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ENGINEERING EXPERIMENT STATION
OREGON STATE COLLEGE
CORVALLIS, OREGON

Research and Testing In the School of Engineering

By
M. POPOVICH
Assistant Dean of Engineering
Oregon State College

THE Oregon State Engineering Experiment Station was established by act of the Board of Regents of Oregon State College on May 4, 1927. It is the purpose of the Station to serve the state in a manner broadly outlined by the following policy:

(1) To stimulate and elevate engineering education by developing the research spirit in faculty and students.

(2) To serve the industries, utilities, professional engineers, public departments, and engineering teachers by making investigations of interest to them.

(3) To publish and distribute by bulletins, circulars, and technical articles in periodicals the results of such studies, surveys, tests, investigations, and research as will be of greatest benefit to the people of Oregon, and particularly to the state's industries, utilities, and professional engineers.

To make available the results of the investigations conducted by the Station three types of publications are issued. These are:

(1) BULLETINS covering original investigations.

(2) CIRCULARS giving compilations of useful data.

(3) REPRINTS giving more general distribution to scientific papers or reports previously published elsewhere, as for example, in the proceedings of professional societies.

Single copies of publications are sent free on request to residents of Oregon, to libraries, and to other experiment stations exchanging publications. As long as available, additional copies, or copies to others, are sent at prices covering cost of printing. The price of this publication is 25¢.

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CORVALLIS, OREGON

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ORGANIZATION AND ACTIVITIES

Introduction

Oregon is a state whose economic well-being has been centered for many years in agriculture, wood products, and tourist trade. Manufacturing industries have grown tremendously during the past decade and presently exert a strong stabilizing influence upon the economy of the State. Payrolls of the miscellaneous manufacturing industries in Oregon in 1954 reached $181,100,000 of a total of $1,278,237,000. The latter figure included lumber and logging, retailing and wholesaling, transportation, utilities, construction, services, agriculture, food processing, and other miscellaneous endeavors.

For many years Oregon has recognized the need for research to aid agriculture and forest and wood industries and has actively supported research in these vital fields. It was not until comparatively recently, however, that the Engineering Experiment Station was established to further engineering research. In spite of the minor amount of support through State funds, the Station since 1927 has contributed a great deal of information and assistance to local industry through publication of more than 100 bulletins, circulars, and reprints of technical articles. These publications have resulted from research and investigations of the faculty and graduate students of the School of Engineering. The titles of the publications are listed on page 27 of this circular.

Research organizations such as the Engineering Experiment Station can be invaluable in assisting industrial development. The purpose of this publication is to outline the functions and facilities of the Station and the engineering departments of Oregon State College because the young industries of the State and the Northwest may be particularly interested in utilizing the excellent staff and facilities in helping themselves to grow.

The Engineering Experiment Station, along with the entire School of Engineering, is a member of the Engineering College Research Council and the American Society for Testing Materials. Staff members of the Station and of the various departments of the school are members of important engineering societies such as the American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, Institute of Radio Engineers, American Institute of Chemical Engineers, Society of Automotive Engineers, American Society of Heating and Air Conditioning Engineers, Society for the Advancement of Management, and others. A majority of the faculty members are registered professional engineers of the State of Oregon.

Organization

The Engineering Experiment Station was established at Corvallis to serve the State in a manner broadly outlined by the following policy:

1. To serve the industries, utilities, professional engineers, public departments, and engineering teachers by making investigations of significance and interest to them.

2. To stimulate and elevate engineering education by developing research spirit in faculty and students.

3. To publish and distribute through bulletins, circulars, and technical articles in periodicals the results of such studies, surveys, tests, investigations, and research as will be of greatest benefit to the people of Oregon, and particularly to the State's industries, utilities, and professional engineers.

The Engineering Experiment Station is an integral part of the School of Engineering. All staff members and laboratory facilities of the engineering school are available for the investigative work of the Station to the extent of funds allocated or contributed for this purpose.

The dean of engineering is director of the Engineering Experiment Station and guides its operation to conform with State and institutional policies. The assistant dean of engineering acts as the administrator in charge, technical editor of publications, and chairman of the Station executive council, which is composed of senior

staff members representing the various departments of the School of Engineering.

The active staff is composed of members of the instructional staff who may be interested in various specific research projects, or of research fellows who are pursuing graduate study and are assigned to part-time work in the Station.

Experts who are especially qualified by training and experience to advise on investigations in certain fields have been appointed to the staff as special technical counselors. Among these are executives and engineers representing major industries of Oregon and the Northwest, prominent consulting engineers, and leading engineers of Federal agencies and State departments. Some technical assistants have been supported by manufacturers and industrial associations interested in working out specific problems.

Activities—Past and Present

Among early investigations of the Engineering Experiment Station were stream pollution and sanitary survey studies, local boiler-water treatments, properties of cement-sawdust mortars, properties of Oregon sands, wood preservation, Oregon fuels, commercial refrigeration, radio interference, gasoline engine combustion, structures, and concrete design.

Recent research activity has included electric radiant-panel and reverse-cycle space heating, spontaneous ignition temperatures of common materials, dielectric properties of Oregon woods, expanded shale aggregates, Oregon pumicites, peppermint distillation, broadcast antennas, arc discharges at low pressures, heat transfer in fluidized systems, diffusion coefficients of organic liquids, conductor vibrations, shunt capacitors in large transmission networks, zirconium and ductile iron fabrication, model studies of siphon spillways, conversion of sulfite waste into protein feed, engine wear by use of radioactive tracers, culvert inlet designs, and highway base-course materials.

Current research is outlined as follows:

Motor Fuel Meter Development. The Station is sponsoring a project initiated by Professors W. H. Paul and M. C. Sheely to

develop an accurate, sensitive portable indicating device for motor fuel rate of consumption. Such a device would be particularly valuable to trucking industries in effecting operating economies.

Decolorization and Adjustment of Beet Wastes. Methods are being studied to render beet wastes colorless and innocuous to receiving streams. During the canning season, beet wastes cause particular difficulties in sewage disposal plants by upsetting operations to the extent that raw sewage is often discharged. Professor Fred Merryfield and Assistant Professor W. C. Westgarth are directing the work of Research Fellow Robert Pailthorp.

Aspects of Corona Formation and Radio Interference. The Bonneville Power Administration and the Experiment Station are studying cooperatively the effects of types of transmission conductors and conductor irregularities on radio interference. Associate Professor L. N. Stone is directing the project.

Scaling Factors on Transverse Finned Tubes. The Station is sponsoring work directed by Associate Professor J. G. Knudsen on rates of scaling of finned tubes while heating saturated solutions of salts having inverse solubilities. This is being conducted to determine the limitations of finned tubes for such applications.

Use of Carbon Dioxide in Setting Dry Sand Cores. Development of an inexpensive method of producing foundry cores without baking is being sponsored. Carbon dioxide is used to set sodium silicate or other sand admixtures. The project was initiated by Assistant Professor L. M. Frazier.

Air Velocity Distribution in Air Blast Freezers. A contract has been negotiated with the U. S. Department of Agriculture to study air velocity distribution in various typical configurations of air blast freezers in order to develop a more efficient arrangement of blowers, coils, etc. Assistant Professor G. E. Thornburgh is project director.

Water Quality Studies in Oregon. The Station is cooperating with the Oregon State Water Resources Board in gathering, correlating, and publishing data on qualities of industrial and domestic waters available in various drainage areas of the State. Assistant

Professor W. C. Westgarth is directing the work, assisted by Instructor Martin Northcraft and Robert Elder, graduate student.

Biological and Physical Phenomena of High-Rate Trickling Filters. Investigations are being made involving type and distribution of flora and fauna of high-rate trickling filter beds in aerobic oxidation of domestic sewage. It also is planned to correlate this with the efficiency of secondary sewage treatment and to investigate deep trickling filters. Research is under the guidance of Professor Fred Merryfield and Assistant Professor W. C. Westgarth.

Engine Wear Studies with Radioactive Piston Rings. With minor amounts of Station funds and considerable assistance from petroleum companies in the form of research fellowships for graduate students, several research programs on engine wear have been carried out. To date these have included:

1. Effect of jacket temperature and sulfur content of gasoline on piston ring wear.
2. Effect of lubricating oil viscosity on piston ring wear.
3. Effect of detonation intensity on piston ring wear.
4. Corrosive wear of antiknock additives in gasoline.

Most of the past research has been directed by Professor M. Popovich. Professor W. H. Paul has assisted with the most recent studies.

Thermal Conductivity of Emulsions Made Up of Two Immiscible Liquids. This work is a sequel to earlier work sponsored by the Station which involved the study of heat transfer between immiscible liquids. Both past and current work has been guided by Associate Professor J. G. Knudsen.

Study of Methods Used in Nonlinear Oscillation Theory to Determine Behavior of Elastic Beam-Columns. This research is presently being initiated by the Experiment Station pending application to the National Science Foundation for sponsorship. The work involves an entirely new approach in the analysis of beam-column behavior under static and dynamic loading. Assistant Professor H. D. Christensen is directing the project.

PERSONNEL AND FACILITIES

The most important facility in the school for contribution in the field of research is the wide range of interest and experience of the staff members in the various departments. This facility is the essential ingredient in any research undertaking. Manpower, as well as physical facilities, will be discussed in the following text according to departments of instruction.

Chemical Engineering

With the completion of the chemical engineering building, instructional and research facilities are among the finest west of the Mississippi River. A special $100,000 allotment has been provided for necessary additional equipment, enabling chemical engineering research to be conducted in almost any field.

Figure 1. Professor J. S. Walton
Using the New Spectrophotometer

The chemical engineering staff is competent to conduct and direct research in these fields. Professor J. S. Walton, head of the department, has had a number of years of experience in petroleum, synthetic rubber, economics, and mass transfer operations, including the manufacture of high purity metals for specialized use in atomic energy installations. Professor Walton has written numerous published articles on fluidization phenomena.

Figure 2. Associate Professor J. Schulein
Purifies Boron by High Temperature Vacuum Distillation

Associate Professor Joseph Schulein has had extensive experience in electrochemistry, air pollution and purification, and separation of metals from their ores.

Associate Professor J. G. Knudsen is an authority on mass, heat, and momentum-energy transfer phenomena, and is a coauthor (with Dr. D. L. Katz) of a book on this subject. He has had many articles published in technical journals. At present he has several research projects under way.

Assistant Professor C. E. Wicks specializes in vapor-liquid equilibria and kinetics.

Civil Engineering

The permanent faculty embraces the major specialities normally associated with civil engineering. Professor G. W. Holcomb and Associate Professors Orville Kofoid and T. J. McClellan have had many years of experience in structural engineering. Professor Fred Merryfield is nationally known in water works and sanitary engineering through numerous publications and activity in professional societies. Assisting Professor Merryfield are Assistant Professor W. C. Westgarth and Instructor F. J. Burgess, who are presently heading water supply and quality studies for the State of Oregon Water Resources Board.

Assistant Professor R. H. Shoemaker, who has had several papers published, is active in hydraulics research and is particularly well-versed in conducting model studies of hydraulic structures. Associate Professor Charles Behlke is a new faculty member who has joined the staff after two years of hydraulics work at Stanford.

Professor M. P. Coopey is well-known on the Pacific Coast as a highway and traffic engineer.

Assistant Professor Theodore Leonard has returned to Oregon State College after a year of advanced study, and is in charge of the soil mechanics laboratory.

The Civil Engineering Department has adequate laboratory facilities for research work in the fields of highway, hydraulic, sanitary, and structural engineering, as well as surveying and other related fields.

The structural laboratory is located in Apperson Hall and is equipped with 30,000- and 60,000-pound testing machines with necessary gaging equipment to measure stress and strain in materials. Loading equipment for trusses and beams with spans up to 40 feet also is located in the main laboratory. Electric strain-gage equipment consists of a strain indicator and analyzer, recording oscillograph, and a universal bridge switch with accessories.

Figure 3. Professor G. W. Holcomb Determines Stresses and Strains in Timber Truss in Structural Laboratory

For model analysis in structures, the department has a $4\frac{1}{2}$-inch photoelastic polariscope, Beggs deformator, and equipment for constructing plastic models.

The sanitary laboratory in Apperson Hall occupies rooms properly equipped for routine testing of bacteriological and chemical samples for both sanitary and water supply problems. The department also has an arrangement with the city of Corvallis whereby the facilities of the modern water filtration and sewage treatment plants of the city are available for use in research studies in these fields.

The soil mechanics laboratory equipment for standard soil tests includes direct shear and triaxial apparatus and a Hveem Stabilometer. Equipment also is available to make field studies in soil mechanics problems.

The hydraulics laboratory contains large weighing tanks for measuring the flow of water over weirs and through pipes and fire hose. There is also space with pump facilities to supply water for hydraulics model studies.

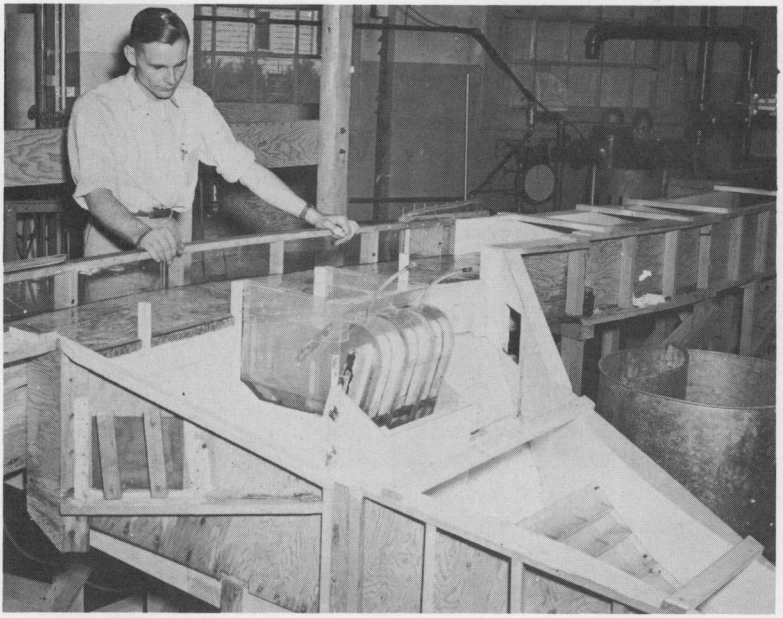

Figure 4. Model of Siphon Spillway Constructed by Assistant Professor R. H. Shoemaker, Jr

Highway engineering personnel may use any of the various civil engineering laboratories for research on particular problems. A large shop, including both wood-working and machine tools, is located in Apperson Hall for use of laboratory workers. It also is equipped for work with plastic materials.

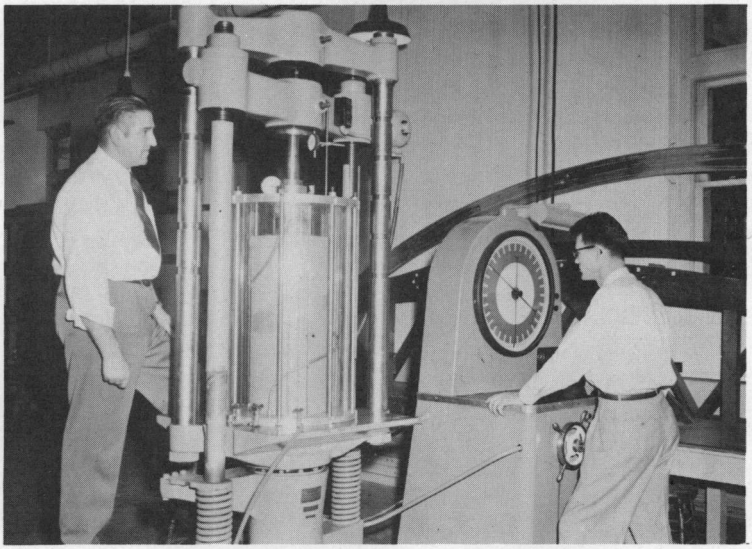

Figure 5. Professor M.P. Coopey and Instructor M.A. Ring Test Highway Base-Course Materials with Triaxial Loading Apparatus Developed for the Oregon State Highway Department

Some research problems which can be handled readily by the department's facilities are:

1. Small-scale model studies in hydraulics.
2. Small-scale model studies in structures.
3. Joint problems in structures.
4. Full-scale trusses and arches to a 40-foot span.
5. Calibration problems in hydraulics.
6. Basic research in structures, mechanics, hydraulics, and sanitary engineering.

Electrical Engineering

The staff of the Electrical Engineering Department is qualified for research in electronics, power machinery, power distribution, power systems, communications systems, servomechanisms and controls, and electrical measurements. Professor H.G. Barnett, chairman of the department, has had a number of years of industrial experience in power distribution and is recognized as an authority in the field.

Professor A. L. Albert has published several widely-used college texts on basic electronics and communications. Associate Professor P. C. Magnusson has published articles on theoretical analysis of electrical systems. Assistant Professor Shirley, a specialist in illumination, has developed an excellent illumination laboratory equipped for advanced study.

Associate Professor L. N. Stone has been conducting research on high-voltage phenomena associated with power transmission, and has developed an excellent servomechanisms and control laboratory.

Other staff members who have had valuable experience are Assistant Professors R. R. Michael and J. F. Engle, power systems and measurements; and Assistant Professor L. J. Weber, electronics.

There are several electrical engineering laboratories used principally for routine instructional purposes, but which may be used occasionally for research work. These include the circuits, communications, power, and electronics laboratories.

Other laboratories, which are more specialized in nature, are used for special and advanced courses, and are well-suited for experimental work in related fields. These are the radiation, illumination, industrial electronics, control, high-voltage, standards, and measurements laboratories.

General facilities of the electrical engineering laboratories serve many of the needs for ordinary measurements and electrical functions in research projects. Some of the useful general facilities are:

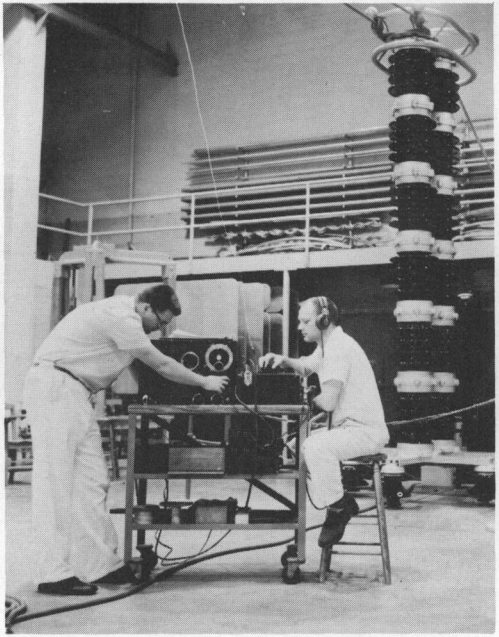

Figure 6. Radio Interference Studies in the High-Voltage Laboratory

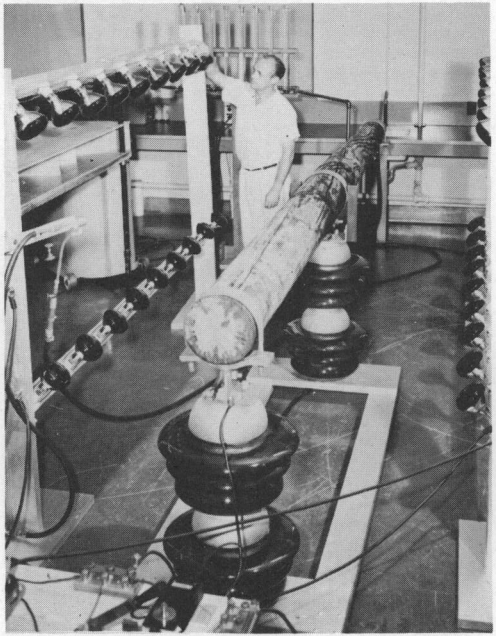

Figure 7. Studying Factors Which Cause Burning of Transmission Line Crossarms

1. Substantial power capacity in a wide variety of a-c and d-c voltages.

2. Instruments for ordinary measurement of a-c and d-c voltages, currents, power, resistance, frequency, speed, and temperature; microvolts to kilovolts, microamperes to amperes, and microwatts to kilowatts.

3. Representative electrical machines and apparatus for practically all uses of electricity.

There are many specialized facilities that frequently can serve special needs for research projects. The following are representative: Standard cells and high precision measuring instruments, cathode-ray and magnetic oscillographs, recording instruments, oscillators, high-voltage d-c supply (0 to 100,000 volts), and high-voltage 60-cycle supply (0 to 350,000 volts).

In addition to laboratory facilities, there are well-equipped shops for constructing special experimental apparatus for research projects. These facilities, with limitations imposed by the availability of personnel, laboratories, and equipment beyond the need for regular instruction, are well-suited to fundamental research and investigation of characteristics of materials, and the applicability of available materials and devices. These include acoustics, electrolytic corrosion, dielectrics, electronic phenomena, electric bridge circuits, circuit and system analysis, corona and radio influence, illumination, instrumentation and recording of information, magnetic circuits and systems, microwave communication, electric machines, servomechanisms, computers, television and radio transmitters and antennas, wire communicating, and transistors.

Mechanical Engineering

As in other departments, knowledge and experience of the mechanical engineering faculty embraces a broad area of subject material.

Professor Louis Slegel, chairman of the department, and Assistant Professor P. W. Osborne have been associated for many years with machine design and machinery development. Assistant Professor M. B. Larson specializes in thermodynamic analysis and

refrigeration. Professor A. D. Hughes and Assistant Professors G. E. Thornburgh and R. W. Beckley have had wide experience in almost all types of heat-power devices and machines, including gas turbines, steam plants, heating, and air conditioning equipment. Associate Professor W. W. Smith has had extensive experience in cooling tower design and performance.

Figure 8. Studies of Stress
Distribution in Conductor Cable and Connectors

Assistant Professor H. D. Christensen is particularly skilled in mathematical analysis of engineering problems, including vibrations, fluid mechanics, and structures and machine parts under dynamic as well as static loading.

Research in nonmetallic materials and in metallurgy has been actively conducted under direction of Associate Professors C. O. Heath and O. G. Paasche. Metallurgical investigations have included both ferrous and nonferrous metals.

The automotive and internal combustion engine research has been carried on for many years by Professor W. H. Paul. He has numerous publications to his credit.

The department has a wide range and variety of materials testing and analyzing equipment, including tension, torsion, and compression machines; photoelastic, strain gage, stress analysis, metallurgical, and x-ray equipment and facilities; vibration analyzer; cement and concrete laboratory; and creep machines.

These facilities are suitable for numerous uses and applications. The physical properties and types of many kinds of engineering materials may be determined, and various types of vibration problems can be investigated.

Other research equipment and facilities in the department include a fuels and lubricants laboratory; a complete internal combustion engines laboratory which contains a special research engine, indicators, and dynamometers; and an engine with complete accessories for determining engine wear through use of radioactive engine parts.

A wide variety of research on fuels, lubricants, and engines is possible with this equipment. This includes determination of many properties of fuels and lubricants, and engine performance characteristics under various loads, speeds, fuel and air ratio conditions, etc.

Departmental facilities also include heat transfer apparatus; air conditioning and refrigeration apparatus and equipment; combustion analyzers; and air-moving apparatus which includes blowers, fans, and wind tunnels.

Another departmental facility is a complete electronic analog computer with various accessories, which include a 2-channel Sanborn recorder and accelerometers. The computer, known as the OSCEAC, consists of 2 units. The first unit was built by graduate

Figure 9. Research Fellow L.E. Johnson Working with Engine Fitted with Radioactive Parts

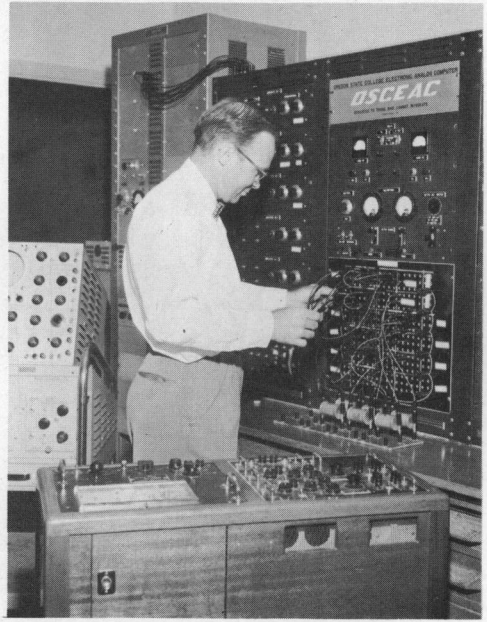

Figure 10. Professor H. D. Christensen Solving a Problem on the Analog Computer

students in 1951 and contains 12 operational amplifiers, 30 coefficient potentiometers, 6 limiters, and a constant amplitude sinusoidal oscillator. A standard Boeing analog computer, purchased in 1954, includes 8 sign changes, xy multiplier, and an operational servo unit. This unit can operate 20 additional operational amplifiers if it becomes necessary to expand it.

The units comprising the OSCEAC can be used separately or together for simple or complicated problems. The units, together with the recording equipment, are valued at approximately $12,000. It is most useful for performing integrations or solving differential equations. When the coefficients of such equations are not constant, the computer uses its ability to add, subtract, multiply, and divide, and obtains solutions which would be extremely difficult by other methods.

A few of the specific applications of the computer are as follows:

1. Well adapted to determine response of structures to vibration. Problems of multidegrees of freedom are easily solved, and acceleration, velocity, displacement, and frequency of vibration can be recorded.

2. Useful for studying servomechanisms response and stability.

3. Assists in design of industrial process control systems and regulators.

4. Useful in studying hydraulic and mechanical booster systems, including stability arising from elastic supports.

5. Has numerous applications in the fields of fluid flow and aerodynamics.

6. Can be used for determination of shear, moment, slope, and deflection curves for beams, and also for statically indeterminate structures.

7. Can be used for design and testing of airplane and guided missile control systems.

Although the primary function of an analog computer is the solution of differential equations, there are many other uses of interest. For example, it is possible to find roots of polynomials,

solve algebraic equations, difference equations, and multiple integrals.

Industrial Engineering

Professor G. B. Cox is head of the Department of Industrial Engineering. Professor W. F. Engesser has broad experience in methods and motion studies, management and supervisor training programs, paperwork simplification, and many organization structure and cost control studies. Assistant Professor B.E. Smith specializes in statistical techniques and engineering economy studies.

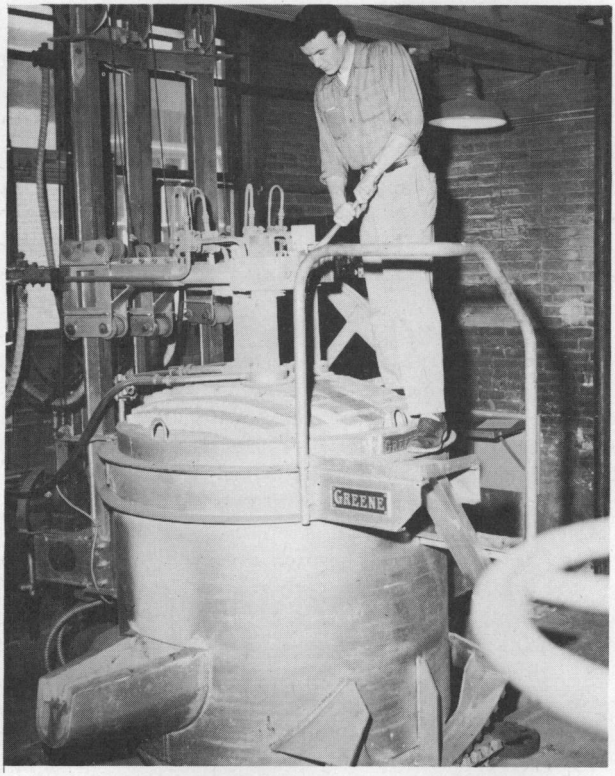

Figure 11. Electric Arc Furnace
in the Industrial Engineering Department

Assistant Professor R. D. Langmo has made work-sampling studies, and has a considerable amount of experience in cost reduction in packaging. Professor M. C. Sheely has been in charge of the machine tool laboratory since 1939, and is well-versed in machine tool application and production design.

The department is equipped with both laboratory and small production-size furnaces for preparation of experimental alloys. Available for research is a full complement of analytical motion picture equipment, including stop-motion and lapse-time devices for methods and motion analysis. The department also has a fairly complete assortment of precision machine tools.

OTHER IMPORTANT FACILITIES

Whenever it becomes necessary, the Engineering Experiment Station may receive technical assistance from other departments on the campus. For example, metallurgical investigations may require analytical assistance from the chemistry department, or studies in sanitary engineering may be aided by advice from a bacteriologist. The physics department has an electron microscope available to departments that may require the use of such an important instrument in their research.

One of the most valuable of campus research facilities is the college library, which has an outstanding technical and scientific collection. The science section contains 55,000 volumes, and the engineering and applied technology collection contains 31,700 volumes. In addition, library subscriptions to scientific and engineering periodical literature are exceptionally complete.

In carrying out research which involves fields outside of engineering, the Station receives cooperation from the Agricultural Experiment Station, the Oregon Forest Products Laboratory, Science Research Institute, and various Federal agencies located on the campus. In addition, Federal agencies such as the Bureau of Public Roads, U. S. Public Health Service, Corps of Engineers, Bonneville Power Administration, and the Bureau of Mines are cooperators or supporters of Station research.

The Engineering Experiment Station, on many occasions, works hand in hand with the Oregon State Sanitary Authority, Oregon State Water Resources Board, Oregon State Highway Department, and the State Department of Geology and Mineral Industries.

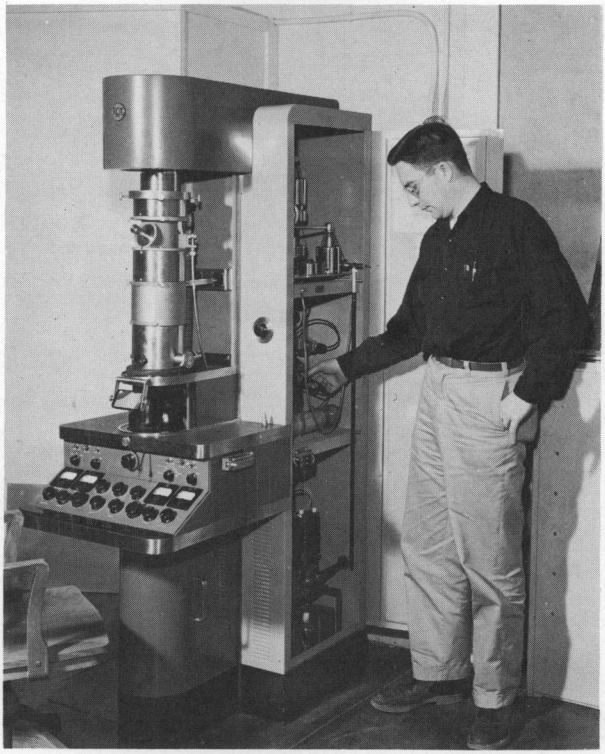

Figure 12. Electron Microscope Available for Use by the Engineering Experiment Station

Various departments in the School of Engineering have available small well-equipped machine shops for fabrication of experimental units. The Department of Industrial Engineering and Industrial Arts also has nonferrous and ferrous metal foundries, wood-working, forging, and welding shops; and a large complete machine shop.

In addition to research space in departmental buildings, the Engineering Experiment Station has under its jurisdiction a laboratory building having 10,000 square feet of floor space. In this building research apparatus requiring as much as 20 feet of headroom may be used.

OPERATING POLICIES

The Engineering Experiment Station provides financial sponsorship of research to the extent of the limited funds provided for that purpose. Research projects for Station sponsorship must be approved by the executive committee of the Station. In most cases, individual departments of the School of Engineering and the Station share responsibilities in the financing of research projects. The Station purchases expendable materials and provides research assistants when necessary. The departments purchase permanent equipment items. Because funds are limited, Station-sponsored projects are critically reviewed before they are approved.

The Station may contract for research sponsored by other State agencies, by Federal agencies, or by industrial organizations if there is evident instructional and research value to the college. The sponsoring organization provides funds to pay for all direct and indirect costs.

According to section C-8 of the Administrative Code of the State System of Higher Education, the following provisions apply specifically to research sponsored by industrial organizations:

> 1. The study shall be made in the most modern, approved, and scientific manner and shall be prepared for publication in a scientific treatise, the same as any other, regardless of whether the results are favorable to or unfavorable to the product; and the result shall become available to the donor of the grant at the same time.
>
> 2. It shall be understood that the results of the findings shall be in no manner influenced by anything except the scientific conclusions.

3. The institution conducting the research shall not recommend individual products by commercial names, but shall give the results of its research with regard to the particular product and its opinion concerning the value of certain methods of preparing such a product.

4. The departments of the institution reserve the right to publish all or any portion of any investigation. The donor will, however, be supplied with the results before publication.

Policies and terms of a contract with agencies or industrial organizations are stipulated in a specific written agreement. Responsibilities of the sponsor and the college are included along with statements concerning records and reports, access of the sponsor to the facilities, records and accounts of the college, subcontracting, patent provisions, period of the contract, and any other pertinent general conditions which may be specified.

In some instances it may be advantageous to administer research contracts directly through departments of the School of Engineering. In such cases, policies and contract arrangements are the same as for research administered by the Engineering Experiment Station.

PATENT POLICY

The following text concerning patent policy is taken from a portion of section C-8 of the Administrative Code of the State System of Higher Education.

A. Objectives of patent policy

(1) Assist personnel of higher educational institutions in developing and protecting inventions.

(2) Promote public welfare by patenting inventions and by controlling marketing of products or processes resulting therefrom to the end that there shall be the greatest possible benefit to the public.

(3) Determine equities and interests of all parties concerned with inventions.

(4) Promote further research.

B. Agreement governing assignment of patent rights of inventor

(1) An employee who develops what is considered to be a patentable invention must report findings to and confer with the institutional patent committee.

(2) Persons whose employment arrangements specifically provide for the performance of research duties, either full-time or part-time, must enter into a patent assignment agreement for all patentable inventions developed in the course of such research. For other employees, if the patent committee finds that institutional facilities or services were used in developing an invention, the inventor is expected to enter into a patent assignment agreement.

The institutional patent committee is appointed from the faculty to counsel with inventors, evaluate patent possibilities, appraise equities of the inventor, counsel with institution executives, and to negotiate contractual agreements with inventors. Such agreements are to be negotiated in collaboration with and approved by the Chancellor of the State System of Higher Education.

The comptroller and secretary of the board of the State System of Higher Education are authorized to enter into contracts in order to obtain patent assignments for the State from research staff members and to enter into necessary agreements or assignments with the Research Corporation, a nonprofit organization for development of patents, or others to secure maximum benefit from inventions. Invention and patent rights may be released to inventor when it has been determined that ownership of such rights does not appear to be of benefit to the State.

Where funds for a research project are provided by an industrial organization, inventions and patent rights are to be handled in such a way that the industrial organization may be given the right to use the invention or patent license free within its plants, but all other invention and patent rights are to accrue to the benefit of the institution and the inventor.

In the instance where an industrial concern requires exclusive patent rights, conditions of the research contract may be negotiated with the State Board of Higher Education.

SERVICE TESTING

In some instances, testing or routine investigations are desired by industrial firms, contractors, or governmental agencies. These investigations are not considered research because the college makes no decisions concerning the conduct of the program. Engineering personnel merely conducts the tests as specified by the firm or agency. Many times these follow standard testing procedures.

Testing services of the School of Engineering are not intended to compete with commercial laboratories. However, a considerable amount of testing is done which requires unique equipment not available at commercial laboratories. Some testing service is performed at the insistence of contractors for their convenience when construction is being done in the vicinity of Corvallis.

Charges for testing services are made on the same basis as for research; i.e., direct costs plus overhead charges. In most instances charges for testing by the various engineering departments of the school will be higher than charges of commercial laboratories because of set-up time. In addition, charges may vary because testing is done by any staff member, from instructor to full professor, who has time available to perform the task most expeditiously. In any event, there can be no guarantee that testing work not arranged for in advance can be done immediately. A testing staff is not maintained, and faculty members must assign highest priority to the duties of teaching.

Examples of special tests recently completed or in progress will illustrate best the capabilities of engineering departments.

The Electrical Engineering Department has conducted high-voltage tests on electrical equipment, conductors, connectors, and insulators by using the facilities of the high-voltage laboratory. A considerable amount of meter and instrument calibration has been done also.

Many tests on long or wide beams, transmission cables, anchor chains, and numerous other items which require a testing machine of unusual size and capacity have been made by the Mechanical Engineering Department. At the present time, controlled ambient temperature creep tests are being conducted using specimens 25 feet in length. The same department provides concrete cylinder testing service for contractors who find it inconvenient to send cylinders to Portland or other locations where there are commercial laboratories. Equipment also is available for making tests on fuels and lubricants, and for metallographic studies.

The Civil Engineering Department is especially equipped for conducting tests on small structures by means of various types of strain gages. It is also equipped for calibrating hydraulic measuring devices, making special tests on mechanical properties of soils, and determining water quality.

Industrial firms, individuals, and various agencies desiring testing services arrange for such activities directly with departments having the necessary equipment. If the testing program is of long duration or involves very great expense, contracts, letter agreements, or detailed purchase requests are employed to specify work desired and any other conditions. Individual tests and programs of short duration are usually arranged informally.

OREGON STATE COLLEGE
ENGINEERING EXPERIMENT STATION
CORVALLIS, OREGON

LIST OF PUBLICATIONS

Bulletins—

No. 1. Preliminary Report on the Control of Stream Pollution in Oregon, by C. V. Langton and H. S. Rogers. 1929. 15¢.

No. 2. A Sanitary Survey of the Willamette Valley, by H. S. Rogers, C. A. Mockmore, and C. D. Adams. 1930. 40¢.

No. 3. The Properties of Cement-Sawdust Mortars, Plain and with Various Admixtures, by S. H. Graf and R. H. Johnson. 1930. 40¢.

No. 4. Interpretation of Exhaust Gas Analyses, by S. H. Graf, G. W. Gleeson, and W. H. Paul. 1934. 25¢.

No. 5. Boiler-Water Troubles and Treatments with Special Reference to Problems in Western Oregon, by R. E. Summers. 1935. None available.

No. 6. A Sanitary Survey of the Willamette River from Sellwood Bridge to the Columbia, by G. W. Gleeson. 1936. 25¢.

No. 7. Industrial and Domestic Wastes of the Willamette Valley, by G. W. Gleeson and F. Merryfield. 1936. 50¢.

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No. 9. Preservative Treatments of Fence Posts. 1938 Progress Report on the Post Farm, by T. J. Starker. 1938. 25¢. Yearly progress reports, 9-A, 9-B, 9-C, 9-D, 9-E, 9-F, 9-G. 15¢.

No. 10. Precipitation-Static Radio Interference Phenomena Originating on Aircraft, by E. C. Starr. 1939. 75¢.

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