Meetings and Societies

Education in Engineering

Sixty-one deans of accredited engineering schools met in a 4-day conference at Purdue University, 9–11 Sept., to review recent developments in seven major fields of engineering and science and to consider the impact of these new developments on engineering education.

The seven major fields of subject matter were (i) computer development and applications; (ii) automation and automatic control; (iii) systems analysis and operations research; (iv) thermodynamics; (v) mass, momentum, and heat transfer; (vi) nuclear engineering; and (vii) solid-state physics and engineering materials. A recognized authority on each subject presented a survey of the field, and a second speaker discussed the impact on engineering education. One session was devoted to discussion of administrative problems, with special reference to trends in the cost of engineering education.

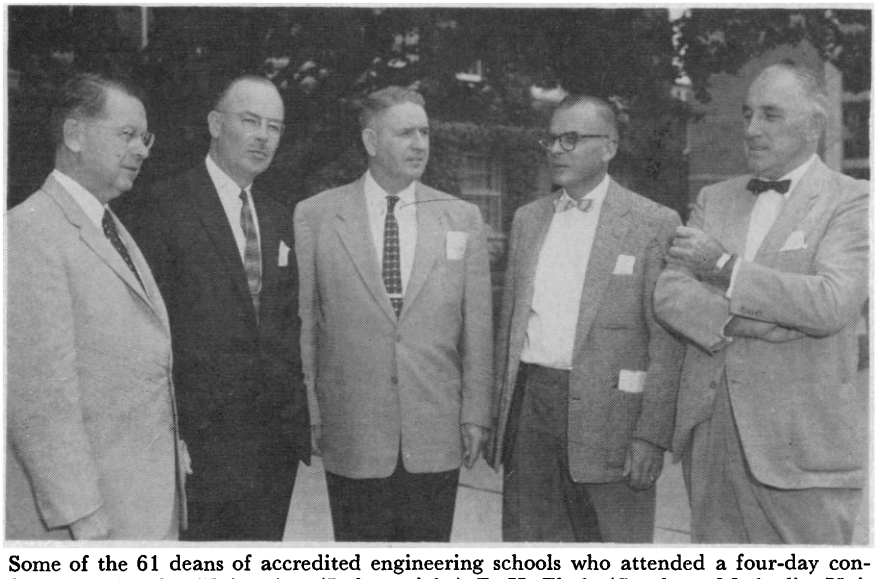
George A. Hawkins, dean of the Purdue Schools of Engineering, who was host to the conference, said that the idea of the meeting grew out of discussions in recent months with many of his colleagues in engineering administration. The program was planned by him with the assistance of associate dean Paul Chenea. At the close of the conference, Hawkins said that, from general comments of the group, it appeared to him that the problems of the future would be (i) the integration of subject matter and (ii) the development of a dual engineering program—one for those interested in the functions of research, design, development, and education and one for those interested in construction, maintenance, estimation, production, and sales—the former highly oriented toward mathematics and the physical sciences—and the latter with a strong foundation in mathematics and physical sciences but oriented toward the humanities. He emphasized that these are of equal importance in society.

Typical of many observations made by speakers was that of Gordon S. Brown (Massachusetts Institute of Technology), who suggested that universities create "centers of learning" in four general areas—namely, communication, energy exploitation, engineering materials, and mobility and transportation—cutting across conventional engineering departments. In similar vein, J. P. Nash (Lockheed Aircraft Corporation), speaking of the impact of computer development on engineering education, said that the increased use of computers affords opportunity for enriching the engineering curriculum with more of basic theory. Along the same line, Myron Tribus (University of California, Los Angeles), who with Newman A. Hall (Yale University) covered the field of thermodynamics, expressed a belief in the desirability of breaking through the boundaries between the divisions in engineering.

Referring specifically to rising costs of engineering education, R. W. Kettler (University of California) made half a dozen suggestions, among which he recommended a reduction in specialization and more emphasis on general courses; establishment of cooperative programs among institutions, where each can specialize in a particular field; and requiring students to assume more individual responsibility for learning. F. L. Hovde, president of Purdue University, in a banquet address, while speaking of administrative problems under pressure of increasing enrollment, emphasized the compelling necessity to minimize specialized engineering curricula and expressed the need for a new philosophy of "self-learning" on the part of the student, beginning in secondary school and extending throughout his academic education, whereby the process of being taught would be supplanted by development of habits of learning which might be continuous throughout his lifetime. Self-learning, said Hovde, would enable instructors to carry larger classes, and this, in turn, would make it possible to pay higher salaries.

Keen discussion by the engineering administrators was provoked by each of the speakers. Samuel Alexander (National Bureau of Standards) spoke of the possibility of reaching a billion-dollar figure in annual sales of computers by 1965, with corresponding pressure on universities for skills in design and manufacture. J. G. Truxal (Brooklyn Polytechnic Institute), speaking on automation, said that the marriage of computers and control systems was the most significant recent development and visualized the installation, 10 years hence, of a digital computer with a control system in a military plane to control all essential functions of the plane, including firing and navigation; he added that any student of automatic control is likely to wind up on a military project. H. H. Goode (University of Michigan) and D. G. Malcolm (Booz, Allen, and Hamilton) spoke on systems analysis and operations research.

E. R. G. Eckert (University of Minnesota) and R. B. Bird (University of Wisconsin), surveying the field of mass, momentum, and heat transfer, held that



Some of the 61 deans of accredited engineering schools who attended a four-day conference at Purdue University. (Left to right) E. H. Flath (Southern Methodist University); R. D. Landon (University of Akron); George F. Branigan (University of Arkansas); George A. Hawkins (Purdue University), who was host to the conference; and Howard K. Justice (University of Cincinnati).

undergraduate training in physics on the subjects of momentum transfer, energy transfer, and mass transfer is inadequate and that unnecessary duplication exists in various engineering departments; they recommended that transport processes be treated as a unified subject covering principles that are applicable to all fields of engineering. Stuart McLain, consultant in nuclear engineering, predicted that the greatest growth in industrial capacity in the next decade will be based on nuclear power, especially in Western Europe; he said that, because of lack of design and operational experience, many new plants will not be started before 1960. H. J. Gomberg (University of Michigan) said that the shortage of reactor physicists is so acute that engineers must be trained to take over more activities normally handled by physicists; he proposed a definite curriculum whereby engineers with sound basic training at the bachelor-of-science level could be given advanced courses in nuclear engineering.

J. E. Goldman (Ford Motor Company) and Glenn Murphy (Iowa State College), speaking on solid-state physics and engineering materials, stressed the need for more engineers with the basic training that, in the recent past, has been given in the realm of solid-state physics rather than in any branch of engineering. Murphy said, "All the products of an engineer's activities are expressed in terms of materials. There has quietly developed a science of materials to replace the art of materials. Within a few years no engineering graduate can hope to practice his profession in other than a subordinate capacity without knowledge of the science of materials."

The proceedings of the conference, which was financed by Purdue University and the Purdue Research Foundation, will be published in book form.

JAMES B. BALL
Purdue University, Lafayette, Indiana

NSF Travel Grants

The National Science Foundation will award individual grants to defray partial travel expenses for a limited number of American scientists who wish to participate in the following international congresses:

International Federation of Electron Microscope Societies, Berlin, Germany, 10–17 September 1958; deadline, *15 February 1958.*

International Congress of Americanists, San Jose, Costa Rica, 20–27 July 1958; deadline, *1 March 1958.*

Special Session of the International Statistical Institute, Brussels, Belgium, 1–6 September 1958; deadline, *1 March 1958.*

Application blanks may be obtained from the National Science Foundation, Washington 25, D.C. Completed forms must be submitted by the deadline date indicated for each meeting.

Society Elections

■ The Society of Rheology: pres., J. H. Dillon, Textile Research Institute; vice pres., J. H. Elliott, Hercules Powder Company; sec.-treas., W. R. Willets, Titanium Pigment Corporation; editor, R. D. Andrews, Dow Chemical Company.

■ Animal Care Panel: pres., Jules S. Cass, University of Cincinnati; vice pres. and pres. elect, Bennett J. Cohen, University of California; sec.-treas., Robert J. Flynn, Argonne National Laboratory, Box 299, Lemont, Ill.

■ The American Society of Tropical Medicine and Hygiene: pres., Donald L. Augustine, Boston, Mass.; pres. elect, Lewis W. Hackett, Berkeley, Calif.; vice pres., Paul C. Beaver, New Orleans, La.; sec.-treas., Rolla B. Hill, Miami, Fla.; editor, Martin Frobisher, Closter, N.J.

■ National Shellfisheries Association: pres., Melbourne R. Carriker, University of North Carolina, Chapel Hill, N.C.; vice-pres., L. Eugene Cronin, Maryland Department of Research and Education, Solomons, Md.; sec.-treas., Philip A. Butler, U.S. Fish and Wildlife Service, Gulf Breeze, Fla.

Forthcoming Events

January

17–18. Blood Symposium, 7th annual, Detroit, Mich. (W. H. Seegers, Dept. of Physiology and Pharmacology, Wayne State Univ. College of Medicine, 1401 Rivard, Detroit 7.)

22–24. American Council of Learned Societies, 39th annual, Bloomington, Ind. (ACLS, 2101 R St., NW, Washington 8.)

22–25. American Group Psychotherapy Assoc., 15th annual, New York. (M. Berger, 50 E. 72 St., New York 21.)

27–28. Scintillation Counter Symp., Washington, D.C. (G. A. Morton, Radio Corporation of America, Princeton, N.J.)

27–29. American Soc. of Heating and Air-Conditioning Engineers, Pittsburgh, Pa. (A. V. Hutchinson, ASHAE, 62 Worth St., New York 13.)

27–30. American Meteorological Soc., 163rd natl., New York. (K. C. Spengler, AMS, 3 Joy St., Boston 8, Mass.)

27–31. Institute of Aeronautical Sciences, 26th annual, New York, N.Y. (S. P. Johnston, IAS, 2 E. 64 St., New York.

28–30. Aging, 4th Ciba Foundation Colloquium (by invitation), London, England. (G. E. W. Wolstenholme, 41 Portland Pl., London, W.1.)

28–30. American Mathematical Soc., 64th annual, Cincinnati, Ohio. (J. H. Curtiss, AMS, 190 Hope St., Providence 6, R.I.)

29–31. American Astronautical Soc., 4th annual, New York. (A. B. Crunden, AAS, 516 Fifth Ave., New York 36.)

29–1. American Physical Soc., annual, New York, N.Y. (K. K. Darrow, Columbia Univ., New York 27.)

30–31. College–Industry Conf., American Soc. for Engineering Education, 10th annual, Ann Arbor, Mich. (W. D. McIlvaine, College of Engineering, Ann Arbor.)

30–31. Mathematical Assoc. of America, annual, Cincinnati, Ohio. (H. M. Gehman, Univ. of Buffalo, Buffalo 14, N.Y.)

30–1. American Assoc. of Physics Teachers, New York. (F. Verbrugge, Univ. of Minnesota, Minneapolis.)

30–1. Western Soc. for Clinical Research, 11th annual, Carmel-by-the-Sea, Calif. (A. J. Seaman, Univ. of Oregon Medical School, Portland 1.)

31–1. Problems of Geriatrics, symp. (by invitation only), New York. (B. F. Chow, Johns Hopkins Univ., School of Hygiene and Public Health, 615 N. Wolfe St., Baltimore 5, Md.)

February

1–14. Pan American Assoc. of Ophthalmology, Caribbean cruise cong., sailing from New York, N.Y. (L. V. Arnold, 33 Washington Sq. W., New York 11.)

3–4. Progress and Trends in Chemical and Petroleum Instrumentation, Wilmington, Del. (H. S. Kindler, Instrument Soc. of America, 313 Sixth Ave., Pittsburgh 22, Pa.)

3–7. American Inst. of Electrical Engineers, winter genl., New York, N.Y. (N. S. Hibshman, AIEE, 33 W. 39 St., New York 18.)

5–7. Biophysical Soc., Cambridge, Mass. (A. K. Solomon, Biophysical Lab., Harvard Medical School, Boston, Mass.)

10–14. American Soc. for Testing Materials, St. Louis, Mo. (F. F. Van Atta, ASTM, 1916 Race St., Philadelphia 3, Pa.)

13–15. National Soc. of Professional Engineers, spring, East Lansing, Mich. (NSPE, 2029 K St., NW, Washington 6.)

16–20. American Inst. of Mining, Metallurgical and Petroleum Engineers, annual, New York. (E. O. Kirkendall, AIME, 29 W. 39 St., New York 18.)

20–21. Transistor and Solid State Circuits Conf., Philadelphia, Pa. (J. H. Milligan, Jr., Dept. of Electrical Engr., New York Univ., New York 53.)

22–25. American Educational Research Assoc., St. Louis, Mo. (F. W. Hubbard, AERA, 1201 16th St., NW, Washington 6.)

24–28. American Soc. of Civil Engineers, Chicago, Ill. (W. W. Wisely, ASCE, 33 W. 39 St., New York 18.)

March

1. Junior Solar Symposium, Tempe, Ariz. (Association for Applied Solar Energy, 3424 N. Central Ave., Phoenix, Ariz.)

1–3. National Wildlife Federation, St.

Louis, Mo. (E. F. Swift, NWF, 232 Carroll St., NW, Washington 12.)

3. Wildlife Soc., annual, St. Louis, Mo. (D. L. Leedy, U.S. Fish and Wildlife Service, Washington 25.)

5–6. Gas Conditioning Conf., 7th annual, Norman, Okla. (M. L. Powers, Extension Div., Univ. of Oklahoma, Norman.)

6–8. Fundamental Cancer Research, 12th annual, Houston, Tex. (W. K. Sinclair, M. D. Anderson Hospital and Tumor Inst., Univ. of Texas, Houston 25.)

6–8. Optical Soc. of America, annual, New York. (A. C. Hardy, Massachusetts Inst. of Technology, Cambridge 39.)

10–13. American Assoc. of Petroleum Geologists, annual, Los Angeles, Calif. (R. H. Dott, AAPG, Box 979, Tulsa 1, Okla.)

10–13. Society of Economic Paleontologists and Mineralogists, annual, Los Angeles, Calif. (R. H. Dott, Box 979, Tulsa, Okla.)

16–21. Nuclear Engineering and Science Cong., Chicago, Ill. (D. I. Cooper, *Nucleonics,* 330 W. 42 St., New York.)

17–21. National Assoc. of Corrosion Engineers, 14th annual, San Francisco, Calif. (NACE, Southern Standard Bldg., Houston 2, Tex.)

18–20. Amino Acids and Peptides, Ciba Foundation symp. (by invitation), London, England. (G. E. W. Wolstenholme, 41 Portland Pl., London, W.1.)

20–22. Michigan Acad. of Science, Arts and Letters, annual, Ann Arbor, (R. F. Haugh, Dept. of English, Univ. of Michigan, Ann Arbor.)

20–22. Pulmonary Circulation Conf., Chicago, Ill. (Wright Adams, Chicago Heart Assoc., 69 W. Washington St., Chicago 2.)

20–23. International Assoc. for Dental Research, annual, Detroit, Mich. (D. Y. Burrill, Univ. of Louisville, School of Dentistry, 129 E. Broadway, Louisville 2, Ky.)

23–26. American Assoc. of Dental Schools, annual, Detroit, Mich. (M. W. McCrea, 42 S. Greene St., Baltimore 1, Md.)

23–29. American Soc. of Photogrammetry, 24th annual, jointly with American Cong. on Surveying and Mapping, 18th annual, Washington, D.C. (C. E. Palmer, ASP, 1515 Massachusetts Ave., NW, Washington 5.)

24–27. Institute of Radio Engineers, natl. conv., New York. (G. W. Bailey, IRE, 1 E. 79 St., New York 21.)

27–29. National Science Teachers Assoc., 6th natl., Denver, Colo. (R. H. Carleton, NSTA, 1201 16 St., NW, Washington 6.)

29. South Carolina Acad. of Science, annual, Charleston. (Miss M. Hess, Dept. of Biology, Winthrop College, Clemson, S.C.)

29–30. American Psychosomatic Soc., 15th annual, Cincinnati, Ohio. (T. Lidz, 551 Madison Ave., New York 22.)

30–3. American College Personnel Assoc., annual, St. Louis, Mo. (L. Riggs, DePauw Univ., Greencastle, Ind.)

April

1–3. Corrosion Control, 5th annual conf., Norman, Okla. (M. L. Powers, Extension Div., Univ. of Oklahoma, Norman.)

2–4. American Assoc. of Anatomists, annual, Buffalo, N.Y. (L. B. Flexner, Dept. of Anatomy, School of Medicine, Univ. of Pennsylvania, Philadelphia 4.)

2–4. Instruments and Regulators Conf., Newark, Del. (W. E. Vannah, Control Engineering, 330 W. 42 St., New York 36.)

4–5. Southern Soc. for Philosophy and Psychology, annual, Nashville, Tenn. (W. B. Webb, U.S. Naval School of Aviation Medicine, Pensacola, Fla.)

7–11. American Assoc. of Cereal Chemists, annual, Cincinnati, Ohio. (J. W. Pence, Western Utilization Research Laboratories, Albany, Calif.)

8–10. Electronic Waveguides Symp., New York. (J. Fox, Microwave Research Inst., Polytechnic Inst. of Brooklyn, 55 Johnson St., Brooklyn 1, N.Y.)

9–12. National Council of Teachers of Mathematics, Cleveland, Ohio. (M. H. Ahrendt, NCTM, 1201 16 St., NW, Washington 6.)

9–14. Applied Psychology, 13th internatl. cong., Rome, Italy. (L. Meschieri, National Inst. of Psychology, Rome.)

10–11. American Inst. of Chemists, annual, Los Angeles, Calif. (L. Van Doren, AIC, 60 E. 42 St., New York 17.)

10–12. National Speleological Soc., annual, Gatlinburg, Tenn. (G. W. Moore, Geology Dept., Yale Univ., New Haven, Conn.)

10–12. Ohio Acad. of Science, annual, Akron, Ohio. (G. W. Burns, Dept. of

Botany, Ohio Wesleyan Univ., Delaware, Ohio.)

11. Vitamin B-12 Symp., New York, N.Y. (Miss J. Watson, 451 Clarkson Ave., Brooklyn 3, N.Y.)

11–12. Eastern Psychological Assoc., annual, Philadelphia, Pa. (G. Lane, Dept. of Psychology, University of Delaware, Newark.)

11–18. Horticultural Cong., 15th internatl., Nice, France. (Secretariat General, 84, rue de Grenelle, Paris 7e, France.)

13–14. American Soc. for Artificial Internal Organs, Philadelphia, Pa. (G. Schreiner, Georgetown Univ. Hospital, Washington 7.)

13–18. American Chemical Soc., 133rd, San Francisco, Calif. (R. M. Warren, ACS, 1155 16 St., NW, Washington 6.)

13–19. Federation of American Societies for Experimental Biology, annual, Philadelphia, Pa. (M. O. Lee, FASEB, 9650 Wisconsin Ave., Bethesda 14, Md.)

14–16. Automatic Techniques Conf., Detroit, Mich. (J. E. Eiselein, RCA, Bldg. 10–7, Camden 2, N.J.)

14–18. American Assoc. of Immunologists, annual, Philadelphia, Pa. (F. S. Cheever, Graduate School of Public Health, Univ. of Pittsburgh, Pittsburgh 13, Pa.)

14–18. American Soc. for Experimental Biology, annual, Philadelphia, Pa. (J. F. A. McManus, Univ. of Alabama Medical Center, Birmingham.)

14–18. American Soc. of Biological Chemists, annual, Philadelphia, Pa. (P. Handler, Dept. of Biochemistry, Duke Univ. School of Medicine, Durham, N.C.)

15–17. Gas Measurement, 34th annual conf., Norman, Okla. (M. L. Powers, Extension Div., Univ. of Oklahoma, Norman.)

17–19. Association of Southeastern Biologists, annual, Tallahassee, Fla. (J. C. Dickinson, Jr., Dept. of Biology, Univ. of Florida, Gainesville.)

18. Iowa Acad. of Science, annual, Des Moines. (C. H. Lindahl, Dept. of Mathematics, Iowa State College, Ames.)

18–19. Arkansas Acad. of Science, annual, Little Rock. (L. F. Bailey, Botany Dept., Univ. of Arkansas, Fayetteville.)

19–21. American College of Apothecaries, Los Angeles, Calif. (R. E. Abrams, Hamilton Court, 39th and Chestnut St., Philadelphia, Pa.)

20–22. American Assoc. of Colleges of Pharmacy, annual, Los Angeles, Calif. (G. L. Webster, College of Pharmacy, Univ. of Illinois, 808 S. Wood St., Chicago 12.)

20–23. Chemical Engineering Conf., Canada-United States, Montreal, Quebec. (H. R. L. Streight, DuPont Company of Canada, P.O. Box 660, Montreal.)

21–23. American Oil Chemists' Soc., Memphis, Tenn. (Mrs. L. R. Hawkins, AOCS, 35 E. Wacker Dr., Chicago 1, Ill.)

21–28. American Industrial Hygiene Assoc., annual, Atlantic City, N.J. (G. D. Clayton, George D. Clayton and Associates, 14125 Prevost, Detroit 27, Mich.)

22–24. Electronic Components Symp., Los Angeles, Calif. (E. E. Brewer, Convair, Inc., Pomona, Calif.)

22–24. West Virginia Acad. of Science, annual, Morgantown. (M. Ward, Glenville State College, Glenville, W. Va.)

EQUIPMENT NEWS

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Science *does not assume responsibility for the accuracy of the information. All inquiries concerning items listed should be addressed to* Science, *Room 740, 11 W. 42 St., New York 36, N.Y. Include the name(s) of the manufacturer(s) and the department number(s).*

■ PHASE-ANGLE VOLTMETER provides 10-μv sensitivity as a phase-sensitive null indicator, with less than 5 μv of noise. Harmonic rejection exceeds 55 db. Full-scale voltage ranges of from 1 mv to 300 v are available for measuring signal magnitude and the quadrature or in-phase components of a signal. (North Atlantic Industries, Inc., Dept. S794)

■ MILLIVOLTMETER features zero-center indication. Input impedance is 2 megohm. Nine ranges up to 10 v d-c full scale, are selectable. Zero stability is said to eliminate the need for zeroing control. (Industrial Control Co., Dept. S806)

■ *p*H MEASURING UNIT, used in conjunction with a vibrating-capacitor electrometer unit, deflects full scale 0.1 *p*H at any point in the range from *p*H 3 to *p*H 10. Measurements are said to be accurate to ± 0.002 *p*H units and the zero