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# Canadian Industrial Participation in The F-35 Joint Strike Fighter Program

December 2012

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# Minister's Message

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On April 3, 2012, the Government of Canada released its comprehensive response to Chapter 2 of the *2012 Spring Report of the Auditor General of Canada*, which recommended that the Government refine its estimates for the full life-cycle costs of the F-35 Joint Strike Fighter and make those estimates public. The Government of Canada accepted the Auditor General's recommendation and conclusions and outlined a Seven-Point Plan to fulfill and exceed the Auditor General's recommendation.

In its plan, the Government of Canada committed to providing updates to Parliament on the industrial benefits of Canada's participation in the F-35 Joint Strike Fighter Program. This report — which provides background on how industrial participation works in the Program, as well as the current results — meets this commitment. Industry Canada officials worked with the National Fighter Procurement Secretariat in the drafting of this report and it has been approved by the Secretariat's Deputy Minister Governance Committee.

I welcome the opportunity to provide Parliament and Canadians with greater transparency into how companies in Canada are currently faring, and positioning themselves for the future, as a result of Canada's participation in the F-35 Joint Strike Fighter Program.

Christian Paradis  
Minister of Industry and Minister of State (Agriculture)

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# Executive Summary

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Canada has been a partner in the F-35 Joint Strike Fighter Program since 1997. Because of this, companies in Canada have been, and continue to be, eligible to bid on the work packages associated with the project. There are no guarantees of work being granted to companies in Canada or in any other partner nation. Companies in all partner countries must offer competitive technologies at competitive prices to successfully win work packages.

As of June/July 2012 reporting, seventy-two (72) companies in Canada have secured \$438 million United States Dollars (USD) in contracts.

Given that factors, such as required changes to supply chains or procurement orders, are likely to occur over the course of a program that is expected to run until 2051, estimating the total future value of work likely to be secured by companies in Canada can be challenging. The Government of Canada currently uses an estimate that is based on information provided by the prime contractors of the Program (Lockheed Martin and Pratt & Whitney) indicating what they see as the value of identified opportunities for which companies in Canada will be able to compete. According to the most recent estimates provided to Industry Canada, the value of contracts already secured by companies in Canada (\$438 million USD), as well as currently identified opportunities (up to \$9.328 billion USD), is up to \$9.766 billion USD.

Over the duration of the Program, additional opportunities for companies in Canada may arise that have not already been identified. In addition, the allocation of work related to the sustainment of the aircraft is still largely to be determined. As of June/July 2012 reporting, one sustainment opportunity has been identified for Canadian industry.

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# Canadian Industrial Participation in the F-35 Joint Strike Fighter Program

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## **A. Purpose**

The *2012 Spring Report of the Auditor General* (the Report) was released on April 3, 2012 and contained a chapter entitled *Replacing Canada's Fighter Jets*. In response to the Auditor General's report, the Government of Canada released a Seven-Point Plan. This plan included the establishment of the National Fighter Procurement Secretariat to oversee the process to replace the Royal Canadian Air Force's CF-18 fighter aircraft.

One of the issues examined in the Auditor General's Report was Canada's industrial participation in the F-35 Joint Strike Fighter (JSF) Program. In his report, the Auditor General stated that industrial participation was well managed and that Industry Canada generally exercised due diligence in its work. The Report noted that collaboration among federal departments was effective in this area and that early efforts to secure industrial opportunities were significant and that the results were successful.

At the same time, the Report observed that projections of industrial benefits appeared to fluctuate over time and that uncertainties regarding industrial benefits were not as well communicated as they could have been. The Report also found that when industrial participation numbers were presented to decision-makers, they were often provided without a description of their basis and associated limitations. In addition, the Report noted the challenge of independently validating projections of industrial participation.

In response to these points raised by the Auditor General, and as part of the Seven-Point Plan, the Government of Canada is reporting on the industrial participation of Canadian industry in the F-35 JSF Program. This report provides background on Canada's industrial participation in the F-35 JSF Program, and up-to-date information on the identified F-35 JSF work opportunities available to, and successfully secured by, companies in Canada.

## **B. Canadian F-35 JSF Industrial Participation: Background**

### **1. The F-35 JSF Program**

Since 1997, Canada has been involved in the development, design and initial production phases of the F-35 JSF Program.

On December 11, 2006, the Deputy Minister of National Defence, on behalf of the Government of Canada, signed a *Production, Sustainment and Follow-on Development Phase Memorandum of Understanding (PSFD MOU)*. The PSFD MOU was also signed by all the other F-35 JSF partner countries: the United States, the United Kingdom, the Netherlands, Denmark, Australia, Turkey, Italy and Norway. The overall objective of the PSFD MOU is to establish a framework to allow the partner countries to cooperatively produce, sustain and do follow-on development (e.g. future technology improvements) of the F-35 JSF. The PSFD MOU details the partners' responsibilities and benefits in these areas. The PSFD MOU does not commit Canada to buy the F-35, but it does establish the conditions for its on-going participation in the F-35 JSF Program.

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In the PSFD MOU, the F-35 JSF partners, including Canada, agree to an industrial participation approach that has two key features:

- Companies from the partner countries can compete for design, production and sustainment contracts on the F-35 JSF Program. This competitive approach helps to ensure that the Program has access to the best technologies at the best prices.
- In order to achieve best value through the competitive approach, the partners agree that “no requirement will be imposed by any Participant for work sharing or other industrial or commercial compensation in connection with this MOU that is not in accordance with this MOU.”<sup>1</sup> This commitment precludes the application of what are known as "offset policies", such as Canada's Industrial and Regional Benefits (IRB) Policy. Canada's IRB Policy requires companies that win defence and security contracts with the Government of Canada to place business activities in Canada at the same value of the contract.<sup>2</sup>

In 2006, the Government of Canada was not making a procurement decision, rather it was agreeing to conditions that would allow it to remain in the F-35 JSF Program. While the Government of Canada was therefore not making an irrevocable decision to forego the application of IRB Policy to its procurement of next generation fighter capability, its decision to sign the PSFD MOU did imply that:

- If Canada chose to remain in the Program and acquire the F-35, it would do so according to the conditions of the PSFD MOU, including that the IRB Policy would not be applied.
- If Canada wanted to apply its IRB Policy to the acquisition of the F-35, it would need to exit the F-35 JSF Program and forego preferential access to JSF industrial opportunities.

The IRB Policy is one of the primary ways in which the Government of Canada ensures that defence and security procurements generate high value-added business activity for Canadian industry. As such, the decision to sign the PSFD MOU and the resulting implications of limiting future options with respect to IRB Policy, should the Government of Canada ultimately acquire the F-35, were considered. However, from an industrial participation standpoint, the Government of Canada had reason to believe that Canada's aerospace industry had – and still has – the strength to compete and benefit significantly from participation in the F-35 JSF Program. Canada's aerospace industry is among the most mature internationally and ranks fifth in the world in terms of its size (and third within the F-35 JSF partnership). Approximately 80 percent of what it produces is exported and companies in Canada have well recognized niche strengths and are major players in their respective markets. Canada's proximity to the U.S. and long experience in working with U.S. suppliers were also seen as advantages to companies in Canada vis-à-vis companies in other F-35 JSF partner nations. Agreeing to sign the PSFD MOU therefore had two benefits from an industrial perspective:

- In the short- to medium-term, it gave companies in Canada on-going access to valuable development and early production work on this new high-tech aircraft, even without a decision to acquire it; and

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<sup>1</sup> PSFD MOU, page 48.

<sup>2</sup> Industry Canada, <http://www.ic.gc.ca/eic/site/042.nsf/eng/home>

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- It positioned companies in Canada for significant work on the production and sustainment of a global fleet of modern fighter aircraft, in the event that Canada did decide to acquire the F-35.

## 2. Industrial Participation MOUs with the Prime Contractors

Since the 2006 PSFD MOU formally established industrial participation within the Program, the Government of Canada needed a tool to implement industrial participation activities going forward. Therefore, also in 2006, the Assistant Deputy Minister of the Industry Sector at Industry Canada, on behalf of the Government of Canada, signed Industrial Participation MOUs with each of the prime contractors, thus formalizing its relationship with them.

The two prime contractors for the F-35 JSF, Lockheed Martin (prime contractor for the F-35 aircraft, systems and subsystems) and Pratt & Whitney (prime contractor for the F-35 engine, called the F135), have full responsibility for the completion of the work, including managing subcontractors to carry out specific parts of the work. Until recently there was also a third prime contractor who was producing an alternative engine to the F135: the Fighter Engine Team (FET), led by GE Aviation and Rolls-Royce. The FET was disbanded in late 2011 when the F-35 JSF Program ceased funding the development of the alternate engine.

The Industrial Participation MOUs define the relationship between the prime contractors and Industry Canada, and outline how industrial participation opportunities will be identified and offered to companies in Canada.

The purpose of the Industrial Participation MOUs is to describe the approach whereby the prime contractors will provide “best value industrial participation opportunities to Canadian industry for the JSF Program.” Under the terms of the MOUs, “best value” is defined as companies in Canada offering competitive technologies at competitive prices, as determined by the prime contractors and their principal suppliers (subcontractors, working for the F-35 JSF prime contractors, that are responsible for delivering large systems or subsystems, such as landing gear, power management systems and control systems).

As outlined in the Industrial Participation MOUs, the continued availability of industrial opportunities to companies in Canada is subject to Canada remaining a partner in the F-35 JSF Program, and acquiring the F-35.

The Industrial Participation MOUs also define how information about these opportunities will be reported to the Government of Canada.

## 3. How Canadian F-35 JSF Industrial Participation Values are Determined

The information in this report is based on data provided to Industry Canada bi-annually in reports from Lockheed Martin and Pratt & Whitney. These companies are the signatories of the Industrial Participation MOUs with Industry Canada.

The bi-annual reports from the prime contractors contain details regarding F-35 JSF industrial activity ongoing, or to be offered, in Canada. This includes data regarding work sourced for the prime contractors’ own supply chain requirements, as well as data for work offered to companies in Canada through the prime contractors’ principal suppliers.

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Specifically, these bi-annual reports include information on:

- which prime contractor or principal supplier is offering the work into Canada;
- which Canadian supplier(s) is performing, or being considered for, the work;
- a description of the work package or activity;
- the value of the executed contracts or purchase orders against the activity; and,
- the potential future value of the work opportunity.

After the reports are received by Industry Canada, the information is reviewed with the prime contractors, and further clarification is obtained, as needed, through ongoing correspondence. Industry Canada also regularly meets with many of the F-35 JSF prime contractors' principal suppliers, as well as the companies in Canada performing F-35 associated work, and uses these occasions to verify the data that is presented in the prime contractors' reports.

The information reported by the prime contractors is commercially sensitive. As such, while the Government of Canada is able to publicly report on the sum of the opportunities and contracts, it cannot release details on individual contracts, opportunities, or the values associated with one prime contractor's industrial participation plan. To do so would violate the terms of the Industrial Participation MOUs and could undermine the competitive position of companies in Canada.

For the purposes of this report, "opportunities" for companies in Canada is broken down into the following categories:

- **Contracts:** signed and executed purchase orders for development and/or production work on the planes and associated systems ordered by partner countries to date; and
- **Identified Opportunities:** the extension of contracted work, or new work which has been identified by the prime contractors as being open for competition to companies in Canada, but for which no contract has yet been signed.

These contracts and opportunities are associated with three "phases" of the Program:

- **Design/Development:** where companies in Canada had the opportunity to develop technologies for use on the F-35 and associated systems. Further development contracts could be available in the future as the Program continuously updates the aircraft's software and hardware.
- **Production:** this includes opportunities in early production (the Program is currently manufacturing around 30 planes per year) and full-rate production when production is expected to increase to approximately 200 aircraft per year.
- **Sustainment:** this relates to the maintenance, repair, simulation and training services that will be required by the F-35 JSF partners to operate the F-35 throughout the life of the Program.



## Ongoing Work on Industrial Participation

An interdepartmental team, led by Industry Canada, is responsible for facilitating the growth of industrial participation in the Program by companies in Canada. Other departments who contribute to this effort include the Department of National Defence, the Department of Foreign Affairs and International Trade, Public Works and Government Services Canada, as well as the Regional Development Agencies. Activities include:

- Sharing Program information with companies in Canada and explaining the best value industrial participation approach used by the F-35 JSF Program and its partners.
- Engaging companies in Canada to understand their capabilities and aspirations with respect to the F-35 JSF Program.
- Engaging the prime contractors and their principal suppliers to understand their sourcing requirements.
- Informing companies in Canada of upcoming work opportunities as identified by the prime contractors and their principal suppliers, and matching Canadian capabilities to the sourcing requirements.
- Working with other partner governments to learn industrial participation best practices, and identify opportunities for international industrial cooperation between our companies.
- Promoting the *Strategic Aerospace and Defence Initiative* and other Government of Canada programs that may contribute to the competitive advantage of companies in Canada.

Site visits, information sessions, presentations, and 'industry days' are just a few of the tools used to discover and communicate industrial participation opportunities.

## **C. Canadian F-35 JSF Industrial Participation Results**

### 1. Contracts

Companies in Canada have thus far participated in the design/development and early production phases of the F-35 JSF Program. Seventy-two (72) companies in Canada have secured \$438 million U.S. Dollars (USD) in contracts; this represents signed and executed orders for work related to the planes ordered as of June/July 2012 reporting. This is work across a range of aerospace subsectors, including airframe, propulsion, tooling, software and mission systems, which would not have been available to our industry if Canada were not a partner in the F-35 JSF Program. A selection of the companies in Canada involved in production of the F-35 JSF can be found in Annex A.

**Table 1: Contracts as of June/July 2012**

<b>Phase</b>	<b>Values in Billions USD</b>
Design/Development	\$0.232
Production and Sustainment	\$0.206
<b>Sum of Contracts</b>	<b>\$0.438</b>

As noted previously, a key goal in participating in this Program was to provide companies in Canada with the opportunity to work on this cutting-edge platform at the development phase. The opportunity to participate in the development phase has led to companies in Canada acquiring production work on the F-35 JSF. It also positions these companies well for sustainment and follow-on development (incremental improvements to technology) work on the components they are producing.

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Beyond the work that this created directly, it has helped to better position firms for other work outside of the F-35 JSF Program. For example:

- GasTOPS Limited of Ottawa developed the debris monitoring sensors for use on the F135 engine that powers the F-35 JSF. This success allowed them to secure additional work on the Pratt & Whitney PurePower engines that will be used on the Airbus A320neo and the Bombardier CSeries jets.
- NGRAIN Corporation of Vancouver developed interactive 3D simulation software to support the maintenance of the F-35. NGRAIN's success on the F-35 JSF Program enabled them to win similar work for the maintenance of the U.S. Air Force's fifth-generation F-22 Raptor air superiority fighter.

Even though this supplemental work is not recorded in the industrial participation data that is presented in this report, these examples illustrate the value that can come from participating in this high-technology defence development program.

### **Highlights of the Canadian Aerospace Industry**

The Canadian aerospace industry contributed \$25.6 billion<sup>3</sup> to Canada's Gross Domestic Product (GDP) in 2011 and 161,966 jobs (full time equivalents, direct, indirect and induced) to the Canadian economy.

Nearly 80 percent of Canadian aerospace manufacturing output is exported and total exports remained stable throughout the 2006-2011 period. In 2011, Canada's exports were comprised of aircraft and rotorcraft (48 percent), engines and related parts (27 percent), avionics (5 percent), flight simulators (5 percent), and other parts (15 percent). In contrast, most aerospace imports (77 percent) are inputs into aircraft production (i.e., parts).

In 2011, Canada had a \$4.6 billion aerospace trade surplus.

## **2. Identified Opportunities**

Beyond reporting on the value of contracts, the prime contractors also report on identified work for which companies in Canada will be eligible to compete, based on the currently estimated partner country buy of 3,100 aircraft. This includes opportunities related to the extension of existing production contracts, as well as new opportunities that have not yet been offered through competition. In order to secure the extension of existing contracts, companies must continue to successfully demonstrate their ability to provide best value, "competitive technologies at competitive prices," throughout the aircraft's production phase. A company's likelihood of securing a contract extension also depends on the type of work it is performing. Some companies in Canada have a decisive advantage in their area of work (for instance, a unique capability or control of vital intellectual property), increasing the likelihood of receiving contract extensions. Other contracts will be more difficult for companies to secure extensions, because there are a greater number of competitors. As long as companies continue to demonstrate best value and remain competitive, the extension of production contracts is currently estimated at up to \$7.792 billion USD.

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<sup>3</sup> Economic estimates based on Statistics Canada National Input-Output Multipliers (2008 adjusted to 2011 GDP and employment).

In addition to the continuation of work associated with existing contracts, companies in Canada will have the opportunity to bid on additional production work (as the Program moves into higher rates of aircraft production and requires a broader supply chain).

Companies in Canada will also have the opportunity to bid on sustainment contracts to support the worldwide fleet of F-35s (work related to maintenance, repair, training and simulation). As of June/July 2012 reporting, one sustainment opportunity has been identified for Canadian industry; therefore, the opportunities do not yet include the total value of work that could be derived from the aircraft's sustainment. Further opportunities related to the sustainment of the F-35 will be identified as the Program progresses.

All new opportunities, whether related to production or sustainment, will be reported to the Government of Canada by the prime contractors as they emerge.

**Table 2: Identified Opportunities as of June/July 2012**

<b>Phase</b>	<b>Values in Billions USD</b>
Development	-
Production and Sustainment	
o <i>Extension of production contracts, assuming that firms are successful in associated competitions</i>	\$7.792
o <i>Other Identified Production and Sustainment Opportunities</i>	\$1.536
<b>Sum of Identified Opportunities</b>	<b>\$9.328</b>

Of note, the F-35 JSF Program currently reports all financial data using 2002 USD as a base year for calculations. This approach makes it easier to track changes over time. However, 2002 dollars are increasingly unrepresentative given the impact of inflation over time and therefore the F-35 JSF Program is transitioning to a base year of 2012 USD. In parallel, the prime contractors will also transition to a base year of 2012 USD for reporting related to industrial participation. This transition will likely happen in the coming months and the 2012 base year will be used for the foreseeable future. While this change will not alter the value of executed contracts (which use actual, unadjusted values), it may increase the projections of industrial participation values to make them more representative of the value of these future contracts.

Industry Canada will also be reporting all figures in USD going forward, as provided by the prime contractors under the Industrial Participation MOUs, to eliminate fluctuations in the figures due to exchange rate variations. The December 2009 industrial participation reports from the prime contractors identified \$10.5 billion USD in opportunities, which was converted to \$12 billion CAD using the Bank of Canada's 2009 exchange rate. While the identified opportunities can vary based on the projected sales of the F-35 JSF to partner countries, as well as how successful companies in Canada are in securing work packages, fluctuations in exchange rates account for about two thirds of the decline in industrial participation opportunities since 2009. The remaining third of the decline results from opportunities that companies in Canada were unsuccessful in acquiring, those that did not materialize due to program decisions, and net adjustments in future values of identified opportunities.

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### 3. Sum of Contracts and Identified Opportunities as of June/July 2012

Based upon the most recent reports received from the prime contractors in June/July 2012, the value of contracts plus identified opportunities (as currently identified by the prime contractors) for companies in Canada could be up to \$9.766 billion USD.

**Table 3: Contracts and Identified Opportunities as of June/July 2012**

<b>Category</b>	<b>Values in Billions USD</b>
Contracts	\$0.438
Identified Opportunities	\$9.328
<b>Sum of Contracts and Identified Opportunities</b>	<b>\$9.766</b>

Because it is difficult to predict what proportion of the identified opportunities companies in Canada will secure, or how large the additional unidentified opportunities will be, an overall prediction of the final value of work that will be secured by companies in Canada (or even a range of possible outcomes) cannot be reliably made at this point.

### 4. Future Industrial Participation Prospects

Fundamentally, when opportunities are offered for competition, the amount and number of the contracts secured will depend on the success of the companies in Canada in these competitive processes. As has been the situation to date, and because the Program is based around the concept of best value, companies in Canada will not be successful in capturing all opportunities available.

In addition, a key factor is that future value projections are based upon the production of the anticipated partner fleet of 3,100 aircraft. Any significant change in the partner nations' acquisition quantities could affect these projections. Similarly, non-partner acquisitions of the F-35 JSF — for instance those of Israel and Japan — could affect the amount of work going to companies in Canada.

At the same time, the prime contractors and their principal suppliers may need to make changes to their supply chains as production rates increase, which could affect the amount of work available to companies in Canada.

As well, over the long-term, there may be other development opportunities to upgrade the aircraft's technology. Such work would represent additional opportunities not currently reflected in the data received by Industry Canada from the prime contractors.

Finally, sustainment opportunities will become available as global and domestic needs for maintenance and training are more clearly defined. At this stage of the Program, sustainment planning is still on-going and one sustainment opportunity has been identified for companies in Canada as of June/July 2012 reporting. However, over the life of the Program, substantial opportunities will be available in areas such as engine and airframe maintenance, component repair, and pilot and maintainer training. Companies in Canada will have the opportunity to compete for work, not only on domestic sustainment, but on sustainment for the global fleet. Except for one example, the value of sustainment opportunities is not yet included in the projections of industrial benefits for companies in Canada.

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Taken together, these factors make it clear that the value of contracts and available opportunities will vary over time. That being said, the following general observations can be made:

- Since 2010, contract values have increased from \$308 million USD to \$438 million USD. In the near term, aircraft production will continue at a steady rate of about 30 aircraft per year and – should companies in Canada continue to demonstrate best value – it is reasonable to expect that contract values will continue to trend upwards.
- By 2017-2018, under the current plan, the Program will begin transitioning to full-rate (i.e. higher rate) production. When this occurs, the Program is expected to produce over 200 aircraft per year, or sevenfold the current low-rate of production. Again, so long as they continue to demonstrate best value, companies in Canada should benefit from the proportionately higher purchase orders or contracts associated with this higher rate of production.
- Post-2020, it is expected that Canadian companies could also benefit from sustainment contracts as there will be a sizable partner fleet, both within North America and globally, that will require maintenance, repair and training.

#### **D. Conclusion**

Any decision to acquire next generation fighter capability will be driven foremost by the operational needs of the Canadian Forces. Maximizing industrial opportunities is an important part of ensuring that Canadians benefit as much as possible from an acquisition, but it is one of many elements that factor into acquisition decisions.

Canada's participation in the F-35 JSF Program has given companies in Canada the opportunity to compete for design/development, production and sustainment contracts on the F-35 aircraft and associated systems. As a result, seventy-two (72) companies in Canada have secured \$438 million USD in contracts. If the Government of Canada decides to acquire the F-35 through the F-35 JSF partnership, companies in Canada will be able to sustain currently contracted work and continue to have access to compete for additional production, sustainment and follow-on development work over the next several decades.

Through the National Fighter Procurement Secretariat (NFPS), Industry Canada will continue to work with other federal partners to fulfill the commitments outlined in the Government of Canada's response to Chapter 2 of the *2012 Spring Report of the Auditor General of Canada*.

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# Annex A

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## Sample of the Companies in Canada Involved in F-35 JSF Production

<b>Company Name</b>	<b>Work related to F-35 JSF production</b>
Advanced Integration Technology	Assembly line tooling systems
Alcoa Howmet	Inlet and Duct Castings
Asco	Large titanium bulkheads and other machined parts
Avcorp Industries	Carrier Variant outboard wings
Centra Industries	Forward and centre fuselage machined components
CMC Electronics	Transceivers
Composites Atlantic	Composite structures
GasTOPS	Oil debris monitors and sensors
Héroux-Devtek	Landing gear door uplocks
Honeywell	Power Thermal Management System controllers
Magellan – Chicopee	Machined components
Magellan – Bristol	Conventional take-off and landing variant horizontal tails
MDS Aero Support Corporation	Test equipment for F-135 engine vertical lift system
NGRAIN	3D damage assessment software
Pratt & Whitney Canada	F-135 engine components
Virtek	Laser templating technology for 3D composite ply alignment