Technology Partnerships Canada

An Agency of Industry Canada

Partenariat technologique Canada

Un organisme d'Industrie Canada

Investing In Our Future

2000

Annual Report 1999-2000

Canada

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BioChem Pharma Inc.

INCREASING CANADA'S TECHNOLOGICAL CAPACITY

As a key element of the Government of Canada's innovation strategy, Technology Partnerships Canada (TPC) is making things happen. Since TPC began in 1996, partnerships involving R&D investments with innovative Canadian companies have helped these companies increase their ability to develop a vast array of new technologies in three key areas: environmental technologies, enabling technologies, and aerospace and defence.

TPC investment is helping companies develop alternative fuel technologies that will help reduce the greenhouse gas emissions that cause global warming. TPC investment is helping companies begin clinical trials on new cancer therapies. TPC is helping Canadians become more connected through investment in leading-edge wireless and other telecommunications technologies. TPC is also helping to advance the growth of the important aerospace and defence sector.

With the help of TPC investment, innovative technology companies are growing. This growth benefits all Canadians, improving the economy, creating jobs and supporting sustainable development.

Today, Technology Partnerships Canada is stronger than ever. After four successful years and a complete restructuring of the fund in 1999, TPC is in a better position than ever to ensure that innovative Canadian companies strengthen their capacity to innovate, develop new technologies and grow. But TPC has only just begun. TPC will continue to invest in the acquisition of the knowledge needed to innovate, in the research required to develop new technologies and in the capacity of innovative companies to take new technologies from design to manufacturing at the rapid pace required.

TPC is ready to take on the future and help innovative companies develop the technologies of the future — today.

MESSAGE FROM THE MINISTER

New innovations and new technologies in every field imaginable are being launched in countries around the world — every day. Nowhere is the opportunity as great as it is here in Canada. They are changing the way we live and work. They have created a wave of excitement and opportunity for the future.

We are blessed to live in a nation with such a high standard of living and a wonderful quality of life. But this did not happen by accident: it is a testimony to the creativity, ingenuity and determination of Canadians from coast to coast to coast. They are the women and men driving these new technologies, strengthening the competitiveness of our industries, building economic growth, and creating new and exciting jobs across Canada.

As Minister of Industry, my number-one priority is to work in partnership with industry, our research community and Canadians in all regions of the country to ensure we continue to build on our success in technology and innovation.

I am proud of the Government's commitment to put Canada front and centre in the new, knowledge-based economy. Since 1993, the Government of Canada has pursued an aggressive strategy to increase Canada's technological capacity by supporting the increase of knowledge acquisition and research capability, investing in the rapid development of leading-edge technologies and encouraging the growth of innovative companies. This is part of our strategy for Canada to be among the world leaders in research and development performance by 2010.

Technology Partnerships Canada (TPC) is a vital part of this strategy.

TPC is helping advance the development of environmental technologies, with projects in British Columbia, Ontario and Newfoundland. Further strengthening of capabilities in the aerospace sector is encouraged through investments in Nova Scotia, Quebec, Ontario and British Columbia. The same can be said for information technologies and biotechnology, particularly in the critical area of health care. TPC is supporting new and innovative projects in these high-growth technologies across the country and has leveraged private sector investments of $1 billion. For every dollar that TPC invests, four dollars are invested from other sources.

The bottom line: TPC is making a difference. These investments let innovative businesses — large and small — create jobs and economic growth for Canada.

Allan Rock, P.C., M.P.
Minister of Industry

MESSAGE FROM THE EXECUTIVE DIRECTOR

It was in March 1996 that the Government of Canada launched Technology Partnerships Canada (TPC). At the time, it represented a new, "partnership" approach to stimulating private sector investment in innovation and promoting sustainable development, economic growth and job creation.

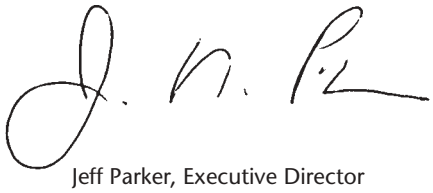
Four years later, there is no doubt that TPC is making a difference! One need only read through the four TPC Annual Reports, including this one, to get a flavour of the remarkable success story that is unfolding. The numbers are impressive, but they tell only part of the story. This document is intended to tell the rest of the story.

TPC is investing in a range of leading-edge technologies that mirror national priorities and the top-of-mind issues of Canadians from coast to coast. In health care, our biotechnology investments hold the promise of developing new approaches to treating serious illnesses from cancer to respiratory diseases to Alzheimer's disease. TPC is involved in environmental technologies, such as fuel cell technology, stationary power generation and water treatment to address the challenges of climate change and sustainable development. Other investments are building Canadian capabilities in e-commerce, connectivity and aerospace.

In 1999, TPC met the challenges surrounding a World Trade Organization (WTO) decision against TPC R&D investments in the regional aircraft industry. TPC was literally shut down and restarted. The complete restructuring of TPC was followed with the WTO confirmation that Canada was in full compliance with its ruling.

Also during this time, the Auditor General examined TPC as one of the federal government's innovation support programs. The Auditor General concluded that TPC has exercised due diligence in assessing the business cases for the projects.

On a personal note, I would like to thank all TPC employees for their vision, talent and hard work, which have helped TPC to achieve remarkable results. I would also like to thank our partners in the private and public sectors, who have dedicated themselves to working with TPC to promote the government's vision of a Canadian culture of innovation.



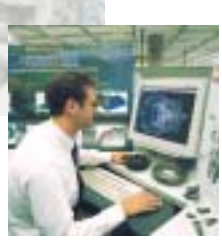
Jeff Parker, Executive Director
Technology Partnerships Canada

INEX Pharmaceuticals Corporation

INEX Pharmaceuticals novel anti-cancer drugs targeting disease-causing proteins — demonstrating the importance of innovation to improving Canadians' health and well-being.

HIGHLIGHTS

ADDING IT UP



Pratt & Whitney Canada

This Year's Totals

Fiscal year 1999–2000 saw the following TPC achievements:

- approval of over $361 million in repayable R&D investments for 31 Canadian research and development (R&D) projects;
- additional leveraged investment commitments of $1 billion in innovation spending;
- forecasted creation and maintenance of about 5 500 high-quality jobs;
- a level of 58 percent of all TPC projects and 33 percent of total TPC funding accounted for by small and medium-sized enterprises (SMEs);
- approval for investment of $25 million in 69 projects through the National Research Council's Industrial Research Assistance Program's (IRAP) partnership with Technology Partnerships Canada (IRAP-TPC).

Totals Since Inception

Forecast

As of March 31, 2000, TPC approved 104 investments totalling $1.1 billion, which will leverage investment commitments of $4.7 billion (approximately $4.26 for every TPC dollar invested). The success of these projects would create or maintain more than 21 000 jobs.

Actual

Leveraged Investment

- Companies report that, as of March 31, 2000, over $2.1 billion in spending has been leveraged as a result of TPC's investment in their projects. This represents over 95 percent of the original estimate of $2.2 billion.

Jobs

- As of March 31, 2000, over 5 200 jobs have been created or maintained. This represents a 101 percent success rate, surpassing the original target of 5 100 jobs.

Progress with SMEs

- SMEs accounted for 57 percent of all projects, 24 percent of total funding.
- IRAP-TPC has approved an additional 108 projects, for total investment of $40.3 million.

Repayments

- Total repayments to date amount to $16.1 million (royalties $2.7 million, warrants $9.3 million, recoveries $4.1 million). This revenue is 92 percent of forecasted revenue of $17.5 million as of March 31, 2000.
- It is important to note that TPC makes long-term investments. On average, the R&D phase of the projects takes 3 to 5 years before completion while the repayment period can extend from 5 to 20 years. Given the fact that the program is only 4 years old, most investments have not reached the benefits phase, and those that have are still in their formative years of commercialization. This reinforces the need for "patient capital" while these projects mature.

Rolls-Royce Industries Canada Inc.

Rolls-Royce's industrial gas turbine technology — helping to address Canada's growing demand for distributed power generation while promoting sustainable development.

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Bristol Aerospace Limited

A Solid Portfolio

NPS Allelix Inc.

Increasing Canada's capacity for innovation — our ability to create new ideas and to quickly turn these ideas into new products and services — is essential to improving our productivity growth and our standard of living. Investments made now in innovation will pay off in the future. Technological innovation and research and development (R&D) are key elements in achieving economic growth and job creation.

Technology Partnerships Canada (TPC), as an agency of Industry Canada, contributes to achieving the department's strategic objectives, specifically to improve Canada's innovation performance and to improve Canada's position as a preferred location for domestic and foreign investment.

TPC makes a difference by supporting Canadian businesses in their efforts to advance technology in three key areas of the knowledge economy: environmental technologies, enabling technologies, and aerospace and defence.

Research In Motion (RIM) Limited

Performance Review

Rolls-Royce Industries Canada Inc.

As of March 31, 2000, TPC has approved 104 investments totalling $1.1 billion, which will leverage investment commitments of $4.7 billion (approximately $4.26 for every TPC dollar invested). These projects, if successful, are forecasted to create or maintain more than 21 000 jobs.

There are two phases for TPC projects: the work phase represents the period over which contributions toward eligible costs are provided, and the benefits phase is the period during which the resulting technology is inserted into the company's products or processes and economic benefits (including repayment) of the project are realized. A work phase typically lasts between two and five years, while a benefits phase may vary anywhere between five and 20 years. After four years of operation, 26 projects now have successfully completed the work phase and have commenced the benefits phase.

In measuring its performance, TPC focusses on three core areas: jobs, leveraged investment, and sharing of risks and rewards including repayments.

Jobs

As of March 31, 2000, companies report that over 5 200 jobs have been created or maintained. This means TPC has achieved 101 percent of the target of 5 100 for the same period.

TPC's investment in innovative technologies and the large number of highly skilled Canadian jobs these technologies create or maintain have a significant impact on our economic growth. All companies being considered for TPC investment must provide a schedule of jobs forecasted to be created or maintained, an annual report of their job achievements, and updated forecasts.

TPC counts two types of jobs that are created or maintained by its projects:

- jobs directly involved in the work phase of a project; and
- jobs directly involved in the subsequent benefits phase.

TPC's job estimates are conservative, since only the number of jobs directly generated by its project commitments are included. Jobs excluded from TPC's totals include those that:

- are not directly involved in the project, but are created or maintained concurrently in other areas of a company; and
- are generated indirectly through TPC-supported projects, such as the number of jobs created or maintained for suppliers, producers of ancillary products, or purchasers of end products.

Leveraged Investment

Companies report that, to March 31, 2000, over $2.1 billion in innovation spending has been leveraged as a result of TPC's investment in their projects. This represents over 95 percent of the original amount of $2.2 billion estimated to be leveraged at this point in time.

TPC investment leverages private sector spending in both R&D and commercialization, which is key to stimulating economic growth. Generally, industry finances its share of this spending through a variety of sources, including:

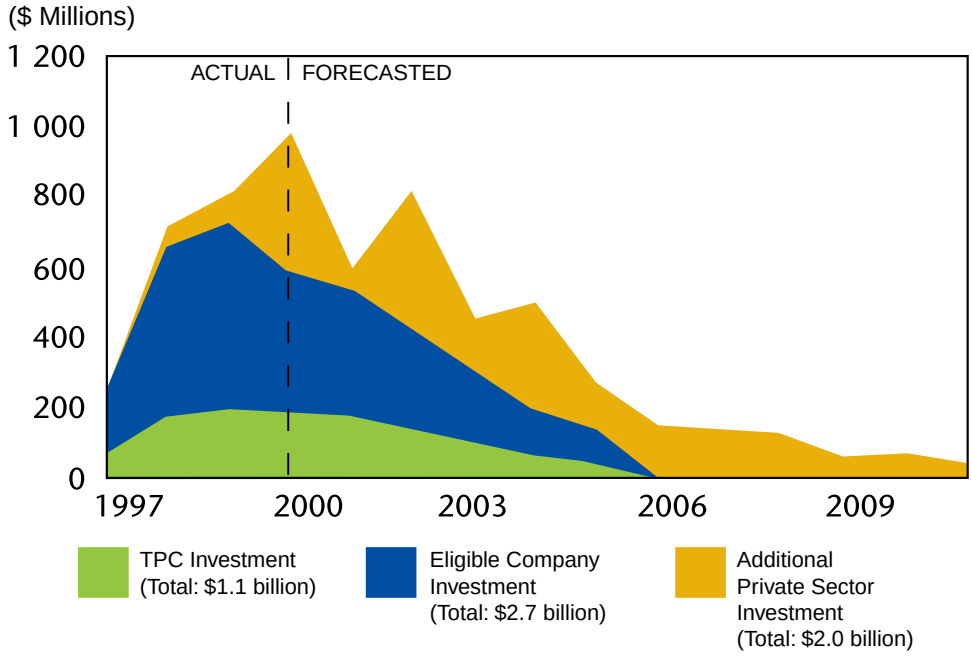
- internally generated cash flow from operations;
- debt and equity financing;
- generally available tax incentives, such as the federal government's Scientific Research and Experimental Development tax credits; and
- other federal and provincial assistance programs.

Forecasted project investment can be divided into three parts:

- TPC's investment;
- the company's share of eligible development costs; and
- additional non-supported development costs such as the cost of land and buildings to conduct R&D, and follow-on investment such as the cost of establishing manufacturing facilities in Canada.

Occasionally, investment leverage can include project costs incurred outside Canada that are deemed essential to the successful completion of a project. These costs relate to activities that, for practical reasons, cannot normally be carried out in Canada. Examples of such costs include the use of specialized test facilities or clinical trials by biopharmaceutical companies, where Canada lacks the right mix of patients with the targeted disease or diseases.

PROJECTED INVESTMENT LEVERAGE ON 104 PROJECTS, CONTRACTED AS OF MARCH 31, 2000



Risk and Reward Sharing

TPC has received over $16.1 million in royalty repayments, warrants and recoveries. This revenue is 92 percent of forecasted revenue of $17.5 million as of March 31, 2000.

Mandated to support high-risk R&D investments, TPC administers an investment fund that shares both risks and rewards with its private sector partners. However, unlike commercial financial institutions that measure return solely in financial terms, the return to TPC is also measured in terms of a broad range of non-financial benefits to Canada that flow from successful projects. These benefits may include:

- economic growth and job creation;
- contributions to sustainable development;
- development of capable and competitive SMEs in all regions;
- growth in private sector investment spending; and
- maintenance and growth of the industrial technology and skill base essential for innovative products and services.

The balancing of financial and public policy objectives distinguishes TPC from a commercial financial institution.

Spectrum Signal Processing Inc.

TPC determines an appropriate balance of investment risk and repayment terms that will enable its private sector partners to proceed with an approved project. Sharing ratios (the ratio of TPC investment to total supported development costs) will vary from project to project and have ranged from 20 to 50 percent. As at March 31, 2000, the weighted average sharing ratio of the portfolio was 29.1 percent. When negotiating an appropriate sharing of investment risk, TPC takes into account other government funding (both federal and provincial) that may be available to support a project.

TPC's approach to risk and reward sharing is to share in the return on successful projects commensurate with the level of risk, the benefits to Canada and the level of return received by the company. At the same time, given that many projects entail considerable technical and commercial risk, not all projects will be successful. However, the number of projects that do not succeed is less than 1 percent. TPC shares in the upside returns should projects turn out better than anticipated. All TPC repayments are reinvested to help grow the fund.

From 1996 to 1999/2000, TPC has approved investments of $1.1 billion in 116 projects. Of these, five projects were voluntarily withdrawn prior to any disbursement of funds. As of March 31, 2000, only five smaller investments have been unsuccessful, with little or no expectation of repayment to TPC. This represents less than 5 percent of our total portfolio of projects and less than 0.5 percent of funds disbursed. Furthermore, TPC has negotiated termination agreements with two other companies for a settlement amount of $4.06 million, generating an internal rate of return of over 26 percent to TPC on these investments. This leaves 104 active projects in TPC's portfolio as of March 31, 2000.

Summary

In view of the risks inherent in projects of a high technology nature, it is recognized that not all projects will succeed and, consequently, not all contributions will be fully repaid. The results to date demonstrate that TPC has achieved significant progress in fulfilling its mandate and long-term expected benefits in the areas of job creation, investment leveraging and return on investment. As a result, TPC remains committed to future investment performance that will continue to create job and wealth opportunities for Canadians.

In addition to reporting through this Annual Report, TPC reports program statistics through Industry Canada's Departmental Performance Report (DPR). There are timing variances between the two documents. For the purposes of accurate reporting, as at March 31, 2000, one investment was dormant and was subsequently withdrawn. Therefore, it was not included as an active project in the calculations of this Annual Report. In addition, figures included in this Annual Report were updated to include adjustments to overall forecasts obtained after the DPR was finalized.

Auditor General's Report

In 1999, the Auditor General examined Technology Partnerships Canada (TPC) as one of the federal government's innovation R&D investment programs. The Auditor General concluded that TPC has exercised due diligence in assessing the business cases for the projects (chap. 19 "Industry Portfolio – Investing in Innovation," *The 1999 Report of the Auditor General*, Ottawa: September 1999, pp. 19–27).

Overall, the report was favourable to TPC and its work to support the government's objectives of increasing economic growth, creating jobs and wealth, and supporting sustainable development. Notwithstanding the Auditor General's positive comments, the report also made suggestions for improvements to TPC reporting and operations.

In the report, the Auditor General suggested that TPC should provide information to clarify the extent to which TPC shares risks and returns, the basis on which TPC shares risks and returns including the main factors taken into consideration when establishing royalty payments, and the extent to which contributions are fully repayable. In addition, TPC should explain the sources and uses of funds leveraged by its contributions. TPC has taken steps to clarify and explain this information in the current and its last Annual Report.

The Auditor General recommended that TPC provide appropriate justification for the specific amount of all contributions. In response, new assessment guidelines for due diligence have been developed and are currently in use. The guidelines specifically cover the need for TPC investment.

Future Sea Technologies Inc.

The Auditor General also noted that more attention must be given to address the monitoring of projects and results, recognizing at the same time that TPC is a relatively new program and that the focus initially had been spent on exercising the due diligence process. Now that due diligence practices are solidly in place, TPC has turned its attention to improved project monitoring policies and procedures. Implementation of these processes is ongoing.

RESTRUCTURING

Orenda Recip Inc.

Because Canada competes in a global economy, transparent, rules-based international trade is important to Canadians. When, on August 21, 1999, the Appellate Body of the World Trade Organization (WTO) confirmed an earlier ruling that found TPC's support of five regional aircraft projects was inconsistent with WTO rules, TPC, in collaboration with the affected companies, took immediate action to comply with the ruling. All outstanding regional aircraft commitments were terminated, resulting in the cancellation of $16.4 million in funding obligations in the five affected projects and the cancellation of two approvals-in-principle. Although not required to do so, TPC went one step further and informed applicants that it was closing all outstanding funding requests (86 in total from all investment areas), pending the restructuring of the program. In essence, the program was shut down, restructured and restarted.

TPC used the clarification of the trade rules in the WTO ruling to help guide the restructuring of the program and to establish revised terms and conditions, governing how TPC operates. These terms and conditions were approved by the Treasury Board of Canada Secretariat and effectively remandated TPC. On November 18, 1999, the government announced the details of TPC restructuring:

- TPC objectives have been adjusted to focus on promoting technological innovation, thereby enhancing the technological capability of Canadian industry, rather than commercialization.
- Eligible activities have been redefined based on the WTO definitions for industrial research and pre-competitive development.
- Assessment criteria have been reoriented to focus on the contribution a project makes to improving the technological competitiveness of a firm rather than the commercial viability of a specific product. TPC will not request or consider information concerning the extent to which applicants do or may export.
- Transparency has been enhanced and TPC investments will be made public. In addition, TPC's administration has been modified to enable TPC to release more information in order to support its investment decision, while still respecting the need for commercial confidentiality. All TPC contracts will explicitly document the government's rationale for the investment and all related conditions.
- The concept of risk and reward sharing has been restructured. TPC will continue to share with its private sector partners in both the risks and rewards of projects, with the rewards to government consisting of both financial returns and economic benefits to Canada. Repayments will no longer be based primarily on royalties tied to specific product sales but will take different forms, depending on the project.

New application, review and approval processes were also implemented by March 31, 2000, and a new Investment Application Guide was released. The result of this restructuring is a stronger fund — one that will stand the test of time and that will ensure all future transactions will comply with WTO rules.

Restructuring resulted in the delay of approvals and cash flows, including deferral of major aerospace and defence projects, which impacted $66 million of 1999–2000 cash flow as well as distorting the one-third–two-thirds ratio between the enabling and environmental budgets, and aerospace and defence budgets that TPC seeks to maintain. Consequently, about half of the WTO-affected funding has been reprofiled, and multi-year budget levels have been realigned.

CAE Electronics Ltd.

TPC Portfolio Distribution

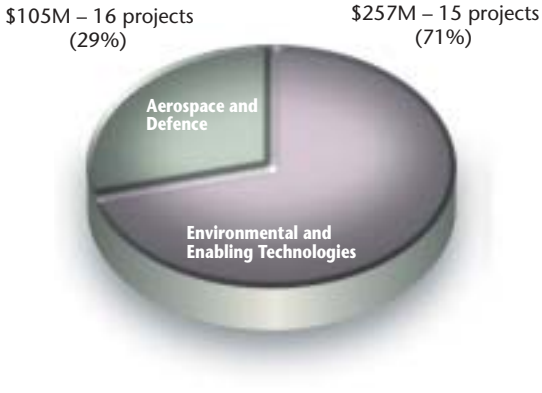
Distribution by Technology

TPC targets one-third of TPC funding to environmental and enabling technologies. Environmental and enabling technologies have grown at a faster pace over the past few years, which has increased the ratio from 13 percent in 1996 to 32 percent in 1998–1999 and to 45 percent by March 31, 2000. In 1999–2000, 71 percent of approved investments were in environmental and enabling technologies, and 29 percent were in aerospace and defence. Currently, about 45 percent of the portfolio is in enabling and environmental technologies. This reflects the dramatic growth in these key technologies for the new economy and the significant deferral of investment decisions in the aerospace sector as a result of the WTO decision. It is expected that the ratio will return to about one-third of the portfolio by the end of 2000–2001.

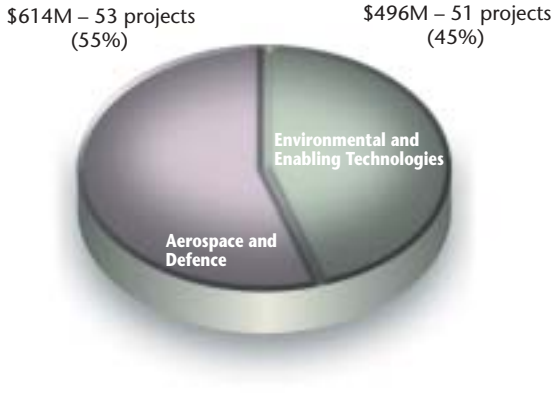
Annual approvals will vary, depending on demand, the carry-forward of previously unused budget allocations and the reallocation of recoveries or repayments.

Distribution of Investments, by Technology (Excluding IRAP-TPC)

1999–2000 Distribution



Cumulative Distribution as of March 31, 2000

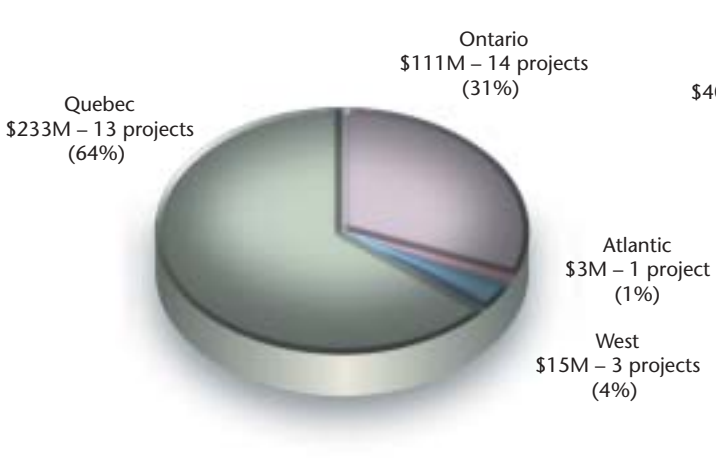


Distribution of Investments by Region and Firm Size

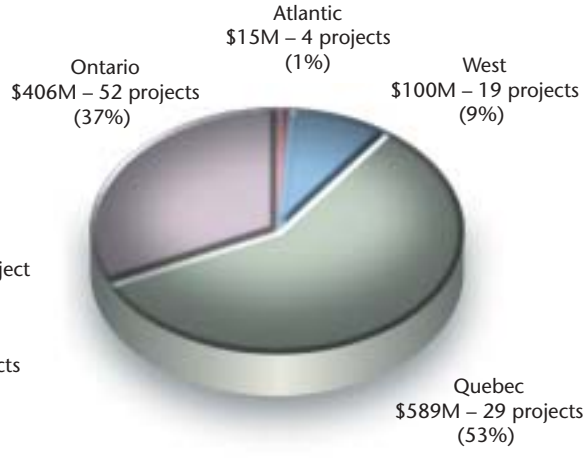
TPC repayable R&D investments are available to various sizes of firms in every region of Canada, and 1999–2000 investments supported projects in all regions. The majority of companies developing new, knowledge-based technologies are located in Ontario and Quebec, and TPC's project funding numbers reflect these location concentrations. As of March 31, 2000, small and medium-sized enterprises (SMEs) composed 24 percent of total TPC investments, with the majority of these projects being located outside Ontario and Quebec. IRAP-TPC, which focusses on small SME investments, further increases regional balance.

Distribution of Investments, by Region (Excluding IRAP-TPC)

1999–2000 Distribution

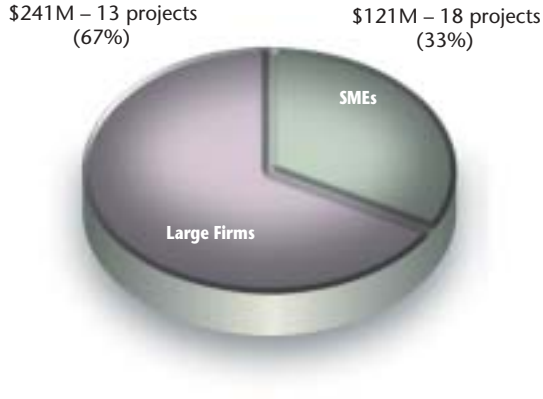


Cumulative Distribution as of March 31, 2000

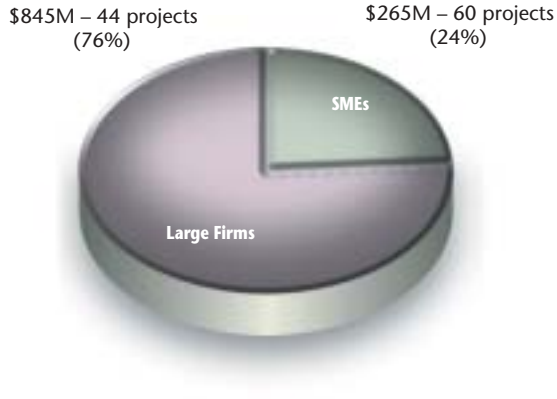


Distribution of Investments, by Size of Firm (Excluding IRAP-TPC)

1999–2000 Distribution



Cumulative Distribution as of March 31, 2000



IRAP-TPC

Technology Partnerships Canada provides repayable R&D investments to SMEs both directly and through its partnership with the National Research Council of Canada's Industrial Research Assistance Program (IRAP-TPC). IRAP-TPC was established in 1998–1999 to make pre-commercialization assistance more readily available to SMEs across Canada. The IRAP-TPC program is cost-shared on a 50:50 basis between IRAP and TPC, and has a budget of $30 million per year. IRAP-TPC is mandated to:

- provide investment to SMEs (fewer than 500 employees) with project costs under $1.5 million;
- stimulate technology development by providing support for pre-commercial innovation projects; and
- serve as a source of information, direct technical assistance to the latest technological advances, facilities and other resources, and provide access to expertise in the business end of innovation.

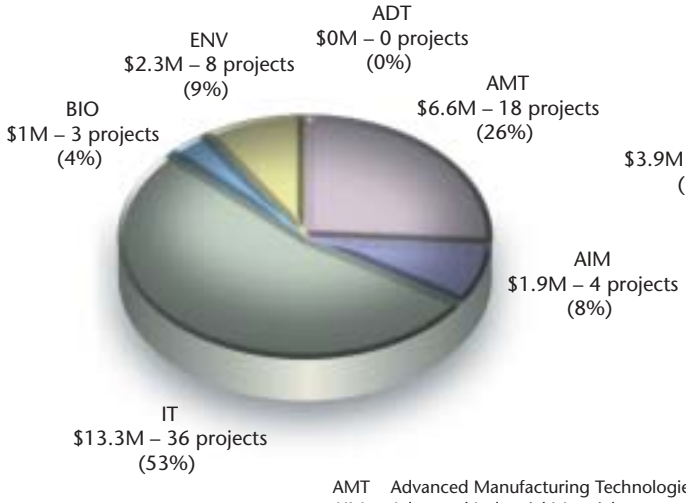
By adding IRAP-TPC to the existing IRAP structure, the National Research Council is able to deliver IRAP-TPC through a network of over 260 Industrial Technology Advisors in seven IRAP regions across Canada and 145 partner organizations in 90 communities. IRAP's advisors provide direct liaison with clients and consider regional concerns, priorities and resources.

IRAP-TPC Summary of 1999–2000 Investments

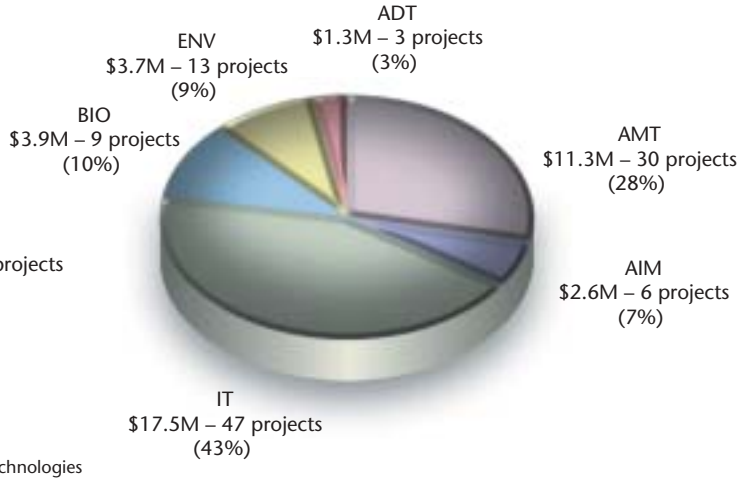
In its second year of operation, IRAP-TPC has continued its efforts to reach full-scale delivery of the program. As a result of IRAP's wide distribution network, IRAP-TPC was able to approve 69 SME projects ($25.1 million of investment) during 1999–2000. As at March 31, 2000, the IRAP-TPC portfolio consisted of 108 projects (total investment of over $40 million) with an average contribution of approximately $373 000. These projects span all targeted sectors across Canada, with the Atlantic and Western regions acquiring over 50 percent of cumulative funding.

IRAP-TPC Investments, by Technology

Investments by Technology 1999–2000 Distribution



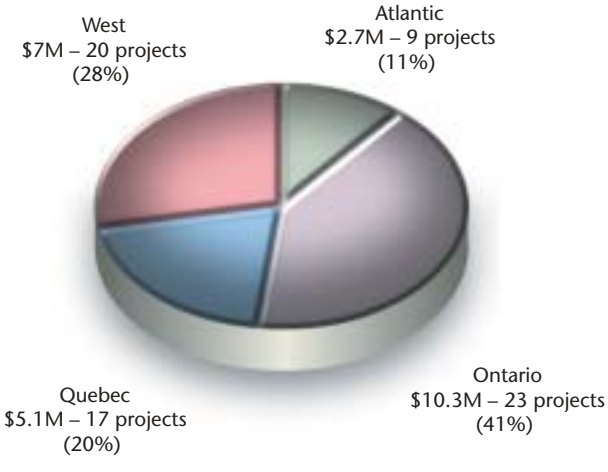
Investments by Technology Cumulative Distribution as of March 31, 2000



AMT	Advanced Manufacturing Technologies
AIM	Advanced Industrial Materials
IT	Information Technologies
BIO	Biotechnology
ENV	Environmental Technologies
ADT	Aerospace & Defence Technologies

IRAP-TPC Investments, by Region

Investments by Region 1999–2000 Distribution



Investments by Region Cumulative Distribution as of March 31, 2000

STRATEGIC INVESTMENTS IN 1999–2000

Environmental Technologies

Enabling Technologies

Aerospace and Defence

ENVIRONMENTAL TECHNOLOGIES

"The investment by TPC in this reward-risk sharing partnership is helping establish Rolls-Royce as the worldwide centre of excellence for large industrial gas turbines."

Pierre Racine
President
Rolls-Royce Industries Canada Inc.

Environmental technologies are intrinsically diverse and touch upon activities throughout the Canadian economy. Traditionally, environmental technologies focussed on pollution control and pollution prevention technologies such as water and wastewater treatment, handling of solid and hazardous wastes and air pollution control. More recently, environmental technologies have come to encompass the concept of sustainable development and eco-efficiency. They include the management and conservation of resources and the re-engineering of industrial processes to improve their resource and energy efficiency as well as to reduce the production of pollutants.

TPC investments focus on environmental technologies that are innovative, contribute to sustainable development, offer cost efficiencies over traditional methods and promise environmental benefits through early and broad adoption in Canada. They include energy-efficient water purification technologies, climate change mitigation technologies, and clean transportation alternatives. They focus on initiatives that combine environmental and human health protection with pollution prevention and an improved bottom line for the technology user.

"This is a solid example of government–industry cooperation where both parties share in the up-front risk and the back-end success."

Jeff Passmore
Executive Vice-President
Iogen Corporation

TPC has invested in the development of pollution prevention technologies such as fuel control systems that allow vehicles to run on gasoline as well as cheaper propane or natural gas while reducing emissions.

TPC has also invested in eco-efficiency technology initiatives including an enzyme-based technology that will allow the conversion of agricultural wastes (straws, corn cobs) into cheaper and cleaner burning ethanol additives for gasoline. Other eco-efficient investments include water recycling technologies for the oil sands and pulp and paper industries that allow the reuse of water and thus reduce operating costs while preventing the release of pollutants to lakes and rivers.

TPC continues to work with Canadian industry in the development of highly efficient fuel cells and gas turbines that promise reduced fuel consumption, hence reduced operating costs and fewer emissions to the atmosphere.

ENVIRONMENTAL TECHNOLOGIES IN BRIEF

CAE ELECTRONICS LTD.

Currently about 10 percent of electrical power generated by power utilities in Canada and elsewhere is lost as it moves from generating stations to the end user. That will soon change if Saint-Laurent, Quebec-based CAE Electronics Ltd.'s Electric Power System Automation and Management (EPSAM) software development project is successful. The EPSAM technology will use information from grid sensors to optimize transmission and distribution pathways, thereby reducing energy losses and the accompanying greenhouse gas and other releases. EPSAM will also provide increased overall grid security by detecting and containing impending problems. CAE's Energy Control Systems Division was sold to SNC-Lavalin in May 2000.

TPC approved repayable R&D investment: $8.7 million

Iogen Corporation

Iogen Corporation

PULP AND PAPER RESEARCH INSTITUTE OF CANADA (PAPRICAN)

The Pulp and Paper Research Institute of Canada (PAPRICAN), whose members include major Canadian pulp and paper producers, is developing more than 30 different environmental technologies related to pulp and paper production. These include closed-system technologies that decrease the loss of raw materials, increase mill efficiency and productivity, and reduce or eliminate the production of pollutants. If successfully implemented by Canadian mills, these technologies will significantly reduce discharges from mills and could result in a significant decline in overall greenhouse gas emissions.

TPC approved repayable R&D investment: $9 million

ROLLS-ROYCE INDUSTRIES CANADA INC.

Developing advanced industrial gas turbine technologies that will produce cleaner, more efficient power aimed at displacing coal, oil and nuclear power is one of the focusses of Rolls-Royce Industries Canada Inc. The new gas turbines are also expected to displace the need for large, central power plants. Typically, a community of 1 000 Canadians consumes one megawatt of power. Rolls-Royce's stand-alone turbines — in the 5 to 75 megawatt power range — will power communities and industries of varying size. The adoption of these new technologies is projected to reduce carbon dioxide emissions in Canada by 430 000 tonnes by the year 2010.

TPC approved repayable R&D investment: $53.3 million

WESTERN STAR TRUCKS INC.

The next time you board the bus, it may be partially operated by electric batteries. Kelowna, British Columbia-based Western Star Trucks Inc. is developing a hybrid electric bus that operates on diesel and electricity. A sophisticated electronic system enables the engine to act as a generator, controlling the flow of electricity and either sending supplemental power to the motor to drive the bus or returning energy to the batteries for later use. The result is an exceptionally efficient and environmentally friendly propulsion system that could reduce the greenhouse gas emissions normally produced by the stop-and-start cycles of transit buses by as much as 50 percent. Western Star Trucks was purchased by Freightliner, the truck-making unit of DaimlerChrysler, in July 2000.

TPC approved repayable R&D investment: $8.5 million

INEX Pharmaceuticals Corporation

ENABLING TECHNOLOGIES

"The investment made by Technology Partnerships Canada has expedited progress in the advancement of our early-stage novel anti-cancer compounds. These compounds are now in development for a variety of different types of cancer."

David J. Main
President and CEO
INEX Pharmaceuticals Corporation

Enabling technologies such as advanced materials processes and applications, advanced manufacturing and processing technologies, biotechnology, and information and communications technologies have the potential to significantly improve the performance and productivity of a wide range of Canadian industries. These technologies drive the development of new products and attract investment in new technologies.

CRS Robotics Corporation

TPC investments focus on projects that develop or apply these strategic technologies with their high potential for secondary enabling effects.

Information and Communications Technologies (ICT) are at the heart of the Internet revolution, providing the foundation for the government agenda for the Knowledge-Based Economy and for a connected nation. TPC supports the Canadian ICT industry through strategic investments in technologies and applications that will allow for faster and more cost-effective use of the Internet and e-commerce such as next-generation technology of voice and data convergence, communications networks and wireless devices.

TPC has also invested in a variety of biotechnology applications across a wide range of industries and has made sectors such as biopharmaceuticals a key priority. Biopharmaceuticals are emerging as a powerful tool in Canada's efforts to forge new approaches to the prevention and treatment of some of society's most devastating diseases such as cancer, Alzheimer's disease and gastro-intestinal disorders. The primary goal is to treat disease at its source to achieve dramatic improvements in human health and quality of life. In the process, this innovative sector is creating jobs and is building high-tech expertise across the country.

TPC is also continuing to work with companies that are developing strategic enabling technologies in the areas of advanced materials and advanced manufacturing and processing technologies such as automated robotic systems that promise to introduce a higher degree of speed and flexibility to laboratory testing and analysis.

ENABLING TECHNOLOGIES IN BRIEF

AETERNA LABORATORIES INC.

More effective treatments for cancer, psoriasis and macular degeneration (a severe impairment of vision) may soon be a reality, thanks to three projects by Quebec City-based Aeterna Laboratories Inc. to develop new treatment approaches. The company's treatment uses angiogenesis inhibitors extracted from shark cartilage, which prevent the formation of the oxygen-giving blood vessels that feed tumours and other growing cells. Without oxygen, these cells starve and die. Because this therapy is non-toxic, it may be used in conjunction with other therapies. If successful, this treatment could increase the quality of life of millions of people around the world.

TPC approved repayable R&D investments: cancer treatment – $9.9 million; psoriasis treatment – $9.6 million; macular degeneration treatment – $9.8 million

AQUA BOUNTY CANADA INC.

Aqua Bounty Canada Inc. has quite a fish story to tell. Using its *AquAdvantage* technology, the company is developing a variety of salmon at its hatchery in Souris, Prince Edward Island, that will reach marketable size in 14 months instead of the 36 months usually required. The fish benefit from a combination of growth hormone genes (derived from wild-type Pacific salmon) and an antifreeze gene (derived from the ocean pout). In addition to their rapid growth, these salmon require 25 percent less feed per unit of weight gain, thus providing a significant cost-saving to *AquAdvantage* fish farmers.

TPC approved repayable R&D investment: $3 million

BIOCHEM PHARMA INC.

To combat the large number of cases of respiratory infections worldwide, Laval, Quebec-based BioChem Pharma Inc. is developing an innovative vaccine program that promises safer, cheaper and more effective protection against pneumonia, meningitis, and streptococcus — diseases considered health priorities by the World Health Organization and Health Canada. As the project evolves, BioChem Pharma is committed to expanding its current research capability and to establishing a research centre or centres in Canada to further develop this and other state-of-the-art vaccine technologies and to produce the vaccines in Canada in a new facility.

TPC approved repayable R&D investment: $80 million

CRS ROBOTICS CORPORATION

Speeding up the routine tasks of laboratories and light industry in order to reduce discovery and testing time is the goal of Burlington, Ontario-based CRS Robotics Corporation. The company is developing a *Polymorph* robotics system that aims to automate the methodical and repetitive tasks required in medical laboratory testing and analysis. The new technology is expected to be particularly useful to organizations involved in large-scale drug discovery and DNA-based research and development.

TPC approved repayable R&D investment: $1.1 million

INEX PHARMACEUTICALS CORPORATION

With as many as one in four Canadians affected by cancer, there is a critical need to develop more effective anti-cancer treatments. INEX Pharmaceuticals Corporation of Burnaby, British Columbia, is developing two new oligonucleotide drugs that prevent defective genes from producing the proteins that cause the growth of four types of cancer cells (melanoma, lymphoma, colorectal and leukemia). The drugs, which are used in conjunction with traditional chemotherapy drugs, are combined with INEX's unique delivery technology, called *Transmembrane Carrier System (TCS)*, which enables them to live longer in the bloodstream and increases their ability to reach disease sites.

TPC approved repayable R&D investment: $9.3 million

"Government involvement in industry, in an economic development, is a major way to get new technology in Canada and therefore provide long-term-based jobs for Canadians, especially the high-value jobs in the technology sector."

Paul Lancaster
Vice-President Corporate Development
Ballard Power Systems

Research In Motion (RIM) Limited

NEUROCHEM INC.

Developing an effective treatment for the estimated 14.5 million North Americans currently afflicted with Alzheimer's disease is the focus of clinical trials being conducted by Neurochem Inc. of Saint-Laurent, Quebec. Neurochem's therapeutic drug aims to prevent and arrest the brain cell death that leads to Alzheimer's disease. If successful, this drug could considerably reduce the number of people developing Alzheimer's disease and also reduce the nearly $4 billion Canada spends each year on health care costs related to Alzheimer's disease and other dementias.

TPC approved repayable R&D investment: $7.9 million

NPS ALLELIX INC.

NPS Allelix Inc. of Mississauga, Ontario, is developing a drug treatment that promises to provide relief to thousands of individuals suffering from severe gastro-intestinal ailments like short bowel syndrome (SBS), inflammatory bowel disease (IBD), the side effects of chemotherapy and radiation treatments, and other conditions that damage the intestine and reduce its ability to absorb nutrients from food. Early studies indicate that the drug promotes intestinal growth and is able to regenerate the lining of the small intestine. The treatment should also reduce or eliminate the number of patient hospital stays, resulting in significant savings to the health care system.

TPC approved repayable R&D investment: $8.4 million

RESEARCH IN MOTION (RIM) LIMITED

Developing new technologies in the exploding world of wireless technologies as well as keeping talented employees and innovative companies in Canada are two of the major goals of TPC's investment in Waterloo, Ontario-based Research In Motion (RIM) Limited technology. The repayable R&D investment will help accelerate RIM's research and development to enhance the performance of its next-generation, hand-held wireless communications devices. These devices will converge the Internet, wireless communications and e-commerce and make it possible for Canadians to communicate anytime, anywhere™.

TPC approved repayable R&D investment: $33.9 million

THERATECHNOLOGIES INC.

Montreal-based Theratechnologies Inc. is offering new hope to the 75 percent of bone marrow cancer patients unable to find a compatible donor. The company is developing a photodynamic treatment that kills a patient's cancer cells without damaging healthy cells. Because the treatment uses the patient's own bone marrow cells and does not affect healthy cells, host rejection and side effects are expected to be minimal. The treatment will be used in conjunction with regular chemotherapy to combat liquid bone marrow cancers such as chronic myeloid leukemia (CML), non-Hodgkin's lymphoma (NHL) and certain breast cancers.

TPC approved repayable R&D investment: $4.6 million

AEROSPACE AND DEFENCE TECHNOLOGIES

"Our partnership with TPC was an important component in the startup for our Composites Manufacturing Centre initiative and supported the creation of over 200 skilled manufacturing jobs."

J. S. (Jim) Butyniec
Vice-President and General Manager
Bristol Aerospace Limited

Aerospace and defence (A&D) are key knowledge-intensive industries, which account for some 15 percent of all research and development performed in Canada. These industries are the leaders in providing science and engineering related jobs in Canada. More than 80 000 Canadians — in highly paid, highly qualified positions — are employed in aerospace and defence firms across the country.

TPC investments are focussing on a series of technologies considered to be key to the continuing contribution of the A&D sector to Canada's national strategic objectives. These technologies include advanced avionics and electronics, aircraft engines and engine components, aircraft structures, components, systems and materials, simulation and modelling, and space systems and components including communications technologies.

TPC's investments have helped make Canada a world leader in aerospace and defence and have helped ensure that the Canadian industry has competitive technologies. TPC has invested in projects such as new aircraft tail components that are critical to flight safety and performance, advanced design tools for landing gear and flight control systems, leading-edge composite panels for aircraft wings and tail sections, next-generation fuel control components for turbofan engines, and new high-performance reciprocating engines for use in small civil aircraft.

"Programs such as the TPC program are essential for the future prosperity and jobs for Canadians and will contribute to maintain Canada's position in the high technology industries."

Gilles P. Ouimet
President and CEO
Pratt & Whitney Canada

Pratt & Whitney Canada

AEROSPACE AND DEFENCE IN BRIEF

ATLANTIS AEROSPACE CORPORATION

Atlantis Aerospace Corporation of Brampton, Ontario, is developing a more effective way to deliver introductory military and commercial aircraft maintenance technician courses. The company's simulation-based interactive training system (SBITS) technology enables simulation to be incorporated into computer-based lessons, thus providing students with more hands-on time. This new form of training can be used both on site at military education institutes, technical and vocational schools and colleges and for distance learning. If adopted, the new technology could result in the training of an increased number of skilled technicians at a considerable cost saving.

TPC approved repayable R&D investment: $1.2 million

BRISTOL AEROSPACE LIMITED

Spacecraft, like small satellites, must be stable (that is, non-spinning) in order to collect or transmit data accurately. Winnipeg-based Bristol Aerospace Limited is using its GyroWheel technology to develop the flight model for an attitude control device aimed at increasing small satellite stability. The GyroWheel is expected to sense and adjust to the extremely small attitude changes (0.1 degree per hour) acceptable for earth-pointing satellites. If successful, the upgraded GyroWheel could lead to substantial savings in satellite mass, power and cost, thus positioning Bristol as a major supplier.

TPC approved repayable R&D investment: $1.6 million

Cosma Powerlasers Limited

B. F. GOODRICH AEROSPACE

Two of the most critical parts of an aircraft are its landing gear and flight control systems. The company's Oakville, Ontario, division (Menasco) is developing and acquiring innovative technologies in these two sectors that will increase its technological capacity. In the first of its two major projects, the company is focussing on three key tasks: the development of improved techniques and advanced design tools for landing gear systems and flight control components; enhanced understanding of how landing gear and flight control subsystems interact; and investigation of new materials and associated manufacturing processes. In its second project, the company is collaborating with three other aerospace companies, Héroux Inc., Messier-Dowty Inc. and Orenda Aerospace, to develop more environmentally friendly High Velocity Oxygen Fuels (HVOF) coatings for landing gear. It will test the endurance of the tungsten carbide cobalt chrome HVOF coating on the landing gear systems of a Dash 8–400 aircraft.

TPC approved repayable R&D investment: first project – $3.1 million, HVOF project – $1.6 million

DERLAN MANUFACTURING INC.

The high power output, light-weight face gear transmission system has never been used in an aerospace application because the high tolerances and high operating temperatures required in the manufacturing process have caused safety and reliability concerns. That is about to change. Milton, Ontario-based Derlan Manufacturing Inc.'s aerospace division, Derlan Aerospace Canada, is developing fully integrated engine transmission systems using new face gear technology that uses enhanced temperature-tolerant materials. While the new systems are primarily destined for helicopters, the technology, if successful, can be applied more broadly to the aerospace and automotive industries.

TPC approved repayable R&D investment: $9.5 million

"The federal government investment, through TPC, has assisted Orenda Recip to get a promising R&D project off the ground; it's a tremendous boost for the aerospace industry in Atlantic Canada."

Peter Jackson
General Manager
Orenda Recip

HALEY INDUSTRIES LIMITED

Today's sophisticated aero-engines and other aerospace components require large, complex, thin-walled light alloy castings to accommodate the many internal oil passages they contain. Because conventional casting methods do not lend themselves to these types of precision castings, Haley Industries Limited, in collaboration with Pratt & Whitney Canada (a leading user of complex light alloy sand castings) and Gudgeon Brothers Ltd. (a leading pattern maker), is developing several technologies around the use of advanced sand casting systems to produce these complex high-quality parts. The project will also allow these castings to be produced using a shorter lead time to quickly respond to customer product design changes, thus reducing parts inventories and costs.

TPC approved repayable R&D investment: $3 million

HÉROUX INC.

A key process of aircraft landing gear repair and overhaul involves stripping and replacing the landing gear coating. Until now, the aerospace industry has been using chrome plating on its landing gear, which has been found to generate environmentally hazardous substances. Héroux Inc., in collaboration with Messier-Dowty Inc. and B. F. Goodrich, is developing and testing new types of landing gear coatings, called High Velocity Oxygen Fuels (HVOF). In addition to being more environmentally friendly, HVOF technology requires less processing time and is expected to be less costly for both suppliers and aircraft operators.

TPC approved repayable R&D investment: $1.2 million

HONEYWELL ASCA INC.

One of Canada's premier developers of aerospace systems and components, Honeywell ASCA Inc., is developing three new types of technologies for the aerospace sector: electric power generation and distribution (EPGD) technologies for a helicopter application; integrated electronic control (IEC) technology for a variety of on-board systems; and power conversion and distribution (PCD) technologies. The three types of technologies will improve Honeywell's core capabilities and are expected to enhance the company's position as a major supplier to the aerospace industry.

TPC approved repayable R&D investments: EPGD – $1.9 million; IEC – $9.9 million; PCD – $9.3 million

MESSIER-DOWTY INC.

Ajax, Ontario-based Messier-Dowty, a developer of small to medium-sized landing gear systems for aircraft like business jets, regional jets and military fighter aircraft, is collaborating with Héroux Inc. and B. F. Goodrich to develop a technology that will replace chrome plating on its landing gears with more environmentally friendly High Velocity Oxygen Fuels (HVOF) coatings. Messier-Dowty's project involves demonstrating and evaluating the performance of the tungsten carbide cobalt chrome HVOF coating on the F-18 E/F military jet nose landing gear system.

TPC approved repayable R&D investment: $1.3 million

OFFSHORE SYSTEMS LTD.

Improving military navigation capability is the focus of the marine navigational technology being upgraded by North Vancouver, British Columbia-based Offshore Systems Ltd. (OSL). Once completed, the upgraded technology will create electronic charts that combine information from navigational charts and shipboard sensors to provide coast guard and military ships with more accurate and timely navigational information.

TPC approved repayable R&D investment: $4 million

PRATT & WHITNEY CANADA

Building next-generation aircraft engines in less time and at less cost requires continuous technological updating. Under phase 2 of Pratt & Whitney Canada's technology development program, the company is increasing its knowledge base in engineering and manufacturing technologies. The project will focus on early-stage research to increase overall engine efficiencies through tools such as computational fluid dynamics, improvements in certain families of engines using demonstrator engines, and new machining technologies and manufacturing processes required to produce highly complex components.

TPC approved repayable R&D investment: $52 million

PRO MAC MANUFACTURING LTD.

Restoring land affected by land mines is the focus of this project by Duncan, British Columbia-based PRO MAC Manufacturing Ltd. The company is developing technology to create a brusher deminer that will clear the brush from land that has been rendered unusable by land mines. The new antipersonnel land mine brusher deminer is designed to withstand land mine explosions and can be used in different terrain conditions. The tool will be adaptable to different power sources and will be highly portable.

TPC approved repayable R&D investment: $160 000

SPACEBRIDGE NETWORKS INC.

Internet connection speeds are increasing almost daily in response to user demand for broadband access. While cable modems currently provide the fastest connections, SpaceBridge Networks Inc. of Hull, Quebec, is developing new technology that will allow users to directly access land- and satellite-based wireless networks for broadband transmission of data. The company's universal modem will provide flexible, two-way, high-speed Internet transmissions at a low cost.

TPC approved repayable R&D investment: $2 million

VIRTUAL PROTOTYPES INC.

In the increasingly digital world of modern aircraft, Montreal's Virtual Prototypes Inc. (VPI) is developing a software tool that will enable aircraft manufacturers to incorporate three-dimensional graphics, optics, tactile sensors and voice recognition systems into aircraft cockpit displays. The user-friendly software development project, called *DaVinci*, can be used by military command and control stations to enhance their complex visual display networks and by car manufacturers and their suppliers to reduce the development cost and time of electronic on-board car information and navigation systems.

TPC approved repayable R&D investment: $2.6 million

"With the assistance of TPC, the Thermal Phase Separation (TPS) technology is now recognized as an innovative "Made in Canada" solution for the management and recovery of oily contaminated waste generated during oil and gas drilling operations."

Paul Antle, President and CEO SCC Environmental Group Inc.

PAPRICAN

Program Administration

Technology Partnerships Canada is committed to limiting its administration costs by using new and innovative delivery mechanisms. To meet this challenge, TPC has developed partnership and service agreements with other areas of Industry Canada and other government departments, rather than developing its own group of experts. These agreements enable TPC to access existing government expertise related to technological assessments, repayment administration, communication, finance, legal, contracting, cost analysis, claim verification and audit.

TPC strives to limit its administration expenses to approximately 3 percent of its total program funding ($8.5 million or 3 percent of $285 million for 1999–2000, excluding the $15 million dedicated to IRAP-TPC). In 1999–2000, TPC expended $7.9 million in program administration, within its targeted budget. Because of the relatively small number of investments that are in the repayment phase during 1999–2000, the cost of administering repayments was borne by the program's general administrative funding. Starting in 2000–2001, additional operating funds, to be provided from the repayments themselves, will be requested to cover the costs of this increasing and specialized activity.

The IRAP-TPC program is delivered through a localized and highly decentralized network of Industrial Technology Advisors (ITAs) and partner organizations. Regional delivery to SMEs is achieved by ITAs in seven IRAP regions across Canada to provide direct liaison with clients in a context that takes into account regional concerns, priorities and resources. As a result, this program incurs higher administration costs as a percentage of program approvals ($2 million or 6.7 percent of $30 million). In 1999–2000, IRAP-TPC fully expended its budgeted amount of $2 million.

Statement of Operations ($000)

(For the year-ended March 31, 2000)

	1999–2000	1998–1999
SALARY		
Regular salaries	3 208	2 916
Employee benefits	642	583
Total Salary	3 850	3 499
NON-SALARY		
Transportation and communications	388	351
Information	632	505
Professional and special services	2 436	1 388
Other	643	781
Total Non-Salary	4 099	3 025
TPC operations	7 949	6 524
IRAP-TCP operations	2 000	839
Total operations	**9 949**	**7 363**

Statement of Contribution Funding ($000)

(For the year-ended March 31, 2000)

	1999–2000	1998–1999
Contribution disbursements under TPC:		
Environmental Technologies	38 416	20 274
Enabling Technologies	48 979	25 344
Aerospace and Defence	93 464	152 776
National Research Council's Industrial Research Assistance Program (IRAP-TPC)	18 943	4 089
Total contribution disbursements under TPC	199 802	202 483
Contribution disbursements under sunsetted programs:		
Defence Industry Productivity Program (DIPP)	77	744
Environmental Technology Commercialization Program (ETCP)	285	–
Total contribution under sunsetted programs	362	744
Total contribution disbursements during fiscal year	200 164	203 227
Funds carried forward to future years	45 000	19 224
Funds not eligible for carry forward	6 626	–
Total contribution funds available	**251 790**	**222 451**

STATUS OF CONTRIBUTION PORTFOLIO ($000)

	ACTUAL	PLANNED SPENDING			
	1999–2000	2000–2001	2001–2002	2002–2003	2003–2004
TOTAL PROGRAM FUNDING:	300 000	300 000	300 000	300 000	300 000
Funding from Other Government Departments (1)	17 710	21 556	15 755	15 378	15 000
Allocation for program operations	(9 949)	(10 678)	(10 522)	(10 511)	(10 500)
Funds reprofiled to future years	(56 732)	13 503	30 726	61 500	1 492
Funds Lapsed in 1999-2000 and carried forward to 2001-02 and 2002-03	(45 000)	–	30 000	15 000	–
Funds Lapsed in 1999-2000 not eligible for carry forward	(6 626)	–	–	–	–
Repayable contributions collected in 1999-2000	–	3 982			
Forecast Repayable contributions	–	–	6 544	15 187	22 786
Other adjustments - operations	761	–	–	–	–
AVAILABLE CONTRIBUTION FUNDING	200 164	328 363	372 503	396 554	328 778
COMMITMENTS UNDER SUNSETTED PROGRAMS:					
Defence Industry Productivity Program (DIPP)	77	33	–	–	–
Environmental Technology Commercialization Program (ETCP)	285	–	–	–	–
TOTAL COMMITMENTS UNDER SUNSETTED PROGRAMS	362	33	–	–	–
COMMITMENTS UNDER TPC as of March 31, 2000:					
Environmental Technologies	38 416	40 534	22 702	11 545	11 375
Enabling Technologies	48 979	68 155	66 916	46 242	26 531
Aerospace and Defence Industries	93 464	64 404	40 315	48 203	6 560
Industrial Research Assistance Program (IRAP-TPC)	18 943	15 620	1 740	241	–
TOTAL COMMITMENTS UNDER TPC	199 802	188 713	131 673	106 231	44 466
TOTAL PORTFOLIO COMMITMENTS	200 164	188 746	131 673	106 231	44 466
TOTAL FUNDS AVAILABLE FOR NEW CONTRIBUTIONS IN FUTURE YEARS	–	139 617	240 830	290 323	284 312
FUNDS AVAILABLE FOR NEW IRAP-TPC CONTRIBUTIONS		20 437	31 171	29 759	28 000
FUNDS AVAILABLE FOR NEW DIRECT TPC CONTRIBUTIONS		119 180	209 659	260 564	256 312
	–	139 617	240 830	290 323	284 312

Note (1) Includes funds from the Climate Change Action Fund, the Canadian Landmines Fund and the Industrial Research Assistance Program (IRAP-TPC).

TPC Partners in Progress 1999–2000

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(Science, Research and Development)
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Canadian Space Agency
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Industry Canada
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Natural Resources Canada
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Western Economic Diversification Canada

Government Partners

Department of Justice Canada
Environment Canada
Industry Canada
National Defence
National Research Council of Canada
Natural Resources Canada
Public Works and Government Services Canada

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