2015 Report

The State of the Canadian Aerospace Industry

Presented by

AIAC

Industrie Canada

Canada

Canada
The Canadian Aerospace Industry Ecosystem
Economic Impact
Manufacturing Comparative Analysis
Canada in the World
Supply Chain Perspective
Key Findings
Annex:
- Main Economic Indicators
- Industry Definitions
- Quantitative Analysis Methodology Principles
Industry Canada and the Aerospace Industries Association of Canada (AIAC) agreed to leverage their respective expertise and formed a collaborative research partnership to provide the most accurate, detailed and relevant analysis to both industry and government decision makers.
The two parties agreed that:

– Industry Canada would develop detailed economic statistics

– AIAC would consult and validate with its network on business drivers, issues and trends

– The statistics, issues and trends would be jointly released on an annual basis
The Canadian aerospace industry ecosystem is interlinked with the space and the defence industries*…

- The Canadian aerospace manufacturing industry** encompasses civil and defence activities as well as space systems manufacturing.

- Beyond space systems manufacturing, the space industry includes satellite operations and value-added applications.

- The Canadian aerospace maintenance repair and overhaul (MRO) industry*** includes both civil and defence aerospace MRO activities.

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* Proportion based on economic modelling direct GDP estimates developed by Industry Canada based on different Government Statistical and Tax Agencies’ data as well as from the Canadian Space Agency Annual Space Survey, 2014

** Includes MRO activity performed by manufacturers

*** MRO industry excludes MRO activity performed by manufacturers and airlines
The Canadian aerospace industry contributed more than $29B to GDP* and 180,000 to employment in the Canadian economy** in 2014.

- The industry*** directly** generated $27.7B in revenues, 76,000 in direct employment and $13.1B in GDP* in 2014.

- Nearly 20% of aerospace manufacturing activity is dedicated to Research & Development (R&D)****, representing a $1.8B investment in 2014.


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* GDP better represents the activity that actually occurs within a country in contrast to revenues which includes foreign content as well as R&D, employment and revenues from outside Canada (even if it was performed by a Canadian firm).

** Direct: Firms where aerospace is their main activity; Indirect: Canadian suppliers to firms where aerospace is their main activity; Induced: Offset economic impact of direct and indirect

*** Firms where aerospace is their primary business activity, space systems manufacturing is included in the aerospace manufacturing sector

**** R&D activity performed by firms within their respective corporations in Canada

Central Canada accounts for the majority of the manufacturing industry

Western Canada plays a dominant role in terms of MRO

Atlantic Canada was the fastest growing region in MRO over the past five years

Source: Industry Canada. Economic modelling based on data from Statistics Canada (Business Registry and Cansim), Canada Revenue Agency and firm level observations, 2014
Aerospace manufacturing is a best-in-class sector in innovation, productivity and skills indicators.

- Aerospace manufacturing R&D intensity* is **5X** the total manufacturing average.
- Aerospace manufacturing productivity growth** (2004-2014) is **2.5X** greater than total manufacturing.

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* R&D activity performed by firms within their respective corporations in Canada (R&D intensity: R&D investment / GDP)
** Value added (GDP) / FTE

Source: Industry Canada. Economic modelling based on data from Statistics Canada (Business Registry and Cansim), Canada Revenue Agency and firm level observations, 2014
Canadian aerospace manufacturing ranks 5th in OECD countries in terms of GDP (2011)

#1 in civil flight simulation (2014)

#3 in civil aircraft production (2014)
  #2 in business aircraft production
  #2 in regional aircraft production
  #3 in general aviation* production
  #5 in helicopter production

#3 in civil engine production (2014)
  #1 in turboprop engine production
  #1 in helicopter engine production

* General Aviation: Includes all aircraft not used in either commuter services or airline service (excluding business jets and rotorcraft)

Sources:
Aircraft production: Average of Forecast International and Teal Group forecasts, 2014
Engine Production: Forecast by Forecast International, 2014
Close to 60% of total Canadian aerospace exports are supply chain related.

- Engines are the main supply chain export activity in terms of volume and growth in value.
- Supply chain exports of landing gear are growing at a fast pace (up 185%) and account for close to 20% of the overall growth in value of exports (2003-2013).

* Engines and Landing Gear include their respective systems and components.
** 57% of aerospace exports are supply chain related (engines, landing gear, avionics and other parts, excluding aircraft and helicopters as well as simulators). Aircraft and helicopters represent 39% of total aerospace exports. Simulators represent 4% of total aerospace exports.

Source: Global Trade Atlas (based on Statistics Canada), 2014
Aerospace supply chain exports* to Europe have increased by over **70%** since 2003.

United States is the **key aerospace supply chain** export market for Canada.

Supply chain exports to Asia Pacific are **growing at a fast pace** (**up 190%**) and account for close to **20%** of the overall growth in value of exports (2003-2013).

* 57% of aerospace exports are supply chain related (engines, landing gear, avionics and other parts, excluding aircraft and helicopters as well as simulators). Aircraft and helicopters represent 39% of total aerospace exports. Simulators represent 4% of total aerospace exports.

Source: Global Trade Atlas (based on Statistics Canada), 2014
In order to integrate into global supply chains, Canadian aerospace manufacturers are accepting greater risk and incurring greater up-front costs…

- Accepting greater risk sharing limits opportunities for smaller firms to integrate into aerospace supply chains*

- A large number of aerospace manufacturers are taking steps to decrease lead-time in response to supply chain pressures

* Industry validation

The merger and acquisition rate in aerospace manufacturing is twice that of total manufacturing for production related activities…

- Approximately 25% of medium and large aerospace manufacturing firms (100+ FTE) have increased production capacity by merger and acquisition compared to 12% for small firms.

- R&D, engineering and software development capacity is mainly increased from within the enterprise.

Year after year, close to 5% of firms in the Canadian aerospace manufacturing sector increase in size…

- Most aerospace manufacturing firms* increasing in size** are moving within the 100-499 employment size range
  - Few firms are decreasing in size
  - Large firms are more active in R&D and exports than others
- The United States shows similar patterns to Canada in the characteristics of aerospace manufacturing enterprises based on size

* Based solely on the total aerospace enterprises from the preceding year
** Increase in full time equivalents (FTEs)

Key Findings ...

The Canadian aerospace industry is **fast growing** and innovative.

Close to **60%** of total Canadian aerospace exports are supply chain related.

Aerospace manufacturing is a **best-in-class sector** in innovation, productivity and skills indicators.

In order to integrate into global supply chains, Canadian aerospace manufacturers are **accepting greater risk**, **incurring greater up-front costs** and **reducing lead-time**.

Aerospace supply chain exports to Europe have increased by over **70%** since 2003.

Canada is a leader in terms of civil flight simulation, aircraft production and engine production.
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Annex
## Economic and Employment Impact of Aerospace Manufacturing and MRO (2014)

<table>
<thead>
<tr>
<th>Economic and Employment Impact of Aerospace Manufacturing and Maintenance, Repair and Overhaul (2014)</th>
<th>GDP - Economic Impact</th>
<th>Employment - Economic Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct</td>
<td>Indirect</td>
</tr>
<tr>
<td>Aerospace Manufacturing (2014)</td>
<td>$ 9,537</td>
<td>$ 4,918</td>
</tr>
<tr>
<td>MRO (2014)</td>
<td>$ 3,520</td>
<td>$ 4,053</td>
</tr>
<tr>
<td>Total*</td>
<td>$ 13,057</td>
<td>$ 8,971</td>
</tr>
</tbody>
</table>

* Totals may not add up due to rounding

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>GDP (M)</td>
<td>$ 9,537 (+7%)</td>
<td>$ 3,520 (+5%)</td>
<td>$ 13,057 (+6%)</td>
</tr>
<tr>
<td>Employment (FTE)</td>
<td>45,943 (+5%)</td>
<td>30,242 (+5%)</td>
<td>76,185 (+5%)</td>
</tr>
<tr>
<td>Revenues (M)</td>
<td>$ 20,276 (+13%)</td>
<td>$ 7,401 (+4%)</td>
<td>$ 27,677 (+10%)</td>
</tr>
<tr>
<td>R&amp;D (M)</td>
<td>$ 1,764 (+2%)</td>
<td>$ 40 (N/A)</td>
<td>$ 1,804 (+2%)</td>
</tr>
</tbody>
</table>

### Breakdown of Canadian Aerospace Exports by Product Category*

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Share of Canadian Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canadian Aerospace Exports</strong></td>
<td></td>
</tr>
<tr>
<td>Aircraft &amp; Rotorcraft</td>
<td>39%</td>
</tr>
<tr>
<td>Simulators</td>
<td>4%</td>
</tr>
<tr>
<td>*<em>Canadian Aerospace Supply Chain Exports</em></td>
<td></td>
</tr>
<tr>
<td>Engines</td>
<td>28%</td>
</tr>
<tr>
<td>Other Parts</td>
<td>13%</td>
</tr>
<tr>
<td>Avionics</td>
<td>9%</td>
</tr>
<tr>
<td>Landing Gear</td>
<td>7%</td>
</tr>
</tbody>
</table>

* 57% of aerospace exports are supply chain related (engines, landing gear, avionics and other parts, excluding aircraft and helicopters as well as simulators). Aircraft and helicopters represent 39% of total aerospace exports. Simulators represent 4% of total aerospace exports.

Source: Global Trade Atlas (based on Statistics Canada), 2014
Breakdown of Canadian Aerospace Exports by Region

<table>
<thead>
<tr>
<th>Product Category</th>
<th>United States</th>
<th>Europe</th>
<th>Asia Pacific</th>
<th>South and Central America**</th>
<th>Middle East</th>
<th>Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Aerospace Exports</td>
<td>57%</td>
<td>21%</td>
<td>14%</td>
<td>4%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Aircraft &amp; Rotorcraft</td>
<td>56%</td>
<td>20%</td>
<td>17%</td>
<td>3%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Simulators</td>
<td>16%</td>
<td>13%</td>
<td>54%</td>
<td>1%</td>
<td>12%</td>
<td>2%</td>
</tr>
<tr>
<td>Canadian Aerospace Supply Chain Exports***</td>
<td>62%</td>
<td>23%</td>
<td>8%</td>
<td>4%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Engines</td>
<td>54%</td>
<td>29%</td>
<td>10%</td>
<td>4%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Other Parts</td>
<td>65%</td>
<td>17%</td>
<td>7%</td>
<td>6%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Avionics</td>
<td>64%</td>
<td>18%</td>
<td>11%</td>
<td>3%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Landing Gear</td>
<td>80%</td>
<td>17%</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

* Percentages may not total 100 due to rounding
** South & Central America includes Mexico
*** 57% of aerospace exports are supply chain related (engines, landing gear, avionics and other parts, excluding aircraft and helicopters as well as simulators). Aircraft and helicopters represent 39% of total aerospace exports. Simulators represent 4% of total aerospace exports.

Source: Global Trade Atlas (based on Statistics Canada), 2014
### Definitions of the Canadian Aerospace Manufacturing and the MRO Service Industries

<table>
<thead>
<tr>
<th>Aerospace Manufacturing Industry*</th>
<th>MRO Service Industry**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main activities:</strong></td>
<td><strong>Main activities:</strong></td>
</tr>
<tr>
<td>• Aircraft assemblies, subassemblies and parts</td>
<td>• Aircraft heavy maintenance, servicing and repair</td>
</tr>
<tr>
<td>• Aircraft engines and engine parts</td>
<td>• Aircraft engine maintenance, servicing and repair</td>
</tr>
<tr>
<td>• Aircraft fuselage, wing, tail and similar assemblies</td>
<td>• Aircraft components and other systems maintenance, servicing and repair</td>
</tr>
<tr>
<td>• Tail and wing assemblies and parts (empennage)</td>
<td>• Aircraft line maintenance (aircraft servicing at airports – excluding sales of fuel revenues)</td>
</tr>
<tr>
<td>• Flight simulators</td>
<td>• Aircraft ferrying services</td>
</tr>
<tr>
<td>• Developing and producing prototypes for aerospace products</td>
<td>• Aircraft inspection services</td>
</tr>
<tr>
<td>• Space vehicles, parts and propulsion units, guided missiles and space vehicle engines</td>
<td>• Aircraft testing services</td>
</tr>
<tr>
<td>• Telecommunication satellites and components</td>
<td>• Aircraft upholstery repair</td>
</tr>
<tr>
<td>• Avionics</td>
<td></td>
</tr>
<tr>
<td>• Helicopters, propellers and parts</td>
<td></td>
</tr>
</tbody>
</table>

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* Includes MRO activity performed by manufacturers
** MRO industry excludes MRO activity performed by manufacturers and airlines
Data is compiled from Government agencies’ information based on tax returns* (as opposed to data based on sampling) with firm-level adjustments in order to capture all key sector firms and segments**

Economic impact and intensity analysis based on GDP***

Industry specific economic multiplier to estimate total economic impact****

- **Direct**: Firms where aerospace is their main activity
- **Indirect**: Canadian suppliers to firms where aerospace is their main activity
- **Induced**: Offset economic impact of direct and indirect

R&D***** investments / intensity*** and other international comparative analysis based on OECD internationally recognised definitions

* Confidence intervals estimated at +/- 2.5%
** Addition of key firms in space manufacturing, avionics manufacturing, flight simulator manufacturing and MRO service providers
*** GDP better represents activity that actually occurs within a country in contrast to revenues which includes foreign content as well as R&D, employment and revenues from outside Canada (even if it was performed by a Canadian firm)
**** Economic multiplier developed by Statistics Canada based on input-output model and other key economic variables
***** Research and Development (R&D) is the systematic investigation carried out in the natural and engineering sciences by means of experiment or analysis to achieve a scientific or technological advance. Research is original investigation undertaken on a systematic basis to gain new knowledge. Development is the application of research findings or other scientific knowledge for the creation of new or significantly improved products or processes. If successful, development will usually result in devices or processes which represent an improvement in the state of the art and are likely to be patentable.