

## ENGINEERING EXPERIMENT STATION

### The Beginning

On the 18th of April, 1913, an act of Legislature established the Engineering Experiment Station at The Ohio State University. The law set forth the purpose of the organization succinctly:

"To make technical investigations and to supply engineering data which will tend to increase the economy, efficiency, and safety of the manufacturing, mineral, transportation, and other engineering and industrial enterprises of the State, and to promote the conservation and utilization of its resources. "

### A New Building

At first the Engineering Experiment Station was just an organization. In the early 1920's the name became attached also to a building on the Ohio State campus. According to apparently authentic campus lore, the late Carl E. Steeb, business manager of the University, traveling on the lookout for bargains in surplus government property following the first world war, telegraphed the dean of the College of Engineering: "Can you use power plant steel?" Dean Hitchcock wired back "Yes. " The job of planning a building to fit a pile of fabricated steel, the reverse of normal procedure, fell to a teacher of structural engineering, the late Prof. J. R. Shank of the Department of Civil Engineering. The original Engineering Experiment Station building was four stories, nearly 40,000 square feet of space.

Besides--and this was a compelling reason for its establishment--the Engineering Experiment Station (to quote The Ohio Revised Code) "has-available to it all University equipment when such equipment is not in use for instruction. " As expected, this provision works both ways: much equipment obtained for research projects is very valuable for

teaching, particularly for graduate instruction.

In its first dozen years, the Engineering Experiment Station (which is governed by the director, who is the dean of the College of Engineering, and by an advisory council of Engineering College faculty members) acquired a building and a good deal of equipment--including several testing machines, the largest of which could squeeze or pull up to a million pounds force--and published more than thirty bulletins. Most of the bulletins reported research by faculty members, but the largest, A Climatological History of Ohio, a book of 745 pages, was by William Henry Alexander, then the Columbus "weatherman" and climatologist for the State of Ohio.

### Research Beginnings

During those first years what support the Station got came mostly from the University, with some cooperative funds from industry and government; for instance, in 1924, F. H. Eno, professor of civil engineering, began full time research on the problem of stabilizing soils under pavements, a project in cooperation with the Ohio Department of Highways and the U.S. Bureau of Public Roads. The State's 1927 appropriation bill contained a budget item for the Station, funds that, though small, provided the nucleus for an administrative and clerical staff, and some funds for projects. The most active fields for investigation at the Station then were building materials and ceramics.

At that time brick was widely used in paving roads. On the theory that work was good for idle hands, the State used Ohio Penitentiary labor to make brick, in competition with a segment of the ceramic industry. As a sort of quid pro quo, the Station's research in ceramics was broadened to include studies of heavy clay products manufactured in a laboratory at Roseville, Ohio that was operated with the assistance of convicts maintained

in a prison building on the property. A number of the "Roseville alumni," young station research engineers and graduate students who worked under the direction of the late Prof. G. A. Bole, have gained outstanding positions in the ceramic industry.

Besides ceramics, nearly all branches of engineering were represented in the Station's projects and publications. The Station building became a sort of campus public utility. It housed a motor generator set that converted thousands of kilowatt-hours of alternating electricity to direct current used in making "heavy water," a project of a chemistry professor when that facet of the development of atomic energy was hardly suspected. The University's first cyclotron was built and operated in the Station, right under Dr. Bole's office, and the good professor wondered whether, with the possibility of stray radiation, he oughtn't to have a lead cushion for his swivel chair. The Station's building and operations were kept flexible, to help out with whatever might come along in those depression years.

One thing that came along was The Ohio State University Research Foundation. The Engineering Experiment Station was an established organization in which, you might say, the Foundation was planted and nurtured until it could be set up as a going concern. The first OSURF cooperative projects were negotiated by the field director of the Station, the title Hurlbut S. Jacoby had for a year and a half before he became the Foundation's first director.

With considerable faltering during the depression, with staff dislocations during the war, and with a great expansion of activities in the post-war period, the Station firmly established itself in its first half century. Its staff, all engineering faculty members, includes specialists who direct investigations in such diverse technical fields as chemical engineering, ceramics, metallurgy, electronics, nuclear engineering, mineralogy, mechanical engineering, welding, non-destructive testing, industrial engineering, aero and astro engineering, architecture, water resources and structural engineering.

The Station also administers studies which combine several disciplines for the solution of problems in community development and urban planning.

### Research Publications

In this half century, the Engineering Experiment Station activities have produced a sizable quantity of technical literature. The number of published bulletins is now near two hundred. Less technical or more popular subjects have been treated in circulars, such as "The Selection of Dinnerware for the Home" by the late Prof. A. S. Watts, long head of ceramic engineering. There are also classifications of publications as "Special Reports" and "Monographs." In 1929 the Station began issuing the slim, pocket-size Engineering Experiment Station News, at first monthly, then bi-monthly. In larger format and with its name changed to The News in Engineering, this periodical is in its 41st year. Each research sponsor is provided copies of research reports which become part of the technical literature in that field.

### In Recent Years

The early objective of conservation and utilization of the resources and "increasing the economy, efficiency, and safety of the manufacturing, mineral, transportation, and other engineering and industrial enterprises" of the state has remained as a primary goal of the Station. Many years of work have gone into studies of coals, clays, and other mineral resources. The Station has worked cooperatively with The Ohio Geological Survey to achieve maximum results and avoid overlapping. The division of effort is such that the Geological Survey deals with the location and mapping of mineral resources and the Station carries on the investigations to determine the suitability of minerals for industrial production. Joint publications with the Geological Survey have outlined the locations, properties, and

washability characteristics of the Meigs Creek No. 9 coal bed, a four-billion ton reserve in Ohio. Station studies of clays formed a scientific basis for the development of the Ohio ceramic industry. In the early years the brick, tile, and white-ware investigations supported growing industries. Recently investigations have looked toward new products from clay and shale, such as the expanded aggregate development to meet the shortage of sound aggregate.

Research on the propane fractionation of residual oils, the solvent extraction of lubricating oils, and the analysis of the Ohio crude oils has led to the establishment of the Zanesville grade of oil and has demonstrated the feasibility of obtaining valuable lubricating oils from the Corning grades.

The period from 1953 to 1963 was an active one in the life of the Station. Changes in the Station were begun shortly after the appointment of Gordon B. Carson as Dean of the College of Engineering, and have been carried on under Dean Harold A. Bolz since 1958. The greatest change, implemented most effectively under the leadership of Executive Director and Associate Dean Robert S. Green, was one of attitude which emphasized the obligation of the Station to work as a research arm of the College of Engineering, serving all departments of the College. The original act contemplated the use of the regular laboratories of the College for research when they were not being used <sup>for</sup> instruction. The resumption of this point of view signaled a change from the view that the Station was another department of the College.

Coupled with this change was the developing conviction that it was necessary for the Station to take the initiative in making industrial contacts and to develop research goals which would be of mutual interest to industry and the University. One measure of the results of these attitude changes is seen in the fiscal growth of the Station programs. In 1968, research dollar volume was 10 times that of 1953. It should be noted that for each dollar coming from the University tax-supported budget, there are eight dollars spent in the Station

program from off-campus sources.

### The Proving Ground

The fiscal increase is of much less importance than the productive scholarship and graduate training afforded on research projects. In the fiscal year 1967-68, 168 graduate students from 22 departments of instruction were engaged in 139 Station research projects. During the same period, 30 Master's theses, and 6 doctoral dissertations were completed. Graduate students work under the supervision of their advisors in the appropriate teaching departments.

Graduate research topics included studies of asphalt viscosity, coking characteristics of Ohio's petroleum residues, age-hardening corrosion resistant steels, time-dependent deformation of clay soils, and photogrammetry. Graduate students are also involved with automated highways, and more recently, investigated ways of using ultrasonic power in and on heavy road machinery.

Clinical experience was gained by 237 undergraduate students working on projects for industrial and governmental organizations in the past year. The undergraduate students are employed as assistants to researchers and to carry out the more straightforward engineering evaluations under professional supervision. This experience with engineering problems of the real world is a valuable part of the training of these young men. This program meets the needs of industry for specialized assistance not otherwise obtainable. Costs for such work are borne by industry.

The Station coordinates the work of research groups in all departments of the College of Engineering--many of which require the talent of researchers in disciplines outside of the College. The facility for conducting interdisciplinary research has become one of the more

important advantages of the Engineering-based, yet university--aware Experiment Station.

The metallurgical engineering research area was one of the first to work through the Station. Although this area is working on many projects, probably one of the most significant is the development of a stainless steel alloy. Many companies are now licensed to use this University patent. The alloy is now being manufactured by several Ohio steel companies. More recently the department of welding engineering, through its sonic power laboratory, has begun licensing patents derived from its pioneering research on power ultrasonics.

The Transportation Research Center is currently conducting the major portion of highway research for the Ohio Department of Highways--contracted through the Station. Studies in progress range from basic research on pavement mixes to interdisciplinary research on electronic highways. In 1966, the Station was authorized to proceed with the development of the Highway Research Laboratory for the Transportation Research Center on a site forty miles northwest of Columbus. Land acquisition was begun in 1967. Today (1969), 5000 acres of a planned 7500-acre facility have been purchased near East Liberty, Ohio. The Building Research Laboratory of the Department of civil engineering is Ohio's foremost research facility for the building materials industry and a pioneer in the field of fire resistance and structural analysis.

The Systems Research Group, Industrial Engineering, is one answer to the need for a research team competent in the complex fields of human factors and systems engineering. The Systems Group is currently investigating problems which became evident when the human began to be considered as a part of a man-machine system. Chemical engineers are currently doing research on petroleum. Their aim is to find a way to upgrade Ohio's oil reserves and thus revive a nearly dormant industry. The research is centered around a new refining process.

The record of the ceramic researchers through the Station shows continued assistance to the ceramic industries of Ohio. Current studies include the investigation of pyrite "popping" clays and an investigation of processes by which certain Ohio clays thought to be useless as ceramic bases may be reclaimed. The Water Resources Center is a leader in research on ways to control acid mine drainage and in the past several years has been engaged in a interdisciplinary and systems-oriented study of the pollution problems of Lake Erie.

In 1962, the Ohio State Nuclear Reactor, a 10KW swimming pool type, was assigned to the Engineering Experiment Station for administration and the development of teaching and research programs. Since the 10KW nuclear reactor began operation in 1960, 18 departments of The Ohio State University and 8 other colleges and universities in the area have utilized the equipment and materials granted by the Atomic Energy Commission on January 14, 1958. A total of 16 MSc and 8 PhD degrees have been issued to science students who have utilized this equipment and materials in their thesis and dissertation work. The critical reactor facilities at The Ohio State University are the only facilities of this type at a college of university in the State of Ohio

The Building, Engineering Experiment Station, as of July, 1967, was renamed Haskett Hall and taken over by the department of photography (a department of the College of Engineering). It is now being refurbished with laboratories converted into photographic studios.

The Headquarters of the Station are now in Hitchcock Hall adjacent to the College offices. The Station group is headed by Executive Director Robert S. Green. Director Green, associate dean of the College and professor of welding engineering, became executive director in 1954. With the help of its academic department colleagues in research, the Experiment Station anticipates continued contributions to progress in engineering.