.

J. H. ELLIS



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Minutes of the Meeting of the Shreveport Section, Louisiana Engineering Society

March 6, 1951, held at the Hostess Room of the Continental Baking Co.

The meeting was called to order at 7:30 p. m. by the president, James P. McCullough. Thirty members and two visitors were present.

The minutes of the previous meeting were read and approved as read, after which chairmen of each of the appointed committees were asked to report on their activities.

W. W. Alsup, the Chairman of the Program Committee presented the speaker of the evening, Mr. Harold Bryant, manager of the Shreveport Chamber of Commerce. His subject entitled "Community Development in Shreveport" was well received and appreciated by members.

A general discussion was held on the number of meetings other than stated meetings and on the matter of a suitable place of meeting.

A motion was made by T. J. Rucker, seconded by T. F. Cash, to hold a special meeting at Camp Soda for a barbecue; the club to pay expenses up to \$75 and any additional expense to be borne by attending members.

There being no further business the meeting was adjourned for a social period and refreshments.

L. H. ROEGER, Secretary-Treasurer
Shreveport Section, L. E. S.
Respectfully submitted,

Minutes of Regular Meeting of Monroe Section of the L. E. S.

March 20, 1951 at La. Tech., Ruston, Louisiana, 7:30 p. m.

The regular meeting of March 20, 1951 was a dinner meeting that was held in Ruston, Louisiana. The beginning portion was an assembly in the Tech Dining Hall where dinner was served to members and their guests. The main meeting was moved to the Engineering Building Library for the purpose of transacting regular business and to hear the guest speaker of the evening.

The business meeting was called to order by President H. M. James, and an introduction of members and guests was made by individual announcements. There were numerous students of the School of Engineering in attendance and their presence was similarly acknowledged. The minutes of the previous regular meeting and of the Executive Committee meeting were read and approved. Mr. C. T. Watts reminded the group of the July 26, 1951 anniversary deadline for filing applications for license under the recently enacted Professional Licensing law. The regular meeting of June 1951 was again designated as "Fellowship Night" and the Entertainment and Program Committee was charged with the responsibilities for the event. A discussion from the floor was made on the possibilities of having a Field Trip during the early part of May. It was suggested that a trip be made to the Carey Salt Company mine in Winnfield, Louisiana, and be planned so as to include the Alexandria Section of the L.E.S. if they so desired. Mr. Jesse Thornton, Chief Engineer of the plant outlined their facilities and extended an invitation in behalf of the Company. The Entertainment and Program Committee was again charged with the responsibilities of planning the visit. Mr. Glen Lee Corrigan, Head, Department of Petroleum Engineering of La. Tech discussed the work being done by a committee in relation to requirements for Member Grade in the L.E.S.

Mr. James then introduced the main speaker of the evening, Mr. Robert W. Cretney, Plant Superintendent of the Thermatomic Carbon Company, Sterling, La. Mr. Cretney's subject was "The Carbon Industry" and in it, he outlined the progress and improvements being made therein, and specifically those that were being made at his plant. His talk was very well received and was of much interest to the group which was evident by the number of interesting questions asked and answers given after the talk.

Fifty-one members and guests attended the dinner and approximately 75 were in attendance at the business meeting.

The meeting adjourned at 10:00 p. m.

WADE M. SANDERS, Sec'y-Treasurer
Monroe Section of the L.E.S.

Meeting Held In Alexandria

Secretary-Treasurer Tom C. David of the Alexandria Section writes that a meeting was held on March 8. Thirteen members were present. Mr. Irving Ward-Steinman spoke on the engineer's place in civil defense.

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PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

VOL. XXXVII

JUNE, 1951

NO. 3

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EDITORIAL NOTES AND COMMENTS

Our Front Cover. Our rooms at the St. Charles Hotel in New Orleans have recently been refurnished. The room is quiet and comfortable, air conditioned and has private toilet facilities. Out of town members especially might find this room a convenient place for a conference, or to rest while stopping over in the city for a few hours. Simply ask at the desk in the main lobby of the hotel, for the key to Room 422. As you face the desk, elevators to your left will be found more convenient. Prof. A. L. Dunlap and his committee have done a fine job in furnishing the room. It is hoped that members will make use of it.

Jobs Galore. This time last year, our engineering graduates were "beating the bushes" job hunting. This year the picture is vastly different. Secretary Fernandez has forwarded for publication the following letter, addressed to our Employment Committee, headed by Raymond P. Bassich.

"The Louisiana State Employment Service has recently received information indicating that experienced Personnel Managers,

Mechanical Engineers, Mechanical Draftsmen, Tool Engineers, Electrical Engineers and Heating and Ventilating Engineers will be needed in this area by manufacturers of material essential to the war mobilization effort. These men must have proven ability and a college degree in their field of work.

"Persons who are interested should register for work or submit a resumé of their experience to the Louisiana State Employment Service, 127 Elk Place, New Orleans, Louisiana.

"There is little demand for semi-skilled or non-skilled workers at this time in these industries. However, all persons interested in employment should file an application for work for consideration when the opportunity for work becomes available."

Our Annual Outing. Our genial Entertainment and Outing Chairman Claiborne Perrillat states that the golf tournament, horseshoes and other entertaining events are scheduled for the latter part of July. More details will be sent to the members later.

Double Feature for John Q. Taxpayer. The Rural Electrification Administration has granted more than \$45,000,000 in loans to super co-ops for generation and transmission systems in Missouri and Oklahoma. Most of this will duplicate lines and generating systems of business managed companies.

This is interesting in the light of the pledge of the administrator of REA in 1935. He was Morris Llewellyn Cooke, and he made this promise:

"The REA has nothing to do with any controversy about the form of ownership of utilities.

"We are out to create as many users of electric appliances as possible. We are not concerned with who supplies the current . . .

"If an application comes for funds to bring service into a rural area that is being served now by some company, that project is declared out instantly. We are not interested in setting up competition. We will not build any generating plants. We limit ourselves to applications from territory without service but which can be served by existing plants."

That was 1935. But federal agencies have to stay in fast motion to keep alive. Thus in 1950 REA is in the transmission and generating business in a big way.

The Unseen Army. With all the hue and cry over stabilizing this and that, our politicians are careful to avoid reference to the hiring of 1400 civilian federal employees each day. These employees of course, further inflate the "Help Wanted" market, and the desks, office space and typewriter requirements certainly don't depress prices. And of course these employees will remain on the federal pay rolls for years after their original function was abolished. The

Legislative Bulletin has the following comment on the newest wrinkle in stabilizations:

EXECUTIVE, ADMINISTRATIVE, AND PROFESSIONAL SALARY BOARD ESTABLISHED

Economic Stabilizer Eric Johnson has just established a new three-man Salary Stabilization Board. *This Board will rule on salary increases for bona fide executive, administrative, professional, and outside salesmen employees* as defined by the Fair Labor Standards Act. The new regulation applies to non-union employees only. Wages still will be covered by rulings from the Wage Stabilization Board.

The new Board may establish its own stabilization policies, but will be expected to have them conform closely to those already governing WSB. The Salary Stabilization Board composed entirely of representatives from the public, will be advised by Dr. George W. Taylor, WSB, chairman, who will serve as a non-voting member.

A Salary Stabilization Division has also been established with authority to interpret regulations and power to rule on requests for salary increases. Regional and Field Offices of the Wage-Hour Division will determine the appropriate Board to which specific requests should be referred.

PAPERS AND DISCUSSIONS

EXPERIMENTAL STRESS ANALYSIS*

For many centuries the design of various structures and machines was practiced as an art. The material was selected and shaped by experience and intuition. Some structures, such as the Roman aqueducts and the Egyptian pyramids, are still standing. Many other structures, not so well constructed, have long since been lost. Experience and intuition still form the basis for the design of many unimportant structures today. Such a basis cannot be used, however, on more important structures because of the uncertainty of the safety of the structure, on one hand, and the need to use the material as efficiently as possible, on the other.

The development of the scientific approach to engineering design seems to have begun with Gallileo, who experimented with materials in 1675 and wrote on the cohesion and resistance of materials to fracture. However, some of his concepts were erroneous. The first practical application of materials testing results was in connection with the construction of a bridge across the Seine River in 1658. At that time a testing machine of 36,000 pounds capacity was constructed and used in testing some of the materials for the bridge. Since then many types of testing machines have been developed and we now have machines ranging in capacity from a few grams to five million pounds and for various types of loading. As more experimental results on the properties of materials became available, engineering design developed along empirical, semi-empirical, and theoretical lines. Today the theory of elasticity is commonly applied, together with simplifying assumptions, to limited types of structures. A factor of safety, or factor of ignorance, is applied to take care of variation in the properties of the materials, and other factors. In many cases, however, the theoretical approach cannot be applied, either because the loads are unknown in direction or magnitude or the shapes are so complex that mathematical analysis is impossible. In other cases, residual stresses in the material may produce an entirely different stress pattern than that indicated by the theory.

Experimental stress analysis might be considered as any experimental means for determining the direction and magnitude of the maximum stresses at a point in the structure under service conditions. The following methods are now used rather commonly for determining stresses and stress distribution in structures:

* Presented by John K. Mayer, Professor of Mechanical Engineering, Tulane University, at the meeting of the Louisiana Engineering Society on April 9, 1951.

1. Measurement of linear strains at a point and the determination of the stress from the stress-strain relationship of the material.

2. The application of photoelasticity to the study of a transparent model of the structure.

3. The use of brittle models or the application of a brittle lacquer coating to the surface of the structure in order to determine the direction, and, to a limited extent, the magnitude of the maximum tensile stresses.

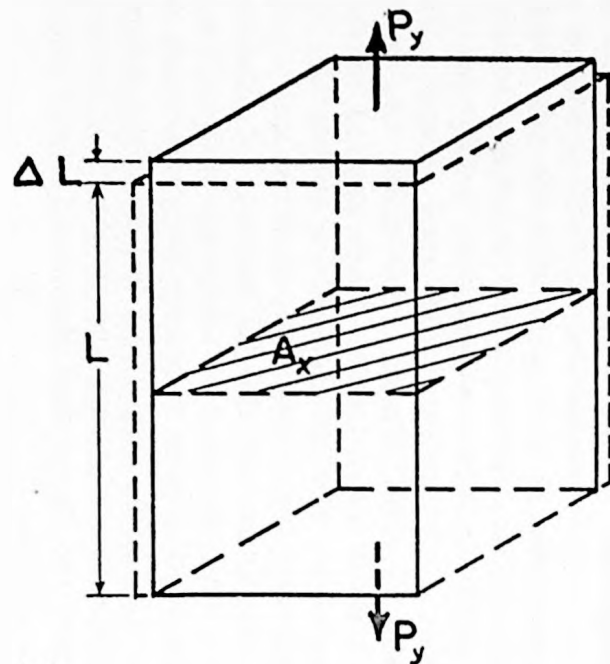
4. The X-ray examination of the material in order to determine the residual stress in addition to the location of defects.

5. The study of a structural model in order to determine forces, stress distribution, critical loads or vibration characteristics.

STRESS-STRAIN RELATIONS

A knowledge of the fundamental concepts of stress and strain is essential to the proper interpretation of strain-gage results. The two types of stress and strain and their relationships will therefore be reviewed before considering the experimental methods of stress determination. A simple rectangular block which receives a load P on its axis is shown in Figure 1 (a). The force is assumed to be uniformly distributed over the cross-sectional area A . The only stress existing on transverse area A is thus a normal stress of average intensity $\frac{P}{A}$. Linear strain is the change in length be-

tween two points which were originally a distance L apart. Linear strain is ordinarily called compressive if the gage length shortens under load, and tensile if it elongates under load. Thus, in the figure shown, a tensile strain exists parallel to the axis of the block, while in the transverse direction, a compressive strain exists. This, however, does not mean that a compressive stress exists in the transverse direction, since the decrease in width is produced by induced shear acting on planes at 45 degrees with the axis. Under axial loading conditions and for stresses below the elastic strength of the material, a given material will usually have a constant ratio between the transverse and the longitudinal unit strains. This ratio we know as Poisson's ratio. Figure 1 (b) shows the stress-strain curves obtained from axial tension loads applied to steel and to aluminum specimens. For usual design purposes the two most important factors obtained from this diagram are (1) the elastic strength of the material and (2) the modulus of elasticity, which is defined as the ratio of stress to strain for stresses below the elastic strength. The modulus of elasticity thus represents the slope of the initial portion of the curve and indicates the relative stiffness of the material without giving any information as to its strength. It is seen from the figure that aluminum would deform

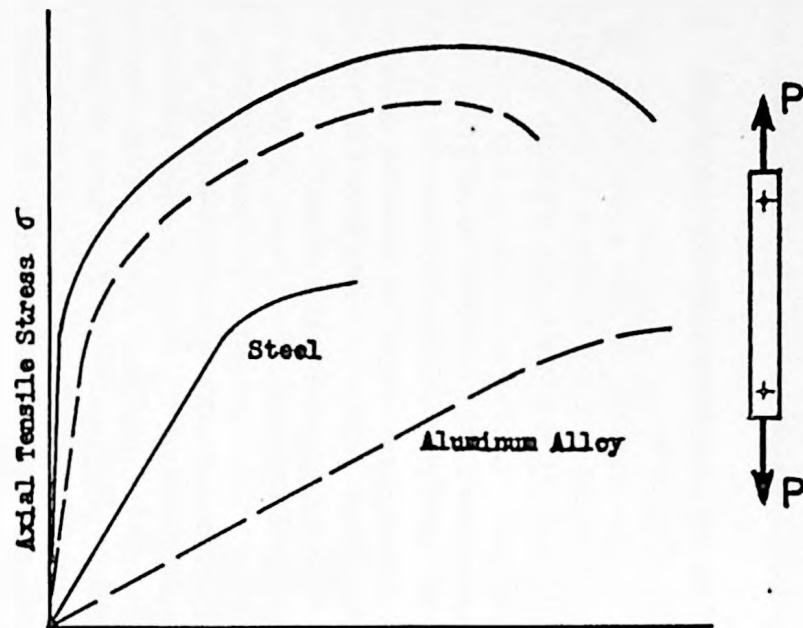


(a)

Normal Stress $\sigma_y = P_y / A_x$

Linear Strain $\epsilon = \Delta L / L$

Poisson's Ratio $\mu = \epsilon_T / \epsilon_L$
(Up to Elastic Limit)



(b)

Axial Linear Strain, ϵ

(Scale magnified for two lower curves)

Modulus of Elasticity $E = \sigma / \epsilon$ (Up to Elastic Limit)

Figure 1 Normal Stress and Linear Strain Relations

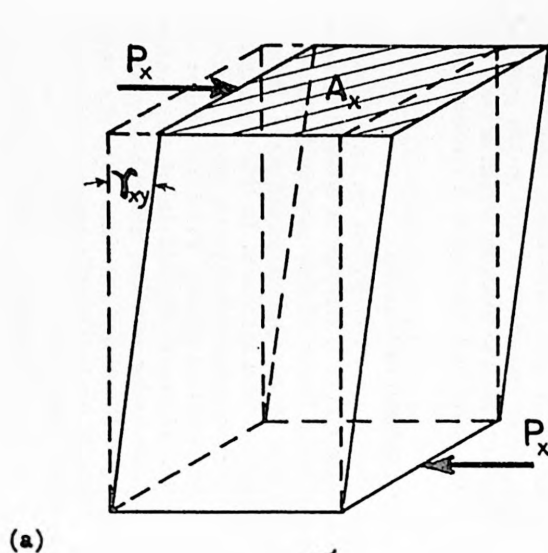
about three times as much as steel for the same stress so long as the stresses of both materials were below their elastic strengths. If other types of steel had been plotted on the diagram, all lines would have been found to start essentially along the same slope, but the elastic strengths would have depended upon composition, heat treatment, and mechanical working of the material.

The other type of stress and strain is indicated in Figure 2 (a). In this case a pair of forces P are applied to the faces of the cube having its cross-sectional area A in the plane of the applied forces. The average shearing stress is now $\frac{P}{A}$, the area being

measured in the direction of the load, rather than at right angles to the load as in the case of normal stress. The distortion due to this shearing stress is an angular distortion and the unit shearing strain is defined as the angular displacement of the line originally normal to the direction of the applied shearing force. Figure 2 (b) shows a pure torque T applied to a bar of circular cross-section. This torque produces a shearing stress on transverse planes varying from zero at the center of the bar to a maximum at the outer surface. A line originally parallel to the axis of the bar on the surface will form a helix under the application of the torque. The angular change of this line, or the helix angle, thus becomes the unit shearing strain at the outer fibers. If we plot outer-fiber shearing stress against shearing strain, a curve as indicated will be obtained. It is seen that this curve is similar to that for tension of steel with the exception that it rises continually, rupturing at a maximum load, since there is no reduction of area at the point of fracture. The ratio of shearing stress to shearing strain is known as the shearing modulus of elasticity and represents a torsional stiffness of the material.

PLANE STRESS RELATIONS

Both normal and shearing stresses usually act on an arbitrarily selected plane in a structure and it is desired to determine these stresses from the measureable linear strains produced. Figure 3 indicates the stresses induced by an applied tensile force P in a vertical direction along the axis of a specimen. In this case, transverse planes and the longitudinal planes receive no shearing stress, and such planes are called principal planes. Principal planes are designated according to the algebraic magnitude of the normal stress which they receive, the major principal plane receiving the maximum algebraic stress and the minor principal plane the minimum algebraic stress. Thus, if we call tensile stress positive and compressive stress negative, the transverse plane becomes the major principal plane while the longitudinal plane is the minor principal plane. If compression were considered positive, then the



Shearing Stress $\tau_{xy} = P_x / A_x$

Shearing Strain γ_{xy} = Change in
Right Angle

Modulus of Elasticity in Shear $G = \tau / \gamma$
(Up to Elastic Limit)

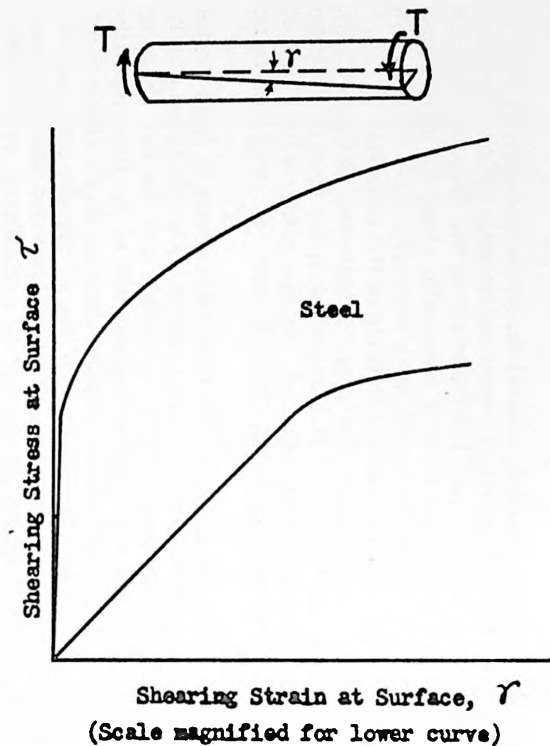


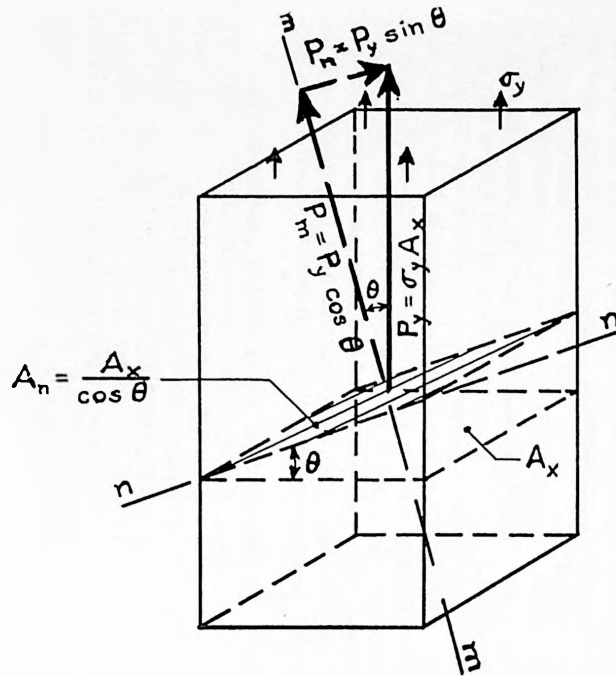
Figure 2 Shearing Stress and Strain Relations

transverse plane would be the minor principal plane. The normal stress and shearing stress on any oblique plane are the normal and tangential force components divided by the area of the plane. The equations show that stresses cannot be resolved in the same manner as forces because of the change in the area receiving the force.

If the shearing stress, τ_{nm} , and the normal stress, σ_m , both acting on the oblique plane n - n , are plotted on a pair of rectangular coordinates with equal scales in both directions, the locus of coordinates for all possible values of the angle θ from zero through 180 degrees becomes a circle as shown in Figure 4. This is known as the Mohr circle diagram and is a most convenient method for determining stress intensities and directions on any plane through a point in a two-dimensionally stressed body. Since the normal stress is plotted as the abscissa, the right end of the horizontal axis of the circle will always represent the major principal stress while the left end will represent the minor principal stress. The maximum shearing stress is seen to be one-half the algebraic difference of the principal stresses. If a line is drawn from a known point on the circle parallel to the plane which receives the stresses in the stressed body, the intersection of the line with the circle becomes the origin of the planes OP , and any other line drawn from this origin will represent a plane at that particular angle in the stressed body. The intersection of this line with the circle will give the shearing stress and the normal stress acting upon the particular plane. Thus in the case of Figure 3 where the major principal plane is horizontal, a line drawn horizontally from the right side of the circle locates the origin of the planes at the left side of the circle. A line then drawn at an angle θ from this point will intersect the circle at the point σ_m, τ_{nm} , which were the stresses computed analytically to exist on this plane. It is seen that the coordinates of stresses acting on two mutually perpendicular planes will always form the ends of a diameter of the circle. Thus, if both normal and shearing stresses can be determined on two mutually perpendicular planes, the circle diagram may be plotted and the maximum stresses determined readily in both direction and magnitude.

STRESS DETERMINATION FROM STRAIN MEASUREMENTS

For a given system of applied loads, the stresses will be different on every plane drawn through a particular point in the stressed body, and the linear strain will likewise differ along every line drawn through the point. Since the normal stress may be computed as the product of the linear strain and the modulus of elasticity only when the linear strain is measured in the direction of an applied axial load, a general relationship for the linear strain produced on a plane at an angle θ from a plane receiving known



$$\sigma_n = \frac{P_n}{A_n} = \sigma_y \cos^2 \theta$$

$$\tau_{nm} = \frac{P_t}{A_n} = \sigma_y \sin \theta \cos \theta$$

$$\sigma_n = \frac{P_n}{A_n} = \sigma_y \sin^2 \theta$$

$$\tau_{mn} = \frac{P_t}{A_m} = \sigma_y \sin \theta \cos \theta$$

Figure 3 Resolution of Stresses

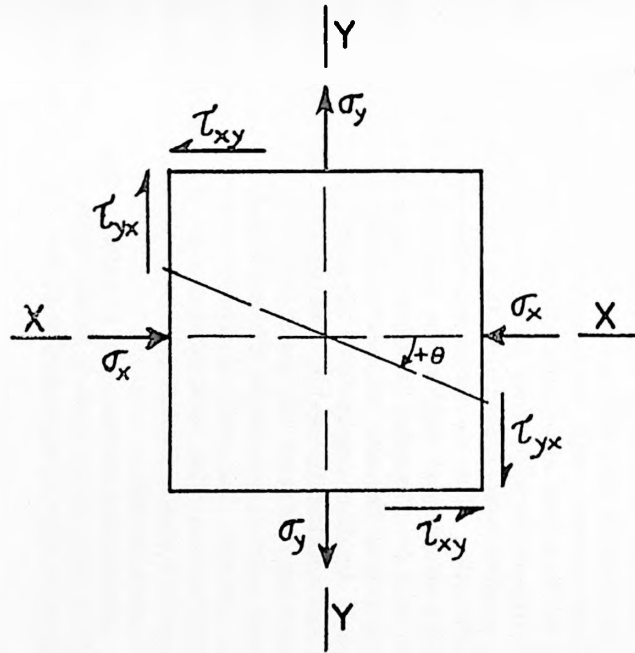
normal and shearing stresses must be developed. The general two-dimensional stress system and the stress-strain relationships for an elastic material are shown in Figure 5. It is noted that the linear strain, along a line at a given angle θ with the X-X axis depends upon the conjugate normal stresses, the shearing stress, and the angle between the planes, but for a given stress system will vary only with the angle. By measuring the linear strain along lines at three different angles through the point, we obtain three equations which can be solved simultaneously in order to determine the stress system at a point in a biaxially loaded material. The only properties of the material which must be known are the modulus of elasticity, Poisson's Ratio, and the elastic strength. If the angles are measured at particular values from the base plane, the general equations may be simplified considerably. The usual angles are zero, 45, and 90 degrees or zero, 60, and 120 degrees. The relationships are shown for the former case. The linear strains could be measured along these three lines through the point by any strain gage with sufficient sensitivity. However, the use of relatively long gage lengths will give average values rather than the values existing at the point. After the stress system on two mutually perpendicular planes has been obtained, the Mohr circle diagram may be drawn and the intensities and directions of the maximum stresses determined. Graphical, mechanical, and electronic methods have been developed to speed up these computations.

STRAIN GAGES

Any strain gage must be capable of measuring very small changes in length over a relatively small initial length. A number of systems have been devised and those in most common use are listed below.

GENERAL TYPES OF LINEAR STRAIN GAGES

1. Mechanical
 - a. lever, simple and compound
 - b. rack and pinion
 - c. combination of lever, rack, and pinion
 - d. scratch type, mechanical recording
 2. Mechanical-optical
 3. Optical
 4. Acoustical
 5. Electrical
 - a. inductance
 - b. capacitance
 - c. resistance
 - d. piezoelectric
 6. Pneumatic control principle
- Mechanical strain gages are usually the most simple type, but



$$e_a = e_x \cos^2 \theta + e_y \sin^2 \theta + \tau_{yx} \sin \theta \cos \theta$$

For $\theta_a = 0^\circ$ $e_a = e_x$

$\theta_c = 90^\circ$ $e_c = e_y$

$\theta_b = 45^\circ$ $e_b = \frac{1}{2} e_x + \frac{1}{2} e_y + \frac{1}{2} \tau_{yx}$

Or $\tau_{yx} = 2 e_b - (e_a + e_c)$

Then $\tau_{yx} = G \gamma_{yx}$ and $\tau_{xy} = - \tau_{yx}$

Also $e_x = \frac{\sigma_x}{E} - \mu \frac{\sigma_y}{E}$

and $e_y = \frac{\sigma_y}{E} - \mu \frac{\sigma_x}{E}$

Or $\sigma_x = \frac{E}{(1 - \mu^2)} [e_a + \mu e_c]$

and $\sigma_y = \frac{E}{(1 - \mu^2)} [e_c + \mu e_a]$

Figure 5 The Two-Dimensional Stress System

have the disadvantage of being relatively large and not suitable for dynamic loading. A gage length of about one-half inch is the smallest which may ordinarily be used satisfactorily with the mechanical strain gage. The scratch type gage is a simple mechanical gage in which an arm bearing a sharp needle is carried across a block set at some distance from the pivot point of the arm. A change in length between the block and the pivot point is indicated by a variation in the position of the scratch relative to an initial base line scribed under no load. A displacement of the scratches is determined by means of a microscope. The mechanical-optical strain gage consists of a combination of mechanical and optical levers, the reflecting surface being pivoted on the gage and the source of light reflected from this mirror to a suitable scale. While this gage is quite sensitive, it has the disadvantage that it must be read and therefore cannot be placed in inaccessible locations. The true optical strain gage is of the interferometer type, and while it is inherently the most accurate because it involves the measurement in terms of the wave length of light, there are a number of practical difficulties to its use. The acoustical gage consists essentially of attaching a tensioned wire to the specimen so that the tension in the wire will be changed by strains of the specimen. This wire is vibrated at its natural frequency and a comparison gage is used to determine the strain required to produce the difference in frequency. The inductance strain gage is composed of an iron-cored coil, the inductance of which may be varied by a change of the spacing of the air gap or by the movement of an iron armature within the coil. The capacitance strain gage operates upon the change in the capacity of a condenser either by a change of plate spacing or by a change of plate area. The change in capacity may be measured by a capacitance bridge. This gage is rarely used due to dielectric problems and clamping difficulties. The development and application of the resistance wire strain gage within the past decade has been so great that it will be discussed in detail later. The piezoelectric strain gage involves the use of electric currents generated in certain crystals by the application of force or strain. Some crystals are not electrically stable, and another disadvantage is that only compressive strains may be applied. The pneumatic control strain gage consists essentially of two air chambers discharging through a nozzle, the area of which is determined by the strain of the material. The back pressure on the nozzle is thus dependent upon the strain. Such a gage is suitable for the measurement of static strains only.

ELECTRICAL-RESISTANCE STRAIN GAGES

The resistance wire strain gage is based upon the principle that the resistance of a wire changes under strain. The resistance of a

wire varies directly as the product of the specific resistance of the material and the length of the wire; it varies inversely as the cross-sectional area. Thus, if the wire is stretched, the length increases while the cross-sectional area will decrease. Both of these effects tend to increase the resistance of the wire. If Poisson's ratio for the material is known, the cross-sectional area may be determined and the expected resistance under strain computed. The ratio of the unit change in resistance to the unit change in length is called the gage factor, which for a Poisson's ratio of 0.3 would be 1.7. Experimental determinations of the gage factor yield values varying from -12 for nickel to +5.1 for a five per cent iridium-platinum alloy. This behavior of the material can only be explained by variation of the specific resistance of the material under strain, a phenomenon which is little understood at present. A certain alloy will, however, have a constant gage factor so that if this factor is known, the unit strain may be computed in terms of a measured unit change in resistance. Three alloys are commonly used in commercial wire resistance strain gages:

1. A copper-nickel alloy, having a gage factor of +2.1;
2. Elinvar, having a gage factor of +3.6;
3. Nichrome, with a gage factor of +2.1.

A high gage factor is desirable since it produces greater sensitivity in the use of the gage. The copper-nickel alloy, however, has a much lower variation of resistance with temperature change than the elinvar or the nichrome alloys. The nichrome alloy is used for high temperature strain gages. The wire used in the resistance strain gage may be either mounted in a frame, which is attached to the material under stress, or it may be cemented directly upon the surface of the material. The discussion here will be limited only to the latter case.

Bonded wire resistance strain gages consist of a length of alloy wire approximately 0.0009 inch in diameter, which is looped back and forth a number of times and cemented to a plasticized paper. The small wire is soldered to heavier wire leads to which connections may be made. These units are called SR-4 strain gages and are available in commercial lengths from $\frac{1}{16}$ inch to 6 inches with resistances ranging from 40 to 2,000 ohms. The most simple arrangement of the wire consists of a single element gage in which the wires are laid back and forth in parallel lines. While this gage is sensitive primarily to strains along the length of the wire, it also has a sensitivity of about 2 per cent in the transverse direction due to the loops at the ends of the sections. Since in order to determine the complete stress system at a point it is necessary to measure the linear strain along three lines through the point, electric resistance

strain gages have been produced which consist of three or four single element gages crossed at a point and insulated electrically from each other. These arrangements are known as strain rosettes. Several other arrangements of the wire have been developed for specialized purposes. The application of the SR-4 strain gage to the surface of the material consists first of smoothing and cleaning the surface thoroughly, coating it with a cellulose or some special cement, and then applying the gage together with its paper backing. A light pressure should be applied to the gage and the cement be allowed to cure for about 24 hours before use. After a gage has once been applied to the material, it cannot be removed to be used at another location. The gage unit is usually coated with some high melting point wax such as ceresine in order to keep out moisture.

Within the last year several special types of SR-4 gages have been developed. The dual-lead gage consists of a gage wire as in the regular gages with an intermediate section of wire about .0025 inch in diameter, which in turn connects to the lead wires having a diameter of .0011 inch. The introduction of this intermediate section is quite effective in reducing slight movements of the lead wires at their junctions with the fine wire. A small piece of Tuffon plastic is inserted under the intermediate wires so that they will not bond to the material. This type of gage is particularly suited to impact strain measurements.

Since the resistance of the wire changes with temperature, the resistance strain gage would show an apparent strain under temperature changes only. The usual method of compensating for this change in resistance with temperature is to use a dummy gage cemented to a similar piece of material but not stressed. In cases where wide temperature ranges are encountered and where these temperature changes take place rapidly, the dummy gage will not follow the active gage properly. A self-compensated gage has been produced for use under these conditions. It consists of a gage made up of two wires, one having a positive temperature coefficient, the other a negative coefficient. Thus, the increase in resistance due to change in temperature on one wire tends to balance the decrease in resistance on the other section of the wire. While it is not possible to find two materials which exactly balance over a wide range of temperature, the use of these gages has greatly improved the accuracy under these conditions. Such gages show an apparent strain of only about 50×10^{-6} over a temperature range of -50 to +350 degrees F within 30 minutes. By using a dummy gage the change is reduced still further even though the temperature of the dummy gage may not follow that of the active gage exactly.

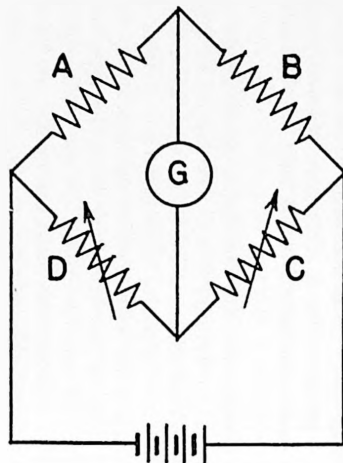
The ordinary SR-4 strain gage is linear up to about 2 per cent elongation. For measurement of greater strains, a post-yield gage has been developed which is suitable for measuring strains up to 20 per cent in 2 inches. An extensometer which will measure strains up to 70 per cent is contemplated. Post-yield gages are made of a ductile wire attached to a tissue backing with a special cement and are of the dual-lead type.

The copper-nickel alloy gages may be used up to about 300 degrees F, whereas the nichrome gages may be used up to about 1,600 degrees F. These high temperatures gages are applied to the surface of the material with a ceramic cement after a pre-coat has first been applied to prevent scaling of the material at the high temperature. Such gages are linear within 15 per cent up to 1,500 degrees F.

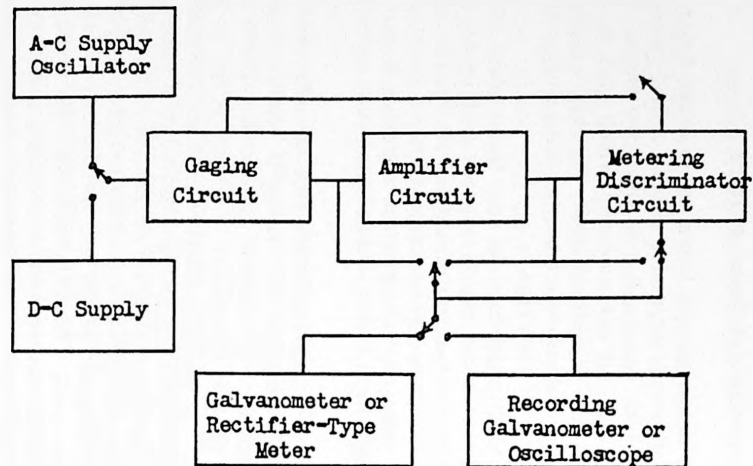
ELECTRIC-RESISTANCE GAGE CIRCUITS AND APPLICATIONS

The indicator used to determine the change in resistance of the gage should respond to resistance changes in the order of .0002 ohm. The Wheatstone bridge circuit, shown in Figure 6 (a), is most commonly used for measuring these small resistances. The ordinary DC Wheatstone bridge with a sensitive galvanometer is sufficiently accurate for the determination of static strains. However, the type of galvanometer required must be especially mounted to prevent vibration, so that the arrangement is not portable. By impressing an alternating voltage on the Wheatstone bridge, the unbalanced voltage, due to the change in resistance of the gage, may be passed through a vacuum tube amplifier and amplified several thousand times. This permits the use of a much less sensitive galvanometer, which will not be affected appreciably by vibration. The Baldwin-Southwark Company has developed a portable strain indicator using the AC bridge circuit. This unit is 6 in. x 9 in. x 12 in. and weighs about 25 pounds complete with batteries. The bridge is balanced to the null point by a slide wire resistor together with step resistances, and readings of strain may be obtained to about 2×10^{-4} .

The essential circuits for the resistance strain gages are shown by the block diagram in Figure 6 (b). The output of the amplifier circuit is usually passed through a discriminator circuit in order to produce deflections in opposite directions for tensile and compressive strains. When the strain varies too rapidly to be followed by manual balancing of the bridge, some other type of indicator or recorder must be used in place of the ordinary indicating galvanometer. The instruments most commonly used for dynamic work are shown in the table below.



(a) D-C Wheatstone Bridge Circuit



(b) Block Diagram of Essential Strain Gage Circuits

Figure 6

INDICATORS AND RECORDERS FOR DYNAMIC STRAIN MEASUREMENT

Device	Number of Channels	Frequency Response
Self-balancing pen recorder	1-2	2 cycles/sec
D'Arsonval pen recorder	1-6	4
Multi-channel oscillograph	50+	5,000
Cathode ray oscilloscope	1-6	100,000
Tape recorder	40	1,000 (?)

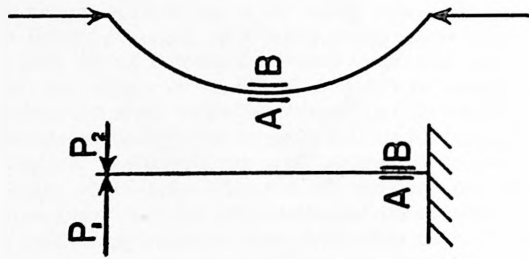
SR-4 gages respond accurately up to 50,000 cycles per second. However, in choosing an indicator or recorder for high frequency work, the maximum frequency response of the instrument should be several times the frequency of the fundamental wave. For complex waves it may be necessary that the instrument be capable of following a frequency as much as 20 times that of the fundamental wave frequency. One of the great advantages of the SR-4 gage is that its indications may be telemetered by wire, radio or television.

The principal applications of the SR-4 gage fall into the following groups:

1. The measurement of flexural strains;
2. The measurement of axial strains;
3. The measurement of shearing strains;
4. Fluid pressure measurements;
5. The measurement of residual strains.

In the measurement of flexural strains, the bridge circuit output may be increased by using two gages; one on the tension side of the member and the other on the compression side. By connecting these gages into the adjacent arms of the Wheatstone bridge, the unbalanced voltage produced for a particular deflection of a symmetrical beam will be twice that which would result from the output of a single active gage in one arm of the bridge and a dummy gage for temperature compensation. Several arrangements of these gages are shown in Figure 7 (a) and may be used for the measurement of deflection, force, acceleration, and the like.

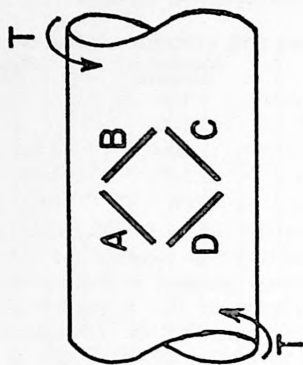
For determining the axial strain of a specimen subjected to either a tensile or a compressive force, two gages are placed on opposite sides of the specimen, their axes parallel to the axis of the specimen as shown in Figure 7 (b). These two gages are connected in opposite arms of the Wheatstone bridge while the dummy gages may be applied to a similar piece of material and connected in the adjacent arms of the bridge. Thus, any bending of the specimen will produce an increase on one side which will balance the decrease in resistance on the other side, the net result being the axial strain. In some cases, it is more convenient to place all four gages on the specimen, two parallel to the axis and the other



(a) For Flexural Strains



(b) For Axial Strains



(c) For Torque Measurement

Figure 7 The Application of SX-4 Gages for Three Types of Loading

two in transverse direction. Under this condition, the transverse gages also receive a small linear strain due to the Poisson's ratio effect of the material. This correction can be made in determining the true axial strain.

Since the application of a pure torque to a circular bar produces compressive stress at 45 degrees in one direction and tensile stress at 45 degrees in the opposite direction from the axis, four gages can be placed at 45 degrees from the axis and connected into the arms of the Wheatstone bridge in order to produce the maximum unbalanced voltage for a torque applied to the bar. This is indicated in Figure 7 (c). When the torque is to be measured on a rotating shaft, leads may be brought out through slip rings on the shaft. Such torque measuring units have been operated successfully up to 30,000 revolutions per minute. A further application of this system consists of combining the unbalanced voltage from the four SR-4 gages, which is proportional to the torque, with the output of a magneto driven from the shaft. Since the horsepower transmitted by the shaft is proportional to the product of the torque and the speed, these two electrical outputs may be combined in an electronic circuit so as to indicate horsepower directly. A very compact unit of this type has been developed for balancing the power of multi-engine diesel ships.

By mounting four single elements at 90 degree intervals around the shaft and parallel to its axis and an additional two units at 45 degrees with the axis of the shaft and set diametrically opposite, it is possible to produce a unit which will indicate stresses on three perpendicular axes. Any bending and axial load would be indicated by the units parallel to the shaft, while any torque will be indicated by the 45-degree units. Such a six-element unit has been used for supporting models in a wind tunnel in order to determine the complete force system acting upon the model.

Fluid pressures may be measured either by applying strain gages to the outside of the tube carrying the fluid or to the outside of a diaphragm which receives fluid pressure on the opposite side. In the case of the tube gages, elements are mounted tangentially in order to read the change in strain from the change in internal pressure. Temperature compensating units may be mounted axially on the same tube. Two types of diaphragm strain gages are used:

1. A spirally wound resistance wire mounted on the surface of the diaphragm;
2. A system of four single element gages, two set radially, and two tangentially, thus giving a temperature compensated arrangement.

Residual stresses may be determined by applying a strain rosette to the surface of the material, taking initial readings, then very

carefully cutting or drilling out the section containing the strain gage. Readings on the gage are taken after the relaxation of the stress and the initial stress thus calculated.

PHOTOELASTICITY

Certain transparent materials, when strained, affect the transmission of polarized light in such a way as to permit determination of the stress distribution over the section. This action is most easily explained by the wave theory of light propagation which considers light to be transverse electromagnetic waves propagated along straight lines to be transverse electromagnetic waves propagated along straight lines called rays. In ordinary light the vibration takes place simultaneously within an infinite number of longitudinal planes crossing on the ray. At any point on the ray this action may be represented by vectors radiating from the line of propagation. Since the length of each vector represents the amplitude of its wave, a section taken one-half a wave length away from the initial section would show vectors of the same length but reversed in direction. White light is composed of waves of various lengths or frequencies while all waves in nonochromatic light have the same length.

When the vibration is constrained to a single plane the light is said to be plane-polarized. This effect is easily obtained by placing a Polaroid screen transversely in the light beam. Polaroid is composed of numerous rod-shaped crystals of extremely small diameter all oriented in one direction. Thus only the light rays vibrating in planes nearly parallel to the axis of the crystals may pass through the screen. If a second Polaroid screen is placed behind the first and set so that its axis is 90 degrees from the first, only a deep purple light will emerge.

doubly refracting under strain. This means that a polarized light

Certain transparent materials have the property of becoming doubly refracting under strain. This means that a polarized light ray entering one face of the material will be broken down into two components parallel to the major and minor principal stress planes at each point in the material. In addition, there will be a retardation in the velocity of propagation through the material. The relative retardation between the two components is proportional to the difference in the major and minor principal stresses, or maximum shearing stress, at the point.

This action is shown in Figure 8 where a monochromatic light source as indicated by a finite number of radial vectors is applied to a Polaroid screen, which permits the passage of only those vibrations in a vertical plane. The plane-polarized rays represented by the vector *oa* is resolved into the two components parallel to *bb* and *cc* respectively by passing through the doubly refracting material. If the principal stress difference is such that the relative

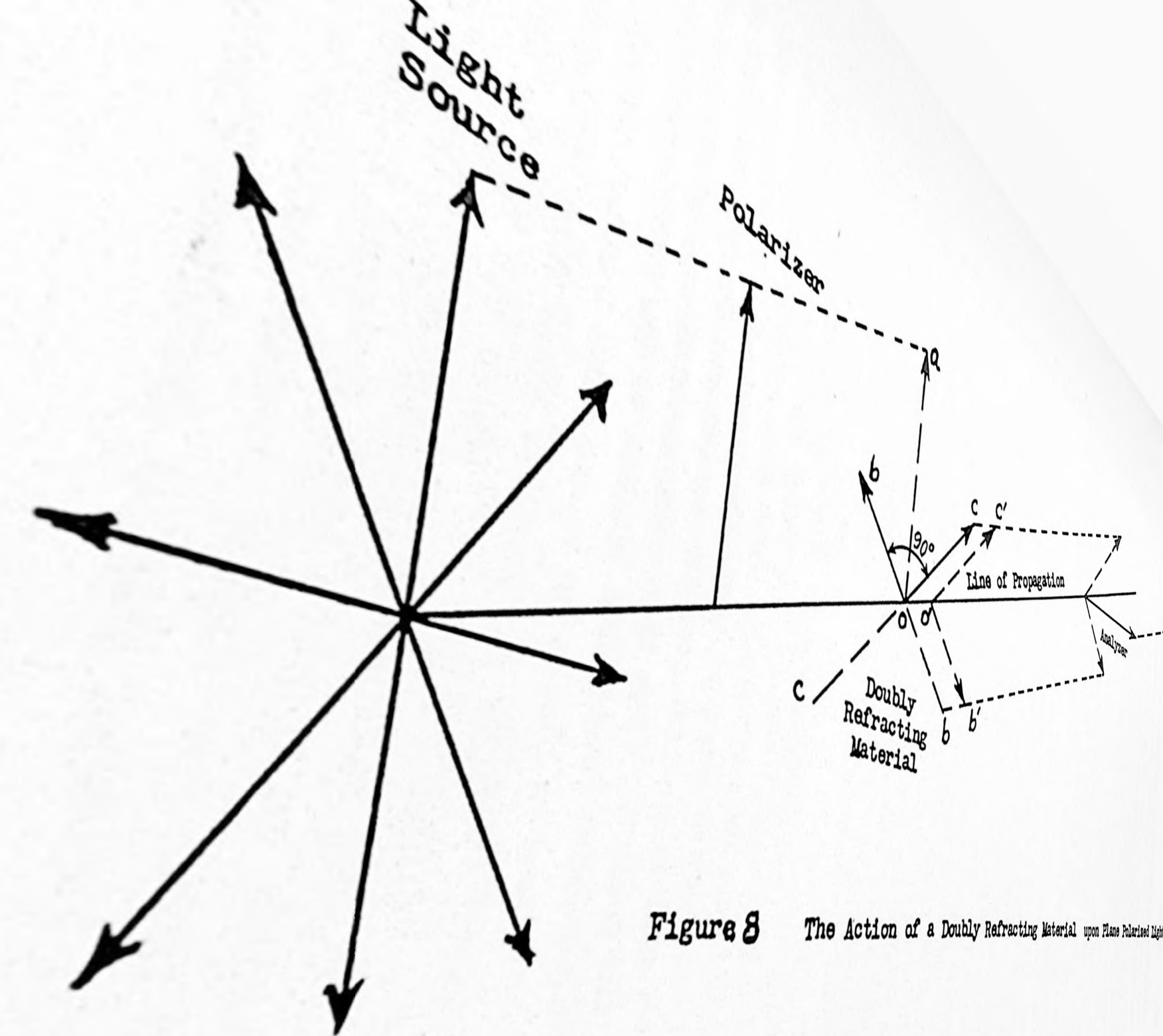


Figure 8 The Action of a Doubly Refracting Material upon Plane Polarized Light

retardation between the components is any odd number of half wave lengths, one component will be reversed in direction as indicated by $o'b'$. A second Polaroid screen placed behind the model and oriented horizontally will permit the passage of only the horizontal components of $o'c'$ and $o'b'$. In this case the horizontal components are in the same direction, indicating that light would be transmitted through this point in the material. However, if the relative retardation of the two components emerging from the model was such that the horizontal components were of the same magnitude, but in opposite direction, no light would be transmitted. It is thus seen that as the stress on the model is slowly increased, the light transmission through a particular spot on the model will pass through a series of cycles varying from zero to a maximum.

One complete cycle of light intensity variation is called a fringe order. The models used for photoelastic studies are made from materials having a linear relationship between the fringe order and the principal stress difference, so that if one of the principal stresses can be determined, the stress system at the point may be obtained from the observed fringe order. Since many points on the model will be at the condition of zero light transmission under a particular applied load, there will appear a series of dark lines on the section. These lines are known as isochromatics and represent contours of equal principal stress differences. The models are usually made of bakelite about $\frac{1}{4}$ inch thick, and the fringe order-stress relationship determined by calibration of a small tension specimen under known applied stresses. The stress distribution in the prototype will be similar to that in the model only so long as a constant stress-strain ratio exists within the prototype material.

It is often desired to study stresses in a three-dimensionally stressed body. The development by Westinghouse Electric Corporation of a bi-phased transparent material known as Fosterite has opened the door for such study. Upon slow cooling of this material after it has been stressed at about 250 degrees F the strain pattern is frozen and is not affected by subsequent removal of load or cutting the section. Thus thin plane sections may be cut from the three-dimensional model and studied in the usual way. Fosterite may be obtained in blocks up to one cubic foot but can not be cast.

Photoelasticity finds its greatest application in the design and study of complicated sections which can not be analyzed satisfactorily by the mathematical approach. From such a study it is often possible to remove some material from the lightly stressed areas and revise the highly stressed sections with the result that a lighter and stronger part is produced. Photoelasticity is also very

useful in studying stress concentrations caused by small fillets, holes, narrow contact faces, etc.

BRITTLE MODELS AND BRITTLE LACQUER COATINGS

Brittle materials were the first type to be studied systematically since Galileo used stone beams in his experiments. Models made from a brittle material, such as plaster or a synthetic resin, are now sometimes used for determining the approximate stress existing just prior to a tensile fracture. The material must first be calibrated by determining the failure stress for small tension specimens. The material must have a constant stress-strain ratio and must fracture without appreciable deformation. The use of brittle models is often unsatisfactory, however, since failure begins when a limiting tensile stress is reached and may thus be greatly influenced by stress concentrations, which may differ in model and prototype.

A modern variation of the above principle is the application of a brittle lacquer coating to the surface of the test piece. The surface is usually first given a coat of aluminum paint and then sprayed with "Stress-coat," a product of the Magnaflux Corporation. Twelve types of lacquer are supplied in the kit and the most suitable one selected on the basis of temperature, humidity and stress. A steel calibration strip is prepared in the same manner and then clamped in a jig, so that it may be deflected as a cantilever beam. The stress at which the first crack appears under a certain deflection is read from a scale on the jig. Thus the stress at the point where the first crack appears on the test piece may be determined with fair accuracy. Stresscoat provides a means of tensile stress determination over very small areas where strain gages might not be applicable.

Stresscoat is often applied in order to locate the points and directions of high tensile stress. Strain gages may then be applied more intelligently to the test piece for further study of the highly stressed areas. The location of maximum tensile stress points is also important in the case of repeated loading which may produce a fatigue failure. Stresscoat provides a rather simple method of determining tensile stresses produced by dynamic loading. It may also be used to locate areas of local yielding since it flakes off at such points.

Residual stresses may be determined by coating the test piece with a sensitive brittle lacquer, then drilling holes about $\frac{1}{8}$ inch in diameter and $\frac{1}{8}$ inch deep into the surface. The relief of any residual stresses which existed in the material removed will produce a particular stress pattern as indicated in Figure 9.

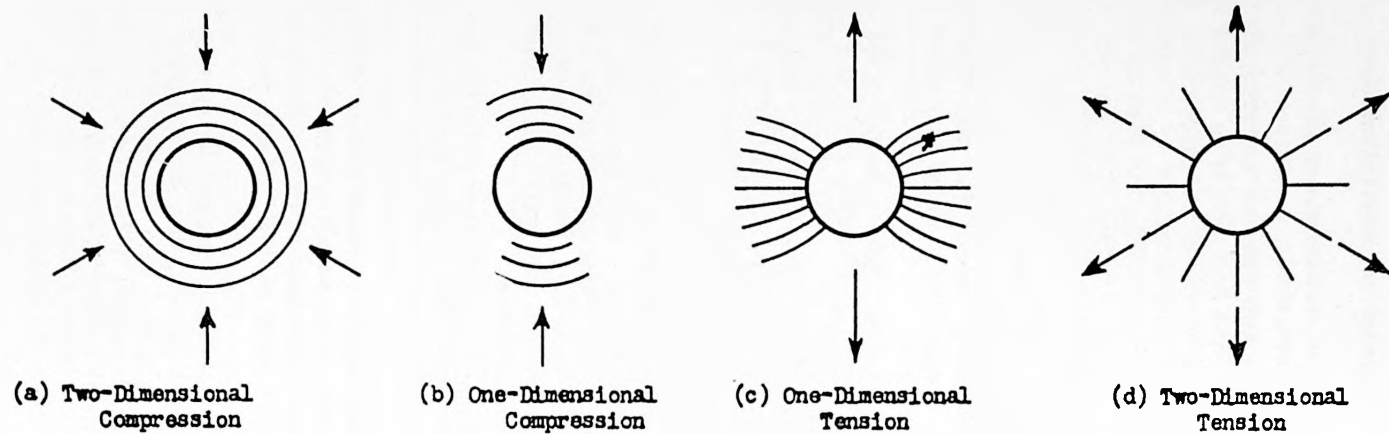


Figure 9 Idealized Stress-coat Crack Patterns From Residual Stresses

RADIOGRAPHY

The most common use of X-rays and gamma rays in the examination of materials is for locating hidden defects. However, X-rays may also be used for stress measurement in crystalline solids, since the diffraction of the X-rays permits the determination of strain in terms of interatomic distances. This method measures elastic strains only and is the one method by which residual strains may be determined without measuring the unstressed material or without cutting or drilling sections.

The X-rays are usually applied to a spot about $\frac{1}{8}$ inch in diameter on the surface and show conditions within a layer less than 0.001 inch thick. One X-ray beam is directed perpendicular to the surface and another at 45 degrees. Stress components at the surface in the direction of the tilted beam may then be computed from the pair of photographic exposures. Such stress determinations are accurate to about 3,000 psi for fine-grained materials. The accuracy is less for quenched, coarse grained or cold-worked metals. A combination of a Geiger counter and an automatic recorder is being developed to produce a plot of stress vs diffraction angle and thus permit more rapid examinations. The X-ray examination also gives qualitative information as to plastic strain and may be used to determine whether recrystallization is complete after annealing cold-worked metal.

USE OF STRUCTURAL MODELS

The analysis of a structural model often yields valuable information, particularly in research and development of structural design. Structural model analysis may be used when a mathematical solution is impossible, such as the determination of stress distribution in an irregular shape; as a short-cut in the solution of very complex problems, such as the analysis of a complex building frame; and to verify mathematical solutions of important or unusual structures. The latter case is exemplified by the common practice of building structural models of proposed suspension bridges. The specific object of tests on a particular structural model may be one or more of the following:

1. Determination of axial forces, shearing forces and resisting moments at certain sections.
2. Determination of stress distribution.
3. Determination of critical or buckling loads.
4. Analysis of vibration characteristics .

CONCLUSION

The rapid development of the field of experimental stress analysis within the past ten years has brought about safer design and more

efficient use of materials and at the same time advanced the theoretical approach to complex problems.

One important point to be remembered is that the modulus of elasticity and Poisson's ratio for any material are constants only up to the elastic strength of the material. Equations containing these terms, therefore, can not be applied when the stress at any point in the material exceeds the elastic strength.

While several of the experimental stress analysis methods yield the same information, each has certain advantages and disadvantages which should govern the selection of the method to be used on a particular investigation. The complimentary use of two or more methods is often advisable.

The Society for Experimental Stress Analysis, a national organization founded in 1943, has done a splendid job of collecting and disseminating information in the field. The two volumes of the proceedings published each year by the Society contain technical papers concerning the application of experimental stress analysis to a wide variety of problems.

NEWS ITEMS

Monroe Section Field Trip. Members of the Monroe Section, Louisiana Engineering Society, had as their guests a number of Louisiana Tech engineering students and a group of Alexandria Section members when they enjoyed a guided trip through the plant and underground workings of the Carey Salt Company at Winnfield, on May 4, 1951. Several members and guests were accompanied by their wives. All of the approximately 60 persons making the trip were impressed with the activities and equipment observed and with the courtesy of the staff at the plant and mine.

The Carey Salt Company began operations at Winnfield in December of 1931. The mine is 811 feet deep and now has about six miles of tunnels excavated through solid salt. The year-round temperature in the mine is constant at 95 degrees Fahrenheit. The company is proud of its three-year safety record. During this time there has been no underground accident resulting in loss of working time.

Many ingenious methods and pieces of equipment were seen in operation. All types of activities, from the blasting of the rock salt to the packaging of the finished product, were demonstrated to the visitors during the trip, which lasted about two and one-half hours. Souvenir packages of salt were presented; and some time after the trip, those participating received from the Carey Salt Company a certificate conferring the Honorary Degree of Carey Salt Miner. Upon the completion of the inspection trip through the mine and plant, refreshments were enjoyed by the members and their guests.

* * *

DEADLINE FOR REGISTRATION OF ENGINEERS WITHOUT EXAMINATION IS JULY 26 ,1951. THIS IS THE RULING OF THE ATTORNEY GENERAL OF THE STATE OF LOUISIANA. FOR FURTHER DETAILS CALL OR WRITE TO PROFESSOR FRANK MACDONALD, EXECUTIVE SECRETARY OF THE STATE BOARD OF REGISTRATION. ADDRESS: TULANE UNIVERSITY, CIVIL ENGINEERING BUILDING; PHONE WALNUT 0970.

ENGINEERING BRIEFS

Soft Lights. A new method of lighting, now being developed by Sylvania Electric Products, Inc., offers promise of new freedom in lighting design. Although it is not yet ready for widespread commercial application, it may ultimately prove as significant as fluorescent light. Light is produced by the direct transfer of energy from an alternating current source to a phosphor coated on an insulator, which covers one side of a sheet of electrically conducting glass, and is itself covered with metal foil. Although a similar phenomenon had been noted before, useful brightnesses were not achieved until recently. The complete light source has the appearance of an ordinary sheet of frosted glass; no vacuum or containing envelope is involved. These "electroluminescent" plates give off light without any gaseous discharge, as in fluorescent lights or neon tubes, or any heating of a filament, as in incandescent lights. Unlike these conventional lights, which are a point or line source of illumination, electroluminescent lights are an area source, with the intensity of the illumination relatively low. This gives a soft, shadowless light, which is not too bright to be viewed directly.

Manufacturing techniques are altogether different from those employed in making conventional incandescent or fluorescent lamps. Large sheets of conducting glass or perhaps plastic can be covered with the phosphor and the metal foil in a film only a few thousandths of an inch thick. The glass would be made conducting by firing appropriate materials onto its surface, then a thin insulating layer of phosphor would be sprayed on, and the metal foil would complete the sandwich. Simple power connections have been devised, and no "starter" is needed, as with a fluorescent light.

Since the intensity of illumination is lower than that of conventional lighting, it would be necessary to cover a whole wall or ceiling with glowing panels in order to light a room on ordinary 110-volt, 60-cycle household current. Higher voltages and higher frequencies produce brighter light, which requires small transformers, similar to those in fluorescent lights. While the cost of glass alone for such installations might be rather high, thin sheets of transparent plastic might effect considerable savings. Actual commercial installations of this type are thought to be several years in the future, although for special decorative effects where cost is not of prime importance the method may offer interesting possibilities.

SMALL LIGHTS

Smaller areas, where it is desirable to have low illumination and correspondingly low power consumption, are expected to be

among the first commercial products using this principle. Powered by household circuits, lighted clock faces, instrument panels, night lights, and markers for darkrooms may win widespread acceptance.

The color given off by the electroluminescent sources depends upon the frequency of the alternating current and also on the chemical composition of the phosphor. The phosphors are not the same as those used in fluorescent lights, and it may be that more powerful ones can be discovered. Pure white light has not yet been achieved, but colors approaching daylight have been developed. Intensity can be controlled by varying the voltage at a given frequency or the frequency at a given voltage.—*From Industrial Bulletin, of Arthur D. Little, Inc.*

* * *

One for the Money. Military demands for titanium may stimulate production of this versatile metal into real tonnage figures, if current development projects show promising results. While total titanium production in 1950 was only 120,000 pounds, a recent military order called for 75,000 pounds, and production by the end of the year rose to the rate of 550,000 pounds annually. If cheaper and more efficient production methods can be put into widespread use, thus reducing the price of the metal, a market is ready for greatly increased output.

Even at current prices of \$5 a pound for "sponge" metal, \$7 a pound for ingot, or \$15 for sheets in quantity, titanium's unique properties offer advantages which sometimes outweigh the cost. Some authorities predict widespread use and a price of \$1.50 a pound for sponge in the foreseeable future. Titanium's advantages for military applications are its lightness combined with strength and its resistance to corrosion. The largest projected use of titanium is as structural members in aircraft. It has been conservatively estimated that titanium can save at least a ton in the construction of heavy planes, such as the B-36, thereby permitting an additional ton of fuel or useful load to be carried. Wherever it is possible to substitute the same thickness of titanium for stainless steel, weight savings of 40 per cent are achieved. Non-structural parts for aircraft, such as de-icing ducts and fittings, are already in production. Ordnance is also interested in titanium to lighten the load of ground troops by providing greater fire power per pound carried. A titanium base for an artillery mortar, for example, weighs only 24 pounds, compared with almost twice as much for the alloy steel which is now used. For naval use, titanium's resistance to corrosion by sea water is an advantage.

Because of titanium's high melting point, 3150° F., it was at one time hoped that the metal would be particularly useful in jet aircraft, rockets, and similar applications. Experiments have shown, however, that strength falls off rapidly above 800° F., and at about

1000°F. irreversible absorption of oxygen and nitrogen causes embrittlement of the metal. Suitable alloying may overcome this.

Although the two U. S. commercial producers are planning further increases in capacity, the problem of producing titanium remains serious. A high plant investment of \$1500 an annual ton is needed for the Kroll process of reducing the original titanium compound to usable metal, excluding the costs of plants to produce the starting compound and the magnesium used in the process. Operating costs are also high since the process requires considerable materials handling. Further, it takes a pound of magnesium — itself scarce — for each pound of titanium. Ten kilowatt hours of electric power are necessary to produce this magnesium, and another one to five kilowatt hours for the titanium reduction. The possibility of a better and cheaper method displacing the Kroll process also causes some hesitation in expanding titanium capacity.

KROLL PROCESS

The Kroll process starts with titanium tetrachloride. This may be obtained from treating the ore directly with chlorine and carbon or by treating titanium dioxide, which has been extracted from the ore with acid. The tetrachloride is then treated in a heated reactor, with magnesium is substituted for the titanium salt, leaving metallic titanium. A technical and economic drawback to the process is the fact that the titanium metal produced is in a sponge which must be separated from the remainder of the mass — usually by distilling off the magnesium chloride at low pressures — before being converted into dense ingots. The metal is generally melted and cast into ingots in a vacuum furnace or in an inert atmosphere, such as argon, because the molten titanium is reactive with air. Alternatively, the sponge metal may be compressed into ingots.

The ideal process would permit reduction of a titanium compound to metal in usable form directly, but the only process which accomplishes this at present does not appear to be commercially feasible. When titanium tetraiodide is placed in a vacuum adjacent to a hot filament, it will decompose and deposit crystals of pure titanium on the filament. The process is used in laboratories to produce small quantities of pure titanium for research purposes, but nobody has discovered a way to translate this laboratory method into a full-scale plant production process.

Another process is that of a Canadian company, which has been reported to produce titanium by direct reduction of titanium dioxide with calcium metal. Savings are said to be possible because this oxide is a cheaper form of titanium than the chloride compound used as the starting material in the Kroll process. The higher cost of calcium in comparison with magnesium would, however, offset these savings. Some experts, moreover, believe that production of a titanium free of oxygen would be difficult.

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TITANIUM PLENTIFUL

One of the more encouraging factors in the long-range picture for titanium is its comparative abundance. It ranks ninth among the elements in the earth's crust, and it has been estimated that the known reserves in North America contain 110 million tons of metal. An important deposit is in Quebec, where a deposit of ilmenite (an ore containing both titanium and iron) is estimated at 125 million tons. The first of five stationary electric-arc furnaces has been put into production for a high-titanium-bearing slag, along with a high-grade melting steel. Present plans call for bringing in the remaining furnaces by mid-1952. The plant will then produce 250,000 tons of slag containing approximately 70 per cent of titanium dioxide and 200,000 tons of high-grade iron. The titanium dioxide will be shipped to pigment manufacturers in the United States, who presently consume over 99 per cent of the titanium dioxide produced. The slag from the Quebec furnaces is highly suitable both for the acid treatment to obtain titanium dioxide and for other methods of obtaining titanium compounds. Since the iron content is somewhat lower than in other sources, less acid is required to remove the iron. While titanium metal is not being produced here, ample power at this location would make it feasible for the future.

A leading U. S. producer of titanium dioxide pigment has expanded its production facilities. The same company has also leased several buildings in Nevada, presumably for the production of titanium metal, and 151 million kilowatt hours of electric power have already been allocated for it.—*From Industrial Bulletin, of Arthur D. Little, Inc.*

* * *

Be Socialized and Stop Worrying. We have a right to be socialized! The Administration says so in a pamphlet "Common Human Needs," Public Assistance Report No. 8. You also have a right to have the government tell you how to live. If your personal and private problems become too great, you have a right to have government settle them for you.

Little items, such as cost, don't matter. Our bureaucrats caution our social workers not to mistrust an applicant for government aid. "That," says Public Assistance Report No. 8, "intensifies his discomfort and tends to lower his morale . . . All services must be proffered as a right to which recipients are entitled." Apparently, recipients should be the judges of their own needs. To question them means loss of votes. There's the nub of it. Some of you backward people do not know all of this yet. So, your government is using more and more of your money to tell you how the government helps you to attain a socialized state and makes you satisfied with it. And keeps you voting straight. It also helps you not to be



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so old-fashioned as to feel an "inordinate pride in independence." That must be "replaced by gratification in interdependence." That's a higher pride!

After you are socialized, you will "have little anxiety" about your need to depend on others, or to compete with others in the cruel free world. For others will take care of you. And you will take care of them—on Election Day.

This little book, "Common Human Needs," outlines our need of "public assistance" from the cradle to the grave. The introduction says that "since some aspects of our statutory provisions, and perhaps more often our entrenched policies have not kept pace with social change or with current understanding of human nature," the agency struggles "to administer mis-conceptions from the past in as corrective a way as possible *until the time when we can effect basic changes.*" That is *bureaucratic gobbledegook for replacing the Republic with socialism.*—Ralph W. Gwinn.

* * *

New Impregnating Process Salvages Rejected Porous Castings. Both ferrous and non-ferrous castings that have been rejected because of porosity can now be salvaged by a new impregnating process which forces a fluid sealant through the porous areas of the castings after the microscopic holes and cracks in the castings have been heated and expanded.

Small parts are placed in a pressure tank filled with the fluid sealant and subjected to pressures of 200 to 400 psi. for a period of 15 minutes, after which the parts are washed in cold water to remove the surface sealant.

Large parts are impregnated under pressure by means of a unit that circulates the fluid sealant through the casting.

The sealant is said to be non-toxic, non-inflammable, and non-injurious to the skin.—*Aminco Laboratory News.*

* * *

New Heavy-Weight. The old simile "heavy as lead" may be due for some revision. The Carboly Company, Inc., a General Electric affiliate, now has a metal 50% heavier than lead. Christened "Hevi-met," the material has high resistance to rays from radioactive substances, and consequently will find application in radiotherapy screens.

Its combination of maximum weight with minimum size means that the newcomer may also expect a warm welcome from those in need of balance weights for crankshafts, gyroscopes, variable-pitch propellers, centrifugal clutches and similar moving parts.—*General Electric News Digest.*

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A Clean Sweep. In almost any endeavor, making "a clean sweep" is cause for congratulation. In wartime, when buried mines are being detected and removed, the efficiency of the sweepers is of more than passing interest. An Army Signal Corps contract for an improved mine detector that will operate on all kinds of soil and under water as well, now promises that ground troops will soon be able to move with greater safety and despatch than ever before.

Older types of detectors are useless in certain kinds of soil. The new models will not only overcome this drawback, but will be capable of operating under water to clear beach areas, in which it is the custom to lay mines to intercept landing craft and troops as they attempt to establish beachheads.

Presence of a buried mine is indicated to the operator of the instrument both by a visible meter and by a sound heard in a headset.

The devices, which resemble vacuum cleaners, began coming off production lines at General Electric early this year.—*General Electric News Digest*.

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OBITUARY OF JAMES PARKERSON KEMPER

James P. Kemper, son of William P. and Mrs. Monica Rogers Kemper, was born at Glencoe, St. Mary Parish, Louisiana, August 6, 1868. He died at Our Lady of Lourdes Hospital in Lafayette, Louisiana, on December 29, 1949, at the age of 81 years and 6 months.

There being no public schools at that time, his early education was from private tutors.

He entered the University of Alabama in the School of Engineering in 1883 and was graduated in the class of 1887 with the degree of B. C. E.; he later received from the same institution the degree of Civil Engineer. He worked with an engineering party of the Tuscaloosa Northern Railroad in 1888 and 1889.

In 1890 he went into the electrical business, starting with a practical course in the shops of the Thompson-Houston Electric Company (now General Electric) at Lynn, Massachusetts. He practiced electrical engineering for about four years in St. Paul and Chicago, then returned to Louisiana where he installed electric plants in several sugar factories.

James Kemper resumed the practice of Civil Engineering about 1895, his work being principally drainage and land surveys, including abstracting of titles. He lived in Franklin, Louisiana, from 1895 until 1908; then moved to New Orleans and later went to his farm in Pointe Coupee Parish, returning to Franklin in 1945.

Early in the nineteen hundreds he became interested in flood control, made extensive studies of river hydraulics in connection therewith, and was looked upon as an outstanding authority on the subject. As consulting engineer for the Atchafalaya Basin Flood Control Committee, he testified before many congressional Committees considering flood control measures, exchanged numerous letters with the Army Engineers, and a great many of his letters on flood control were published in the New Orleans newspapers.

He considered flood control his life's work and wrote two books on that subject: *Floods in the Valley of the Mississippi*, A National Calamity — What Should Be Done About It, printed by King, Hannaford Co., Inc., Morgan City, Louisiana, Distributing Agent, National Flood Commission, New Orleans, Louisiana, in 1898; and *Rebellious River*, An Authoritative Analysis of the Problem of Flood Control with Particular Reference to the Mississippi and its Tributaries, published by Bruce Humphries, Inc., Boston, 1949. This book was released just three days after his death. He never saw it.

He was a life member of the Louisiana Engineering Society before which he presented questions pertaining to flood control. He also belonged to the American Society of Civil Engineers and to the Society of American Military

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Engineers. He was noted in "Who's Who in America" for about 25 years.

He married Cordelle Alexander on March 19, 1896. Their children are Mrs. Cordelle Kemper Ballard of Connecticut, James Lawson Kemper of Live Oak, Florida, and Richard Rogers Kemper of Lafayette, Louisiana. He had one granddaughter, Dorothy, daughter of James. He is also survived by one brother, Walter Y. Kemper of Franklin, Louisiana.

S. W. ELBERSON

S. E. HUEY

OBITUARY OF CHARLIE FREDERICK BLANK

Charlie Blank was born in the city of Shreveport, Louisiana in 1903. He received his preliminary education in the public schools at Monroe, Louisiana, and entered the United States Naval Academy in 1922, but resigned in 1923 due to illness in his family. He resumed his college career in 1927 when he entered Louisiana Polytechnic Institute from which he was graduated with the degree of B.S. in Mechanical Engineering in 1931. While at Louisiana Tech, because of the high quality of his work, he was extended membership in Delta Alpha Rho Honorary Engineering Fraternity.

Mr. Blank was employed by United Gas in 1931 and served in various field jobs until 1936 when he was transferred to the General Office Engineering Department as a draftsman. In 1938 he was transferred to the Statistical Section of the Engineering Department where he was employed at the time of his death on April 3, 1951.

Mr. Blank was keenly interested in youth work and took an active part in Boy Scout work. During World War II, he was Civilian Defense Chief of Police for Bossier City. He was quite interested in the Louisiana Engineering Society of which he became a member in April, 1950.

Mr. Blank is survived by his wife, the former Olive Lucille Rogillio, and one son, Charlie Frederick Blank III, both of Shreveport, and his sister, Mrs. J. L. Heath of Calhoun, Louisiana.

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MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Louisiana Engineering Society

Held on Monday, March 12, 1951

The meeting was called to order by President Newton, with approximately 100 members and guests present. The president welcomed those in attendance. Mr. Knost moved that the reading of minutes be dispensed with, seconded by Mr. Hannaman and carried.

It was announced that a charter had been presented to the newly organized Alexandria Section on Tuesday, February 15.

President Newton announced a meeting of the Society of American Military Engineers to be held on March 29, following which Mr. S. E. Hottinger introduced Mr. James K. Evans, Associate Consulting Engineer for the National Board of Fire Underwriters, who delivered a most interesting and informative illustrated lecture on "Building Codes".

The meeting adjourned with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society

Held on Monday, April 9, 1951

The meeting was called to order by President Newton, with approximately 125 members and guests present. The president welcomed those in attendance, following which it was voted to dispense with reading of minutes.

The secretary announced that the Society had been contacted by Mr. Paul Ristroph, Director of Civil Defense for New Orleans, in an effort to secure volunteers for civil defense work.

Mr. Waldemar Nelson outlined briefly the plans for the proposed Engineers Club and urged all those who had received the canvass letter to reply promptly.

Secretary Fernandez then introduced the main speaker of the evening, Professor John K. Mayer of Tulane University, who gave a most informative talk on "Experimental Stress Analysis", following which the meeting adjourned with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction

Held on Monday, March 12, 1951

The meeting was called to order by President Newton, with Messrs. Abraham, Cucullu, Hannaman, Knost, Molaison, Seago, Sessums and Fernandez present. Minutes of the preceding meeting were accepted as read.

President Newton reported on the meeting and presentation of a charter to the newly organized Alexandria Section, and announced that Mr. Soule Butler had been elected President and Mr. Tom C. David Secretary-Treasurer.

A letter from Mr. Lamon L. Moody, President S.L.I. Student Chapter, was read, wherein he requested consideration of a proposed change in their constitution in order to create an office of "Alumni Secretary". Mr. Knost moved that the desired change be approved, seconded by Mr. Molaison and carried.

After considerable discussion of the subject of vocational guidance, Mr. Knost moved that a sub-committee be appointed by the president to outline the policies and mechanics for establishing a standing committee to be known as "Vocational Guidance Committee". The motion was seconded by Mr. Hannaman and carried. Thereupon President Newton appointed Mr. Cucullu, Chairman, Mr. Knost and Mr. Molaison to serve on the sub-committee.

The qualifications of Mr. O. D. White, which had been referred to the board by the Membership Qualifications Committee, were reviewed. Mr. Cucullu moved that Mr. White be approved for transfer from affiliate to full membership grade and that his name be placed on the next ballot. Motion seconded by Mr. Seago and carried.

Mr. Abraham moved that the Editor be authorized to have pictures taken of the newly furnished headquarters to be published in the Proceedings. The motion was seconded by Mr. Molaison and carried.

A letter from the Committee on Radiological Defense of the Chicago Area was read, in which they solicited the aid of scientific societies in securing monitors for the Civil Defense Corps. It was decided that, should the State Director of Civil Defense for Louisiana request the Society's roster for a similar purpose in the New Orleans area, the secretary should be authorized to furnish same.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction

Held on Monday, April 9, 1951

The meeting was called to order by President Newton in Room 422 of the St. Charles Hotel. Those present were Messrs. Abraham, Butler, Cucullu, Molaison, Seago and Fernandez. Mr. Waldemar S. Nelson also was present by invi-

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tation. Reading of minutes followed, and Mr. Cucullu moved that they be accepted as read, seconded by Mr. Molaison and carried.

The treasurer presented the Society's quarterly financial report. Mr. Abraham moved that the report be accepted, seconded by Mr. Seago and carried.

The secretary reported that all applicants named in the March ballot had been elected, and that 354 ballots had been cast.

Two letters from the Louisiana State Department of Labor were read, and the secretary was instructed to have the requested announcement placed in the Proceedings. Mr. Cucullu moved that the second letter be referred to the Employment Committee for recommendation. The motion was seconded by Mr. Abraham and carried.

Mr. Seago moved that the resignations of the following members be accepted with regret: John W. Barton, Ernest L. Eustis, L. G. Ireland (at end of 1951), W. S. Galloway.

Correspondence with Mr. Paul S. Ristroph, Director of Civil Defense for New Orleans, was read.

Mr. Cucullu moved that the insurance policy now up for renewal be transferred to cover the Society's property now located at the secretary's residence. Motion seconded by Mr. Abraham and carried.

After some discussion about the Engineers Club, Mr. Cucullu moved that the Board authorize an expenditure up to \$50.00 to cover stationery expense incurred in canvassing prospective members of the club. This amount is to be refunded to the Society if the club should organize. The motion was seconded by Mr. Molaison and carried.

Mr. Cucullu presented an outline of the duties and scope of activity of a proposed Vocational Guidance Committee, followed which he moved that a standing committee to be known as "Vocational Guidance Committee" be formed. The motion was seconded by Mr. Butler and carried. The organization and duties of this committee are to be as follows:

"A Vocational Guidance Committee shall be appointed each year by the Society. It shall consist of at least three New Orleans members and one member from each of the State Sections. It is recommended that each of the State Sections form their own vocational guidance committees to carry on the activities in their area, and that each Section's member on the statewide committee be automatically a member of chairman of its local committee. New Orleans would not have a separate committee; its members on the statewide committee would also be responsible for New Orleans local activities.

"The Committee's duties shall be to provide counsel and guidance to the high school students of Louisiana with respect to the Profession of Engineering and related scientific fields of endeavor. It shall work cooperatively with the programs of Engineers' Council for Professional Development, Engineers' Joint Council and the National Engineering Societies and shall coordinate, as far as practicable, the activities of local affiliates of these agencies within the State of Louisiana.

"The scope of its counsel and guidance shall be such as to reach not only the senior students (with whom some efforts toward vocational guidance begin and end) but also those of the lower classes, with particular reference to influencing the latter group's choice of elective courses in their school's curriculum. The objectives of the program of activities shall be to promote an adequate registration of qualified high school graduates in the engineering and scientific colleges of Louisiana; to insure, as far as possible, that these registrants shall include a large proportion of the highest calibre graduates; to counsel high school students of all classes, from freshmen to senior, in the scheduling of high school courses of study which will facilitate rather than preclude their following an engineering or scientific curriculum at the university level; and such other aims as experience may indicate to be necessary to meet the needs of the country, the state, the profession, the colleges, the high schools and the students."

President Newton appointed Messrs. James P. McCullough, J. S. Broyles and T. F. Cash to prepare an obituary of the late C. F. Blank, member of the Shreveport Section.

Mr. Cucullu moved that, in view of the fact that Messrs. Millard R. Blum, Jr. and Thomas C. Ponder have not accepted their election to membership, said elections be considered void in accordance with the constitution. The motion was seconded by Mr. Molaison and carried.

The secretary presented a list of delinquent members to be dropped for non-payment of dues. Mr. Cucullu moved that the names of delinquent members of each section be sent to the respective secretaries in an effort to try to retain these memberships. The motion was seconded by Mr. Butler and carried.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer



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Minutes of Meeting, Lake Charles Section, Louisiana Engineering Society
Held on March 26, 1951

The regular by-monthly meeting of the Lake Charles Section of the Louisiana Engineering Society was held in the Council Room of the City Hall at 7:30 p. m.

The President, Mr. W. M. Larkin, presided. There were twenty-seven (27) members in attendance.

The Secretary gave the financial report.

The Secretary read the minutes of the meeting of the Executive Committee Meeting held on March 8, 1951, including the new committee appointees.

Mr. Ricketts asked for the roster of the entire Society. He was told it would appear in the next issue of the Proceedings.

It was moved by Mr. C. W. Stokes and seconded by Mr. G. B. Ricketts that the recommendation of the Executive Committee concerning the Program Committee be adopted. The recommendation was that the Program begin to function with the second meeting after the Annual Meeting, and continue through the first meeting after the next Annual Meeting. The motion carried.

The President introduced Mr. Sam H. Jones who spoke on "The Land in Which We Live," with emphasis on southwest Louisiana.

The meeting adjourned at 8:20 p. m.

W. M. DAVIS, Secretary-Treasurer

Minutes of Meeting, Lake Charles Section, Louisiana Engineering Society
Held on June 4, 1951

The regular by-monthly meeting of the Lake Charles Section of the Louisiana Engineering Society was held in the Council Room of the City Hall at 7:30 p. m., with the President presiding.

The minutes of the previous meeting were read and approved.

The financial statement was read and approved.

The Secretary read the correspondence received since the last meeting.

There was no old or new business.

The President read a telegram from the Alexandria Section, inviting members of the Lake Charles Section to their meeting on Friday, June 7, 1951.

The President asked if the time of the meeting was satisfactory. There were no objections, so the time will remain the same.

Mr. G. B. S. Ricketts introduced Mr. H. V. Anderson of the Pelican Broadcasting Company who spoke on "Television: A General Survey of its Present Status and Consideration of Its Possible Future Development."

The meeting adjourned at 9:45 p. m.

W. M. DAVIS, Secretary-Treasurer

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society

Date, March 13, 1951; Time, 8 p. m.; Place, Physics Building, L.S.U. Officers present: F. A. Hannaman, Jr., President; Mr. Louis Duclos, 1st Vice-President; Mr. Henry Landry, 2nd Vice-President.

The meeting was called to order by Mr. Hannaman, President of the Baton Rouge Section of the Louisiana Engineering Society. Sixty-five members and guests were present.

A motion was passed to dispense with the reading of the minutes for the previous meeting. Mr. Hannaman announced that the Alexandria Section received its charter on February 21, 1951, with forty-one members comprising its roster. Mr. Hannaman also advised the members of the recent work on vocational guidance that has been undertaken by the society. There being no further old or new business, Mr. Hannaman turned the meeting over to Mr. H. L. Landry who introduced Mr. James K. Evans, who presented a talk on "Building Codes."

The meeting adjourned at 9:30 p. m. and refreshments were served. In my absence, Mr. Hannaman prepared the minutes of the meeting.

T. J. INNES, JR., Secretary-Treasurer

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society
and Engineering Societies L. S. U.

Date, April 11, 1951; Time, 7:30 p. m.; Place, Geology Auditorium, L.S.U. Officers present: Mr. F. A. Hannaman, Jr., President; Mr. Louis Duclos, 1st Vice-President; Mr. H. L. Landry, 2nd Vice-President.

The meeting was called to order by Mr. Hannaman. Thirty-five members and guests were present.

A motion was passed to dispense with the reading of the minutes for the previous meeting. There being no old or new business, Mr. Hannaman turned the meeting over to Mr. E. E. Evans, Chairman of the Student Activities Committee, who introduced the speakers from the engineering societies at L.S.U. The following excellent papers were presented:

"Synchronous Tie in Vertical Lift Bridges" by W. R. Jones, Graduate Student in Electrical Engineering.

"Pre-stressed Concrete" by E. N. Hernandez, Graduate Student in Civil Engineering.

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"Experimental Water Flooding" by Jerry D. Bullock, Senior in Petroleum Engineering.

The meeting adjourned at 9:00 p. m. and refreshments were served. In my absence, Mr. Hannaman acted as secretary.

T. J. INNES, JR., Secretary-Treasurer

Minutes of the Meeting of the Shreveport Section, Louisiana Engineering Society

The quarterly meeting of the Shreveport Section, Louisiana Engineering Society, was held at the Beaird Cafeteria June 5, 1951 at 7:00 p. m. Dinner was served prior to the business meeting.

The meeting was called to order by the President, J. P. McCullough.

Reading of minutes of previous meeting was dispensed with.

A Committee appointed by President Newton, consisting of J. T. Broyles, T. F. Cash and J. P. McCullough, Chairman, presented an obituary on the late C. F. Blank, which was read after which the members stood in silent prayer.

The Rules and Charter Committee presented an amendment to the Constitution to the effect that five regular meetings will be held each year, the fifth meeting to be held January 15. (See attached amendment)

E. M. Gillen moved to adopt the amendment, seconded by E. M. Freeman. Passed.

H. L. Lehmann, past President of the L. E. S. was presented as guest of R. H. Vaughn.

The meeting was recessed to reassemble at the Research Laboratory of the United Gas Corporation where a tour of the laboratory was made by members, after which an extemporaneous talk was given by D. T. MacRoberts, Director of Research of United Gas. A rising vote of thanks was extended to the speaker, upon which the meeting was adjourned.

Shreveport Section, Louisiana Engineering Society
L. H. ROEGER, Secretary-Treasurer,

**Amendment to the Constitution, Presented by the Rules and Charter Committee of the Shreveport Section, Louisiana Engineering Society
Shreveport, Louisiana**

To the Officers and Members of the Shreveport Section of the Louisiana Engineering Society:

We, your Charter and Rules Committee, offer the following amendment to the Constitution:

ARTICLE V—SECTION I—which reads as follows:

"There shall be a minimum of four regular meetings per annum.

The meetings shall be held quarterly on the first Tuesday of March, June, September and December. The December meeting is designated as the Annual Meeting."

The above to be amended to read as follows:

"There shall be a minimum of five regular meetings per annum.

There shall be four quarterly meetings to be held on the first Tuesday of March, June, September and December. The December meeting shall be designated as the Annual Meeting. There shall be a fifth meeting to be held before January 15 following the Annual Meeting; the exact date to be decided by the out-going and in-coming Presidents. The purpose of this meeting will be to retire Old Officers and install New Officers and all members shall be notified at least 30 days in advance as to place and date of said meeting."

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PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

JUNE, 1951

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PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

VOL. XXXVII

AUGUST, 1951

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PAPERS AND DISCUSSIONS

TREASURE FROM THE SEA*

I wish to give you a short history of magnesium, its growth through the years with special emphasis placed on the extraction of magnesium from seawater, and the future outlook for the magnesium industry. After the conclusion of my talk, I would like to show you a film of the Magnesium producing plant at Freeport Texas which I was fortunate enough to obtain for tonight. I wish to thank Dean Johnson for his assistance in obtaining this film for me.

Magnesium does not occur in the native state but it is the eighth most abundant of the elements. It constitutes 2.1% of the earth's crust. A sharper distinction is made when it is considered that magnesium is 70 times as plentiful as nickel and 200 times as plentiful as copper. Of the engineering metals, it is surpassed only by aluminum and iron. Magnesium is found in minerals as the oxide, carbonate and haloid salts. It is also found in mineral water and seawater.

Magnesium compounds date back to the year 1695 when an English physician, Grew, discovered the medicinal value of mineral waters at Epsom, England. This mineral contained in the mineral

By Roger E. Knox, Senior Chemical Engineering Student, Tulane University. Presented at the regular meeting of the Society, May 14, 1951.

water is well known today as Epsom salts. The medicinal properties of the oxide were discovered shortly thereafter but its chemical composition was not established until 1808. Davy at that time showed that it was the oxide of a new metal which he called "magnium" which name was later changed to magnesium.

The earliest attempts to isolate magnesium both by chemical and electrochemical means are attributed to Davy; however he succeeded only in making an amalgam. He never isolated pure magnesium.

In 1880 the first pure metal was prepared by Bussy who fused anhydrous magnesium chloride with potassium. About 35 years later Deville and Caron improved this method and produced the metal on a manufacturing scale. They introduced distillation as a means of separating the magnesium from the impurities present.

In 1882, Bunsen laid the foundation for the present magnesium industry when he produced the metal by electrolysis of a fused bath of anhydrous magnesium chloride. Modifications of his method consisted in electrolysis of anhydrous mixtures of magnesium chloride and an alkali chloride.

Magnesium had a fluctuating career until the German industry was established after the beginning of the 20th century, or around the year 1905. The magnesium industry had its beginning in the United States around World War I. Six companies produced magnesium as a use for pyrotechnics but with the war's end all of these companies expired with the exception of Dow at Midland, Michigan. They continued mainly because they were processing the Michigan salt brines for its bromine content. The composition of these salt brines are as follows:

14% NaCl; 9% CaCl₂; 3% MgCl₂; .15% Bromine

Along in the twenties, the demand for magnesium started increasing. With the increasing demand for magnesium, the Dow Company realized that a source of magnesium other than the Michigan salt brines had to be found. About this time too, Dow was exploring the possibility of extracting bromine from seawater. After a thorough examination of existing sources, the investigating engineers were convinced that seawater held the key to any future large scale production of magnesium.

The following analysis of seawater shows these elements most abundant:

Cl ₂	18,980 mg/kg
Na	10,561 "
Mg	1,272 "
S	884 "
Br ₂	65 "

A more pertinent analysis is that the average seawater yields about one ton of magnesium per 800 tons of seawater or the average is .13% of magnesium.

A glamorous approach to the abundance problem can be had in this way. If the United States used magnesium at the rate of 100 million tons per year for 100 years, the amount of magnesium in the oceans of the world would decrease from .13% to .12%; this does not count any magnesium that would be added to the oceans through erosion and river water.

From these investigations, an intensive search was then started to find a site that would provide a source of warm, undiluted seawater, a means of disposal of spent seawater to prevent short-circuiting, and unlimited quantities of raw materials.

After a long search, Freeport, Texas was chosen because it provided unlimited quantities of seawater, oyster shells, salt, fresh water, sulfur, and gas for power, all within a radius of 30 miles. One of the great reasons for the choice of such a spot in Texas was its geographical position. In the early 1930's, government engineers built a diversion canal in the Brazos river. This canal thus created an island on which the town of Freeport and the magnesium plants are now built. The Gulf stream flows down the coast of Texas toward Mexico and it was this coupled with the diversion canal that made this spot in Texas an ideal location. Water that is to be used for the extraction of magnesium is drawn in from a point above where the Brazos river empties into the Gulf stream. This water is stripped of its magnesium and bromine content at the Freeport and Velasco plants and then dumped into the diverted Brazos river. This altered water then flows into the Gulf, but the natural flow of the Gulf stream carries this altered water away from the spot from where the unextracted seawater is being pumped into the plants. This prevents shortcircuiting of the seawater supply.

Construction of a magnesium plant was started at Freeport in April 1940 and the first magnesium was dipped from the cells on January 21, 1941. After two additions the plant was soon producing at the rate of 36,000,000 lb. of magnesium per year.

The method of obtaining magnesium from seawater is a relatively simple chemical process. However the engineering required is noteworthy because it is seldom that such a huge amount of raw material is handled for such a small return. It is remarkable too that such a venture can produce such a relatively cheap product.

Fresh seawater is brough into the plant by a flume extending from a point well out in the Gulf (2 miles), to the extraction plant at Freeport. The entering seawater is screened to remove trash, fish, etc. and then treated to prevent marine growth. Oyster shells

are dredged in the Gulf and are brought into the plant by barge, they are washed, calcined, and slaked to produce Ca(OH)_2 . This is then run into huge Dorr thickeners where the Ca(OH)_2 is concentrated. After several filterings to obtain the proper weight of CaO per cubic foot, the Ca(OH)_2 is added to the seawater and Mg(OH)_2 is precipitated. The magnesium hydroxide is in very diluted form and the next step is one of concentrating it. This is done by the use of the Moore Filter, a piece of equipment that heretofore had been used only in the mining industry in the West. This equipment consists of many heavy canvas sacks or envelopes about four feet high suspended on a frame work 100 feet long. It operates in this way: The sacks on this frame are transferred by a traveling crane and suspended in a tank containing the magnesium hydroxide slurry. Suction is applied on each of the canvas envelopes until a magnesium hydroxide cake about one inch thick has been built up on the outside of each envelope. A traveling crane then picks up the Moore filter and transfers it over an empty tank. Air is then blown into the canvas envelopes and the expanding envelopes cause the magnesium hydroxide to crack and fall off. At this point, hydrochloric acid, which is made from the electrolysis of salt, is added and a 15% solution of magnesium chloride is formed. From this point to the magnesium cells, the process is one of concentration of the magnesium chloride to form a suitable cell feed. The magnesium chloride concentration is increased from 15% to 35% by the use of a spray drier. This is a huge drier about 60 feet high, the 15% magnesium chloride is sprayed into the drier and is met there by a hot gas flame. A great amount of evaporation takes place and large clouds of steam issue from the top of these driers. This type of drier is used because of the presence of calcium in the magnesium chloride slurry. The presence of calcium sulphate forms a scale on the sides of the spray drier and it can be removed very easily. If a regular type evaporator were used, excessive and costly scaling would result. From this evaporator the magnesium chloride is introduced to a tube evaporator where the concentration is increased from 35% to 48%. From this evaporator the 48% magnesium chloride is concentrated to 73% in a shelf drier. This piece of equipment is also unique to the Dow process. These driers are large rectangular boxes with shelves up each side. Each shelf has raker arms on them and the heat is automatically controlled. The drier works in this way: The 48% magnesium chloride is introduced into the top of the drier and falls on the shelf. The raker arms then push the magnesium chloride off the shelf and it falls to the next shelf where the same procedure follows. The magnesium chloride flakes are held at 170°C in upper shelf drier and in the lower part, the flake is held at 200°C .

The dried, granular magnesium chloride product is removed from the bottom of the drier and without further alteration this is the feed that is introduced into the magnesium cells which is the heart of the Dow Process.

These cells are large rectangular steel pots and will hold about ten tons of molten salts. They operate between 50,000 to 70,000 amperes and 600 to 650 volts. The current efficiency is around 80%. The production is about 1100 lb. of mg/cell/day. The purity of the finished product is 99.5% which needs no further purification. One of the unique features of this cell is that external heat is used to maintain the bath at 700°C. This overcomes fluctuating bath temperatures due to fluctuating power. Sludging is performed once a day and feeding is continuous with the exception of time out for metal dipping. The molten magnesium metal is collected in the cells by inverted troughs placed under the bath level, which catch the metal as it rises from the cathodes. These troughs direct the metal to metal wells situated in the front of the cells from where it is dipped two or three times daily. Due to the presence of water in the feed, electrolysis of the water occurs. This is evidenced by liberation of hydrogen at the cathode and consumption of the anode by oxygen. This electrolysis amounts to the consumption of 0.1 lb. of graphite per lb. of magnesium produced.

Magnesium chloride is not electrolyzed by itself because it melts at too high a temperature. Therefore in the electrolysis of magnesium chloride, sodium chloride is used in preference to potassium chloride because not only is its conductivity greater but it has the decided advantage of yielding a bath with higher specific gravity.

There were many obstacles to overcome before magnesium could be produced efficiently. One of the biggest trouble makers was boron. The presence of boron in cell feed results in liberation of boron at the cathode, where it is believed to react with the magnesium to form magnesium boride. This metallic like deposit collects between crystals and exerts a dispersing action on the metal. This caused sludge to form in the cell and production of magnesium was much lower than had been anticipated. The trouble was found and eliminated when it was found that boron will adhere to the magnesium hydroxide floc if alkilinity is produced. It was found that boron could be kept out of the cell feed entirely if excess alkilinity was produced when using calcium hydroxide to precipitate the magnesium. Due to this alkilinity the boron will not be adsorbed on the magnesium hydroxide and subsequently would not enter the cell.

The economic picture of magnesium has changed thusly:

- (1) The price has been reduced from \$5 per lb. in 1915 to 20½ cents per lb. in 1944.

- (2) The production has risen from less than 1 million lb. in 1915 to over 400 million lb. in 1943.

It has become a rival of aluminum because of its greater lightness and comparable strength. In fact its lightness is its greatest selling point. The specific gravity of aluminum is 2.7 while the specific gravity of magnesium is 1.74. This means that magnesium is approximately 60 lb. per cubic foot lighter than aluminum.

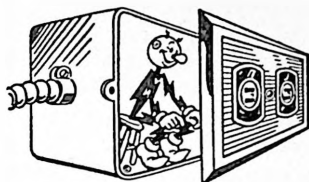
Magnesium is a very versatile metal. It can be fabricated using sand, permanent mold, or die casting. It can be extruded, rolled, or forged by either press or hammer. It is the most easily machined of all the metals. It can be spot, arc, or gas welded.

The uses of magnesium are many and varied. Among them are: aircraft, cars, trucks, textile machinery, oil field equipment, automatic tools, cathodic protection, shipping containers, sporting goods, railroad equipment, high speed printing equipment, household equipment, home construction and toys.

Because magnesium is a new metal, relatively speaking, there are many new developments in this industry. The Dow process is currently being worked on to eliminate hand dipping of the metal from the cells. And an entirely new method for producing the metal from seawater other than the aforementioned process is being worked on. This, it is hoped, will produce a metal by a process much more simple than the one now in use and will eliminate some of the steps now involved. New methods are constantly being worked on for the development of new alloys, new methods of electro-plating and of new methods of extruding magnesium alloys.

In conclusion it might be said that the magnesium industry is in a very different position today than it was in 1939. American consumption today is nearly 10 times the 1939 level. Many government built plants are in standby condition. In the year the production of magnesium is expected to increase by 400%. Wrought magnesium fabrication has been highly developed and shopskills are wide spread. Information on the properties of magnesium and its alloys is now available. In a national emergency such as now exists, the demand on the magnesium industry will be prompter and greater than in World War II, but the ability to meet that demand has been vastly increased.

For the years of peace that it is hoped lie ahead, the future of magnesium depends a great deal upon the acceptance of a light metal to take over the job of heavier metals. Only when the nation as a whole accepts and realizes that magnesium when alloyed with heavier metals, combines strength with lightness, that its' uses are many and diversified, then and then only will the magnesium industry become an industry with an "increasing production" future.



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NEW ORLEANS

ANNUAL OUTING

Annual Outing. The regular outing of the Society was held at the Colonial Golf Club on July 26, 1951. This was the 21st outing of the Society.

A record number of golfers (109) and horse shoe pitchers, (24) participated in the event.

An unusually large number of prizes and donations were secured. The evening activities consisted of a dinner and floor show.

Chairman Claiborne Perrilliat and his committee are to be commended for a job well done.

New Members. The following were elected to membership in the Society in a recent ballot. We welcome these new members, and look forward to having them participate fully in the affairs of the society.

For Member

PAUL EMILE DUBOIS, Alexandria; age 40. Endorsed: Soule Butler, T. C. David, W. E. Flowers. Oklahoma University, B.S. Eng. Physics, 1933; B.S. C.E., 1935. Asst. City Engineer, Oklahoma City, 1938-41. Design Engineer, J. S. Waldrep, 1946-48. Const. & Estimating Engr., Earl W. Baker & Co., 1948-date. Registered P.E., Oklahoma Assoc. Mbr. ASCE, Okla. Society Professional Engrs., National Society Prof. Engrs.

JOSEPH BRES EUSTIS, New Orleans; age 38. Endorsed: B. M. Dornblatt, D. W. Godat, Lee H. Johnson, Jr. Tulane University, B.E. in Ch.E., 1934. Mass. Institute of Technology, Soil Mechanics, summer 1939. Harvard University, Masters Degree in C.E., 1941. U.S. Waterways Experiment Station, Corps of Engineers, Vicksburg, Miss., Technician to Engineer, 1934-46. Eustis Eng. Co., partner, present occupation. Licensed C.E., La. and Miss. Associate Member, ASCE.

JAMES P. EWIN, JR., New Orleans; age 32. Endorsed: W. E. Douglas, Jr., D. W. Godat, W. S. Nelson. Tulane University, B. E. in C.E., 1942. Mass. Inst. of Technology, Naval Architect and Marine Engineering. Certificate of completion. J. P. Ewin, Inc., Engineer, Estimator & Supt. Various projects, 1946-50. Keller Construction Corp., Vice-President, 1950-51. Registered P.E., La., Ala. Member ASCE.

CARL MINTON HADRA, Shreveport; age 29. Endorsed: W. C. Sorensen, C. A. Frey, L. H. Roeger, W. E. Fitzgerald. L. E. Kente, Consulting Engineer, 1 yr. Yandell, Cowan & Love Eng. Co., Mechanical Engineer, 14 mos. Paul O. Rottmann, Consulting Engineer, Mechanical Engineer, 1 yr. Globe Aircraft Corp., Aeronautical Engineer, 12 mos. Private practice as Consulting Mechanical & Electrical Engineer, Shreveport, 1 yr. Registered M.E., La. Member ASH&VE.

ROBERT FAULK HELMS, Lafayette; age 39. Endorsed: J. E. Jarman, R. M. Harrison, W. D. Walthall. Southern Methodist Univ., 3 yrs. Wichita Municipal Univ., 1 yr., Major Business Admin., Minor Geology. Halliburton Oil Well Cementing Co., Cementer, Tool Technician, Operator & Supervisor Electrical Logging, 1935-42. Dowell Inc., Jr. & Field Service Engineer, now in charge of Dowell interests in Lafayette, 1946-51.

HOWARD B. L'HEUREUX, Alexandria; age 43. Endorsed: T. C. David, Soule Butler, Eugene Levy. Georgia Institute of Technology, B.S.C.E., 1931. Consulting Engineer, Alexandria, La., since 1934. Licensed C.E., La.

STAVROS D. LOUCHIS, New Orleans; age 27. Endorsed: J. S. Gentilich, R. M. Shaw, J. P. Fernandez. Tulane University, B.E. in M.E., June 1945. U.S. Naval Reserve. Line Officer, 1945-46. U. S. War Dept., Corps of Engineers, Engineer Hydraulic Section, Nov. 1946-date.

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- LEONARD FLETE MAGEE, Alexandria; age 52. Endorsed: W. S. Leake, C. P. Knost, Soule Butler. Employed in electrical field since 1916, and in responsible charge of design, construction and operation of electric generating stations, transmission and distribution since 1925. City of Alexandria Municipal Electric Light & Power System, Asst. Supt., 1937-45; General Supt., 1945 to date.
- THOMAS J. McDANIEL, JR., Bogalusa; age 29. Endorsed: M. R. Guell, B. B. Pierce, C. H. Hundemer. Louisiana State University, B.S.E.E., 1947. Gaylord Electric Service, Electrical Engineer, 1947-date. Member AIEE, Tau Beta Pi.
- GEORGE F. MEYN, New Orleans; age 45. Endorsed: G. H. Dudley, Rudolf Hertzberg, J. P. Fernandez. Tulane University, M & E Engineering, 1925-27. U. S. War Dept., Corps of Engineers, New Orleans District, Draftsman to Civil Engineer, 1928-date.
- RICHARD R. O'NEALL, Shreveport; age 56. Endorsed: E. M. Freeman, A. A. Lyons, H. Lane Mitchell. Purdue University, Civil Eng., 1915-16. University of Illinois, Civil Eng., 1916-17. The Texas Company, Draftsman, 1919-20. Webster Refining Co. Engineer in charge construction, 1921-22. Arkansas Natural Gas Co., 1922-36, Chief Draftsman; Associate Civil Engineer, 1936-date. Registered P.E., Texas, Ark. Member SAME.
- JAMES W. RODGERS, Lafayette; age 28. Endorsed: J. E. Jarman, R. M. Harrison, W. D. Walthall. Kansas State College of Agri. & Applied Mechanics, B.S.Ch.E., 1944. National Geophysical Co., Junior Observer, Mar.-May 1944. The Athletic Refining Co., Observer, Computer, 1944-45. Dowell, Inc., Jr. and Field Service Engineer, 1950-date.
- JOSEPH W. SEARS, New Orleans; age 36. Endorsed: M. R. Guell, B. B. Pierce, L. L. Smith. Armour Institute of Technology, 1932-34. Austin Evening College, 1929-32. Link Belt Co., Draftsman, Engineering Est. & Design, Engineering Sales, 1935-40; District Manager, Houston, 1945-50. R. J. Tricon Co., New Orleans, Mechanical Engineer, 1950-date. Former member Houston Engineers' Club.
- VAINO A. TIRRI, Bogalusa; age 39. Endorsed: M. R. Guell, B. B. Pierce, J. E. Wallace. Northeastern University, Boston, 1929-34, B.S.C.E. Mass. Institute of Technology, courses in Construction Methods & Geodesy. University of Louisville, Review courses in Strength of Materials & Reinforced Concrete Design, 1941. E. W. Branch, C.E., Quincy, Mass., Transitman, alternate 5 week periods while attending Northeastern, 1930-34. Henry F. Bryant & So, C.E., Brookline, Mass., Chief of Party, 1935. Mass. Public Works Dept., Party Chief, 1935-36. U.S. Engineer Dist., Jr. Engineer, 1936-42. U. S. Marine Corps, 1942-45. Gaylord Container Corp., Bogalusa, Civil Engineer, 1946-date. Member Boston Society Civil Engrs., SAME.
- IRWIN CHARLES WEIDIG, New Orleans; age 35. Endorsed: J. R. Rombach, B. P. Babin, W. V. deGruy. Tulane University, B.E. in E.E., 1940. Federal Works Agency, Public Bldgs. Admin., Jr. Electrical Engineer, 1941-42; Asst. Engineer, 1942-43. Navy Dept., Bureau of Ships, Associate Elect. Engr., 1943-45. La. Power & Light Co., Asst. Sub-Station Engineer, 1947-49; Electrical Engineer, 1949-date.
- EAKIN L. WHELESS, JR., Shreveport; age 29. Endorsed: E. M. Freeman, J. C. Faulkner, E. T. Robinson. Cornell University, B.S.M.E., 1947. Esso Esso Standard Oil Co., Mechanical Inspection, 1947-48. Texas Eastern Transmission Corp., Design, Supervision, Construction Costs Estimates, 1948-date. Member ASME.

FOR TRANSFER FROM AFFILIATE TO MEMBER

- O. D. WHITE, Alexandria; age 46. University of Mississippi, Civil Engineering, 1924-27. Illinois Central R.R. Co., Rodman, 1925-28. Missouri Pacific R.R. Co., Rodman, Instrumentman, 1928-31. La. Dept. of Highways, Instrumentman. Project Engineer, 1931-43 U. S. Navy Construction Battalion, 1943-46. La. Dept. of Highways, District Construction Engineer, 1947-date.

FOR TRANSFER FROM JUNIOR TO MEMBER

- FARRELL, W. ADAMS, Monroe; age 29... Louisiana State University, B.S. M.E. 1948. United Gas Corp., Air Conditioning Engineer, 3 years. Jr. Member ASME.
- SEWMOUR CAMBIAS, JR., New Orleans; age 27. Tulane University, B. E. in E.E., 1945. N. O. Public Service Inc., Asst. Electrical Engineer, 1945 to date.

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AUBON L. MABRY, Nashville, Tenn.; age 34. Mississippi State College, B.S. C.E., 1942. U.S. Navy Radar School graduate. U.S. Engineer Corps, C.E. (P-1), 1 yr. 1946. Tulane University, Instructor in Experimental Engineering, 2½ yrs., 1947-49. Stevens Brothers & The Miller-Hutchinson Co., Inc., Head Engineer. 2½ yrs., 1949-51.

FOR AFFILIATE MEMBER

SAUNDERS AYMOND, Tioga, La., age 28. Endorsed: T. C. David, W. E. Flowers, C. A. Myers. Louisiana College, pre-engineering, 1941. Area Engineer, Camp Livingston, Draftsman 1942. U.S. Army Air Force, 1942-46. Pan American Engineers, Engineering draftsman, 1946-date.

RICHARD G. BRANNON, Pineville, La., age 32. Endorsed: T. C. David, C. C. Edwards, Jr., J. C. Harris. Louisiana Polytechnic Institute, 1935-37, B.A. Alabama Polytechnic Institute, Landscape Architecture School, 1939-40. Southern Bell Tel. & Tel. Co., Fieldman, Eng. Dept., 1940-41. Naval Aviator, 1941-46. Southern Bell Tel. & Tel. Co., Jr. Engineer, Engineer, 1946-date.

WALTER D. GIBSON, Natchitoches, La., age 34. Endorsed: E. J. James, F. E. Welch, H. L. Lehmann. U.S. Army Surveyors School, Ft. Belvoir, Va., June-Sept. 1942, graduate surveyors course. U.S. Dept. of Agriculture, Levelman, 1935-37. U.S. Engineer Dept., Chainman & Levelman, 1938-40. H. K. Ferguson Co., Instrumentman Highway Construction, 1941. E. I. Dupont & Co., Bldg. layout, 1941-42. U.S. Army, 1942-45. La. Dept. of Highways, Instrumentman, Project Engineer, 1945-date. Member La. Hwy. Engineers Ass'n.

JOHN L. ISLES, Shreveport; age 30. Endorsed: E. M. Freeman, A. A. Lyons, V. A. Lyons. Southwestern University of Memphis, B. S. Biology & Chemistry. Louisiana Metal Culvert Co., Sales Engineer, 5 years.

LOLAN J. MELANCON, Pineville, La., age 48. Endorsed: T. C. David, C. A. Myers, Soule Butler. Southern Bell Tel. & Tel. Co., communications engineering work since 1941.

FOR JUNIOR MEMBER

WILLIAM A. BURFORD, JR., Shreveport, age 28. Endorsed: J. G. Atteberry, R. H. Vaughan, C. T. Watts. Louisiana Polytechnic Institute, B.S.C.E., 1950. La. Dept. of Highways, June 1950-date. Licensed C.E., La. Member La. Highway Engineers Ass'n.

CLAUDE K. ELKINS, JR., Alexandria; age 25. Endorsed: C. A. Myers, T. C. David, Soule Butler. Vanderbilt University, B.E. in C.E., 1948. Southern Bell Tel. & Tel. Co., Junior Engineer, Aug. 1949-date. Licensed C.E., La.

ERNEST M. FURBY, JR., Alexandria; age 22. Endorsed: Soule Butler, C. W. Cook, C. R. Westerchil. Louisiana State University, B.S.C.E., 1950. Registered C.E., La. Member ASCE.

KEITH ALLEN HETRICK, Shreveport; age 26. Endorsed: C. B. Foster, Jr., L. F. Valentine, H. L. Mitchell. Shreveport Trade School, engineering drafting, 1½ years. City of Shreveport, Water Dept., Rodman, 2 yrs., Party Chief, 3 years.

LEWIS B. HOWE, Logansport, La.; age 29. Endorsed: E. S. Heim, H. L. Lehmann, R. H. Vaughan. Louisiana Polytechnic Institute, B.S.C.E., 1949. La. Dept. of Highways, 1949 to date, now Junior Project Engineer. Licensed C.E., La.

THOMAS H. NOLAN, New Orleans; age 24. Endorsed: D. W. Stewart, R. M. Seago, A. H. Jensen. Tulane University, Engineering, 1943-44. U. S. Merchant Marine Cadet Corps & Academy, Marine Engineering, 1944-47, B.S. Louisiana State University, 1947-50, B.S.M.E. N. O. Public Service Inc., Student Engineer, Feb. 1950-date.

JOSEPH R. PEZOLD, New Orleans; age 25. Endorsed: W. E. Blessey, F. C. Fromherz, J. L. Porter. Louisiana State University, B.S.C.E., 1950. La. Dept. of Highways, Engineer I, 1950-51. Fromherz Engineers, Feb. 1951-date. Licensed C.E., La. Member ASCE.

WINFRED J. SPANO, Baton Rouge; age 28. Endorsed: G. M. Gossen, W. J. Morgan, M. A. Steele. Southwestern Louisiana Institute, B.S.C.E., 1950. La. Dept. of Highways, Chief of Party, 1950 to date.

JUNIOR MEMBERSHIP AWARD WINNERS

THOMAS H. ARNOLD, JR., Baton Rouge; graduate of Louisiana State University in Chemical Engineering, 1951.

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WILLIAM A. BARNWELL, Shreveport; graduate of Louisiana Polytechnic Institute in Chemical Engineering.

VINCENT LOUIS GOODMAN, New Orleans; graduate of Tulane University in Electrical Engineering.

CHARLES L. MELANCON, JR., Norco; graduate of Southwestern Louisiana Institute in Mechanical Engineering.

FOR TRANSFER FROM STUDENT TO JUNIOR MEMBER

Graduates in Chemical Engineering at Southwestern Louisiana Institute:

JAMES EMMIT BROUSSARD

JOHN ATKINS BROWN, JR.

KENNETH H. FAULK

KENNETH C. FINSTER

WILFRED F. HERBERT

BENJAMIN E. RITCHEY

Graduates in Civil Engineering at Southwestern Louisiana Institute:

E. P. HALL

ROBERT E. MILLER, JR.

L. LAMON MOODY, JR.

DONALD J. O'ROURKE

H. A. PERKINS

FREDERICK SIMONSON, JR.

LEO VAN AMEROGEN

L. T. WATKINS

Graduates in Electrical Engineering at Southwestern Louisiana Institute:

WESLEY J. BODIN, JR.

WILLIAM JOSEPH DORMAN

FLBERT J. DRAGON

H. M. KING, JR.

WHITMEL E. LAZARUS

CARL MARTIN

LLOYD J. NAPALUCH

ROLAND OTTO

SYLVIAN RAY

CECIL S. SONNIER

SIDNEY N. TANNER

Graduates in Mechanical Engineering at Southwestern Louisiana Institute:

EDEN BAILEY

THOMAS D. CLARK, JR.

ROBERT HINCKLEY

J. I. KOTTER

J. R. MESTEPEY

NELSON PIMENTEL

JOSE PRADO

H. P. PUYPER

H. H. RAY

W. O. RAY

CALVIN J. ROACH

JOHN P. WALSH

News Item. Mr. Robert S. Cooper has been appointed as Assistant Manager of Division 1, of the Texas Eastern Transmission Corp. Mr. Cooper has been associated with the Louisiana Highway Commission, Plantation Pipe Line Company, Delta Shipyards at New Orleans, Pan American Engineers at Alexandria and E. M. Freeman and Associates, Shreveport.

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MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Regular Meeting of the Society Held on May 14, 1951

The meeting was called to order by Vice-President McNiven, with approximately 50 members and guests present. Mr. McNiven welcomed those present, and particularly the visitors from out of town. Mr. Knost moved that the reading of minutes be dispensed with, seconded by Mr. Lehmann and carried.

Mr. Abram spoke on the subject of the proposed Engineers' Club, and urged all who had received inquiries to return their replies promptly.

Mr. Ole Olsen suggested that, in recognition of Student Night, all of the older members present should introduce themselves to the new members.

Dr. Wayne P. Wallace then introduced Mr. Jerry D. Bullock of Louisiana State University, who gave a most interesting and instructive talk on "Experimental Water Flooding".

Following this, Professor Arthur M. Hill introduced Mr. Roger E. Knox of Tulane University, whose talk entitled "Treasure from the Sea" was highly interesting and informative.

A film showing the Dow Chemical Plant at Freeport, Texas, was shown, following which Professor R. A. Steinmayer moved that the audience show its appreciation for the two fine talks presented with a rising vote of thanks to both speakers.

The motion was executed, and the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction held on May 14, 1951

The meeting was called to order by Vice-President McNiven. Those present were Messrs. Abraham, Cucullu, Hannaman, Knost, Molaison, Seago and Fernandez. Mr. Seago moved that the minutes be accepted as read, seconded by Mr. Abraham and carried.

The secretary read minutes of meeting of the Louisiana Council of Engineers held on April 26, following which Mr. Abraham reported that the proposed Engineers' Club had received 99 paid memberships totaling approximately \$3,400. He believed that no large donors had yet been approached.

Mr. Cucullu gave a resume of vocational guidance activities in the local high schools and announced that the following recommendations had been suggested:

- (1) The proper time to approach students should be in the fall.
- (2) In addition to meeting as a group, individual counsel should be given.
- (3) Some literature in the form of a brochure should be available to give to students. In this connection, the E.C.P.D. has prepared several pamphlets, one titled "Engineering as a Career", which probably would be suitable.

The secretary read a letter from Dean Johnson of Tulane, recommending that the Society's scholarship be awarded to Charles Guido Battig, a June graduate of Jesuit High School. Mr. Abraham moved that the award be made in accordance with the Dean's recommendation, seconded by Mr. Molaison and carried.

A letter from the secretary of the L.E.S. Student Chapter at Southwestern Louisiana Institute was read, in which representation at the annual Student Night meeting of the society was requested. The secretary was instructed to point out to them that the board had suggested to the state sections that they hold a Student Night each year and obtain speakers from nearby universities; it was hoped that S.L.I. thereby could be represented at the Lake Charles and Lafayette Section meetings. However, Southwestern would be invited to furnish a speaker for the next Student Night meeting held in New Orleans.

Correspondence between Messrs. S. W. Elberson and A. M. Hill was read, and Mr. Seago moved that the obituary of our late member, James P. Kemper, be published in the Proceedings and copies of the issue be mailed to the widow with a letter of apology. The motion was seconded by Mr. Abraham and carried.

A letter from the Louisiana Civil Service League was read. Mr. Cucullu moved that the matter be referred to the Committee on Professional, Civic and Industrial Affairs, seconded by Mr. Knost and carried.

The secretary was instructed to ascertain the increase in cost of insurance on his residence to cover the Society's property now located there.

A list of delinquent members was presented and it was the consensus of those present that action on same should be postponed.

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Mr. Seago moved that the annual outing be held in the third week of July, but not on Friday. The motion was seconded by Mr. Hannaman and carried.

Mr. Cucullu moved that Mr. J. Howell Peebles be appointed Chairman of the Technical Papers Committee for the 1952 Annual Meeting, seconded by Mr. Abraham and carried.

The secretary was instructed to write to the founder societies requesting their views on the proposal that joint meetings with L. E. S. be held on fixed months each year.

Mr. Hannaman also announced that the annual Joint Meeting of the Baton Rouge Section with the parent organization would be held on Saturday, June 23, at Harry Cloud's Camp, and asked if it would be permissible to also designate the occasion as Past Presidents' Night for the Baton Rouge Section. Each of Mr. Hannaman's inquiries were answered in the affirmative.

Mr. Hannaman also announced that the annual Joint Meeting of the Baton Rouge Section with the parent organization would be held on Saturday, June 23, at Harry Cloud's Camp, and asked if it would be permissible to also designate the occasion as Past Presidents' Night for the Baton Rouge Section. Each of Mr. Hannaman's inquiries were answered in the affirmative.

A discussion of the engineering registration law followed, and Mr. Molaison suggested that a member of the State Board of Registration for Professional Engineers and Land Surveyors be invited to attend a meeting of the L. E. S. board in the near future, in order to acquaint board members with the progress being made in the registration of engineers in our state.

There being no further business, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Special Meeting of the Board of Direction, June 25, 1951

The meeting was called to order by President Newton, with Messrs. Knost, McNiven, Molaison, Seago and Fernandez present. Mr. Claiborne Perrilliat, Chairman of the 1951 Annual Outing, also was present by invitation. Minutes of the May meeting were accepted as corrected.

President Newton reported on the special committee to clarify the Society's constitutional requirements for membership. It was decided to invite Messrs. Kammer, Chairman, and Billingsley, Vice-Chairman of the special committee to attend the August meeting of the Board to discuss their recommendations. Following this, a discussion on the National Society of Professional Engineers and its affiliate societies took place.

President Newton read a letter from Mr. Cucullu on the subject of vocational guidance, following which the secretary read a letter from the dean of Notre Dame University indicating the shortage and growing need of engineers. It was announced that Lafayette, Monroe and Baton Rouge had appointed members to serve on the Vocational Guidance Committee.

Mr. Knost moved that Mr. Cucullu be appointed Chairman of the Standing Committee on Vocational Guidance, with authority to name local members to this committee at his discretion, seconded by Mr. McNiven and carried.

The auditor's report for 1950 was presented and Mr. McNiven moved that it be accepted, seconded by Mr. Cucullu and carried. In view of the increased volume of work involved in the audit, the auditor's bill was submitted for \$125.00 instead of \$100.00 fee charged last year. Mr. Seago moved that the budget be revised and that the secretary be authorized to pay the bill, seconded by Mr. Molaison and carried.

Mr. Cucullu moved that Mr. Ellis L. Begnaud of New Iberia be reinstated to Junior Membership in the Society, seconded by Mr. Molaison and carried.

A letter of resignation from Mr. Andrew P. Whitman was read, and Mr. McNiven moved that the resignation be accepted with regret, seconded by Mr. Knost and carried.

In accordance with Article IX of the constitution, and since local sections have been notified of the following delinquent members, Mr. Cucullu moved that they be dropped from the rolls for non-payment of dues; the motion was seconded by Mr. Knost and carried:

E. H. Barentine, J. W. Baxter, J. K. Brothers, D. H. Brown, S. L. Calhoun, W. B. Catchings, R. E. Compagno, S. A. Curley, J. C. Domingue, L. C. Eldridge, J. L. Frier, H. D. Golding, A. A. Gustafson, F. E. Haight, D. L. Hannaford, L. W. Harrell, L. D. Higginbotham, C. R. Hogle, L. A. Hymel, R. R. Jones, H. E. Keller, H. Lester, C. A. Matherne, H. E. Mobley, J. R. Murphy, C. P. Norwood, R. K. Prothro, A. B. Ratcliff, W. V. Ratcliff, R. L. Saucier, S. B. Smart, S. S. Stanton, J. M. Smith, Granville Wyatt, W. N. White.

Mr. Claiborne Perrilliat announced that the 1951 Annual Outing would be held on July 26 at the Colonial Country Club, and that Papa Celestin's band and entertainers would be contracted for if so authorized. He then submitted an estimate of the budget for the annual outing. Mr. Cucullu moved that the chairman be authorized to proceed with arrangements based on the estimated



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budget, seconded by Mr. Knost and carried. Following this, Mr. Perrilliat was excused from the meeting.

The 1952 Annual Meeting was discussed and Mr. McNiven moved that the secretary engage Dixon Hall for the Thursday night general interest program. Motion was seconded by Mr. Colaison and carried. Mr. Molaison moved that Mr. Clifford King be appointed Chairman of the Banquet Committee, seconded by Mr. Knost and carried.

It was suggested that at the next meeting of the Board an Awards Committee should be established, to consist of five members.

The Qualifications Committee referred two applications to the Board for decision. After reviewing each, Mr. Seago moved that Mr. Paul M. Barber of Shreveport be recommended for the grade of member and his name placed on the next ballot; motion seconded by Mr. Cucullu and carried. Mr. Molaison moved that Mr. Otha E. Barron of Alexandria be recommended for member grade and his name also be placed on the next ballot, seconded by Mr. Knost and carried.

Upon the recommendation of the Board, President Newton appointed Professor Donald Derickson, Chairman, and H. S. Salzer a committee to write the obituary of our late member, Anthony M. Zibilich.

A bill received from the Medallic Art Company covering two Civic Award medals was presented by the secretary. President Newton stated he would contact Mr. C. C. Crawford of A. M. Lockett & Company, sponsors of the award, for payment.

In accordance with the recommendation of the Finance Committee, based on the first quarterly financial statement, Mr. McNiven moved that the secretary's salary be increased to \$200.00 per month, effective April 1, 1951. The motion was seconded by Mr. Molaison and carried.

In view of the fact that President Newton will be away from the city during most of the remaining months of 1951, Mr. Knost moved that Second-Vice-President Abraham be authorized to sign checks in addition to President Newton and Secretary-Treasurer Fernandez. The motion was seconded by Mr. Seago and carried.

Mr. Molaison reported that of the 1,352 members listed in the Society's roster (not including student members), 560 were registered as professional engineers as of May 7, 1951, or a percentage of 41.3. This does not include those listed as surveyors.

Following a discussion on the sponsorship of standing committees by individual board members, President Newton appointed sponsors for the standing committees as follows:

Employment and Legislative	Mr. Knost
Entertainment and Outings	Mr. Seago
Finance, Membership and Technical Papers	Mr. Fernandez
Professional, Civic and Industrial Affairs.....	Mr. McNiven
Publications	Mr. Molaison
Publicity	Mr. Abraham
Vocational Guidance and Awards	Mr. Cucullu

It was suggested that the Technical Papers Chairman be informed that papers should not exceed 45 minutes in delivery time.

It was also suggested that, since no business of the Society is transacted at its general meetings, the minutes of the preceding board meeting be read at each monthly meeting.

Following this, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society May 23, 1951

Mr. F. A. Hannaman, president of the Baton Rouge Section of the Louisiana Engineering Society, called the meeting to order at 7:30 p. m., at the Louisiana Highway Testing Laboratory. Approximately thirty-eight members and visitors were present.

There was no old or new business and a motion was made and passed to dispense with the reading of the minutes for the previous meeting. Mr. Hannaman introduced Mr. J. F. Wright of the Esso Standard Oil Company, Louisiana Division, who was the speaker for the evening. Mr. Wright gave a very interesting talk on the "Economic Potential of the United States."

The meeting closed at 9:00 P. M. and refreshments were served.

T. J. INNES, JR., Secretary-Treasurer

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**MINUTES OF JOINT MEETING OF PARENT ORGANIZATION AND
BATON ROUGE SECTION LOUISIANA ENGINEERING SOCIETY**

The annual joint meeting with the parent organization started at 2:00 p. m. at Harry Cloud's Camp on Florida Street, June 23, 1951. Mr. J. T. O'Brien registered and bracketed members and guests for the horseshoe pitching. The Louisiana Highway and Heavy Construction Section of the Association of General Contractors of America donated six electric clocks as prizes for the horseshoe pitching which were won by the following individuals:

1st prize for singles, Mr. Jackson; 2nd prize for singles, Mr. F. D. Richards; 1st prize for doubles, Mr. F. D. Richards and F. A. Hannaman; 2nd prize for doubles, Mr. G. C. Kerr and Mr. T. L. Cappel.

Dinner was served at 7:30 p. m. to 62 members and guests.

Mr. F. A. Hannaman, Jr., President of the Baton Rouge Section, presided over the short business session following the meeting. Mr. L. Cucullu outlined the progress that is being made by the educational guidance committee.

At 8:30 p. m. Messrs. Hannaman, Duclos, and Innes made the presentations of the attendance prizes. The prizes and winners are as follows:

1 case of Goebel's Beer from Harry Cloud, Mr. D. F. Lattimer; 1 Steel Rule from Floyd Electric Company, Mr. D. C. Delaune; 1 Desk Pen from Mr. R. Gosa, Mr. L. Cucullu; 1 Desk Pen from Mr. R. Gosa, Mr. T. L. Cappel; 1 Desk Pen from Mr. R. Gosa, Mr. T. W. Kirby; 1 Electric Clock from Gulf State Utilities, Mr. J. D. Ritter; 1 Pocket Knife from Floyd Electric Company, Mr. A. G. Meakin; 1 Pocket Knife from Floyd Electric Company, Mr. R. C. Herrell; 1 Cigarette Lighter from Floyd Electric Company, Mr. Carville; 1 Steak Dinner from Mike and Tony's, Mr. Culver; 1 Steel Rule from Floyd Electric Company, Mr. F. J. Warren; 1 Fifth of Scotch from La. Metal Culvert Company, Mr. Dunbar; 1 Seat Cushion from Robert's Esso Station, Mr. Carnegie; 1 Pipe from the Okonite Company, Mr. K. A. Rees; 1 Pipe from The Okonite Company, Mr. Jackson; 1 Fifth of Whiskey from La. Metal Culvert Company, Mr. Nasca! and 1—½ HP Outboard Motor from Esso Standard Oil Company, Mr. R. C. Herrell.

Meeting adjourned at 9:00 p. m.

T. J. INNES, JR., Secretary-Treasurer

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AUDITOR'S REPORT

Board of Direction,
Louisiana Engineering Society,
New Orleans, Louisiana.

Dear Sirs:

I have audited the accounts of the Louisiana Engineering Society for the year ended December 31, 1950 and submit the following:

Balance Sheet, December 31, 1950 (Cash receipts and disbursements basis) (Exhibit A)

Statement of Income and Surplus For The Year Ended December 31, 1950 (Cash receipts and disbursements basis) (Exhibit B)

The cash on deposit at December 31, 1950 in the regular checking account was verified by certification obtained from the depository, Whitney National Bank of New Orleans, La.

The U.S. Savings bonds were inspected by me on June 1, 1951 in the Society's bank box and the amounts to the credit of the Society in the various homesteads were verified by certifications obtained from those institutions.

In my opinion, the accompanying balance sheet and statement of income and surplus fairly presents, respectively, your financial condition at December 31, 1950, and the results of your operations for the year ended that date.

June 8, 1951.

Yours truly,

CARLOS J. GRIMADER

Certified Public Accountant

Exhibit A

LOUISIANA ENGINEERING SOCIETY BALANCE SHEET, DECEMBER 31, 1950 (CASH RECEIPTS AND DISBURSEMENTS BASIS)

ASSETS

CASH IN BANK—Checking account	\$ 3,995.21
UNITED STATES SAVINGS BONDS, SERIES F (Maturity value—\$6,000.00)—redemption value	\$ 4,810.00
INVESTMENTS—HOMESTEADS: (at cost)	
Columbia Homestead Association	\$ 368.21
Commonwealth Homestead Association	306.15
Greater New Orleans Homestead Association	1,702.22
Security Building and Loan Association	500.00
Sixth District Building and Loan Association	500.00
Union Savings and Loan Association	500.00
Total investments—homesteads	\$ 3,876.58
PROPERTY — Furniture, Fixtures, Equipment and Books—nominal value	\$ 1.00
FUNDS ON DEPOSIT WITH BANK—IN LIQUIDATION: Interstate Trust & Banking Co. in Liquidation (less reserve for loss \$95.91)	\$ 1.00
TOTAL ASSETS	\$12,683.79
LIABILITIES	
SURPLUS (Per Exhibit B)	\$12,683.79

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Materials Testing

Testing Engineers
Inspection

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for more than a quarter of a Century*

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⊙ with any drive

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MECHANICAL EQUIPMENT COMPANY, INC.

861 Carondelet Street

New Orleans, La.

Exhibit B

STATEMENT OF INCOME AND SURPLUS (ON CASH RECEIPTS AND
DISBURSEMENTS BASIS) FOR THE YEAR ENDED
DECEMBER 31, 1950

INCOME:

Dues collected (less payments to Baton Rouge, Lafayette, Lake Charles, Monroe and Shreveport Sections, \$1,178.25)	\$ 6,269.00
Advertising revenue	691.84
Income from investments and savings accounts	209.12
Net profit—sale of certificates, buttons, etc.	27.66
Total Income	\$ 7,197.62

EXPENSES:

Salary — secretary — treasurer	\$ 2,100.00
Cost of publishing proceedings	2,246.96
Cost of annual meeting (excess of disbursements over receipts) ..	161.79
Expenses paid in advance—succeeding year's annual meeting	72.78
Cost of annual outing (excess of disbursements over receipt)	94.18
Refreshments at meetings (less pro rata receipts from joint meetings held)	307.19
Printing, stationery, and postage	1,162.34
Printing of Registration Act	148.50
Floral offerings	21.13
Library expense — porter	48.00
Social Security tax	70.50
Auditing	100.00
Scholarship award	75.00
General expenses	78.99
Total Expenses	\$ 6,687.36

NET INCOME FROM OPERATIONS\$ 510.26

ADD—SURPLUS CREDIT:

Reduction of reserve for loss due to receipt of liquidating dividend from bank in liquidation	95.91
---	-------

DEDUCT—SURPLUS CHARGES—(Capital expenditures):

Design of Technological Accomplishment Medal—Partial cost	(500.00)
Expenses—Engineer's License Act	(150.00)
Purchase of new furniture and equipment, \$574.05, less sale of old bookcases and cabinets, \$275.00)	(299.05)

NET INCOME (LOSS) FOR THE YEAR\$ (342.88)

SURPLUS AT BEGINNING OF YEAR 13,026.67

SURPLUS AT END OF YEAR\$12,683.79

The St. Charles Hotel

NEW ORLEANS, LA.

ROOMS WITH BATH FROM \$3.00

The St. Charles Bar is famous from coast to coast for its delicious, old-time mixed drinks. Everything in the bar has been modernized, EXCEPT the bartenders—they're old-timers!

Make the St. Charles your home in New Orleans for comfort, convenience, refreshing sleep, modern service.

The St. Charles Hotel

JOHN J. ("MIKE") O'LEARY, Vice-Pres. and Mgr.

Direction

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CARLING DINKLER, President

OPERATING:

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Birmingham, Ala.

JEFFERSON DAVIS
Montgomery, Ala.

ANSLEY
Atlanta, Ga.

ANDREW JACKSON
Nashville, Tenn.

ST. CHARLES, New Orleans, La.

SAVANNAH
Savannah, Ga.

O. HENRY
Greensboro, N. C.

PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

AUGUST, 1951

"PATRONIZE OUR ADVERTISERS"

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This Journal reaches the officials with whom rests the responsibility for the bulk of the municipal, state and industrial works in Louisiana and the surrounding territory. Its advertising pages afford you an effective and dignified means of cultivating a wider acquaintance among prospective buyers.

PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

VOL. XXXVII

OCTOBER, 1951

NO. 5

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EDITORIAL NOTES AND COMMENT

Our Annual Outing. This year's event includes the largest number of participants in golf and horse shoe contests scheduled in recent years. The prize committee also secured a record number of prizes. Sec.-Treas. Fernandez reports a deficit of \$12.87, probably an all time low. Chairman Perrilliat and his committee are to be complimented on this excellent outing.

Committee on Honors and Awards. At the July meeting of the Board of Direction, this new committee was created. Its function will be to recommend to the Board recipients of honors, medals, awards and honorary membership given by the society.

Members of the committee are as follows: J. H. Collins, Sr., chairman; V. J. Bedell, Henry Boh, Ray E. Burgess, A. R. Choppin, Tom C. David, Hardy M. James, J. E. Jarman, J. P. McCullough, E. A. McLellan, E. L. Mire, and John Riess.

Engineering Books Needed for the Free University of Berlin. The National Conference of Christians and Jews Inc., is making an appeal for textbooks for the Free University. Six thousand students attend the university. The office of the Conference is Room 513 Pan American Building, phone CAnal 3760. If you have one or more engineering books which are up to date and in good condition, it would help the cause of education to send them to the above address.

Engineers and Architects Clubs of New Orleans. Our front cover pictures the quarters of the club, in Hotel De Soto.

The club has been set up as non-profit corporation to promote the common interests of local and visiting engineers and architects, their firms, corporations and societies engaged in and interested in the business or profession of engineering and architecture.

The club rooms are located in the newly redecorated and renovated former main dining room of the hotel. Numerous facilities will be available for the engineers, architects, and their various technical societies and organizations. A large meeting-room is provided for use of such groups as local sections of the American Society of Civil Engineers, American Institute of Architects, etc. One of the primary functions of the club is to supplement the activities of these various recognized professional technical societies. In addition to the meeting-room, an office with a secretary-manager is available to help with scheduling of meetings, etc. Also a large, well furnished lounge with a library of current technical publications is open daily from 11:00 a. m. to 6:00 p. m. as a meeting place for the members of the club and their colleagues. Meals will be served in a special section of the club room from the excellent cusine of the Hotel DeSoto kitchen and a small bar will be available for drinks.

The organization of this club fills a long-felt need of the community to provide facilities for the professional engineers and architects to hold their organization meetings, to meet together fraternally, to coordinate their activities for improvement of the business conditions under which the members of the profession operate, and to encourage and promote understanding among the members. In it, visiting engineers will find facilities for contacting local engineers and firms and conducting their business while in the city.

The club's organization was brought about through the efforts of members of the Louisiana Engineering Society, and the Louisiana Council of Engineers. In 1950 under guidance of Mr. L. J. Cucullu, the president of these two groups, a club committee with M. C. Abrahm as Chairman Pro-tempore, was found to deter-

mine ways and means of initiating the club. This sub-committee, composed of Messrs. Abrahm and J. S. Janssen, W. S. Nelson, and Roy Johnson, with the assistance of Mr. R. M. Seago, completed the plans for the club and located the present quarters. The club was incorporated on July 31, 1951, and is governed by officers elected from the board of directors, composed of outstanding engineers and architects of this section. The following constitute the first Board of Directors and Officers of the club: Paul F. Jahncke, Sr., president; Waldemar S. Nelson, vice-president; Michael C. Abrahm, secretary-treasurer; George S. Bisso, Ole K. Olsen, Rudolph B. Roessle, Henry Boh, David Taylor, Walter Cooke, and E. M. Freeman.

Membership in the club is open to those engineers and architects who are members of the Louisiana Engineering Society, or one of the recognized national professional engineering or architectural societies or registered professional engineers or architects.

The club rooms opened for operation on September 5, 1951 with an open house for all local engineers and architects on that evening to inspect the rooms.

Formation of this club and the opening of these facilities promise to bring about more unity of effort of the organizations of engineers and architects. Through it the professional engineers and architects and their firms and corporations will be able to perform an even better job in their respective fields.

The Engineers License Law. The following letter concerning this law has been received from Secretary Macdonald:

Dear Mr. Fernandez:

The Board has instructed me to write to you concerning the registration of Professional Engineers in Louisiana.

As you no doubt know, July 26, 1951 was the deadline for applying for registration on the basis of Private Practice. This is the arrangement outlined in Sec. 17-A of Act 73 of 1950, copy of which is attached.

There has been no deadline set, however, for filing applications for registration as Professional Engineer on the basis of Graduation. The requirements for registration under this classification are outlined in Sec. 12-A of Act 73 of 1950. It appears that some of the engineers in the state have been under the impression that they can no longer apply on the basis of Graduation. We would appreciate it, therefore, if you would transmit this information to the members of your Society and let them know that it is still possible to apply for registration on the basis of Graduation.

Very truly yours,
F. W. MACDONALD,
Executive Secretary.

New Members. The following new members were elected on the ballot of September 10, 1951.

For Member

- FRANCIS W. ALCOCK**, New Orleans; age 45. Endorsed: W. E. Douglas, Jr., A. J. Negrotto, A. M. Fromherz. Rensselaer Polytechnic Institute, C.E., 1927. Robt. J. Barthey, Cons. Engr., Asst. Engineer, 1927-41. U.S. Navy, Cmdr. CEC, 1941-47. W.A.A., Real Property Disposal and Sanitary Consultant, 1947-48. U.S. Navy CVA Plant, Dallas, 1948-50; 8th N.D., 1950-date. Registered Prof. Engr., Okla., Texas, N.Y. Registered Land Surveyor, N.Y.
- HERMAN M. ANDREAS**, New Orleans; age 44. Endorsed: H. L. Lehmann, W. H. Rhodes, A. H. Sykes. New Mexico Military Inst., Engineering, 1926-28. Louisiana State University, Agricultural Engineering, 1929-30. Texas Bitulithic Co., Foreman, Asst. Supt., 1930-38. Supt. Const. on highway and airport construction, 1938-43. U.S. Aviation Engineers, 1st Lt., 1943-45. Texas-Bitulithic Co., Construction Supt., La. Branch Mgr., 1946-date. Member SAME.
- PAUL M. BARBER**, Shreveport; age 38. Endorsed: A. A. Lyons, J. C. McLemore, E. A. Meagher, L. F. Valentine. I.C.S. course in Surveying and Mapping. The Texas Co., Field Engineer, 1935-40. W. Horace Williams Co., Engineer, 1940. Salis Mason Co., Area Engineer, 1941. M. W. Kellogg Const. Co., Engineer, 1942-44. City of Shreveport, 1948-date.
- OTHA E. BARRON**, Alexandria; age 53. Endorsed: Soule Butler, Chas. A. Myers, Eugene Levy. Southern Bell Tel. & Tel. Co., 1926 to date, now District Engineer in charge of 14 parishes in central and southwestern Louisiana.
- THOMAS CLYDE BEATTY**, New Orleans; age 48. Endorsed: L. J. Cucullu, M. C. Abrahm, E. L. Dennis. Georgia Institute of Technology, M.E., 1927. Combustion Eng. Superheater Co., 15 yrs. W. A. Ramsay Co., Honolulu, Sales Engr., 1945-51. Riley-Stoker Corp., Dist. Sales Mgr., present position.
- WILLIAM MCGREGOR CRAWFORD**, Lake Charles; age 33. Endorsed: E. M. Schwartz, A. J. Mary, Brandt Pederson, Lewis Henslee. A & M College of Texas, B.S.E.E., 1947. Gulf States Utilities Co., Junior Engineer, 1947-50. Southern Alkali Corp., Electrical Engineer, Dec. 1950-date. Associate Member AIEE. Jr. Member Texas Society Professional Engrs. Registered E.E., La.
- LOUIS NATHAN GOODMAN**, New Orleans; age 51. Endorsed: M. C. Abrahm, C. B. Gamble, M. G. Zervigon. Mississippi State College, Electrical, B.S., 1919; E.E., 1923. Electrical Contractor and Designing Engineer, 1924-34. Electrical Consulting Engineer, 1934-date. Member AIEE, IES, Gulf Institute Consulting Engrs. Registered E.E., La. Registered P.E., Miss.
- HENRY K. GROVES**, Baton Rouge; age 42. Endorsed: A. G. Meakin, T. J. Innes, Jr., F. A. Hannaman, Jr. Louisiana State University, Petroleum Eng., B.S. 1933. Esso Standard Oil Co., 1934-date, now Gen. Foreman Lt. Ends Div. Member Geological and Mining Society.
- JAMES HARPER HAMILTON**, Shreveport; age 44. Endorsed: E. M. Freeman, T. J. Rucker, F. W. Grant. Miss. State College, B.S.C., Chemical Engineering. Barrow-Agee Laboratories, Inc., 1935-date. Branch Mgr. since 1938, with exception of time spent in armed forces. Member American Oil Chemist Society.
- EDMOND McQUEEN JULIAN**, New Orleans; age 61. Endorsed: W. J. Amoss, A. L. Walker, R. E. Gosa. University of Tenn., B.S.C.E., 1911. Standard Dredging Co., Oiler, Foreman, Engineer, 1912-17. Bruce Dry Dock Co., Supt. Dredging and Wharf Const., 1917. Central Const. Co., Bldg. Const., Edward Arsenal, Md., 1917-18. Holbrook-Rollins, Wharf Const., 1918. Day & Zimmerman, Dredging Inspector, 1918-19. Standard Dredging Co., Booster Operator, 1919. Central Dredging Co., Supt., 1920. Standard Dredging Corp., Dredge Operator, 1920-24; Oredge Supt., 1924-27; Job Supt., 1927-44; District Supt., New Orleans, 1944-51.
- KENNETH LEE KINNEY**, Baton Rouge; age 30. Endorsed: T. J. Innes, F. A. Hannaman, Jr., F. D. Richards. Louisiana State University, B.S.M.E., 1949. Esso Standard Oil Co., Project Coordinator, 1949-date.
- KENNETH D. R. LaCROIX**, Baton Rouge; age 26. Endorsed: T. E. Peak, Sr., F. A. Hannaman, Jr., J. C. Hill, A. C. Matthies. Louisiana State University, B.S. Chem. Eng., 1947. Esso Standard Oil Co., Engineer, Petroleum Technical Service, 1947-date. Member Alpha Chi Sigma, Tau Beta Pi.
- JOHN ELDRED LANGLEY**, Baton Rouge; age 35. Endorsed: F. A. Hannaman, Jr., T. J. Innes, R. C. Herrell, O. D. Johnson. Alabama Polytechnic Institute, B.S.M.E., 1937. Allis Chalmers Mfg. Co., Student Engineer, 1937-38. La. State University, misc. engineering courses, (24 credit hrs.) 1946-50. Design Engineer, road graders, tools and jigs, 1938-41. Army Engr. Corps, Staff Officer, 1941-45. Mechanical Engineer, inspection, estimating, specifications for oil refinery, Nov. 1945-date.

- JOHN FARNEWORTH MANSON, New Orleans; age 32. Endorsed: R. A. Steinmayer, S. K. Manson, Jr., Robert Bland, Tulane University, B.E. in C.E., 1939. R. P. Farnsworth Co., Inc., 1939 to date, now General Supt. and Secretary.
- JOHN S. MALAHY, JR., Shreveport; age 33. Endorsed: E. M. Freeman, W. E. Fitzgerald, W. W. Sorenson, Oklahoma Agricultural and Mechanical College, B. S. M. E., 1939. Stanolind Pipe Co., 1939. U. S. Army Corps of Engrs., Jr. Engr., 1939-41. U.S. Navy Bureau of Ships, Eng. Officer, 1941-46. Landauer & Guerrero, Engineer, 1946-50. Carl M. Hadra, Associate, 1950-date. Registered M & E., La. Registered Mech. Engr., Texas. Member ASH&VE.
- DANIEL B. McCARTY, Covington; age 42. Endorsed: J. B. Carter, Oren Baker, W. L. Thompson, H. G. Fritchie, Surveyor and Engr., Rodman, Chainman, Instrumentman, 1926-32. La. Geodetic Survey, Party Chief, Field Supervisor, 1932-37. Atlantic Refining Co., Surveyor, 1945-47. La. Dept. Highways, Sr. Instrumentman, 1947. City Park Commission, Engineer, 1947-48. La. Dept. Highways, Party Chief, Jr. Project Engr., 1948-date. Registered C.E., La. (Public Employee). Member La. Hwy. Engrs. Ass'n.
- GEORGE C. McMILLEN, Port Sulphur; age 44. Endorsed: V. H. Brogdon, R. H. Earl, K. T. Price, Univ. of Minnesota, Liberal Arts, 1924-25; Mines and Metallurgy, 1925-29; Engr. of Mines, Freeport Sulphur Co., 1929 to date, Now Asst. General Supt., Grand Escaille Sulphur Mine., Port Sulphur. Member AIMME. Registered Professional Mining Engineer, Texas.
- JAMES SAMUEL MORGAN, Shreveport; age 37. Endorsed: F. W. Grant, A. C. Lindsay, Jr., T. J. Rucker, Harding College, Chemistry Major, B.A., 1937. Arkansas State Highway Dept., Inspector. Van Trump Testing Laboratories, Chemist and Inspector. Barrow-Agee Laboratories, Inc., Inspector and Testing Engineer.
- ERNEST R. PEREZ, JR., New Orleans; age 30. Endorsed: G. R. Hammett, R. P. Lockett, Jr., B. S. Nelson, Louisiana State University, 1938-42, B.S.M.E. Boeing Aircraft Corp., Design Engineer, 1942-45. A. M. Lockett & Co., Ltd., Engr., 1946-date.
- F. COOPER RATLIFF, Bogalusa; age 40. Endorsed: M. R. Guell, B. B. Pierce, W. C. Barnwell, Louisiana State University, B.S.Ch.E., 1934; M.S.Ch.E., 1936. Gaylord Container Corp., 1936-date, routine testing, chemical engineering studies and design of process units.
- JOHN EARL RITTER, Baton Rouge; age 36. Endorsed: J. H. Gillum, K. A. Rees, T. L. Wilson, Louisiana State University, B.S.E.E., 1935. Esso Standard Oil Co., Engineer, Petroleum Technical Service Dept., 1935-41; Technical Asst. to General Supt., Administrative Dept., 1941-48; Division Foreman, Light Ends Dept., 1948-date.
- LOMIS E. STEWART, New Orleans; age 32. Endorsed: C. L. Graves, R. T. Sessums, Nelson Crews, Louisiana Polytechnic Institute, B.S.M.E., 1940. U.S. Navy, Bureau of Public Works, Mechanical Draftsman, 1940. U.S. Army Airforce, 1942-45. National Hotel Co., Chief Maint. Engr., 1946-47. Crescent Bed Co., Plant Supt., 1947-49. J. Ray McDermott Co., Inc., Field Engr., Marine Supt., 1949-date.
- ROLAND L. TOUPS, Houma; age 40. Endorsed: E. L. Dennis, Walter Godchanx, Jr., Leon Godchaux III, Georgia Institute of Technology, B.S.M.E., 1933. The South Coast Corp., Chief Engineer, 1945-date.
- CLARENCE J. TIRCUIT, Baton Rouge; age 30. Endorsed: C. E. Abrahmson, A. D. Jackson, J. J. Mundinger, Louisiana State University, 1939-41. U.S. Army Air Corps, 1943-46. La. Dept. of Highways, Boundary Survey Engineer, 1946-date. Registered Land Surveyor, La.
- JOHN PAUL TUCKER, Lake Charles; age 51. Endorsed: G. B. S. Ricketts, Brandt Pedersen, W. J. Lechtenberg, Washington University, 3 yrs. International Correspondence School, Mech. Eng. Wilson Engineering Institute, Structural Eng. University of Wisconsin, Structural Eng., Alexander Hamilton Institute, General Business, Dallas Power & Light Co., Draftsman, 1921-22; Brown-Abbott Const. Co., Const. Engr. 1922-23. Petroleum Iron Works, Checker-Designer, 1923-27. Ft. Worth Structural Steel Co., Chief Draftsman, Asst. Chief Engr., 1927-36. U.S. Engineers Dredging Div., Engr., 1936-37. Mathieson Chemical Corp., charge of Engineering and Design 1937-date. Member SAME.
- HERMAN ROBERT VICK, New Orleans; age 33. Endorsed: A. L. Walker, J. C. Baehr, G. H. Dudley, Ohio State University, B.M.E., 1940. Dupont Company, Trainee, Engineer, mtce. and plant engineering. Project engineer for various plant constructions, 1940-49. Tidewater Dredging Corp., Mechanical Engineer and vice-president, 1949 to date. Member SAME. Registered M.E., La.

VALDEMAR WESTH, Baton Rouge; age 49. Endorsed: H. L. Lehmann, W. B. Gurney, R. K. Wilkerson, R. J. Robertson. Louisiana State University, Safety Engineering Course, 1941-42. Fuller Lehigh Co., Foreman, boiler erection, 1927-30. Babcock & Wilcox Co., Boiler erection, 1930-32. Gulf States Utilities Co., Helper, Boiler Maintenance Engineer, 1932-date.

JOHN RADOLPH WHIPPLE, Baton Rouge; age 33. Endorsed: D. F. Latimer, W. S. Syrett, F. J. Warren. Louisiana State University, B.S.E.E., 1938. Princeton University, E.E., 1939. Gulf States Utilities Co., Student Engr., 1939-40. U.S. Army, Univ. of Tenn., Asst. P.M.S. & T., 1940-42. U.S. Army Engineer Board, Research and Development Engr., 1942-45, 1945-46. National Carbon Co., Process Engineer, 1946-49. Ogden & Woodruff, Electrical Design Engineer, 1949-date. Registered E.E., Ohio. Member AIEE, Tau Beta Pi.

ALBERTA M. YOUNG (MRS.), New Orleans; age 38. Endorsed: W. J. Drawe, Jr., G. Elmer May, Claiborne Perrilliat. Tulane University, College of Engineering, 1927-29. School of Mines, El Paso, Tex., 1930-31. Engr. Science and Management Defense, Tulane U., 1941-43. Geological courses, Tulane U., 1949-date. U.S. Army Corps of Engrs., 2nd N.O. Dist., Inspector, 1929-30. Dept. of Interior, Bureau of Reclamation, Asst. Engr., 1930-31. Southern Bell Tel. & Tel. Co., Chief Draftsman and Eng. Asst., 1932-38. Corps of Engineers, Area Engineer, N.O. and vicinity. Engineer, 1938-40. Wm. Helis Oil Co., Asst. to Chief Geologist, 1940-46. Atwater & Young, Petroleum Consultants, Partner, 1946-date. Member N.O. Geological Society, Altrusa International, AIMME. Registered Petroleum Engineer, La.

For Transfer From Junior To Full Member

KENNETH M. DECOSSAS, New Orleans; age 26. Tulane University, B.E. in Ch.E., 1944. Southern Regional Research Laboratory, Chemical Engineer, November 1944 to date. Registered, Miss. Member A.I.Ch.E., Tau Beta Pi.

For Affiliate Member

AUBRA A. BRADDOCK, Grayson; age 36. Endorsed: J. E. Ross, E. R. Woodman, E. J. James Louisiana Dept. of Highways, Rodman to Jr. Project Engineer, 1943-date. Registered C.E. (Public Employee). La Highway Engineers Association, Member, 1947.

JOHN H. DUCHKAR, Monroe; age 28. Endorsed: W. I. Neel, G. P. Forman, J. E. Ross. Northeast Jr. College of L.S.U., 1938-40, Chem. Eng. Louisiana Polytechnic Institute, 1940-41, Chem. Eng. International Correspondence School, Surveying and Mapping course in process of completion. City of Monroe, Transitman, 1944-45. La. Dept. of Highways, Instrumentman, Chief of Party, 1945-49. W. I. Neel, Surveyor and Asst., 1949-date.

HARRY F. MCGOWEN, JR., Shreveport; age 33. Endorsed: E. C. Greco, J. P. McCullough, W. C. Sorensen. Armor Institute of Technology, 1936-37-38. United Gas Corp., Research Machinist, 12 years.

ALBERT H. RORDAM, New Orleans; age 35. Endorsed: L. K. Nelson, G. E. Millard, H. C. Swan. Louisiana State University, Civil Eng., 1936-38. Tulane University Civil Eng., 1940. La. State Highway Dept., Sewage Inspector, 1939. Coleman Eng. Co., Party Chief, 1941-42. McWilliams Dredging Co., Field Engineer, 1942-43. Southwest Equipment Co., Oil Field Salesman, 1943-44. Employers Group, Safety Engineer, 1944-47. American Coating Mills, Sales Representative, 1947-48. Fairbanks, Morse & Co., Sales Engineer, 1948-date.

For Junior Member

BEN D. ATCHLEY, SR., Shreveport; age 29. Endorsed: E. M. Jolly, A. A. Lyons, J. C. McLemore. Louisiana Polytechnic Institute, B.S.C.E., 1949. City of Shreveport, Engineering Dept., 2 years. Registered C.E., La.

FREDERICK A. DECKBAR, JR., New Orleans; age 24. Endorsed: H. J. Molaison, E. F. Pollard, R. M. Persell. Tulane University, B.E. in Ch.E., 1948. U.S. Dept. of Agriculture, Southern Regional Research Laboratory, June 1948 to date Junior Member, AICHe.

RAYMOND E. DUFRECHOU, New Orleans; age 25. Endorsed: E. P. Hall, J. I. Kotter, L. T. Watkins. Tulane University, 1946-49. Southwestern La. Institute, 1950-51, B.S.C.E. Frank P. Dufrechou, General Contractor, Civil Engineer, estimating, design, supervisory work, June 1951-date.

RALPH CALEB ELLIOT, Lake Charles; age 29. Endorsed: W. M. Davis, G. H. Hill, G. B. Wooster. Southwestern Louisiana Institute, B.S.M.E., 1950. Cities Service Refining Corp., Jr. Engineer, August 1950 to date.

RUSSELL A. HALL, New Orleans; age 25. Endorsed: T. E. Ernst, W. E. Blessey, T. J. Rennie. Tulane University, B.S.C.S., 1951. T. Edward Ernst, Consulting Engineer, Jan. 1951 to date. Registered C.E., La.

- WILLIAM F. KING**, New Orleans; age 24. Endorsed: A. M. Hill, R. P. Lockett, Jr., W. S. Nelson. Tulane University, B.E. in M.E., 1946. Cornell University, M.S. Eng., 1947. Pan American Equipment Corp., Design Engineer, 1947-49. James M. Todd & Associates, Design Engineer, Sept. 1949-date. Junior Member ASME. Registered M & E Engineer, La.
- THEODORE J. LALA**, New Orleans; age 22. Endorsed: R. G. Cappel, M. R. Guell, C. J. Mayeux. Louisiana State University, B.S.M.E., 1948. Hepinstall Steel Works, Asst. Chief Engineer, 1948-date. Member ASME.
- EDMOND J. LANGHETEE, JR.**, New Orleans; age 22. Endorsed: H. J. Molaison, F. M. Ritchie, P. T. Seashore. Louisiana State University, B.S. Pet. Eng., 1949. Louisiana Land and Exploration Co., Petroleum Engineer, Feb. 1949-date. Member N.O. Geological Society, Jr. Member AIMME. Registered Petroleum Engineer, La.
- HENRY FISHER LEMIEUX**, New Orleans; age 25. Endorsed: W. E. Blessey, Cal F. Hadden, J. P. Fernandez. Tulane University, B.E. in E.E., 1946; B.S.C.E., 1949. Raymond Concrete Pile Co., N. Y., Engineer, Field Supt., 1949-51. Boh Bros. Const. Co., Engineer, 1951. Raymond Concrete Pile Co., N. O. Representative, June 1951-date. Junior Member ASCE. Registered C.E., La.
- WILLIAM E. McWHIRTER, JR.**, New Orleans; age 23. Endorsed: H. J. Molaison, J. E. Pottharst, Jr., F. M. Taylor. Tulane University, B.S.Ch.E., 1950. Mechanical Equipment Co., Inc., Chemical Engineer, June 1950-date. Member Alpha Chi Sigma.
- OTIS OLENDER MILLER**, Baton Rouge; age 27. Endorsed: H. L. Landry, G. W. Robert, W. S. Syrett, F. J. Warren, Jr. University of Tennessee, B.S. M.E., 1951. Now employed by La. Public Service Commission
- LOUIS C. NEFF, JR.**, Port Sulphur; age 23. Endorsed: W. P. Wallace, F. F. Pillet, A. A. McCool. Southwestern Louisiana Institute, B.E., 1944-45 and 1947-49. Louisiana State University, B.S.C.E., 1949-51.
- WILLIAM W. ROGERS**, Alexandria; age 28. Endorsed: F. H. Coughlin, Erwin Hogge, A. M. Moore. Paris Jr. College, Civil Engineering, 1940-41. Augustana College, Advanced Math., 1942-43. Army Special Training Program, Civil Eng. 1944-45. U.S. Engineering Dept., Denison Dist., Location Engineer, 1941-42. Instructor, Engineers, Ft. Belvoir, 1944-46. Freese & Nichols, Resident Engineer, 1946-51. Central La. Electric Co., Senior Engineer, June 1951-date.
- MICHAEL J. RUCK**, New Orleans; age 23. Endorsed: W. E. Blessey, T. Edw. Ernst, F. W. Macdonald. Tulane University, B.S.C.E., 1951. City of N.O., Dept. Public Utilities, Utilities Engineer, June 1951-date. Louisiana C.E. registration pending.
- SAMUEL R. WARRINER, JR.**, New Orleans; age 32. Endorsed: M. E. Kirkpatrick, Jr., A. H. Jensen, R. M. Seago. Virginia Polytechnic Institute, B.S. M.E., 1950. Northern Equipment Co., Erie, Pa., Research Engineer, July-Dec., 1950. Warriner Equipment Co., N.O., Manufacturer's Representative, 1-1-51 to date. Junior Member ASME.

PAPERS AND DISCUSSIONS

ENGINEERING IN UTILIZATION RESEARCH ON SOUTHERN FARM PRODUCTS[†]

By C. H. Fisher*

INTRODUCTION

I am glad to have the opportunity of appearing on the program of this joint meeting of the Louisiana Engineering Society and the New Orleans Section of the American Institute of Chemical Engineers. You, as engineers, are key men on all modern research teams, and I'm honored by your invitation to be present.

While the engineer is widely acclaimed for his contributions in some of the older fields of technology, such as civil, electrical, and mechanical engineering, I have the impression that his important role and opportunities in a relatively new branch of research, namely, the utilization of farm crops—or chemurgy for short—have received insufficient recognition. As a member of the Southern Regional Research Laboratory, one of the larger organizations engaged in crop utilization research, I am pleased to have the opportunity of discussing briefly some of the engineers' contributions, and opportunities for future achievements, in this field.

THE SCOPE OF CHEMURGY

As you know, chemurgy is a modern concept of one branch of science, virtually unheard of before the middle of the 1930's, when problems in the utilization of surplus farm commodities led to widespread interest in the development of non-food, or industrial uses, through the application of chemistry. Today, the term implies much more than that. About two years ago the president of the National Farm Chemurgic Council, Mr. Wheeler McMillen, suggested a broader definition of chemurgy to reflect more accurately its possibilities in the development of agricultural resources generally—in food as well as industrial uses. As Mr. McMillen put it, "The definition of chemurgy keeps bursting out at the seams. Whenever one definition seems to be final and complete, the idea expands and before long the designation has to be pieced out."

Such a broadened concept of chemurgy throws a new perspective on the subject as it is related to engineering, and gives more emphasis to the role of engineering in chemurgy. Perhaps this was better illustrated by Mr. R. C. Archer, vice-president of the Inter-

* Director, Southern Regional Research Laboratory, New Orleans, La. (One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture).

[†] Presented at a Joint Meeting of L.E.S. and the American Institute of Chemical Engineers, Oct. 8, 1951.

national Harvester Company, in a report he gave at the fourth annual meeting of the National Farm Chemurgic Council in 1949. In that report Mr. Archer referred to two engineering developments and said that chemurgy had its beginnings a century before its name was coined—in 1831 when Cyrus Hall McCormick invented the reaper and in 1838 when the first steel plow was used, marking the beginning of farm mechanization. Certainly the engineers of the various farm equipment manufacturing companies and of research agencies concerned with the production and harvesting of crops are contributing to the progress of chemurgy in its broadest sense today. The cotton gin, mechanical harvesters, milking machines, threshing machines and many other examples could be cited to illustrate improvements in production and harvesting of crops. The advances not only have facilitated production and harvesting; they have also aided utilization by lowering costs and improving the competitive position of farm crops.

HOW ENGINEERING CONTRIBUTES TO UTILIZATION

If the definition of chemurgy is narrowed somewhat by considering only its applications in the field of crop utilization, we can say that it is concerned with new products from farm crops, new and expanded outlets, and improved processing leading to better products, lower costs, or both.

In discussing the role of engineering, it is convenient to limit the subject further by dividing chemurgic research into two types—the development of new or improved products, and the development of new or improved processing methods. While engineering is important in both types of research, the latter type appears to offer better opportunities for the engineer most expeditiously to make contributions of great economic value.

The physicist, chemist, biologist, or other specialist may discover a new and valuable product, such as penicillin or a new emulsifier, and may even develop a method for making the product on a small scale. But making the new product on a large scale is a different matter, and several questions must be answered before this new product can become an article of commerce. For example: Is it feasible to make the new product on a large scale? What sort of factory equipment will be needed to make it? What will it cost? Engineering undertakes to answer these and similar questions. It would be difficult or impossible to answer them in the laboratory, and much too expensive on a factory scale. As a rule then, the chemist, the physicist, the biologist and other specialized research workers depend on the engineer to take the knowledge they obtain and make it commercially useful. They may also depend on him to use his pilot-plant facilities to produce, under known and con-

trolled conditions, sufficient quantities of new products to permit further laboratory research and evaluation studies that may be needed.

In processing research, engineering usually plays an even more prominent role. Frequently, the laboratory stage of processing research is skipped altogether, and often the problems involved in processing are inherently and exclusively engineering in nature. It is difficult to overestimate the importance of processing investigations. The annual value of Southern farm crops processed runs into billions of dollars, and hence even a minor improvement in processing may be worth millions of dollars per year.

But even processing research usually involves teamwork and cooperation between engineers on one hand and chemists, physicists, and other scientists on the other. Even in strictly engineering research, the materials subjected to processing must be analyzed and the products must be tested and evaluated. The engineer usually calls on others for help in jobs of this kind.

ACHIEVEMENTS IN CHEMURGIC ENGINEERING

Cotton Lint. Advances in the mechanical harvesting of cotton have been mentioned already. It has been estimated that the proportion of the crop harvested mechanically increased from 5 percent in 1949 to 8 percent in 1950, and there are estimates that it will be 16 percent in 1951. Because the annual value of cotton lint is more than 2 billion dollars, the economic value of any advance in harvesting and processing is ordinarily very high.

Two important improvements in cotton lint processing—that is, in the manufacture of cotton lint into yard and fabric—have come from investigations in the Southern Regional Laboratory. One of the basic operations in cotton processing is that of opening baled cotton so that it can be cleaned, spun, and woven efficiently. A new machine that opens and fluffs up the cotton more efficiently has been developed. It is estimated that savings up to one dollar per bale can be effected because more trash—but less spinnable fiber—is removed. Although the opener was announced only one year ago, it is now being manufactured by six companies and used by four textile mills.

The weaving of cotton yarns has been made more efficient through the development of a new and inexpensive loom attachment. Cotton fabrics of normal density made with the help of the new attachment have improved appearance and somewhat greater strength. In addition, fabrics of greater than normal density can be made. These have greatly improved resistance to the passage of water and air. Tarpaulins made of such fabrics are now being tested as covers for the Pelican Ball Park.

Work done at the North Carolina State Textile School under contract for the U. S. Department of Agriculture's Bureau of Agricultural and Industrial Chemistry also has aided cotton processing. In one study, it was shown that the formation of neps (tangled knots of fiber that detract from the appearance and value of the yarn and fabric) can be decreased by the use of proper adjustments and speeds of some parts of the card and other processing equipment. These results have already been applied profitably by industry. The information obtained in an investigation of high-speed tricot knitting should make possible smoother and more economical operation of the machines to give cotton textile products of improved quality.

The contributions of engineering research to the manufacture of cotton are not confined to the field of mechanical processing alone. The development of a new textile material, called acetylated cotton, has been aided by the chemical engineer. Large quantities of the new material in fiber, yarn and fabric form have been made in pilot plants, both in America and England for large-scale evaluation in applications requiring special properties, including unusual resistance to heat, mildew, rotting and chemicals. Improved production methods are being developed, and a continuous process for making the acetylated yarn and fabric is now under study at the Southern Laboratory, where the processing of the acetylated fiber into yarns and fabrics is receiving the attention of textile engineers.

The importance and opportunities of the engineer working on cotton utilization can be illustrated further by reference to an improved semi-elastic cotton bandage. The superior properties of this bandage are easily demonstrated, and those who have examined it prefer it to the conventional cotton bandage. It seems very likely that this new bandage will be made available commercially when the engineering problems involved in its manufacture are solved.

This account of recent achievements and current research of engineers working on cotton is obviously incomplete. Not mentioned so far are engineering developments on the crimping of cotton, the chemical treatment of cotton fiber by continuous methods, and miscellaneous improvements in spinning and weaving.

Cottonseed Processing. Striking examples of the results of teamwork between engineers and other scientists can be drawn from oilseed processing studies at the Southern Regional Research Laboratory. One entire Division is concerned with laboratory investigations of the vegetable oils produced from southern crops—cottonseed, peanuts, rice bran, sesame, and others as information on them is needed; another Division investigates the meals from these oilseeds on a laboratory scale; and a third—our Engineering and Development Division—develops the information on a pilot

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plant scale and applies the results in improving oil seed processing techniques.

Since cottonseed, economically, is the most important southern oilseed crop, bringing farmers 288 million dollars in 1950, it receives the major attention, and some of the developments can be used appropriately to illustrate the importance of engineering in chemurgic progress.

In this work attention has been given to certain new experimental methods of processing, as well as to the conventional processing methods including hydraulic pressing, screw pressing, solvent extraction, and forepressing.

Improvements in solvent extraction. From an economic standpoint perhaps the most worthwhile contributions so far have been made in the field of solvent extraction—a process by which greater quantities of oil can be recovered and meals produced that are adaptable to the production of industrial products as well as of high quality feeds. However, like most innovations in processing, solvent extraction has presented certain problems.

For one thing, the elimination of cooking prior to extraction of the cottonseed meats—a step that is common with hydraulic and screw pressing—permits more of the color from the unique pigment system of the cottonseed to affect solvent-extracted oil. Unless this could be controlled, any increase in the total value of the oil resulting from increased yields would be offset by lower prices for the highly colored oil. In a series of laboratory and pilot plant studies, engineers and other scientists found a solution in the proper control of the heat that is used in removing the solvent from the oil-solvent mixture after extraction. Since the proportion of oil to solvent varies rather widely, it was necessary to determine the optimum conditions for different mixtures in order to make the information of maximum value to processors. This could be done only by careful engineering studies in the pilot plant—but the resulting data have proved their value. Not only have they helped cottonseed processors directly—they contributed information needed by machinery manufacturers in the design of improved solvent extraction equipment.

There have been other problems too—in the preparation of the seed for extraction, for example. Again, in close teamwork between laboratory scientists and engineers, a solution has been found. The moisture content of the cottonseed has a profound effect on its suitability for solvent extraction. Flakes prepared from seed that is low in moisture are too fine, whereas flakes from high-moisture seed are too soft. They tend to pack in the extractor and do not permit the solvent to flow through freely. Our research team has found that flakes having about 9 percent moisture largely over-

come these tendencies and permit efficient extraction. Furthermore, we learned that in order to obtain flakes of 9 percent moisture we need seed of 10 to 12 percent moisture. Seed with more than this amount of moisture can be dried, of course. For seed that is too dry, our engineers worked out what we call a moisture equilibration technique for increasing the moisture content to the optimum level.

The solution of these two problems has contributed greatly to the expanded use of solvent extraction during recent years. From only a very small percentage a few years ago, it has grown to about 7 percent of the total cottonseed processed at present—and the trend is still up. It is expected that solvent extraction may be used with 15 or 20 percent of next year's crop.

The full significance of this trend lies in the fact that solvent extraction permits the recovery of about 3 percent more oil than can be recovered by screw pressing and about 5 percent more than can be recovered by hydraulic pressing. With the improvements that have been made in solvent extraction, the oil is comparable in quality, and therefore in price, to other cottonseed oils, so that the increased production means an increased money value for cottonseed oil, hence for the cottonseed crop. With only the present use of solvent extraction, it is estimated that cottonseed oil production has been increased perhaps 20 million pounds a year—valued at several million dollars. Next year this may be more than doubled.

New trends in solvent extraction. Further improvements in solvent extraction are being sought through research on the use of this process in combination with prepressing, a method that has been attracting considerable attention lately; through studies of a novel new technique whereby the whole seed, instead of just the meats is solvent-extracted; and through the use of filtration as the major unit operation of a direct solvent-extraction method.

The filtration-extraction method, which is under active investigation at the Southern Laboratory at this time consists in mixing a slurry of rerolled, cooked cottonseed flakes and hexane-oil miscella followed by filtering and countercurrent washings. The method makes a good use of cooking to eliminate many of the technical problems encountered in the usual direct solvent extraction. Prepressing is not used, and since expensive auxiliary equipment, such as centrifuges, may be eliminated, the process should be attractive to the smaller as well as the larger plant.

The idea of filtering and extraction in one operation has grown out of research conducted at the Southern Laboratory on still another method of cottonseed processing—the fractionation method.

Fractionation of oil, meal and pigment glands. This latter process—called fractionation—is a particularly good example of the role of engineering research in adapting the findings of our labora-

tory scientists into a feasible process. During studies of the complicated pigment system of cottonseed, our chemists worked out a laboratory method for separating the whole pigment glands from the oil and meal. Our engineers developed the method in the pilot plant and worked out a modification that is economically feasible in combination with screw pressing. The advantage of such a process commercially would be the removal of pigments, resulting in a purified high-protein meal and a high grade oil. And the pigments themselves may eventually prove valuable. The pigment glands produced during pilot plant research on the fractionation process at the Southern Laboratory have made research in this direction possible. Gossypol, the principal pigment, has been investigated both by the Southern Laboratory and by other research organizations. It is interesting to note that, should a use develop, the potential production of gossypol would amount to as much as 50 million pounds per year, assuming that all cottonseed processing would be done by methods permitting recovery of the pigment.

Hydraulic and screw pressing. Engineering research is contributing also to improvements in the processing of cottonseed by hydraulic and screw pressing—and opportunities in this direction are great. For example in hydraulic pressing, the method by which well over half our cottonseed is processed today, an improvement that would increase the recovery of oil by as much as one percent would mean millions of pounds of oil added to the present production. It may be of interest to this group to know that much of the information needed to investigate such possibilities on a pilot plant scale has already been obtained by the Engineering Experiment Station of the University of Tennessee, working on a contract for the Bureau of Agricultural and Industrial Chemistry.

As for a screw pressing, some revolutionary changes may be just around the corner. Our chemists and engineers are cooperating with State Experiment Stations, the National Cottonseed Products Association, several agencies of the Department of Agriculture, and a number of oil mills in a thorough study of a modified screw pressing technique by which meals of unusually high nutritional quality can be produced. These meals have been fed in large quantities to hogs and chicks with good results, whereas ordinary cottonseed meals can be fed to these animals in only small concentrations. This improvement is expected to open large new markets for cottonseed meal in the mixed feed industry. Our engineers and those of the cooperating cottonseed oil mills can take a large share of the credit for this.

Peanuts. A considerable amount of engineering research, both Federal and State, has been directed in recent years toward the development of improved production, harvesting, and handling

methods for peanuts, in an effort to lower production costs. At the same time other engineers, working in close cooperation with chemists, have sought ways to increase the value of this important southern farm crop in both food and industrial uses. Satisfactory blues, adhesive, paper sizes, and textile fibers have been produced on a pilot plant scale. Their commercial production depends on the availability of suitable peanut meal and protein, which can be produced by solvent extraction when it becomes economically practical to use peanuts for such products. Engineers have worked out each step of the process—from deskinning and otherwise preparing the peanut, through solvent extraction, to separation of the protein.

In food uses perhaps the greatest attention has been given to peanut butter. Pilot plant studies at the Southern Laboratory are providing much valuable information leading to an improved peanut butter through a better understanding of the relationship between processing conditions and quality. Resulting so far indicate that careful control of temperature in roasting the peanuts gives a more uniform peanut butter from the standpoint of spreadability, color, and longer retention of freshly roasted flavor.

Citrus Fruits. In the development of new food products, perhaps one of the greatest contributions of engineering has been in connection with frozen orange concentrate. This new product resulted from work done cooperatively by the Florida Citrus Commission and our Winter Haven Fla., Citrus Products Station.† This research has paid off in the form of a brand-new industry whose products today are valued at more than 130 million dollars a year. Considerable laboratory work preceded the final development, of course, but much engineering done largely by industry was required to make the process commercially feasible.

Engineering also has contributed knowledge that may increase the efficiency with which citrus molasses is utilized. Pilot plant studies have shown that it is technically feasible to make feed yeast, lactic acid and butyl lactate from this byproduct of citrus processing.

Pine Gum Products and Processing. In the Southeast, the production of turpentine and rosin from pine gum is a 40-million-dollar-a-year industry. Virtually all the modern plants—there are 29 of them—use processes developed in engineering research at our Naval Stores Station in Olustee, Fla.§ These include an efficient method of gum cleaning that makes it possible for a plant to process 1,000 barrels of crude gum a week, against a capacity of 180

†This field station, a unit of the Bureau of Agricultural and Industrial Chemistry, is administered by the Southern Regional Research Laboratory.

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barrels by older methods. Moreover, the yield of rosin is 5 percent greater. Steam distillation, a process developed by our engineers, has almost entirely displaced the older fire-stills during recent years.

With improvements in the methods of processing pine gum have come also developments to improve the utilization of pine gum products. Rosin and turpentine, while still the major end products of pine gum, are also the starting point for a number of useful products, including chemicals of vital interest to defense agencies at the present time. The processing research on pine gum, involving engineering, is estimated to have brought benefits worth more than 4 million dollars a year.

Two intermediates that can be converted into synthetic rubber have been made satisfactorily on an engineering scale from pine gum products. These two intermediates, isoprene and p-isopropenyl-toluene, were made by the thermal cracking of dipentene and p-cymene, respectively. Excellent synthetic rubbers have been prepared from them.

Sweetpotatoes. Sweetpotatoes are used widely as a popular food, but industrial uses for this vegetable are severely limited because of production costs. Many scientists, some of them engineers, are doing research to lower production and harvesting costs. It is understood, for example, that engineers at the Louisiana Agricultural Station at Baton Rouge are working on an improved machine to dig sweetpotatoes, which is expected to greatly reduce the number of man hours required to harvest the crop. It is hoped that, with this machine, one operator will be able to do the work of a considerable number of men digging potatoes. If this effort is successful, sweetpotatoes should be produced at greatly reduced cost. Low cost sweetpotatoes might result in renewed interest in the establishment of a sweetpotato starch industry in the South. The Southern Laboratory has developed a satisfactory process for such an industry when sweetpotatoes can be produced at a cost sufficiently low to make them attractive as an industrial raw material.

It is likely also that the production of sweetpotatoes at lower cost will result in expansion of the dehydrated sweetpotato feed industry. With current prices of sweetpotatoes, the production of dehydrated potatoes for feeds and industrial uses is limited primarily to surplus and cull potatoes as the raw materials.

Sugarcane Products and Processing. Sugarcane is another southern farm crop whose utilization has been improved through a combination of engineering with chemical research. One very important development to which engineering research contributed greatly is the process for the recovery of aconitic acid as a profitable

byproduct in the production of sugar. Last season the gross revenue from this process for the one plant at present recovering aconitic acid was enough to pay for the research that made the process possible—and this was from the marketing of only about 1,000,000 pounds of aconitate salt. Potential demand is estimated at nearly 12 million pounds a year, which would be worth several million dollars at current prices.

Bagasse, another sugarcane byproduct, has received considerable engineering attention. There is at present, both in the United States and Hawaii, much interest in the possibilities of bagasse for commercial use in making pulp, paper, feed and other products.

Recently the utilization research on sugarcane itself has centered on efforts to provide information to aid the processing of new varieties of cane and to overcome problems associated with mechanically-harvested canes. The processing characteristics of new varieties are being studied jointly by engineers of Louisiana State University and chemists of the Southern Regional Laboratory in a special pilot plant provided by the University. Experiments can be carried out on individual samples of as little as two tons of cane, yet processing is continuous and operating conditions are automatically controlled to simulate those of full-scale sugar manufacture. By correlating the results of these small-scale processing experiments with information the chemists obtain on the composition of the cane and juice used, information of great practical value is being provided. Eight of the varieties of sugarcane have been studied so far.

The processing of mechanically harvested cane has been greatly improved among other things, by the application of research at the juice-clarification step in sugar production—the step in which impurities are precipitated by adding lime and heating the juice. In periods of wet weather more field mud, as well as trash, is brought in with the cane. Juice from cane handled under these conditions produces a precipitate that is too voluminous and does not settle readily. This slows down the process. Treatment of such juice with oystershell flour as well as lime has been found advantageous as an aid to good clarification. A number of plants have tried the treatment and found it helpful.

Miscellaneous. Other examples of engineering achievements and current efforts by industries, universities and other research organizations include the processing of kenaf and ramie, the production in Florida of woodpulp scrub oak, and pilot plant studies of rice milling.

These are but a few of the contributions of engineering to utilization research on Southern farm crops. But even these instances are enough to show that the engineer has greatly enriched

the lives of American citizens through crop utilization—or chemurgic engineering. W. Rhea Blake has said that agricultural research “. . . . has created an increase of more than 10 billion dollars in the farm income of America each and every year.” The portion of this annual dividend of 10 billion dollars that can be attributed to engineers is not known, but certainly it is considerable.

OPPORTUNITIES FOR CHEMURGIC ENGINEERING

If past achievements, and the wealth and diversity of raw materials are any indication, the future for crop utilization engineering will be both productive and exciting. In the South alone, the annual value of farm crops is about 7 billion dollars, excluding the value of wood pulp and wood products. Both cotton and wood products bring revenues greater than 2 billion dollars annually to the growers.

Although research has been productive, the total amount of agricultural research is small compared to the value of the crops investigated. All Federal and State agencies together spend less than one percent of the total value of farm crops for all types of agricultural research. It is impossible to visualize the role engineering might play in chemurgy if the amount of research to improve the utilization of farm crops were brought in line with the tremendous volume of research in other fields. The petroleum industry, for example, spends more than 2 percent of the annual volume of the product on research—relatively speaking, six times as much as is spent on agricultural research.

LOOKING AHEAD WITH THE ENGINEER

Looking toward the time when fulfillment of these opportunities may be possible, engineers who may be interested in crop utilization research, along with engineers already engaged in this field, can prepare themselves to make their greatest possible contributions. Much more than technical knowledge is needed, though this is essential. To do their jobs well, engineers must be versatile and adaptable, with a high leadership potential, and the ability to get along well with other people. For crop utilization research is done by teams—not individuals. And above all, the engineer who would contribute most in the field of crop utilization research, must be able to communicate facts and ideas effectively. For he will have responsibilities in educational and informational fields.

The professional engineer who can carry out these responsibilities capably has the satisfaction of knowing that he is an essential link between the farmers who grow agricultural raw materials and the industries who use them, and that he serves both. He will also have the satisfaction of knowing that, through his efforts, ideas that are painstakingly nursed through various stages of laboratory research are brought to fruition and used for the public welfare.

ENGINEERING BRIEFS

Faster Diagnosis. Diabetes diagnosis has taken a jump ahead with a new machine which has speeded up precise determination of blood sugar content.

The new machine, the Hewson Clinitron, developed by the Mathewson Machine Works, Inc., of Quincy, Massachusetts, has been used to make tests on 4300 blood specimens in about 40 hours, and with only one attendant. Without the machine, the processing of this number of blood specimens would require 10 to 15 weeks of laboratory technician's time.

In the diagnostic operation, several chemicals are added to the specimen at intervals. Test tubes holding the specimens are progressively heated, steamed, and subjected to subdued heat from a special G-E Calrod heating unit. Then they are tilted, shaken, and cooled. If the blood sugar value is below screening level, the solution will be blue. If above this level, indicating an increase of blood sugar above the standard range, the solution will be colorless. This affords a precise, easy reading.—*General Electric News*.

* * *

For a Safe Return. According to General Electric engineers, firing record-breaking 250-mile-high rockets is a major operation, but getting them back to earth at the right spot is an equally difficult task.

It seems that approximately 10 variable factors must be taken into consideration when high-altitude rockets are fired at the Army's White Sands, N. M., proving grounds. These include range and direction of the impact area from the launching site, trajectory, geography, wind direction and velocity, air density, and the rotation of the earth.

Of these, the earth's rotation is of major importance. If this factor were not computed in present trajectories, some rockets would descend as much as 15 miles off-target.

This effect of the earth's rotation, known technically as the Coriolis acceleration, has been considered a minor factor in computing earlier rocket and guided missile trajectories. However, because of the extreme altitudes attained by the present "Bumper" rockets and the in-flight time lapse, the earth's movement must be reckoned with.

The "Bumper" rocket program is being conducted by General Electric for the Army Ordnance Corps.—*General Electric News*.

Britain's Answer to the Coal Shortage*. Before the end of this year, Britain will be building the first electricity generating station to use atomic-energy. It is calculated to save a million dollars a year over a conventional coal-fuelled power station.

This experimental nuclear power plant will consist of a pile operating at a temperature of up to 600° Centigrade. The heat will be transferred to a steam boiler and the steam raised will generate power through turbines in the conventional way.

The cost of the atom power station is estimated—very roughly—at \$22,000,000—three times the relative cost of a conventional power station. But the coal-fired station would burn \$45,000,000 worth of fuel during its life of approximately 30 years, during which the atom-power energy unit will operate without fuel costs. In other words, the atom-power station will result in a net saving of \$30,000,000 over the period, or a million dollars a year.

Outwardly, the atom-powered station will look little different from one using coal. Chimneys and cooling towers will remain, the chimneys to carry away exhaust heat. Because of the immense amount of shielding required to safeguard workers from the harmful effects of radiation, considerable thicknesses of concrete and lead will be needed, and for this reason there will be little change in the size of the power station of the future.

The location for the new atomic power station still remains secret.—*Coal To Kilowatts*, June, 1951.

* * *

New Ceramic-Metal Coating Promises Better Turbine Blades. Better turbine blades for resisting the high temperatures developed in gas-turbine and turbo jet engines, may result from work done at the National Bureau of Standards with high-chromium ceramic-metal coatings deposited on titanium-carbide materials.

A recent report issued by the National Advisory Committee for Aeronautics reveals the feasibility of protecting a cobalt-bonded titanium-carbide ceramal against oxidation by the application of a ceramic-metal coating having a high content of chromium powder.

At a blade temperature of 1800 degrees Fahrenheit, the report continues, this coating would probably greatly prolong the life of the ceramal blade under operating conditions sufficiently severe to accelerate failure of uncoated blades by oxidation.

"Ceramal" is a relatively new term applied to materials consisting of a combination of ceramic and metallic ingredients (carbides being considered as ceramals). The material protected by the new

*Taken from "This is Britain," a Monthly News Letter put out by the United Kingdom Information Office.

coating contained 80% titanium carbide and 20% cobalt, while the coating contained 80% by weight of chromium powder and 20% frit. After the glaze was applied, either by dipping or by spraying, the coating was bonded to the ceramal by firing at 2200 degrees Fahrenheit for ten minutes in an atmosphere of high-purity hydrogen.—*Aminco Laboratory News.*

* * *

Molybdenum Strongest for High Temperature Service. Research at the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics, Cleveland, Ohio, shows that sintered wrought molybdenum, at temperatures in excess of 1800 degrees Fahrenheit, outclasses other materials such as titanium carbide and Inconel X alloy.

Even at high temperatures, such as 2400 degrees F., molybdenum has high strength. Tensile strengths of 33,670 psi. at 1800 degrees to 27,500 psi. at 2400 degrees F. were reported by R. A. Long, K. C. Dike, and H. R. Bear in the NACA test (NACA Technical Note 2319).

The manner in which the metal is worked and handled in manufacture has much to do with the strength of the finished metal.—*Aminco Laboratory News.*

* * *

Tiny Radio Transmitter Has a Range of 100 Miles. A new radio transmitter developed at the Applied Physics Laboratory, Johns Hopkins University, Silver Spring, Md., is about the size of a cigarette package and has a range of 20 miles at sea level and 100 miles at elevations of 10,000 feet or more. It operates in the 200 megacycle band, has a power output of 2 watts, and has low distortion and high stability.

Its chief advantage is the small space it will occupy in a rocket's nose, thus it will replace larger types and provide more space for the instruments that pick up the information desired.—*Aminco Laboratory News.*

* * *

Improved Aluminum Electrical Wire Patented. An aluminum wire for carrying electric currents contains a small amount of boron to give it a better combination of strength and electrical conductivity than available in other aluminum wire.

Patent 2,545,866 was awarded the inventors, Raymond T. Whitzel and William E. King, both of Massena, N. Y., assignors to the Aluminum Company of America, Pittsburgh, Pa.

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The inventors found that wire of high tensile strength accompanied by improved electrical conductivity can be obtained by the addition of less than one-half per cent of boron. The boron-containing aluminum can be cold-worked from the hot-rolled rod without any annealing or softening operation.—*Aminco Laboratory News.*

* * *

New Orlon Fabric Resists High Temperature. Orlon, one of America's latest synthetic fibers, has now been converted into a black substance that has the usual properties of resisting temperatures as high as 1400 degrees Fahrenheit.

Heat-resisting Orlon was discovered by accident in the laboratories of DuPont in Wilmington, Del., where Orlon, as well as Nylon and Darcon (formerly known as Fiber V) was developed.

A piece of woven Orlon was left in an oven and heated accidentally to 275 degrees Fahrenheit. Instead of being ruined the fabric was found to have the ability to resist very high heat. The fabric became black in the process and the new kind of Orlon seems to be limited to that color alone.

This development is so new that plans have not been made for its utilization. Many applications to military use can be visualized. In industrial use, it could be used for awning and curtains that need to be fireproof and for which the black color is not objectionable.

The fabric to be converted is 100% Orlon and it is woven before the heat treatment. It loses some tensile strength in the process.—*Aminco Laboratory News.*

* * *

Glass Soldered to Metal in New Process. Glass is soldered to metal in a new process which utilizes titanium hydride and which results in a bond stronger than the glass itself, it was revealed recently. It is said that the same method can be used to solder metal to ceramics and carbon. The glass and metal areas to be soldered are painted with a thin layer of titanium hydride, and the solder is placed on both painted areas. Then the parts are placed together and heated under a vacuum. When the temperature reaches about 900 degrees Fahrenheit, the titanium compound decomposes. This causes the solder, which has already become molten, to adhere to the titanium-painted surfaces of both glass and metal.

By using soft metal solders, it is possible to subject this glass-to-metal seal to rapid temperature changes without danger of cracking, despite the wide difference in temperature expansions

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between glass and metal. This is possible because the differences in movement are absorbed by the solder, it was explained.

The new technique is already in use in aircraft ignition systems and is possible in many other applications.—*Aminco Laboratory News.*

* * *

Styrene Steps Out. A host of new plastic products ranging from suitcases to wall paints are adding to the pinch in styrene. Demand in synthetic rubber manufacture for this colorless liquid, which turns solid with suitable catalysts and temperatures, makes it scarce for other uses, but several new products have been successfully introduced. Much greater success is expected if present plans to increase styrene production can be carried out.

One rapidly growing market for styrene is in products of the "reverse-ratio rubbers," so called because they are resins containing a high percentage of butadiene. These two synthetics are combined in reverse ratio to that used in standard synthetic rubber. As the percentage of styrene is increased, the resulting resinous products become more and more rigid, although still tough. They are made as solid materials and also as emulsions of the resin in water.

Water-emulsion paints using this styrene-butadiene latex as a binder were introduced three years ago, and volume is already about five million gallons annually. Sales are held to this figure only because of shortages of materials; the potential market for interior paints is \$250 million annually. These latex paints appeal to consumers, especially those who do their own painting, because they are packaged ready to apply, and are easily and quickly put on by brush, roller, dip, or spray. Because of the absence of solvents, there is no fire hazard, and the paints have a mild odor; they dry quickly, upon evaporation of the water. The alkali in masonry does not attack these paints, and they have good scuff resistance. Both the surface that has been painted and the painting equipment can be cleaned easily with water. Styrene-butadiene emulsions are also being used for coating paper, as a carpet backing to prevent slipping, as waterproof coatings, and as adhesives.

Another widespread application is in products which are rapidly replacing leather for shoe soles and products such as luggage. When the reverse ratio rubbers were introduced about four years ago, about 10 per cent of the shoe-sole business was in rubber compounds; volume has increased until well over half of the 500 million pairs of shoes produced in 1950 were soled with either natural or synthetic rubber reinforced with reverse-ratio resins, accounting for 25 million pounds of the resins. These reverse-ratio

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rubbers increase the hardness, durability, scuff resistance and water resistance of the soles. Although these synthetic soles do not "breathe" like leather, this factor has not detracted seriously from their comfort. Four of the principal rubber companies and two chemical companies are making these reverse-ratio resins and distributing them under a variety of trade names, such as Pliolite, Goodrite, and Kralac. Trade names for soles from these resins include Neolite and Solite. It is expected that at least one producer may enter the upper-leather field, which would be a serious blow to leather manufacturers, since 87 per cent of all leather goes into footwear. The advent of "composition" soles has already forced several sole-leather companies out of business, and invasion of the upper-leather field threatens the industry, whose products are valued at over a billion dollars annually. These high-styrene-butadiene co-polymers have also been used successfully as a substitute for leather in handbags and luggage.

Other Products

Another group of co-polymers with a high percentage of styrene is used as a molding powder for injection molding, producing a material which is light in weight, but tough, rigid, and dimensionally stable. It has good electrical and chemical resistance and high tensile strength. Since it is not as brittle as earlier plastics, such as polystyrene, made from styrene alone, it can be used for industrial products that must stand rough usage and maximum corrosive conditions. These products are being used for salt- and chemical-resisting pipelines to carry brine in oil fields, for electrical connections, floor tiles, and other applications. Volume in this field is not large as yet, since the price of 58 to 75 cents a pound is somewhat high, but when sufficient styrene is available for increased production, the price is expected to come down to a level competitive with other types of plastic.

Addition of a styrene—fatty acid co-polymer to the alkyd types of resins used in synthetic varnishes, and to varnish oils, changes and improves their characteristics. Used as an ingredient of enamels and special zinc printers, the styrenated alkyds have several advantages. They set to handle in an hour, have good water and alkali resistance, and good color retention. Again, volume is held down by the styrene shortage, but one manufacturer alone expects sales of over a million pounds a month when supplies are fore plentiful. Drying oils are similarly improved by the addition of styrene compounds, but so far this field is not large.

Another important use of styrene is for the "polyester" resin-fibrous glass laminated plastics, which are coming into widespread use. This market, too, is limited by supplies of styrene. The

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laminates set at low temperatures and pressures and can be made in large shapes; and products range from boat hulls to electrical equipment.

The styrene shortage depends, in turn, on benzene supplies. During 1950, 541 million pounds of styrene were produced; 450 million from benzene made from coke, 27 million from petroleum benzene, and 64 from imported benzene. Since there is a limit to the volume of benzene produced from coke or coal tar, additional benzene from petroleum is planned for this year. Eight refineries of seven petroleum companies will produce 70 million gallons of benzene, and 180 million gallons will be produced from coke. This will mean a substantial increase in supplies of styrene and perhaps a price rise from 20 to 25 cents a pound, since petroleum benzene is more expensive. Another possible relief is new production of methyl styrene, a compound similar to styrene but made from toluene, which can be made from petroleum more easily than can benzene. Present plants could produce annually 670 million pounds of styrene, and expansion planned for the near future would bring the total to 770 million pounds. Increases in the synthetic rubber program would take 340 million pounds of styrene, as against 215 million last year. Despite this increase, Government allocations are expected to permit a sharp increase in output of the newer styrene products.—*Industrial Bulletin of Arthur D. Little, Inc.*

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Obituary of HENRY J. MALOCHEE

Our beloved member Henry Malochee passed away on 22 July 1951 at the age of 85. He was one of seven children of Jean Pierre Paul Malochee and Textia Anais DuPaty. He was born in New Orleans on 27 February 1866.

He received his early education at Vatinel Private School and Tulane High School. After spending one year at Louisiana State University he worked for four years with William Oswald, a very reputable electrical engineer and one of the first to enter that profession in New Orleans. After working these four years he entered Tulane University and graduated and received his B.S. in Electrical Engineering in 1889. In 1897 he received his Master's Degree, an award which was one of the first given by Tulane.

After graduation from Tulane he was employed by Orleans Railway Company and later became manager where he remained until the formation of the engineering firm of Coleman, Malochee and Villere. Among his most important duties were consulting engineer for the American Cities Company and also the Dock Board.

At the turn of the century he went with the firm of Glenny and Castanedo during which time he promoted and installed many isolated power plants throughout the south including the hotels in New Orleans.

After dissolution of this firm he entered into a partnership with the firm of Buckmaster, Luck and Malochee. For the past twenty-two years he was in business for himself and also spent several years with the Government until he retired at the age of 81.

He was president of the Louisiana Engineering society in 1900. He was made a life member of the Louisiana Engineering Society in 1930.

He was very prominent in the social life of New Orleans and was Captain of one of the leading carnival organizations for 25 years.

In February of 1938 a 50-Year Golden Anniversary "Pioneer of the Electrical Industry" Certificate was awarded Mr. Malochee by that organization. The award was made by Mr. A. B. Paterson. In the "citation" Mr. Paterson said, "Mr. Malochee was one of the earliest electrical



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engineering graduates of Tulane and his first employment was with William Oswald, who was the first electrical engineer to come to New Orleans".

He married Elisa A. Loney. He left three surviving daughters, Mrs. E. H. Lavarre, Mrs. F. O. Cornay and Mrs. Amelie Hammons; three grandchildren; two brothers, Alfred P. Malochee, James J. Malochee and one sister Louise A. Malochee.

To those whose privilege it was to work with Mr. Malochee his passing represents a great loss.

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MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction Held on Monday, July 9, 1951

The meetings was called to order by Acting President McNiven with Messrs. Abrahm, Butler, Cucullu, Fernandez, Jarman, Knost, Molaison, Seago and Sessums present. Professors Donald Derickson and Frank Macdonald also were present by invitation. Mr. Seago moved that the minutes of the preceding meeting be accepted as corrected, seconded by Mr. Cucullu and carried.

The order of business was dispensed with to enable Professor Derickson, President of the Louisiana State Board of Registration for Professional Engineers and Land Surveyors to report on the activities of his board. He then gave an excellent outline of its work. It was reported that the first member to complete his term of office on this board would be Mr. J. J. Mundinger, whose term would expire November 7, and that the Louisiana Engineering Society should prepare to submit candidates to the governor to fill the vacancy. Mr. Cucullu moved that a vote of thanks be given to Professor Derickson and Macdonald for their courtesy in attending the meeting; the motion was seconded by Mr. Molaison and carried unanimously.

The treasurer's quarterly report was presented. Mr. Jarman moved that the report be accepted, seconded by Mr. Butler and carried.

A letter from Dean Johnson of Tulane University was read, in which he stated that the L. E. S. scholarship appointee had received an honorary scholarship from another source and therefore would not need the scholarship offered by L. E. S.

Mr. Cucullu moved that a Committee on Honors and Awards be formed, whose duties shall be to recommend to the Board of Direction recipients for the honors, medals, honorary memberships and awards given by the Society. The committee is to consist of 12 members, each of whom shall serve three years, the terms of four members expiring each year. For the initial committee members shall be appointed for a term of one year, four members for a term of two years, and four members for a term of three years. All appointments thereafter to be for the full three-year period. The motion was seconded by Mr. Molaison and carried.

Upon the recommendation of the Board, Acting President McNiven then appointed the following to serve on the Committee of Honors and Awards:

J. H. Collins, Sr., Chairman; V. J. Bedell, Henry Boh, Ray E. Burgess, Dr. A. R. Choppin, Tom C. David, Hardy M. James, J. E. Jarman, J. P. McCullough, E. A. McLellan, and E. L. Mire.

Mr. Butler moved that, in view of the fact that Mr. Louis A. Delatour has not accepted his election to membership, said election be considered void in accordance with the constitution. The motion was seconded by Mr. Jarman and carried.

Upon the recommendation of the Board, Acting President McNiven appointed Messrs. Edwin C. Dennis, Chairman, and Walter Godchaux, Jr., a committee to prepare an obituary for the Society's late Life Member, Jules Godchaux. The meeting then adjourned in order to allow the Society's general meeting to open on time.

JOHN P. FERNANDEZ, Secretary-Treasurer

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Minutes of Meeting of the Society Held on Monday, July 9, 1951

The meeting was called to order by Acting President McNiven, with approximately 120 members and guests present. Mr. McNiven welcomed those in attendance and introduced visiting officers from several of the state sections. Mr. Abraham moved that reading of minutes of the preceding meeting be dispensed with, seconded by Mr. R. N. Graham and carried.

In accordance with the request of the Board of Direction, the secretary read minutes of the meeting of the board held on June 25.

Mr. Claiborne Perrilliat announced that the 21st Annual Outing of the Louisiana Engineering Society would be held at the Colonial Country Club on July 26, and urged that all members attend.

Mr. Waldemar Nelson spoke in behalf of the Engineers Club, announcing that formation of the club was practically a certainty, and that those who desired to join now could come in as charter members.

Mr. Benton P. Babin then introduced the principal speaker of the evening, Mr. Charles Dusenbury of Westinghouse Electric Company of Atlanta, who gave a demonstrative lecture on "Industrial Application of Modern Supervisory Control."

Following the customary question period, the meeting adjourned with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction Held on Monday, August 13, 1951

The meeting was called to order by Acting President McNiven with Messrs. Abraham Cucullu, Fernandez, James, Jarman and Knost present. Messrs. K. P. Kammer and F. N. Billingsley also were present by invitation. Mr. Cucullu moved that the minutes of the preceding meeting be accepted as read, seconded by Mr. Abraham and carried.

The order of business was dispensed with to enable Messrs. Kammer and Billingsley, Chairman and Vice-Chairman respectively, of the committee organized to study the requirements for membership grade in the Society, to be heard. The committee's recommendations were presented to the board and, after some discussion, Mr. Cucullu moved that an amendment to the constitution be submitted to the membership at large, to read as follows:
"Article II — Membership.

Section 3. A member at the time of his admission shall be not less than 26 years of age. Fulfillment of one of the following eligibility requirements shall be construed as evidence that a candidate is qualified for Member Grade:

- (a) Graduation from a school of engineering of approved standing, and, in addition thereto, four years of satisfactory professional practice of engineering.
- (b) Registration as a Professional Engineer in any state or district of the United States of America, and not less than four years of satisfactory professional practice of engineering.
- (c) At least eight years of satisfactory professional practice of engineering.
- (d) Members of Members Grade in one or more of the following national engineering societies: A.I.Ch.E., A.I.E.E., A.I.M.E., A.S.C.E., and A.S.M.E.

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- (e) At least eight years of satisfactory professional practice as a Scientist in a field of endeavor closely allied with engineering, as an Architect or as a Land Surveyor.

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The teaching of engineering or of applied science in the grade of professor, associate professor or assistant professor may be construed as professional practice. Undergraduate study shall not be considered as professional practice.

Any applicant for Member Grade having the necessary qualifications as prescribed above shall be eligible for membership even though not practicing his profession at the time of his application.

- Section 4. A Junior Member shall be not less than twenty years of age. He shall have had active practice in some branch of his profession for at least four years, or shall have graduated from a technical school of recognized standing. His connection with the Society shall cease when he becomes thirty-two years of age unless he be previously transferred to Member or Affiliate Member."

The motion was seconded by Mr. Knost and carried. Mr. Abraham moved that the committee be given a formal vote of appreciation for its splendid work, seconded by Mr. Jarman and unanimously carried.

The secretary reported that 405 ballots were cast in the June membership election, and that all those named in the ballot were elected to their respective grades of membership.

The treasurer gave a tentative financial report on the Annual Outing, and stated that 109 individuals had played golf, 24 pitched horseshoes, and 153 attended the dinner; he further stated that the deficit appeared to be \$12.87. Mr. Cucullu moved that the Board officially thank Mr. Perrilliat and his committee for their excellent work, and that the secretary so inform the chairman of the committee. The motion was seconded by Mr. Knost and carried.

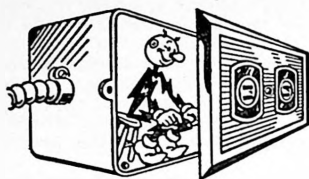
A letter from Mr. Clifford King, accepting the chairmanship of the Annual Meeting Banquet Committee, was read. Discussion followed on the membership of the various annual meeting committees, and it was requested that the Board be prepared to appoint personnel at the next meeting. The secretary was instructed to remind board members of this matter in the regular meeting notice. It was also decided that the Acting President and the Secretary complete the membership of the Committee on Honors and Awards.

A letter from Bastian Bros. Co., who are interested in designing a lapel button for the Society, was read but no action was taken.

Mr. Jarman moved that Mr. John L. Nicklaus be given the L.E.S. scholarship at Tulane University, seconded by Mr. Abraham and carried.

Mr. Cucullu reported on the activities of the Vocational Guidance Committee and announced that practically all members of his committee had been contacted.

Mr. Jarman moved that Mr. A. D Jackson be reinstated to full membership in the Society, seconded by Mr. Knost and carried.



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Mr. Abrahm moved that Messrs. Charles Rogers, Chairman, Allen Dusenbury, Allan Harris and Ole Olsen be appointed to prepare the obituary for our esteemed former president, Henry J. Malochee, seconded by Mr. Cucullu and carried.

The secretary reported that Mr. Edwin Vennard had been obtained as the Keynote speaker for the 1952 Annual Meeting, through the efforts of Mr. R. M. Seago.

Mr. James reported that the Monroe Section had two particular problems which he asked the Board to think about: (1) What action should be taken by state sections with regard to members who pay the parent organization dues but not local dues; and (2) since the Monroe Section contains Ruston, a city of equal size, the Ruston members disapprove of the title "Monroe Section". Would it be advisable to change the name of the section to "Second Congressional District Section".

It was the consensus of opinion that these matters should be discussed at the conference of state section officers and contact representatives with the Board, which is held during the annual meeting.

The meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

**Minutes of Meeting of the Louisiana Engineering Society held jointly with the
New Orleans Section, A.S.M.E., August 13, 1951**

The meeting was called to order by Acting President McNiven with approximately 150 members and guests present. Mr. McNiven welcomed members and guests of ASME and introduced out of town distinguished members. Reading of minutes of the preceding meeting was dispensed with.

The secretary read minutes of the July Board meeting, in which the Honors and Awards Committee was appointed.

The chair then was relinquished to Mr. Robert L. Nall, Chairman, New Orleans Section, ASME, who introduced the principal speaker of the evening, Mr. Edward Mason, Chief Engineer, Chrysler Corporation, who gave an interesting illustrated talk on "Planning for Tank Engine Production".

Following the usual question period, the chair was returned to Acting President McNiven, who thanked the ASME for arranging the program, and the meeting closed with a rising vote of thanks to the speaker.

JOHN P. FERNANDEZ, Secretary-Treasurer

**Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society and
Baton Rouge Sub-Section American Institute of Electrical Engineers
September 12, 1951**

The joint meeting was called to order by Mr. Hannaman, President of the Baton Rouge Section at L. S. U. Testing Laboratory, September 12, 1951. Approximately fifty-five members of the Louisiana Engineering Society and American Institute of Electrical Engineers and their guests were present.

A motion was passed to dispense with the reading of the minutes of the previous meeting. Mr. Hannaman read a letter from a local attorney requesting assistance from the Louisiana Engineering Society in the passage of certain bills presently before Congress dealing with the income taxes for

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professional persons. There being no further business, Mr. Hannaman turned the meeting over to the president of the Baton Rouge Sub-Section of the America Institute of Electrical Engineers who introduced Mr. Frank Macdonald, the speaker for the evening. Mr. Macdonald gave a very informative talk on the engineering licensing law after which a short movie on a new type of jet propelled air craft was shown. The meeting adjourned at 9:00 p. m. and refreshments were served.

T. J. INNES, JR., Secretary-Treasurer

Minutes of The Lake Charles Section

The regular bi-monthly meeting of the Lake Charles Section of the Louisiana Engineering Society was held in the office of the Gulf States Utilities Company at 7:30 p. m., with the President presiding. There were eighteen members and guests present.

The minutes of the last meeting were read and approved.

The financial report was read and approved.

The Secretary read the correspondence received since the last meeting.

Mr. R. R. L. Ward made a partial report to the committee on the engineering library. The complete report will be made when answers from the parent society and others have been received.

The motion was made by Mr. R. E. Burgess, and seconded by Mr. R. R. L. Ward, that the Lake Charles Section go on record as suggesting that the renaming of the sections by Congressional Districts rather than by cities be considered. The motion carried.

Mr. Burgess will refer to the Charter and Rules Committee, the questions of permanent Post Office Box in Lake Charles, the changing of manner of voting in election of officers, and the meeting dates for their consideration and recommendations.

Mr. G. B. S. Ricketts asked what had become of the Women's Auxiliary. The President agreed to secure the information as to the number of members, and what could be done.

The Secretary introduced Mr. F. I. Stalnecker of Cities Service who spoke on "Utilities In An Oil Refinery."

The meeting adjourned at 9:15 p. m.

W. M. DAVIS, Secretary Treasurer

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OF THE

LOUISIANA ENGINEERING SOCIETY

VOL. XXXVII

DECEMBER, 1951

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EDITORIAL NOTES AND COMMENTS

Our Annual Meeting. Already a great number of details for this important event have been completed. The meeting days are January 10, 11 and 12, 1952.

Each member will receive a complete program through the mails.

The Thursday night general interest speaker is outstanding. He is Nathaniel Leverone. He is active in business and civic affairs, and it will undoubtedly be a treat to hear him speak on "This Freedom of Ours." Members of your family, and friends are welcome at this meeting on Thursday night, January 10 at 8 p. m. in Dixon Hall. Plan now to attend.

Edwin Vennard will be our keynote speaker on Thursday morning. The technical program is as follows:

Friday a. m.	M. W. Eurlson, Commodities Manager of In-
ASRE & ASHVE	sulation, Johns Manville Sales Corp., N. Y.
	Title: MOISTURE BARRIERS AND TWO TEMPERA-
	TURE INSULATION MATERIALS

- | | |
|--|---|
| Friday a. m.
SPE, AICbE, &
AIMME | Dr. Robert N. Miller, Professor of Chemical Engineering, Georgia Institute of Technology
Title: PLASTICS AND THEIR VALUE TO THE ENGINEER |
| Saturday a. m.
ASME, ASSE &
La. Agri. Engrs.
Ass'n. | A. S. Jameson, Supervisor of Metallurgical Research Laboratory, International Harvester Company, Chicago
Title: ACTIVITIES OF RESEARCH LABORATORY AND METALS SUBSTITUTION PROGRAM OF INTERNATIONAL HARVESTER COMPANY |
| Saturday a. m.
AIEE & IES | J. B. Clapp, Products Sales Manager, Safety Mineral Insulated Wiring Division, General Cables Corp., N. J.
Title: SAFETY MINERAL INSULATED WIRING—NEW ADVANCE IN ELECTRICAL WIRING |
| SAME, APWA &
ASCE | Frank A. Backman, Construction Manager, Kaiser Engineers, Chalmette, La.
Title: CONSTRUCTION PROBLEMS PECULIAR TO ALUMINUM PLANTS |

The annual banquet and dance will be held on Saturday night, January 12.

Pa and Me — Wesa Confused? (*Intended to convey, in a light vein, the situation with which we are all too familiar.*)

Whatsa matta papa? You no looka well. Why you wringa you hands a likea dat You say things a diffarent? I no understand. Tella me you trouble. Atsa right. Talk. Make you feela some better.



Mama, when I come here thirty years ago theesa country isa inad of opportunity. I gotta noddin and now I gotta store. Only here can I makea progress likea dees. But things she's a changa so

much. Today everything she's a fall ona my head. Im a sick in heart. Allaways I try to do right. Lasta week a peddler he sella me new item: Im a put him on sale ata faira trade price. Nexa day a govamenta man he say I no cana sell dat price. I never makea data profit ona da samea type product in whatta dey call "Basa Period." So I no wanta break law ina country so good to me so I reduce a da price. Govamenta report me for to sell too high. Peddler company sue me for to sella too low. Botha ways I am criminal.

I no wanna dat happen again so I cheka on some morea tings. I calla Joe Bivona. I say "Joe, what you sella lettuce for." He tella me an I a say "Joe, you tinka deesa fair price?" He say yes. So I marka de lettuce datta price. Righta way nother govamenta man hesa report me fora anti-trust. He say I no gotta right to sella same price Joe. So I cutta da price. I move a da lettuce quck. Anotha govamenta man he say I sella too low. He say I no cana sell ata less dan sixa percent above cost. These govamenta men—they watcha me so close. It neva was likea dat. Soon a govamenta man acoma in. He say I sella lettus to onea customa ata one price and to notha customa at anotha price. Ima charga with Robinson—Pat.

Ima so guilty.

Now I refusa to sella lettus. Mya colored porter say he likea to buy some atta low price. Ima so confused I refusa to sell. An what you know. Govamenta man popsa up—charga me with de racial discriminations under efa EPC (FEPC).

I no understand. I try to getta haircut. No place aless dan \$1.00. Alla barbers agree on a gooda price. But the govament charga big companies witha antitrust for samea thing. They fighta big grocery company fora low prices but they giva farmers money to keepa prices up. Then they makea OPS to keepa prices down. They say no fixa prices but they fixa plenty. Ima so sick, everything she'sa controlled. Ima scare to breath. Musta be some law against dat. Mama, I didn a pay for thesa much govament! I thinka sometimes I shoots myself but dats agina de law. Only ting I gotta left isa my right to tink whatta I please.

Papa! Thatsa wha you tink! Beega men they say thought control law coma soon.

Mama mia! Alla people better do somea quick tinkin whilea theys astill time. Excoosa me, I gotta meditate!

PAPERS AND DISCUSSIONS

SOME FACTS CONCERNING THE NEW ORLEANS UNION PASSENGER TERMINAL*

By C. J. Wallace, Terminal Manager

While most of you are familiar with the UPT, I can assure you there are plenty of people in New Orleans who are somewhat confused at what is going on. Ever since I took over 3½ years ago, I have been receiving calls from people who ask me questions that indicate they believe the entire project was designed to cause the maximum amount of harm to the community and the least amount of good. When I explain to them their sources of information are somewhat unreliable and what the true facts are with respect to their own interests, they are amazed. The situation reminds me of a reputed incident in the career of Robert Ingersoll when he had been under attack for his unconventional views by an editor of a newspaper. The editor attacked Ingersoll through his son, stating that the son read cheap novels, lost his mind and died miserably in an insane asylum. Ingersoll's reply was: "My son was not a novel reader. He did not go insane. He was not sent to an asylum. He did not die. In fact. I never had a son."

I suppose that many of you anticipate my talk tonight will deal with engineering problems in connection with the construction of the Union Passenger Terminal. If so, I must disillusion you. Engineering problems with us are no different than those you encounter day after day in your own work and they are no more difficult to solve. What I propose to do is explain a few things about the Union Passenger Terminal.

The Terminal is not being constructed for the same reasons that brought about passenger terminal consolidations in other cities throughout the country. Insofar as railroad operations are concerned, there is no compelling need for a single union terminal here. Five of the eight railroads which serve the city already operate into stations which are relatively new and are certainly more than adequate to take care of their business. The other three, namely, Louisville and Nashville, Illinois Central and Southern Pacific, while operating into old stations which may be eyesores from the public viewpoint, are, nevertheless, getting along all right as far as the handling of traffic is concerned.

The only real justification for the Terminal lies in the economies which accrue to the taxpayers of this city by reason of the fact that

* Presented at the regular meeting of the Society, Dec. 12, 1951.

a single Union Passenger Terminal reduces the number of grade separations required to cure the traffic ills that have become so acute in recent years. I am told by engineers who studied the grade separation problem there are 144 grade crossings at which serious traffic delays occur. I am also told to relieve the congestion at these crossings a total of 65 grade separation structures would have been necessary if the Union Passenger Terminal were not constructed. By consolidating the eight railroads into one terminal, the City is accomplished with 27 grade separation structures the same results it would have required 65 to achieve otherwise.

I think it is reasonable to assume that 65 grade separations would have cost at least \$65,000,000 under present conditions. Compare this figure with the amount to be expended under the present program and you will find a saving of at least \$20,000,000 in favor of the program as now planned.

From the taxpayer's viewpoint, the Terminal is even more attractive because of the fact that he doesn't have to pay for it. The funds which are being expended for construction of the Terminal come from the proceeds of \$15,000,000 worth of revenue bonds issued by the City. Payment of principal and interest on the bonds is the obligation of the railroads which will use the Terminal. The bonds will be retired by means of rental payments for use of the Terminal, each railroad paying in proportion to that use. In addition, the railroads will pay the cost of operating and maintaining the Terminal.

After the bonds have been retired, the railroads will continue to pay rental for the use of the Terminal which rental will be paid to the City as the equivalent of ad valorem taxes on the property. Thus, you will have a municipality in effect collecting taxes on property it owns.

The City also derives benefit by reason of the cleaning up of slum areas as a result of abandonment of old stations and erection of the new.

In addition, it gets the benefit of new and wider boulevards to take the place of old narrow streets. An example of this is the Loyola-Calliope Street development wherein what used to be a narrow Saratoga Street becomes a modern, wide vehicular artery between the New Station and Canal Street and wherein Calliope Street is extended from its present intersection at Broad in a southwesterly direction to the Jefferson Highway at the Parish Line. These two thoroughfares will change the driving habits of a large section of the City and will afford measurable relief to existing traffic arteries.

No doubt, some of you are asking yourselves: "If the UPT Program is a 'good deal' for the City and the taxpayers, where is the

gimmick for the railroads?" The answer, of course, is that it is also a "good deal" for the railroads both financially and otherwise.

Consider the 65 hypothetical grade separations. Without a doubt, the railroads would have had to share in the cost of each of them. What that share would have been is anyone's guess, but it would have been substantial. Under the Terminal Program, the railroads are to pay 15% of the cost of the grade separations which are required plus the cost of the Terminal itself. This amounts to approximately \$20,000,000 as the railroads' share of the program. It is doubtful if the railroads could have gotten by for any less than that under a straight grade separation arrangement and highly probable they would have spent much more. Assuming, for the sake of argument, they would have paid \$20,000,000 under either plan, the advantage of a plan carrying with it a new Terminal is obvious even though they could operate satisfactorily in the old ones.

Another advantage to the railroads is in the limited amount of capital investment required of them under the plan. While it is true they are obliged to retire the bonds, the fact the bonds are issued in the name of the City results in an interest charge which is considerably less than the railroads would have to pay had they borrowed the money themselves for the project. This reduced interest charge is because municipal bonds are tax free.

Another factor influencing the railroads to agree to the plan was the provision in the Union Passenger Terminal Agreement for the formation of the Union Passenger Terminal Committee. Any railroad man views with alarm the possibility of his operations being mixed up with politics.

To allay this fear, the City agreed with the railroads to the formation of a committee composed of representatives of the City and the railroads which committee would act as an agency of the City and have complete supervision and control of the acquisition, construction, maintenance and operation of the Terminal.

The committee has a total membership of 15. Of these, nine represent the railroads, three represent the Public Belt Railroad Commission, and three represent the City. During the period of construction, the three City representatives are members of the New Orleans Railroad Terminal Board, which Board also represents the City in connection with all grade separation work.

It should be borne in mind that the committee and the Board are two separate entities even though the Board members are also members of the Committee.

Because of the fact the railroads pay for the Terminal in proportion to their use thereof, the voting power of each railroad member

is weighted in proportion. For example, the Illinois Central representative on the Committee has more voting power than any other member because his railroad makes more use of the Terminal and pays more for it. Conversely, the Gulf, Mobile & Ohio representative has the least voting power of any of the Carrier members because his railroad makes the least use and contributes the least amount of money. The percentage of use is determined in accordance with the number of engines and cars each Carrier operates into the Terminal. Since neither the City nor the Public Belt will operate any equipment into the Terminal, the voting power of their members is not increased.

The above arrangement does not mean that any individual railroad can dominate the Committee. There are checks and balances provided which prevent this. Also, while the total carrier vote exceeds the City vote, there are certain fundamental questions which are not decided by majority vote at all but which have to have approval of the City membership regardless of voting power.

An example of this was in the design of the station building. In this case, the city members were given the right to select the architects and through them to design the building. This was done, of course, in order that the City could be certain the building would do credit to the community. I can assure you the railroads were quite willing to have it that way. Pleasing a community of 600,000 people is no mean task, as you know, if you read the papers.

The Committee is organized as follows:

The chairman must be one of the carrier members of the Committee.

The Union Passenger Terminal Agreement sets forth the order of succession so that each year a different carrier member automatically becomes chairman. He serves for a term of one year. In addition, the Committee elects each year two vice-chairmen, one of whom is a citizen of New Orleans.

The Committee, of course, exercises control of the spending of the funds for construction of the Terminal. This is done much in the same manner that a board of directors does it for a railroad corporation with certain differences made necessary by the fact they are spending public funds.

The proceeds of the UPT Revenue Bonds have been placed in the hands of a Trustee (in this case the Hibernia National Bank). These proceeds are called the "Construction Fund." Money is drawn from this fund by requisitions approved by the Chairman or a Vice-Chairman of the Committee upon recommendation of the Chief Engineer and the Auditor, both of whom are employees of the Committee. The Committee controls the issuance of these re-

quisitions by granting authorities for expenditures for each individual project on the Terminal. The requisitions are placed in the hands of the Trustee who makes the money available as needed. The Trustee invests surplus funds not immediately needed for construction in short term Government Securities at the direction of the Committee. Payment to Contractors is made by drafts on the Trustee, which drafts are honored only upon prior approval by the Trustee of the requisitions.

The accounts of the UPT are audited monthly by the Committee's auditor and annually by a separate committee composed of the Chief Accounting Officers of all the railroads involved. Accounting is in accordance with the rules of the Interstate Commerce Commission.

After all of the bond funds are exhausted, and they will be sometime next year, the individual railroads are obligated to advance whatever is required to complete the job out of their own pockets. This advance is not considered a capital expenditure by the railroads but is called "prepaid additional rental" for their use of the Terminal. The way things look now the railroads will be required to put up between $4\frac{1}{2}$ and 5 million dollars as prepaid rental. Most of this will go to pay the railroads' share of grade separation costs.

The actual manner in which the Terminal is being constructed may be of interest to you. All work is let on the basis of competitive bids. There is no single general contractor for the entire Terminal. As plans and specifications for each individual unit of the Terminal are completed, invitations to bid are extended and contract awarded to lowest bidder. We have had on the Terminal so far twenty-one separate general contracts, with the usual complement of subcontracts for mechanical and electrical work. The largest single general contract is that for the Station Building which amounts to about $2\frac{1}{4}$ million dollars. This method makes a lot of work for the Committee's employees but it results in the minimum expenditure for each project, and that, of course, is what the Committee is after.

I would like to digress a moment at this time, because I know several of the contractors who have worked for us are represented here tonight. We are extremely proud and I'm sure all citizens of New Orleans are also, that practically all of our work has been done by local contractors. We feel this is as it should be. We have been pleased with the quality of the work and with the cooperation extended to us by these contractors, and I take this opportunity to thank them publicly on behalf of the Committee.

In the short time that is left me I think a brief description of what has been or is being constructed on the Terminal is in order.

During the past two and a half years we have constructed temporary facilities for the handling of existing passenger traffic which consist of four station tracks with canopies and platforms between each of capacity of 16 cars. These facilities have been in use since September of 1949 and were necessary in order that ground could be cleared for permanent facilities.

In addition, the permanent Express Facilities were completed in December, 1949. These consist of a large warehouse served on three sides by vehicular driveways and on the other by eight loading tracks with car floor level platforms and overhead canopies connected with the warehouse and serving each pair of tracks.

Engine Serving Facilities, consisting of several miles of track a diesel engine repair shop, fuel oil storage and distribution system, engine washing, watering and sanding plants and a building containing wash and locker facilities for engineers and firemen were completed this past summer.

Work on facilities for serving cars is still underway. Completed so far is a power plant containing two 200 HP automatic gas fired boilers and two 360 CFM automatic electric driven air compressors. All of our main steam, air and water lines are in the two-thirds of the service platforms in a coach yard which contains 10 tracks of 14 cars capacity each. Under construction in the coach yard area is a large car shop building and the remaining third of the platforms.

Main line tracks have been completed from the bumping posts at the site of the proposed Station Building at Loyola Street out as far as Carrollton Avenue where we are marking time until the Carrollton Avenue underpass is sufficiently completed to extend our tracks across.

The permanent passenger platforms and canopies, six in number and serving 12 station tracks in pairs, have also been constructed. These tracks range in capacity from 10 to 20 cars.

The Station and Baggage Buildings have just been started and are the last major units required to compete the job.

In connection with the track work, one of the most interesting features of the Terminal is the signal and switch control system that is being installed under contract with the General Railway Signal Company. A central control tower has been constructed at Euphrosine and Clara Streets. This building which we call the Interlocking Tower will house the batteries, relays and control machine with which one man will direct the movements of all trains throughout the Terminal.

Because it is something most of you will not encounter in your work, I shall describe the manner in which it will be operated.

The system is divided into two parts. The section on the left of a vertical band is operated by coded relay and each switch and signal must be activated by individual buttons. The section to the right is what we call an NX system under which signals and switches are operated automatically to establish routes for movements of trains through the area. The letters NX are contractions of words "entrance - exit" which in the parlance of traffic engineers would be the same as "origin - destination."

The Union Passenger Terminal Committee is spending \$1,300,000 on this signal and control system to provide the most modern safety features available and to make it as fool-proof as possible. Unfortunately, no matter how good the system is, it can be circumvented by fools. In spite of all rules and regulations in practice on all railroads, occasionally a fool gets into the cab of a locomotive. When he does, somebody gets hurt. We have a saying on the railroads which contains a lot of wisdom—"The best safety device in the world is a careful man."

ENGINEERING BRIEFS

Oil Well Production Aided by Chemical Made From Beef Tallow.

A chemical made from beef tallow is being used experimentally, but successfully, to help get additional crude oil from petroleum wells after production by ordinary pumping becomes low.

When an oil well is near the end of its production by ordinary pumping, much oil still remains in the oil-bearing sand. Several methods have been developed to recover this remaining oil which may amount to one-half of the original crude in the sands.

One method introduces natural gas or air into the sands from the surface by compressors forcing the gas or air down a central bore, and another method uses water pressure.

The water washes oil in the sands to the pumping wells for removal to the surface.

A new chemical, known as Ethomid HT-60 and made by Armour & Co., Chicago, Ill., is now used to make the water more effective, and its use may increase the total amount of oil a well may produce by as much as 10%.

Another chemical, a quaternary ammonium compound, is used at the same time. This chemical is a derivative of ammonium hydroxide and is employed to prevent corrosion of the water pipe and equipment. The quaternary found to be most effective is known as Arquad 2C.—*Aminco Laboratory News.*

* * *

Silica Gel Cells Reactivated by Induction Heating. Induction heating, used to reactivate silica gel cells used for drying gases at the Southern Oxygen Co., has reduced hazards to personnel and has resulted in an appreciable saving in cost, space, and labor. Temperatures as high as 500 degrees Fahrenheit are obtained within the cells.

At the Company's Bladensburg, Md. plant eight silica gel cells are used, each wrapped with a 4-kw. coil—a total load of 32 kw.

Gases were previously dried by caustic soda which was blown out and replaced with new soda after becoming liquefied.—*Aminco Laboratory News.*

* * *

Social Security and the Consultant. Consulting Engineers, particularly those over 50 years of age, will want to re-examine their potential place in the current Social Security picture. As a

general rule, *except for members of professional groups*, such as doctors, lawyers, and professional engineers, the present Social Security law has been extended to cover self-employed persons, who are individual proprietors, or members of a partnership. Most employed persons are already covered without regard to the nature and scope of their work, or the total amount of salary they receive. Officers of a corporation, for example, are specifically defined as employees for the purpose of the law.

Before much more time has elapsed, a very considerable number of older people will find that, after having contributed to the system for a comparatively short time, they have become eligible for a substantial pension. *It is conceivable that a person not now in covered employment might find it greatly to his advantage to modify his status to occupy a covered position.* Here is a possible case in point:

A self-employed consulting engineer, who, because he is self-employed and a professional is not eligible to come under Social Security, is now 65 years of age. He gives up his consulting practice as of January 1, 1952, and goes to work at a salary of \$300.00 or more per month. As an employed person he then becomes part of the Social Security scheme. He plans to work as an employee for 18 months. During that time he will have contributed 1½% of his salary (up to \$3600 per year) to the Social Security Fund, for a total of \$81.00. His employer, of course, will have contributed a like amount. On July 1, 1952, at age 67, the engineer retires and is then eligible for a life time tax-free pension for himself, and, when she reaches age 65, for his wife. In addition, other benefits are acquired—the right to a lump sum death payment, and certain rights for dependent children. Using the example cited, the engineer will have \$62.00 per month for himself, and \$31.00 per month for his wife, the equivalent of annuities worth approximately \$17,000. The figures will vary, of course, depending upon the circumstances involved, *but as of now*, it is believed that self-employed consultants will wish to examine the possibilities under the law as it exists.

Because of the method of computing of the months of coverage, which established the amount of the benefit, this picture will change rapidly in years to come. *The possibilities will never again be so favorable under the law as it now is written.*

One additional factor has a decided bearing on the problem. As a general rule, a recipient of Social Security benefits, between the ages of 65 and 75, may not earn over \$50.00 per month without losing all or a substantial part of his benefits. *This is not true for self-employed professionals, including professional engineers, when the income is from the practice of the profession.* In other words,

the engineer from the example above may, if he so desires, set up a consulting practice upon his retirement, established these rights he will be able to draw them regardless of any income from his self-employed professional practice.

Every Social Security claim will, of course be judged on its merits and on the facts of the case. *Before making any decided change local officials of the Social Security Administration should be consulted concerning eligible jobs and self-employment arrangements.*—*From Legislative Bulletin of the National Society of Professional Engineers.*

* * *

United States—India Reclamation Agreement. By a recently signed formal agreement the Bureau of Reclamation will furnish advice and scientific and technical engineering service in the United states to the Indian government. *This agreement is the first of its kind with any foreign government.* It provides for direct communication between the Reclamation Commissioner and the Indian Commission in the handling of technical engineering matters.

Under the new agreement the Bureau's personnel and laboratory facilities at its Denver Engineering Center will be made available to assist the Indian Government with water development problems. Few laboratories in the world are equipped for engineering advice and research matters as is the Engineering Center where a staff of 300 and a million dollars worth of equipment is in use.

The services to India will include the study and analysis of scientific and technical engineering data, testing of materials for dams, analysis of stresses and stability involving technical studies, construction and testing of hydraulic models, and advisory services. They will also include services and advice requested to determine the adequacy of designs or construction.—*From Legislative Bulletin of the National Society of Professional Engineers.*

* * *

Putting Sparks To Work. The sparks which destroy automobile-distributor points and erode electrical switches and contacts have been put to work shaping metals which cannot be formed by machining. The new "Method X" is suitable for sintered carbides, hardened steels for tools and dies, alloys used in gas turbines, and special-use materials like titanium, molybdenum, and zirconium, or, as a matter of fact, any electrically conducting material. The process is being introduced to American technology by the Method X Corporation, an affiliate of the Firth Sterling Steel and Carbide Corporation.

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In this new technique, the metal erosion caused by a condensed spark discharge is electronically controlled in intensity and duration. There is no physical contact between the "tool" and the work; the tool does not cut, as in conventional machining practice, nor does it melt off the metal, as in electric-arc methods. The tool is brass and is one electrode of an electric circuit, with the work piece the other electrode. An electrical condenser is connected in the circuit across this gap. Rapid interruption of the electric circuit causes a spark to jump the gap between the electrodes, producing controlled erosion of the work piece, and forming it to the desired shape. This erosion can be controlled to make screw threads, round or shaped holes, all the way through the work or not, and to cut the work off or turn it down, as in a lathe. The process is particularly applicable to making holes only partly through the work and to forming curved holes or undercut recesses. It can also be used for shaping cams and dies, sharpening hardened tools, marking, and engraving. The process is now being used in the production of various types of dies, threading carbides for hold punches, and other special applications. It is claimed that size tolerances can be held to within 0.0005 inch, and location tolerances are limited only by the accuracy of the machine tools for positioning the tool and the work. The surface finish obtainable is comparable to that achieved with coarse grinding or diamond-tool turning.

The machine for spark discharge work consists of a base similar to a drill press with a rotatable work bed, which can be raised or lowered on a rack. The work is mounted on this bed, completely submerged in a tank of non-conducting fluid, such as kerosene, fuel oil, or a specially developed fluid. A pumping system circulates the fluid over the work surface, removing chips and improving the stability of the sparking process. An exhaust system removes fumes from the breakdown of the fluid, which must be replenished to make up for decomposition and evaporation and for that which adheres to finished parts.

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The "cutting tool" is a negative of the shape to be produced, and is adjusted to maintain a space in the range from 0.005 to 0.007 inch between it and the work. The tool is automatically fed by a servomechanism. If a chip lodges between the tool and the work, the tool backs off until the circulating fluid washes the chip away. The machine is set for a voltage between 50 and 300 volts to cause a spark to jump the gap between the electrodes. The tool is consumed in the process, thus using more metal than other machining methods, but since the products, such as carbide dies, are otherwise unmachinable, the expense is often justified. Since the tool does

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not touch the work, the rigid machines necessary with conventional methods are not used. Simple holding devices clamp work pieces and rigid floor mountings are not essential.

The mechanism of spark erosion is still obscure. Some experts believe that the high current densities in the spark discharge result in high mechanical stresses on the surface which cause particles to detach themselves without meeting, leaving the exposed surface unchanged. In Russia, where the process is in widespread use, at least two hypotheses are advanced. One ascribes the effect to the impact action of the high energy discharge. The second claims that the short duration and extremely high current density of the spark discharge leads to high energy in the surface, causing explosive vaporization of the electrode metal. Jets or flares of vaporized metal from one electrode would thus erode the opposite electrode when they hit.—*From Industrial Bulletin of Arthur D. Little, Inc.*

* * *

Fill'er Up—In the Air. The U. S. Air Force is using red and green traffic lights now—up in the air.

The important matter of keeping proper position during night-in-flight refueling operations has been made easier by the use of "traffic lights," developed by General Electric for Boeing KB-29 and KC-97 tanker airplanes.

The lights, four red and one green, are automatically triggered by microswitches connected with the Boeing Flying Boom, through which the fuel is pumped to the receiver airplane. Directions on the red-lighted oblong panel read "up," "down," "fwd," and "aft," to advise the receiving pilot when his plane is out of position.

When the telescoping section of the boom is extended to the proper length and the boom's elevation angle is correct, the green light glows. But should the airplane receiving fuel move outside this position the green panel darkens and either one or two of the red lights flash on to tell the receiver pilot where to move.

Some of the crews handling the refueling planes used to be nervous during their first after-dark hook-up, but the darkness fear soon was lost and night transfers are now being made as smoothly as those in the day-time.—*From General Electric News Digest.*

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Obituary of
JULES GODCHAUX

Jules Godchaux was born in New Orleans, Louisiana on July 11, 1872 and departed this life on July 5, 1951. Mr. Godchaux was a son of Leon Godchaux and Justine Lamm Godchaux.

Mr. Godchaux, after completion of his preparatory education at Exeter Academy, graduated from Massachusetts Institute of Technology with a degree of Mechanical Engineer in 1893.

Immediately after graduating from Massachusetts Institute of Technology Mr. Godchaux became associated with the sugar industry to which he devoted the balance of his very active life. Mr. Godchaux' accomplishments in his chosen profession are legend throughout the entire sugar world, and particularly in Cuba and Louisiana. Notable among the features are the construction of Central Baragua Factory in Cuba, which job Mr. Godchaux did in his early experience completely. While Mr. Godchaux' engineering life was devoted in main to the sugar industry he accomplished also material achievements in drainage and railroad construction work in the early part of the twentieth century.

After completion of the erection of Central Baragua Mr. Godchaux joined the staff of Godchaux Sugars, Inc. in New Orleans where he was directing head of the activities of Raceland Plantation and Factory. In 1926 he succeeded his brother Edward Godchaux as Chief Executive of factory and refining operations of Reserve Refinery and Race-land Factory which position he continued until his death as Senior Vice-President of the corporation.

During Mr. Godchaux' administration he saw the capacity of Raceland Factory increase from 1000 tons of cane per day to 4000 tons per day, and this factory has now become one of the most modern in the State. Likewise the refinery at Reserve, Louisiana, under this administration became greatly enlarged and modernized and at the present time refines in excess of 2,500,000 pounds of sugar per day.

In the many years Mr. Godchaux devoted his energy in the sugar industry he still found time to become active

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in many other interests. In the year 1904 he was one of the organizers of Raceland Bank and Trust Company and served as its president for many years. In addition he was president of the Luling Hahnville Bank from 1924 to 1937 and remained as Chariman of the Board of this bank until his death.

He was one of the organizers of Road District No. 1 in Lafourche Parish and a membebr of the Board of Commissioners that built the first gravel road in Lafourche Parish from DesAllemands to Raceland, and from Lockport to the Theriot Canal, which at the time of their construction were engineering achievements. In the early part of the twentieth century the Lockport branch of the M.L. and T. Railroad was built from Raceland to Lockport and Mr. Godchaux took an active part in its consummation.

During the years in which the Louisiana sugar industry was besieged with the many vicissitudes of this interest which are common knowledge to all he not only successfully carried his company through this period but also was a successful co-receiver of several sugar interests, which are today leaders in the industry.

Although Mr. Godchaux never aspired to political office he, for many years, took a very active part in local, state, and national politics. He was for a long period chairman of the Third Congressional District Republican Committee, and was a delegate to several Republican National Conventions.

Mr. Godchaux was always an active supporter of public education and recreation. He cooperated at all times for the enlargement and advancement and improvement of public schools and recreational facilities.

Among his many other interests and activities he was one of the Organizers and Officers of the State Agricultural Credit Corporation, a Founder and Life Member of the American Sugar Cane League, and, as is well known to this society, an Honorary Life Member. Mr. Godchaux was a member of Phi Gamma Delta fraternity.

Jules Godchaux, in his long and distinguished career, won the admiration of all who came in contact with him, not only for his broad intelligence, outstanding ability and balanced judgment, but also for the manner in which he



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carried on despite the many long years of impaired health that would have vanquished a less courageous spirit.

The fortitude with which he bore the ills that were visited upon him, the determination that he showed in pursuing the tortuous rounds of daily activities were deeply impressive. One associate wrote to him during his last illness, "your determination has been a source of inspiration to all of us."

Mr. Godchaux was known for his fighting spirit by all his acquaintances and despite ill health and the transient adversities with which those associated with the sugar industry are familiar he fought a gallant battle for any cause that he deemed right. He asked no quarter and he gave none. It must be stated that when Mr. Godchaux fought it was without personal anger or bitterness, and he was ever eager to recognize what was just and fair in the cause of his adversaries. If, in the heat of battle, hot words passed and tempers were lost, he was first to make the conciliating gesture which robbed anger of much of its sting. His personality was gracious. He carried from the old generation to the new a charm of manner and a spirit of understanding, as well as innate courtesy that made all association with him a pleasant experience. He was generous, courteous, considerate, and forebearing with all who came in contact with him.

He accepted the disability of his encumbering illness in his later years not as an affliction but as a challenge and with fortitude and uncomplaining endurance. So successful was he in carrying on the burden of his profession that he not only waived aside his handicap but conducted himself in such a manner that others entirely lost sight of the fact. His singular courage recalls one of the inspiring lyrics of the British poet, William Ernest Henley, "THE INVICTUS." The author, whose life offers a curious parallel to that of Jules Godchaux, because he too was harrassed by a long and painful illness and spent long and wearisome hours upon a bed of pain in the English nursing homes, and because he too, met his afflictions with a high courage and a triumphant note of challenge.

As well we might let us, in speaking of Jules Godchaux, employ the stirring words that this poet uttered for they are a true expression of the character, courage and deter-

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Out of the night that covers me,
Black as a pit from pole to pole,
I thank whatever gods there be
For my unconquerable soul.

In the fell clutch of circumstance
I have not winced nor cried aloud.
Under the bludgeoning of chance
My head is bloody, but unbowed.

Beyond this place of wrath and tears
Looms but the horror of the shade,
And yet the menace of the years
Finds and shall find me unafraid.

It matters not how strait the gate,
How charged with punishment, the
scroll,
I am master of my fate,
I am captain of my soul.

Jules Godchaux' devotion to his family, his friends, his country and his faith and service to others are beautiful. His many friends are from all walks of life which is a memorial to a life well spent. He was the type the Louisiana Engineering Society is proud to have listed on their rolls as a lifetime member, and it is fitting and proper that we spread these minutes upon our records, and send a copy to his devoted family.

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**Obituary of
ANTHONY M. ZIBILICH**

Anthony M. Zibilich, son of Michael A. and Mrs. Marie Zibilich, was born in New Orleans on December 14, 1897. He died at his home in New Orleans on May 21, 1951, at the age of 53 years, 5 months.

His primary and high school education was received in the Parochial schools of New Orleans, namely St. Peter and Paul and St. Aloysius High Schools.

He entered Tulane University in the Fall of 1913 and was graduated in the class of May 1917 with the degree of Bachelor of Engineering—Civil Engineering.

After graduating from Tulane he went into the Design Section, U.S. Navy Department, Washington, D. C. Subsequently, he served in various engineering capacities with the Louisiana Railway and Navigation Company, and the Board of Port Commissioners, Port of New Orleans.

In December, 1919, he entered the U.S. Lighthouse Service, Eighth District, New Orleans, as Structural Engineering Draftsman, and was promoted to Second Assistant Superintendent (Associate L. H. Engineer) in May of 1920.

In May, 1936, he was appointed Assistant Superintendent (Senior L. H. Engineer) serving as such until December, 1939.

After the consolidation of the U.S. Lighthouse Service with the U.S. Coast Guard, he was commissioned a Lieutenant-Commander during December, 1939, heading the Aids to Navigation Section. He was subsequently advanced in rank to Commander and Captain. He retired from the U.S. Coast Guard in 1947.

In addition to his engineering duties in the Eighth District, Captain Zibilich was associated with important developments in Aids to Navigation on the waters within the District's areas, including the network of Intracoastal Waterways extending from St. Marks, Florida to the Rio Grande. He was with the District from the inception of this important project, and realized its completion before his retirement.

From April, 1948 to the date of his death, May 21, 1951, Captain Zibilich was with the Avondale Marine Ways, New Orleans, as Materials Requisitions Engineer.

He married Elmira Bautovich in 1927. Their children are Michael, a senior midshipman at Annapolis Naval Academy, Raymond, with the Marine Corps, Anthony and Miss Marie Zibilich. He is also survived by his parents.

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MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting of the Board of Direction Held on Monday, September 10, 1952

The meeting was called to order by Acting President McNiven with Messrs. Abrahm, Cucullu, Hannaman, Jarman, Knost, Molaison, Seago and Fernandez present. Mr. Allen W. Betz, General Chairman of the 1952 Annual Meeting, also was present by invitation. Mr. Knost moved that the minutes of the preceding meeting be accepted as read, seconded by Mr. Molaison and carried.

Mr. Cucullu, Chairman of the Vocational Guidance Committee, reported on the activities and correspondence of said committee, following which Mr. McNiven commanded Mr. Cucullu for his interest and excellent handling of this important work.

The secretary reported that Mr. J. H. Collins, Sr. had accepted the chairmanship of the Awards Committee and that the committee had received the necessary data to begin its function.

A letter from Mr. James M. Todd, President, Engineers Joint Council, was read, in which he requested the cooperation of L.E.S. in the meeting of the Union Pan American de Asociones de Ingenieros to be held on August 26-30, 1952. The secretary was instructed to inform Mr. Todd that the L.E.S. would be glad to cooperate.

A letter from Mr. F. W. Macdonald, Executive Secretary, State Board of Registration for Professional Engineers and Land Surveyors, requesting that announcement be made that there is no deadline for registration of professional engineers on the basis of graduation; the time limit which recently expired applied only to registration on the basis of private practice, and many engineers have been under a wrong impression. It was decided that this information should be published in the Proceedings, in addition to announcement at the regular meeting.

Mr. Cucullu moved that the L.E.S. committee organized for the formation of the Engineers' Club be discharged with an expression of appreciation for the good work it has accomplished. The motion was seconded by Mr. Knost and carried.

A letter from Professor Derickson, Chairman of the Louisiana State Board of Registration for Professional Engineers and Land Surveyors, requesting that the name of Mr. J. J. Mundinger be submitted to the Governor for re-appointment to this board, was read. The secretary was instructed to write to all board members requesting that they suggest names of other possible candidates to fill the vacancy on the State Board.

The secretary reported on the handling of the proposed amendment to the constitution pertaining to the qualifications for member grade in the society.

With the approval of the Board of Direction and Mr. Allen W. Betz, General Chairman, the following chairmen and vice-chairmen of Annual Meeting committees were appointed: *William J. Drawe, Jr., General Vice-Chairman. Banquet Committee: *Clifford A. King, Chairman; Norman H. Ross, Vice-Chairman. Contact with Woman's Auxiliary: George A. Heft, Chairman. Plant Inspection: Albert R. Boelte, Chairman; John D. Taylor, Vice-Chairman. Program: Aaron Abramson, Chairman; Ward C. Purdum, Vice-Chairman. Publicity: R. P. Lockett, Jr., Chairman; Allen H. Jensen, Vice-Chairman. Registration: Claude J. Kelly, Chairman; Walter E. Blessey, Vice-Chairman. Student Activities: Ambrose K. Ramsey, Chairman; Frank W. Macdonald, Vice-Chairman. Technical Exhibits: Albert A. Glodt, Chairman; Albert L. Soule, Vice-Chairman. Technical Papers: *J. Howell Peebles, Jr.; T. Edward Ernst, Vice-Chairman. Reception: W. Stone Leake, Chairman; H. L. Lehmann, Vice-Chairman.

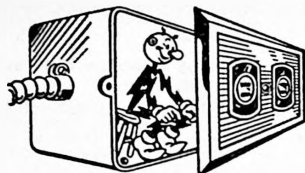
Following this, the meeting adjourned.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Louisiana Engineering Society Held Jointly with the New Orleans Section, A.I.E.E., September 10, 1951

The meeting was called to order by Acting President McNiven with approximately 200 members and guests present. Mr. McNiven welcomed the AIEE, members and guests. Mr. Janssen moved that the reading of meetings

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of the preceding meeting be dispensed with, seconded by Mr. Knost and carried. The secretary then read minutes of the August meeting of the Board of Direction.

At the request of Mr. Kerr, it was announced that the amendment to the constitution referred to in the minutes would be mailed with the September ballot to all voting members for study, and will then be brought up for discussion at the October and November meetings.

The secretary read an announcement by the State Board of Registration for Professional Engineers and Land Surveyors with reference to the deadline for registration.

A communication from Mr. James A. Kime, Acting Director of the Southern Regional Research Laboratory, inviting members of the Society to attend Open House at the laboratory on September 10 to 14, in accordance with Mayor Morrison's proclamation of "Chemistry Week" in New Orleans, was read.

Mr. M. C. Abrahm made an announcement concerning the formation of the Engineers and Architects Club of New Orleans, following which the chair was relinquished to Mr. J. Robert Rombach, Chairman, New Orleans Section, A.I.E.E., who introduced the principal speakers, Messrs. Charles H. Elliot and William Douville of the Kaiser Aluminum & Chemical Company, who gave an excellent talk on "Primary Aluminum Reduction and Power Requirements at the Chalmette Reduction Plant."

After the usual question period, the chair was returned to Acting President McNiven, who requested a rising vote of thanks to the speakers and adjourned the meeting.

JOHN P. FERNANDEZ, Secretary-Treasurer

Minutes of Meeting of the Board of Direction, October 8, 1951

The meeting was called to order by First Vice-President McNiven, with Messrs. Abrahm, Butler, Cucullu, Jarman, Molaison, Seago, Sessums and Fernandez present. Mr. Kelly, Vice-Chairman of AIME, also was present by invitation. The order of business was dispensed with to allow Mr. Kelly to be heard. He announced that the AIMME, Delta Section, requested that the L.E.S. consider Messrs. Benjamin Craft and J. C. Posgate as candidates for the vacancy on the State Board of Registration for Professional Engineers and Land Surveyors. The board then thanked Mr. Kelly for his suggestion and he was excused from the meeting.

Minutes of the preceding meeting were read and accepted with one correction. The secretary then reported that the first conference of Annual Meeting committee chairmen and vice-chairmen had been held on Monday, October 1 and that a meeting of the Technical Papers Committee would be held on Tuesday, October 9. It was decided to invite Mr. Allen W. Betz, General Chairman of the 1952 meeting, to attend the November meeting of the Board of Direction.

A report submitted by Mr. J. H. Collins, Chairman of the Awards Committee, was read. Mr. Molaison moved that the selection of award recipients be deferred until the next meeting of the board and that copies of the biographies of candidates be forwarded to each board member for study. The motion was seconded and carried. Mr. Cucullu requested that Mr. Collins be informed that it is in order for his committee to recommend candidates for honorary membership.

The secretary reported that all applicants for membership listed in the September ballot had been elected.

The financial report for the third quarter of 1951 was presented.

Mr. Cucullu, Chairman of the Vocational Guidance Committee, reported on same and stated that the committee would need some financial assistance in order to proceed with its work. Mr. Abrahm moved that \$50.00 be appropriated for expenditures of the Vocational Guidance Committee, seconded by Mr. Jarman and carried.

Mr. Butler moved that the following names be submitted to the Governor from which to select an appointee for the vacancy on the State Board of Registration for Professional Engineers and Land Surveyors: John J. Mundinger, Frederick N. Billingsley, Harold L. Deloney, Waldemar S. Nelson, J. C. Posgate, Max P. Watson.

The motion was seconded by Mr. Sessums and carried.

A letter from the Illuminating Engineering Society was read, in which cooperation was requested in the exchange of meeting invitations between the IES and the LES. The secretary was instructed to answer that the L.E.S. would be glad to place IES on its mailing list and also announce its meetings to our membership whenever possible; but that he should indicate that the

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E. C. Atkins & Company	Hills-McCanna Company
Badger Manufacturing Co.	Jenkins Bros.
Badger Meter Mfg. Company	Keasbey & Mattison Co.
J. T. Baker Chemical Co.	Kerotest Manufacturing Co.
Bethlehem Steel Corp. (Wire Rope)	Kieley & Mueller, Inc.
Bristol Company	Wm. F. Klemp Company
Buda Company	E. J. Lavino & Company
Carboloy Department of General Electric Co.	Mercoide Corporation
Clark Manufacturing Co.	Merrill Brothers
Climax Engineering Co.	Moeller Instrument Company
Cooper Alloy Foundry Co.	Moisture Register Company
Corning Glass Works	Morehead Manufacturing Co.
Crane Company	New York Belting & Packing Co.
Crosby Steam Gage & Valve Co.	Nordstrom Valve Division
The Dayton Rubber Company	Okonite Company
DeVilbiss Company	Robbins & Myers, Inc.
Durant Manufacturing Co.	Rockwell Manufacturing Co.
Eagle Iron Works	Taylor-Wharton Iron & Steel Company
Ford Meter Box Company	Trane Company
Foster Engineering Co.	Tube Turns, Inc.
General Controls Company	Union Gear & Sprocket Co.
Globe Steel Tubes Co.	Weston Electrical Instrument Co.
Goddard & Goddard Co.	Wright Hoist Division
	John Zink Company

COMPLETE WAREHOUSE STOCKS

Pipe, Valves, Fittings, Steel Plates, Structural, Bars, Band and Strip, Stainless and Tool Steel, Machine Shop Equipment, Rubber Belting and Hose, Saws and Knives, Boiler Tubes, Thermometers, Laboratory Glassware, and Chemicals.

Engineer's Club would be the logical organization to handle such announcements.

Correspondence with members of the American Society of Agricultural Engineers was read and the secretary was instructed to refer the matter to the Committee on Revision of the Construction and By-Laws.

Mr. Abraham moved that the resignations of Messrs. H. S. Wilson, H. M. Begue and Vernon Mills be accepted with regret. The motion was seconded and carried.

In accordance with the constitution, since the following student members now graduated have not accepted junior membership in the Society, Mr. Molaison moved that they be considered as having resigned: Leo Van Amerongen, Eden Bailey, Wesley J. Bodin, Jr., James E. Broussard, John Atkins, Jr., L. Lamon Moody, Jr., Lloyd J. Napaluch, Roland Otto, Nelson Pimenton-Brown, Jr., Kenneth C. Finster, H. M. King, Jr., Carl Martin, Robert E. Mittel, Sylvian Ray, John P. Walsh.

The motion was seconded by Mr. Jarman, and the meeting adjourned in order that the Society's regular meeting could proceed on schedule.

JOHN P. FERNANDEZ, Secretary-Treasurer

**Minutes of Meeting of the L. E. S. Held Jointly with the New Orleans Section,
A.I.Ch.E., October 8, 1951**

The meeting was called to order by First Vice-President McNiven, with approximately 125 members and guests present. Mr. McNiven welcomed the New Orleans Section, A.I.Ch.E., members and guests. The order of business was dispensed with to permit Mr. L. L. Dresser, President of the National Society of Professional Engineers, to address the meeting. Mr. Dresser spoke on the registration act and the aims of the N.S.P.E.

Mr. R. M. Seago moved that the reading of minutes of the preceding meeting be dispensed with, seconded by Mr. R. H. Graham and carried. Acting President McNiven then read the minutes of the board meeting of September 10, following which it was announced that the proposed amendment to the constitution concerning the qualifications for membership was open for discussion. However, none was forthcoming.

Commander H. S. Salzer then read the obituary of our late member, Anthony M. Zibilich, following which a moment of silence was observed in memory of the deceased.

The secretary announced that Mr. Al Glodt, Chairman of the Technical Exhibits Committee for the 1952 Annual Meeting had requested all firms wishing to display exhibits to contact him as soon as possible.

The chair then was released to Dr. E. F. Pollard, Chairman, N. O. Section, AIChE, who requested Dean Lee H. Johnson of Tulane University to present to the audience two new members of the Chemical Engineering faculty at Tulane, Dr. R. V. Bailey and Dr. M. M. Gilkerson.

Dr. Pollard then introduced the main speakers of the evening, Dr. Charles H. Fisher, Director, Southern Regional Research Laboratory, who spoke on "Engineering in Utilization Research on Southern Farm Products", and Dr. J. W. Bertetti, Assistant General Manager of Manufacturing, Pan-Am Southern Corporation, who spoke on "Engineering Pan-Am Southern's New Refinery."

The chair then was returned to Acting President McNiven, who adjourned the meeting with a rising vote of thanks to the speakers.

JOHN P. FERNANDEZ, Secretary-Treasurer

**Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society
October 9, 1951**

The meeting was called to order by Mr. Hannaman at the Louisiana State University Testing Laboratory, Oct. 9, 1951. Thirty-nine members and guests were present.

A motion was passed to dispense with the reading of the minutes for the previous meeting. There being no old or new business, Mr. Hannaman introduced Mr. H. P. Leonard, Vice-President and General Manager of the Louisiana Division of Gulf States Utilities Company, who made an excellent talk on the industrial developments in and around Baton Rouge. The meeting adjourned at 9 p. m. and refreshments were served.

T. J. INNES, JR., Secretary-Treasurer,
Baton Rouge Section L.E.S.

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Minutes of Meeting, Lake Charles Section, Louisiana Engineering Society

The regular bi-monthly meeting of the Lake Charles Section of the Louisiana Engineering Society was held at McNeese State College at 7:45 p. m., with the President presiding. There were nineteen members and guests present.

The minutes of the last meeting were read and approved.

The financial statement was read and approved.

There was no correspondence since the last meeting.

In the absence of Mr. R. R. L. Ward, the President reported the status of the library situation. He stated a Board Meeting was to be called to consider the matter. Mr. Ricketts suggested that members donate any publications that may contain valuable data not published in books.

Mr. Burgess reported that questions before the Charter and Rules Committee would be considered by the Board before they are brought before the Section.

The President reported that he was waiting for answers from other sections before the question of renaming the Sections be presented to the Board.

The President reported that Mr. Hightower, who was the scheduled speaker, was unable to be present. In his absence, Mr. Ricketts introduced Mr. John Koehn, Technical Assistant to the Production Manager of Mathieson Chemical Corporation, who spoke on the manufacture of Soda ash.

Mr. Goodloe made a few remarks and answered a few questions about the new bridge near Calcasieu River.

The meeting adjourned at 9:15 p. m.

W. M. DAVIS, Secretary-Treasurer,
Lake Charles Section, L.E.S.

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