State of Canada’s Aerospace Industry
2018 Report

Presented by:
Innovation, Science and Economic Development Canada and AIAC
ISED and the AIAC have partnered to provide evidence-based, relevant, quality and timely analysis to both industry and government decision makers.

For the State of Canada’s Aerospace Industry 2018 Report:

- Innovation, Science and Economic Development Canada (ISED) developed detailed economic models, statistics and analysis* based on Statistics Canada and global private independent research organizations’ data.

- Analysis reflected the latest Statistics Canada revisions of economic impact multipliers for the 2012-2017 period, including the measurement of jobs and GDP impact from the Canadian aerospace industry, its value chain, and associated consumer spending.

- The Aerospace Industries Association of Canada (AIAC) consulted and validated research findings with its network on business drivers, issues and trends.

- ISED and the AIAC jointly published the latest statistics.

* See Annex A1 and A2 for aerospace industry definitions and economic impact methodology principles, respectively.
Features of the 2018 report

- Aerospace industry ecosystem
- Economic indicators
- Global value chain participation
- Innovation and skills

Annex
A – Definitions and economic impact methodology principles
B – Economic and industrial indicators
The Canadian aerospace industry ecosystem is interlinked with the defence and space industries

The share of GDP by Canadian aerospace industry segment in 2017 was as follows:

- **Aerospace manufacturing** (68%)
- **Aerospace MRO** (32%)
- **Space systems manufacturing**

**Canadian aerospace industry sales** were made up of:
- commercial aerospace (86%)
- defence aerospace (12%)
- space systems (2%)

The space systems manufacturing industry in Canada was highly skills focused and civil oriented.

Among overall defence activities, aerospace captured more than 30% of sales and close to 50% of research and development (R&D).

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* See Annex A1 and A2 for aerospace industry definitions and methodology principles, respectively. MRO is maintenance, repair, and overhaul.
** Based on the latest [2016] available information.
*** Beyond space systems manufacturing, space activities include applications such as satellite operations, value-added applications, and space-based broadcasting.

Source: ISED’s economic model estimates based on latest revised data from Statistics Canada, the Canada Revenue Agency, the Canadian Space Agency and enterprise-level observations, 2018; Canadian Defence, Aerospace and Marine Industries Survey [2016], 2018.
The aerospace industry contributed close to $25 billion in GDP and almost 190,000 jobs to the Canadian economy* in 2017

- Positive 5-year growth in its GDP (+6%) and jobs (+2%) contribution to the Canadian economy, despite a slight decline in both between 2016 and 2017
- Revenues of close to $29 billion with direct employment of 85,600 Canadians
- Close to 75% of aerospace manufactured products were exported in 2017

* Gross Domestic Product (GDP) is the total unduplicated value of the goods and services produced in an industry, country or region during a given period. Jobs refer to full-time equivalent employees. Economic impact indicators include the aerospace industry (direct economic impact from enterprises for which aerospace is the main activity), suppliers to the aerospace industry (indirect economic impact from enterprises for which aerospace is not the main activity), and consumer spending by associated employees (induced economic impact). See Annex B1 and B3 for detailed aerospace industry GDP and employment contributions to the Canadian economy by year (2012-2017)

** Direct economic impact from enterprises for which aerospace is the main activity.

Source: ISED’s economic model estimates based on latest revised data from Statistics Canada National Input-Output Multipliers (2014) adjusted to 2017 GDP and jobs (in 2007 chained dollars), 2018
The Canadian aerospace industry is national

Aerospace employment share by region
2017

- Manufacturing
  - Quebec: 52%
  - Ontario: 28%
  - Western Canada: 15%
  - Atlantic Canada: 5%

- MRO
  - Quebec: 21%
  - Ontario: 23%
  - Western Canada: 43%
  - Atlantic Canada: 13%

- Most aerospace manufacturing activity takes place in Central Canada
- Western and Atlantic Canada captured close to 60% of MRO activities
- MRO activity grew by over 25% while manufacturing activity saw a slight contraction between 2012 and 2017*

* See Annex B3 for detailed aerospace industry GDP and employment contributions to the Canadian economy by year (2012-2017)
Source: ISED’s economic model estimates based on latest revised data from Statistics Canada, the Canada Revenue Agency and enterprise-level observations, 2018

Manufacturing

Quebec 52%
Ontario 28%
Western Canada 15%
Atlantic Canada 5%

MRO

Quebec 21%
Ontario 23%
Western Canada 43%
Atlantic Canada 13%
In a country comparison, Canada ranked* in the top three in terms of civil aircraft, engines, and flight simulators.

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Civil flight simulator production</th>
<th>Civil aircraft production</th>
<th>Civil engine production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>#1 - Civil flight simulator production</td>
<td>#2 - Business aircraft production</td>
<td>#1 - Turboprop engine production</td>
</tr>
<tr>
<td>3</td>
<td>#3 - Regional aircraft production</td>
<td>#2 - Regional aircraft production</td>
<td>#1 - Helicopter engine production</td>
</tr>
<tr>
<td></td>
<td>#4 - Large jet production</td>
<td>#4 - General aviation** production</td>
<td>#4 - Turbofan engine production</td>
</tr>
<tr>
<td></td>
<td>#5 - Helicopter production</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Rankings based on final production
** General Aviation: includes all aircraft not used in either commuter services or airline service (excluding business jets and rotorcraft)

Source:
Over 60% of Canadian aerospace product exports were supply chain related

- The share of supply chain exports has increased by almost 50% over the past 15 years (2003-2017)

* Aeroengines and landing gear include their respective systems and components

Source: Global Trade Atlas (2017), 2018
Share of STEM* employment in aerospace manufacturing was almost 3X the manufacturing average

* Science, technology, engineering, and mathematics
** Includes management, administration, marketing, and unspecified occupations

Source: Statistics Canada’s special tabulation of occupation by industry, 2018
Aerospace was the number one R&D player among all Canadian manufacturing industries

- R&D performed by aerospace manufacturing totalled $1.7 billion in 2017
- The aerospace manufacturing industry contributed close to a quarter of total manufacturing R&D in Canada and was over seven times as R&D intensive as the manufacturing average

*R&D intensity is calculated using the ratio of R&D to GDP based on Statistics Canada’s CANSIM tables
Source: ISED’s economic model estimates based on latest revised data from Statistics Canada, the Canada Revenue Agency and enterprise-level observations, 2018
The Canadian aerospace industry was actively engaged in R&D collaboration with a variety of partners

- Firms capturing more than 70% of the aerospace industry’s activity* collaborated on R&D with academia, government, and suppliers

*Aerospace industry collaborative R&D activity* by partner type

2016

% of total aerospace industry sales

<table>
<thead>
<tr>
<th>Partner Type</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academia</td>
<td>75%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suppliers</td>
<td>73%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>71%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customers</td>
<td></td>
<td>67%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other companies</td>
<td></td>
<td>64%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Any R&D collaborative activity that may have occurred between 2014 and 2016. Values represent the enterprises’ share of total aerospace industry revenues.ISED estimates based on the survey data and activity among firms that more fully responded to the collaborative business practices questions.

Source: Canadian Defence, Aerospace and Marine Industries Survey (2016), 2018
Key Findings*

The Canadian aerospace industry is:

• A national industry that contributed close to $25 billion in GDP and almost 190,000 jobs to the Canadian economy

• The number one R&D player among Canadian manufacturing industries, with large-scale, multi-year innovation initiatives that lead to high-volume and diversified export activities

• Skills focused, with a STEM employment share 3X higher than the manufacturing average, and its share of women working in STEM doubling over the past five years

• Actively collaborating on R&D with academia, industry, and government in order to achieve commercial success

* According to the latest data
Annex A

Annex A1 – Definitions of the Canadian aerospace manufacturing and MRO service industries

Annex A2 – Economic impact methodology principles
Annex A1 – Definitions of the Canadian aerospace manufacturing and MRO service industries

<table>
<thead>
<tr>
<th>Aerospace manufacturing industry</th>
<th>Aerospace MRO service industry*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main activities:</td>
<td>Main activities:</td>
</tr>
<tr>
<td>• Aircraft assemblies, subassemblies and parts</td>
<td>• Aircraft heavy maintenance, servicing and repairing</td>
</tr>
<tr>
<td>• Aircraft engines and engine parts</td>
<td>• Aircraft engines maintenance, servicing and repairing</td>
</tr>
<tr>
<td>• Aircraft fuselage, wing, tail and similar assemblies</td>
<td>• Aircraft components and other systems maintenance, servicing and repairing</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 systems</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>

* Excludes MRO activity performed by manufacturers and airlines
Annex A2 – Economic impact methodology principles

- Aerospace industry data is compiled from various government agencies such as Statistics Canada, the Canada Revenue Agency, and the Canadian Space Agency, with firm-level adjustments to capture all key industry firms and segments*
- Economic impact analysis based on gross domestic product (GDP)** and full-time equivalent employees
- In 2018, the economic impact estimates of the State of Canada’s Aerospace Industry Report were based on Statistics Canada economic impact multipliers reflecting a comprehensive revision of the Canadian system of macroeconomic accounts
- This revision contributed to updated ISED estimates***:
  - 2016 GDP impact estimate of $25.0B (compared to $27.7B, pre-revision), and a jobs impact of 191.1K jobs (compared to 207.6K, pre-revision)
- Using the latest Statistics Canada Input-Output multipliers compared to the previously available multipliers resulted in a difference**** of 10% of GDP and 8% of jobs impacts to the Canadian economy

* Inclusion of key firms in space manufacturing, avionics manufacturing, flight simulator manufacturing and MRO service providers
** GDP better represents activity that actually occurs within Canada in contrast to revenues that include foreign content as well as R&D, employment and revenues from outside of Canada (even if it was performed by a Canadian firm)
*** Economic model estimations are not comparable to older estimates in previously published reports as Statistics Canada’s Input-Output framework has been updated for all industries in April 2018
**** The difference relates to 2016 estimates that are based on the 2014 multipliers released in April of 2018 (the most current available) versus initial estimates that were based on 2011 multipliers
Annex B

### Annex B1 – Economic impact indicators (2017)*

<table>
<thead>
<tr>
<th></th>
<th>Impact on Canadian GDP ($ millions)</th>
<th>Impact on Canadian employment (jobs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerospace industry</td>
<td>Suppliers to aerospace industry</td>
</tr>
<tr>
<td>Aerospace manufacturing</td>
<td>8,613</td>
<td>3,511</td>
</tr>
<tr>
<td>Aerospace MRO</td>
<td>4,025</td>
<td>3,251</td>
</tr>
<tr>
<td>Aerospace total</td>
<td>12,638</td>
<td>6,762</td>
</tr>
</tbody>
</table>

* National Input-Output Multipliers (2014) adjusted to 2017 GDP (in 2007 chained dollars) and employment
** Includes the aerospace industry (direct economic impact from enterprises for which aerospace is the main activity), suppliers to the aerospace industry (indirect economic impact from enterprises for which aerospace is not the main activity), and consumer spending by associated employees (induced economic impact)

Note: Due to rounding, numbers presented may not add up precisely to the totals provided.

Source:ISED’s economic model estimates based on latest revised data from the Statistics Canada Business Registry and CANSIM, the Canada Revenue Agency, and enterprise-level observations, 2018.
# Annex B2 – Industrial indicators (2017)*

<table>
<thead>
<tr>
<th></th>
<th>Aerospace manufacturing</th>
<th>Aerospace MRO</th>
<th>Aerospace industry total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GDP ($ millions)</strong></td>
<td>8,613</td>
<td>4,025</td>
<td>12,638</td>
</tr>
<tr>
<td><strong>Employment (jobs)</strong></td>
<td>53,588</td>
<td>31,998</td>
<td>85,586</td>
</tr>
<tr>
<td><strong>Revenues ($ millions)</strong></td>
<td>21,151</td>
<td>7,831</td>
<td>28,982</td>
</tr>
<tr>
<td><strong>R&amp;D</strong> ($ millions)</td>
<td>1,744</td>
<td>42</td>
<td>1,786</td>
</tr>
<tr>
<td><strong>Exports</strong> ($ millions)</td>
<td>15,069</td>
<td>N/A***</td>
<td>15,069***</td>
</tr>
</tbody>
</table>

* National Input-Output Multipliers (2014) adjusted to 2017 GDP (in 2007 chained dollars) and employment. Revenues and R&D are in current annual dollars.

** Several aspects of the Statistics Canada Annual Survey of Research and Development in Canadian Industry have been redesigned since 2016, including concepts, methodology, the collection method and the data processing system. The concepts and definitions employed in the collection and dissemination of R&D data are provided in the Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development (Organisation for Economic Cooperation and Development (OECD), 2015). According to this definition: “R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge.”

*** Export figures are sourced from Trade Data Online (2017), 2018. Export data for aerospace MRO is not available.

Note: Due to rounding, numbers presented may not add up precisely to the totals provided.

Source: ISED’s economic model estimates based on latest revised data from the Statistics Canada Business Registry and CANSIM, the Canada Revenue Agency, and enterprise-level observations, 2018.

<table>
<thead>
<tr>
<th>Industry</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>% change from 2012 to 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP ($ millions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerospace manufacturing</td>
<td>8,974</td>
<td>9,474</td>
<td>10,325</td>
<td>9,787</td>
<td>9,167</td>
<td>8,613</td>
<td>-4.0%</td>
</tr>
<tr>
<td>Aerospace MRO</td>
<td>3,195</td>
<td>3,247</td>
<td>3,520</td>
<td>3,664</td>
<td>3,802</td>
<td>4,025</td>
<td>+26.0%</td>
</tr>
<tr>
<td>Aerospace total</td>
<td>12,169</td>
<td>12,722</td>
<td>13,845</td>
<td>13,452</td>
<td>12,969</td>
<td>12,638</td>
<td>+3.9%</td>
</tr>
<tr>
<td>Aerospace contribution to Canadian economy**</td>
<td>23,231</td>
<td>24,236</td>
<td>26,369</td>
<td>25,753</td>
<td>24,976</td>
<td>24,514</td>
<td>+5.5%</td>
</tr>
<tr>
<td>Employment (jobs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerospace manufacturing</td>
<td>56,648</td>
<td>58,079</td>
<td>60,140</td>
<td>57,648</td>
<td>55,725</td>
<td>53,588</td>
<td>-5.4%</td>
</tr>
<tr>
<td>Aerospace MRO</td>
<td>28,541</td>
<td>28,695</td>
<td>30,242</td>
<td>31,314</td>
<td>31,457</td>
<td>31,998</td>
<td>+12.1%</td>
</tr>
<tr>
<td>Aerospace total</td>
<td>85,190</td>
<td>86,773</td>
<td>90,382</td>
<td>88,961</td>
<td>87,182</td>
<td>85,586</td>
<td>+0.5%</td>
</tr>
<tr>
<td>Aerospace contribution to Canadian economy**</td>
<td>185,362</td>
<td>188,570</td>
<td>196,635</td>
<td>194,523</td>
<td>191,119</td>
<td>188,327</td>
<td>+1.6%</td>
</tr>
<tr>
<td>Revenues ($ millions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerospace manufacturing</td>
<td>15,860</td>
<td>17,397</td>
<td>20,863</td>
<td>22,550</td>
<td>20,234</td>
<td>21,151</td>
<td>+33.4%</td>
</tr>
<tr>
<td>Aerospace MRO</td>
<td>6,985</td>
<td>7,022</td>
<td>7,401</td>
<td>7,663</td>
<td>7,698</td>
<td>7,831</td>
<td>+12.1%</td>
</tr>
<tr>
<td>Aerospace total</td>
<td>22,845</td>
<td>24,420</td>
<td>28,264</td>
<td>30,214</td>
<td>27,932</td>
<td>28,982</td>
<td>+26.9%</td>
</tr>
<tr>
<td>R&amp;D*** ($ millions)</td>
<td>1,843</td>
<td>1,993</td>
<td>2,052</td>
<td>2,003</td>
<td>1,825</td>
<td>1,786</td>
<td>-3.1%</td>
</tr>
</tbody>
</table>

* National Input-Output Multipliers (2014) adjusted to 2017 GDP (in 2007 chained dollars) and employment. Revenues and R&D are in current annual dollars.

** Includes aerospace industry (direct economic impact from enterprises for which aerospace is the main activity), suppliers to the aerospace industry (indirect economic impact from enterprises for which aerospace is not the main activity), and consumer spending by associated employees (induced economic impact).

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