

The Knowledge Bank at The Ohio State University
Ohio State Engineer

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ELECTRICAL ENGINEERING AT THE OHIO STATE UNIVERSITY

By E. E. DREESE, *Chairman*
Department of Electrical Engineering

EDITOR'S NOTE.—Professor Dreese was recently appointed head of the department of electrical engineering. We take pleasure in presenting him to our readers.

The future of the electrical engineering department is the future of electricity itself. Already in a few years this useful natural force has risen to a commanding position in the lives of men. Electricity now lights our nights, launders our clothes, cools our food, cooks our food, and enables the movies to speak. It carries us up and down tall buildings and into the depths of the earth. It can transport us hither and thither across the land and on or under the sea. It enables untold horse power to be used in the work of the world by merely leading two or three small wires to the spot—however remote—where the work is to be done. It carries our messages and even our voices to the far corners of the earth. Through the agency of electrical engineering, we now have running accounts in our newspapers of flights across the poles and minute-by-minute bulletin service of flights across the Pacific. Electricity is the modern hewer of wood and drawer of water. It is more than that. It is also a finely skilled artisan and a trustworthy courier. One time it can wield the crude and raw strength of the giant and at another the delicate and sensitive touch of the artist sensitive even to a ray of light.

Such is the past and present glory of electrical engineering. Some years ago scientists had become convinced that there were only two things in the physical world. These things were energy and matter (or material). Now, today, there is more than a suspicion among scientists that there is only *one* thing in the world. That thing is energy, and moreover it is *electrical energy*. Who can measure or predict the future developments in electrical engineering with this startling realization to face? With everything in the world of an electrical nature in its final analysis, the electrical engineer need never feel downhearted, as Alexander the Great once did, because there are no other worlds to conquer.

In this brilliant history of electrical development, the electrical engineering department of The Ohio State University has shared and is sharing abundantly. The honor roll of accomplishment for electrical engineering would find us represented by a group second to none. Wherever electrical men come together such names as Lamme, Kettering, Cooper, Skinner, Lincoln, Scott, Craft and Mershon are to be reckoned with. Other lists picked at random could be fully as imposing to those who know the work of electrical engineers.

One who is not an electrical engineer can gain some idea of the accomplishment of Ohio State's electrical engineers by listening to the list of positions held by some in executive work alone. A few such for both past and present are:

Manager of Engineering, Westinghouse Electric and Manufacturing Co.

Chief Engineer, Westinghouse Electric and Manufacturing Co.

President, General Motors Research Corporation
Vice President, General Electric Co.

Vice President, American Telegraph and Telephone Co.
Chairman of the Board, Lincoln Electric Co.

President, Lincoln Electric Co.

Director, School of Electrical Engineering, Cornell University

Professor of Electrical Engineering, Iowa State College

Professor of Electrical Engineering, Yale University

President, Hertner Electric Co.

The list might be indefinitely extended. Engineering graduates from the electrical department are thus filling high executive and high engineering positions. All have had a part in the phenomenal rise of the electrical industry.

But a department cannot rest on its past glories, however great. The electrical field is alive and pulsating with change. The future expects much from the electrical engineer, and we must meet the challenge. We must first of all gauge as accurately as we can just what the engineer of the future, and particularly the electrical engineer of the future, is going to be.

A few changes are well under way and show the signs of the times in engineering. The idea that the engineering student should try to be a "rough-neck" and wear corduroy pants is on the way out. He was at one time proud that he was not "highbrow" but now he rises up and fights if called "lowbrow." Engineers, particularly student engineers, in those days were often referred to as "boilermakers." This came from the prevalent idea among the uninformed that engineers forever worked in dirt and grime with hammers and tongs. Today this phase is about over, and only vestiges of it remain. It is now coming to be universally recognized that the engineer is no more likely to work in grease and grime than many other college graduates going into the industrial world of today, and it is further recognized that his tools are much more precise and accurate than hammers and tongs. His greatest tools are mathematics and physics and fundamental electrical engineering, and he must keep them exceedingly sharp. Brawn is not so important as brains, and social standing not so important as sociability.

Another change which is well under way is the realization that the engineer works not only with materials but also with men. Any school which turns out engineers equipped to deal only with materials and forces and not with men is failing in its duty to modern engineering and the modern world. The engineer moves in a complex orbit through life. While he must, in his work, deal with exact physical relations and measurable quantities, he must also live in a social and economic world where things are not measured by the foot or by the pound but rather by such intangible things as tact, point of view, habits, culture, sociability, idealism, and education.

It may surprise some to hear the word "educa-

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ELECTRICAL ENGINEERING

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tion" in this connection. The criticism has often been leveled at engineering education in times past that it was not education at all but was simply training a man to do the things necessary to get, hold, and improve in, a job. While this is very important, it is said that a man to be educated must have something which he takes home with him after his day's work is done and which increases his enjoyment and understanding of life outside of the daily grind. While it is true that the engineer could benefit just as much as anyone else from art, history, sociology, and literature, the difficulty is to get any amount of these things into a four-year course without crowding out valuable engineering education. So the engineering schools have pleaded guilty to the charge, in the past, that they did not give the engineer anything to take home; but while thus pleading, they have become more and more conscious that many of these unmeasurable things are also needed *on the job* as well as at home. This realization is gradually forcing itself upon those responsible for engineering education. We are awake to the fact that a man is a social being *even while on the job*. This point of view is inclining us more and more to the aim of providing engineering education rather than mere engineering training. We are stopping to think that, after all, the engineer has a large life outside of his technical field. He is human, he eats, drinks, and sleeps, and if you prick him he will bleed—just as his associates will.

When it comes to the technical tools with which to equip the student engineer, a crystallization of opinion is taking place. Here again the idea of education rather than training governs. The difference between education and training in engineering is much the same as the difference between designing the combination lock to a safe and knowing how to open the safe with a given combination. The educated man has to know the *principles* of all combinations—the trained man has to know the combination.

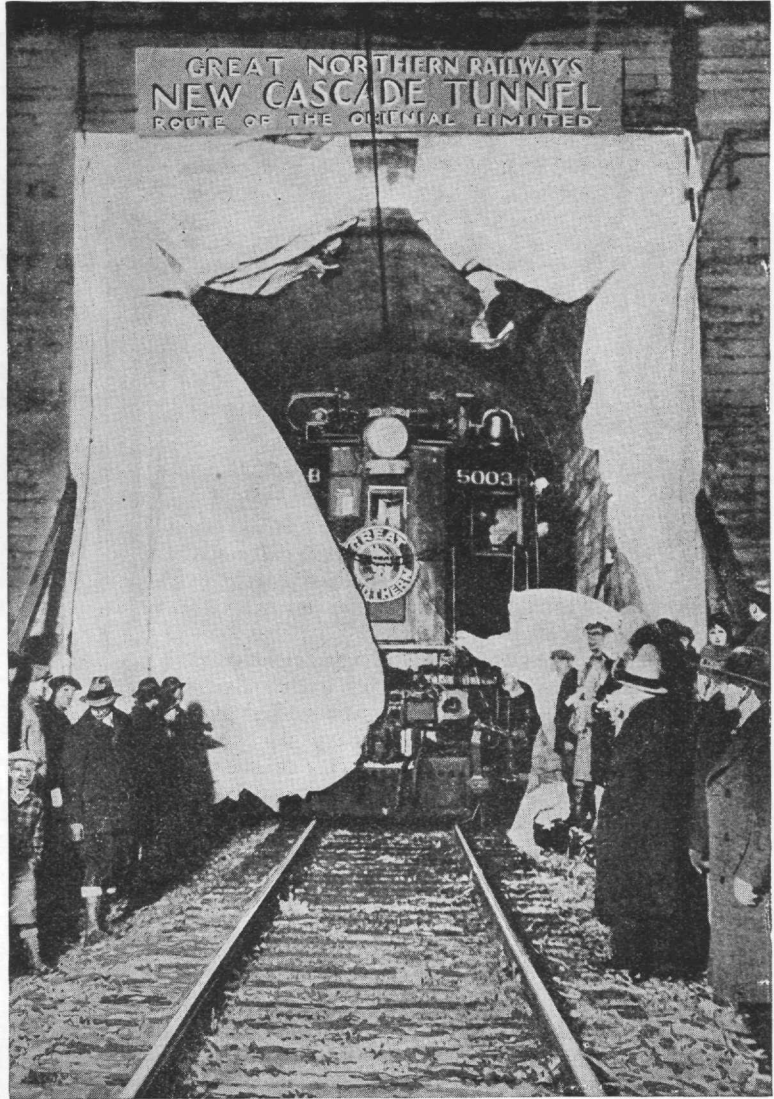
Electrical engineering has many ramifications and diversifications. There are power plant engineering, power application engineering, hydroelectric engineering, design engineering, communication engineering, and research engineering. With this array of specialized fields within the broad field of electrical engineering, it becomes a physical impossibility to give *training* in all of these specialties to every electrical engineering student. It might be urged that the thing to do is to have every student make a selection of specialization within the field and then give him intensive training in his selected specialty. There is an almost insuperable difficulty in the way of this alternative. This is that it does not allow a student or engineer to change his specialization without wasting his previously acquired training. He is like the man who knew the combination to the safe and then found that someone had changed the combination! As a matter of fact, students will change their minds a number of times as to the specialization they prefer while going through college, and many also change their specialization after they leave college. Another difficulty with the specialized training scheme is that the art itself may change the combination!

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ELECTRICAL ENGINEERING

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Fortunately, there is a way out. Underlying all of these specializations is a common groundwork of basic principles. One who is thoroughly grounded in these fundamentals can select almost any field of specialization without loss of effort and time. Instead of training him in the expert use of one combination, we attempt to teach him the underlying principles of combinations so that he can adapt himself to any. This is the only safe way.

Besides the undergraduate work, that is, work done by students during their four-year course, there is the graduate field or work taken by the student after graduation. This work leads to advanced degrees. In this graduate field, electrical engineering has great possibilities which are fully recognized. Those students who show exceptional scholastic ability are urged to stay in college after graduation in order to carry out special advanced studies. Graduate work of a high caliber has a stimulating effect way back through the undergraduate courses and raises the tone of the whole institution.

The aim of the department is to face the future and not the past, to be progressive and responsive to new suggestions and not be bound too much by tradition.

Such are the things the electrical engineering department has in its heart—and it has a heart—and with these things it confidently faces that future.

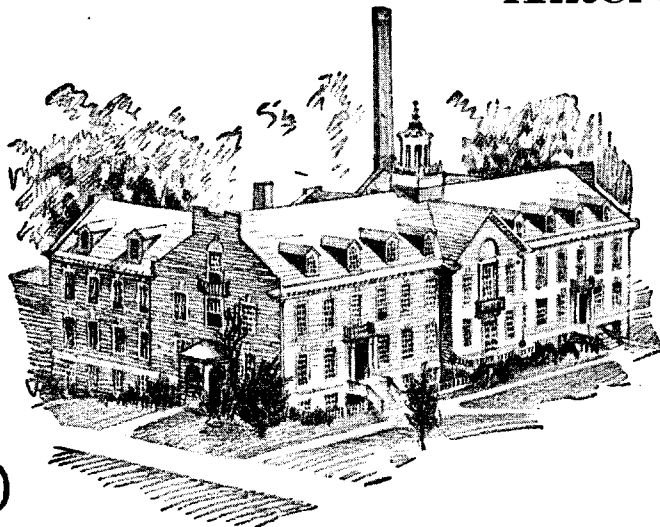
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