

This is the first of a series of articles on the research projects of campus faculties and departments. Many do not realize the amount of research being done at the moment; Gateway Features hopes that the series will help students to know more of their university besides the instructional side. In future articles, research in Law, Psychology, Medicine, and Political Science will be covered. L.G.

ENGINEERING RESEARCH

by Anne Mason

"Research is essential to any university department, since it focuses on the frontiers of knowledge," said Professor Longworth of Civil Engineering. The pursuits of truth and knowledge are the prime functions of a university. Both Dr. Flock of Chemical and Petroleum Engineering, and Professor Lilje of Mining and Metallurgy, expressed the view that a university is primarily concerned with fundamental research, and the application is more the concern of industry.

However, specific research projects carried on at the university are supported by industry. Large sums of money are also donated by the National Research Council, the Alberta Research Council and the university itself.

The University of Alberta has some 1,012 engineering students in five departments. The departments

PROJECTS DIVIDED

themselves are subdivided into specific research projects, with either one or more staff members working on them, and perhaps a graduate student.

How do prospective masters and Ph.D. students decide what research they will do? They may spend up to half a year discussing it with various staff members, and doing more general work. Their final selection is often influenced by previous involvement in industry in their chosen field, or perhaps by summer work.

CHEMICAL and PETROLEUM

Dr. D. B. Robinson is head of the department that offers the only source of petroleum engineering graduates in Canada. It involves, as you may have guessed, petroleum and natural gas, and the problems associated with discovery, drilling to locate, and the recovery and production of the greatest amount most economically. To do this, we have to understand how it comes out of the rock and ground.

In Alberta, we are lucky enough to have the Pembina field—the largest area extent field in the world, although it is not very thick. If we recovered the oil from the sandstone by natural mechanisms, 70% to 75% of it would be lost! Research in this area is proceeding under the capable supervision of Dr. Flock.

Graduate programs have been offered in Chemical Engineering over the past twenty years, and a graduate program was established in Petroleum Engineering in 1952. In pursuing this latter program, the opinions of industry are made available through an Industrial Advisory Committee which has been established

to offer guidance, to review accomplishments, and to familiarize staff with industrial research efforts. This committee meets twice a year.

Research in Chemical Engineering involves thermodynamics, fluid flow, chemical reaction and process dynamics. At the moment, Dr. Robinson is doing some important work for the chemical industry, studying how systems behave, their temperature, pressure and volumetric changes during a particular process.

ELECTRICAL

Professor Harle is the head of the department that virtually bristles with computers, electrical memories, system analyzers and many more marvels. One of the most spectacular pieces of equipment for research and educational purposes is the analog computer, technically the PACE 231R, \$67,000 worth of American import.

We are one of the few universities in Canada which possess a machine of this size, and presently, Associate Professor Fokkinga and his research assistant Mr. J. Ash are the principal people using it. It can add, subtract, integrate, multiply, divide (why wasn't it available for my math exam?) and simulate a wide variety of physical phenomena.

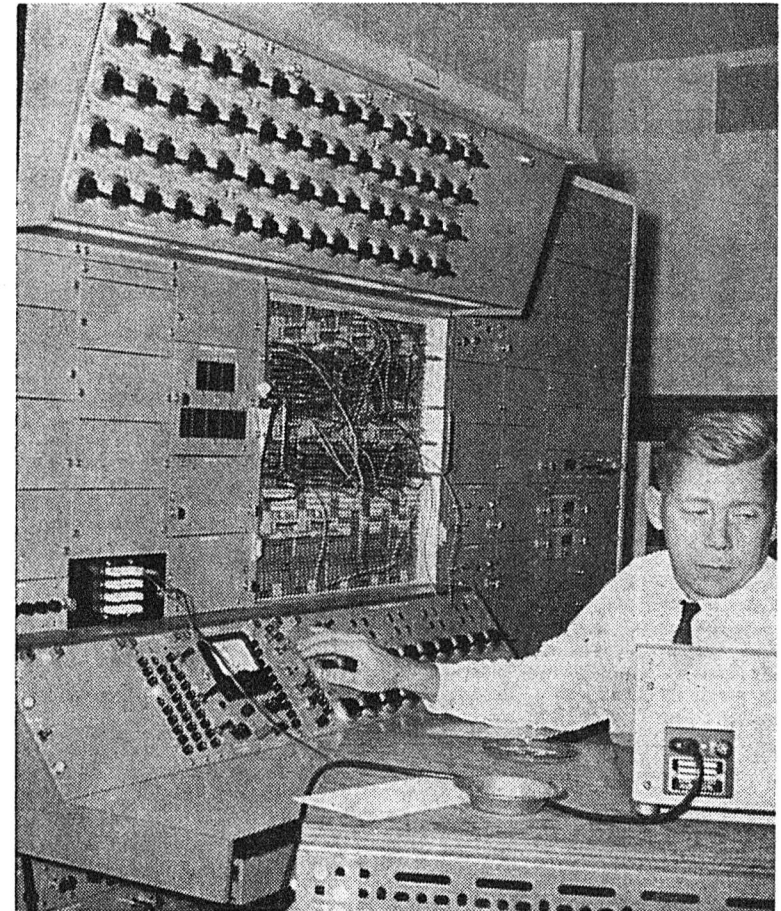
You can learn much about a problem by putting it on the analog computer—in fact, it sometimes suggests how to improve a situation! During this reporter's visit, a problem concerning heat flow through insulation was being studied on the computer.

Next door to the analog computer on the fifth floor of the engineering building is the magnificent machine called a network analyzer. It simulates power systems, and is used often for industry. In addition to the large computers, there are many small ones in this department. Several have been designed and built by the

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staff. An electronic multiplier has been developed as a research project. A digital memory that can feed back information at regular intervals is under development.

A graduate student is working on high gain (operational) magnetic amplifiers, another on a transistorized differential amplifier. Work is also done on pneumatic control systems nonlinear and optimizing systems. In the undergraduate fourth year, students frequently work with analog computers on problems and experiments. All the small computers are unsophisticated and less accurate aspects of the PACE computer, the grand-daddy of them all!



A recorded announcement from an analog computer?

Not all electrical engineering research is concerned with these machines work is also carried out in the field of microwaves and in the high voltage lag.

MINING and METALLURGY

"With the tremendous increase in technology to-day in every field of science and engineering, more and more knowledge is required of the properties of metals," said Professor Lilje, head of this department. To acquire such knowledge, much research must be carried out in the universities and in industry. The university can contribute most in fundamental research, rather than applied, and should concentrate most of its efforts in this field.

A variety of research projects are pursued in this department. Most are in the field of metallurgy and are concerned with obtaining knowledge on the production, fabrication and properties of metals.

Dr. Parr is working on a project concerned with zirconium and its

alloys. Zirconium has a peculiar property in that it does not capture neutrons. This is most important, for in atomic power plants uranium fuel can then be encased in zirconium metal cans, without seriously impeding the efficiency of the uranium fuel which produces the power.

Another project is designed to recover and up-grade pitchblende (uranium oxide) from low grade ore by a special machine called a hydrocyclone. This and other associate projects were the first major projects undertaken by the department and were started some eleven years ago.

It has produced some valuable information and just recently Profes-

LONDON PAPER

sor Lilje gave a paper in London, England, which was entitled "Hydrocyclone Fundamentals." Dr. Leja is working on a basic study of mineral surfaces, and Dr. Youdelis is investigating the properties of various metal alloys of mercury, tin and silver, in order to produce better Dental Amalgams.