Canada Commerce

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Productivity

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Canada Commerce

The Honourable Edward C. Lumley
Minister of Industry, Trade and Commerce
and
Regional Economic Expansion

The Honourable William Rompkey
Minister of State for Small Business and Tourism

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News Briefs

Good Trade Possibilities With Benelux Countries

Businessmen attending a special seminar held at the World Trade Centre Toronto earlier this year were told that the door is wide open to Canadian firms wishing to enter Europe's Benelux marketplace in the fields of high technology, electronics, energy and consumer goods.

The seminar, part of an export series focusing on Western Europe, highlighted the economic trends and market characteristics of Belgium, the Netherlands and Luxembourg.

Guest speakers from private industry, the federal government and representative trade consulates told the audience that Canadian business is welcome, especially if it can provide innovative, high-technology products or offer technology exchange to the three European nations.

Grants for Industries to Switch to Gas

The federal government is implementing a $25 million program to encourage a greater use of pipeline natural gas. The aim of the program is to reduce oil consumption and contribute to the security of the country's energy supply through a more widespread use of this abundant, domestic fuel.

Under this five-year program (the Industrial Conversion Assistance Program), contributions will be made of up to 50 per cent of the eligible capital costs of converting appliances from the use of bunker fuel oil (No. 6) to pipeline natural gas.

Although the focus of the program is on industry, commercial establishments and private institutions are also eligible. The program is available in all provinces and territories, and will be administered by local gas suppliers.

Federal Support for Skills Training

Employment and Immigration Canada has approved 118 projects to establish, expand or modernize training facilities using $42.1 million from the government's Skills Growth Fund.

The fund, which has allocated $98 million to the end of the 1983–84 fiscal year, was established last August by the National Training Act to accelerate skills development and to help overcome serious shortages anticipated in technical and related occupations. The fund will also permit people who are disadvantaged in the labour force to take advantage of emerging employment opportunities through training especially tailored to their needs.

Both public training institutions and private non-profit training organizations are eligible to submit proposals.

Examples of approved projects are: $2.6 million to New Caledonia College in Prince George, B.C., to set up a training institute for computer-assisted drafting and manufacturing; $692 000 for the Conestoga College campuses in Kitchener and Guelph, Ontario, to start new training programs for occupations such as tool and die makers, mouldmakers, computer programmers and systems analysts; and $958 000 to Holland College in P.E.I. to establish new training programs for systems analysts and programmers.

1983 *Canadian Trade Index* Available

The 1983 edition of the *Canadian Trade Index*, published by the Canadian Manufacturers' Association, is now available. The Index gives a profile of Canadian companies and their products.

The publication is composed of seven sections: an alphabetical list of manufacturers; a geographical section which lists head offices and/or plants by city or town in each province, county, district or populated region; a classified list of products under more than 10 000 product headings; a farm produce section listing agricultural producers and a classified list of products; a services section, which includes listings of government foreign-trade service offices abroad, customs brokers and freight forwarders, highway freight and parcel carriers, airlines, steamship lines, banks, management consultants, export trading houses, and transportation specialists and consultants; a French glossary of all product headings, followed by the English equivalent (Spanish available upon request); and a trade mark section identifying over 22 000 trade marks and/or brand names used by Canadian manufacturers.

In 1982, almost 13 000 copies of the Index were used by buyers to source Canadian-made products — more than 4 600 copies by foreign buyers. A survey undertaken in 1979 indicated that over 60 per cent of users consult their copies regularly, over 50 per cent of them every week or more often.

The 1983 edition of the Index is available from the Canadian Manufacturers' Association, One Yonge Street, Suite 1400, Toronto, Ontario, M5E 1J9. The price is $75.00 per copy plus $3.00 postage (plus Ontario sales tax if applicable).

Conference to Examine Future of Mineral Industry

More than 250 delegates and observers are expected to attend the first Canadian Mineral Outlook Conference being held in Ottawa May 17–18 to examine the state and future of the mineral industry.

The conference, sponsored by the Department of Energy, Mines and Resources, will include representation from the various organizations and associations composing the mineral industry as well as from the federal and provincial governments. Topics to be examined include mineral policies, investment, taxation, resource base strategy, research and development, the impact on communities of changes in the industry, and the impact of international developments in minerals.

It is hoped the conference will become an annual event.

Major Wage Settlements Lowest in Four Years

Labour Canada has announced that the average annual increase in base-rate wage settlements in the fourth quarter of 1982 declined to 7.3 per cent — the lowest figure since the second quarter of 1978. It was also the fifth consecutive quarter in which the level of wage settlements declined. Fourth quarter wage settlements totalled 125 major agreements involving 343 455 employees in all industries excluding construction. Of this total, 115 agreements were without a cost-of-living clause.

(cont. on P. 24)

Companies in the News

Transforming microcomputers and ASCII video display terminals into full-screen IBM 3270 terminals is the job of a new protocol software package from Aztek Computing Inc. of Ottawa. Aztek's Ed Sterling holds the protocol tape that runs on an IBM mainframe under the VM operating system without any hardware or system modifications.

Hanson-Mohawk to get Contribution for Modernization

Hanson-Mohawk, one of the top Canadian manufacturers of men's and ladies' work, sport and fine hosiery, will receive a contribution of $135 775 from the Canadian Industrial Renewal Board for modernization of its plants at Renfrew, Ontario and Hull, Quebec.

The cost of the company's modernization plan is estimated at $427 700. Part of the contribution was awarded to cover a portion of consultants' fees for guidance in management development, advice on control systems, marketing studies and project follow-up.

The CIRB was established by the federal government in 1981 to help restructure and modernize the textile, clothing and footwear industries, to help diversify the economic base of certain designated areas heavily dependent on those industries, and to help workers affected by these changes find new employment.

$16 Million Contract for Flyer Buses

Flyer Industries Ltd. of Winnipeg, the Manitoba government-owned manufacturer of transit buses, has been awarded a $16 million contract to supply 110 diesel buses to the City of San Francisco. The 53-year-old company, which is the major manufacturer of trackless electric trolley buses in North America, produces about 400 diesel and trolley buses a year.

Up to 80 per cent of Flyer's market is in the U.S. Last October the company closed a $25.2 million deal with the City of Chicago for 200 buses.

A Flyer bus ready for delivery to Toronto.

Quasar Systems Revenues Up Again

Quasar Systems Ltd., an Ottawa-based computer software firm, recently announced a 70 per cent increase in annual revenues for the third year running. For the 1982 fiscal year, the company's revenues climbed to $18.6 million, while net income rose by 43 per cent to almost $900 000, or 48 cents a share.

In January the company was awarded a $420 000 grant under the Enterprise Development Program of the Department of Industry, Trade and Commerce/Regional Economic Expansion. The federal contribution will go toward an $800 000 research project that will make the company's software compatible with a broader range of computer hardware.

de Havilland Sells Five Dash 8s to Air Atonabee

Air Atonabee — the commuter airline which connects Toronto Island, Montreal, Ottawa and Peterborough — has signed contracts with de Havilland Aircraft for five Dash 8s to be delivered between late 1985 and late 1986. This brings to 45 the number of signed contracts de Havilland has for this aircraft.

The Dash 8s are intended to replace Air Atonabee's ST-27s, which the company has operated since beginning service in January 1975. The acquisition of the Dash 8s means a step-up for the airline from 20-passenger to 36-passenger aircraft.

The total value of the sale is $30 million.

Productivity: It Must and Can be Improved

by P.G. Rivest

Commenting on what he called the "perennially unfavourable climate towards productivity issues", the director of one of the largest and most dynamic national productivity centres once said that "the climate in industry and commerce never seems to be favourable for people to become concerned with productivity problems".

If the economy is booming, he went to explain, managers are too busy running their production lines and meeting orders to be concerned with the "rather lofty concept" of productivity; and if, on the other hand, the economy is weak, they become too preoccupied with their immediate survival to spend time worrying about their productivity.

Back in the early 1970s the then Department of Industry, Trade and Commerce first attempted to introduce a practical productivity improvement measure and initiated an interfirm comparison program which would look exclusively at productivity measures. It was soon realized that this approach did not have the necessary appeal to draw the attention of business managers in order to obtain the voluntary participation of large numbers of firms.

It was, therefore, necessary to develop a program which would concentrate on the analysis of the financial performance of companies, as this was of more direct interest to management and more readily understood, but which would also incorporate productivity measures.

Everyone Stands to Gain

The current economic crisis is certainly having a profound impact on the attitudes of managers and workers alike towards productivity. In view of spiralling prices and increasing competition in domestic and export markets, people have come to realize, unfortunately in an extremely painful way, that the safest road to a permanent economic recovery is to produce more and better goods and services with less resources — improved productivity.

This is what productivity is all about — the degree of success we have in the effective utilization of our resources, both human and physical. And if we are successful, all segments of society will benefit. In fact, all social and private betterment for which we strive can only come from productivity gains — increased real earnings and more jobs for the workers; better returns for investors and entrepreneurs; improved social services through governments; and lower prices for the consumer.

It would be to dream of utopia to think that we could all fullfil these aspirations if we don't want to first increase the collective wealth that can be shared. This is true at the enterprise level just as much as it is true for society as a whole.

If management wants bigger profits or if labour asks for higher wages or if governments need more tax revenues, the ratio of output per unit of input will have to be increased; otherwise, the price of the end-product or service will necessarily rise with all the ensuing problems that such action entails in a competitive environment.

There Are Barriers to Overcome

In spite of the renewed interest in productivity, there are still many obstacles to be overcome when the time comes to do something about it. Many of these barriers are the results of a misunderstanding of what productivity is, and of what it can do for the main parties involved.

Partly because there may have been unfortunate experiences in the past and partly because the productivity concept is not properly explained, labour tends to look with suspicion at the efforts made to advance productivity. Productivity is regarded purely as working harder and sweating more, whereas productivity gains should normally be accompanied by — and result in — more satisfactory working conditions for the workers. Also, too often productivity is equated with the loss of jobs. This perception is the result of a false approach to the productivity concept.

The point is that if a more efficient utilization of resources within a firm could mean that fewer workers are required to produce the same quantity of goods or services and that a few jobs are eliminated, a declining or even stagnant productivity could well mean the disappearance of the firm with the elimination of all the jobs it created. Actually, by increasing its productivity, this firm will become more competitive and will likely increase its sales, which will result in more, not less, employment.

Molten metal — Canada's steel industry.

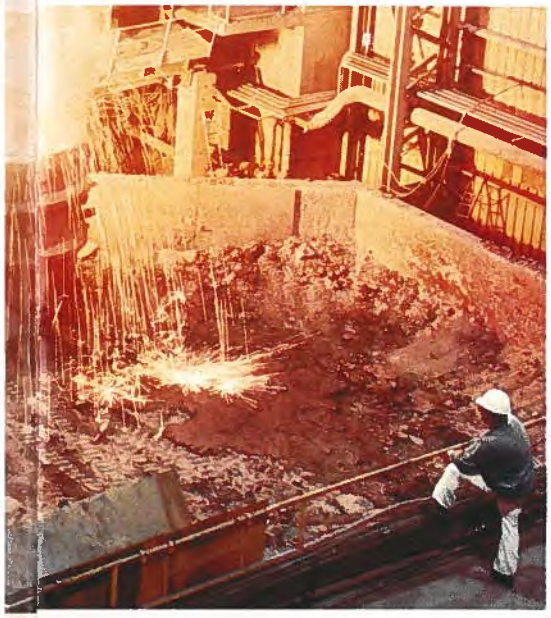
From the point of view of management, because the struggle for improved productivity calls for concerted action on the part of both management and labour, there might be fear of an invasion of management prerogatives by labour. There may also be a natural resistance to change, and productivity advances often imply profound change in the ways things are done and above all in the approach of looking at problems.

The Importance of Measurement

In the same manner as a doctor first makes a diagnosis of a patient before applying a remedy, managers want to determine where the problems are in order to take the most effective corrective action. With a clear knowledge of what is going wrong in his organization

or of what is not utilized to its full potential, a manager can make better choices between various alternatives offered to him and find more justification for the expenditures to be made.

The systematic productivity measurement approach used in Interfirm Comparisons (Canada Commerce – November 1982 Issue) has proven effective in involving and stimulating continuing action on the part of management to improve productivity. Specific measures mean a lot more to management than the mere listing of abstract theories. There is a great deal of difference between saying that a given action will help improve productivity and stating that it will raise the output per hour worked by some 20 per cent.



True, measurement is not an easy task and there are all kinds of problems associated with developing comparable measures between firms or overtime. But the argument that a function cannot be measured is often exaggerated and used as an excuse for not taking action. The president of a successful firm, taking part in an interfirm comparison, remarked that "the demise of the industry is partially due to the inaccurate, incomplete and inconsistent cost and accounting information available to executives of other companies within the industry".

Much Room for Improvement

The analysis of the productivity level of companies engaged in similar activities has revealed that there are wide variations between companies. Productivity, as expressed in terms of value added per hour worked, varied by 7.6 per cent to 116.1 per cent between the median and best performing company, and 29.2 per cent to 412.4 per cent between the lowest and highest performer for a number of industry sectors in which interfirm comparisons were conducted during the past two years.

These wide variations within sectors that have been narrowly defined in order to ensure maximum comparability between firms, clearly indicate that there is ample room for productivity improvement in most organizations. It should be pointed out that according to studies conducted earlier in other industry sectors and which have looked at multifactor productivity measures, similar results have been obtained, i.e. wide differences have also been observed in productivity performance.

Knowledge Stirs Up Action

The awareness that significant potential exists for productivity improvement in an organization does not leave management undisturbed. There is an immediate desire to know what are the main causes for a weak performance and an eagerness to take corrective action. Productivity analysis and productivity improvement go hand in hand. A sad observation is that there are very few firms which have effective systems for measuring variations and changes in productivity relationships, and even fewer know the causes of such variations and changes.

Comparative analyses have led management to act in a variety of areas where performance has been determined as relatively weak. The types of action taken, just like the number of factors affecting productivity, are highly diversified and range from the closer supervision of some specific activities of the production or administrative process to "launching an overall alert throughout all departments" in order to correct identified deficiencies.

Other firms where a low level of productivity was observed, decided to retain the services of a consulting firm to analyze further all aspects of their operations, noting in one case that "we have the potential to become one of the leaders in our area".

Numerous steps can be taken to improve the output side of the productivity relationship. Participants in interfirm comparisons have considered increases in shop size or modifications in the product sales mix, to allow greater sales volume without a corresponding increase in the factors of input. Other steps have included a reduction in the variety of products or in the number of models manufactured, as well as changes in product quality or a review of the pricing structure. A firm determined to "computerize its sales efforts to make more sales possible without additional staff".

All areas of input have also been subject to review, such as the "restructuring of manufacturing and engineering staffs" and a "further review of machinery addition and replacement". Other companies have directed their attention to "taking more care to produce proper run size per various product lines" or have "hired a draftsman who will design various reporting systems".

The attention of a metal producing firm was directed to the "analysis of the flow of materials through the plant", whereas another planned a "re-allocation of staff and increased computer control". Actions have been oriented to analyzing and eliminating the causes of a high labour turnover and at improving manpower utilization through supervisor training, better management control or improved motivation.

A prime consideration is that none of the problems or their causes can be presumed for specific sectors. Each industry sector and each enterprise must systematically review and analyze its own situation and take the steps considered most appropriate for its own needs. But the struggle for productivity growth requires conviction and determination as illustrated by these comments from the president of a farm equipment manufacturing firm upon receipt of a report outlining a rather weak performance: "We hope to use this to double our production per employee and improve our whole operation. We'll do it, I guarantee. I cannot stress too much that we intend to use this study for the next six months to a year."

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The Human Factor In High Technology

by Harry Traynor, Canada Commerce

The high technology involved in producing light-alloy castings for aerospace manufacturers is miraculously reduced to simple, human terms when you are in a jumbo jet thundering along the runway to the point of lift-off. With each engine developing around 50 000 lbs. thrust and turbine inlet temperatures intent upon cresting 2 400F, you suddenly appreciate the logic of subjecting ligh-alloy castings to extensive X-ray and ultra-violet inspection.

Like other Canadian exporters of aerospace products, Haley Industries relies upon illustrated brochures to familiarize potential customers with the manufacturing and test facilities behind a range of items that help to enhance the performance of some of the world's most formidable fighter aircraft, best known airliners and most versatile helicopters. Light-alloy castings are Haley's stock in trade. Aluminum and magnesium castings are designed and produced for a variety of aerospace applications, including the housings for main engine gearboxes, auxiliary power units and auxiliary drive systems. More than half of all Boeing 727s and 737s, and an even greater proportion of McDonnell Douglas DC 9s depend upon Haley castings. Bell and Sikorsky figure prominently in work schedules at the Ontario foundry, as do the manufacturers of engines for such potent fighters as the U.S. F14, F15, F16 and F18.

Although propulsion unit castings perform vital functions, they are not visually exciting, not photogenic, which may explain why photographs of sophisticated processing and test devices are used to enliven the pages of Haley brochures. Back in 1975, for example, company literature gave prominence to the employment of computers, industrial X-ray machines, radiographic and fluorescent penetrant inspection controls. An impressive array of high technology equipment for that period, and especially for an organization with fewer than 300 employees. This was a company that had taken its name from a no-longer-existent railway station situated remote from the main roads that meander through the Ottawa valley. But when magnesium castings account for a sizeable slice of your business, what better location than immediately above a magnesium mine?

The simple logic of building a foundry close to a main source of raw material did not shelter Haley Industries from the chill economic winds that swept through the Canadian aircraft industry in 1957 in the wake of the Arrow fighter's path to oblivion. When Prime Minister Diefenbaker halted Canada's bid for supremacy in supersonic flight,

scores of small suppliers of ancillary aerospace equipment faced the threat of extinction. Haley's plight was doubly critical because survival depended mainly upon domestic orders. The company suffered yet another embarrassment: it was owned by a federal government which wanted to divest itself of a manufacturing operation that rightly belonged in the private sector. Haley Industries Limited (originally Light Alloys Ltd.) was a brainchild of C.D. Howe. The American-born visionary used his Cabinet powers to create an industrial empire that contributed massively to the successful outcome of World War II and also added new and permanent dimensions to the economy and social structure of his adopted country.

No illustrated brochures were produced by the Haley Station foundry during the immediate post-Arrow period. Company finances did not permit such expenditures, nor was the plant a technological showplace. By 1967 not even the trading figures were fit to print: sales of $1 million and operational overheads somewhere in the region of $1.5 million. Little wonder the Ottawa mandarins began to drop broad hints that a certain light-alloys foundry might be for sale. Asking price? One Canadian dollar! That offer didn't cause a stampede. In fact, the only real prospect toured the plant three times and quizzed all senior employees before he recommended acquisition by his employer, Barteco Industries Ltd., of Orillia, Ontario. The 1967 emissary from Orillia was not a chartered accountant, not one of those financial wizards who adopt ailing companies primarily for tax relief purposes. He was a metallurgist, a foundryman with 34 years experience in the automotive, shipbuilding, engineering and aviation industries. He had learned his trade at a hard school, in Scotland, during the depressed 'Thirties'.

Sensitive as he was to the concerns of 180 Haley personnel who feared redundancy, Scots canniness alerted Robert Turnbull to the real cost of revitalizing a run-down foundry. There would have to be major investments in new plant, the latest machinery, sophisticated test equipment. Even so, straitened circumstances in the Canadian aircraft industry meant that he wouldn't fill the Haley order book with domestic business. Exports would have to be increased. But could a small Canadian outfit challenge U.S. castings giants in their own territory and win profitable contracts from engine specialists such as Pratt and Whitney, General Electric, Sundstrand or Garrett? Would British aerospace companies welcome Canadian overtures? And what about France, where factories were busily producing advanced aircraft, space and missile systems?

With each finished casting goes a separate metal sample, its properties measured by microprocessors.

Trade with the United States was buoyant in 1967. But whilst Canadian exports to that country increased by 17.5 per cent, a cool reception awaited any outsider who attempted to open new accounts with American aerospace manufacturers. It was a period when the American aircraft industry was dedicated to a policy of self-sufficiency, not through lack of work for the nation's 100 000 aerospace employees (many of them were on constant overtime, most took home fat pay envelopes), but because American aircraft designers and engineers wanted to reinforce their claims to being the best in the world. In that same year, 1967, such terms as 'advanced technology', 'high technology', and 'technological break-through' gained wide currency in Washington. Capitol Hill politicians peppered their speeches with laudatory references to American aerospace, the high technology industry that had started the year with a $28 billion backlog of business, $10 billion of which was for commercial jets. Aircraft manufacturers were the star performers in 1967, increasing output by 10 per cent, whereas other major sectors of U.S. industry showed little or no improvement over the previous year.

U.S. aerospace statistics brought cold comfort to Robert Turnbull. He ushered in 1968 as the newly appointed president of newly acquired Haley Industries Limited, specialists in light-alloy castings for the aerospace industry.

The recorded history of core casting goes back thousands of years. The Chinese were masters of the craft as early as 400 B.C. From the same part of the world came the first grains of gunpowder, an invention which, at the midway point of the twentieth century,

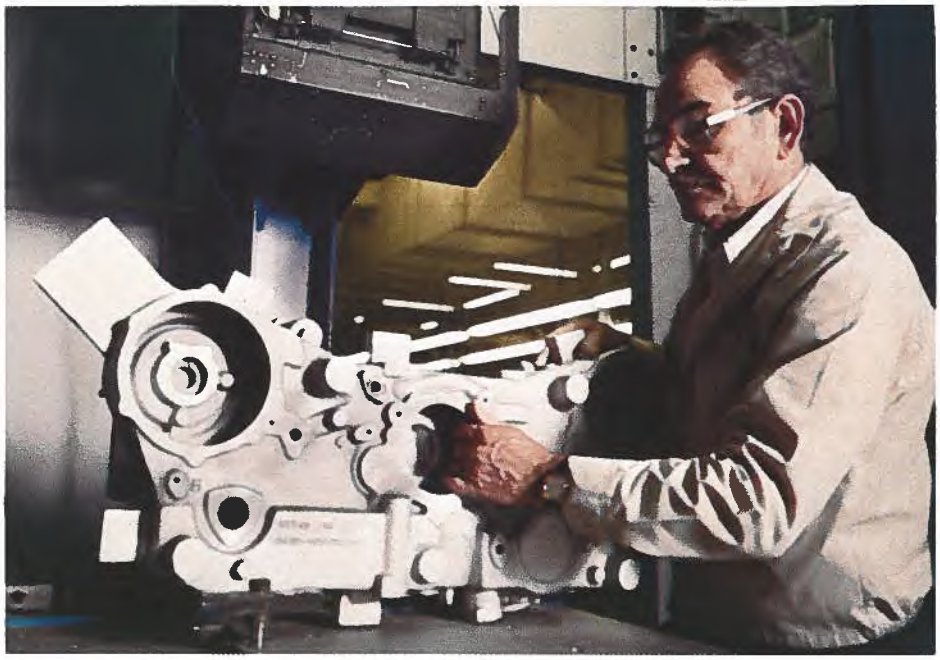
Destined for the world's most successful manufacturer of turboprop engines. Haley light-alloy castings are also used in the power units of most DC9s, Boeing 727s and 737s.

would have a catalytic influence on the evolution of aerospace castings, elevating them to the field of advanced technology. That process was triggered by the Korean conflict which started in July 1950 and gave helicopters their baptism of enemy fire. Like most wartime rookies, helicopter crews displayed a bravado which cost them dearly: time and again small arms fire found its target amidst oil pipes that festooned whirlybird main and auxiliary power systems. Some military analysts, whose limitations as aerospace technologists were more than compensated by seniority of rank, may have advanced the simplistic theory that helicopter engines should be cleared of all vulnerable appendages. Certainly the early helicopter losses in Korea focused attention on engine design features worthy of major modification. Engineers were asked to develop some form of "internal plumbing" whereby vital lubricants could be ducted internally to power plant bearings in different locations. The potential benefits of such modifications were obvious enough, but economies of space, extreme operating temperatures and pressures, metal stresses and a myriad other complex factors reduced the possible design options. Engine technicians appealed to experts in castings light alloys: devise methods of honeycombing casting walls.

The Western allies learned yet another valuable lesson from the air war in Korea: Soviet research and development engineers had done their jet engine homework. Although late starters in the race for jet supremacy, the Communists suddenly unleashed the MIG 15, a high-altitude fighter which proved to be more than a match for most challengers in the Korean campaign. To redress that imbalance, the Americans threw into the fray the then incomparable F 86 Sabrejet. But it was exclusively a weapon of war, and even before the ink dried on Pacific armistice documents, U.S. leadership in the air was once again threatened, this time along commercial air routes, by the British, with the world's first jetliner.

It has been said of Americans that they are slow to anger in the bear pit of international politics, but injure their pride in the commercial arena and they respond with such energy and enterprise that erstwhile rivals are doomed to relegation in the world league.

The British 4-engine Comet started a regular passenger service to South Africa in 1952, fully two years before the Boeing 707 made its first test flight. Britain scored again with a 4-engine turboprop, the Vickers Viscount. In 1955, it became the first foreign airliner to bear the logo of an American carrier and transport U.S. passengers through U.S. air space. One year later, with the Boeing 707 still on proving flights, a Russian passenger jet, the Tupolev Tu-104, inaugurated the Moscow-Peking service.



Casting for the auxiliary drive system for a McDonnell Douglas F 18. More than half of all DC 9s, Boeing 727s and 737s depend upon light-alloy castings produced by the Haley, Ontario, foundry.

All these blows to U.S. aerospace prestige would prove to be blessings in disguise. The dawn of a new era of high technology was about to break, and when it did the most rewarding harvest of manufacturing contracts would go to American companies. Those well earned rewards, in which Canada would share, sprang from the seeds of disaster. Two major calamities over the Mediterranean in 1954 were destined to set new standards for aerospace manufacturers throughout the world. When two de Havilland Comets, pioneers in jet travel, disintegrated in mid-air, the cause was traced to metal fatigue, a defect which suddenly posed an entirely new threat to air safety.

The manufacturer of the ill-fated aircraft subjected a third Comet to simulated flight conditions in a specially designed water tank bristling with telltale dials and recording instruments. That post mortem presented new horizons to aerospace designers. In no other field of human endeavour had there been such precise research, and it was conducted in the interests of countless millions of future air travellers. For 375 days and nights the guinea pig aircraft was subjected to the strains and stresses of varying flight conditions. It was during the 9 000th hour of continuous testing that a rivet in a window sprang loose. Almost immediately a rent appeared in the side of the cabin, solving the riddle of 186 fatalities in the sunlit sky above Italy in 1954.

When Robert Turnbull became President of newly reconstituted, private enterprise Haley Industries in January 1968, he was acutely aware of the foundry's obsolete production and test equipment. But he had in his briefcase personal records of what the main opposition — in the United States, of course — was up to. Modernizing the Haley plant, improving product quality, guaranteeing prompt deliveries and getting down to competitive prices — those were Turnbull priorities. Like a football coach whose own future depends upon swiftly elevating his team from the bottom of the league to a Grey Cup or World Series final, the foundry boss made wholesale personnel changes. And he travelled — to international trade fairs, where trained eyes could absorb high technology invention and innovation; to the Paris and Farnborough (U.K.) air shows, where clients, potential customers and leading rivals show their wares.

The dimensional inspection of light-alloy castings has been reduced from 300 to 40 man hours by employing high technology equipment. Microelectronics allow all measuring operations to be pre-programmed in this 5-axis manipulator.

The federal government, concerned about the aerospace industry, has aided Haley.

Robert Turnbull, President of Haley Industries, believes that striving towards new technological horizons best guarantees healthy balance sheets.

The federal government, concerned about Canada's place in the aerospace industry, and especially in respect to defence commitments, came up with a grant which contributed towards Haley's 1969 modernization program. That $750 000 investment was made in the year when sales topped $2.75 million, or almost three times the 1966 performance, and the balance sheet showed a profit.

Turnbull set his sights on sales of $4.25 million by the end of 1971. He was not to know that North American aerospace would be the victim of a cyclical recession which would close down 75 per cent of the industry's casting capacity and hasten the demise of three world-renowned rivals of the little Ontario company.

Some financial analysts, pouring over Haley balance sheets, might venture the opinion that the company's strength could be traced to stringent economies in operating the plant. But the accountant's definition of cost efficiency are not necessarily those of an airline operator who, flying through U.S. air space, must observe the regulations of the Federal Aviation Administration (F.A.A.). Some of those rules are legacies of death and destruction. Who can forget the day in May 1979 when a DC 10 lost an engine shortly after take-off at Chicago's O'Hare Airport and 272 passengers and crew lost their lives?

The National Transportation Safety Board report on the Chicago tragedy recommended improved monitoring of aircraft production and maintenance. These and other lessons learned the hard way explain why Haley recently completed yet another modernization program. A seven million dollar investment in high technology.

Processing and test equipment installed in the 1969 plant rejuvenation program was replaced by the more sophisticated systems which appeared in 1975 brochure illustrations. By 1980 much of that "gear" was out of date for an industry dedicated to pushing towards new frontiers in air travel. Humans living close to airports demand less engine noise. Airline passengers protest about fare increases, most of them dictated by soaring fuel prices. Regular globetrotters crave more leg room in flight. The answer is obvious, but not simple: design jetliners with more spacious interior accommodation, and with quieter, less thirsty engines.

Even in this era of global recession, conservative estimates of turbine engine costs during the next ten years amount to $100 billion. In a recent technical paper which a propulsion engineer prepared for component suppliers, including manufacturers of light alloy castings, he underlined the need for "basic materials with higher strength-to-weight characteristics, higher temperature resistance and advanced thin-film coatings to take the materials to even hotter temperatures."

The President of Haley Industries is a canny Scot who insists that he "doesn't want to make castings: just money". So neither he nor Greg Kedrosky, company Vice President and General Manager, Operations, believe in filling odd corners of the foundry with microelectronic toys costing millions of dollars. Haley Industries supplies what aerospace customers demand: light-alloy castings accompanied by test equipment printouts of each item's metal composition, dimensions, performance capabilities, tensile strengths and operational temperatures.

With a single Haley casting costing anywhere between $400 and $4 000, who will question the customer's right to specification details correct to five decimal places? Certainly not any of the 41 U.S., Canadian and offshore airline operators whose 270 DC 10s were grounded following the Chicago air disaster in 1979.

Finding a Use for Lasers:
A Scientific and Commercial Success

A sampling of tiny articles marked by the LaserMark system.

The world's third largest commercial manufacturer of lasers is right here in Canada. In little more than a decade, Lumonics Inc. of Kanata, Ontario (just outside Ottawa) has developed laser technology and found commercial uses for it, become a public company to the delight of investors, and enjoyed an ever-increasing sales record that would be the envy of anyone in these recessionary times.

The company — which takes its name from the Latin *lumen* for *light*, and *onics* from the word *electronics* — got its start in 1970 with technology developed by the federal government. In 1968, scientists at the Canadian Defence Research Establishment in Valcartier, Quebec, achieved a breakthrough in laser technology: a laser that could be operated at atmospheric pressure, rather than under the near-vacuum conditions necessary for the operation of most other gas lasers. (*Laser* stands for "light amplification by stimulated emission of radiation".) The new laser was called the TEA (transversely excited atmospheric) laser, and its development pointed to the possibility of constructing a relatively low-cost, compact, but powerful laser which could have many commercial applications.

Enter Lumonics, a company which had been formed specifically to exploit the TEA technology. Early in 1970, the company's founders applied for a licence from the federal agency which licences government technology, for the manufacture and sales rights to this new technology, and operations began in 1971.

A six-year period of product and development work followed — an activity which also captured the interest of the then Department of Industry, Trade and Commerce. In 1971, 1973 and again in 1976, the department provided contributions under the Program for the Advancement of Industrial Technology (PAIT), forerunner of today's Enterprise Development Program.

Although Lumonics had been profitable since 1972 through sales of lasers to the scientific market, the big payoff came in 1976 when the company introduced LaserMark, the trade name for a new laser-marking system. The system imprints a code mark or other message by selectively altering or removing the surface material of the object to be marked. A pulse of light (intermittent as opposed to continuous) from a laser is beamed through a stencil-like device in the form of the desired markings, and then projected through a lens onto the surface of the object.

LaserMark is now in use around the world to mark an immense variety of materials, including barely visible electronic components, beer bottle caps, food packages, electrical and automotive parts and soft contact lenses.

Laser marking was a brand new system when Lumonics introduced it in 1976, and now it's used worldwide.

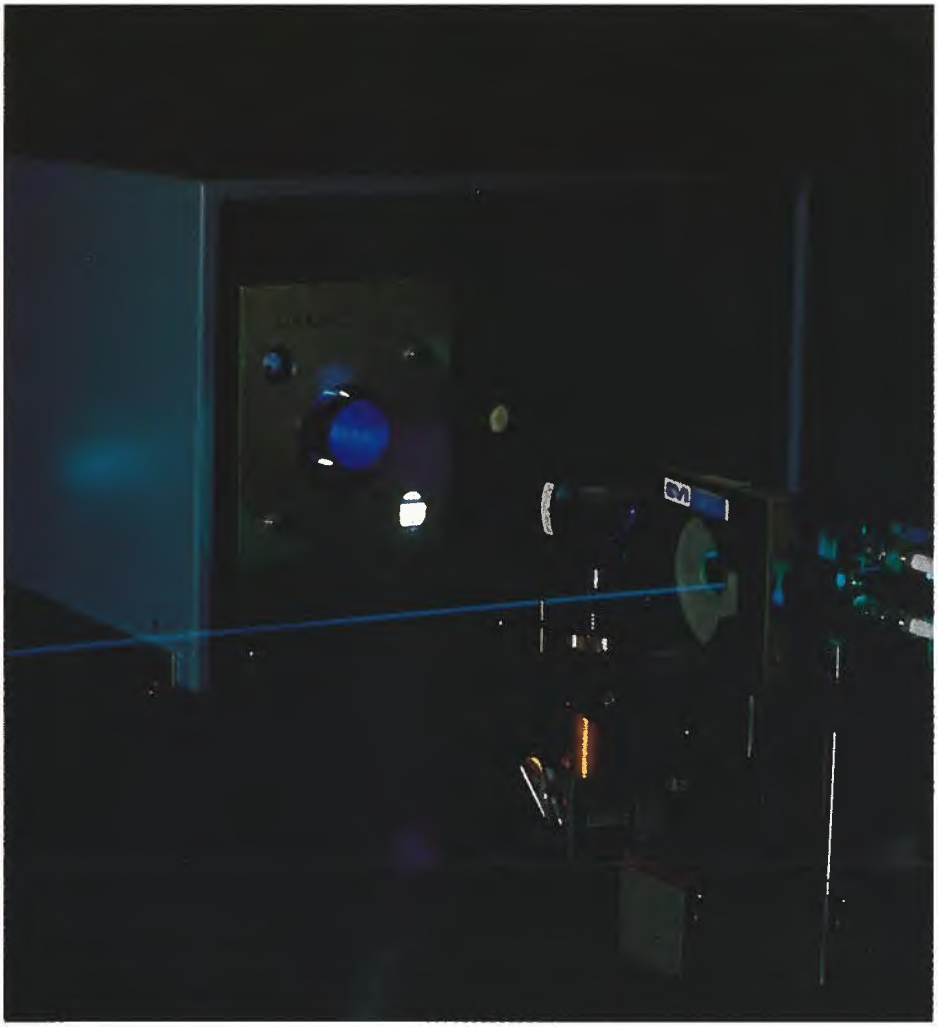
"Laser marking was a brand new system when we introduced it in 1976," says company Chairman and chief executive officer Allan Buchanan, and since then it has taken off as one of the country's hottest exports. More than 90 per cent of sales are outside Canada, with about 60 per cent of that in the U.S. and 30 per cent in Europe and Japan.

Coca-Cola Ltd. was the company's first customer. At first, clients bought single units for up to a year's evaluation. But LaserMark's reputation is so good now that first-time buyers purchase in bulk. Last year, Motorola Inc. bought 15 units to add to the more than 40 they already had in operation.

The average cost of a LaserMark system is about $30 000, although the price will vary with the particular use to which a unit is put. Today there are over 500 LaserMark systems in operation.

After doubling the size of its plant to 50 000 square feet (4 650 m^2), the private firm looked for equity funding in 1980. It also wanted to increase its cash resources so that it could expand through the acquisition of another company. When the firm went public, interest was so great there was not enough stock for the interested buyers.

The LaserMark system being used to mark the caps of Coca-Cola bottles.



Two products for the scientific community: the dye laser in the foreground is being activated by an ultra-violet laser.

Lumonics wanted to acquire a company which manufactured a different type of laser. "Companies tend to specialize in one type," says Buchanan, "because you have to stay right up to snuff in your selected technology." With the acquisition last year of J.K. Lasers of Great Britain, one of the biggest companies of its kind in Europe, Lumonics became the world's third largest manufacturer of commercial lasers.

J.K. Lasers manufactures a solid state laser which is used for drilling, cutting and welding. Solid state is one of the largest selling types of laser, so this acquisition gives Lumonics access to that market without having to develop the technology itself. It also brings the opportunity of marketing the British products in Lumonics' North American markets, and of capitalizing on the subsidiary's European market for the sale of LaserMark.

In November, J.K. Lasers received a bulk order for delivery in 1983 of 100 solid state lasers to a medical equipment manufacturer. The sale, valued at $1.15 million (U.S.), is the company's first in the medical laser market, an area which is expected to expand rapidly.

On the Canadian side of operations, there's another development with a lot of promise for the future. For the past four years, the company has been working on developing industrial applications for yet another type of laser — the excimer. This is a high-frequency, short-wavelength, rare-gas halide laser that differs from the low-frequency, long-wavelength, carbon dioxide laser that the company currently uses in the manufacture of LaserMark systems. The excimer will be used for such applications as metal marking, photo lithography and surface annealing.

"We've got a four-year investment in excimer technology," says the company's president Bob Atkinson, "and we see the potential of opening up all kinds of new markets." This development has also won the support of the Department of Industry, Trade and Commerce, who contributed to the excimer development in 1980 under the Enterprise Development Program.

Just over the horizon is the huge military market, which Lumonics successfully entered only last year through a sub-contract from GTE Sylvania Corp. for the preliminary design of a laser for a U.S. Air Force area detection system.

Companies tend to specialize in only one type of laser so that they can stay on top of their selected technology.

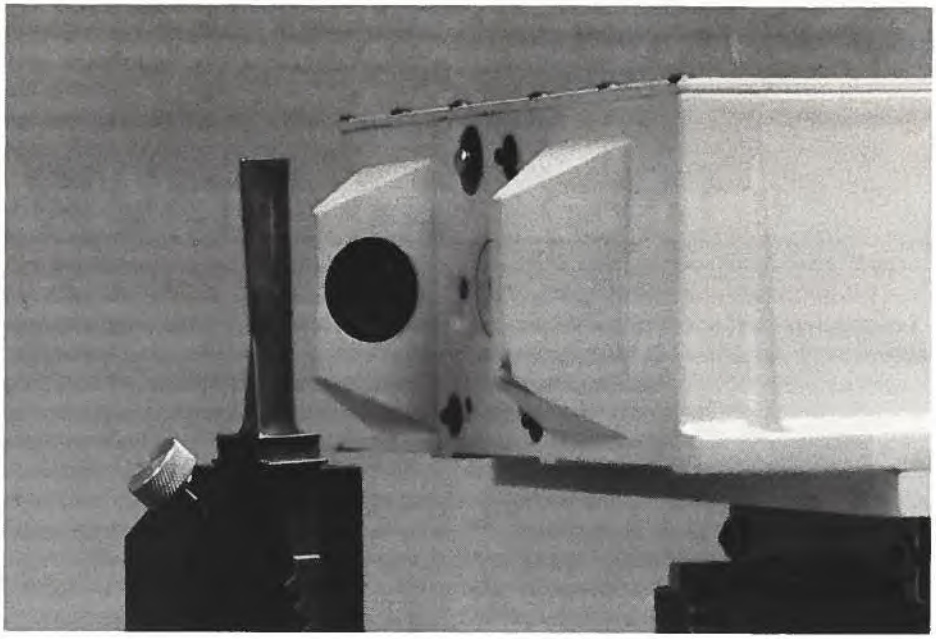
As well as its successful acquisition of J.K. Lasers in 1982, Lumonics also enjoyed a 70 per cent growth in its U.S. industrial markets, and a 100 per cent growth in Japan. During the year, the company established a sales, service, systems engineering and assembly facility in Phoenix, Arizona as well as sales and service offices in Los Angeles and Long Island, N.Y. A Chicago sales and service office, which has been in operation since 1978, was also expanded.

The discharge cavity of a large high-energy laser.

Last year was also marked by the introduction of a new LaserMark model aimed at the packaging industry. It operates at a more moderate speed and is 25 per cent cheaper than previous models.

Although the 1982 fiscal results are not yet available, they are expected to show a 60 per cent increase in sales to the $15 million range, and a 40 per cent or better increase in profits to more than $2 million.

The company employs 135 people at its Kanata base, 75 in England and Europe, and 30 in the U.S.



A Diffracto programmable airfoil contouring system (PACS) using lasers to inspect airfoils.

Small Business

Windsor Company a Winner in Robotics

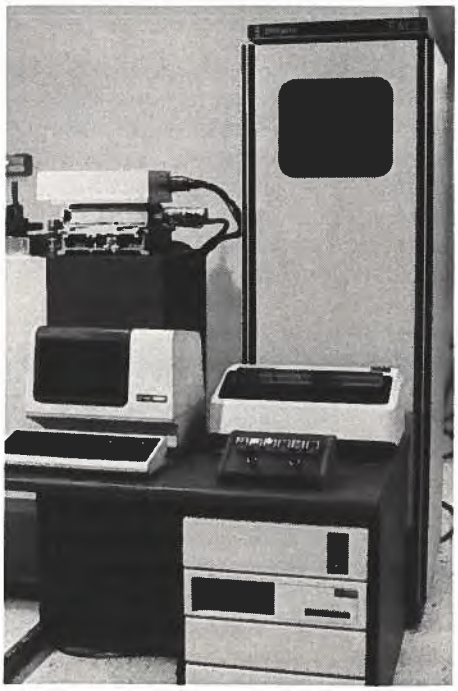
Having already captured a world leadership in the design and manufacture of electro-optical gauging and inspection systems for industrial applications using computer "vision" and lasers, a Windsor, Ontario, company is set to break into world markets with a new product, a logical step from its original products — programmed robotic inspection equipment.

The company, Diffracto Limited, started more than 10 years when three highly qualified Windsor Ph.D. graduates decided to pool their knowledge to design and produce "on-line" industrial gauging and inspection equipment, primarily for the automotive industry but with broad application in other industries.

Sales grew from $30 000 in 1972 to $5.5 million in 1981, proving that the Diffracto founders had an accurate vision. Today, the company is considered a leading world supplier of custom inspection systems based on computer "vision".

Now the company is taking its new step with help from the Department of Industry, Trade and Commerce and Regional Economic Expansion (IT&C/REE).

This newest endeavour — the automatic, programmable robot inspection equipment — builds on the experience gained by the company to date, both from customer and inspection application points of view.



Complete Diffracto PACS system with computer peripherals.

"We are very well positioned to convert this experience and technology base into the robotic inspection of the future," says Diffracto president Tim Pryor.

The initial line of Diffracto products includes a range of electro-optical automatic equipment such as surface flaw detectors, bolt sorters, cylindrical co-ordinate measuring machines as well as automatic inspection equipment and systems.

"Inspection of manufactured products consumes approximately nine per cent of the total manufacturing workforce," Pryor explains. "In any concept of computer-aided or robotic manufacturing, one would naturally tend to single out inspection as a potentially good application area.

"Robotic inspection is indeed one of the few ways one can improve both product quality and productivity at the same time."

The Diffracto project for robotic inspection is broken into three areas — robotic inspection of sheet metal body panels, inspection of gears and the inspection of high tolerance machined parts — designed primarily for the automotive industry.

"We contemplate production of complete robots here (in the Windsor plant) for certain aspects as well as purchase and modification of commercial robots for others," Diffracto President Tim Pryor says. "We have an affiliated company in Germany distributing our products and a recent agreement has been made for a joint venture in Japan where visual robotic inspection hasn't been developed."

Already, a Diffracto robotic inspection system has been sold to a North American automaker.

Diffracto currently occupies some 6 100 m^2 in two Windsor area buildings which include administrative offices, research and development, manufacturing facilities and laboratories. Growing with the times and in a fiercely competitive market, the company has acquired a full range of quality control and research and development electronic instrumentation and testing apparatus including electro-optical equipment, five microprocessor development systems, a business computer, and a minicomputer for research and development applications.

Everything about the company is geared to progressive, aggressive operations aimed at taking Diffracto to the top of its field.

In its continuing series of articles on small business, the Federal Business Development Bank (FBDB) outlines how a small business must prepare for the future in . . .

A Plan for Recovery

It is now apparent the economy is turning the corner. How quickly it regains pre-recession levels of activity is another matter. A large part of the answer will depend on how effectively the small business community pursues the new opportunities for growth that recovery will generate.

Small business growth has been a driving force in the economy. It can be again. But if it is to have maximum effect, each small business owner and manager must carefully plan for it. The question for many is where to start. After more than a year during which every effort was directed towards assuring business survival, it's not easy to redirect that effort towards achieving growth.

One starting point might be for each small business owner and manager to ask that deceptively simple question: What makes the business successful now? It's a deceptively simple question because the answers sometimes are difficult to provide. Nevertheless, the answers are needed, in detail, if a sound recovery plan is to be mounted.

To obtain the answers, every aspect of the small business operation should be carefully analyzed. What goods and services are most in demand? How profitable have they been? How large is their market? How appropriate are they at a time when customer requirements may be changing?

Questions should also be asked about the business's ability to compete. Is it because of the price or quality of the goods or services it offers? Is it because of location? Attractive advertising? Efficient staff? Reliability?

The purpose of these questions, and all the others which must be asked before a detailed analysis of the business can be completed, is to establish its strengths and weaknesses. Having done that, the recovery plan can be drawn in ways which build on the strengths and correct the weaknesses.

Some owners and managers may mistake some of the decisions they make for recovery planning. Suppose a retailer finds, upon analysing his sales, that certain lines of merchandise have sold better than he expected. A sensible decision would be to push those lines more actively. But that is not a recovery plan. That's the sort of day-to-day decision the retailer should always be making. A recovery plan must go well beyond this to be effective.

A recovery plan should look at least three years ahead and, where possible, even farther. As answers to the question of what now makes the business successful were necessary at the start of recovery planning, the completed plan should outline what will make the business successful, on a larger and more profitable scale, three years from now.

Many small business owners and managers already have a business plan.

A recovery plan should outline what will make a business successful and more profitable three years from now.

A plan which sets forth the objectives of a business and the timing for their realization makes two important contributions to operating efficiency. It presents a standard against which to measure actual performance, and it tells owners and managers what requirements — in terms of financing, size of staff, premises and so on — must be met to achieve their objectives.

A recovery plan can be, with one important difference, the extension of an existing business plan. The difference is that a recovery plan will be directed primarily towards making the most of renewed economic activity after a period of recession. It will emphasize growth.

Building on the strengths of a business while correcting its weaknesses is not, of course, the only way to set it upon a recovery course. Others include diversification of existing business and acquisition of new business. In a good many instances, opportunities for growth emerge where least expected — from the introduction of a new product, for example, or emergence of new markets for existing products.

Preparation of a recovery plan should take these possibilities into consideration. That means the plan should be flexible, with scope for responding to unexpected opportunities should they arise.

Many small business owners and managers are thought to be lucky because they were in the right place at the right time. In practice, being in the right place at the right time is usually the result of careful planning — that, and a growth-oriented attitude towards the operation of a business which is quick to recognize new opportunities.

The first of the essentials of any recovery plan is the recognition that the economy is on the move again. The next is a far-reaching analysis of the business as it is now, followed by the careful projection of what the business can be three years from now. Finally, there needs to be a detailed list of the conditions the business must meet to achieve those future objectives.

Is growth to be pursued by moving to a new location and larger premises? If so, what then must be done to find that location? How much should be budgeted for it? What will be needed in the way of new equipment and furnishings? And when should the move be scheduled?

Is growth to be pursued by acquisition? If so, what needs to be done to assure adequate financing? Is a new product to be manufactured or retailed? If so, what steps need to be taken to establish the market for it, introduce it and promote it?

The answers to these questions are all elements of a recovery plan. How ambitious the plan should be depends a great deal on the present performance of the business and the ability to manage new growth. If new growth is to be in areas unfamiliar to present management, time has to be provided to remedy this.

Possibly the most important aspect of recovery planning is the awareness that a business must continue to grow over the longer term if it is to be successful. It can't stand still for long. If it does, it begins to fall back. Planning for recovery in a time of economic renewal is as vital, in this respect, as planning for survival in a recession.

Supply and Services in Exporting?

It is, perhaps, a fact not well enough known in Canada that the Department of Supply and Services (DSS) is a major buyer of Canadian products for export as well as for government use.

One of the major functions of the department's Supply Administration is to act as the central procurement authority for Canadian government departments, Crown corporations, boards and statutory agencies. This is how many Canadians see the department.

DSS's purchasing power helps firms develop and make products for domestic and foreign markets.

However, the Supply Administration also provides the contracting and contract management role for the Canadian Commercial Corporation (CCC) for government-to-government export of goods and services. In fact, since the CCC was founded in 1946, agreements and contracts have been negotiated, on behalf of CCC, with more than 50 governments and international agencies by officers of Supply Administration. Total value of goods and services provided under these CCC contracts is more than $13 billion.

In the fiscal year 1981-1982 alone, the Administration's purchases for all its customers came to more than $3 billion, including export sales of $554 million for CCC, its second largest customer.

This massive purchasing power can be used to help firms develop, design and manufacture products not only for domestic markets but also to help provide a competitive edge in the international marketplace.

As can be seen by its name, the Department of Supply and Services (DSS) consists of two separate administrations, each reporting to a deputy minister — the Supply Administration (already mentioned) and the Services Administration.

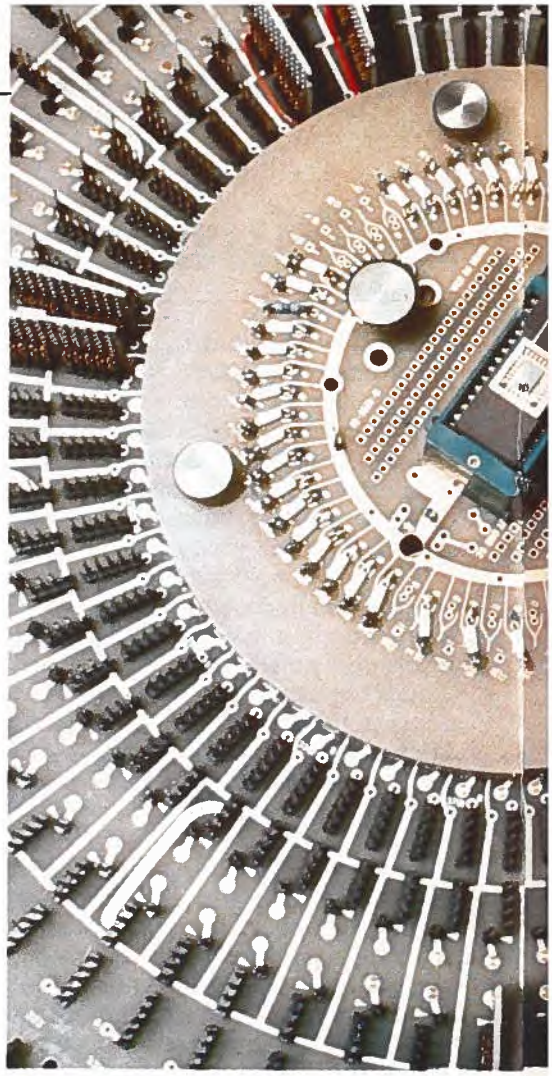
While the Services Administration is primarily concerned with managing the accounts of Canada and administering the consolidated fund, it also participates in the export field through the provision of a wide range of highly qualified consultants and professional personnel. These services are provided, under CCC contracts, through the Administration's Bureau of Management Consultants (BMC). In addition, professional services are also provided through the Administration's Audit Services Bureau (ASB).

CCC Establishment

The Canadian Commercial Corporation was established by statute in 1946 to replace the Department of Reconstruction and Supply. At the outset, it provided the procurement function, not only for the Department of National Defence (DND) but also for the Canadian contribution to such activities as the Canadian Mutual Aid Board, the United Nations Relief and Rehabilitation Administration and the International Refugee Organization.

In 1951, when the Department of Defence Production was established to perform the supply function for DND, the staff of procurement officers as well as other resources were transferred from CCC, leaving only a small group to maintain the CCC contact with the U.S. and other government and international agencies.

Further organizational changes (the formation of the Department of Supply and Services in 1969, and the change of CCC reporting relationship from the minister of Supply and Services to the minister of Industry, Trade and Commerce in 1978, and then to the minister of International Trade in 1982) did not disrupt the original operational procurement concept. Today, CCC still employs the sourcing, contracting and contract management services of Supply and Services to fulfill its international obligations.



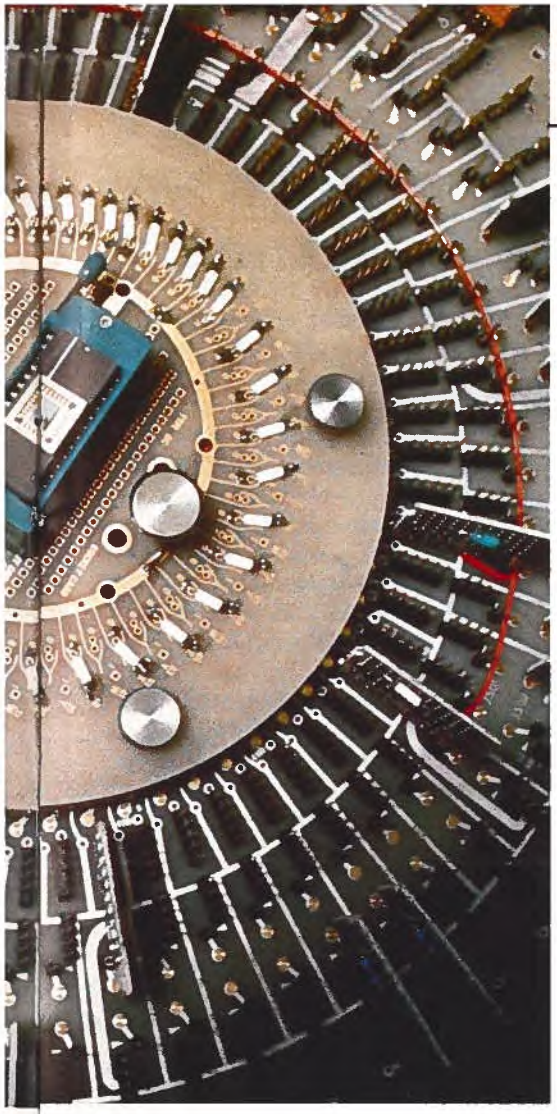
Electronics, a growing Canadian export.

The latest reorganization of the Supply Administration has resulted in the formation of three Sectors — the Operations Sector, the Supply Management Sector and the Finance, Planning, and Systems Sector. The Export Supply Directorate, reporting to the ADM, Supply Management, is a group of about 100 employees totally dedicated to providing contract management, financial, planning and other services to CCC. The contracting activities on behalf of CCC are provided by the Operations Sector Products Centres.

Military Exports

Over the years, the majority of CCC export business has been related to sales of military equipment made possible by the co-operation of the Trade Commissioner Service and other branches of the then Department of Industry, Trade and Commerce.

These joint ventures in defence products sales have evolved into a responsive program to meet client requirements not only for military but civil procurements.



DSS's Services Administration has also been active over the years with its Bureau of Management Consultants (BMC) and Audit Services Bureau (ASB).

During 1982, the Bureau of Management Consultants, under contracts from CCC, assisted the Malaysian government with formulating and implementing improvements in financial management systems, reporting procedures, and project management techniques.

Most CCC exporting has been in sales of military equipment helped by the Trade Commissioner Service.

A project was also undertaken for the offices of the African Development Bank, Abidjan, Ivory Coast, in the area of position evaluation, performance appraisal and salary and benefits compensation. A similar project was carried out on behalf of Nigeria. These programs were conducted "in country" followed, in some cases, by basic classroom type training in Canada for selected customer government staff.

Audit Services Bureau

The Audit Services Bureau has also provided professional services on behalf of CCC. Under a four-year contract completed in 1982, ASB conducted training in Algeria on ASB auditing policies, practices and procedures, cost accounting standards and financial records. The contract also provided for ASB supervision of in-plant audits by Algerian government audit teams of contracts placed in Algeria, France, United States, United Kingdom and Canada.

Most of the CCC contracting work comes under the Supply Administration's Science and Engineering Acquisitions group. However, the Administration's Commercial Acquisition group is also involved, particularly in the Food, Drug and Textile Branch; Transportation and Energy Branch; and the Professional and Special Services Branch.

The Industrial Security Branch of Supply and Services works closely with the Trade Commissioner Service and other government departments in support of exports, particularly in the defence field. Their direct assistance involves processing of personnel and facility security clearances for representatives of Canadian firms wishing to make exploratory sales visits to foreign government agencies and/or contractors, and processing clearance requests for foreign nationals wishing to visit Canadian industrial firms.

These services are also made available for selected Canadian government-sponsored national and international classified conferences, briefings and symposiums.

Other Services

The Supply Administration provides many other special services to CCC in addition to contract management. One of the most important of these services is the establishment of project management offices for major export projects.

An interesting program managed by Supply is the Unsolicited Proposals Fund for research projects of merit.

This function is similar to the project offices established for major Crown projects. Three such offices have been set up on behalf of CCC by the Supply Administration. They are the Light Armoured Vehicle Office, the Recovery, Assist, Traverse and Secure (helicopter hauldown) System (RATS) and the Drone. The Light Armoured Vehicle project is for research, development and manufacture by General Motors Diesel Division for up to $1.6 billion of light armoured vehicles for the U.S. Army and Marine Corps.

The RATS project is for the manufacture of up to 100 sets of the helicopter hauldown systems for the U.S. Navy. The Drone project is concerned with research, development and manufacture of drones for the British, French and German armies. These project offices are set up and staffed by personnel from Supply and work to manage the project for the customers in conjunction with the prime contractors.

One of the most interesting programs managed by Supply is the Unsolicited Proposal Fund. Unsolicited proposals for research and development are received by the Science Branch and are examined in conjunction with the appropriate government departments and agencies to determine merit. Bridge financing is available for proposals which are accepted and for which the department with program responsibility has no funds available in the current fiscal year.

"Shopping List"

Following is a "shopping list" of products and services either supported by federal research and development funds or for which economical production costs have been achieved through the Department of Supply and Services bulk purchasing or other government-industry co-operative means.

"Shopping List"

Propulsion Systems (launch scientific research instruments in sub-orbit)
Bristol Aerospace
Winnipeg, Manitoba

Flight Recorders
Crash Position Indicators
Port Radars Parachutes
Leigh Instruments
Carleton Place, Ontario

Irvin Industries
Fort Erie, Ontario

Underwater Detection Systems
Hermes Electronics
Dartmouth, N.S.

Sparton of Canada Ltd.
London, Ontario

Light Armoured Vehicles
General Motors
London, Ontario

Wire Strike Protection System (helicopter)
Bristol Aerospace
Winnipeg, Manitoba

Helmets, Ground Troops
R.J. Stampings
Montreal, Quebec

Canteen Cups — Military
R.J. Stampings
Montreal, Quebec

Snowmobiles
Bombardier Inc.
Valcourt, Quebec

Cargo-Passenger Track Vehicles
Bombardier Inc.
Valcourt, Quebec

Personnel Carriers
Canadian Foremost
Calgary, Alberta

Helicopter Heaters
Casey Copters
Dorval, Quebec

Shock Absorbers
Gabriel of Canada
Toronto, Ontario

Lenses, Telescopic
Ernst Leitz
Midland, Ontario

Snow Shoes
Magline of Canada
Renfrew, Ontario

Plastic Containers, Military
Scepter Mfg. Co. Ltd.
Toronto, Ontario

Fire Trucks
Pierre Thibault Truck
Pierreville, Quebec

Image Analyses System (record and analyze satellite date)
Dipix Systems Ltd.
Ottawa, Ontario

Vaccines
Connaught Laboratories
Willowdale, Ontario

Sonar Systems
Westinghouse Canada Inc.
Burlington, Ontario

Sonar Systems
Computing Devices Co.
Nepean, Ontario

Shipboard Helicopter Hauldown Systems
DAF Indal
Mississauga, Ontario

Avalanche Hazard Weather Data Acquisition System
Bristol Aerospace
Winnipeg, Manitoba

Nuclear Radiation Monitor and Alarm System
Scintrex Ltd.
Concord, Ontario

Laser System — Detection of Molecular Atmospheric Pollutants
Scintrex Ltd.
Concord, Ontario

Ferrous Ordnance Locator Locating Shells, etc.
Scintrex Ltd.
Concord, Ontario

Magnetic Anomaly Detection/ Submarine Anomaly Detection Equipment (airborne equipment for the detection of submarines)
CAE Electronics
St. Laurent, Quebec

Solid State Militarized Computer
Sperry Univac
Winnipeg, Manitoba

Instrument Landing Systems
Phillips Electronics Ltd.
Scarborough, Ontario

L.F. Non Directional Beacons (Marine and aeronautical use)
Nautical Electronic
Laboratories Ltd
Hacketts Cove, N.S.

Constant Current-Solid State Airfield Lighting Regulators
Westinghouse Canada Ltd.
Hamilton, Ontario

Variable Power Dividers and Phase Shifting Networks for Communications Satellites
Com Dev Ltd.
Cambridge, Ontario

Ultra High Resolution Colour TV Display
Electrohome Ltd.
Kitchener, Ontario

Ice Prediction Model for Unconsolidated Sea Ice
Intera Environmental
Consultants Ltd.

Business Information Display System
Norpak Limited
Ottawa, Ontario

Telidon Information Preparation System
Norpak Limited
Ottawa, Ontario

Innovation 83 — A Look at Tomorrow, Today

"Sorry, the Conference and Tours are fully booked!"

That's what the sign said the second morning of the Innovation 83 conference and exhibition in Vancouver February 14, 15 and 16. And that pretty well tells the story of Innovation 83 . . . one of the most outstanding fairs ever held in Vancouver.

Innovation 83 was the brainchild of Maxine Gelfant, Chairperson of the Western Advisory Committee of the National Design Council. She thought it was time to bring Western Canadian business managers up to date with new technologies that could improve their productivity, profitability and competitive position.

Plans were for 200 business people to take part in the conference with leaders in the high technology industry. But these plans were scrapped in face of the demand which found 300 registrants and many more turned away.

"Excellent" pretty well sums up what the participants thought of the conference. And the reaction was the same from the more than 3 000 people who took guided tours through the computer-laden design floor, shop of the future, office of the future and leisure areas of the future — all part of the Innovation 83 exhibition which was an integral and important part of the conference.

Ed Lumley, Minister of Industry, Trade and Commerce and of Regional Economic Expansion, described the conference "aside from being useful and exciting, it is extremely timely. In the current technological revolution, the future is now. It is now that we must deal with the subject of innovation. It is now that we must learn how new technology can solve productivity problems."

The Department of Industry, Trade and Commerce and Regional Economic Expansion underwrote a large part of the costs of the conference and exhibition because of the department's commitment to improved design, productivity and competitiveness of Canadian business and industry.

The theme of the exhibition was innovation and productivity and the show itself was particularly innovative. It was not the standard affair of many individual company booths manned by company officials and touting company products through both static and active displays. Such shows have been described as giving the visitors a "bad case of information overload" and leaving them confused.

Instead, Innovation 83 was designed as an integrated package to show the application of high technology in four different areas. It used "live theatre" presentations to display a wide variety of systems and equipment shown in actual use in surroundings simulating the environs for which they were designed.

Visitors reserved for tours through this world of high technology — through the office of the future; the design floor where the steps of designing a new product were outlined; the shop or production stage of the future; and the home and leisure areas.

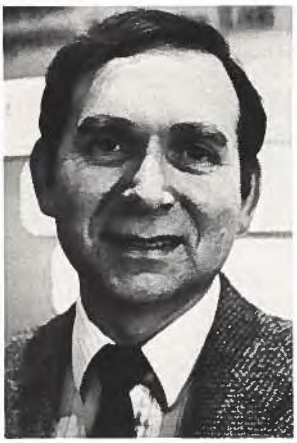
And in these showcase areas there were strict rules — there were no corporate signs or business cards.

But an exhibition of this nature is designed not only to show what the future (near future, in fact) will be like, but to interest potential buyers of the products on display. Therefore, while the first two-thirds of the exhibition was taken up with the four display areas, the final third contained the more familiar booths and their attendant company officials. Having seen the products in practical use, the visitors could now question the makers.

Computer technology was also in evidence even at this stage. As the visitor went through the display areas, he or she was able to note products and items on which each might wish to find out more information. Computers helped direct the visitor.

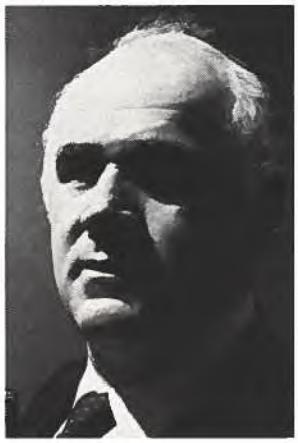
Regarding the show, Mr. Lumley said: "Innovations such as those on display in this show will improve virtually all aspects of our working and living environments. They will make our industries more productive and better competitors in world markets. Technology developments will create new customer needs and demands which in turn will lead to opportunities to create, develop and market more new products."

Speaking at a reception for Innovation 83, Maxine Gelfant explained how Innovation 83 came about as a result of a concern that Canadians were "lagging behind in their awareness of the application of new technologies and how these technologies could be applied to improve productivity, competitiveness and for the design and development of new products".



Alfred Hurwitz, Sandpiper Computer Systems: "Well organized, well thought out. Met many people who are interested in timesharing now that they've learned about it."

Diane Armstrong, Pacific Microcircuits: "It's a great show for a new company like ours. I not only learned a lot but we received interesting business inquiries."



Garvin MacDonald, Microtel Pacific Research: "It is a superb exhibition and the first time I have seen a show of this nature booked so far in advance."

Fredericton High Tech in World Use

by Charlie Foster, Moncton Regional Office, DREE/IT&C

Neill and Gunter technicians check a drawing produced entirely by computer in the company's micrographics department.

A composition board plant recently started production in the Philippines. Similar modern plants are in the advanced negotiation stage for construction behind the Iron Curtain — one in Russia and one may be located in today's fast modernizing China. All are projects involving high technology provided by a Fredericton, New Brunswick, engineering company which, in a few short years, has achieved world recognition.

Assisting in making these projects and others competitively possible for Neill and Gunter Limited is one of today's silicon chip miracles, a $500 000 computer aided design and drafting (CADD) system that produces with its electronic brain engineering and drafting work that might, only a few years ago, have taken skilled engineers and technicians 20 times as long to complete.

The impressive offices of Neill and Gunter in Fredericton are a maze of computer terminals and electronic equipment. This equipment of tomorrow has put the company in the forefront of the finest high technology engineering operations. From indications at the recent "Exchange 82" seminar in Houston, Texas, Neill and Gunter would fall in the top three per cent of consulting engineering companies in North America in its application of electronic systems.

The federal government thinks so highly of Neill and Gunter that it has commissioned the company, through the Department of Regional Economic Expansion and Industry, Trade and Commerce (DREE/IT&C), to do a variety of work including the technical $120 000 study on the Bathurst Forest Industry Complex in New Brunswick.

The micrographics and computer assisted design and drawing techniques offered by Neill and Gunter have startled a lot of people, including a highly placed official from the National Research Council in Ottawa. "New Brunswick," he said, "has a world-class Canadian engineering firm based here in Fredericton."

If he was surprised, two Japanese industrial/commercial giants were not. Top executives from Kawasaki Heavy Industries and Nissho Iwai sought out the Fredericton company's subsidiary, NGM International, when they wanted a world-class partner to add composition board engineering expertise to their consortium in a bid for major composition board plant projects in Russia, Japan and other Pacific Rim countries.

Bob Neill, President and Chief Executive Officer of Neill and Gunter and NGM International, said "we were delighted with this recognition that was made possible by our association with Helmut G. Moeltner of New Liskeard, Ontario". (Mr. Moeltner was tragically killed in an auto accident in 1982.) The company carries on the work which has resulted from the 17 years of dedication to excellence which has given the company world renown.

In 1964, when the company opened its doors for business in Neill's basement there were two employees including Neill and Executive Vice-President Rod Nolan. Harold Gunter joined Neill and Nolan on a full-time basis a few months later. In those days, if the floor needed sweeping likely as not the president or vice-president got the job.

This willingness to do any job that came along and to demand excellence as a basis for any undertaking made the two-man operation grow into today's highly skilled team of more than 160 people. In addition to Fredericton, Neill and Gunter signs can now be seen outside engineering offices in Dartmouth, Nova Scotia; Corner Brook, Newfoundland; New Liskeard, Ontario; and in the United States in Portland, Maine, and Greenville, South Carolina.

Did the founders in 1964 have any idea their company would expand to its present size? Of course, said Mr. Neill, the original objectives of the company called for the creation of "a competent, growing consulting and design engineering company". This policy has been followed, notwithstanding a number of setbacks and problems over the years.

Contrary to popular belief, the move to computerization has not lessened the company's need for human skills. "Without the computers we would likely be much less competitive and employing a lot less than our present 160 workers," said John Devlin, the company's Vice-President and General Manager. "Within the next five years we estimate as many as 50 per cent of our employees will have a computer terminal on their desks."

Technology is already available, he added, "for us to take portable computers with us on trips, and when we reach our destination to feed the results of our work over standard telephone lines back to whichever one of our offices is awaiting the information".

This composition board plant operating in the Philippines was designed by a $500 000 computer aided design and drafting (CADD) system in the Fredericton, N.B., office of Neill and Gunter.

"Computerization has helped to make the company competitive in any market in the world," said Devlin. "We are ahead of our competition in several respects and we plan to stay that way."

Many of the company's skilled workers are graduates of either the University of New Brunswick's Engineering Department or the technicians course at the New Brunswick Community College Moncton campus. "We couldn't get better or more competent workers wherever we tried," said Devlin.

Despite this standard of excellence, the electronic wizardry installed by the company was so new that when Neill and Gunter invested their half-million dollars they had to spend a lot more flying key personnel to Denver, Colorado, for a special operational course. When the machines were installed another eight-week experimental operation was necessary followed by more advanced training under the watchful eye of the manufacturer's own instructor and many months of "learning by doing" before the new operators were considered proficient. Now new operators are trained as required entirely by present company staff.

But high technology will never take away the safeguards that have helped make Neill and Gunter into one of the most highly respected engineering companies in North America. "Each computer produced design goes back to the designer and an independent technician for thorough checking," said Devlin. "With the type of complex operations we deal with nothing can ever be left to chance."

The comments of some of the company's clients:

"They deliver what they say they will and when they say they will," said Arch Cook, Vice-President, Operations, Baxter Dairies Limited. Neill and Gunter designed for Baxter Dairies one of the most efficient and modern milk processing plants in Canada.

A modern dairy production line at Baxter Dairies Ltd., Saint John, N.B., designed by the Neill and Gunter CADD system.

"They share our goal of excellence," said Richard Oland, former Vice-President of Production for Moosehead Breweries in Saint John, the last of North America's major independent breweries. Neill and Gunter has completed more than 30 expansion projects for Moosehead, including a major addition for which the company devised one of the fastest and most modern production lines in any North American brewery, delivering 1 400 bottles a minute.

From an initial plan to concentrate on industrial engineering design renewable resource and energy industries — Neill and Gunter has spread its corporate wings to encompass designs and engineering, and often construction management, for many varied industries, commercial and institutional clients, industrial parks, bridges, dams and tunnels, municipalities, transportation and others.

"A big factor in our success has been our planned ability to work harmoniously with our client's own experts," said Gerry Scott, Vice-President and Director of Engineering. "Obviously Moosehead's staff, for example, know more about brewing than we do. So we combine their expertise with ours. In fact we become an extension of their staff."

Although marketing has been, and will continue to be, a major part of the company's growth strategy, under the direction of Brent Alward, a lot of satisfaction came with the unsolicited arrival of the two Japanese industrial giants. "How better can you be told that you've been doing a good job," said Alward.

The company's most recently established branch office in South Carolina was only made after an intensive commissioned study of the industrial potential of the entire United States was completed. "We believe we have moved into a region that is one of the major growth areas in the United States," said Bob Neill.

But expansion will never mean moving the company's head office from the city in which it started, Fredericton.

If the vast majority of people are surprised to learn that New Brunswick — once chiefly known for its basic natural resource industries — is fast becoming a major high technology area of North America, 160 people at Neill and Gunter already know. For their company was one of the first in Eastern Canada to start the ball rolling.

Bob Neill says, "The corporate strategy is to build upon the company's management strength and new technology to take advantage of the many opportunities in North America and around the world. This will keep Neill and Gunter in the leadership position won by the hard work and motivation of all of its employees."

Single Cell Protein Comes of Age As Animal Feed Supplememt

Project Manager Bob MacDonald explains single cell protein process to Hon. Ed Lumley, IT&C/REE Minister, while Envirocon Chairman, Richard Buchanan looks on.

A Canadian-designed plant that converts agricultural and forest industry wastes to protein-rich feed supplement was officially opened in Vancouver recently.

Only 11 months after the announcement of the project at the 1982 Pulp and Paper Annual meeting in Montreal, Envirocon Ltd. began the Single Cell Protein (SCP) process of converting forest wastes from a pulp mill at Prince George, B.C., into a granular cereal-like product with a protein content of about 40 per cent.

"What we're opening here today is a plant designed and built by a B.C. company, using a process created by a university in Ontario, developed with the assistance of the federal government. In those terms I think you'll agree it qualifies as an all-Canadian venture — a positive example of co-operation between the public and private sectors," Richard Buchanan, President of Envirocon, developer of the process, told the audience at the plant's opening.

"This co-operation had its beginnings in the early months of 1980. At that time, a client of ours in Czechoslovakia asked us to report on Canadian work in this field. We commissioned a survey through our Toronto office. Very quickly we encountered the work of the Centre for Process Studies at the University of Waterloo. Dr. Murray Moo Young and his colleagues were, we discovered, on the frontier in world development of these processes.

"We at Environcon were fascinated about the possibilities of developing the SCP process to production scale and in testing its economic viability. This we knew would be a very expensive undertaking but, considering the evident advantages of this system over others that had been tried, it would be a highly promising undertaking."

Shortly after this, at a seminar in Ontario, two gentlemen of vision happened to run into one another — George Ingham of the federal Department of Industry, Trade and Commerce and Regional Economic Expansion (IT&C/REE) whose job includes the stimulation of promising technology in this country; and Don Manolescu, a senior officer of Envirocon. This led, after some meetings with the University of Waterloo, to two important events. One was the licensing of Envirocon by the university to develop and market the process worldwide. The second was support by the Government of Canada for the pilot project through the Enterprise Development Program (EDP).

"We at Envirocon and our sister company, Agrodev, have been careful to say that this *is* a pilot project," said Mr. Buchanan. "We're not able yet to make any final judgement about the economics. We do know, however, that we can produce feed supplement which looks and tastes reasonably appetizing. (Believe me I know. In the course of explaining the system around the world, I figure I must have eaten several full dinnerpails of SCP.) More important, we know that our product has roughly the same protein content as soymeal. And soymeal is the benchmark used by the Food and Agriculture Organization to measure the nutritional efficiency of animal feed supplements.

"In more general terms we're optimistic because, provided the price is right, animal feed from waste seems to be an idea whose time has come.

"At present, the farmers of the world use natural additives. They use oil meal cakes based on soya, rapeseed, linseed and other materials. They also use fishmeal. Apart from the possibility of offering farmers a cheaper product, what are the chances of persuading them to switch to SCP?"

Envirocon has done some market research on this, Mr. Buchanan explained. The reason, for a significant number of nations, he said, can be summed up in two words — self sufficiency.

"We know for instance that just four nations: Japan, West Germany, France and Holland import 10 million tons of feed supplement a year. They are not happy about this state of affairs. France, the leading farming nation in Europe blames feed supplement imports for the agricultural trade deficits it has suffered in recent years." He noted that these nations have a need to reduce animal feed costs and to increase domestic supplies. Indeed, the European Economic Community has made increased self-sufficiency in this field a priority goal for this decade.

"So what are the possibilities?" he asked. "Even if we are extremely cautious in our projections. Even if we consider *only* these four nations. Even if we consider capturing one per cent of that market — we are looking at 100 000 metric tons of supplement a year. In terms of Envirocon plants of the type we hope to market, that would mean some 30 production-scale installations.

"And of course the potential market goes beyond that. Many developing countries now use soya, fishmeal and other natural substances for animal feed. They would like to move these into direct human consumption. This technology is right for them. It is not forbiddingly expensive. It can be assembled and operated in frontier conditions — literally in the bush. And it makes use of waste materials found in tropical climates: rice husks, sugar cane remnants, banana leaves, cassava and fruit pulps.

"Is it really edible?"

This by the way is where earlier systems have failed: they were too complex to be practical and they used expensive raw materials as input.

"In any case we know that many industrialized and developing nations are interested. We know because since announcing the process a year ago we have been deluged with inquiries. We've also had some invitations to enter into joint venture development. We seem to be touching a nerve of need.

"The collaboration which has resulted in this project shows that . . . Canada can produce": states justly proud Envirocon President Richard Buchanan.

"Everything, of course, depends on what we learn from this plant and from our feeding tests on poultry and livestock. But it would not be irresponsible of me to say that we are optimistic about the prospects. This is an exciting and challenging field. The British magazine *New Scientist* ran an article on us in December. It described Envirocon as a newcomer 'taking on the giants'. Giants meaning companies such as ICI and ITT. We are playing in a very big league. The fact that we've come this far, this quickly is testimony to the fact that modern technology has opened up doors for new contenders and new ideas. The collaboration which has resulted in this project shows that we in Canada can produce both," Mr. Buchanan concluded.

Echoing Mr. Buchanan's sentiments, Minister of Industry, Trade and Commerce and Regional Economic Expansion, the Hon. Ed Lumley, in starting the plant, told the audience: "In this project, we seem to have put together the necessary ingredients in almost successful fashion: the R&D necessary to put us in the forefront in biotechnology, as carried out by the University of Waterloo Centre for Process Development; the entrepreneurship to take advantage of that biotechnology and test its feasibility, as provided by Envirocon; the government encouragement to assist in the achievement of national goals, as provided by my department; and finally, in many ways the most important, the marketing drive to push the process and the product into world markets, as provided by Mr. Buchanan and his colleagues.

"This project can well serve as an example to all Canadian businesses of the type of action we must take to keep Canada competitive."

Making use of a patented process developed at the University of Waterloo, the plant has been designed and built by Envirocon to improve the efficiency of the process for commercial scale operation, and to learn whether protein feed supplement produced this way can compete in price with natural products such as oilcakes and fishmeal which now dominate the market.

If results are favorable, Envirocon will exercise its exclusive licence to build and market plants on a turnkey basis for a world market. The pilot plant converts one ton of raw material a day into half a ton of supplement. Production-scale plants planned by Envirocon would process 100 tons a day of wastes into 50 tons of product.

Envirocon's plant uses a microbial life form — a fungus — to convert the wastes into single cell protein. The process can be used to convert a variety of forest industry and agricultural leftovers including sludge, sawdust, cornstover, rice husk, banana leaves and fruit pulp.

Feeding trials on poultry and livestock have begun and will continue through 1983.

Rain fails to dampen enthusiasm.

"Queer Gears" and Binary — Transmissions of the Future

by Bob McDonell, Canada Commerce

There is still room in the world of science and technology for the individual inventor of genius — the modern day Edisons and Fords. One such is the Kingston man who has come up with answers to some automatic transmission problems that have never been solved before.

Treasure Island, five miles east of Kingston, Ontario, at the beginning of the Thousand Islands, might well be your typical setting for a cottage industry. But the modern homes in estate-like settings are not the place you are liable to find a thriving family business. But then Ker-Train Systems is not your typical cottage industry.

In the basement of its founder and chief executive officer's home, Ker-Train, consisting of Hugh Kerr, his family and one full time employee, has developed transmission technology that has eluded the best efforts of the many multinational giants and millions of dollars in the search for an infinitely variable transmission (IVT).

Basically, Hugh Kerr, the inventor, has beaten most power transmission problems with two systems — a binary and a queer-gear variator design. Basically, queer gears are elliptical in shape and mesh at a variable ratio on each tooth which in the gear configuration of the variator gives it the elusive IVT.

Hugh's ready smile and quick wit as he explains the workings of his inventions leave no doubt that he enjoys his work immensely. And the work has earned him a string of inventions which are both an incentive and a drain on his capital.

While the patents protect his proprietory rights and have been the reason he receives private and public funding to continue his development work, they also drain off some $4 000 to $5 000 a month to keep them current in North America, Europe and other major world markets.

Hugh Kerr became interested in power train design at the scene of an airplane crash in the late 1960s when he was with Canada's armed services as an Air-Tech officer. As part of the investigation, he picked up a broken gear assembly from a flight recorder which started the ideas that have obsessed him ever since.

Retiring from the services 13 years ago (at age 45 with the rank of Lt. Col.) to devote more time to his ideas, Kerr first formed a partnership with other developers but found this too restraining for his free spirit and active mind.

Since that time, he further developed his ideas when he worked as a senior associate professor at Royal Military College (RMC) in Kingston. This was a fortunate alliance since his design team has included colleagues from the institution and many of the officers taking their master's have used the Ker-Train technology for their theses.

For the last few years, private funds have supported his development work on the queer gear variator system. The Department of Industry, Trade and Commerce and Regional Economic Expansion (IT&C/REE) has supported his binary "smart transmission" system, as part of the federal government's electric car development program.

The model purchased by IT&C/REE is aptly called the "64 on the floor" by Bill Whyte of the National Research Council's Fuels and Lubricants Lab where the transmission is now undergoing extensive dynamometer testing. It consists of three modules of four clutched gears each controlled by microprocessor hardware which give 64 gear shifts in fraction of a second sequence.

These commands are controlled by a software package based on a programmed micro-chip which shifts on such operating requirements as motor speed, fuel economy and power demand. The software packages can be programmed through a wide range of instructions depending on the individual parameters required for the particular application. Thus, these same principles apply in all automotive uses and are readily adapted to other power transmis-

David Lang adjusts '64 on the floor' seen torn down at right.

sion needs, for example in power lathes, shapers, drills and particularly in numerically and computer controlled machine tools.

The advantage of the binary system for machine tools is the fact that, with such a wide range of options, speed and torque can be controlled from the shaft of a simple cheap squirrel-cage electric motor, rather than through the highly complicated and expensive variable DC motors now used in this application.

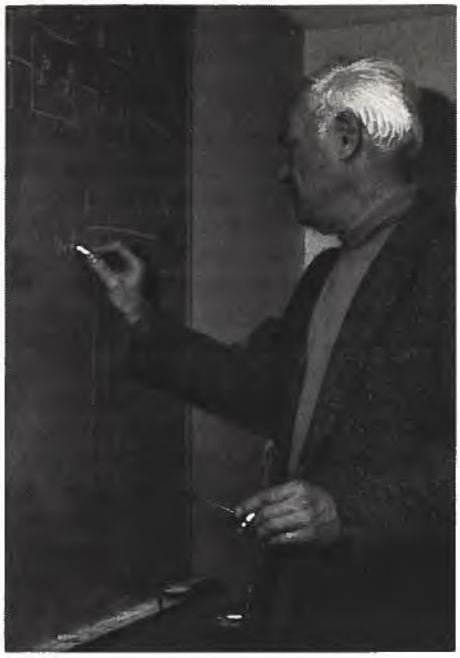
While the design parameters of IT&C/REE's electric car model were arbitrarily set at 64 steps (four cubed), using the binary system this can be increased or decreased by adding or deleting gear modules. Other design specifications included: a translation range of 9:1 to 1:1 under full load; all gears are in constant mesh and all gear ratios locked up; maximum torque levels to be maintained at the various speeds appropriate to this vehicle; and an efficiency of not less than 95 per cent overall on the standard driving cycle.

While these are very stringent demands, the National Research Council tests over several weeks have shown that the transmission not only meets but in some cases surpasses them. For example, on efficiency it was shown that rates of 97 per cent were possible whereas the norm for the automatic transmission industry, under the extremes of loading in these tests, is in the high 70s and low 80s.

Some of the advantages of the binary system include simplicity since all gears are common to those used in current transmissions, the elimination of the bulky torque convertor and the ability to place the binary modules in a parallel cluster rather than in a straight line.

Other perceived uses for this system are in military applications — on tracked vehicles such as tanks where the binary control of two separate drive transmissions provides steering control without the use of braking mechanisms, slip clutches and other complicated systems. The cluster capability of the modules is also an advantage in the design as is the ease of maintenance. If one module fails, replacement of that module is quick and simple to bring the transmission back into service.

Prior to the development work on the electric car transmission, now being road tested by Marathon Electric of Montreal, Ker-Train was almost exclusively involved in development work on



Inventor Hugh Kerr explains engineering principle at his usual work station.

the queer gear variator system. This system allows for a truly infinitely variable transmission of power for winches, hoists, farm and other industrial and resource uses.

Queer gears have been around for a number of years but their adaptation to industrial use had always been restricted due to problems associated with producing the gears which call for a different angle of meshing for each tooth on the gears. This has been solved by Ker-Train through the use of a computer program (developed by Hugh Kerr, his son Mitch and former fellow professors at RMC) which controls a wire electro-discharge machining tool (EDM).

Using this relatively new technique, which electrically cuts through the metal by spark erosion, it is possible on a computer-controlled table to cut at any angle or shape required, thus opening up the possibilities of automatic cutting of these complex gears to the variable geometry required in the variator.

In essence the variator, through changing the angle of mesh of the queer gears, changes the speed and torque of the driven shaft. At present the variator can provide a 40 per cent differential but this could be decreased or increased both internally through gear design or by adding external clutching arrangements or additional variators. An advantage of this system is its regenerative power which can be used to provide braking power for high-speed applications when needed or the regeneration of electrical power in large industrial crane and similar installations.

While Hugh Kerr and his firm have a decided edge in the development of transmission technology in both geared variators and binary "smart transmission" technology, all is not clover. In addition to the hefty patent fees which put a strain on finances, the company must now find additional development capital to produce prototypes of transmissions for the many markets they can identify. But prototypes — a necessary sales tools for a skeptical market — are expensive.

It is hard for the purchasing agents of large engineering firms to realize that a small Canadian cottage industry has been successful where the multinationals have failed. They, therefore, want the models to test. And this type of venture capital is hard to come by in Canada, as many Canadian inventors have discovered.

Asked by Canada Commerce what was required, Hugh Kerr, with the twinkle in his eye, said an angel willing to put up the necessary capital to develop dozens of prototypes for the various markets, preferably one with a million dollars to invest. For Canada's sake, it is to be hoped that the angel appears or once again we may lose the opportunity to cash in on true Canadian genius.

In the meantime, we are sure that Hugh Kerr, his wife, son Mitch and his daughter-in-law with their assistant, David Lang, will continue to develop transmission ideas and technology in their well-equipped machine shop and computer room — technology which could well put Canada in the forefront of transmission production if the means can be found to develop these ideas. Otherwise we might lose these ideas to companies in countries more willing to provide the necessary funds.

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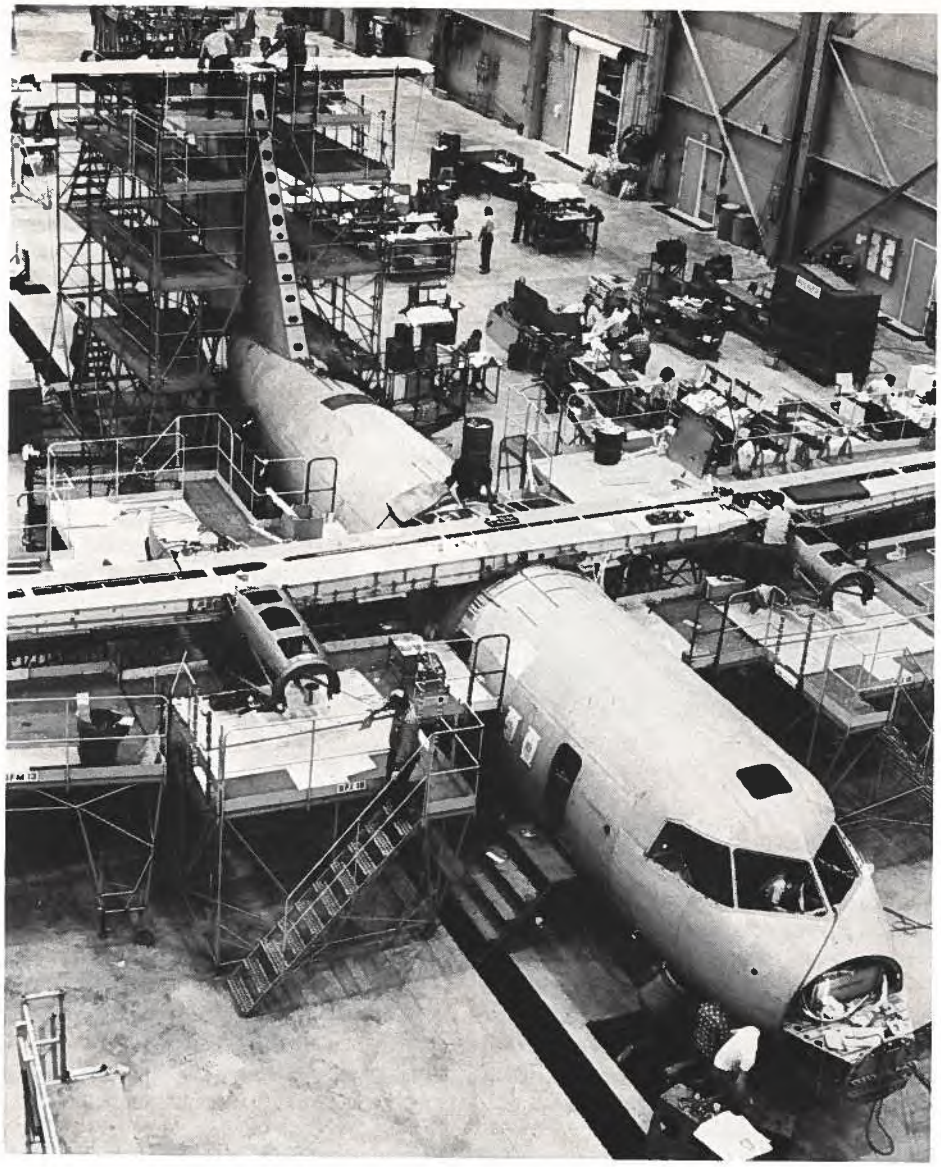

Prototype With a Pedigree

Nearing completion at the de Havilland plant, Downsview, Ontario, is the prototype of the DASH-8, a short-haul transport aircraft powered by two turboprop PW120 engines manufactured by Pratt and Whitney, Longueuil, Quebec.

The Hon. Ed Lumley, Minister of Industry, Trade and Commerce and Regional Economic Expansion, will attend the official roll-out of the new 36-seat commuter aircraft on April 19.

The first flight, planned for June, will start a 1 600-hour certification program which is scheduled for completion before the DASH-8 makes its public debut at the Farnborough Air Show, England, in September 1984.

Fitting midway between the 19-seat Twin Otter and the 50-passenger DASH-7, the latest de Havilland has attracted more orders than any aircraft of the same marque prior to prototype completion. By the end of January 1983, the list of customers numbered 29, and they accounted for 45 firm orders and 74 options.

With a cruising speed of 270 knots at 25 000 feet (7 620 metres), the DASH-8 will cover 300-mile route segments in 80 minutes. The Pratt and Whitney engines were designed specifically for 30-50 passenger planes and de Havilland hopes to achieve fuel efficiency some 40 per cent better than existing commuter aircraft.

The DASH-8 will also score with traditional de Havilland short take-off and landing capabilities. Runway requirements are expected to be approximately 1 000 feet (300 metres) less than the closest commercial rival.

News Briefs

(cont. from P. 2)

Canadian Mineral Production Down in 1982

Statistics recently released by the Department of Energy, Mines and Resources show that 1982 mineral production volumes in Canada were generally down compared to 1981 in the three mineral sectors of metals, nonmetals and fuels. The notable exceptions were gold, zinc and coal.

The value of metal mining production fell 19 per cent, with copper, nickel and iron ore suffering the most. The drop in nickel production was the worst, at 45 per cent.

Prices for most minerals hit record lows in 1982 as worldwide consumption decreased for the third consecutive year. However, as prices were higher during the year for coal, natural gas and crude petroleum, their increased value led to an overall increase in the value of production of 2.5 per cent to a record high of $33.1 billion.

Alberta provided 61 per cent of the total value of Canadian mineral production — up from its 53 per cent share the previous year.

Fewer Major Collective Agreements Expiring in 1983

Data contained in Labour Canada's recently released publication *1983 Calendar of Expiring Collective Agreements* show that compared to 1982, there is a 24 per cent decrease in the number of major collective agreements (excluding the construction industry) up for renewal this year. Major agreements are defined as those which affect 500 or more employees.

In 1983, 339 major bargaining agreements covering 699 415 employees will expire. This compares to 1982 figures of 444 bargaining situations involving 1 116 595 employees. Eighteen major amendments provide for a reopening this year of specified clauses, usually dealing with wages.

The calendar, which lists the agreements up for renewal, also contains a listing of 56 construction collective agreements that expire this year. This includes all known construction agreements regardless of the number of employees affected.

Copies of the calendar are available from Labour Canada.

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