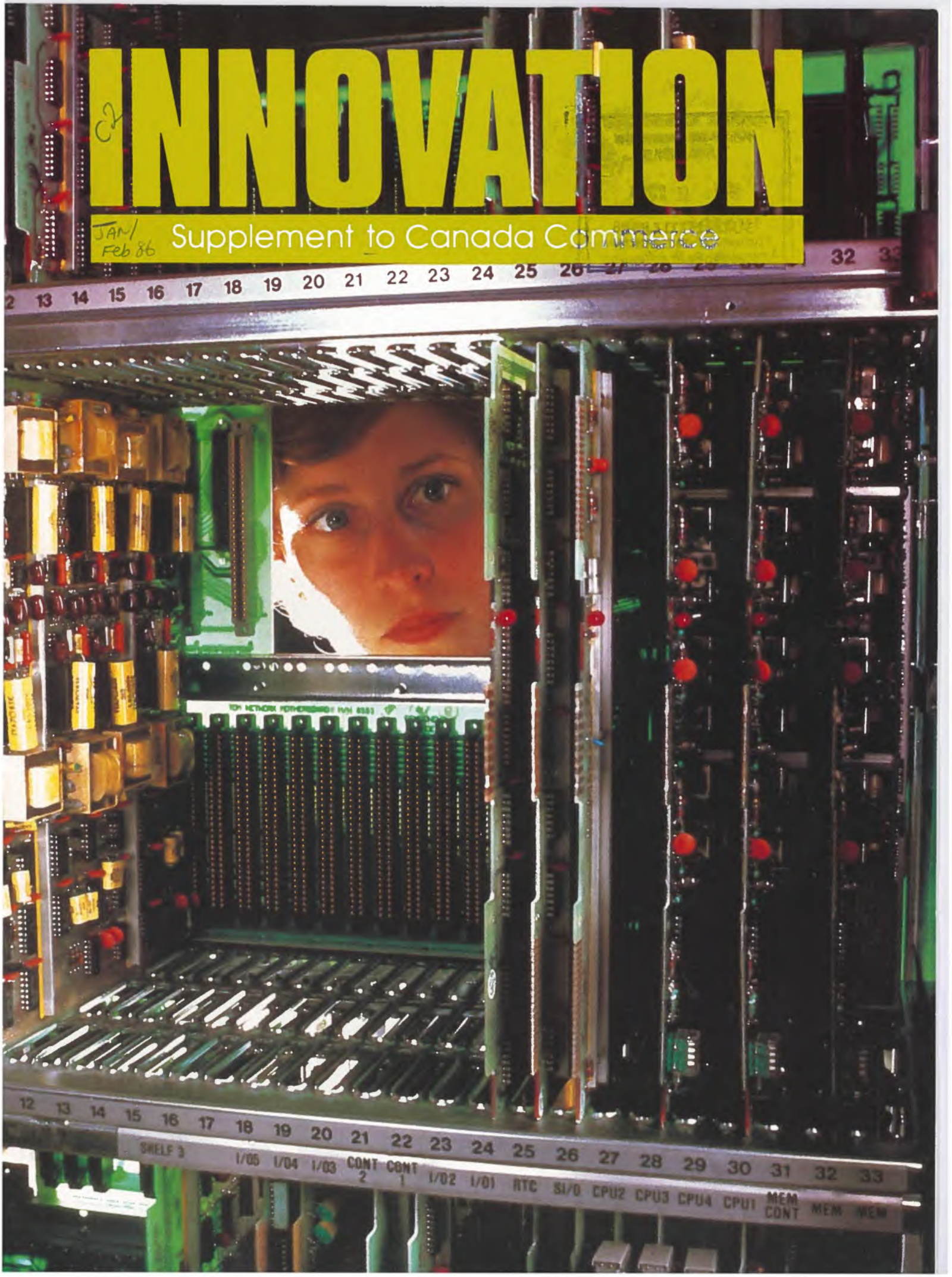
INNOVATION
Supplement to Canada Commerce
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Editorial:

This month's *Innovation Supplement* presents articles on four of Canada's eight provincial research organizations (PROs). These organizations are major elements of the expanding network of government, university and private sector entities designed to assist Canadian firms in satisfying their scientific and technological needs.

While each PRO is unique in terms of the technologies it addresses and services it provides, they are all designed to promote regionally-relevant R&D and to fill gaps in the existing technology of their region. A large part of their attention is devoted to helping smaller firms to obtain access to technical capabilities they may not be able to afford on their own.

Provincial research organizations can provide firms with access to research and professional support, product testing services, and an array of on-line information services that may save them the cost and time of duplicating research that has already been undertaken.

The PROs do not, however, limit their activities to small and medium-sized firms. With the high degree of specialization in research that now exists, even large firms find it difficult to keep experts from a wide spectrum of specialties on staff.

For example, Texaco Canada turned to the Alberta Research Council and its staff of oil sands experts for assistance in solving problems in this area of its operations.

The PROs maintain extensive links with university and other government research organizations and are, therefore, aware of emerging technologies and technological trends. Often they carry out useful projects in co-operation with these other groups.

We encourage our readers to learn more about the services and activities of their own provincial research organization.

Innovation Supplement

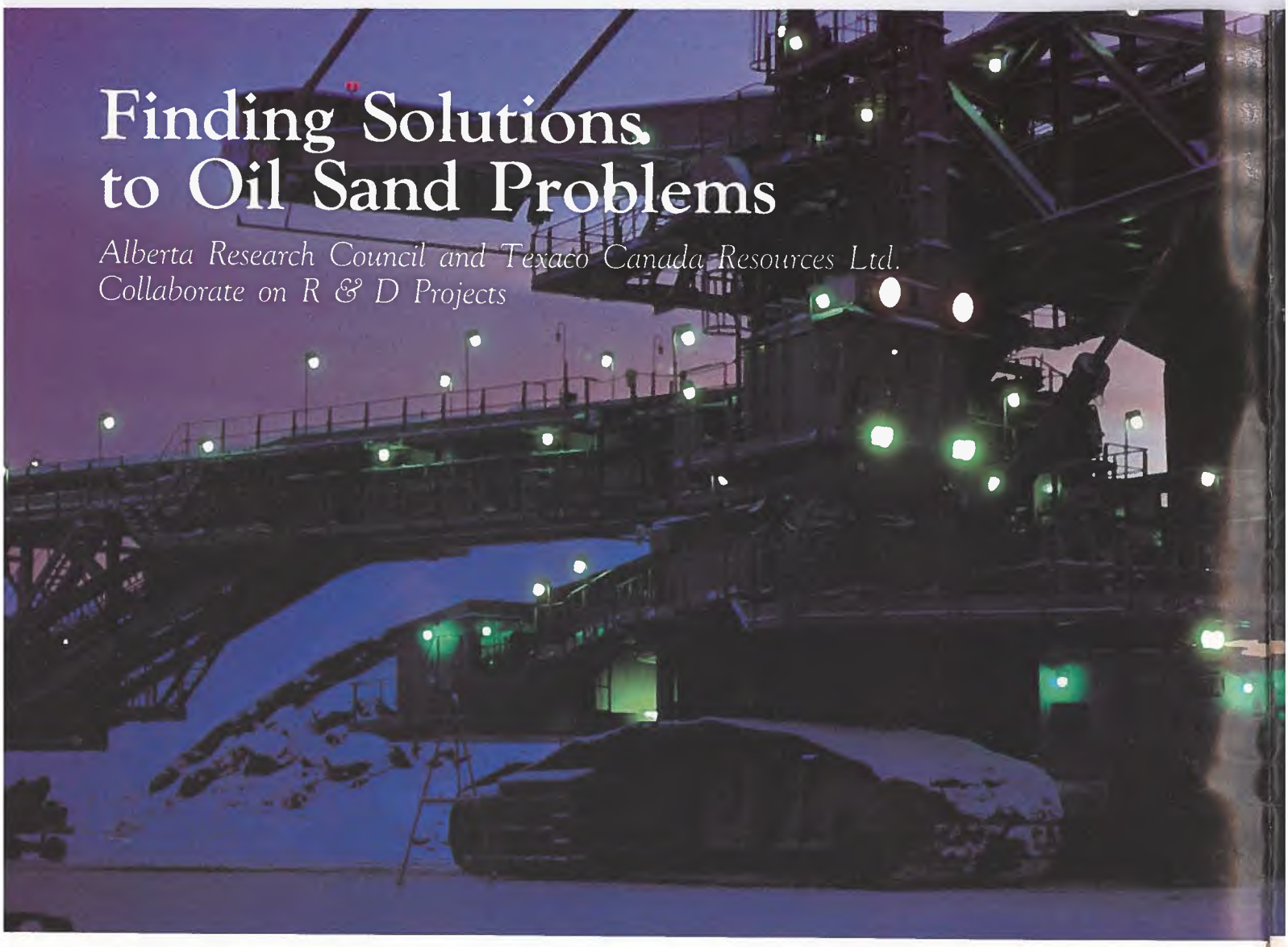
This is a reader's magazine, open to ideas and information from its readers. Offers and requests of technology transfers must come from our readers in Canada to match those supplied from abroad. Ideas for articles and information, even finished articles, will be welcomed.

We invite you to become a part of the *Innovation Supplement* with your comments and ideas. You can contact us at:

Innovation Supplement
Technology Transfer Services (EOII)
Office of Industrial Innovation
Department of Regional Industrial Expansion
235 Queen Street
Ottawa, Ontario
K1A 0H5
Tel: (613) 995-2235

Finding Solutions to Oil Sand Problems

Alberta Research Council and Texaco Canada Resources Ltd. Collaborate on R & D Projects



When a major oil company required research facilities in Canada to develop the technology for in situ bitumen extraction from the Athabasca oil sands, the Alberta Research Council was the obvious choice.

That was 14 years ago. Today, Texaco Canada Resources Ltd. is the Alberta Research Council's longest standing client. This collaboration has resulted in the initiation of eight major research projects, the assignment of 34 Canadian and 30 United States patents to Texaco, the development of sophisticated research tools and the publication of numerous scientific papers.

Historically, the Alberta Research Council has been synonymous with oil sands research. Within two years of its establishment in 1921, council scientist Dr. Carl Clark patented the original hot water extraction process, the basis for the development of the process now used by both Syncrude and Suncor at their Fort McMurray mining operations.

While the technology associated with surface extraction is considered well advanced, only a fraction of the one trillion barrels of bitumen in the Athabasca oil sands can be recovered by mining. In situ techniques are required to coax the remaining, deeply buried, viscous bitumen to the surface.

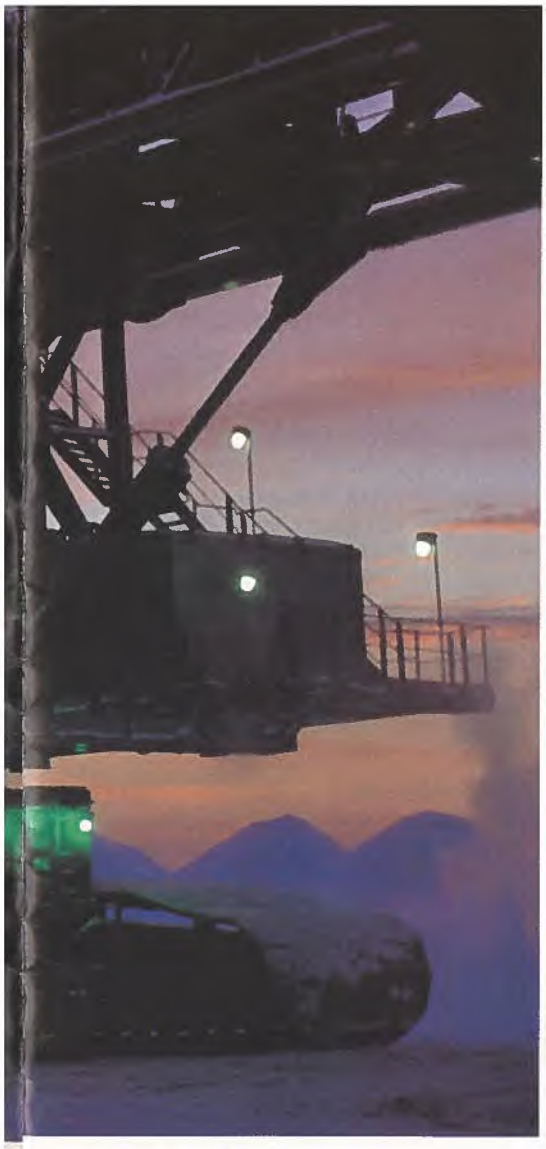
Research and development to refine existing technologies or invent better methods of extraction have been the focus of the council's Oil Sands Research Department.

By developing an extensive capability in both facilities and scientific expertise in the last decade, the Alberta Research Council has acquired an international reputation, part of which can be directly traced to the long-standing association of Texaco and the council.

Texaco holds leases containing an estimated 60 billion barrels of bitumen in the Athabasca oil sands. When the company established a field pilot project at Fort McMurray in 1972, the council's supporting laboratory research was already under way.

In searching for solutions to Texaco's and other companies' field problems, the council constructed a series of highly complex physical simulators which are among the best in the world, and now has 12 simulators capable of handling samples of oil sand from one to 5 000 kilograms.

The simulators include the Core Evaluation Facility, a small but extremely useful simulator for conducting a large number of screening experiments, and the



Alberta Research Council has long been involved in oil sands research.

larger one-metre physical simulator, capable of providing data for the detailed analysis of recovery processes.

As a result of the physical simulator research for Texaco, both a light-hydrocarbon steam and an air-stream process were developed in the laboratory and tested at the Fort McMurray pilot plant.

Solids control — restricting the flow of sand into producing wells — has been a problem during cyclic steam operations at Texaco's pilot project. Texaco contracted the Alberta Research Council to carry out a research project to solve the sand inflow problem which interrupted operations and incurred high maintenance costs.

Scientists made extensive use of a physical simulator specifically designed to evaluate existing sand control techniques, including gravel packing and commercially available prepack systems. They determined that most materials could not withstand the downhole conditions encountered with in situ steam operations.

The council's Dr. Petre Toma suggested that metallic fibre might be a suitable filter element. Texaco carried out the design work and produced a prototype filter composed of compressed metallic wool inserted in a self-standing cartridge. In 1984, a U.S. patent for the filter was granted and assigned to Texaco by the inventors, Dr. Declan B. Livesey of Texaco Canada Resources Ltd. and Dr. Toma.

The construction of the "sandwich" filter is a new concept in the oil patch. Initial field tests have shown the sand filter's ability to withstand the harsh environment typical of thermo recovery in oil sands extraction and that it is efficient and cost-effective.

The Alberta Research Council continues to monitor the device during long-term field tests which are in progress at the Texaco Athabasca Pilot Plant near Fort McMurray. It also underwent testing in the Cold Lake area by other companies co-operating with Texaco.

An increasing number of companies — both majors such as Texaco and smaller independent companies — have retained the Alberta Research Council to conduct R&D in support of their field pilot studies.

Industrial clients are able to enlist the help of 120 personnel involved in oil sands related research, and also have access to the council's extensive oil sands research facilities in Edmonton, including a fully equipped analytical laboratory.

— by Elizabeth Page
Alberta Research Council
Special to *Innovation Supplement*

Nova Scotia Research Foundation

Magnetic Couplings Solve Major Problems for Industry

In the late 1970s, the Nova Scotia Research Foundation Corporation (NSRFC) developed a patented magnetic coupling which has been incorporated into several new products.

Magnetic coupling is a method of transferring torque from a drive motor to a driven fan without a direct mechanical linkage. Torque is transferred by the use of rare earth magnetics attached to the motor drive shaft and to the fan's drive shaft. The magnets are so strong that, even though it is separated from the magnets by a barrier, the fan can be turned at high speeds.

This method of transferring torque eliminates the need of a drive shaft penetrating the barrier between the inner fan and the outer drive motor. Static seals can be used instead of dynamic seals, significantly reducing the possibility of leakage. This innovation is important in the nuclear, chemical and diving industries where maximum separation between inner environment and outer environment is required.

Soon after the development of the coupling and its patenting by Nova Scotia Research, a contract was signed with the Defence and Civil Institute of Environmental Medicine (DCIEM) deep dive facility in Toronto to provide hyperbaric blowers. These blowers move high-pressure breathing gases out of diving chambers through a system of piping to the environmental conditioning system (ECS) and back to the chambers for the divers.

What is an Environmental Conditioning System?

Divers living in a saturated environment within pressure chambers on large diving systems, such as those used in offshore oil-related construction and production, breathe a mixture of pressurized helium and oxygen. This mixture of gases must be continuously cleaned, dehumidified and temperature controlled on a "closed" basis in order to provide a safe and comfortable environment to the chamber occupants; i.e., they require an "air"-conditioning and life support system that is designed to operate at the chamber pressure.

Nova Scotia Research Foundation Corporation

The Research Foundation was established in 1946 by the Government of Nova Scotia to assist in the province's economic development. In 1975, a new act changed the name to the Nova Scotia Research Foundation Corporation (NSRFC) with its objective being to "assist in the economic development of Nova Scotia by promoting, stimulating and encouraging the effective utilization of science and technology by industry and government".

This change recognized the industrial orientation of the corporation and the fact that approximately two-thirds of the corporation's income is derived from contract research and development activities.

Under President T. B. Nickerson, five operating divisions — Industrial and Information Services, Engineering Physics and the Centre for Ocean Technology, Geophysics, Chemistry, and Biology — carry out approximately 4 000 assignments each year for 600 companies and government departments. The corporation's activities can be grouped into two approximately equal parts — assistance to industry in the solution of today's technical problems and innovation for tomorrow's opportunities.

While the corporation uses its capabilities to serve all sectors of Nova Scotia's industrial economy, particular emphasis is placed on technological support for the secondary manufacturing industry. The corporation continues to emphasize the potential for ocean industry development in Nova Scotia.

Contract R&D activities important in NSRFC finances.

Support facilities and services include an instrument shop, glassblowing, marketing, ocean technology production and an extensive scientific and technical library.

Industrial and Information Services

The Industrial and Information Services Division provides, without charge, technical information and assistance to small manufacturing industries with a view to supplementing and advancing their technological capabilities.

The National Research Council's (NRC) Industrial Research Assistance Program (IRAP) and the Energy Test and Information Centre (ENERTIC) Program of the federal and provincial energy departments play key roles in delivering these services to clients.

The division performs contract work on technical, marketing and research problems.

Director — J. R. Helliwell

The system must re-use the same gas continuously to save the cost of expensive helium, remove carbon dioxide, water vapour and other gases in the chamber, add make-up oxygen and control temperature to close tolerances. This is the function of the ECS.

This function can be realized in two ways: the internal ECS and the external ECS. Internal EC systems mount the majority of the equipment within the divers' pressure chambers, utilizing chamber space and relying on the divers to service the equipment within the chamber.

The external ECS is an attractive solution in that it is fully accessible to the technicians outside the chamber, ensuring safety, allowing ease of service, as well as minimizing use of valuable chamber space. Realization of an external ECS requires the ability to couple mechanical power for the gas circulation into the sealed space of the ECS in an effective and safe manner. NSRFC's patented magnetic coupling meets this requirement.

NSRFC used this technology to develop its hyperbaric blower for DCIEM. The success of the product at DCIEM soon led to similar customers with deep dive facilities who had to move gases at high pressures under zero leakage conditions. NSRFC hyperbaric blowers are now found in the U.S., Norway, West Germany, the United Kingdom, Sweden and on vessels in the North Sea.

These land-based dive facilities generally are used for research activities; however, the bigger market for the hyperbaric blowers is aboard offshore diving vessels and drilling/production rigs in support of hydrocarbon exploration and production.

To respond to this market, NSRFC incorporated its hyperbaric blower into a complete external environmental conditioning system designed to meet the needs of diving companies operating sophisticated diving vessels in the North Sea and elsewhere. This new product is currently being introduced to the international market.

Over this same time period, contacts were made with the nuclear and chemical industries resulting in the development of additional types of blowers. To take advantage of these opportunities and to fulfill its mandate of technology transfer, Nova Scotia Research set up a separate company, a wholly-owned subsidiary of NSRFC, to market the blowers for the nuclear and chemical markets. Today, blowers manufactured by Nova Magnetics Limited are found in chemical and nuclear facilities around North America.

— Special to *Innovation Supplement*

Engineering Physics and the Centre for Ocean Technology
The electronic and mechanical engineering design skills of this division are used to support and encourage the development of specialized industrial hardware suitable for manufacture in Nova Scotia and competitive in world markets. The Centre for Ocean Technology emphasizes development of ocean hardware.
Director — C. R. Tyner

Geophysics Division
The division includes both marine and ground geophysics sections with expertise in field surveys, data interpretation and specialized equipment development. The Deep Towed Sub-Bottom Profiling System developed by the division is used worldwide to examine the engineering properties of the sea floor for offshore pipelines and structures.
Director — D. E. T. Bidgood

Chemistry Division
Chemical and chemical engineering research and development and problem-solving for industry and government in Nova Scotia are undertaken by this division in response to existing problems and future opportunities. Process innovation and product improvement related to the utilization of the province's natural resources form a major part of the work of the Chemistry Division.
Administrator — J. J. Starzomski

Biology Division
The work of the Biology Division includes development of biological products and processes as well as the provision of biological services to industry and government. The division emphasizes research and development related to fermentation and microbial technology.
Director — K. E. Hellenbrand

Product Innovation
Products developed and marketed by NSRFC fall into three categories:
- Sub-bottom profiling systems for offshore engineering studies;
- Electric and fluid rotary connectors for umbilical winches; and
- Magnetically coupled blowers for gas circulation.

All products are commonly found in oil exploration and producing areas.

Please direct requests for marketing and general information to: J. A. Gillis — Head of Marketing or
R. F. MacNeil — Manager of Administration

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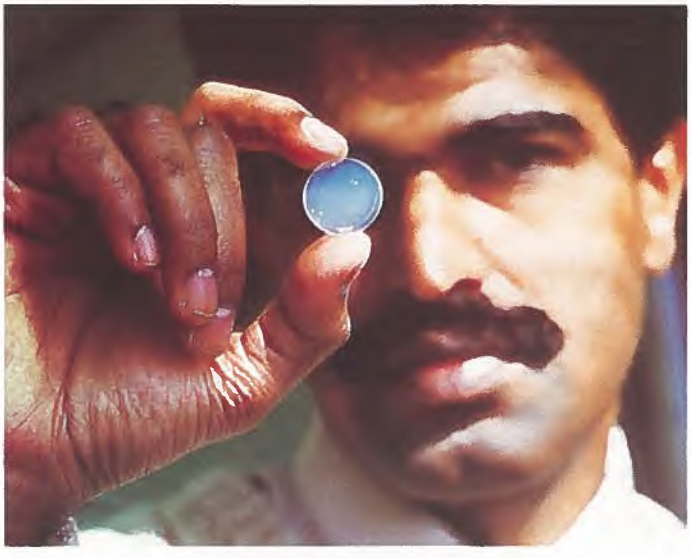
The Ontario Research Foundation

Advanced Materials at the Ontario Research Foundation

Advanced materials are matters of ongoing research for the Ontario Research Foundation (ORF). They include such subjects as insulations, chemical vapour depositions of tungsten carbide coatings for non-ferrous jobbing foundries, heat mirrors for energy-efficient windows, porous surfaces on metal medical implants and ultra-high-strength concrete.

The materials and programs described here not only allow us a glimpse into the broad spectrum of ORF's capabilities, they also provide an insight into the current priorities of the industries and governments that sponsor these programs.



Aerogel Insulations

An aerogel is a colloidal gel in which the usual interstitial liquid has been replaced by a dry gas without collapse of the solid matrix. Aerogels open the possibility of very efficiently insulated windows, for the material is transparent in addition to being an efficient thermal barrier.

Other unusual properties may suit aerogels for more exotic uses. The low density, for example, may open opportunities in the aerospace industry, while its unusual (for a solid) refractive index, dielectric constant, porosity and pore size distribution, if combined with adequate mechanical strength, may make it suitable for a broad range of applications yet to be considered.

The material is produced by drying colloidal gels supercritically in an autoclave at 300°C and 2 000 psi over a 24-hour period. The work now being carried out at ORF is designed to improve the production process and reduce the temperature, pressure and the drying time required.

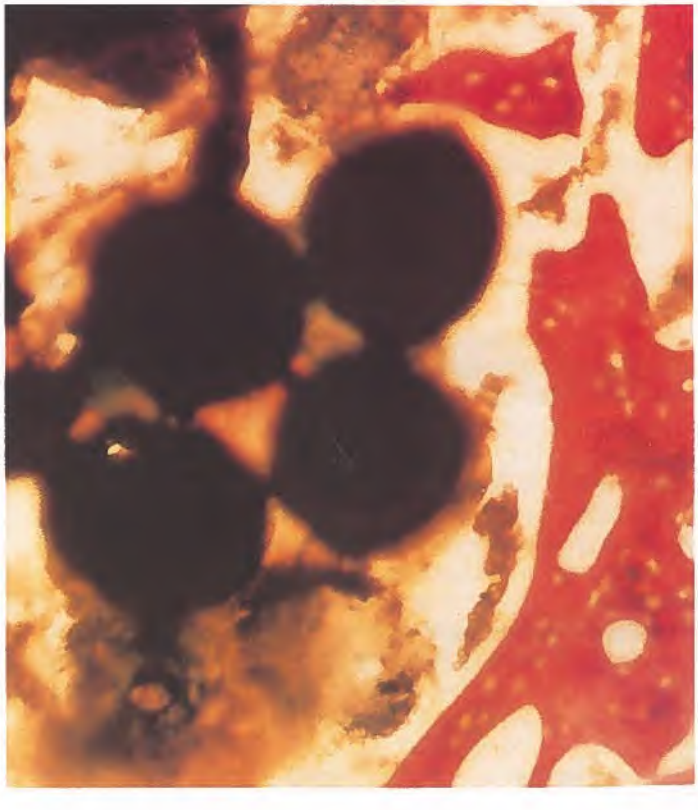
Porous-Surfaced Metal Implants

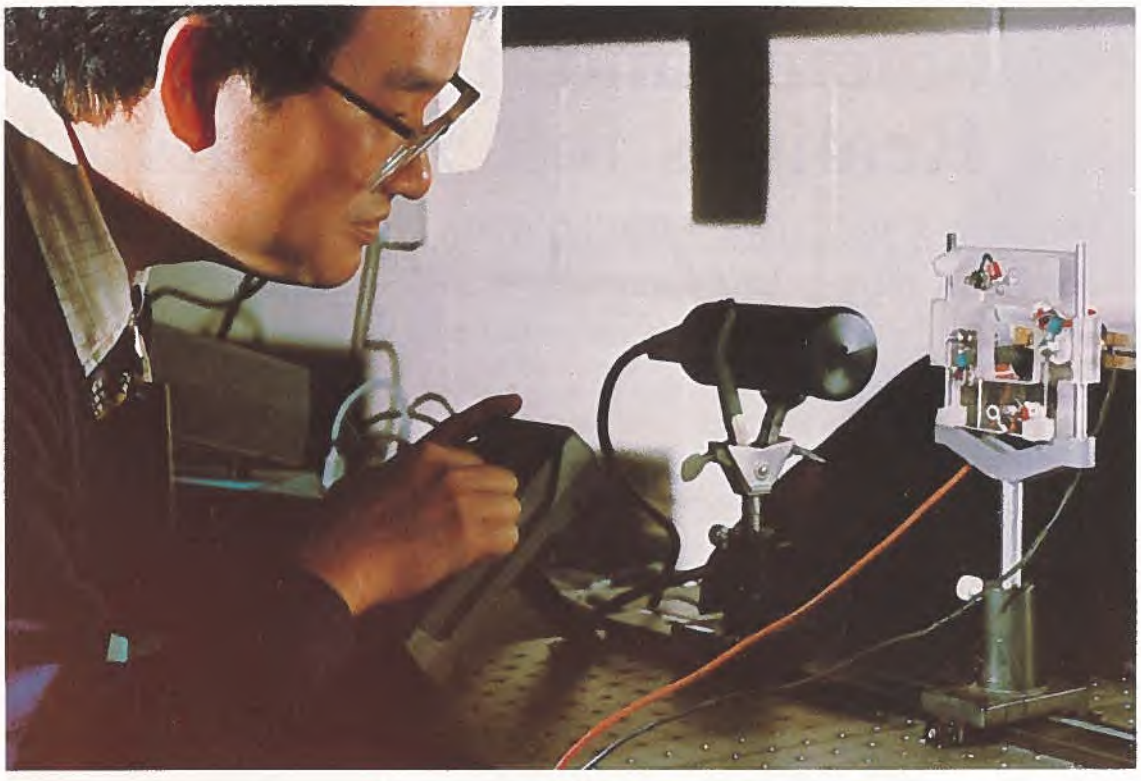
Porous surfaces on metal medical implants provide for a firm biological fixation between the implanted device and the body. In joint replacement, they eliminate the need for the poly methyl methacrylate (PMMA) cement employed with smooth-surfaced prostheses.

At Ontario Research, fine metal powders are applied to metal surfaces using the binder technique, a process that grew out of many years' experience in the powder metallurgy field. The metal powder, held to the surface by the binder, is sintered at high heat in an oxygen-free atmosphere and passivated by a chemical method to produce an oxide film resistant to body fluids.

For hip implants, the metal porous powder surface provides excellent bonding to cortical bones, with shear strength of about 20 MPa and a tensile strength of about 10 MPa. Although these strength levels are known to be satisfactory for inactive adults, it has yet to be established that they are adequate for active adults.

Powder-coated heartpacer tips anchor positively to the tissue in contrast to uncoated tips, and the formation of scar tissue, which occurs with conventional uncoated tips, is significantly reduced. The intimate contact between tissue and tips also results in improved efficiency of pacer signal transfer.





Heat Mirror Coatings
Two projects under way in ORF's physics laboratories are concerned with the production of heat mirrors for energy-efficient windows. These devices reflect the near-infrared portion of the spectrum without affecting the visible portion.

One of the programs utilizes films based on titanium nitrides and oxides, which have high visible transmittance and high near-infrared reflectance. The choice of these refractory materials was based on their superior long-term durability and stability.

Ultra-High-Strength Concrete
Typical of the advanced cementitious materials investigated at Ontario Research is an ultra-high-strength, high-durability and low-permeability concrete. Its special properties are the result of efficient particle packing, careful control of water/cement ratios, and the appropriate use of chemical admixtures. Compressive strength values in excess of 100 MPa are regularly achieved compared to values of 30 to 50 MPa for ordinary structural concrete. Density values are similar to those of standard concrete formulations.

Ultra-high-strength, high-durability and low-permeability concrete is ideal in structural applications where it is necessary to reduce the cross-section of the structural member or the dimensions of steel reinforcement. Its low permeability toward water, salt and other aggressive chemicals makes it suitable for special industrial applications, while its combined properties are expected to give it a unique durability under severe Arctic marine conditions. An indicator of its strength is the fact that, in failure, fracturing commonly occurs through the aggregate, whereas with ordinary concrete, fractures normally occur within the matrix.

The second project involves development of a switchable (dynamic) heat mirror in which the optical properties in the near-infrared range can be varied on demand by means of an electrical excitation. Ideas were borrowed from the field of electrochromic displays to develop a completely solid-state device with poly-WO_3 as the active material. This is in contrast to the sol-gel technology previously described, which has been applied to solid/liquid cells. ORF's task has been to produce films with the correct optical properties.

Chemical Vapour Deposition
Because of their relatively low cost, graphite moulds are extensively used for short production runs by the non-ferrous jobbing foundries. However, to prevent oxidation of the graphite surface and prolong mould life, casting temperatures have to be kept low, thus reducing the fluidity required for good definition and placing limits on the complexity permitted in mould design.

At ORF a project was undertaken to eliminate the problem of surface oxidation by coating the mould using a chemical vapour deposition (CVD) technique. A small CVD reactor was built especially for the purpose. Graphite moulds of various complexities were then coated with titanium diboride (TiB_2) produced from gaseous reactants.

The ORF reactor was successful in coating the surface of small graphite moulds which were shown to be superior to conventional uncoated moulds. Thus, the way was opened to manufacture complex non-ferrous mouldings.

For further information, contact: Ontario Research Foundation, Sheridan Park Research Community, Mississauga, Ontario L5K 1B3.

Solving Problems and Turning Ideas into Realities for 58 Years

In 1978, the Ontario Research Foundation celebrated its 50th birthday. The occasion was low key, and even today there is little knowledge or understanding of how the foundation began, how it is financed, how it is organized and governed, what it does and what its relationship with its clients is.

The Ontario Research Foundation (ORF) was founded in 1928 with an endowment of $3 363 050, half of which was donated by industries, business and financial institutions, and half by the Government of Ontario. The first chairman was Sir Joseph Flavelle, who was responsible for raising the original endowment within the business community, and the chosen location was Queen's Park Crescent in Toronto.

From the start, Ontario Research was organized not as a government agency but as an independent, non-profit research facility existing to provide scientific and technical back-up to the industries of Ontario and the rest of Canada. In particular, the organization was designed to serve small and medium-sized companies not large enough to have their own research and development facilities, and to provide special services to larger companies as a complement to their own in-house research resources.

The chief operating officer of Ontario Research is the president, who reports to a board of governors made up of 25 prominent industrialists. The governors, who serve without fee, are appointed for a five-year term by the Lieutenant-Governor of Ontario.

The objectives of Ontario Research have remained unchanged over the years, although operations have changed and expanded to meet the growing requirements of Canadian industry. In 1967, ORF moved to the Sheridan Park Research Community in Mississauga to meet such requirements through expanded facilities.

Original building at 47 Queen's Park Crescent, Toronto.

In order to provide the most comprehensive service possible, Ontario Research has become involved in five broad areas of activity — energy, environment, materials, products and processes, and resources. Such diverse capabilities enable ORF to serve about 85 per cent of the standard industrial classifications found in Canada. Revenues for Ontario Research are expected to be in the $23-million range in 1985.

Approximately 260 of ORF's 400 employees work within three operating divisions: Environmental and Chemical Engineering, Materials, and Engineering Sciences. The remainder are assigned to administrative and business development activities. A separate group within the Business Development Division provides industrial and management services specializing in productivity improvement, quality control systems, facilities planning and strategic planning support.

Administrative and operating divisions are housed in 25 641 square metres (276 000 square feet) of space in the main building and two pilot plants at the rear of the property. The buildings, together with parking space and other outdoor faci-

lities, are situated on ORF's 36-hectare (90-acre) property within the Sheridan Park Research Community.

ORF was a major driving force behind establishment of Mississauga's Sheridan Park, which today houses 14 separate facilities engaged in research, development and related activities.

The diversity of ORF is seen in its ability to tackle problems in a wide range of important fields. They include: engineering; product development; pulp and paper; sewage and effluent treatment; applied microbiology; polymer chemistry; pesticide and trace analysis; organic and inorganic building materials; metallic and non-metallic minerals; physical and process metallurgy; waste utilization; glass and ceramics; pollution monitoring and control; instrument development; computer-aided engineering; electron microscopy; energy applications; advanced materials; and textiles, clothing and footwear.

In its multidisciplinary capability, Ontario Research resembles a large clinic staffed with specialists. No matter how many-sided and complex the problem, ORF can assemble a team of experts to examine and probe it from all directions. At the same time, no problem is too small for the attention of ORF's scientists, engineers and technologists.

Regardless of size, complexity or novelty, all projects and service work are subject to the same strict confidentiality between the sponsor and the Ontario Research Foundation. Likewise, all patents arising out of contract work become the property of the sponsor.

The many capabilities of Ontario Research imply the presence of much sophisticated equipment. The precise answers required by modern industry demand high resolution instrumentation for diagnostic examination, analysis, materials characterization and testing. For example, ORF currently has no fewer than six electron microscopes employed in various ways for materials characterization.

Before commencing work on any R&D program, it is important to know what has been done previously on the subject. Ontario Research has on-line access to more than 800 computerized data bases of bibliographic information and abstracts on subjects ranging from the arts to nuclear physics.

Data bases most frequently consulted by ORF researchers are probably Engineering Index, Chemical Abstracts and the various patent files. The search service and library facilities are also available, on a fee basis, to researchers working outside ORF.

What happens when Ontario Research is approached for help with a technical problem?

- If the caller does not have the name of an ORF contact, the call will be routed through an information co-ordinator to the most appropriate specialist to handle the enquiry.
- If it is routine service work, a price estimate is given and arrangements made to deliver the samples.
- If the problem is more complex, requiring investigative or development work, arrangements will be made for a meeting that may include experts from several ORF disciplines and others from the client's company.

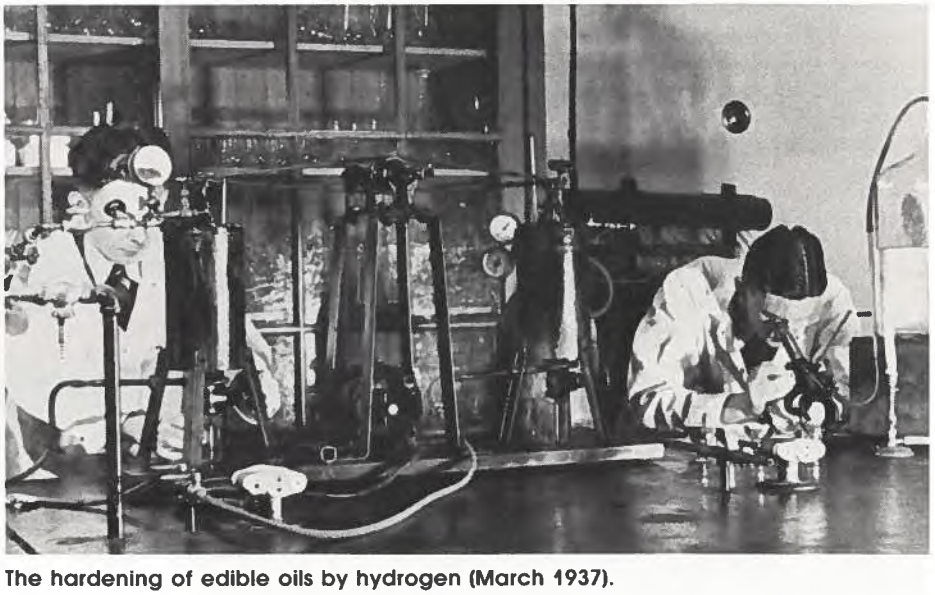
Dr. H.B. Speakman, first Director of ORF.

Such meetings generally result in the decision to prepare a proposal, containing an outline of the work program and an itemized estimate of costs.

Sometimes a client will wish to apply for government funding for the project, and ORF may assist in doing so. Once a contract between the client and ORF is signed, work may begin.

For 58 years people from inside Canada and around the world have been approaching the Ontario Research Foundation with technical problems and ideas. And members of ORF's technical team have sat with them to discuss the problems and methods of approach, and then worked closely with them, quietly solving problems and turning ideas into realities.

For further information, contact:
Ontario Research Foundation
Sheridan Park Research Community
Mississauga, Ontario



The hardening of edible oils by hydrogen (March 1937).

Eastern Canadian Development Centre

N.B.'s Research and Productivity Council Promotes Innovation

Provincial RPC Helps New Brunswick Industry Cope With Changing Demands of the Marketplace And Develop New Processes and Products.

New Brunswick formed its provincial research organization in the early 1960s with instructions to help industry and to carry out research and development that could lead to the establishment of new industry.

The Research and Productivity Council (RPC) has its headquarters in Fredericton where there is a building complex of 8 000 square metres for laboratories, engineering shops, pilot plants and administration. Branch offices are being opened elsewhere in the province.

Flexibility of space usage is important and what is office space today might be a laboratory for confidential work tomorrow. Similarly, a pilot plant operation can be turned into a manufacturing enterprise for a brief period until the enterprise is transferred to a commercial locality.

The 120-strong staff, including 60 engineers and scientists and their technical assistants, form teams which emphasize versatility. Staff members are exchanged easily across the three main RPC divisions — engineering, industrial services and science and technology — so that science and technology are applied to the various branches of engineering.

Successful innovation requires a close co-operation between RPC's staff, as the technology developers, and the businesses that will exploit technology as workable products or processes.

The shock troops of the innovative process are the industrial advisors who have a search-and-find mission to industry. They knock on the doors of businesses and visit factories to find out their problems and how RPC can help solve them. It takes time to establish a cordial relationship in which business problems can be fully discussed, identified and defined and a solution sought.

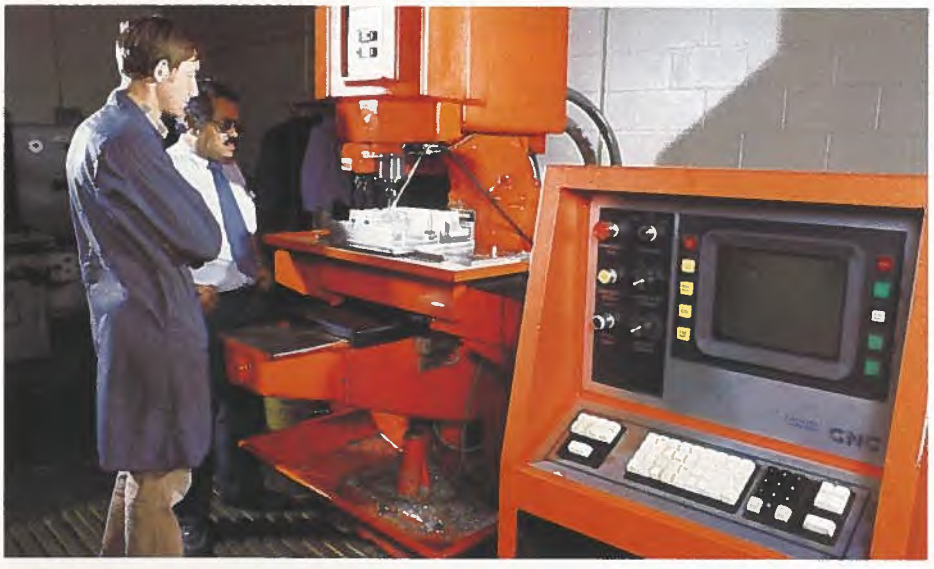
RPC's activities are closely linked with those of the provincial government and the National Research Council (NRC), particularly those of the NRC field advisory staff. Much innovation has been spurred on with funds from NRC's Industrial Research Assistance Program (IRAP). Some $800 000 has been spent since 1981 on 150 projects to improve productivity and the technological base of businesses.

Innovation is not without cost. All RPC work is done on a fee-for-service basis through contract or sponsorship. In the 1984-1985 fiscal year, contract revenue, representing more than 90 per cent of all income, exceeded $7 million. The split between federal and provincial sources and the private sector was about equal.

Partnerships are formed with other consultants and manufacturers to provide the combination

On-site inspection by metallurgical engineers of failed equipment.

Innovation comes easiest from a sponsor with a perceived industrial need.



Computer-aided machining on the factory floor.

of strengths and specialties needed to run and execute certain contracts. Clients can also deal directly with subsidiary companies such as Innovent Ltd., which specializes in advanced technology, and Enhanced Recovery Systems Ltd., which commercializes mineral processing innovation.

Although New Brunswick remains the first priority for RPC, work is done elsewhere in Canada and overseas. Although a small part of RPC's work, such activities are tremendously stimulating because they allow staff to match their skills with the best anywhere.

Innovation comes easiest from a sponsor with a perceived industrial need. Atomic Energy of Canada Limited (AECL) filled this role when it needed better methods of inspection to meet the high standards required for nuclear installations. RPC responded with an ingenious design for an ultrasonic device capable of transmitting small diameter sound beams over long distances to improve the detection and sizing of defects in metals.

The end product was the "Axicon" series of conical lenses which give a two-fold increase in depth of focus. Further refinements to a toroidal shape give a four-fold increase. The use of these lenses in ultrasonic inspection to locate previously undetected flaws saves clients millions of dollars each year.

Such technology could also play a vital role in medicine when high resolution images of tissue and organs are required.

There is another route to industrial innovation which starts in the laboratory rather than the factory. A scientific hunch or engineering brain wave is developed and turned into a marketable proposition.

Laboratory work, engineering design, techno-economic analysis, or whatever else is needed, always follows in close consultation with the users and exploiters of the research until technology transfer is complete and the results are used by the client.

RPC offers clients one-stop shopping for science, technology and engineering. Staff organization is streamlined to help the innovation process through the supply of technical information. RPC staff solve problems and provide quality control, market identification, process and product development, equipment design and manufacturing.

A good example of in-house laboratory work is in the once basic science of mineral processing which has since become a major industrial demonstration project.

Control valve for roaster feed.

The leaching circuit for the extraction of zinc and copper at Enhanced Recovery Systems Ltd.

New Brunswick has zinc-lead-copper deposits from which it is difficult to prepare saleable metal concentrates because it is hard to separate the valuable ore minerals from each other. The sulphation roast leach-electrowining process developed at RPC solves the problem by the use of a pyro- and hydro-metallurgical process that, at comparable cost to other processing, is much more efficient. As a result, metal recoveries are maximized.

The viability of this process is being demonstrated by the RPC subsidiary, Enhanced Recovery Systems Ltd., at Chatham, N.B., with the help of an Economic and Regional Development Agreement (ERDA) grant. The successful application of these process innovations will allow hitherto uneconomical mineral deposits to be exploited and the return on investment could yield a billion dollar bonanza in terms of revenue and job creation. Patents for the process have been taken out in many countries.

RPC, sensitive to the requirements of clients, has developed areas of excellence in a number of disciplines such as non-destructive testing, physical metallurgy, semio-chemistry and advanced manufacturing technology at its Manufacturing Technology Centre (MTC). The MTC operates a CAD/CAM network with easy access to various provincial terminals to demonstrate and evaluate the latest technologies in manufacturing. Design tasks vary from producing hull designs for fishing craft to that of off-round gears and complex processing equipment.

The CAD/CAM capability allows quick optimization of design, prototype production and testing of innovative ideas generated at RPC and by industrial clients. Technology transfer and acquisition of manufacturing capability necessary for market penetration are frequently facilitated by financial assistance from the Industrial and Regional Development Program (IRDP) of the Department of Regional Industrial Expansion (DRIE).

A current example is a robotic system for dewiring wire pulp bales at pulper feed stations at pulp and paper mills. Arrangements are being made to build and test a prototype robotic handling system in an Ontario pulp and paper mill. An outcome to these trials will mean that a method of handling the scrap wire can be marketed.

New Brunswick manufacturers will benefit because another innovative commercial venture can be started.

— by D. Abbott
Manager, Research and Development
Research and Productivity Council
Special to the *Innovation Supplement*

TECHNOLOGY TRANSFERS

OFFERED

CANADA
- Interactive Visual Communications System
- Control System for an Optical Modulator
- Production of Purified Porcine Immunoglobulins
- Peak Position Detector
- Masks for a Camera Lens for the Determination of Tridimensional Co-ordinates
- Tension Link for Parachute/Payload Separation
- Remote Identification Device
- Humectants to Preserve Meat Products
- Lithium Battery Protection Circuit
- Computer Controlled Constant Concentration and Size Particulate Aerosol Generation System
- Extraction of Both Carotenoids and Protein from Crustacean Wastes
- Chemorepellant Compound
- Heat Exchanger Core Construction
- Full Support Vehicle Dolly
- Parkguard
- Electronic Cribbage Board
- Printing Pressure-Sensitive Labels
- Portable Multi-Hull Watercraft Kit
- A Device That Controls Stress Naturally

AUSTRALIA
- Tri-Axle Suspension System
- A Low-Light Miniature Flashlight
- Birefringence Compensation in Polarisation Coupled Lasers
- Airborne Measurement of Optical Scattering Coefficient
- Device and Method for Detecting Antigens and Antibodies
- Aero-Medical Retrieval Unit
- Anti-Ballistic Screens
- Steel Curtain Roll-Up Doors

BELGIUM
- Plastic Tubes and Pipes

BRITAIN
- Industrial Pallet Converters

FRANCE
- Snowshoe-Ski
- Building Construction and Timber Industry
- Sail Catamaran and Power-Driven Outboard All In One

GERMANY
- Manual Road-Marking Machine
- Electronic Components Containers
- Liquid Crystal Layers Control
- Iron Casting Technology
- Ball Valve for Variable Flow Control
- Heat Exchange System
- Smoke-Gas Heat Exchange System
- Mechanical Drive Device
- Mechanical Foaming Machine

INDIA
- Foam Polymeric Material

ITALY
- Internal Combustion Engine

SWEDEN
- Arrangement in Spring Suspension Systems, Particularly for Vehicles
- Heat Pumping Process Based on the Principle of Absorption

SWITZERLAND
- Telephone Exchange System
- Universal Experimental System for Digital and Linear Circuits
- Pipe Joining System

U.S.A.
- Fold-A-Bar
- Variable Bore Ram
- Feedthrough Terminal for High-Power Cell

REQUESTED

CANADA
- Method for Object Measurement and Determination
- Advanced Non-Linear Disc Propulsion System
- Advanced Lift and Field Resonance Generation Technology
- Mining Venture

BELGIUM
(European Communities)
- Off-set Printers
- Packagings
- Cold-Extruded Metal Articles
- Hardened Steel Articles and Tools
- Glass/Resin Fibre
- Asbestos and Mineral-Wool Based Products

BRITAIN
- Drives, Clutches and Related Products

OFFERED

CANADA

Interactive Visual Communications System — 6240
An interactive visual communications system for maintaining an identical visual picture (picture space) at a number of terminals linked by narrow bandwidth transmission lines. Thus, a number of participants can communicate and use a single picture space without being in physical proximity.

Control System for an Optical Modulator — 7417
A control system for modulating the intensity of a laser so that the modulated component of the output beam is maintained at a constant amplitude. This system was devised for use in transmission spectroscopy.

Production of Purified Porcine Immunoglobulins — 7755
The invention provides a method for the continuous production of a purified porcine immunoglobulin preparation which is employed in the formulation of milk replacers for neonatal pigs. The milk replacers confer passive disease immunity to the piglets and allow them to be raised from birth removed from the sow. Survival rates for piglets can be substantially increased and Specific Pathogen-Free pigs can be raised under practical commercial conditions.

Peak Position Detector — 7977
A detector which will give in real time the position of a peak in a digital input signal to a precision better than one pixel. Detection is achieved by a simple circuit designed for a wide range of signal processing applications.

Masks for a Camera Lens for the Determination of Tridimensional Co-ordinates — 7992
A three-dimensional imaging device of very simple design using essentially an aperture mask and a bidimensional CCD detector. The system is compact and robust and provides very fast operation (within ½ second) on objects moving at random undetermined speeds. Present performance can reach one per cent of the field of view using a 100 x 100 tridimensional image with real time determination of x, y and z co-ordinates.

Tension Link for Parachute/Payload Separation — 8091
A wholly mechanical device used to link a parachute and its payload together which will affect automatic separation of the payload from the parachute after landing, particularly on water.

Remote Identification Device — 8094
The scattering or reflecting properties of an antenna are used to modulate the radar return from a moveable object in a distinctive manner, thereby permitting identification of the object. This technique requires no radio-frequency power source on the object to be remotely identified.

Humectants to Preserve Meat Products — 8145
This invention involves conveniently manufactured protein hydrolysates for use as humectants in meat and fish products. Problems associated with taste, saltiness or the effects on hypertension of previous humectants are circumvented. The humectants are nutritious, safe, colourless and relatively bland to the palate.

Lithium Battery Protection Circuit — 8180
A device designed to prevent a battery or any one cell of a multicelled battery from undergoing voltage reversals. The device can be integrated and built into the battery pack which makes it cost-effective and well adapted for system design.

Computer Controlled Constant Concentration and Size Particulate Aerosol Generation System — 8181
An aerosol generator for therapeutic inhalation systems designed for dispensing drugs, such as insulin, which are more efficiently utilized when taken through the respiratory system.

Extraction of Both Carotenoids and Protein from Crustacean Wastes — 8192
This invention concerns the extraction, from shrimp or other crustacean wastes, of carotenoproteins which may be used as tissue colourant feed supplements in the rearing of salmon, trout or lobster. These carotenoproteins have better stability and nutritive value than previous products.

Chemorepellant Compound — 8224
The invention concerns a chemorepellant compound for attachment to a prosthetic surface for use in human and animal cardiovascular systems to provide a biocompatible surface with reduced thrombogenicity.

For any of the offers listed above, write to:
Canada Patents and Development Limited
275 Slater Street
Ottawa, Ontario
K1A 0R3
Tel: (613) 990-6100
Please quote the appropriate case number.

Heat Exchanger Core Construction
A core construction for a counterflow heat exchanger is disclosed. The core comprises a stack of plates and each plate has lateral rows of corrugations separated by planar areas. The corrugations are angled from the airflow directions, with alternate plates having their corrugations alternately angled. The rows of corrugations in alternate plates bear on each other, defining complex flow passages, and the planar areas face each other, defining plenum areas between rows of complex flow passages. Guide vanes disposed between the plates in inlet and outlet areas assist in distributing airflow laterally across plenum areas adjacent to the ends of the core.
Write to: Kinetic Systems Inc., 590 Bearinger Road, Unit 21, Waterloo, Ontario N2L 6C4.

A Device That Controls Stress Naturally
Canadian inventors are offering a Canadian or foreign firm the right to manufacture, market or purchase their invention, ALPHAPLUS, a stress control device. Portable and easy to use, this device is said to help reduce and prevent stress and fight insomnia. The inventors claim that the device is painless, has no side-effects and can be used by the whole family.
For further information, please contact:
ALPHAPLUS, P.O. Box 8706, Ste-Foy, Quebec G1V 4N6.

Full Support Vehicle Dolly
This invention covers a highly maneuverable vehicle dolly that provides off-the-ground support to all vehicle wheels at the same time. Its flexibility enables it to accommodate any wheelbase and any wheel spacing. When the dolly is fully inserted under a damaged vehicle, the vehicle can be rolled by hand to a desired shop area.
Write to: R.A. Woods, 595 Gorge Road, E., Victoria, British Columbia V8T 2W5.

Parkguard
A Canadian inventor offers a Canadian company specializing in parking devices, a joint venture or licensing arrangement for the manufacturing and marketing rights for Canada and the United States, of its unique parking obstruction device. It can be used wherever reserved parking is stipulated but not controlled, such as apartment buildings, banks, hospitals, etc.
Write to: Klaus Hartwing, c/o Kaymar Co., P.O. Box 855, Station "K", Toronto, Ontario M4P 2H2; Tel: (416) 484-6939.

Electronic Cribbage Board
A Canadian inventor offers a Canadian company in the electronics field, under licence, the manufacturing and marketing rights for Canada, for his new invention — an electronic cribbage board. A manual input is also provided so that the board can be used in a variety of other games.
Write to: Fred Mah, c/o William R. Edgar, Burke-Robertson, Chadwick & Ritchie, 130 Albert Street, 18th Floor, Ottawa, Ontario K1P 5G4; Tel: (613) 236-9665.

Printing Pressure-Sensitive Labels
A Canadian firm offers a Canadian company in the printing industry, under licence, the manufacturing in Canada and the marketing and export rights for Canada and the United States, for a printing press developed for printing pressure-sensitive labels in roll form, designed for the short-run label market and the quick-print industry. It is claimed to be easy to operate and maintain.
Write to: David H. Baldner, Shamrock Label Systems, 1569 Orange Street, Winnipeg, Manitoba R3E 3B5; Tel: (204) 774-5597; Telex: 07-55189.

Portable Multi-Hull Watercraft Kit
A portable kit for assembling a multiple-hulled watercraft, such as a catamaran, from two or more open-hulled boats, such as canoes, has been patented. In one embodiment the kit allows the assembly, using two standard canoes, of a stable catamaran with a large deck surface. The multiple-hulled vessel may be assembled or disassembled rapidly using a novel fastening which allows the deck to be tied down with straps or other suitable hardware. In its disassembled state, the kit and hulls can be carried on the roof of a car or van. In its assembled condition, the deck acts to seal the open hulls, creating a stable, water-tight watercraft of large capacity. The deck is constructed to enable the erection of a tent or similar collapsible shelter. It may include a water-tight, protective shroud around the circumference of the tent and, in one variation, a protective tarpaulin above the tent.
Write to: Victor R. Loffler, 32851 - 6th Avenue, Mission, British Columbia V2V 1Z2.

AUSTRALIA

Tri-Axle Suspension System — 4703-AUA
An Australian firm offers a Canadian company in the automotive/heavy transportation industry, under licence, the manufacturing and marketing rights for Canada for its specially-designed tri-axle suspension system for log-hauling trucks.
Write to: E.D. McComb, Director, Pentarch International Pty. Ltd., 1/224 Wellington Road, Mulgrave, Victoria, Australia 3170.

A Low-Light Miniature Flashlight* — 4703-AUA
The Australian government offers a Canadian company the manufacturing and marketing rights, under licence in Canada, for its invention which relates to a throw-away flashlight incorporating as a complete unit batteries and a LED light source and switch, for use in map reading, keyhole lighting, etc.

Birefringence Compensation in Polarisation Coupled Lasers* — 4703-AUA
The Australian government offers a Canadian company the manufacturing and marketing rights, under licence in Canada, for its invention which relates to a circular laser rod with optical rotator in which non-uniformities in the beam must be reduced or removed to increase the efficiency of the laser operation.

Airborne Measurement of Optical Scattering Coefficient* — 4703-AUA
The Australian government offers a Canadian company the manufacturing and marketing rights, under licence in Canada, for its invention which relates to a method of measuring the optical scattering coefficient of the ocean depth when using a scanning laser beam.

Device and Method for Detecting Antigens and Antibodies
A device for use in detecting or determining the presence of antigenic or haptenic substances or antibodies in a sample. It comprises a number of tubular or capillary elements, each having antibodies, antigenic or haptenic substances attached to the internal surface, and a means for causing fluids to pass simultaneously or sequentially through the many capillary elements.
Write to: Commonwealth Serum Laboratories Commission, 45 Poplar Road, Parkville 3052, Victoria, Australia.

Aero-Medical Retrieval Unit* — 4703-AUA
The Australian government offers to a Canadian company the manufacturing and marketing rights, under licence in Canada, for its invention, a dual-action transportable aero-medical unit for treatment and transportation of newborn babies from one locality to another by helicopter, plane or road ambulance. A completely self-contained unit offering full medical facilities to a newborn baby, operating either from available power supply or self-contained batteries. Prototype built and placed into actual hospital use.

For information on the above, marked with an asterisk, **write to: Patents and Licensing Section, Marketing Branch, Office of Defence Production, Department of Defence**, Canberra, ACT, 2600, Australia; Tel: (062) 48 2111.

Anti-Ballistic Screens
An Australian company offers under licence to a Canadian firm the rights to manufacture in Canada its line of "Anti-Ballistic" screens. The Safetell Security Screen system is specially designed to withstand an "Armalite" bullet. Made of thick aluminum, it catches projectiles fired into it. The screens can be lowered or raised within seconds, completely securing an area of at least two metres in height above a teller's station, and can easily fit unobtrusively into any existing decor while offering maximum security.
Write to: R.C. Coyne, Marketing Manager, Safetell Australia Pty Ltd., 4-6 Somerleigh Road, Laverton North, Victoria 3026, Australia.

Steel Curtain Roll-Up Doors
A Western Australian company offers under licence or joint-venture arrangements to a Canadian firm, with necessary plant or willing to invest in a plant, the rights to manufacture in Canada its continuous steel curtain roll-up doors for domestic and industrial use.
Write to: Cleveland Industries Pty Ltd., c/o Senior Trade Commissioner, Australian Trade Commission, P.O. Box 69, Commerce Court Postal Station, Toronto, Ontario M5L 1B9; Tel: (416) 367-0783; Telex: 06219762.

BELGIUM

(European Communities)

Plastic Tubes and Pipes
Spanish manufacturer of helically-welded, large-diameter pipes, plus replated coatings, wishes to co-operate in joint venture or manufacture under licence with firm manufacturing plastic tubes and pipes (for gas and water services) and/or plastic coatings for metal pipes.
Ref. No: BRE/8578/31
Write to: Business Co-operation Centre, 6 Rond-Point Schuman, Boite 3, B-1040 Brussels, Belgium.

BRITAIN

Industrial Pallet Converters
A British firm offers a Canadian company a licence to manufacture and market its "PALLETOWER SYSTEM". The system allows the pallets to be converted into numerous shaped shelves and containers for industrial use.
For more details contact: Palletower (G.B.) Limited, Orket House, Heyes Lane, Alderley Edge, Cheshire SK9 7LE, England.

FRANCE

Snowshoe-Ski
A French firm is offering a Canadian polyethylene plastics firm the exclusive rights to manufacture and market in Canada and the United States its snowshoe-ski, used to carry or pull loads across deep snow.
Write to: Paul Hubert Brunel, Manager, Société SEPCAN, 46, rue Président E. Herriot, 69009 Lyon, France.

Sail Catamaran and Power-Driven Outboard All in One
A French firm involved in the manufacture of sailboats is looking to enter into a licence agreement with a Canadian company to manufacture the floats and fibreglass pieces used in its power-driven, out-board, the SEA BOB and its sail catamaran the TWIN SURF CATAMARAN. These two boats use the same floats, which may be used separately as sailboards, thanks to a very simple mounting system. The aluminum mounting kit alone is different.
Write to: R.E.E.L. S.A., 6, rue Hernoux, 21000 Dijon, France.

Building Construction and Timber Industry
A French firm is offering a Canadian wood processing or public works and construction firm the right to manufacture and market its Libres Espaces wood-frame house construction system under licence in Canada. This system uses wood, plywood, particle board and insulating techniques allowing two essential functions to be executed in a single operation, namely, the Wall and the Roof.
Write to: Guy Lemerre, LIBRES ESPACES, Industrial Process Engineering, 10, rue Sadi-Carnot, 14300 Caen, France.

GERMANY

Manual Road-Marking Machine
A West German company offers under licence to a Canadian firm the rights to manufacture in Canada its two-component cold plastic thickline road marking machine which is manually guided and suitable for city and country road marking with minimal disturbance to traffic.
Write to: Canadian Consulate General, Esplanade 41, 2000 Hamburg 36, Germany (FRG).

Electronic Components Containers — Ref: 01
Fully closable container for the storage of electronic circuits (components). The material holding the components is an electrically conductive foam, with an inscribable surface. Allows high-density but clearly organized storage of components, enabling them to be found quickly when needed. For use by software and service departments of computer firms and by amateur electronics enthusiasts.
Patent pending; functioning prototype available; ready for mass production. Licence agreement sought.

Liquid Crystal Layers Control — Ref:03
Circuit for control of liquid crystal layers, allowing the direction of transparency to be adjusted uniformly over the area of a quadrant. Cell degradation is avoided; power consumption is low. For use in windows for buildings, vehicles and aircraft, and in vehicle anti-dazzle rear-view mirror system featuring instantaneous, infinitely variable dimming.
Patented; functioning prototype available; ready for mass production. Licence agreement sought.

Iron Casting Technology — Ref: 04
Process for producing castings made of cast iron with spheroidal graphite with a bainitic/austenitic structure, in such a way that the mechanical properties of this material are largely equivalent to those of low-alloy heat-treatable steels. Advantages are lower component weight and lower production cost, and what in some cases is a very great increase in life. For use in highly stressed crank shafts, railway wheels, and as a substitute for wrought steel, cast steel and components made of case-hardening steels.
Patented; ready for mass production. Licence agreement sought.

Ball Valve for Variable Flow Control — Ref: 06
In connection with the demand for digital flight-control systems, a fast-switching, magnetically operated electrohydraulic 3/2-way ball valve has been developed, with variable flow control achieved by pulse-width modulation. Switching time less than 1 ms. Pressure from 0 to 300 bar. Rigidly constructed and only a few cm in size. Usable for fast and precise microprocessor-driven control of electrohydraulic actuators for all kinds of machinery.
Patented. Licence agreement/contract with manufacturers of control for all kinds of machinery.

Heat Exchange System — Ref: 07
Heat exchange system, working with the latent heat of fusion or solidification. A liquid flows in bubble form through a second liquid which is immiscible with the first and which acts as a heat reservoir. When heat is taken off by the first liquid bubbling through, the second crystallizes at the lower range of the working temperature. When heat is added with the first liquid by means of special nozzles, the crystallized matter liquefies again, after which heat can be taken off as before. The system can be run with low-temperature heat, for instance taking a sodium sulphide solution as the reservoir liquid. For use in heat reservoirs in solar energy systems or other kinds of low-temperature heating systems.
Patented; functioning prototype available. Licence agreement/contact with manufacturers of heating apparatus, etc., sought.

Smoke Gas Heat Exchange System — Ref: 08
Patented system reduces SO_2 emission of central heating installations up to 90 per cent (residues are in dried substance). Available as module for new and, as service kit, for older boilers, it increases efficiency by lowering the smoke gas temperature.

For the above offers write to:
Canadian Embassy, Commercial Division, Friedrick-Wilhelm-Str. 18, D-5300 Bonn 1.
Please refer to Reference No.

Mechanical Drive Device
Mechanical drive device with which a moving car wheel can be used to drive tooling, equipment and machinery at power levels of up to 20 hp. This gives a drive potential independent of a fixed power supply. For use in DIY applications, agriculture and disaster emergency services.

Patented; functioning prototype available; ready for mass production. Licence agreement/production partner in mechanical engineering industry sought.
Write to: Albert Diets, Muhlgasse 37 D-6309 Rockenberg 1, Tel: 06033 - 66980.

Mechanical Foaming Machine
The "Hansa-Mixer" is a mechanical foaming machine for processes such as the coating, finishing, pasting and laminating of flat surfaces in the textile, paper, furniture and building materials industries. It is suitable for use throughout the food industry (except the water/sugar/glucose sector) and in particular in the mass-production baking industry. Future use in the waste water industry is also planned. Used instead of fluidics for foam production, the machine can reduce material costs, energy costs and waste water, and give a superior end product.

Patented; ready for mass production. Sales and distribution agreement sought.
Write to: Hansa Industrie-Mixer GmbH & Co. KG, Kronsbruch 6-8, D-2805 Stuhr 1/Heiligenrode, Tel: 04206-9084/9086, Telex: 24609 him / Germany (attn: Herr Kupfer/Herr Kerl).

INDIA

Foam Polymeric Material
An inventor from Calcutta, India, offers a Canadian company in the field of polyurethane chemistry, under licence, the manufacturing in Canada and marketing and export rights for Canada and the United States, for his process for manufacturing foam polymeric material from carbonaceous waste. It is claimed that the product has excellent dimensional stability and does not expand when subjected to weathering. It is less expensive than conventional foam, odour-free and can be made totally non-flammable. Its quick setting and excellent compressibility makes the product suitable for the construction industry.
Write to: Santanu Roy, c/o Dr. James R. Keneford, Herridge, Tolmie, 50 O'Connor Street, Suite 1400, Ottawa, Ontario K1P 6L2; Tel: (613) 235-7234; Telex: 053-3323.

ITALY

Internal Combustion Engine
This internal combustion engine performs the thermodynamic cycle partially inside the cylinder, with the piston connected to the crankshaft, and partially in a turbo-supercharger. The final stage of the expansion of the burnt gasses and, simultaneously, the suction and the first phase of compression of the air takes place in the turbo-charger. The compression is completed in the cylinder, continuously and without any partialization.
Write to: Guidoboni, Laerte, Italy.

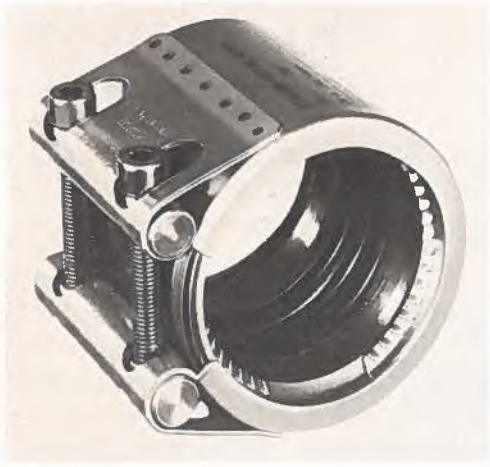
SWEDEN

Arrangement in Spring Suspension Systems, Particularly for Vehicles
An arrangement in spring suspension systems, particularly for vehicles, for allowing movements with most or all degrees of freedom between two bodies and with a frequency range of from 1-5 000 Hz. The arrangement comprises at least one spring member mounted between the bodies and formed with a rigid cylindrical outer surface axially of which the spring member is resiliently deformable. The spring member is connected laterally between its ends with one of the bodies by a supplemental elastomeric spring. The supplemental spring means surrounding the cylindrical outer surface of the spring member so as to allow resilient universal tilting movements of the spring member from a centre position, while the spring member is connected with the other body by an articulated end on the spring member.
Write to: Mining Transportation Co. AB, Box 99, S-981 22 Kiruna, Sweden.

Heat Pumping Process Based on the Principle of Absorption
Phosphoric acid, especially orthophosphoric acid, is employed as the absorption medium in an absorption heat pumping system using water as its working medium. The acid may contain additions of corrosion inhibitors and/or boiling point elevating agents if desired.
Write to: Scandiaconsult AB, 7, Kapellgrad, S-116 21, Stockholm, Sweden.

SWITZERLAND

Telephone Exchange System
A Swiss firm is offering Canadian companies, through a joint-venture arrangement, technology related to its "Telephone Exchange TELITCH". This is claimed to be one of the most modern telephone exchanges for connections on local battery as well as telex connections and transmission of data. It is fully electrical and cordless with very simple handling. This system could be used for military purposes, civil defence and civil communication.
Write to: Indigel AG, Schaffhauserstrasse 34, CH-8450 Andelfingen/Switzerland.



Pipe Joining System
European producer seeks Canadian partner for distribution and technical support, as well as for production after a successful introduction phase, of its new pipe-joining system, employing new technology already proven in world markets. This unique patented device couples or repairs pipes from 3.8 cm (1½ in.) to 198 cm (78 in.) diameter better, faster, more easily and more economically than traditional methods. Eliminates costly treatment of pipe ends (welding, threading, grooving, bordering, etc.). Partner should have a well-developed program in piping components, valves, pumps, etc., and good connections to all potential users.
Write to: "COUPLING", Kurt M. Frey, Commercial Officer, Canadian Embassy, Kirchenfeldstrasse 88, CH-3005 Berne, Switzerland; Tel: (41-31) 44-63-81.

Universal Experimental System for Digital and Linear Circuits
A Swiss firm is offering Canadian companies, through a joint-venture arrangement, technology related to its "Experimental Board TP". The latter is specially suitable for high-quality digital, microprocessor and analogue controls. Most important characteristics: due to screening, highest work frequency to 10 MHz is possible; connections without soldering with high elastic cables; 3 × 8 LED-lamps for indication of static control state, involved generator and network equipment. Digital and analogue controls are possible at the same time. Large accessory of adapters.
Write to: Indigel AG, Schaffhauserstrasse 34, CH-8450 Andelfingen/Switzerland.

U.S.A.

Fold-A-Bar
An American inventor offers a Canadian company in the leisure products industry, under licence, the manufacturing in Canada and the marketing and export rights for Canada and other countries for his invention, a Fold-A-Bar which carries everything to a party site in one hand. Included are an ice bucket, refreshments and glasses with built-in holder. It won't tip or spill, folds compactly for easy storage and is perfect for patio, pool, deck, boat, picnics or parties.
Write to: David B. Ruber, Ever-Wear, Inc., 7817 Luna, Morton Grove, Illinois 60053.

Variable Bore Ram
A blowout preventer and a seal are patented for sealing about pipes or other objects in a well bore. The seal element is a semi-circular section of resilient, compressible material having a semi-circular inner surface to engage the pipe-embedded radially disposed support elements. These have anti-extrusion members which serve in combination with overlapping ram block members to prevent extrusion of the resilient material from the top and bottom of the seal. The top and bottom members are stair stepped and have interlocking fingers and recesses and are adapted to slide radially and circumferentially. Flanges on the seal element are provided with top and bottom plates each of which overlaps at least one support element.
Write to: Hydril Company, 714 West Olympic Boulevard, Los Angeles, California 90015.

Feedthrough Terminal for High-Power Cell
A feedthrough terminal has been patented for a high-power electrochemical storage cell which provides low resistance coupling to the conductive elements therein, while isolating the terminal electrode from the highly corrosive environment within the cell. A large diameter, cylindrical copper electrode is enclosed in a stainless steel tube with a BN power feedthrough seal maintained around the stainless steel tube by means of facing insulative bushings and an outer sleeve. One end of the copper conductor is silverbrazed directly to a flat, "butterfly" bus bar within the cell, with the adjacent end of the surrounding outer feedthrough sleeve welded to the bus bar.
Write to: United States Department of Energy, Washington, DC 20585.

REQUESTED

CANADA

Method for Object Measurement and Determination
A Canadian inventor seeks suitable licensing or joint-venture arrangements with a Canadian company interested in the further development of a patent pending method for object measurement and determination. The dimensions and other characteristics of an object are measured as it slides freely past a special arrangement of sensors and electronics. The method has specific application in coin validation equipment as well as in other fields requiring the measurement of moving objects.
Write to: J.R. MacDonald, P.Eng., Antares Electronics Engineering, P.O. Box 11204, Stn. H, Nepean, Ontario K2H 7T9; Tel: (613) 825-6259.

Advanced Non-Linear Disc Propulsion System
An Ontario company is developing (after successfully testing an earlier concept/working prototype) an advanced non-linear disc propulsion system. It seeks joint-venture/equity funding to further develop the second generation system which is now 70 per cent complete. This new high technology disc system, weighing approximately 90 kilograms (200 pounds), has been computer modelled to project 900 kilograms (2 000 pounds) of thrust which is industrially applicable to the defence/aerospace/marine industries for use in mini/shuttle orbital vehicles, satellite orbital adjustment systems, and marine vessel applications. This advanced propulsion system uses magnesium discs, electro-mechanical electro-magnetic pulse generators, infrared sensors, and advanced state-of-the-art solid-state electronics with a continual accelerating capability.

Advanced Lift and Field Resonance Generation Technology
An Ontario company is developing an advanced second generation model of an advanced lift and field resonance system that vertically and horizontally displaces, molecularly disintegrates and/or laterally shreds into micro-ribbons specimens of aluminum, steel, copper, ceramics and wood. This technology uses advanced electronics, field generators, applies components of Nikola Tesla, and uses an additional combination and application of frequency modulation to create an envelope of field resonance surrounding and through metal specimens. Seeking joint-venture/equity funding/manufacturer participation to further develop system and to develop a production prototype for defence, aerospace and industrial development applications.
For more details on these two ventures, write to: T.A. McNally, Advanced Technologies Canada, Inc., 32nd Floor, Toronto Dominion Bank Tower, Box 65, Toronto-Dominion Centre, Toronto, Ontario M5K 1E7; Tel: (416) 836-1000.

Mining Venture
A Canadian corporation is looking for a successful Canadian mining operation willing to form a joint-venture.
If interested, please contact J.A. Wright, Bellechasse Mining Corporation Ltd., P.O. Box 24517, Houston, Texas 77013, U.S.A.; Tel: (713) 672-6647.

BELGIUM

(European Communities)

Off-Set Printers
Danish off-set printers seek co-operation partner for exchange of research and know-how or working under licence.
Ref. No.: BRF/8520/47

Packagings
Swedish plastic injection moulder of packagings seeks a partner for manufacturing and marketing of packagings with a unique in-mould decoration.
Ref. No.: BRE/8665/48

Cold-Extruded Metal Articles
Spanish manufacturer of cold-extruded metal articles seeks partner manufacturing cold or semi-hot extruded metal articles and making automated tools and equipment for exchange of technology and know-how.
Ref. No.: BRE/8579/31

Hardened Steel Articles and Tools
Spanish manufacturer of hardened steel articles and tools (drills and milling heads) seeks partner for exchange of technology and know-how.
Ref. No.: BRE/8580/31

Glass/Resin Fibre
Spanish manufacturer of laminated sheet, compression mouldings, tubes (filament winding) and (hand-up) contact mouldings for automated electrical and thermal machinery seeks partner, manufacturing glass/resin fibre based electrical insulators, for joint product development and exchange of technology.
Ref. No.: BRE/8582/31

Asbestos and Mineral-Wool Based Products
Spanish manufacturer of asbestos and mineral-wool based insulating and sealing products and asbestos clothing and equipment seeks partner engaged in the same activity for exchange of technology and know-how and development of substitute products.
Ref. No.: BRE/8584/24

For More Information on these and other requests please write to:
Business Co-operation Centre
6 Rond-Point Schuman
Boite 3
P-1040 Brussels, Belgium
Please indicate Reference No.

BRITAIN

Drives, Clutches and Related Products
British firm involved in power transmission drives is looking for appropriate Canadian technology to diversify its product line.
For more information please contact: I. Bier & Son (Overseas) Ltd., Kemp House, 152/160 City Road, London ECIV 2PE, England; Tel: 01253-6173.

SPECIAL EVENTS

CANADA
- First Workshop on Operational Meterology/ Winnipeg-February 1986

GERMANY
- Hanover Fair/Hanover-April 1986

CANADA
- Petroleum Industry's Annual Safety Seminar/ Banff-April 1986
- Colloquium IV/Lake Louise-April 1986
- EXPO '86 / 1986 World Exposition/Vancouver-May-October 1986 .

U.S.A.
- TechEx '86 AMERICAS/Orlando-May 1986

CANADA
- World Congress on Education and Technology/Vancouver-May 1986
- Twentieth Annual CMOS Congress/Canadian Hydrology Symposium: 86/Regina-June 1986
- 1986 National Petroleum Show/Calgary-June 1986
- Renewable Energies '86/Winnipeg-June 1986

U.S.A.
- 1986 Process and Materials Quality Conference/Atlanta-September 1986

FRANCE
- 13th Congress of the World Energy Conference/Cannes-October 1986

CANADA
- 1986 International Printing and Graphic Arts Conference/Ottawa-October 1986

CZECHOSLOVAKIA
- INVEX '86 / 9th International Exhibition of Inventions and Novel Features/Brno-October 1986

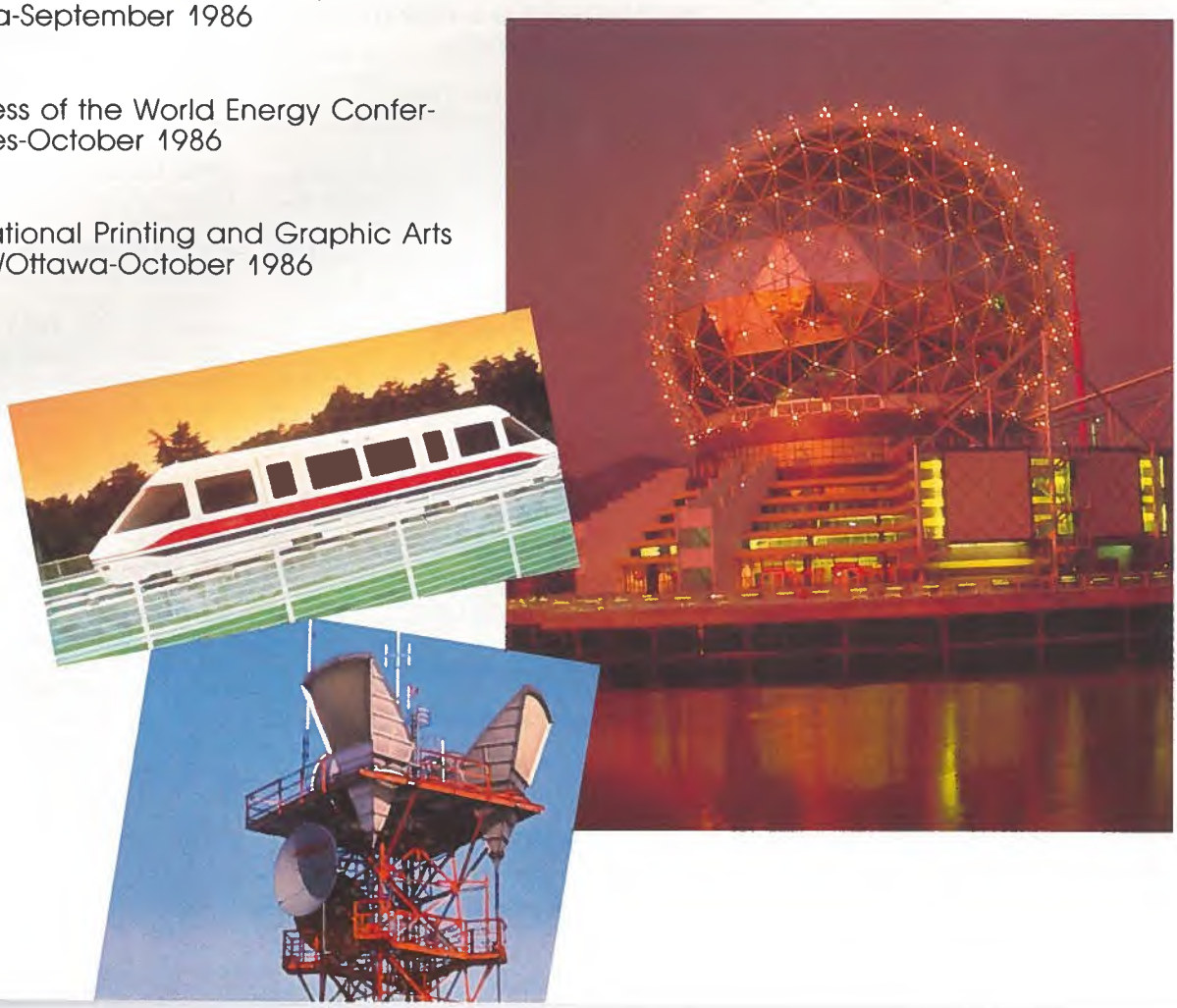
ITALY
- TechEx '86 Europa/Milan-November 1986

CANADA
- Annual Transit Trade Show/Windsor-November 1986

GERMANY
- Technologieforum Berlin/Berlin-November 1986

BELGIUM
- Eureka 35th World Inventions Exhibition/ Brussels-December 1986

FINLAND
- Pulp Washing '87/Mariehamn-May 1987



SPECIAL EVENTS

First Workshop on Operational Meteorology
Winnipeg, Manitoba
February 4-6, 1986
The First Workshop on Operational Meteorology, sponsored by the Atmospheric Environment Service of Environment Canada and the Canadian Meteorological and Oceanographic Society, will be held February 4-6, 1986 in Winnipeg, Manitoba.
For additional information concerning the meeting, please write to:
Program Chairman, Louis Legal
18 Alburg Drive
Winnipeg, Manitoba
R2N 1L9
Tel: (204) 949-2071

Hanover Fair
Hall 7, Hanover Fairgrounds,
Hanover, West Germany
April 9-16, 1986
Contact: Mr. Wiegmann
Deutsche Messe und Ausstellungs AG
Messelaende, D-3000, Hanover 82
West Germany
Tel: 0511-89-2735
Telex: 992728

Petroleum Industry's 35th Annual Safety Seminar
Banff Park Lodge
Banff, Alberta
April 30 - May 2, 1986
Main topic of discussion will be critical sour gas wells and public safety.
For additional information on the special event, please write to:
Safety Seminar
CANADIAN PETROLEUM ASSOCIATION
1500, 633 - Sixth Avenue S.W.
Calgary, Alberta
T2P 2Y5
Tel: (403) 269-6721

Colloquium IV
Château Lake Louise
Banff National Park, Alberta
April 21 - 25, 1986
The Canadian Hydrographers' Association and the Canadian Petroleum Association are pleased to invite you to a jointly sponsored CHA Workshop and CPA Conference to discuss today's survey challenges, land, sea and space.
For additional information on the CHA-CPA meeting, please write to:
Diana Parnell
CANADIAN PETROLEUM ASSOCIATION
1500, 633 - Sixth Avenue S.W.
Calgary, Alberta
T2P 2Y5
Tel: (403) 269-6721

EXPO '86
1986 WORLD EXPOSITION
Vancouver, British Columbia
Canada
May 2 - October 13, 1986
For more information, write to:
EXPO Information
P.O. Box 1800, Station "A"
Vancouver, British Columbia
Canada
V6L 3A2
Tel: (604) 660-3976

The 21st Event at a New Location
TechEx '86 Americas
EXPO CENTRE
500 West Livingston Street
Orlando, Florida 32801 U.S.A.
May 20 - 23, 1986
TechEx is the largest international fair that deals with new products and technology available for licence. Exhibitors include members of industry and governments, universities and delegates from all major areas where technology is available.
For additional information on the fair, please write to:
Canadian Agent
J.L. Eckebrecht
Lomar Associates
1384 Tyandaga Park Drive
Burlington, Ontario
L7P 1N3
Tel: (416) 632-3863
Telex: (FELL-FAB) 061-8673
or
Dr. Dvorkovitz & Associates
P.O. Box 1748
Ormond Beach, Florida 32075-1748
U.S.A.
Tel: (904) 677-7033
Telex: 810-832-6299

World Congress on Education and Technology
Vancouver, British Columbia
May 22 - 25, 1986
It will be the first major conference of its kind to address the impact of new technology on training, education, culture and society in general.
Titles of the seven themes are:
- Teaching, Learning and Technology
- Management and Technology
- Training and Employment
- The Future Society
- Innovations
- Special Needs and Technology
- Policy and Planning

For additional information on this international event, please write to:
World Congress on Education and Technology
1155 West 8th Avenue
Vancouver, British Columbia
V6H 1C5
Tel: (604) 734-2721

Twentieth Annual CMOS Congress/Canadian Hydrology Symposium:86
University of Regina
Regina, Saskatchewan
June 3 - 6, 1986
For additional information on the CMOS Congress/CHS:86, please write to:
K.H. Jones
CMOS / CHS:86
Environment Canada
P.O. Box 4080
Regina, Saskatchewan
S4P 3W5

1986 National Petroleum Show
CANADA'S 10th INTERNATIONAL MARKETPLACE FOR THE WORLD'S ENERGY INDUSTRIES
Stampede Park
Calgary, Alberta
June 10 - 12, 1986
Canada's largest energy show is held biennially in Calgary, the centre of Canada's oil and gas industry. The show attracts the top specifying and purchasing agents throughout the industry from Canada, the United States and abroad.
For additional information on the energy show, please write to your nearest representative:
Eastern Canada
Joyce Parsons, Show Manager
The National Petroleum Show
1450 Don Mills Road
Don Mills, Ontario
M3B 2X7
Tel: (416) 445-6641
Telex: 06-966612

Western Canada
Ward Brandow, Show Co-ordinator
The National Petroleum Show
Suite 200
1201 - 5th Street S.W.
Calgary, Alberta
T2R 1L1
Tel: (403) 269-3161
Telex: 03-822845

Renewable Energies '86
University of Manitoba Campus
Winnipeg, Manitoba
June 22 - 25, 1986
For additional information on the conference, please write to:
Renewable Energies '86
P.O. Box 1256
Winnipeg, Manitoba
R3C 2Y4

1986 Process and Materials Quality Conference
Waverly Hotel
Atlanta, Georgia
September 21 - 24, 1986
The conference, which is co-sponsored by the Technical Section, CPPA, TAPPI and SPCI, will provide an international forum for dissemination of information relating to methods, techniques and instrumentation useful in quality evaluation of materials, processes and products of the pulp, paper and related industries.
For additional information on the conference, please write to:
David Paterson
Technical Section, CPPA
Sun Life Building
1155 Metcalfe Street, 23rd Floor
Montreal, Quebec
H2B 2X9
Tel: (514) 866-6621
Telex: 055-60690

13th Congress of the World Energy Conference
Palais des Congrès
Cannes, France
October 5 - 11, 1986
An exhibition will be held at the Palais des Congrès throughout the Congress. Its theme will be: "Energy: Current and Future Technology".
For further information, contact:
Dr. C.H. Smith, General Manager
Canadian National Committee
World Energy Conference
Suite 305
130 Albert Street, Ottawa, Ontario
K1P 5G4
Tel: (613) 993-4624
Telex: 053.3117

1986 International Printing and Graphic Arts Conference
Château Laurier Hotel
Ottawa, Ontario
October 21 - 23, 1986
The conference, which is co-sponsored by the Technical Section, CPPA and TAPPI, will focus on the role of paper in printing of the future and will concentrate on the challenge of keeping up with rapidly evolving printing and imaging processes and their demands on paper requirements.
For additional information on the conference, please write to:
David H. Paterson
Technical Section, CPPA
Sun Life Building
1155 Metcalfe Street, 23rd Floor
Montreal, Quebec
H3B 2X9
Tel: (514) 866-6621
Telex: 055-60690

INVEX '86 9th International Exhibition of Inventions and Novel Features
Fair Grounds
Brno, Czechoslovakia
October 22 - 28, 1986
Contact:
Zdenek PLCH, Manager
Brno Trade Fairs and Exhibitions Vystaviste
602 00 Brno, Czechoslovakia
Tel: 314-2942
Telex: 062-294

TechEx '86 Europa
Milan Fair
Milan, Italy
November 4 - 7, 1986
TechEx is the largest international fair that deals with new products and technology available for licence. Exhibitors include members of industry and government, universities and delegates from all major areas where technology is available.
For additional information on the fair, please write to:
Canadian Agent,
J.L. Eckebrecht
Lomar Associates
1384 Tyandaga Park Drive
Burlington, Ontario L7P 1N3
Tel: (416) 632-3863
Telex: (FELL-FAB) 061-8673
or
Dr. Dvorkovitz & Associates
P.O. Box 1748
Ormond Beach, Florida 32075-1748
U.S.A.
Tel: (904) 677-7033
Telex: 810-832-62299

Annual Transit Trade Show
Hilton Hotel
Windsor, Ontario
November 17, 1986
For additional information on the special event, please write to:
Mrs. C. Graefner, Manager of Administration
Canadian Urban Transit Association
Suite 1101, 55 York Street
Toronto, Ontario M5J 1R7
Tel: (416) 365-9800

Technologieforum Berlin International Innovation Market Exhibition and Congress
Berlin, West Germany
November 25 - 28, 1986
For additional information on the fair, please write to:
AMK Berlin
Ausstellungs-Messe-Kongress GmbH
Messedamm 22
D-1000 Berlin 19

Eureka 35th World Inventions Exhibition
Expo Rogier Centre
Brussels, Belgium
December 1986
Contact:
Secretariat
Sogestor S.A.
Rue Duquesnoy 14
1000 Brussels, Belgium
Tel: 02/512.21.87 - 513.16.07
Telex: 62052 sofair

Pulp Washing '87
An International Symposium on the Fundamentals and Practice of Pulp Washing
Hotel Arkipelag
Mariehamn, Aland, Finland
May 19 - 21, 1987
For additional information on the Symposium, please write to:
David H. Paterson
Technical Section, CPPA
Sun Life Building
1155 Metcalfe Street, 23rd Floor
Montreal, Quebec
H3B 2X9
Tel: (514) 866-6621
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Charlottetown
Prince Edward Island
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Local Office:
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Tel: (902) 436-4846

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Halifax, Nova Scotia
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Tel: (902) 564-7007

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770 Main Street
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Tel: (506) 452-3124
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Tel: (506) 648-4791

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Tel: (819) 374-5544
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Tel: (416) 365-3821
Local Offices:
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Tel: (519) 679-5820
Ottawa
Tel: (613) 993-4963
Sudbury
Tel: (705) 675-0711
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Tel: (807) 623-4436

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P.O. Box 981
330 Portage Avenue
Room 608
Winnipeg, Manitoba
R3C 2V2
Tel: (204) 949-6162
Local Office:
Thompson
Tel: (204) 778-4486

1101 – 1055 Dunsmuir Street
Vancouver, British Columbia
V7X 1K8
Tel: (604) 661-0434
Local Offices:
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Tel: (604) 388-3181
Prince George
Tel: (604) 562-4451

Yukon
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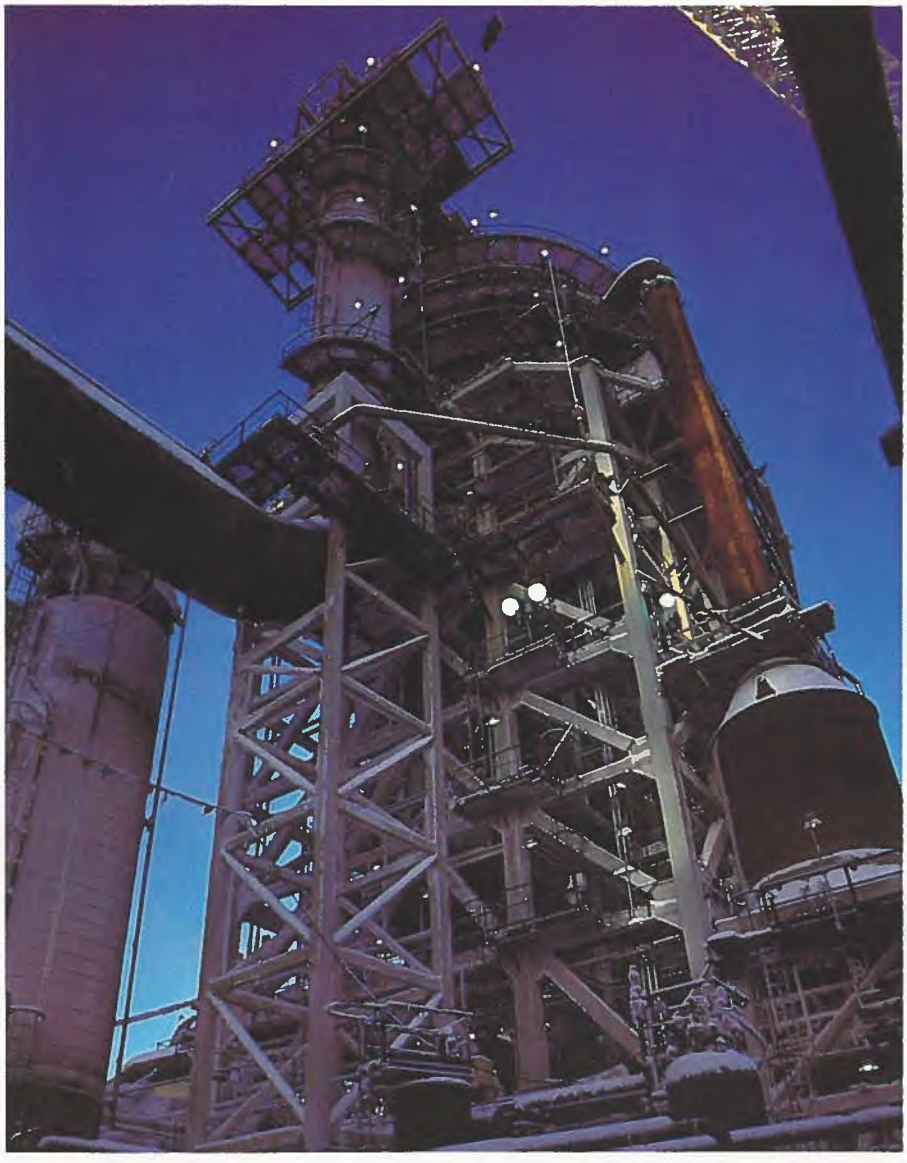
108 Lambert Street
Whitehorse, Yukon
Y1A 1Z2
Tel: (403) 668-4655

Northwest Territories
P.O. Bag 6100
Precambrian Building
Yellowknife, Northwest Territories
X1A 1C0
Tel: (403) 920-8668 or 8571



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