

The projects in the research program range from studies of logging machine prototypes to the converted end-products of the pulp and paper industry, and are directed at eight broad research goals: reduction of wood cost, reduction of fibre cost, reduction in capital and operating costs, testing and process control, products research, reduction of environmental pollution, basic knowledge, and the transfer of technology. The Institute is regarded as a centre for broad, long-range and uninterrupted studies of basic principles and for major engineering research and development projects which individual pulp and paper companies would find difficult to justify if the costs were not shared. Moreover, the Institute is a centre of highly specialized equipment and manpower which individual companies would not normally have.

In addition to its permanent staff, the Institute, in co-operation with McGill University, has some 45 graduate students working on fundamental projects in the background of pulp and paper technology, which also serve as their theses topics. The E.B. Eddy Professor of Industrial and Cellulose Chemistry at McGill, who is also a staff member of the Institute, directs graduate student work on such subjects as the behaviour of the materials of which wood is made — cellulose, lignin and hemicelluloses. The Director of the Institute's Applied Chemistry Division, also a Professor in the McGill Chemistry Department, supervises graduate student work in polymer, surface and colloid chemistry with particular reference to those aspects that pertain to the physics and chemistry of pulp and paper. An Associate Professor of Chemical Engineering at McGill, who is a consultant to the Institute, directs graduate students in a variety of chemical studies. In addition, the Director of the Institute's Applied Physics Division, who holds a teaching appointment in McGill's Department of Mechanical Engineering, supervises graduate student investigations on such subjects as supercalendering of paper and frictional processes in polymeric systems. Other staff members who hold concurrent honorary positions at McGill as Research Associates assist in this student program.

The Institute undertakes contract research projects on a cost-reimbursement basis for individual companies or groups of companies in the pulp and paper or allied fields. The larger of these co-operative contracts have been concerned with problems of particular segments of the Canadian pulp and paper industry. The Institute also provides technical information to the industry and, to some extent, to other industries and the public. It maintains a specialized library for this purpose which stocks bibliographies, abstracts, translations and critical reviews for the use of the scientific staff and the industry.

9.5.2 Electrical industry research

Meeting the needs of society for energy resources at reasonable cost, in adequate quantity and with minimum environmental impact requires the solution of a wide range of problems related to the development of raw energy sources as well as the improvement of existing techniques. Extensive research is under way on a world-wide basis and the electrical energy field is particularly well suited to meeting energy needs within acceptable constraints set by economic, technical and social factors.

The Ontario Hydro research program dates back to the establishment of the Research and Testing Laboratory in 1912. Since then research facilities have grown appreciably and today the Research and Development Division employs over 300 people. The Division's high-voltage laboratory is capable of impulse testing at 1,250 kv and power frequency testing at up to 720 kv; this equipment can also be adapted for use as a 50,000-ampere current surge generator. A high-current-testing laboratory is presently under construction and upon completion will boast a capability of 100,000-ampere testing at up to 600 volts (single or three phase) for 0.5 second or continuous testing at up to 24,000 amperes and 300 volts (single phase).

The Research and Development Division is undertaking an extensive program to develop high-voltage transmission lines which are more compact and more aesthetically appealing. This study has yielded significant results not only in the design of new tower configurations but in many related areas as well. It was found, for example, that insulators treated with a semi-conductive glaze have greatly increased flashover strength, even in the presence of moisture and contamination. Significant achievements in the prevention of galloping in ice-laden conductors have also been made. Other studies are producing encouraging results in providing synchronized high-speed fault interruption, improved power system reliability and more efficient thermostats for the control of room temperature. The recent purchase of a scanning-type electron microscope has facilitated studies of the surface features of new alloys,