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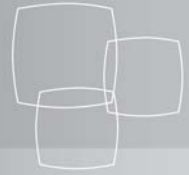
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***SADI*** / *Strategic Aerospace and Defence Initiative*

## Program Highlights 2011-2012



*Accelerating Innovation*



## Table of Contents

TOPIC	PAGE
1. Introduction	1
2. Supporting the Government of Canada's Science and Technology Strategy	2
3. SADI Overview	3
4. Financial Framework	5
5. SADI Project Portfolio	6
6. SADI Results	9
7. 2011-2012 Highlights	10
8. Conclusion	12
Annex A	

# 1 Introduction

Canada's aerospace, defence, space and security (A&D) industries are major contributors to our nation's economy and important global players. Canada's aerospace industry is the fifth largest worldwide, with annual revenues of \$22 billion and more than 700 companies across the country.<sup>1</sup> This industry supports more than 160,000 direct, indirect and induced jobs to the Canadian economy, including around 70,000 direct jobs in 2011. The defence and security industry comprises more than 2,000 firms, employs approximately 71,000 Canadians, and generated \$12.6 billion in annual revenues in 2011<sup>2</sup>.

In the global marketplace, research and development (R&D) is a key driver of economic growth, and innovative companies are more likely than others to be part of that growth. R&D allows Canada to compete in new markets and industries, and helps Canadian businesses offer their customers new or improved products, processes and services. With annual investments of more than \$1.6 billion each year, the aerospace sector is among Canada's largest contributors to Canadian R&D activities<sup>3</sup>.

Innovative R&D benefits individual Canadians too, through economic development, employment opportunities, and the potential environmental and safety benefits of new or improved technologies (for example: better fuel efficiency, reduced emissions, or enhanced emergency communications capabilities).

Canadian companies must invest in innovation to maintain and increase their global market shares. Unfortunately, Canadian business expenditures in R&D tend to be low compared to other developed countries. In times of economic uncertainty, companies may reduce their R&D expenditures, potentially slowing the pace of innovation and "making it difficult to stay on the leading edge".<sup>4</sup>

The Strategic Aerospace and Defence Initiative (SADI) accelerates innovation by Canadian A&D companies to produce economic, technological and social benefits for Canadians. The program provides repayable contributions in support of strategic industrial and pre-competitive R&D. SADI was launched in 2007 and is delivered by the Industrial Technologies Office (ITO) of Industry Canada.

This report covers the SADI program, from April 2, 2007 to March 31, 2012, and highlights developments in 2011-2012.

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<sup>1</sup> Aerospace Review, Beyond the Horizon: Canada's Interests and Future in Aerospace, November 2012

<sup>2</sup> Canadian Association of Defence and Security Industries (CADSI) report prepared by KPMG: Economic Impact of the defence and security industry in Canada, May 2012.

<sup>3</sup> Aerospace Review, November 2012

<sup>4</sup> Science, Technology and Innovation Council, State of the Nation 2008: Canada's Science, Technology and Innovation System, 2009, p. 1.

## 2. Supporting the Government of Canada's Science and Technology Strategy

In May 2007, the Government of Canada released its Science and Technology (S&T) strategy entitled: *Mobilizing Science and Technology to Canada's Advantage*.

The Strategy focused on creating a business environment that encourages private sector innovation while ensuring that public funds are invested wisely. It recognized the important role that the private sector and others play in the Canadian economy, and committed to investing in R&D. Since 2006, the government has provided \$8 billion in new funding for science and technology and the growth of innovative firms.

SADI is an important part of the S&T Strategy. With a focus on Canada's A&D industries, the program directly supports the federal government's commitments to R&D, leveraging private sector investment, and encouraging strategic partnerships and collaboration among companies and research institutions. These commitments are key components of Industry Canada's Business Plan 2011-12, which sees science and technology, knowledge, and innovation as effective drivers of a strong Canadian economy.

By making repayable contributions in strategic industrial and pre-competitive R&D projects, SADI helps create a supportive environment in which Canadian companies can develop advanced technology, products and processes. These efforts benefit not only the company conducting the R&D, but also other companies throughout the A&D supply chain and the Canadian economy as a whole through job creation, technology transfer and other spill-over benefits.

At the same time, by nurturing private sector R&D at home, SADI helps Canadian companies of all sizes remain competitive in the global economy.



### 3. SADI Overview

SADI provides repayable contributions to support strategic R&D among Canadian A&D industries. By sharing in the risks and rewards of R&D, SADI supports innovation by Canadian A&D companies. The program also encourages private sector investment in R&D by increasing the amount of capital available for eligible projects.

#### *The three key objectives of SADI investments*

- (1) encourage strategic R&D that will result in innovation and excellence in new and improved products, services, and processes;
- (2) enhance the competitiveness of Canadian A&D companies; and
- (3) foster collaboration between research institutes, universities, colleges and the private sector.

#### *Eligibility Criteria*

- The company must be incorporated under Canadian law, conduct R&D in the A&D industries and contribute to a highly skilled and knowledge-based workforce.
- The project must comprise industrial research or pre-competitive development.
- The project must include strategic R&D activities that support the development of next generation A&D-related products or services, build on Canadian strengths in A&D technology development, enable Canadian companies to participate in major platforms and supply chains, or assist the A&D industries in achieving Canada's international obligations.
- The applicant must demonstrate that SADI funding is required to meet the location, scope and/or timing of the proposed project.
- The project must comprise R&D that takes place in Canada.
- The project must involve collaboration with post secondary education institutions in Canada.

## ***Project Approval Process***

Submission of the Proposal: SADI proposals are accepted throughout the year using an on-line application form. There are no submission deadlines, nor contribution minimum/maximum amounts. Once the on-line application form is complete, it becomes the applicant's project proposal.

Eligibility and Completeness Screening: ITO screens each proposal to ensure that the project meets the six eligibility requirements and that the proposal contains adequate information upon which to start a due diligence review.

Due Diligence Review: ITO evaluates the company's capability to achieve the stated objectives (e.g. financial resources, management expertise, business plan, technical feasibility) and the social and economic benefits that would likely result from the R&D activities.

Project Approval: Final project approval rests with the Minister of Industry. Funding requests for more than \$10 million require approval of the Treasury Board. Funding requests for more than \$20 million require the approval of the Cabinet and the Treasury Board. Once a project receives approval, a contribution agreement is signed by the recipient and the Crown outlining the legally binding obligations and responsibilities of both parties, and the conditions under which payment will be made.

## ***Repayment Terms***

The SADI program provides repayable contributions, as opposed to loans, generally covering 30% of total eligible project costs. Repayments are based on the recipient's gross business revenue and usually begin one year after the completion of the R&D over a 15 year period. The maximum amount repayable is based on risk as calculated by ITO during the due diligence review.

SADI also supports projects under the Defence Development Sharing Agreement (DDSA) with the United States Department of Defence and the multi-national Joint Strike Fighter (JSF) program. SADI typically contributes 40% of eligible project costs and the repayment rate is 100% of the contribution, payable over 15 years for DDSA and over 20 years for JSF projects.

## ***Monitoring Process***

Annual site visits, monthly or quarterly progress reports, annual financial statements and annual benefit reports allow ITO to monitor the progress of the company in meeting the objectives of the project, with greater oversight in cases of high risk projects and projects of more material size.

## 4. Financial Framework

SADI's program funding comes from appropriations made available through the estimates process, and an authority to access repayments collected from SADI and the program that preceded it, Technology Partnerships Canada (TPC). In addition, in 2009, \$200 million over four years (2010-11 to 2013-14) was announced for SADI.

As of March 31, 2012, SADI approved \$824.8 million in authorized assistance of which \$386.6 million was disbursed against eligible claims. Available funds for SADI for 2012-2013 are \$296.3 million.

SADI annual disbursements continue to grow while operational costs decline as the program reaches steady state. ITO's operating expense was \$7.8 million in 2011-12 for the management of SADI and TPC. Operating expenses cover salaries, audits, site visits, employee training, outreach and other administrative program requirements.

**Program Resources by Fiscal Year (\$000)**

<b>Fiscal Year</b>	<b>ITO Operating Expenses *</b>	<b>SADI Annual Contribution Disbursements **</b>	<b>TPC Annual Contribution Disbursements **</b>
2007-08	12,660	10,500	256,553
2008-09	12,635	35,783	198,813
2009-10	12,369	62,035	130,916
2010-11	10,596	114,558	46,726
2011-12	7,784	163,675	25,194

\* Represents total operating costs for the management of SADI and TPC, as reported in Industry Canada's corporate financial system.

\*\* As presented in the Annual Public Accounts of Canada

## 5. SADI Project Portfolio

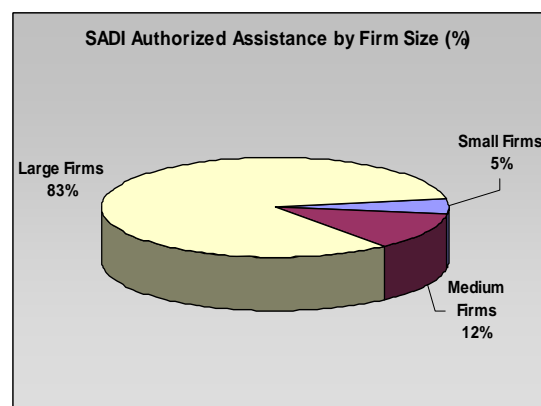
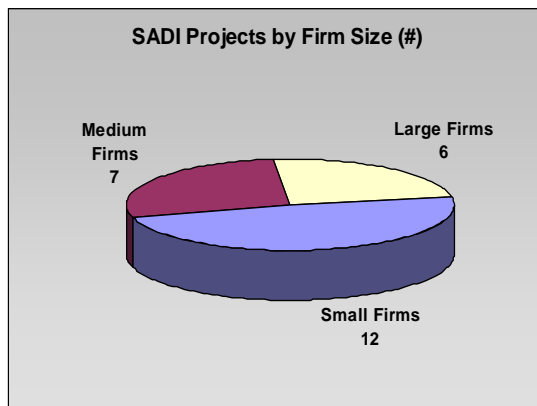
As of March 31, 2012 the SADI portfolio comprised 25 projects with a combined authorized assistance of \$824.8 million. The authorized assistance ranged from \$276,000 to \$300 million per project. Most projects are still performing R&D and have yet to enter the repayment phase.

SADI Project Portfolio				
Status	# of Projects	Authorized Assistance	Disbursements	Repayments
R&D Phase	19	784,091,468	373,888,201	Not due until 2013
Repayment Phase	2	3,403,484	3,403,484	Not due until 2013
Inactive *	4	37,266,991	9,258,859	6,172,282

\* Includes a) Projects which have both the R&D and repayment phases completed and all financial obligations have been fulfilled by the company and the government; b) Projects unable to be completed for reasons such as: technical failure or market conditions, and for which both the company and the department have agreed to terminate the Contribution Agreement; c) Projects cancelled before having made any disbursements; d) Projects in default due to cessation of operations, and may have entered into bankruptcy or receivership.

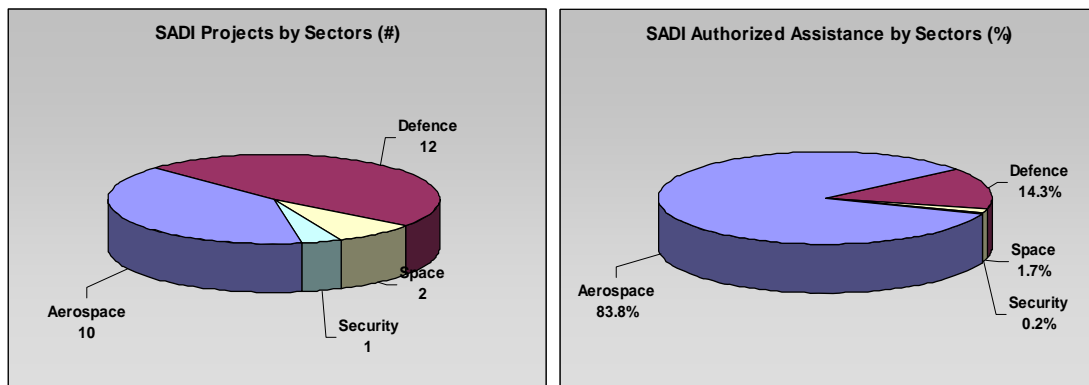
### *SADI provides contributions to companies of all sizes*

Of the 25 SADI projects, small companies with less than 100 employees accounted for 12 projects and 5% of the authorized assistance; medium sized companies with 100-500 employees accounted for 7 projects and 12% of the authorized assistance; and large companies with more than 500 employees accounted for 6 projects and 83% of the authorized assistance.



### ***SADI supports the aerospace, space, defence, and security sectors***

Of the 25 SADI projects, 10 projects supported the aerospace sector accounting for 84% of the authorized assistance; 12 projects supported the defence sector accounting for 14% of the authorized assistance; 2 projects supported the space sector accounting for 2% of the authorized assistance; and 1 project supported the security sector accounting for less than 1% of the authorized assistance.



### ***SADI supports Canada's international objectives***

Of the 25 SADI projects, three were developing new technologies for the Joint Strike Fighter (JSF) and three were developing technologies for the government of the United States under the Defence Development Partnership Sharing Agreement (DDSA). This is a testament to the strength of Canadian companies in their respective niches.

- The three JSF projects account for 12% of SADI's portfolio and 7% of authorized assistance.
- The three DDSA projects account for 12% of SADI's portfolio and 0.2% of authorized assistance.

**SADI Portfolio 2007-2012**

No.	Company	Project Description	Authorized Assistance *
<b>2007-2008</b>			
1	Diamond D-Jet Corporation	Single-engine, five-passenger jet aircraft	\$19,600,000
<b>2008-2009</b>			
2	Integran Technologies Inc.	Nanotechnology enabled tooling	\$4,596,000
3	Magellan Aerospace Limited	Structural components for the F-35	\$43,391,600
4	Héroux Devtek Inc.	Advanced landing gear technology	\$26,964,430
5	Norsat International Inc.	Microwave, wireless and portable satellite technologies	\$5,975,200
6	CMC Electronics Inc.	Integrated cockpit and communications system	\$52,287,784
7	EMS Technologies Canada Ltd.	Next generation mobile satellite communications	\$8,718,634
8	SkyWave Mobile Communications Inc.	Fleet management, shipping security	\$3,127,200
9	CAE Inc.	Enhanced simulation technology	\$250,000,000
10	Sputtek Inc.	Advanced protective coating technologies	\$360,285
<b>2009-2010</b>			
11	AXYS Technologies Inc.	Unifying data from monitoring and surveillance sources	\$1,836,900
12	PCI Geomatics	Earth observation information extraction	\$7,665,000
13	BelAir Networks Inc.	Radio technology with advanced security	\$9,690,706
14	Kongsberg Mesotech Ltd.	Acoustic instrumentation for underwater security	\$4,968,000
15	GMA Cover Corporation	Next generation camouflage	\$8,646,000
16	Integran Technologies Inc.	Cadmium replacement coatings	\$276,284
17	Integran Technologies Inc.	Hard chrome alternative	\$807,399
<b>2010-2011</b>			
18	2154331 Canada Inc.	Flight simulation	\$18,570,000
19	D-TA Systems Inc.	Advanced sensor processing	\$1,790,140
20	ASCO Aerospace Canada Ltd.	Structural components for the F-35	\$7,688,288
21	Pratt & Whitney Canada Corporation	Gas turbine engine applications	\$300,000,000
22	Thales Canada Inc.	Fly-By-Wire flight control system	\$12,988,800
23	FLYHT Aerospace Solutions Ltd.	Automated flight information reporting system	\$1,967,507
24	Ultra Electronics Canada Inc.	Tactical high capacity radio	\$32,447,400
<b>2011-2012</b>			
25	Integran Technologies Inc.	Nanostructured alloys as an alternative to copper beryllium	\$399,386

\* **Authorized Assistance** represents the maximum amount contracted at the time of the initial contribution agreement. Actual amounts disbursed at the time of this report may be lower than the maximum allowed.

## 6. SADI Results

SADI's Performance Measurement Strategy identifies performance indicators for each of the program's three objectives: innovation, competitiveness and collaboration. This section reports on the overall progress of recipients in meeting program objectives. For descriptions at a project level, please see Annex A. A copy of the Performance Management Strategy may be found at <http://ito.ic.gc.ca/eic/site/ito-oti.nsf/eng/00802.html>.

### *Innovation*

By November 2012, 20 out of 25 recipients had successfully completed all or part of their R&D project, resulting in the development of new or improved products, services or processes. In some cases, the entire project was not completed, but an element of it was completed and efforts had begun to commercialize or put into use the new technology. Most projects are in the R&D phase and are making good progress in achieving the activities outlined in their Statement of Work, as contained in the Contribution Agreement and described in Annex A. The overall program target is to see 90% of all companies successfully complete their R&D project over the life of their agreements.

In 2011-12, \$163.7 million of approved funding was disbursed against eligible claims, leveraging \$347.2 million from other sources to accelerate innovation in Canada. A total of \$2.12 was leveraged for every SADI dollar in 2011-12. Since 2007, the program has leveraged \$2.01 per SADI dollar disbursed.

### *Competitiveness*

By November 2012, 14 out of 25 recipients had successfully commercialized the results of their R&D project or put into use the new process innovation supported by SADI. As described in Annex A, companies are progressing well in their early days of exploiting new market opportunities. They are beginning to generate economic benefits to recipients and broader economic and social benefits, including increased production efficiency, reduced consumption of fossil fuels and reduced waste. The overall program target is to see 82% of all recipients successfully commercialize their R&D project over the life of their agreements.

### *Collaboration*

When companies undertake collaborative R&D with universities and colleges, the benefits extend beyond the goals of the specific project, resulting in a stronger alignment of research interests, training of the next generation of researchers and engineers, acceleration of innovation, improved access to research infrastructure, and increased student employment. Of the 25 R&D projects, 23 recipients have already entered into a wide array of collaborations with various universities, colleges and affiliated research institutes as described in Annex A. The target over the R&D phase of each project is to see all recipients engage in meaningful collaboration.

## **7. 2011-2012 Highlights**

### ***New Agreements***

In 2011-12, the government announced a \$399,386 repayable contribution to Integran Technologies Inc. The Mississauga-based Company is developing innovative nano-structured aerospace and defence products that will offer superior performance while meeting the highest environmental standards. Integran's project is expected to result in the creation of next-generation metal alloys that are more robust and free from toxic beryllium copper. This will help expand the company's product line and its customer base. As part of the initiative, Integran will collaborate with graduate-level engineering students from the University of Toronto. The full press release may be found at [http://www.ic.gc.ca/eic/site/ito-oti.nsf/eng/h\\_00796.html](http://www.ic.gc.ca/eic/site/ito-oti.nsf/eng/h_00796.html).

Demand for SADI is expected to be more robust in 2012-13 as the market conditions improve. The Conference Board of Canada forecasts a resumed expansion based on a modest economic increase in North America and expects the industry to reap large gains in orders from emerging markets.

### ***Service Standards***

Service standards were developed in 2010. In 2011-12, ITO improved its client focus, meeting its service standard to respond to all incoming requests in one business day, process applications under \$10 million in under six months, and process claims in under 45 days. ITO's performance in meeting service standards is published every quarter at <http://ito.ic.gc.ca/eic/site/ito-oti.nsf/eng/00734.html>.

**Table 4: SADI Service Standards**

<b>Service Standard</b>	<b>2010-2011</b>	<b>2011-2012</b>
<u>Application Assistance Response Time</u> - Respond within one business day when one requests assistance with a project application through one of our toll-free numbers or email.	100%	100%
<u>Application Processing Time</u> - Complete the proposal review and provide a funding decision within 6 months of receiving a completed application. Applications requesting more than \$10 million require additional review by Treasury Board and/or Cabinet, and may require additional time.	7 months average (7 projects approved)	4.4 months average (1 project approved)
<u>Claims Processing Time</u> - Process completed claims and release the payment as per contribution agreements in good standing within 45 calendar days.	93%	100%

### ***Terms and Conditions***

The Terms and Conditions of a program define the parameters under which transfer payments may be made for that program. On March 23, 2012, the Minister of Industry renewed SADI's terms and conditions. A copy of SADI's terms and conditions can be found at [http://ito.ic.gc.ca/eic/site/ito-oti.nsf/eng/h\\_00728.html](http://ito.ic.gc.ca/eic/site/ito-oti.nsf/eng/h_00728.html).

### ***SADI Evaluation***

In 2011, the department conducted an evaluation of SADI to assess the program's relevance and performance. The evaluation concluded that SADI addresses a demonstrable need for R&D support to the aerospace and defence sector, is aligned with the priorities of the department, and is consistent with the overall federal responsibility to increase competitiveness. The evaluation recommended that the program further streamline the application process; improve client uptake, particularly among small and medium sized enterprises; and further enhance collaboration.

ITO developed and implemented a new SADI Proposal Development Guide to help reduce the application processing time for potential recipients. Further efforts will be made to process applications efficiently without compromising the required due diligence. ITO also has embarked on a renewed outreach effort to raise awareness of the program, particularly among small and medium sized enterprises. In addition, collaboration commitments are now systematically included in Contribution Agreements as contractual requirements. A copy of the SADI Evaluation and Management Response can be found at [http://www.ic.gc.ca/eic/site/ae-ve.nsf/eng/h\\_03499.html](http://www.ic.gc.ca/eic/site/ae-ve.nsf/eng/h_03499.html).

### ***Auditor General Report***

The Auditor General completed a review of SADI in 2012. The report concluded that the department collects sufficient information to determine progress against the program's objectives, uses reasonable program controls to review recipients' claims and progress reports before issuing payment, and funds recipients that meet program eligibility requirements. In response to recommendations of the audit, ITO will revise its claims standard to apply it to a broader base of claims, publish more information on program results and accomplishments, and implement the other administrative improvements as proposed. A copy of the Auditor General report and departmental response can be found at [http://www.oag-bvg.gc.ca/internet/English/parl\\_oag\\_201210\\_06\\_e\\_37350.html](http://www.oag-bvg.gc.ca/internet/English/parl_oag_201210_06_e_37350.html).

### ***Recipient Audits***

In 2011-12, ITO performed a total of 26 SADI and TPC project audits: five cost audits, 14 revenue audits and seven lobbyist audits. Projects were selected for audit based on risk and materiality. The projects audited are part of a multi-year audit plan which identifies audits planned for the period ending 2015-16. Recipients were found to be in compliance with the conditions of the contribution agreements and all audit findings were resolved satisfactory.

## **8. Conclusion**

SADI is fulfilling its key objectives: encouraging innovation through R&D excellence, enhancing the competitiveness of Canadian companies, and fostering collaboration between the private sector, research institutions and universities.

Although most SADI projects are currently in the R&D phase, significant progress is already being made toward achieving benefits to Canada.

As announced in Budget 2011, the Government launched an Aerospace Review to consider how federal policies and programs can maximize the competitiveness of Canada's aerospace and space sectors. Mr. David Emerson, head of the review, tabled his report on November 29, 2012.

Business priorities for 2012-13 include building on SADI's progress and responding to the recent departmental evaluation, Auditor General's report, and the Aerospace Review's recommendations.

## Contact Information

More detailed information about SADI can be found on the ITO website. For other information, please contact:

### **Industrial Technologies Office**

Industry Canada

235 Queen Street, 7th Floor

Ottawa ON K1A 0H5

Email: [info@ito.ic.gc.ca](mailto:info@ito.ic.gc.ca)

Toll-free (hearing impaired only) TTY: 1-866-468-1669

Toll-free (Canada): 1-800-266-7531

Fax: 613-954-5649

ITO Web site: <http://ito.ic.gc.ca>

## ANNEX A

The majority of projects in the SADI portfolio are in the research and development (R&D) phase. A few companies have recently completed their R&D projects and moved into the repayment phase, with the earliest payments due in 2013. R&D projects are typically 5 years in duration followed by a 15 year repayment phase. Economic and social benefits are expected from the research and then commercialization of the innovation over the 20 year life cycle of an average project.

### PROJECTS IN THE RESEARCH AND DEVELOPMENT PHASE

#### ASCO AEROSPACE CANADA LTD.

**Location:** Delta, British Columbia

**Authorized SADI Assistance:** \$7,688,288

**Contribution Agreement:** October 25, 2010

**Innovation:** ASCO Canada's R&D is focused on developing new techniques and approaches to titanium and aluminium milling, putting in place strict internal quality assurance procedures, and developing an advanced computerized machining process.

**Collaboration:** ASCO Canada has maintained a coop partnership with the University of British Columbia and has recruited post graduated students into its operations.

**Economic and Social Benefits:** In under a decade ASCO Canada has transformed itself from a small machine-shop working on one-off machining contracts into a highly sophisticated machining firm compliant with stringent industry standards. It has been awarded large volume, contracts for complex structural aerospace components including for the F-35 Joint Strike Fighter, where ASCO Canada will machine the titanium bulkhead (frame) of the plane, the single largest structural component. ASCO Canada has implemented additional waste reclamation and recycling programs, dramatically reducing industrial waste and minimizing its ecological footprint.

#### AXYS TECHNOLOGIES INC.

**Location:** Sidney, British Columbia

**Authorized SADI Assistance:** \$1,836,900

**Contribution Agreement:** August 5, 2009

**Innovation:** The objective of this project is to research and develop a system to combine data from various maritime monitoring and surveillance sources to provide comprehensive real-time information. The innovative aspect of this project involves the system's ability to receive information from various sources, integrate the data and

present it to users and decision makers in real time. The goal of this project will be to integrate and manage data from sensors and systems to provide a unified view of maritime domain and enhance port and waterside security. This project is currently in the research phase with approximately 60% completed to date.

**Collaboration:** AXYS has been collaborating with the University of Victoria's Neptune Project. The Neptune Program Office provides access to its academic pool, reference libraries and laboratories. AXYS has also collaborated with Memorial University of Newfoundland utilizing test data from their ocean simulator laboratory. As well, AXYS continues to engage engineering co-op students in its research and development activities and JASCO Research in the area of marine underwater acoustic surveillance.

**Economic and Social Benefits:** Once the innovation currently being developed is complete, this technology is expected to help defence and security organizations, port operators and other stakeholders improve maritime security and respond promptly to security incidents such as undesired vessel movements, discharge of pollutants at sea, oil spills and severe weather threats.

## CAE INC.

**Location:** Saint-Laurent, Quebec

**Authorized SADI Assistance:** \$250,000,000

**Contribution Agreement:** March 30, 2009

**Innovation:** Project Falcon's objective is to solidify CAE's position in the commercial and defence virtual air training market and leverage its core modeling and simulation technologies to offer products and services across a broad spectrum of aerospace and defence applications. Development of several innovative products is underway. CAE's Dynamic Synthetic Environment which is in early stage development aims to demonstrate virtual world interoperability. Examples of products which are in the late development phase include: the Augmented Visionics System (AVS), the 3000Series full-flight simulator (FFS) development, the Unmanned Aerial System (UAS) Trainer, and the next generation of Magnetic Anomaly Detection (MAD).

**Collaboration:** CAE uses a collaborative model of technological development that benefits universities and research facilities. The company has made contributions in excess of \$7 million for collaborative projects with universities and research institutes including: a McGill University Research Chair; Carleton University's Centre for Advanced Studies in Visualization and Simulation (VSIM); and CAE's Augmented Engineering Environment Software/Development Laboratory at École Polytechnique de Montréal. CAE has also launched collaborations with Ottawa and McMaster Universities and is currently participating in several collaboration projects with the Consortium for Research and Innovation in Aerospace in Quebec (CRIAQ) and other educational institutions. In addition, CAE is collaborating with the National Research Council of Canada and the Institut national d'optique (INO).

**Economic and Social Benefits:** In CAE's traditional market segments where a 70% market share has been maintained, the company has consistently introduced new aircraft platforms incorporating Project Falcon technologies. The Boeing 787 and the Airbus A350 platforms are a few of the many new platforms that have been brought to market. In addition, sales of CAE's Tropos-6000 and 3000Series FFS have been announced. CAE is also collaborating with Bombardier Aerospace for the C-Series platform and the Global 7000 and Global 8000 aircraft programs, the Aviation Industry Corporation of China (AVIC) for the new AVIC Medium-Sized Transport aircraft, the Mitsubishi Aircraft Corporation for the Mitsubishi Regional Jet (MRJ), and AgustaWestland for the AW189 full-flight simulator. Project Falcon has enabled CAE to maintain and broaden training services that have grown to include the largest network of civil training locations in the industry. This has contributed to making commercial flying among the safest forms of transportation. Modelling and simulation applications have been leveraged into the defense and security applications, notably PRESAGIS products which were featured at the 2010 Vancouver Olympics. CAE is expanding professional services offerings, applying modelling and simulation to achieve safety, security and efficiency/ productivity benefits for entire Nations, such as Brunei. Falcon know-how in complex algorithmic modelling and evidence-based training has also been applied into healthcare and mining markets.

## DIAMOND D-JET CORPORATION (DDJC)

**Location:** London, Ontario

**Authorized SADI Assistance:** \$19,600,000

**Contribution Agreement:** January 10, 2008

**Innovation:** The objective of the project is to develop an entry level jet aircraft that opens private and business jet air travel to a new segment of travellers. The objectives are to significantly lower the acquisition cost, the operating cost and the environmental impact, while maintaining high degrees of safety and comfort. The single pilot D-JET can accommodate up to 4 passengers, fly over 2000km, at speeds up to 560 kph, and altitudes up to 25,000 feet, all at a direct operating cost of less than \$1 per km. The D-Jet represents major technological advancements in aerospace technology. It requires design and system integration of a single small turbofan jet engine, with an all carbon composite airframe and state of the art digital flight instrument displays and automated flight control system. The D-Jet is the first Canadian aircraft with a carbon composite pressurized cabin. Diamond has completed 3 of 6 prototypes, and has flown over 650 hours validating the objectives, performance, handling and certifiability of the D-JET.

**Collaboration:** Diamond provides employment opportunities to co-op students and graduates from various Canadian universities and colleges. It assisted in the development (2007 - 2008) of an Aviation Composite Fabrication Program at Fanshawe College which supported the establishment of the currently offered aerospace composite structural repair technician program. Diamond also collaborates with Canadian third party companies on

the qualification and certification of materials and production processes for composite aerospace structures.

**Economic and Social Benefits:** Diamond is working toward certification of its aircraft by Transport Canada and foreign airworthiness authorities to serve a global market. This aircraft is the first of its type and bridges the current gap between high performance piston and jet aircraft. Diamond is building its expertise in small business jets while developing a highly skilled workforce and expanded manufacturing knowledge base in Canada. The D-JET program creates a foundation of knowledge and capabilities, which will enable development of a family of derivative aircraft.

## **D-TA SYSTEMS INC.**

**Location:** Ottawa, Ontario

**Authorized SADI Assistance:** \$1,790,140

**Contribution Agreement:** August 25, 2010

**Innovation:** This project involves research and development of products that convert high frequency analog signals into intermediate frequency analog signals (Activity 1), develop software/firmware for recording and processing the digital data (Activity 2), and convert intermediate frequency analog signals to digital data for computers (Activity 3). The objective is to change how large scale defense systems such as radar, radio, and sonar are built. The end results of the R&D will be configured solutions to enable large scale systems to be built without the need for additional hardware components. To date, Activity 1 has been successfully completed; Activity 2 is approximately 50% complete; and Activity 3 has started development. Progress is being made in recording data at a higher rate and the company expects to surpass the industry norm for recording rate.

**Collaboration:** D-TA founded Carleton University's Dipak and Tara Roy Sensor Processing Laboratory which was opened in November 2011. This laboratory supports graduate research and facilitates advanced research in sensor processing to develop concepts, algorithms and system architectures for a variety of applications, including: radio, radar, sonar, wireless, medical imaging and instruments, and other areas of interest to communication, defence and aerospace sectors. Four students have benefited from D-TA guidance and supervision and access to company facilities. D-TA also delivered a consulting report to ADD in South Korea with the support of a Carleton University engineering faculty member.

**Economic and Social Benefits:** The Radio Frequency system completed to date has increased the visibility of D-TA's presence in the defence market and enhanced D-TA's competitiveness. D-TA won several projects with US Department of Defence and is exporting to six countries. System integration, software development and system testing often require enormous amount of time and money. D-TA's configured solutions are significantly reducing deployment time and costs. Customers can also get to field trials in six to nine months instead of two to three years. A number of high paying jobs have been

created. The entire R&D was undertaken in Canada including with Canadian based sub-contractors and 90% of the manufacturing vendors of D-TA are located in Canada. Products supplied by D-TA also support the security requirements of Canada.

## **EMS TECHNOLOGIES CANADA LTD.**

**Location:** Ottawa, Ontario

**Authorized SADI Assistance:** \$8,718,634

**Contribution agreement:** March 3, 2009

**Innovation:** SADI supported a project at EMS Technologies Canada Ltd. (EMS) to research and develop next-generation mobile satellite communications technology. The investment enabled EMS to develop new technologies for its satellite communications products. EMS successfully developed a family of satellite communications transceivers that are leading the technology for satellite connectivity on commercial aircraft in the air transport market. The technology developed improved satellite communication services, with a reduction in the size and weight of transceivers and functionality aligned with customer requirements. This new technology is currently being adopted by a number of major commercial aircraft manufacturers.

**Collaboration:** EMS launched a co-op student recruitment program that hired students from Waterloo University, Carleton University and Ottawa University to work on the SADI project. Approximately 22 co-op students were hired during the last year of the project, a substantial increase from previous years. EMS also contributes to the Canadian contract manufacturing sector through technology transfer with its suppliers.

**Economic and Social Benefits:** Several products developed under the SADI project have been commercialized and shipped to hundreds of customers, including a next generation Quad Helix High Gain antenna, a low cost transceiver for small aircraft and a number of customer specific transceivers for major commercial aircraft OEMs. The project improved both cabin and cockpit satellite communication. In addition, with a reduction in product size and weight, it is also helping to reduce the overall fuel requirements and thus the carbon footprint of the commercial air transport industry.

## **ESTERLINE CMC ELECTRONICS INC. (CMCE)**

**Location:** Saint-Laurent, Quebec

**Authorized SADI assistance:** \$52,287,784

**Contribution Agreement:** January 13, 2009

**Innovation:** The objective of the project is to develop cost-effective cockpit technologies for next-generation business jets, helicopters and transport aircraft. The company is on track toward developing a complete cockpit system with open architecture which will make the components of the cockpit easily customizable and adaptable to

changing technologies and varied aircraft platforms. Through many of the technical innovations developed through this project, the company expects to achieve its goal to develop a fully integrated generic navigational and communications cockpit system in 2013.

**Collaboration:** CMCe has established collaborative relationships with several Canadian universities, colleges and public research institutes, including: the École Polytechnique de Montréal, Carleton University in Ottawa, and the École de Technologie Supérieure (ETS) in Montreal to study model-driven engineering for automatic code generation. The company is also collaborating with 13 engineering trainees at Sherbrooke University and studying the integration and management of interfaces in cockpits and simulators with Concordia University in Montreal, École Polytechnique de Montréal, McGill University and the École de Technologie Supérieure (ETS). CMCe established a "SmartDeck" cockpit Integration laboratory at the École Nationale d'Aérotechnique (ÉNA) in St-Hubert, Québec and is studying Infra Red (IR) technology with the Institut National d'Optique (INO) in Quebec City and the Centre OPTECH of the CEGEP André-Laurendeau in Montreal.

**Economic and Social Benefits:** The ultimate objective of this project is to establish CMCe as Canada's first cockpit designer/manufacturer. The company is now in position to showcase its prototypes in many renowned international aerospace trade shows. Its commercialization efforts have already attracted several business opportunities for both complete cockpit systems and individual system components. The commercialization of the CMCe *SmartDeck*® integrated glass cockpit for General Aviation (GA) PART 23 class aircrafts, led to the selection of CMC on two new platforms, the CO50 business aircraft from Cobalt Aircraft Industry of Saguenay, Canada and the EV-55 Outback aircraft from Evektor Aerotechnik of the Czech Republic. The company is now focused on adapting on other aircraft platforms the numerous generic technologies developed.

## **FLYHT AEROSPACE SOLUTIONS LTD.**

(formerly AeroMechanical Services Ltd.)

**Location:** Calgary, Alberta

**Authorized SADI Assistance:** \$1,967,507

**Contribution Agreement:** February 22, 2011

**Innovation:** This project involves the development of next-generation data communication systems for commercial and military aircraft. The company is developing a unique product which also allows for real time stream of aircraft data normally stored in the Black Box or Flight Data Recorder. The combination of new features in one device is a new concept for the aviation industry. To date, the company has successfully developed improved technologies to support an on-board, remotely programmable avionics system capable of using text, voice and data transmission to communicate to and from an airplane. The system it has developed (the AFIRS 228B) can relay data from the black box and other diagnostic components to the ground in real time. The company is now in

advanced stages of completing the research and development on a related system, the AFIRS 228S, which will have improved functionality and is currently undergoing certification.

**Collaboration:** The Company hired an engineering student and a MBA student from the University of Calgary to support the project. FLYHT Aerospace Solutions Ltd. continues to explore other opportunities to work with students at the University of Calgary and the University of Alberta.

**Economic and Social Benefits:** The AFIRS 228B has already sold more than 100 units globally. The AFIRS 228S has been selected by Airbus for the A320 factory option through L-3 Aviation Recorders division. The company is in the early stages of exploring other commercialization opportunities for both systems.

## HÉROUX-DEVTEK INC.

**Location:** Longueuil, Quebec

**Authorized SADI Assistance:** \$26,964,430

**Contribution Agreement:** September 2, 2008

**Innovation:** The project to incorporate new technologies into landing gear design consists of developing and integrating new technologies such as advanced design and modeling capability; developing landing monitoring and diagnostic tools; and developing lighter landing gear that is more resistant to corrosion. As a result of the advancement of Héroux-Devtek (HD)'s SADI-funded project, seven new products have been developed, 15 technologies have been optimized and five processes have been established. SADI assistance has resulted in the following projects currently undergoing qualification: front and main landing gear and tail skid shock absorber for the Sikorsky CH53K helicopter; front and main landing gear for the Embraer Legacy 450/500 business jets; and front and main landing gear for the Learjet 85 business jet; as well as the Bombardier/Learjet emergency release system.

**Collaboration:** Since 2007, HD has hired 26 co-op students from Laval University, the École Polytechnique, ÉTS, Dawson College and the Collège Bois-de-Boulogne. In the medium term, HD is aware of the need to develop collaborative relationships with certain educational institutions.

**Economic and Social Benefits:** Thanks to the SADI project, three major sales have been made with three different major clients, as follows: Front, main and tail skid landing gear for the Sikorsky CH-53K helicopter; Front and main landing gear for the Embraer Legacy 450 / 500 business jet; Front and main landing gear for the Learjet 85 business jet, as well as the Bombardier/Learjet emergency release system. This project, which involves optimizing the landing gear design to reduce its weight, will generate environmental benefits over the long term. In addition, the creation of full-time positions and the hiring of students will generate long-term economic benefits.

## INTEGRAN TECHNOLOGIES INC.

**Location:** Mississauga, Ontario

**Authorized SADI Assistance:** \$4,596,000

**Contribution Agreement:** August 27, 2008

**Innovation:** The objective of this project was to undertake research and development of nanotechnology-based coatings for aircraft tools related to the Joint Strike Fighter program. By September 2012, Integran successfully developed a process for plating carbon graphite substrates with its Nanovate (TM) coating to create tools (moulds) used in the construction of aircraft and aircraft components. The innovation combines the hardness, durability and damage tolerance of the metallic coating with the lightweight, low thermal mass and low cost of carbon fibre composite mould tools to deliver a durable and cost-effective solution. The project resulted in one patent and four patent applications.

**Collaboration:** As a direct result of this project, Integran involved 8 engineering students, offering them an opportunity to work at the company for one year as part of their program. Integran hired two full time engineering graduates to continue its involvement with this work. The project enabled the company to maintain an ongoing relationship with the University of Toronto. Students benefited by working in a real-world leading-edge environment in which they applied and learned new skills via hands-on experience. The collaboration also enabled new research using the university's equipment and Integran's facilities.

**Economic and Social Benefits:** Once fully demonstrated and validated, the company expects to be able to commercialize the technology. To date, numerous companies have expressed interest. Once in the marketplace, this technology is expected to reduce the carbon footprint of composite manufacturing due to the decrease in energy and increased throughput related to Nanovar carbon fibre composite tooling. The technology was launched during a number of top-level visits to major European and US aerospace composite companies last year. As inspection and repair processes for composite aircraft parts mature, and the benefits of lighter and stronger airframes are realized, it is expected that original equipment manufacturers will increase composite use in their products. This would make Integran's innovative tool a more viable and cost effective solution compared to currently available products.

## INTEGRAN TECHNOLOGIES INC.

**Location:** Mississauga, Ontario

**Authorized SADI Assistance:** \$807,399

**Contribution Agreement:** March 24, 2010

**Innovation:** Integran has developed a proprietary and patented electrodeposition nanophase cobalt phosphorous product called Nanovate CoP as a replacement for Electrolytic Hard Chrome (EHC) in steel components used in aerospace applications. This product is an environmentally compliant alternative to EHC that exhibits significant performance enhancements, including superior sliding wear, lubricity, corrosion protection and fatigue resistance while showing efficiencies over EHC. The greater efficiencies include lower power consumption and higher deposition rates resulting in a much smaller carbon footprint. This new product can be employed on, and adheres to, all standard (low carbon) steels, high strength steels and aluminum alloys and may equally be used in military and private sector products. Demonstration and validation components installed on the US DoD aircraft and are currently being evaluated for performance against strict military specifications. The plating specification and activation procedures as well as data acquisition with the US DoD remains ongoing.

**Collaboration:** Integran collaborates with a number of Master and PhD students from the Materials Engineering Department of the University of Toronto to leverage their knowledge, expertise and equipment. Students are given the opportunity of working in a real world leading edge environment in which to apply their skills and to learn new ones from actual hands-on applications.

**Economic and Social Benefits :** Integran licensed its nano-Cobalt electroplating process (Nanovate™ CoP) to a Montreal-based aerospace corporation for deployment as an alternative to hard chromium electroplating in gas turbine power plant applications for aerospace use. The company also recently extended license exclusivity by five years to a major US manufacturer of hard chrome steel bars and tubes for the fluid power industry. This new technology replaces existing hard chromium plating processes known to cause adverse health effects (ranging from skin ulcerations to lung cancer) and reduces greenhouse gas emissions and water pollution.

## INTEGRAN TECHNOLOGIES INC.

**Location:** Mississauga, Ontario

**Authorized SADI Assistance:** \$399,386

**Contribution Agreement:** March 15, 2012

**Innovation:** The objective of this project is to undertake research and development of a nano-structured copper-based material as an alternative to toxic copper-beryllium for aerospace and defence products that offer superior performance while meeting the highest environmental standards. The nano-structured copper-based alloy development continues to progress and is being targeted for parallel applications requiring non-ferromagnetism, high corrosion protection, good electrical conductivity and high thermal stability.

**Collaboration:** Integran is involving two engineering students from the University of Toronto in this project. The students are taking one year to work in the company as part of their program.

**Economic and Social Benefits :** Once the R&D is completed, Integran expects to expand its product line and customer base, providing next-generation metal alloys that are more robust and free from toxic copper-beryllium alloys.

## **KONGSBERG MESOTECH LTD.**

**Location:** Port Coquitlam, British Columbia

**Authorized SADI Assistance:** \$4,968,000

**Contribution Agreement:** February 23, 2010

**Innovation:** Kongsberg Mesotech Ltd. (KML) is developing its next generation of sonar for the purposes of monitoring and classifying threats to ports and high-value marine assets. These high resolution images will also be used for mine detection, avoidance and counter measure. The sonar being developed has proven itself in trials and has been deployed to various other industries (fisheries, oil and gas, engineering) with favourable results. KML's sonar units use advanced telemetry and data compression in order to obtain the most detailed images as fast as possible.

**Collaboration:** KML has employed coop students (temporary) as well as Post Docs (long term) from SFU and provides funding for a PhD student at the University of Victoria for the development of imaging technology. KML looks to engage a Post Doctoral fellow at the University of British Columbia for using sonar and acoustics for material characterization and possibly classification. KML continues to place high priority on its university collaboration and annually spends 50% of its research and development budget on work with Canadian post-secondary institutions for work related and unrelated to the SADI project.

**Economic and Social Benefits:** To date, KML's has commercialized one model of its M3 sonar which has a wide range of abilities and operable depths.

## **MAGELLAN AEROSPACE LIMITED**

**Location:** Winnipeg, Manitoba

**Authorized SADI Assistance:** \$43,391,600

**Contribution Agreement:** September 1, 2008

**Innovation:** The objective of the project is to undertake the research and development of new processes for composite manufacturing and complex assemblies that incorporate both composite and metallic components. This project is related to the multinational Joint Strike Fighter (JSF) program. The complexity and precision, essential to produce the

parts that go into an F-35 JSF, requires specific technologies. For example, the aircraft design demands exactness such that on the multiple pieces that are assembled for the horizontal tail assembly, almost 1,400 holes each, have to align within one-half thousandth of an inch, which is 1/6th the thickness of a piece of paper. The first units produced by Magellan were sent to the United Kingdom for final assembly and met specifications. The technology required to complete this engineering feat, and do it repeatedly and efficiently, continues to improve with new equipment, software updates and new processes, all supported by SADI.

**Collaboration:** Working with Red River College, Magellan opened the Centre for Non-Destructive Inspection Technologies, which is located on the College's Industrial Campus at Magellan Aerospace. This state-of-the-art centre allows students and professors to learn and experience technology that inspects carbon fibre parts up to 85% faster and is found nowhere else in Canada. Work is also being done with the University of Manitoba and the Composite Innovation Centre.

**Economic and Social Benefits:** Magellan is advancing its manufacturing capabilities with leading edge equipment in state-of-the-art facilities, and continues to develop technologies that provide the opportunity for many years of work. These precision machining, composite work, and inspection technologies provide employment in highly skilled manufacturing jobs and world-class learning opportunities for students and faculty. With the international participation associated with the JSF program, Magellan is gaining global recognition for its accomplishments in applying advanced technology in a production environment. Many design, engineering and affordability changes continue to happen as the F-35 JSF proceeds with flight testing. Magellan expects this phase of the programme to last a few more years, and continues to seek better ways of producing the various products being manufactured. Magellan built, pre-production units, are currently undergoing in-flight testing. Full rate production of the JSF program is now expected in the latter part of this decade.

## NORSAT INTERNATIONAL INC.

**Location:** Richmond, British Columbia and Aurora, Ontario

**Authorized SADI Assistance:** \$5,975,200

**Contribution Agreement:** September 5, 2008

**Innovation:** Norsat's R&D activities focus on the development of portable satellite ground terminals, microwave components, terrestrial wireless antennas, and power conditioning technologies. Its technologies are improving the reliability of satellite terminals and their ability to withstand extreme environmental conditions. **Satellite Terminals:** Norsat has developed new products, such as the ROVER flyaway satellite terminal, and made significant design and engineering improvements to GLOBETrekker and Sigmalink terminals. **Microwave:** Norsat developed a new product (Universal LNB) which is now part of many satellite systems and eliminates the need to switch LNBs for different frequency bands. Also new is the X-Band BUC (5010XRT), for new military

customers. The development of a new in-line volt meter, spectrum analyzer, and fiber optic modules streamline procedures for the satellite industry. A new line of Band Pass Filter eliminates terrestrial interference from WiMAX and LTE usage. Finally, newer more compact waveguide components are now suitable for maritime applications.

**Wireless:** Norsat created WiMAX test beds to better understand technology, developing the internal expertise necessary to provide connectivity solutions to remote locations. The development of temperature compensation technology improves the performance of high power filters for high power applications. Norsat also developed a new enhanced prediction tool, which works as a calculator for part selection to increase manufacturing efficiency. Finally, newer, more compact filters and space saving antennas improve service to land mobile radio, which is used in emergency services communications.

**Patents:** Norsat received two patents as a result of the SADI project.

**Collaboration:** Norsat collaborated with Simon Fraser University to characterize Ka and Ku band antennas. Collaboration with the University of British Columbia resulted in a Ka band antenna system for Ka band propagation studies, provided WiMAX training to two UBC interns, and enabled the use of a Ka-Band BUC for use in the ALPHA (Antihydrogen Laser Physics Apparatus) experiment at the CERN Laboratory.

**Economic and Social Benefits:** Norsat has become more competitive in the communications market through research that resulted in performance improvement and cost reduction for existing products and the commercialization of 27 new products. As a direct result of SADI, Norsat secured 160 new customers including NATO NCI Agency, the First Nations Emergency Services Society of BC (FNESS), Finnish Defence Forces, the US Air Force, and now serves 15 militaries worldwide. Norsat's \$3.5M communications network and service contract with the First Nations Emergency Services Society is providing enhanced broadband access to 17 of British Columbia's remotely located First Nations communities which are now able to access emergency services and educational and health resources over the internet.

## PCI GEOMATICS INC.

**Location:** Richmond Hill, Ontario

**Authorized SADI Assistance:** \$7,665,000

**Contribution Agreement:** August 12, 2009

### **Innovation:**

The objective of this project is to research and develop a high-speed computing framework and software suite that will make it possible to process large amounts of raw satellite image data faster and more cost-effectively, with an emphasis on increasing the automation of image processing. The resulting data are essential for decision making in many fields, including environmental monitoring, agriculture, security and intelligence, aerospace and defence, and wide-area surveillance. This project has developed and demonstrated software that can automatically extract information from earth observation data obtained from satellites and other aerial vehicles. This software converts data into

decision-supporting information at faster speeds and with less operator interaction. Through this SADI project, PCI has enhanced its capabilities in this field and continues to work on researching and developing new technologies for the marketplace.

**Collaboration:** PCI has collaborated with the University of Ottawa under the SME4SME program in the exploration of visual attention models in the context of satellite imaging. As well, PCI has collaborated with the University of Toronto in the area of neural net computation applications in high resolution earth observation imagery. PCI has also collaborated with the University of New Brunswick in the area of optical and radar image processing. PCI continues to seek out opportunities to collaborate with post secondary institutions.

**Economic and Social Benefits :** SADI funding has aided PCI is enhancing technologies, most notably Geomatica and GeoImaging Accelerator, and allowing them to enter the marketplace at a faster rate. This software converts data into decision support information at faster speeds and with less operator interaction and can be used to create custom applications. SADI has enabled PCI to apply more resources to technology development, improve the quality of its product releases and expand its range of offerings to new technologies.

## **PRATT & WHITNEY CANADA CORP. (P&WC)**

**Location:** Longueuil, Quebec

**Authorized SADI Assistance:** \$300,000,000

**Contribution Agreement:** December 10, 2010

**Innovation:** P&WC is developing aircraft engines that are lighter, more powerful, and offer better fuel consumption and improved durability, enabled by technologies related to lighter materials, high temperature coatings, next generation combustors, novel compressor architectures and intelligent engine controls. The company is leading the way in developing cleaner, quieter engines which, in many cases, will exceed the noise and emission standards in the industry. The technologies developed in this project are being demonstrated in next generation platforms, such as regional turboprop and large business jet. The quality of the innovation is reflected in over 60 patents granted per year.

**Collaboration:** The company has established and maintained collaborative relationships with a large number of universities, research institutions and industrial partners in Canada, with a total investment of approximately \$12 million per year. It has been recognized by the Strategic Technology and Innovation Council as a leader in strategic collaboration. On a yearly basis, P&WC conducts over 200 collaborative projects with 21 universities across Canada, engaging well over 400 students through different programs. P&WC participates in seven NSERC industrial research chairs established at universities in British Columbia, Nova Scotia, Ontario, and Quebec and five consortia and research networks, such as Consortium for Research and Innovation in Aerospace in Quebec (CRIAQ), which enhance university expertise and develop Canadian supply

chains. In addition, P&WC has established ten university Centres of Expertise and has been instrumental in the creation of the Undergraduate Aerospace Institutes at six universities in Ontario and Quebec. All collaborative initiatives contribute to advancing university expertise, expanding the capability of the supply chain, and developing the next generation of aerospace professionals in Canada.

**Economic and Social Benefits:** Since the start of the project, the technologies developed have led to the certification of a new PT6A turboprop engine, which builds upon the PT6A legacy. The PT6A-140 offers more power to extend its capabilities for missions with higher altitudes and demonstrates a 5% improvement in specific fuel consumption, through the incorporation of advanced aerodynamics, a more efficient compressor, and the latest generation of hot section materials. Other innovations have reduced emissions, increased maintenance intervals and further enhanced ease of operation with the introduction of digital electronic control to small gas turbine engines. These new technologies are delivering additional benefits such as reduction of noise and elimination of materials of concern. In its next generation regional turboprop, these new technologies are resulting in 20% lower fuel consumption. Through the use of fewer raw materials, increased automation and more efficient manufacturing processes, the company is lowering its use of energy and reducing its production of pollutants. In addition, the project provides development opportunities for the company's already highly skilled workforce and its research and industrial partners. Since the beginning of this project, over 1400 engineering employees have increased their technical skills through formal training. P&WC employees are actively participating in over 130 technical committees and aerospace association to shape the future of the aerospace industry.

## THALES CANADA INC.

**Location:** Saint-Laurent, Quebec

**Authorized SADI Assistance:** \$12,988,800

**Contribution Agreement:** December 23, 2010

**Innovation:** The objective of the project is to research and develop a full Fly-By-Wire (FBW) flight control system that is lighter and more reliable than the mechanical linkages of the hydro-mechanical flight control systems. To date, this project has resulted in the development of three new technologies related to the Bi-directional 429 bus, Flight Control Computer and Back-up Flight Control Computer. In addition, the project has resulted in the development of two new prototype products: Flight Control Computer and a Back-up Flight Control Unit.

**Collaboration:** Thales is involved in several collaborative projects with the Consortium de recherche et d'innovation en aérospatiale au Québec, École Polytechnique de Montréal, McGill and École de Technologie Supérieure for total research contributions approaching \$690,000. Through these research projects there is an exchange of knowledge between the universities' researchers and Thales in the development of new

prototypes. By providing internships to five students each semester, Thales is aligning research to the needs of industry.

**Economic and Social Benefits:** Thales's two new products, the Flight Control Computer and Backup Flight Control Unit are both available and ready for integration into commercial, FBW aircraft. Their modularity and adaptability allows them to meet the needs of a wide range of regional and business FBW aircraft in terms of aircraft size, structure and performance requirements.

## ULTRA ELECTRONICS TCS INC.

**Location:** Montréal, Quebec,

**Authorized SADI Assistance:** \$32,447,400

**Contribution Agreement:** March 22, 2011

**Innovation:** Ultra Electronics is developing a new generation of tactical radio systems, comprising wireless and mobile communication devices for military and government security applications. The company is on track with respect to developing a family of high capacity radios with unique features for different markets. New technologies under development include a platform that fully exploits the Software Defined Radio (SDR) concept; a multiband/multichannel radio that integrates several communication technologies into one system.

**Collaboration:** Ultra Electronics is contributing \$250,000 per year to support a NSERC Industrial Research Chair in high performance wireless emergency tactical communications technology at the École de Technologie Supérieure (ETS). The Chair currently employs 2 institutional researchers, 2 Post-Doc fellows, 4 Professional Engineers, 12 PhD candidates, and 8 M. Eng. candidates. This has allowed many students to develop highly specialized expertise in wireless technology and to benefit from valuable internships in the industry. A strong relationship and regular brainstorming between researchers and industry practitioners makes this relationship a wellspring of innovation, as recognized in 2008 by a NSERC Synergy prize.

**Economic and Social Benefits:** The Company has released and sold a version of the high capacity radio that addresses a new military frequency to the United Arab Emirates. It has completed the R&D on another radio and is now bidding to win major contracts in India. One other radio and the adaptive antenna are mature enough to start business development efforts. More than 10 software and firmware design contractors contributed to this project with much hardware design subcontracted to Canadian companies. Over the course of the next year, the company will explore other commercialization opportunities.

## PROJECTS IN THE REPAYMENT PHASE

### INTEGRAN TECHNOLOGIES INC.

**Location:** Mississauga, Ontario

**Disbursed Assistance:** \$276,284

**Repayment:** \$0 (expected to begin in 2013)

**Contribution Agreement:** March 24, 2010

**Innovation:** Integran has developed a new product, a nanostructured ZnNi alloy coating, using its core IP as part of this project. The objective of this project was to undertake research and development of a nanoscale zinc-based coating as a safe, effective, and environmentally-benign alternative to the use of cadmium in the electroplating process for aerospace applications. By December 2011, Integran successfully developed a nanostructured alloy coating that adheres to all standard (low carbon) steels, high-strength steels, and aluminum alloys. This technology can replace toxic cadmium coatings in numerous aerospace and defence applications.

**Collaboration:** Integran collaborated with Trent University and the University of Toronto to undertake research and testing. Work assignments increased the knowledge and experience of four engineering students who worked at Integran for one year as part of their program

**Economic and Social Benefits:** Integran is in discussion with other companies to adopt its new technology and is in discussion with other facilities to provide large-scale processing. Once fully commercialized, the technology developed as a result of this project is expected to provide an environmentally-safer alternative to toxic cadmium coatings, which will produce wide-reaching health benefits and give Integran a competitive advantage.

### SKYWAVE MOBILE COMMUNICATIONS INC.

(Previously TransCore Link Logistics, Inc.)

**Location:** Kanata, Ontario

**Disbursed Assistance:** \$3,127,200

**Repayment:** \$0 (expected to begin in 2013)

**Contribution Agreement:** March 27, 2009

**Innovation:** The objective of the project was to evolve GPS-related, wireless and data-transfer technologies which track goods and vehicles travelling through global supply chains, to improve shipping security, fleet management and performance. SkyWave successfully created a new commercial satellite messaging network, terminal products and services. The network was commercially launched as IsatData Pro in August 2011. The innovative aspects of IsatData Pro include: GPS software development, antenna

design for a maritime terminal, a global satellite network design, a highly integrated core modem, a messaging service for thousands of bytes, and a software development environment to utilize the IsatData Pro system. These features allow SkyWave to offer a satellite based messaging service.

**Collaboration:** Since 2006, SkyWave has been collaborating with Carleton University in the area of innovative LTCC (low temperature co-fired ceramic) technology development. The company supported a PhD graduate student to work at SkyWave. This collaboration resulted in published papers and working prototypes of LTCC circuits.

**Economic and Social Benefits:** The IsatData Pro service was officially launched in August 2011. SkyWave beta tested the IsatData Pro service with existing customers – many of whom will continue on as service providers, distributors or users of the IsatData Pro product and services. The IsatData Pro system and services employ the Inmarsat satellite constellation to provide asset-tracking and messaging data services to land and marine mobile terminals anywhere in the world, which is now offered as a standard data service by Inmarsat. The new system has been successfully commercialized, with 12,000 units sold in the first year of service. The IsatData Pro service offers improved safety as goods move through the global supply chain.

## INACTIVE PROJECTS

### BELAIR NETWORKS INC.

**Location:** Ottawa, Ontario

**Disbursed Assistance:** \$3,713,325

**Repayment:** \$6,126,986

**Contribution Agreement:** October 8, 2009

**Project:** The intent of this project was to develop new hardware and software capabilities for the company's wireless networking product line to improve the capacity, reach and security of networks used by defence industries for surveillance, communications and video transmission. BelAir was granted three new US patents: Automatic Antenna Selection for Mesh Backhaul Network Nodes; Integrated Wireless Distribution and Mesh Backhaul Networks; and Method for Estimating and Monitoring Timing Errors in Packet Data Networks. The company collaborated with the University of Manitoba in 2010 and Carleton University in 2011 regarding the development of antennae technologies and increased its workforce from 56 to 70 during the time of the SADI project. In February 2012 Ericsson Canada purchased BelAir Networks for its expertise in carrier-grade Wi-Fi networks and made the former BelAir Networks group its centre of excellence in the field of Wi-Fi Networks. The components developed during the SADI project will continue to drive innovation and competitiveness in Canada.

## GMA COVER CORPORATION

**Location:** Guelph, Ontario

**Disbursed Assistance:** \$0

**Repayment:** \$0

**Contribution Agreement:** March 24, 2010

**Project:** The intent of this project was to develop superior-quality camouflage materials for various protection, concealment and deception systems. GMA Cover was sold to a US based company in 2011 and in 2012 closed its Canadian operations. Since no R&D was undertaken, and no federal disbursement of funds had been made, the project was cancelled in November 2012.

## SPUTTEK INC.

**Location:** Toronto, Ontario

**Disbursed Assistance:** \$26,645

**Repayment:** \$35,970

**Contribution Agreement:** March 31, 2009

**Project:** The objective of the project was to advance protective coating technology for use in a wide range of materials, including lower grade steels. The company was unable to pursue the project. In 2010 it agreed to repay the crown 135% of the amount that had been disbursed in order to terminate the agreement, in keeping with the terms of the SADI agreement. The full amount owed to the Crown has been repaid.

## 2154331 CANADA INC.

(Previously Mechtronix Systems Inc.)

**Location:** Saint-Laurent, Quebec

**Disbursed Assistance:** \$5,518,889

**Repayment:** \$0

**Contribution Agreement:** July 26, 2010

**Project:** The objective of this project was to develop next-generation flight simulator training products. Technology development included aircraft performance modeling advancements, motion on seat cueing system, simulation technologies for performance modeling, flight controls, cockpit replication/simulation and avionics simulation and rehosting to support new aircraft types, resulting in two patent applications. Work was completed on one model and successfully validated against flight test data, progressed well on the development of other technologies to support five aircraft platforms, and had started on a sixth aircraft program. The Company has released and sold two new simulator models, one that incorporates actual flight data into the model, and another that augments the fidelity of simulators currently been delivered. The company had a

collaborative relationship with Laval University for the development of a new visual display system. The market softened and the companies' financial situation weakened. In 2012, 2154331 Canada Inc. entered into protection under the Bankruptcy and Insolvency Act and sold its assets to an investor who retained the business and current levels of employment.