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Current and Future Human Capital Needs in the Aerospace Industry and Strategies for Harnessing the Potential Workforce

A Report Prepared for The Aerospace Review
By Prism Economics and Analysis

PRISM
ECONOMICS AND ANALYSIS

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Executive Summary

This is the Report for the Human Capital Needs in Canada's Aerospace industry prepared for the Aerospace Review. The first part of the report presents a detailed analysis of the current and future labour market conditions for key aerospace trades and occupations. The report provides a short and long-term forecast of aerospace industry employment, as well as an assessment of the potential for competition for workers and recruitment opportunities for key aerospace occupations from competing industries across four regions in Canada. The second part of this report focuses on strategies and best practices for attracting and retaining women, Aboriginals and unemployed, skilled workers from other industries which can be used successfully by the Canadian aerospace industry.

Key aerospace occupations are grouped into four categories:

1. Core aerospace occupations which are defined as occupations with employment concentrated within the aerospace industry
2. Managers and Supervisory occupations
3. Engineers and Technologist occupations
4. Trades.

Aerospace employment is heavily concentrated in Quebec and Ontario. Employment in all other provinces represents only about 22 percent of the national total.

Employment in Canada's aerospace industry has remained relatively stable over the last decade with little change in the distribution of employment across provinces. While employment was flat over the first half on the last decade, the industry experienced a modest expansion in employment from 2007 to 2009. The implications for aerospace labour markets was that human resources demand requirements for trades and entry level occupations were potentially met by available workers from like occupations in neighbouring companies in the transportation sector and the manufacturing industry as a whole. The labour market for experienced workers, with specialized aerospace sector skills, would have been considerably tighter during this expansion resulting in some recruitment challenges for the industry.

Industrial engineering and manufacturing technologists and technicians, and Mechanical engineering technologists and technicians witnessed the largest increases in employment, while employment increases for trades such as Sheet metal workers, Tool and die makers and Machining tool operators were more muted.

Following a modest correction in 2010 industry, employment is forecast to rise modestly through 2018, before the start of a down cycle in 2019. Employment cycles back up beginning in 2025.

Employment growth estimates for the medium and long-term should be taken with caution as they are based on current macroeconomic assumptions.

Total annual hiring requirements range from 3,000 to 5,000 over the forecast period. Annual replacement demand requirements related to deaths and retirements from the workforce rise from just over 3,000 in 2012 to about 4,000 late in the scenario. Expansion demand requirements continue to increase in the near term, and then fall with the down cycle between 2019 and 2022. With flat expansion demand aerospace industry hiring requirements are overwhelmingly related to the replacement of retiring workers.

In the provinces with the largest shares of aerospace industry employment, Ontario and Quebec, labour markets are generally balanced over the next 10 years. However, continued weakness in Ontario's manufacturing sector results in weaker market conditions for many engineering and technologist occupations over the near term. Growth in engineering and non-residential construction maintains employment demand for occupations employed by the construction industry.

The older age demographic of occupations in the Manager and Supervisor category contributes to tighter conditions for these occupations in all industries and in all regions of the country. The labour market conditions for Atlantic Provinces are considerably tighter over the scenario. This reflects a smaller and much older workforce. Although the age demographic is younger for many Central and Western Provinces, stronger economic growth outlooks for Western Canada translate to higher demand requirements and greater competition between industries to attract and retain workers.

Employment growth continues in the near term until 2017, but not at the pace of the period from 2008 to 2011. During the expansion there was skills availability from the broader transportation and other manufacturing industries. This trend reverses in the medium term as manufacturing starts to recover, limiting opportunities for recruitment from these industries.

In Ontario, over the near term, employment growth in Manufacturing and Transportation equipment manufacturing exceeds growth in Aerospace transportation equipment manufacturing elevating the potential for increased competition for Managerial and supervisory occupations.

In Quebec, employment growth for Managerial and supervisory occupations appears stronger than the broader manufacturing industry, relative to the aerospace industry, but the differential is much smaller. Potential recruitment opportunities exist for a number of occupations in the Trade contracting and Computer and electronics product manufacturing industries.

In Central and Western Canada, employment for many Aerospace occupations rises at a slightly faster rate relative to the Aerospace industry, increasing competition for key occupations.

In Atlantic Canada, analysis indicates some potential recruitment opportunities from the Architectural, Engineering and related services sector, as well as the Transportation equipment manufacturing industry.

Based on the moderate growth expected in the aerospace and space industry over the medium to long term, the industry should not experience any broad-based labour market constraints to recruitment for key occupations identified in this analysis. Nonetheless, highly specialized, experienced workers will remain in short supply, especially in the specialized engineering, technology, and supervisory occupations. This is perhaps a consequence of the industry needing to recruit and train new entrants in these specialized technology fields, giving the industry the ability to fill requirements for senior and supervisory positions internally.

The greatest recruitment and retention challenges identified by aerospace and space companies are in occupations and trades characterized as highly skilled, technically oriented and specialized. These occupations pose a recruitment and retention challenge in any case for the aerospace and space industry. But the recruitment challenge is accentuated when trying to increase the participation in the industry of the targeted groups of women, Aboriginals and skilled workers from other industries. The targeted groups have typically lower representation in the feeder occupations and in the educational and training institutions which provide the specialized skills required.

Across all occupations in aerospace and space industries, there were an estimated 79,475 persons employed in 2011. Of these, 63,040 were men and 16,436 are women, about 20.7 percent. This distribution is not uniform across occupations. Women have low participation in core aerospace occupations involved in design, production, maintenance and repair of aerospace and space products. Women are more represented in administrative and clerical functions, and some types of aerospace and space manufacturing, like electrical and electronic components assembly.

Persons of Aboriginal ancestry account for approximately 2,991 workers in the aerospace and space industry, representing 3.8 percent of the workforce. Aboriginal ancestry workers are concentrated in aerospace assembly occupations and manufacturing trades with about 4.1 percent of the workforce in each, but are found in relatively lower proportions in technical occupations at approximately 2.9 percent for aerospace engineering and technology occupations.

The report summarizes eleven examples of initiatives for women, Aboriginals and unemployed skilled workers. These initiatives have several dimensions: 1) a continuum of skills from essential skills upgrading to career transition; 2) a focus on a sector and a target group; and 3) research, consultation, partnerships and actionable strategies. A five step model is used to examine options for increasing participation of the target groups in the aerospace and space industry.

The key issue for recruiting and retaining women into the aerospace and space industry is attracting women into mathematics, science and technology. Women are underrepresented in engineering and technology occupations which carries through to being underrepresented in feeder

disciplines for aerospace, and therefore, being underrepresented in aerospace and space. Two other important issues for women's participation in aerospace are recruitment and retention.

It may be difficult for the aerospace and space industry to deal with changes to the overall education system to deal with girls' awareness and interest in mathematics, science and technology. Recruitment of science-oriented and educated women into aerospace presents the greatest opportunity to increase their numbers into the industry. But concerted efforts at retention of women after five and ten years are vital in order to provide them with long term careers. And to address the shortages of highly- skilled, specialized and experienced engineers and technologists that faces the industry overall.

The key issue for the participation of Aboriginal persons in aerospace and space is lower educational attainment and high school and university completion rates which limit the pool of Aboriginal persons available to be recruited into aerospace. Another dimension is the regional concentration of Aboriginal populations compared to the regional concentration of the aerospace and space industry. Initiatives aimed at Aboriginal workers for aerospace need to be specific to the regional characteristics of the population. In Winnipeg and Montreal, with local concentrations of Aboriginals, initiatives can be targeted to communities. In Toronto and Vancouver, with large but diffuse populations, broad-based Aboriginal organizations become more significant.

Considerable restructuring is occurring in manufacturing and technology industries, and unemployment of skilled workers from these industries is relatively high. At the same time, labour markets are tight in primary, resource and construction industries, some of which also compete for related skills and occupations, particularly for manufacturing trades like machinists, sheet metal workers and welders. Focused recruitment efforts in regions where precision and technology manufacturing are downsizing and sector-wide promotion of best practices for skilled retention provide some scope for success.

1. Introduction

This is the Report for the Human Capital Needs in Canada's Aerospace industry prepared for the Aerospace Review. Prism Economics and Analysis researched the state of the aerospace and space industry in Canada, reviewing the literature and examining data sources.

The second chapter provides an analysis of the Current and Future Human Capital Needs in the Aerospace Industry. This chapter identifies the human capital needs of the aerospace and space industry, reviews the regional distribution and recent trends of the industry.

The next section of the chapter provides the employment outlook for 2012 to 2032. Labour markets are then assessed by occupation and region.

The next section of the chapter then assesses the labour markets by occupation and industry. Labour markets are analysed for aerospace and other industries where key aerospace occupations are found and which may be competing for the same or similar skills and occupations. This analysis looks at regions for forecast periods of 2012 to 2017, 2018 to 2022, and 2023 to 2032.

The third chapter provides a summary of the literature review of strategies to better access and develop skills of three groups in the Canadian workforce for women, Aboriginal workers, and skilled workers. This report focuses on providing descriptions of eleven initiatives for women, Aboriginal workers, and skilled workers from other industries in Canadian sectors which have occupations and trades comparable to aerospace and space.

The next section of this chapter provides a summary and comparative analysis of these eleven initiatives, and deals with their applicability to the aerospace and space industry.

The next section of the chapter provides a description of the options for the Aerospace Review for dealing in representation by the three groups: women, Aboriginals and unemployed skilled workers.

Appendix 3 provides a previous 2008 report prepared by Prism Economics and Analysis for Engineers Canada and the Canadian Council of Technicians and Technologists which describes diversity strategies that work for women, Aboriginals and recent immigrants. (Note: this appendix is a pdf attachment; please click on it to activate the link.)

2. The Current and Future Human Capital Needs in the Aerospace Industry

In March 2012, the Canadian Council for Aviation and Aerospace released a study prepared for the Department of Foreign Affairs and International Trade Canada, *Skilled Labour in the Canadian Aerospace Manufacturing Sector*.[1] The study was undertaken to determine whether there is a labour or skills shortage in key aerospace occupations. The study was based upon a survey of companies' representative of the aerospace industry. The report identified the greatest shortages to be for engineers with aerospace skills or experience, machinists with Computer Numerical Control training, specialty composite fabricators, non-destructive testing and quality assurance. The study also reviewed the availability of training in aerospace occupations. It concluded:

> The aerospace industry has a low turnover rate and a high rate of retention of its workforce, even in economic downturns. As well, the study found the rates of retirement and voluntary separation to currently be very low. Many companies reported a good working environment and strong company morale.[2]

The study also identified that key occupations in aerospace all fall into engineering, scientific, technician, technologist and production:

- Assembler
- Composites Fabricator
- Electrical/Electronic Assembler
- Engineer
- Machinist
- Non-destructive Testing Technician
- Quality Assurance Manager/Quality Assurance Inspector
- Sheet metal worker
- Technicians
- Technologists.[3]

[1] Department of Foreign Affairs and International Trade Canada, *Skilled Labour in the Canadian Aerospace Manufacturing Sector*, a study prepared by the Canadian Council for Aviation and Aerospace, March 30, 2012, Ottawa, selected pages.

[2] Ibid, p. 1.

[3] Ibid, p. 6.

2.1 Identifying needs in the aerospace industry

The People and Skills working group of the Aerospace Review identified a need for more robust labour market information in the aerospace industry at the trade and occupation level.

This report presents a detailed analysis of the current and future labour market conditions for key aerospace trades and occupations. The report provides a short and long-term forecast of aerospace industry employment as well as an assessment of the potential for competition for workers and recruitment opportunities for key aerospace occupations from competing industries across four regions in Canada.

The report also provides a measure of labour market conditions for key aerospace occupations in the form of labour market rankings that signal conditions of potential **shortages, oversupply** or **balanced markets** for each year of the short and mid-term forecast.

The labour market outlook presented in this report spans a period from 2012 to 2032 and identifies (1) any market shortages or oversupply for key aerospace occupations in the aerospace industry; and (2) the potential pools of labour supply in other and industries and provinces to help meet industry requirements.

Defining the aerospace industry and key occupations

Aerospace industry employment constitutes a relatively small share of the Canadian workforce[4], but is spread across 200 Occupations[5] and is fragmented across a number of North American Industry Classification System (NAICS) industries. These industries include: Plastic Product Manufacturing (3261), Computer and Electronic Product Manufacturing (334), Aerospace Product and Parts Manufacturing (3364), Professional, Scientific and Technical Services (54), Other Support Activities for Air Transportation (48819), Repair and Maintenance (811) and Defense Services (9111).[6]

Developing industry specific labour market outlooks at the trade/occupation level is complicated by this diverse make-up of the aerospace industry and by the considerable outsourcing of services

[4] Based on CAAHRA estimates the industry employed about 78,000[4] people in 2008.

[5] 2006 census of 4 digit National Occupation Classification in NAICS 3364 Aerospace product and parts manufacturing

[6] Labour Market Analysis for the Nova Scotia Aerospace and Defense Industry

across a network of companies within the industry. To simplify the labour market analysis this report restricts the definition of the aerospace industry to:

1. NAICS 3364 Aerospace product and parts manufacturing and,
2. NAICS 4881 Support activities for air transportation.

Based on 2006 census data employment in these two industries was approximately 50,000 and 25,000 respectively.

To narrow the labour market analysis to occupations that are most relevant to the aerospace industry, occupation specific employment data was obtained through a special order from Statistics Canada. This analysis includes trades and occupations with at least 400 individuals employed in the Aerospace Transportation Equipment Manufacturing industry, excluding those classified as Business, finance and administration occupations. In total 22 occupations met these criteria. Employment in the Support activities for air transportation industry was added to employment in Aerospace Transportation Equipment Manufacturing industry to arrive at total industry employment. According to 2006 Census data, industry employment for these 22 occupations was 36,920, which is about half (50 percent) of total employment (72,910) for all occupations in the two NAICS industries. Although limiting the analysis to just two industries and 22 occupations underreports total aerospace related employment, it allows for the isolation of aerospace industry related demand from demand generated by other overlapping industries.

Key aerospace occupations are grouped into four categories:

1. Core aerospace occupations which are defined as occupations with employment concentrated within the aerospace industry
2. Managers and Supervisory occupations
3. Engineers and Technologist occupations
4. Trades

Exhibit 1 below provides aerospace industry employment for the 22 key occupations identified, based on 2006 census and aerospace employment as a share of total employment in all industries.

Exhibit 1
Occupations concentrated in Aerospace Manufacturing Industry

Aerospace Occupations	Employment Aerospace and support Activities (2006)	Share of all Industry Employment
1. Aircraft assemblers and aircraft assembly inspectors	7,975	87%
2. Aircraft mechanics and aircraft inspectors	3,225	56%
3. Aircraft instrument, electrical and avionics mechanics, technicians and inspectors	3,755	46%
4. Aerospace engineers	6,220	40%

Managers and Supervisors	Employment Aerospace and support Activities (2006)	Share of all Industry Employment
5. Supervisors, other mechanical and metal products manufacturing	1,425	29%
6. Engineering managers	540	3%
7. Manufacturing managers	1,280	2%
8. Senior managers - goods production, utilities, transportation and construction	675	1%

Engineers and Technologist Occupations	Employment Aerospace and support Activities (2006)	Share of all Industry Employment
9. Industrial engineering and manufacturing technologists and technicians	840	5%
10. Mechanical engineering technologists and technicians	595	4%
11. Industrial and manufacturing engineers	835	4%
12. Mechanical engineers	760	2%
13. Electrical and electronics engineers	540	2%
14. Drafting technologists and technicians	440	1%
15. Information systems analysts and consultants	675	0%

Trades Occupations	Employment Aerospace and support Activities (2006)	Share of all Industry Employment
16. Machine fitters	790	15%
17. Machinists and machining and tooling inspectors	3,450	7%
18. Painters and coaters, industrial	830	5%
19. Sheet metal workers	720	3%
20. Tool and die makers	415	3%
21. Machining tool operators	500	2%
22. Welders and related machine operators	435	0%

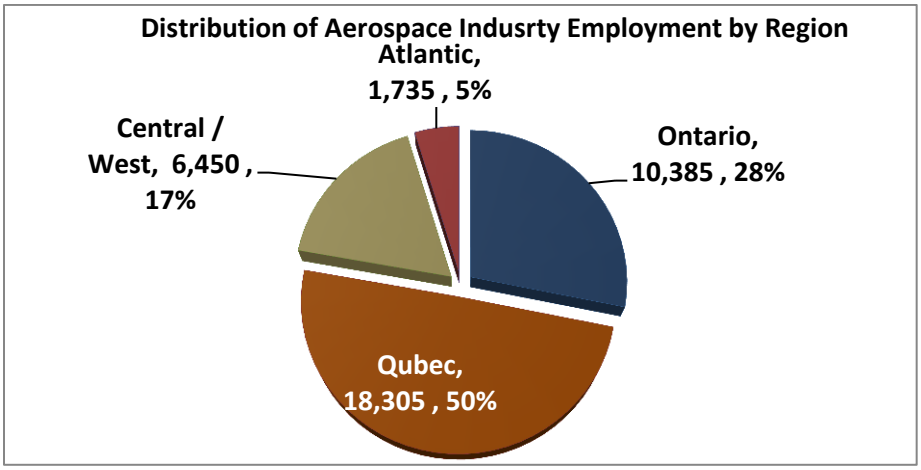
Source: Statistics Canada, 2006 Census

Regional Distribution of Employment

Aerospace employment is heavily concentrated in Quebec and Ontario. Employment in all other provinces represents only about 22 percent of the national total. To facilitate a comparative regional analysis of labour market conditions, provinces west of Ontario are grouped as a single Western/Central region, and provinces east of Quebec into a single Atlantic region.

Exhibit 2 below illustrates the distribution of national employment across Quebec, Ontario and the Western/Central and Atlantic regions. Quebec represents half of total employment, Ontario 28 percent. Central and Western provinces, constituted by Manitoba, Saskatchewan, Alberta and British Columbia, represent 17 percent and the Atlantic Provinces of Nova Scotia, New Brunswick, PEI and Newfoundland and Labrador represent 5 percent.

Exhibit 2
Distribution of Aerospace Industry Employment

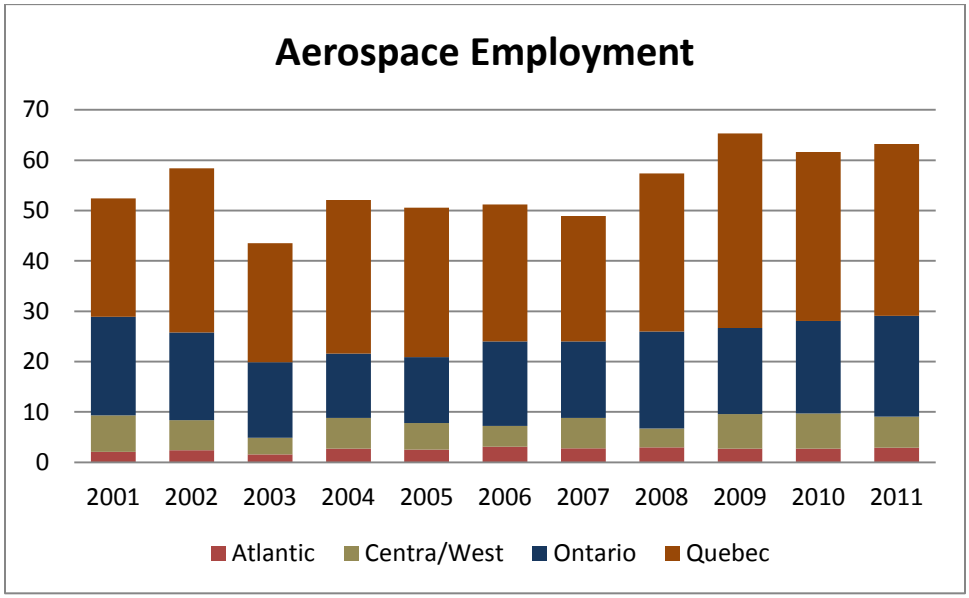


Source: Statistics Canada, Labour Force Survey

Trends in Recent Industry Employment

Employment in Canada's aerospace industry has remained relatively stable over the last decade with little change in the distribution of employment across provinces. Exhibit 3 shows employment in the aerospace equipment manufacturing industry, by region from 2001 to 2011. While employment was flat over the first half on the last decade, the industry experienced a modest expansion in employment from 2007 to 2009.

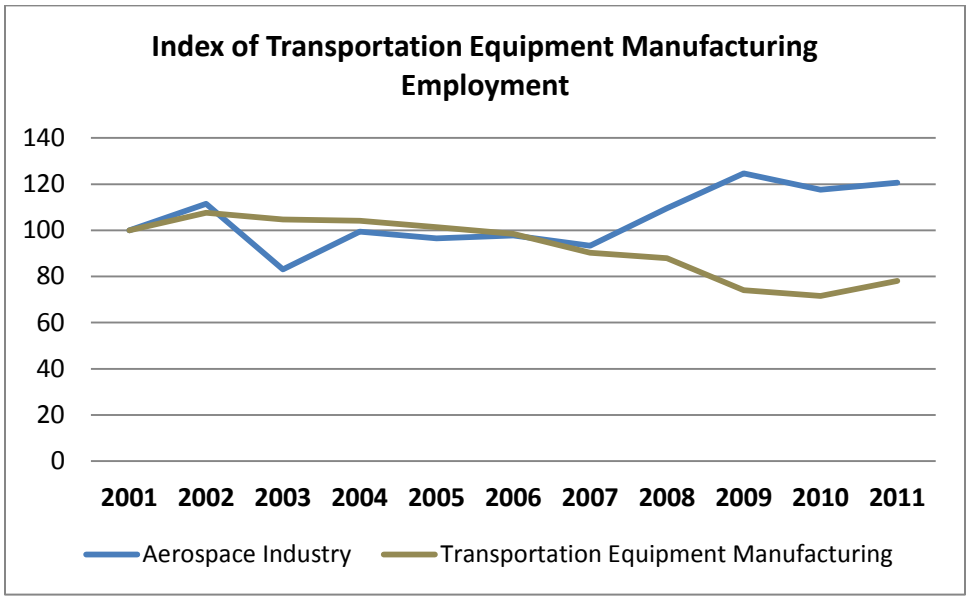
Exhibit 3
Distribution of Aerospace Industry Employment



Source: Statistics Canada, Labour Force Survey

This expansion occurred just as the 2009 recession drove down employment in the broader Transportation Equipment Manufacturing industry. Exhibit 4 below illustrates the growth in aerospace transportation equipment manufacturing employment relative to total transportation equipment manufacturing employment from 2001 to 2011. The implications for aerospace labour markets were that human resources demand requirements for trades and entry level occupations were potentially met by available workers from like occupations in neighbouring transportation sectors and the manufacturing industry as a whole. However, the labour market for experienced workers, with specialized aerospace sector skills, would have been considerably tighter during this expansion resulting in some recruitment challenges for the industry.

Exhibit 4
Index of Transportation manufacturing employment



Source: Statistics Canada, Labour Force Survey

Occupation Specific Employment

The table below provides employment estimates for key aerospace occupations, grouped by occupation classifications. Employment in 2006 is based on Census employment for Aerospace Transportation Equipment Manufacturing and Support activities for air transportation industries. Estimates for industry employment in 2012 are derived from the Provincial Occupational Modelling System (POMS) model[7]. Employment increased by 11 percent over the 6 year period, with strongest growth in the Core aerospace occupations.

Industrial engineering and manufacturing technologists and technicians and Mechanical engineering technologists and technicians witnessed the largest increases, while employment increases for trades such as Sheet metal workers, Tool and die makers and Machining tool operators were more muted.

[7] Stokes Economic Consulting, Provincial Occupational Modelling System model runs, June and July 2012.

Exhibit 5
Employment Estimates for Key Aerospace Occupations, Grouped by Occupation Classifications

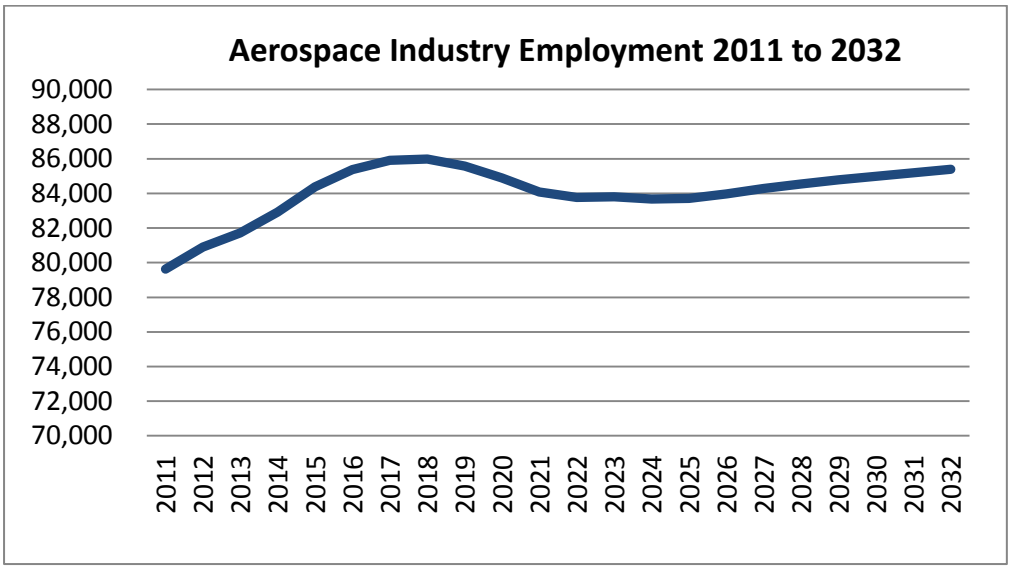
	Occupations	Employment 2006 (Census)	Employment 2012 (Estimate)	Growth (%) 2006-2012
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	**7975**	**9417**	*18%*
	Aerospace engineers	**3225**	**3618**	*12%*
	Aircraft instrument, electrical and avionics mechanics, technicians and inspectors	**3755**	**4127**	*10%*
	Aircraft mechanics and aircraft inspectors	**6220**	**6754**	*9%*
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	**840**	**1056**	*26%*
	Mechanical engineering technologists and technicians	**595**	**707**	*19%*
	Industrial and manufacturing engineers	**835**	**961**	*15%*
	Mechanical engineers	**760**	**826**	*9%*
	Electrical and electronics engineers	**540**	**585**	*8%*
	Drafting technologists and technicians	**440**	**465**	*6%*
	Information systems analysts and consultants	**675**	**714**	*6%*
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	**1425**	**1536**	*8%*
	Engineering managers	**540**	**572**	*6%*
	Manufacturing managers	**1280**	**1356**	*6%*
	Senior managers - goods production, utilities, transportation and construction	**675**	**709**	*5%*
Trades Occupations	Machine fitters	**790**	**841**	*6%*
	Machinists and machining and tooling inspectors	**3450**	**3674**	*6%*
	Painters and coaters, industrial	**830**	**891**	*7%*
	Sheet metal workers	**720**	**749**	*4%*
	Tool and die makers	**415**	**431**	*4%*
	Machining tool operators	**500**	**520**	*4%*
	Welders and related machine operators	**435**	**460**	*6%*
	Sub-total(core occupations)	**36,920**	**40,967**	***11%***
	Total (All Occupations)	**72,910**	**80,901**	

Source: Prism Economic and Analysis estimates; Statistics Canada, 2006 Census; Stokes Economic Consulting, Provincial Occupational Modelling System.

2.2 Employment Outlook 2012 to 2032

Employment in the aerospace industry avoided the downturn in the broader transportation equipment manufacturing industry. Following a modest correction in 2010 industry, employment is forecast to rise modestly through 2018, before the start of a down cycle in 2019. Employment cycles back up beginning in 2025. Employment growth estimates for the medium and long-term should be taken with caution as they are based on current macroeconomic assumptions.

Exhibit 6
Aerospace Industry Employment 2011 to 2032



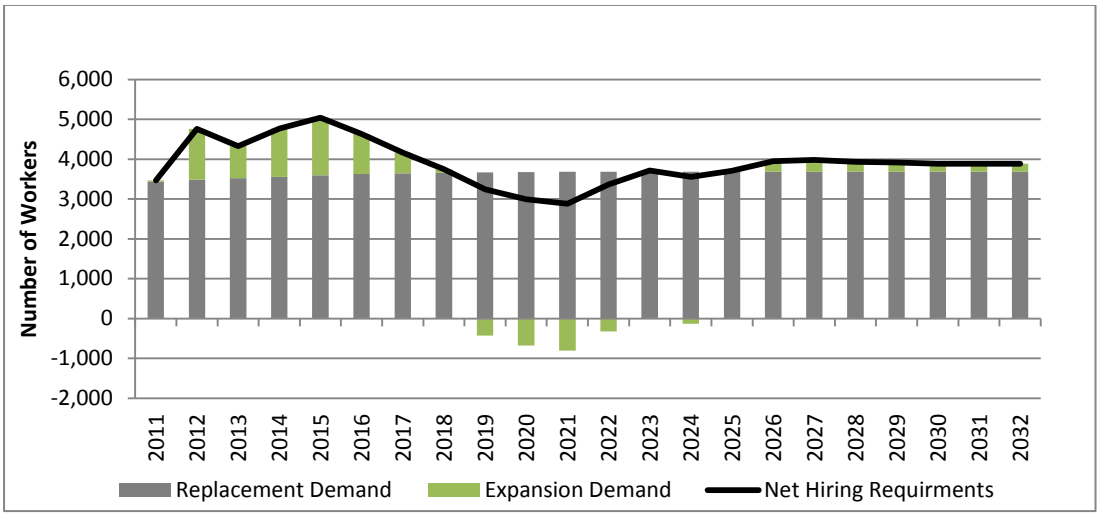
Source: Prism Economic and Analysis estimates; Statistics Canada, 2006 Census; Stokes Economic Consulting, Provincial Occupational Modelling System.

Industry Hiring Requirements

Total annual hiring requirements range from 3,000 to 5,000 over the forecast period. Annual replacement demand requirements related to deaths and retirements from the workforce rise from just over 3,000 in 2012 to about 4,000 late in the scenario. Expansion demand requirements continue to increase in the near term, and then fall with the down cycle between 2019 and 2022. With flat expansion demand Industry hiring requirements are overwhelmingly related to the replacement of retiring workers.

Exhibit 7 illustrates annual hiring and replacement demands for the aerospace industry.

Exhibit 7
Aerospace Industry Hiring Requirements 2011 to 2032



Source: Prism Economic and Analysis estimates; Statistics Canada, 2006 Census; Stokes Economic Consulting, Provincial Occupational Modelling System.

Assessing Labour Markets by Occupation and Region

The following section provides a measure of labour market conditions for key aerospace occupations in all industries in the form of labour market rankings that signal conditions of potential **shortages, oversupply** or **balanced markets** for each year of the short and mid-term forecast.

The unemployment measure is summarized for each occupation and province using a ranking for labour market tightness. These ranks measure the difference between current unemployment and long term trend unemployment in each market.

Exhibit 8
Market Tightness Rankings

Market tightness rankings	
1	Weaker than average labour market conditions (Higher unemployment)
2	Average labour market conditions (Normal unemployment)
3	Tighter than average labour market conditions (lower unemployment)

Where current unemployment is significantly below trend, the rank is given a value of 3, and where current unemployment is significantly above trend, the rank is 1. Conditions where unemployment is close to trend values are assigned a rank of 2. Thus, tight labour markets are identified with a rank of 3 and in these circumstances recruiting would be difficult and the search process would extend outside of the local market. Conversely a rank of 1 would signal a weaker market where job search will be difficult and workers seeking employment will need to look farther afield.

In the provinces with the largest shares of aerospace industry employment, Ontario and Quebec, labour markets are generally balanced over the next 10 years. However, continued weakness in Ontario's manufacturing sector results in weaker market conditions for many engineering and technologist occupations over the near term. Growth in engineering and non-residential construction maintains employment demand for occupations employed by the construction industry.

The older age demographic of occupations in the Manager and Supervisor category tightens conditions for these occupations in all industries and in all regions of the country in the latter half of the scenario.

It should be noted that shortages of experienced workers with specific and specialized skill requirements can be experienced even in weak market conditions. Significant recruitment challenges can occur under ranking conditions of a 1. However, workers should be available, but may require significant retraining to meet industry requirements.

The labour market conditions for Atlantic Provinces are considerably tighter over the scenario. This reflects a smaller and much older workforce.

Although the age demographic is younger for many Central and Western Provinces, stronger economic growth outlooks for Western Canada translate to higher demand requirements and greater competition among industries to attract and retain workers. It is important to note that labour market conditions will differ significantly between Western and Central Provinces. The weaker conditions for some occupations in the near term for the Central and Western region are a reflection of weaker conditions in British Columbia and much tighter conditions in Alberta and Saskatchewan.

Exhibit 9
Regional Labour Market Rankings

Ontario Labour Market Rankings

	Occupations	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	2	2	2	2	2	2	2	2	2	2
	Aerospace engineers	1	1	1	1	2	2	2	2	2	2
	Aircraft instrument, electrical and avionics mechanics, technicians and insp	1	1	1	1	2	2	2	2	2	2
	Aircraft mechanics and aircraft inspectors	1	1	1	2	2	2	2	2	2	2
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	1	1	1	1	2	2	2	2	2	2
	Mechanical engineering technologists and technicians	1	1	1	1	2	2	2	2	2	2
	Industrial and manufacturing engineers	1	1	1	1	2	2	2	2	2	2
	Mechanical engineers	1	1	1	1	2	2	2	2	2	2
	Electrical and electronics engineers	1	1	1	1	2	2	2	2	2	2
	Drafting technologists and technicians	1	1	1	1	2	2	2	2	2	2
	Information systems analysts and consultants	1	1	1	1	2	2	2	2	2	2
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	2	2	2	2	2	2	2	2	2	2
	Engineering managers	1	1	1	1	2	2	2	2	2	2
	Manufacturing managers	1	1	1	1	2	2	2	2	2	2
	Senior managers - goods production, utilities, transportation and constructi	1	1	1	1	2	2	3	2	2	2
Trades Occupations	Machine fitters	2	1	1	2	2	2	2	2	2	2
	Machinists and machining and tooling inspectors	1	1	1	2	2	2	2	2	2	2
	Painters and coaters, industrial	2	1	1	2	2	2	2	2	2	2
	Sheet metal workers	2	2	2	2	2	2	2	2	2	2
	Tool and die makers	2	1	1	2	2	2	2	2	2	2
	Machining tool operators	2	1	1	2	2	2	2	2	2	2
	Welders and related machine operators	2	2	2	2	2	2	2	2	2	2

Quebec Labour Market Rankings

	Occupations	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	2	2	2	2	2	2	2	2	2	2
	Aerospace engineers	2	2	2	2	2	2	2	2	2	2
	Aircraft instrument, electrical and avionics mechanics, technicians and insp	2	2	2	2	2	2	2	2	2	2
	Aircraft mechanics and aircraft inspectors	2	2	2	2	2	2	2	2	2	2
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	2	2	2	2	2	2	2	2	2	2
	Mechanical engineering technologists and technicians	2	2	2	2	2	2	2	2	2	2
	Industrial and manufacturing engineers	2	2	2	2	2	2	2	2	2	2
	Mechanical engineers	2	2	2	2	2	2	2	2	2	2
	Electrical and electronics engineers	2	2	2	2	2	2	2	2	2	2
	Drafting technologists and technicians	2	2	2	2	2	2	2	2	2	2
	Information systems analysts and consultants	2	2	2	2	2	2	2	2	2	2
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	1	2	2	2	2	2	2	2	2	2
	Engineering managers	1	1	1	2	2	2	3	3	3	2
	Manufacturing managers	1	2	2	2	2	2	3	3	2	2
	Senior managers - goods production, utilities, transportation and constructi	1	2	2	2	2	2	3	3	2	2
Trades Occupations	Machine fitters	2	2	2	2	2	2	2	2	2	2
	Machinists and machining and tooling inspectors	2	2	2	2	2	2	2	2	2	2
	Painters and coaters, industrial	2	2	2	2	2	2	2	2	2	2
	Sheet metal workers	2	2	2	2	2	2	2	2	2	2
	Tool and die makers	2	2	2	2	2	2	2	2	2	2
	Machining tool operators	2	2	2	2	2	2	2	2	2	2
	Welders and related machine operators	2	2	2	2	2	2	2	2	2	2

Atlantic Canada Labour Market Rankings

	Occupations	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	1	2	2	2	2	3	3	3	3	3
	Aerospace engineers	1	2	2	2	3	3	3	3	3	3
	Aircraft instrument, electrical and avionics mechanics, technicians and insp	1	2	2	2	2	3	3	3	3	3
	Aircraft mechanics and aircraft inspectors	2	2	2	2	2	2	2	2	2	2
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	2	2	2	2	3	3	3	3	3	3
	Mechanical engineering technologists and technicians	2	2	2	3	3	2	2	2	2	2
	Industrial and manufacturing engineers	1	2	2	2	2	3	3	3	3	3
	Mechanical engineers	1	2	2	2	3	3	3	3	3	3
	Electrical and electronics engineers	1	2	2	2	3	3	3	3	3	3
	Drafting technologists and technicians	1	2	2	2	3	3	3	3	3	3
	Information systems analysts and consultants	1	2	2	2	3	3	3	3	3	3
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	2	2	2	2	2	3	3	3	3	2
	Engineering managers	1	1	1	2	3	3	3	3	3	3
	Manufacturing managers	1	2	2	2	3	3	3	3	3	3
	Senior managers - goods production, utilities, transportation and constructi	2	2	3	3	3	3	3	3	2	3
Trades Occupations	Machine fitters	2	2	2	2	2	2	2	2	2	2
	Machinists and machining and tooling inspectors	2	2	2	2	2	3	3	3	3	3
	Painters and coaters, industrial	2	2	2	2	2	3	3	3	3	3
	Sheet metal workers	2	2	2	2	2	2	2	2	2	2
	Tool and die makers	1	1	1	1	1	2	2	2	2	2
	Machining tool operators	1	2	2	2	2	3	3	3	3	3
	Welders and related machine operators	2	2	2	2	2	2	2	2	2	2

Central and Western Canada Labour Market Rankings

	Occupations	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	1	2	2	2	2	2	2	2	2	2
	Aerospace engineers	1	1	1	2	2	2	2	2	2	2
	Aircraft instrument, electrical and avionics mechanics, technicians and inspec	1	1	1	2	2	3	3	3	2	2
	Aircraft mechanics and aircraft inspectors	2	2	2	2	2	3	3	3	2	2
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	1	1	1	2	2	2	2	2	2	2
	Mechanical engineering technologists and technicians	1	1	1	2	2	2	2	2	2	2
	Industrial and manufacturing engineers	1	1	1	2	2	3	3	3	2	2
	Mechanical engineers	2	2	1	2	2	3	3	3	3	2
	Electrical and electronics engineers	2	2	2	2	2	3	3	3	2	2
	Drafting technologists and technicians	2	2	2	3	3	3	3	3	3	2
	Information systems analysts and consultants	1	1	1	2	2	3	3	3	3	2
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	2	2	2	2	2	2	2	2	2	2
	Engineering managers	1	1	1	2	2	3	2	2	2	2
	Manufacturing managers	1	1	1	2	2	2	2	2	2	1
	Senior managers - goods production, utilities, transportation and construction	1	1	1	2	3	3	3	3	2	2
Trades Occupations	Machine fitters	2	2	2	2	2	2	2	2	2	2
	Machinists and machining and tooling inspectors	2	2	2	2	2	2	2	2	2	2
	Painters and coaters, industrial	2	2	2	2	2	3	3	3	2	2
	Sheet metal workers	2	2	2	2	2	3	2	2	2	2
	Tool and die makers	2	2	2	2	2	3	3	3	2	2
	Machining tool operators	2	2	2	2	2	2	2	2	2	2
	Welders and related machine operators	2	2	2	2	2	2	2	2	2	2

Source: Prism Economic and Analysis estimates; Stokes Economic Consulting, Provincial Occupational Modelling System.

Assessing Labour Markets by Occupations and Industries

The final market assessment considers employment growth by industry. At this level of analysis labour markets competing with the Aerospace industry are identified. A market is defined as a specific industry in a specific region. A market is identified as "competing" if the growth rate in a particular region and industry exceeds the average national growth rate in the narrowly defined aerospace industry by at least a 2 percent differential. These markets are identified by coloured circles in the tables contained in Exhibit 11 below:

- A red circle shows that employment is growing at a faster rate in that market relative to aerospace; the market poses potential competition for aerospace recruitment
- A yellow is neutral which means no competition nor recruitment opportunities
- A green shows potential for recruitment opportunities.

Assessments are suppressed for markets where employment is below 100.

Competing industries were selected based on their all industry share of employment of key aerospace occupations. The table below shows total employment for the 22 key aerospace occupations by industry as well as the share of that employment of across all industries. The industries with the largest share of all industry employment were selected for the analysis.

Exhibit 10
Employment of key occupations across Industries

NAICS Industry	Employment	Share of all industry employment (%)
Transportation equipment manufacturing	100,248	10
Fabricated metal product manufacturing	80,739	8
Architectural, Engineering and Related Services	61,427	6
Machinery manufacturing	60,677	6
Computer and electronic product manufacturing	57,918	6
Trade contracting	40,226	4
All Industries	**971,878**	

Source: Prism Economic and Analysis estimates; Stokes Economic Consulting, Provincial Occupational Modelling System.

The exhibits in this section report competitor markets and markets that provide recruitment opportunities for key aerospace occupations. Separate assessments are reported for three periods; 2012 – 2017, 2018 – 2022 and 2023 – 2032.

Exhibit 11
Inter-industry employment differentials 2012-2017

Ontario	2012-2017				
Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Aircraft assemblers and aircraft assembly inspectors	1%	S	S	S	S
Aerospace engineers	2%	S	1%	0%	S
Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	0%	S	S	S	S
Aircraft mechanics and aircraft inspectors	3%	S	S	S	S
Industrial engineering and manufacturing technologists and technicians	3%	4%	3%	2%	0%
Mechanical engineering technologists and technicians	5%	4%	3%	3%	0%
Industrial and manufacturing engineers	1%	5%	5%	4%	1%
Mechanical engineers	-2%	1%	1%	0%	-2%
Electrical and electronics engineers	-1%	S	-2%	-3%	-5%
Drafting technologists and technicians	-1%	0%	-1%	-2%	-4%
Information systems analysts and consultants	18%	0%	-1%	-2%	S
Supervisors, other mechanical and metal products manufacturing	16%	7%	S	S	S
Engineering managers	17%	6%	-2%	3%	-5%
Manufacturing managers	16%	6%	-2%	2%	-5%
Senior managers - goods production, utilities, transportation and construction	3%	5%	S	2%	-5%
Machine fitters	3%	4%	S	S	S
Machinists and machining and tooling inspectors	0%	4%	3%	3%	0%
Painters and coaters, industrial	2%	0%	S	-1%	-4%
Sheet metal workers	2%	2%	S	S	-1%
Tool and die makers	2%	2%	2%	0%	S
Machining tool operators	-2%	2%	S	1%	S
Welders and related machine operators	-6%	-1%	-2%	-3%	-5%

Quebec		2012-2017				
	Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	-1%	S	S	-3%	S
	Aerospace engineers	-1%	S	-2%	S	S
	Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	-3%	S	S	S	S
	Aircraft mechanics and aircraft inspectors	0%	S	S	S	S
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	1%	3%	-1%	-1%	-7%
	Mechanical engineering technologists and technicians	2%	3%	0%	-2%	-7%
	Industrial and manufacturing engineers	-2%	4%	1%	1%	S
	Mechanical engineers	-5%	1%	-3%	-4%	-9%
	Electrical and electronics engineers	-3%	S	-5%	-6%	-12%
	Drafting technologists and technicians	-3%	-1%	-4%	-5%	-11%
	Information systems analysts and consultants	7%	S	-4%	-5%	S
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	5%	9%	S	S	S
	Engineering managers	5%	S	-8%	-4%	S
	Manufacturing managers	5%	8%	S	-4%	-15%
	Senior managers - goods production, utilities, transportation and construction	1%	8%	S	-4%	-15%
Trades Occupations	Machine fitters	1%	4%	S	S	S
	Machinists and machining and tooling inspectors	-3%	3%	S	-1%	-6%
	Painters and coaters, industrial	-1%	-1%	S	S	S
	Sheet metal workers	-1%	2%	S	S	-8%
	Tool and die makers	-1%	1%	S	S	S
	Machining tool operators	-5%	1%	S	S	S
	Welders and related machine operators	-6%	-2%	S	-6%	-12%

Atlantic Canada		2012-2017				
	Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	1%	S	S	S	S
	Aerospace engineers	-1%	S	S	S	S
	Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	2%	S	S	S	S
	Aircraft mechanics and aircraft inspectors	3%	S	S	S	S
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	-1%	S	S	S	S
	Mechanical engineering technologists and technicians	S	S	0%	S	S
	Industrial and manufacturing engineers	S	S	S	S	S
	Mechanical engineers	S	S	-4%	S	S
	Electrical and electronics engineers	S	S	-8%	-1%	S
	Drafting technologists and technicians	S	S	-6%	S	S
	Information systems analysts and consultants	S	S	-5%	S	S
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	-2%	S	S	S	S
	Engineering managers	S	S	-8%	S	S
	Manufacturing managers	0%	5%	S	S	S
	Senior managers - goods production, utilities, transportation and construction	S	6%	S	S	-6%
Trades Occupations	Machine fitters	S	S	S	S	S
	Machinists and machining and tooling inspectors	-1%	3%	S	S	S
	Painters and coaters, industrial	0%	S	S	S	S
	Sheet metal workers	-2%	3%	S	S	-5%
	Tool and die makers	S	S	S	S	S
	Machining tool operators	-3%	S	S	S	S
	Welders and related machine operators	-6%	-1%	S	S	-9%

Central and Western Canada		2012-2017				
	Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	3%	S	S	S	S
	Aerospace engineers	3%	S	S	S	S
	Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	2%	S	S	S	S
	Aircraft mechanics and aircraft inspectors	4%	S	S	S	S
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	4%	1%	6%	3%	2%
	Mechanical engineering technologists and technicians	7%	S	6%	S	3%
	Industrial and manufacturing engineers	2%	2%	8%	4%	S
	Mechanical engineers	-4%	-1%	5%	3%	2%
	Electrical and electronics engineers	S	S	2%	-1%	-3%
	Drafting technologists and technicians	1%	-3%	3%	S	0%
	Information systems analysts and consultants	S	S	3%	-1%	S
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	5%	2%	S	S	S
	Engineering managers	3%	1%	2%	-1%	-5%
	Manufacturing managers	7%	1%	1%	-1%	0%
	Senior managers - goods production, utilities, transportation and construction	8%	0%	S	-1%	1%
Trades Occupations	Machine fitters	S	S	S	S	S
	Machinists and machining and tooling inspectors	0%	1%	7%	S	3%
	Painters and coaters, industrial	3%	-3%	S	S	-4%
	Sheet metal workers	3%	0%	S	S	-1%
	Tool and die makers	4%	0%	S	S	S
	Machining tool operators	-1%	-1%	S	S	S
	Welders and related machine operators	-6%	-5%	2%	-3%	-5%

Source: Prism Economic and Analysis estimates; Stokes Economic Consulting, Provincial Occupational Modelling System.

Exhibit 12
Inter-industry employment differentials 2018- 2022

Ontario	2018-2022				
Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Aircraft assemblers and aircraft assembly inspectors	1%	S	S	S	S
Aerospace engineers	1%	S	7%	4%	S
Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	1%	S	S	S	S
Aircraft mechanics and aircraft inspectors	-4%	S	S	S	S
Industrial engineering and manufacturing technologists and technicians	-4%	-2%	2%	-2%	0%
Mechanical engineering technologists and technicians	-4%	-2%	2%	-2%	0%
Industrial and manufacturing engineers	-4%	-3%	2%	-2%	0%
Mechanical engineers	-3%	-2%	2%	-2%	0%
Electrical and electronics engineers	-4%	S	2%	-1%	0%
Drafting technologists and technicians	-4%	-3%	1%	-2%	-1%
Information systems analysts and consultants	-6%	-3%	1%	-2%	S
Supervisors, other mechanical and metal products manufacturing	-9%	-1%	S	S	S
Engineering managers	-8%	-5%	-1%	-4%	-2%
Manufacturing managers	-7%	-4%	0%	-4%	-1%
Senior managers - goods production, utilities, transportation and construction	-4%	-3%	S	-3%	0%
Machine fitters	-4%	-2%	S	S	S
Machinists and machining and tooling inspectors	-5%	-2%	2%	-2%	0%
Painters and coaters, industrial	-4%	-4%	S	-3%	-1%
Sheet metal workers	-4%	-3%	S	S	0%
Tool and die makers	-4%	-2%	2%	-2%	S
Machining tool operators	-5%	-2%	S	-2%	S
Welders and related machine operators	2%	-3%	1%	-3%	-1%

Quebec		2018-2022				
	Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	-1%	S	S	-1%	S
	Aerospace engineers	-1%	S	6%	S	S
	Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	-1%	S	S	S	S
	Aircraft mechanics and aircraft inspectors	-6%	S	S	S	S
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	-6%	-6%	1%	-7%	-2%
	Mechanical engineering technologists and technicians	-6%	-6%	1%	-6%	-2%
	Industrial and manufacturing engineers	-6%	-6%	1%	-7%	S
	Mechanical engineers	-6%	-6%	1%	-7%	-3%
	Electrical and electronics engineers	-7%	S	1%	-7%	-2%
	Drafting technologists and technicians	-7%	-7%	0%	-7%	-3%
	Information systems analysts and consultants	-7%	S	0%	-7%	S
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	-10%	-6%	S	S	S
	Engineering managers	-9%	S	-2%	-10%	S
	Manufacturing managers	-8%	-8%	S	-9%	-3%
	Senior managers - goods production, utilities, transportation and construction	-6%	-7%	S	-8%	-2%
Trades Occupations	Machine fitters	-6%	-7%	S	S	S
	Machinists and machining and tooling inspectors	-8%	-6%	S	-7%	-2%
	Painters and coaters, industrial	-6%	-8%	S	S	S
	Sheet metal workers	-6%	-6%	S	S	-3%
	Tool and die makers	-6%	-6%	S	S	S
	Machining tool operators	-7%	-6%	S	S	S
	Welders and related machine operators	2%	-7%	S	-8%	-3%

Atlantic Canada		2018-2022				
	Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	-1%	S	S	S	S
	Aerospace engineers	0%	S	S	S	S
	Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	-1%	S	S	S	S
	Aircraft mechanics and aircraft inspectors	-6%	S	S	S	S
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	-1%	S	S	S	S
	Mechanical engineering technologists and technicians	S	S	-3%	S	S
	Industrial and manufacturing engineers	S	S	S	S	S
	Mechanical engineers	S	S	-3%	S	S
	Electrical and electronics engineers	S	S	-2%	-8%	S
	Drafting technologists and technicians	S	S	-3%	S	S
	Information systems analysts and consultants	S	S	-4%	S	S
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	-10%	S	S	S	S
	Engineering managers	S	S	-4%	S	S
	Manufacturing managers	-10%	-12%	S	S	S
	Senior managers - goods production, utilities, transportation and construction	S	-13%	S	S	-16%
Trades Occupations	Machine fitters	S	S	S	S	S
	Machinists and machining and tooling inspectors	-8%	-9%	S	S	S
	Painters and coaters, industrial	-6%	S	S	S	S
	Sheet metal workers	-5%	-9%	S	S	-16%
	Tool and die makers	S	S	S	S	S
	Machining tool operators	-8%	S	S	S	S
	Welders and related machine operators	2%	-10%	S	S	-16%

Central and Western Canada		2018-2022				
	Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	3%	S	S	S	S
	Aerospace engineers	2%	S	S	S	S
	Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	2%	S	S	S	S
	Aircraft mechanics and aircraft inspectors	-2%	S	S	S	S
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	-3%	-6%	3%	-3%	-9%
	Mechanical engineering technologists and technicians	-3%	S	3%	S	-10%
	Industrial and manufacturing engineers	-4%	-6%	3%	-4%	S
	Mechanical engineers	-1%	-7%	3%	-3%	-10%
	Electrical and electronics engineers	S	S	3%	-3%	-10%
	Drafting technologists and technicians	-2%	-7%	3%	S	-11%
	Information systems analysts and consultants	S	S	2%	-4%	S
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	-4%	-5%	S	S	S
	Engineering managers	-5%	-9%	0%	-6%	-13%
	Manufacturing managers	-4%	-8%	0%	-5%	-13%
	Senior managers - goods production, utilities, transportation and construction	-4%	-7%	S	-4%	-11%
Trades Occupations	Machine fitters	S	S	S	S	S
	Machinists and machining and tooling inspectors	-4%	-6%	3%	S	-12%
	Painters and coaters, industrial	-3%	-8%	S	S	-10%
	Sheet metal workers	-2%	-7%	S	S	-10%
	Tool and die makers	-2%	-8%	S	S	S
	Machining tool operators	-4%	-6%	S	S	S
	Welders and related machine operators	2%	-7%	2%	-4%	-10%

Source: Prism Economic and Analysis estimates; Stokes Economic Consulting, Provincial Occupational Modelling System.

Exhibit 13

Inter-industry employment differentials 2023- 2032

Ontario	2023-2032				
Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Aircraft assemblers and aircraft assembly inspectors	3%	S	S	S	S
Aerospace engineers	3%	S	8%	-1%	S
Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	2%	S	S	S	S
Aircraft mechanics and aircraft inspectors	1%	S	S	S	S
Industrial engineering and manufacturing technologists and technicians	0%	0%	6%	-3%	-1%
Mechanical engineering technologists and technicians	3%	0%	5%	-4%	-2%
Industrial and manufacturing engineers	0%	2%	8%	-1%	1%
Mechanical engineers	0%	0%	6%	-4%	-1%
Electrical and electronics engineers	0%	S	5%	-4%	-2%
Drafting technologists and technicians	0%	-1%	5%	-4%	-2%
Information systems analysts and consultants	1%	-1%	5%	-4%	S
Supervisors, other mechanical and metal products manufacturing	-5%	3%	S	S	S
Engineering managers	-1%	-4%	0%	-8%	-7%
Manufacturing managers	-5%	0%	4%	-4%	-3%
Senior managers - goods production, utilities, transportation and construction	-1%	-3%	S	-7%	-6%
Machine fitters	-1%	0%	S	S	S
Machinists and machining and tooling inspectors	-4%	-1%	5%	-4%	-2%
Painters and coaters, industrial	-2%	-4%	S	-8%	-6%
Sheet metal workers	-2%	-2%	S	S	-3%
Tool and die makers	-2%	-2%	4%	-6%	S
Machining tool operators	-1%	-2%	S	-6%	S
Welders and related machine operators	-2%	-1%	5%	-4%	-2%

Quebec		2023-2032				
	Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	-8%	S	S	-7%	S
	Aerospace engineers	-8%	S	5%	S	S
	Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	-8%	S	S	S	S
	Aircraft mechanics and aircraft inspectors	-10%	S	S	S	S
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	-11%	-7%	3%	-10%	-3%
	Mechanical engineering technologists and technicians	-8%	-8%	2%	-10%	-4%
	Industrial and manufacturing engineers	-10%	-5%	5%	-8%	S
	Mechanical engineers	-11%	-8%	2%	-10%	-4%
	Electrical and electronics engineers	-11%	S	2%	-10%	-5%
	Drafting technologists and technicians	-11%	-8%	2%	-10%	-4%
	Information systems analysts and consultants	-11%	S	2%	-11%	S
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	-17%	-6%	S	S	S
	Engineering managers	-13%	S	-4%	-16%	S
	Manufacturing managers	-17%	-8%	S	-12%	-5%
	Senior managers - goods production, utilities, transportation and construction	-11%	-12%	S	-15%	-9%
Trades Occupations	Machine fitters	-11%	-9%	S	S	S
	Machinists and machining and tooling inspectors	-15%	-8%	S	-11%	-4%
	Painters and coaters, industrial	-12%	-12%	S	S	S
	Sheet metal workers	-12%	-9%	S	S	-6%
	Tool and die makers	-13%	-9%	S	S	S
	Machining tool operators	-11%	-9%	S	S	S
	Welders and related machine operators	-2%	-8%	S	-11%	-5%

Atlantic Canada		2023-2032				
	Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	-6%	S	S	S	S
	Aerospace engineers	-5%	S	S	S	S
	Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	-6%	S	S	S	S
	Aircraft mechanics and aircraft inspectors	-8%	S	S	S	S
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	-4%	S	S	S	S
	Mechanical engineering technologists and technicians	S	S	-4%	S	S
	Industrial and manufacturing engineers	S	S	S	S	S
	Mechanical engineers	S	S	-5%	S	S
	Electrical and electronics engineers	S	S	-6%	-13%	S
	Drafting technologists and technicians	S	S	-5%	S	S
	Information systems analysts and consultants	S	S	-5%	S	S
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	-13%	S	S	S	S
	Engineering managers	S	S	-9%	S	S
	Manufacturing managers	-16%	-12%	S	S	S
	Senior managers - goods production, utilities, transportation and construction	S	-15%	S	S	-21%
Trades Occupations	Machine fitters	S	S	S	S	S
	Machinists and machining and tooling inspectors	-14%	-10%	S	S	S
	Painters and coaters, industrial	-10%	S	S	S	S
	Sheet metal workers	-10%	-11%	S	S	-20%
	Tool and die makers	S	S	S	S	S
	Machining tool operators	-11%	S	S	S	S
	Welders and related machine operators	-2%	-11%	S	S	-18%

Central and Western Canada		2023-2032				
	Occupations	Transportation Equipment Manufacturing	Fabricated metal product manufacturing	Architectural, Engineering and Related Services	Computer and electronic product manufacturing	Trade contracting
Core Aerospace Occupations	Aircraft assemblers and aircraft assembly inspectors	2%	S	S	S	S
	Aerospace engineers	2%	S	S	S	S
	Aircraft instrument, electrical and avionics mechanics, technicians and inspecto	1%	S	S	S	S
	Aircraft mechanics and aircraft inspectors	0%	S	S	S	S
Engineers and Technologist Occupations	Industrial engineering and manufacturing technologists and technicians	-2%	-5%	9%	0%	-4%
	Mechanical engineering technologists and technicians	2%	S	8%	S	-4%
	Industrial and manufacturing engineers	-1%	-1%	12%	2%	S
	Mechanical engineers	-4%	-5%	10%	2%	-4%
	Electrical and electronics engineers	S	S	9%	1%	-5%
	Drafting technologists and technicians	-1%	-6%	9%	S	-4%
	Information systems analysts and consultants	S	S	9%	0%	S
Managers and Supervisors	Supervisors, other mechanical and metal products manufacturing	-5%	-4%	S	S	S
	Engineering managers	-2%	-12%	4%	-4%	-12%
	Manufacturing managers	-6%	-7%	8%	0%	-6%
	Senior managers - goods production, utilities, transportation and construction	-3%	-10%	S	-4%	-9%
Trades Occupations	Machine fitters	S	S	S	S	S
	Machinists and machining and tooling inspectors	-7%	-6%	9%	S	-4%
	Painters and coaters, industrial	-3%	-10%	S	S	-9%
	Sheet metal workers	-3%	-9%	S	S	-7%
	Tool and die makers	-2%	-11%	S	S	S
	Machining tool operators	-3%	-7%	S	S	S
	Welders and related machine operators	-2%	-5%	8%	0%	-6%

Source: Prism Economic and Analysis estimates; Stokes Economic Consulting, Provincial Occupational Modelling System.

Conclusion

Aerospace industry employment is expected to continue to rise in the near term until 2017, but not at the pace of the period from 2008 to 2011. During the expansion there was skills availability from the broader transportation equipment manufacturing and other manufacturing industries to meet aerospace industry recruitment requirements. This trend reverses in the medium term as manufacturing recovers, limiting opportunities for recruitment.

In Ontario, over the near term, employment growth in Manufacturing and Transportation equipment manufacturing exceeds growth in Aerospace transportation equipment manufacturing elevating the potential for increased competition for Managerial and supervisory occupations.

As in Ontario, employment growth for Managerial and supervisory occupations in Quebec also appears stronger than the broader manufacturing industry, relative to the aerospace industry, but the differential is much smaller. Potential recruitment opportunities exist for a number of occupations in the Trade contracting and Computer and electronics product manufacturing industries.

In Central and Western Canada, employment for many Aerospace occupations rises at a slightly faster rate relative to the Aerospace industry, increasing competition for key occupations. Analysis reveals heightened potential competition from the Architectural, Engineering and related services sector for engineering and technician occupations.

Given the small size of workforce in Atlantic Canada many markets are suppressed. However, analysis indicates some potential recruitment opportunities from the Architectural, Engineering and related services sector, as well as the Transportation equipment manufacturing industry.

Because of the long forecast period, the medium and long term indicators are much less reliable and should be interpreted as soft trend indicators given current assumptions about future economic trends.

Based on the moderate growth expected in the aerospace and space industry over the medium to long term, the industry should not experience any broad-based labour market constraints to recruitment for key occupations identified in this analysis. Nonetheless, highly specialized, experienced workers will remain in short supply, especially in the specialized engineering, technology, and supervisory occupations. This is perhaps a consequence of the industry needing to recruit and train new entrants in these specialized technology fields, in order for the industry to have the ability to fill requirements for senior and supervisory positions internally.

3. Strategies to Better Access and Develop the Skills of Three Groups in the Canadian Workforce

The *Canadian Aerospace Human Resources Strategy*[8], a collaborative strategy produced by several national and regional aerospace organizations in 2008, identified three strategic directions for aerospace human resources. The first was to establish 'competencies-based, out-comes driven' principles to developing and attracting employees to the aerospace industry. The second was to target Canadian youth as 'new entrants' to the aerospace industry.

The third of these directions was to "Target …those already skilled/experienced/qualified people (or nearly so) from other industry sectors, new Canadians, and non-traditional groups as further 'new entrants' to our industry…"[9]

This part of this report focuses on strategies and best practices for attracting and retaining women, Aboriginals and unemployed, skilled workers from other industries which could be used successfully by the Canadian aerospace industry.

[8] Canadian Aerospace Associations Human Resources Alliance, *Canadian Aerospace Human Resources Strategy*, 31 March 2008, Ottawa, various websites, http://www.ontaero.org/Page.asp?PageID=122&ContentID=1227&.. , accessed June 2012.

[9] Ibid, p. 7.

3.1 Industry Representation of Three Groups

Prism Economics and Analysis, in conjunction with John O'Grady Consulting Ltd., conducted eight key informant interviews with human resources professionals in the aerospace and space industry. (See Appendix 1 for the list of interviewees.) Interviews focused on two issues: the impacts of cyclicality in the aerospace and space industry; and the representation of women, Aboriginals and the skilled unemployed from other industries.

Telephone interviews were conducted with companies in Nova Scotia, Quebec, Ontario and British Columbia. Interviewees were asked about their recruitment and retention experience for women, Aboriginals and skilled workers from other sectors.

The greatest recruitment and retention challenges identified by these companies are in the following occupations and categories:

- aerospace specialists roles
- aircraft assemblers
- CNC programmers
- engineering, particularly manufacturing engineering, senior engineers
- quality inspectors
- IT specialists
- logistics functions
- pilots
- project managers
- radio frequency engineers and digital radio frequency engineers
- skilled trades (e.g. industrial electricians)
- specialized engineering functions like acoustics, instrumentation and dynamics
- software developers and integration specialists with experience
- sheet metal technicians
- specialized senior technical staff
- technicians and technologists
- training instructors
- welders.

The occupations and trades identified are all characterized as highly skilled, technically oriented and specialized.

These occupations pose a recruitment and retention challenge in any case for the aerospace and space industry. But the recruitment challenge is accentuated when trying to increase the participation in the industry of the targeted groups of women, Aboriginals and skilled workers

from other industries. The targeted groups have typically lower representation in the feeder occupations (broad-based occupations in which persons can be receive training upgrading to meet aerospace skill requirements) , and in the educational and training institutions which provide the specialized skills required.

The aerospace and space companies interviewed reported that:

- some (3) companies actively recruit women and Aboriginal workers
- some (3) companies are targeted in their recruitment of women and Aboriginals, as a result of the federal contractors program and having a plan in place
- some (3) companies do not actively recruit women and Aboriginal workers
- a company indicated it faces difficulty hiring women in engineering
- companies have positive experience with hiring women
- a company identified concerns that they have not hired or retained women in sufficient numbers, so they have developed programs (networking, mentoring and promoting the advancement of women) and have communicated these programs to them
- few companies have experience in hiring Aboriginals
- those companies with experience in hiring women and Aboriginals has generally been positive; they have no issues
- recruitment of Aboriginals occurs but is limited to locations close to concentrations of Aboriginal populations (Manitoba compared to Toronto)
- a company observed that few women and Aboriginals take up the challenge of senior management positions
- some companies (3) hire unemployed skilled persons, some from other industries
- a company would hire for semi-skilled positions.

Exhibit 14 provides estimates of aerospace occupations by gender and by Aboriginal identity. The occupations listed are the 25 top occupations based on employment grouped by categories for: 1) aerospace specialty occupations; 2) engineering and technology occupations; 3) management; 4) industrial trades; and 5) business and finance.

Across all occupations in aerospace and space industries, there were an estimated 79,475 persons employed in 2011. Of these, 63,040 are men and 16,436 are women, about 20.7 percent. This distribution is not uniform across occupations, with women being least represented in the manufacturing trades occupations at 4.6 percent, but having the highest representation in clerical occupations at 54.5 percent, administrative and regulatory occupations at 51.4 percent, and professional occupations in business and finance at 48.0 percent. Women have low participation in core aerospace occupations involved in design, production, maintenance and repair of aerospace and space products. Women are more represented in administrative and clerical functions, and some types of aerospace and space manufacturing, like electrical and electronic components assembly.

Persons of Aboriginal ancestry account for an estimated 2,991 workers in the aerospace and space industry, representing 3.8 percent of the workforce. Aboriginal ancestry workers are concentrated in aerospace assembly occupations and manufacturing trades with about 4.1 percent of the workforce in each, but are found in relatively lower proportions in technical occupations at approximately 2.9 percent for aerospace technical occupations and engineering and technology occupations.

These results for both women and Aboriginal ancestry workers can be expected given the issues identified concerning scientific and technology awareness and training among these two groups. Addressing the low representation among women and Aboriginal ancestry persons presents a challenge to the aerospace and space industry since the occupations most in demand in aerospace are also science and technology based.

Exhibit 14
Major Occupations in Aerospace by Gender and Aboriginal Ancestry, 2011

Occupations	2011	Males	Females	Female Percentage	Aboriginal	Aboriginal Percentage
Aircraft assemblers and aircraft assembly inspectors	9,378	8,041	1,337	14.3	386	4.1
Aerospace engineers	3,516	3,013	503	14.3	100	2.9
Aircraft instrument, electrical and avionics mechanics, technicians and inspectors	4,024	3,526	497	12.4	115	2.9
Aircraft mechanics and aircraft inspectors	6,539	5,731	808	12.4	187	2.9
sub-total Aerospace specialty occupations	**23,457**	**20,311**	**3,146**	**13.4**	**921**	**3.9**
Industrial engineering and manufacturing technologists and technicians	1,040	904	136	13.1	--	--
Mechanical engineering technologists and technicians	703	602	101	14.3	--	--
Industrial and manufacturing engineers	946	810	135	14.3	--	--
Mechanical engineers	806	691	115	14.3	--	--
Electrical and electronics engineers	566	485	81	14.3	--	--
Drafting technologists and technicians	442	387	55	12.4	--	--
Information systems analysts and consultants	678	594	84	12.4	--	--
sub-total Engineering and Technology occupations	**5,180**	**4,474**	**707**	**13.6**	**148**	**2.9**
Supervisors, other mechanical and metal products manufacturing	1,471	1,328	143	9.7	--	--
Engineering managers	553	473	79	14.3	--	--
Manufacturing managers	1,310	1119	191	14.6	--	--
Senior managers - goods production, utilities, transportation and construction	662	571	91	13.7	--	--
sub-total Management occupations	**3,995**	**3,491**	**504**	**12.6**	**143**	**3.6**
Machine fitters	834	807	27	3.2	--	--
Machinists and machining and tooling inspectors	3,641	3,525	116	3.2	150	4.1
Painters and coaters, industrial	996	854	142	14.3	--	--
Sheet metal workers	749	725	24	3.2	--	--
Tool and die makers	431	418	14	3.2	--	--
Machining tool operators	520	503	17	3.2	--	--
Welders and related machine operators	442	447	14	3.2	--	--
sub-total Industrial trades occupations	**7,612**	**7,259**	**353**	**4.6**	**313**	**4.1**
Professional occupations in business and finance	2,011	1,046	965	48.0	79	3.9
Administrative and regulatory occupations	2,017	981	1,036	51.4	79	3.9
Clerical occupations	6,529	2,970	3,559	54.5	256	3.9
sub-total Administrative occupations	**10,557**	**4,998**	**5,559**	**52.7**	**413**	**3.9**
Sub-total	50,802	40,533	10,269	20.2	1,938	3.8
Sub-total Other Occupations	28,674	22,507	6,147	21.5	1,053	3.7
Total	**79,475**	**63,040**	**16,436**	**20.7**	**2,991**	**3.8**

Source: Prism Economics and Analysis estimates; Statistics Canada, 2006 Census, Labour and Aboriginal Special Interest Profiles, the Labour Force Survey; and Stokes Economics Consulting, Provincial Occupational Forecasting System.

Note: Data suppressed for Aboriginal ancestry estimates below 50.

3.2 Best Practices

I. Women in Aerospace (Hypatia Association)

The Hypatia Association, a not-for-profit women's organization in Nova Scotia with a mandate to promote women's participation in science, trades and technology, prepared an initiative in this regard, *On the Level: Women in the Aerospace Industry*[10], in 2009. This document is an employers' guide created in partnership with the Aerospace and Defence Human Resources Partnership in Nova Scotia.

The goal of this project is to support employers seeking to hire diverse women in trades and technology with approaches to creating and sustaining welcoming and respectful workplaces. This project was developed working with industry partners, of various sizes and people in companies of various roles. *On the Level* is structured on three themes:

- Readiness – creating respectful work environments that will attract skilled women in trades and technology
- Recruitment – finding and hiring skilled women
- Retention – keeping those skilled women as part of the workforce.[11]

The guide provides specific action items for each theme and develops them as a checklist. It provides examples of successful and unsuccessful integration of women in the aerospace workplace.

[10] The Hypatia Association, *On the Level: Women in the Aerospace Industry*, Halifax, Nova Scotia, January 2009, http://www.hypatiaassociation.ca/ , accessed June 2012.

[11] Ibid, p. x

Exhibit 15
Women in Aerospace Checklist of Action Items[12]

READINESS	GET STARTED ❑ Make Hiring Women a Strategic Priority
	LOOK CLOSELY AT YOUR WORKPLACE ❑ Gather the Data ❑ Talk to the Female Employees in Your Company ❑ Record the Results ❑ Report the Findings ❑ Build a Team
	CREATE A VISION AND GIVE IT LIFE ❑ Expand the Team ❑ Provide Training and Support ❑ Provide Opportunities to Learn About Diversity ❑ Communicate Your Commitment ❑ Develop Policies and Practices that Respect Women
	CREATE A SUPPORT NETWORK FOR WOMEN ❑ Develop a Mentoring Program
	LOOK OUTSIDE YOUR COMPANY ❑ Encourage Women to Get Trades and Technology Training
RECRUITMENT	GET THE WORD OUT – YOU'RE HIRING! ❑ Create Ads that Appeal to Women ❑ Place Your Ads Where Women Will See Them
	SCREEN THE APPLICANTS ❑ Eliminate Gender Stereotyping ❑ Make No Assumptions ❑ Don't Penalize Women
	INTERVIEW AND HIRE ❑ Remove Barriers from the Interview Process ❑ Pay Attention to Interview Do's and Don'ts ❑ Consider Added Value of Women in the Workplace ❑ Align Applicants with Company's Diversity Goals and Business Plan
	PROVIDE EFFECTIVE WORKPLACE ORIENTATION ❑ Notify Staff that Women Have Been Hired ❑ Introduce Women to People, Policies, and Procedures ❑ Provide Quality Training ❑ Create Mentoring and Networking Opportunities
RETENTION	STAY ON COURSE ❑ Provide Leadership ❑ Model Appropriate Behaviour ❑ Take Complaints Seriously
	MAINTAIN WORKPLACE RESPECT AND EQUITY ❑ Apply Policies Equally ❑ Implement Supportive Policies and Practices ❑ Listen to Women ❑ Establish and Maintain Pay Equity ❑ Identify Opportunities to Make Changes
	PREVENT THE ISOLATION OF WOMEN
	INVOLVE MALE EMPLOYEES ❑ Be Aware of Generational Differences

[12] Ibid, pp. 50-51.

II. Women in Construction Engagement Strategy (Construction Sector Council)

The Construction Sector Council has undertaken a series of initiatives to increase the number of women in the construction labour force. The Women in Construction initiative is similar to the initiative on the Aboriginal labour force. The Women in Construction initiative was begun with the *State of Women in Construction in Canada*[13] study to assess the situation for women's participation in the industry. The Construction Sector Council then conducted a *Women's Symposium*[14] with business, labour, tradeswomen, industry associations, women's organizations and government for a dialogue on how to increase participation of women in the construction sector. The two reports were the basis for the *Women in Construction Engagement Strategy*[15].

The Aboriginal and women's initiatives originate from the recognition by the construction industry of a serious shortfall in skilled workers that is predicted for the next decade. The construction labour force is aging rapidly. Not enough young people are beginning apprenticeships in construction trades to replenish the labour force. Apprenticeship completions are insufficient. At the same time, significant construction activity is occurring in specific regions of the country, increasing demand for skilled workers.

The *State of Women in Construction in Canada* study found that, while the absolute number of women in construction has increased, the rate of employment in construction trades was generally small and not increasing sufficiently. Growth in women's participation rate in a limited number of construction trades was not matched in many other occupations. The number of women in registered apprenticeships increased but there was limited growth in the proportion of women in apprenticeships. The study found that effective educational and career pathways are the basis for successful efforts to boost the participation of women in construction. Building educational pathways to science, trades and technology careers is required.

The study identified a gap in the literature documenting good practices in recruitment, hiring and workplace retention to increase women's participation in construction. The study identified several reasons to explain why the rate of women's participation has not increased.

- The first explanation is the problem of supply. Specifically, the study pointed to the need to promote construction industry careers, to improve the image of the industry to work against gender stereotypes, and to increase pre-apprenticeship programming to prepare more women to enter the construction trades.

[13] Construction Sector Council, *State of Women in Construction in Canada,* June 2010, Ottawa, Canada, www.csc-ca.org, accessed June 2012.

[14] Construction Sector Council, *Women in Construction Women's Symposium Report,* June 2010, Ottawa, Canada, www.csc-ca.org, accessed June 2012.

[15] Construction Sector Council, *Women in Construction Engagement Strategy,* June 2010, Ottawa, Canada, www.csc-ca.org, accessed June 2012.

- The second explanation is the problem of demand. Employers would hire more women with a financial incentive to deal with the learning period when new hires are less productive than experienced workers. A number of pre-apprenticeship programs were identified as demonstrating good practices by providing support for women apprenticeships beyond the training period through to hiring and retention.
- The third explanation is the problem of retention. Most women do not stay in the trades longer than five years.

The study concluded that to successfully build and maintain women's participation, multiple programs are needed to work together to improve recruitment, training, education, hiring employment and retention.

The *Women in Construction Engagement Strategy*[16] resulting from this analysis and consultation comprises six elements:

1. Industry leadership to create the cultural change needed to attract and retain more women in the industry,
2. Apprenticeship strategies to improve women's apprenticeship experience,
3. Training for women in technical skills and orientation to construction, and workplace sensitivity training for supervisors and tradespeople,
4. Outreach, recruitment and retention strategies to promote construction to women and to inform employers on the business case for hiring women,
5. Policies and procedures to address systemic barriers,
6. Partnerships with national, provincial, territorial and regional stakeholders to avoid duplication and to maximize resources and objectives achieved.

III. Women in Information and Communications Technology (Information and Communications Technology Council)

The Information and Communications Technology Council (ICTC) undertook a research initiative in 2007-08 to determine the reasons why women are underrepresented in information and communications technology industries and what could be done to address the issue. ICTC identified that female participation in a number of occupations, like law, medicine, business and engineering, had increased, while female participation in computer science had declined. ICTC examined the barriers to participation in computer science occupations for women and internationally trained professionals.

[16] Ibid, pp. 2 -6.

Diversity – The Competitive Edge: Implications for the ICT Labour Market, a report commissioned by ICTC on this subject, identified the following as the most significant barriers to female participation in computer science occupations:[17]

1. Socialization and early education that define girls attitudes to mathematics and technology,
2. Negative perceptions of computing and related work,
3. Systemic barriers in post-secondary institutions,
4. Misalignment of job descriptions and job requirements,
5. Lack of workplace support.

The *Diversity* report went on to recommend several initiatives specific to women to address the problem of insufficient women's participation. These initiatives included:

1. Socialization and early education through focused and integrated initiatives to encourage girls to participate in math and technology courses,
2. Improve understanding of careers in ICT,
3. Systemic action to improve participation of women in post-secondary institutions,
4. Employers need to remove systemic barriers to recruitment by better aligning job descriptions and job requirements and providing specific IT training to generalists with other high demand skills,
5. Employers need to provide better supports in the workplace to retain women over the long term, such as parental leave policies, job-sharing, flexible work arrangements and on-site day care.

An integrated strategy was called for consisting of diversity audits and scorecard, diversity research, and diversity watch.

ICTC conducted a series of national forums on Women in ICT in 2008 to follow-up on the findings of the *Diversity* report, to bring together stakeholders to address attraction and retention of women in IT occupations. This report identified five barriers to women's participation in ICT comprising:

1. Socialization and early education
2. Negative perceptions of computing and related work
3. Systematic barriers in post-secondary institutions
4. Employers need to remove systemic barriers to recruitment
5. Lack of workplace support.

[17] Wendy Cukier, *Diversity – The Competitive Edge: Implications for the ICT Labour Market,* A Report submitted to the Information and Communications Technology Council, The Diversity Institute, Ryerson University, Toronto, Canada, March 2007, www.ictc-ctic.ca/.../13-Diversity%20The%20Competitive%20Edge.pdf, accessed June 2012, pp. 1-4.

Several themes emerged from the forum sessions. First, engagement with the right cause is a compelling attraction and retention strategy for women. Second, national collaboration is needed among stakeholders to effect notable change in the participation of women employed in the ICT industry. Third, women are attracted to workplaces and occupations that provide opportunities to collaborate and contribute. [18]

IV. Women in Engineering and Technology (Engineers Canada and Canadian Council of Technicians and Technologists)

Engineers Canada and the Canadian Council of Technician and Technologists jointly conducted a series of analysis and reports on the participation of women in engineering and technology occupations and industries.

The first of these studies, *Achieving Diversity: Strategies that Work*[19], highlighted the fact that women's participation in engineering and technology occupations has lagged compared to other occupations. Progress in this area has been set back because the share of undergraduate enrolments has fallen to levels in the early 1990s. The report describes 10 initiatives to increase participation in engineering and technology occupations by targeted groups, three of which are initiatives for women, two for aboriginals, three for internationally trained, and two of general application for diversity groups. (See Appendix 2 for the full Report.)

The three initiatives for women in engineering and technology occupations are:

- Women in Scholarship, Engineering, Science and Technology (WISEST, Alberta)
- Discover Engineering (Ryerson University, Ontario)
- Canadian Association for Girls in Science (CAGIS, national).

The two initiatives for Aboriginals in engineering and technology occupations are:

- Engineering Access Program (ENGAP, Manitoba)
- Native Access to Engineering Programme (NAEP, Quebec).

From these initiatives, the *Achieving Diversity* report concluded that:

1. Well focused programs succeed,

[18] Heather Turnbull, Turnbull Consulting Group, *Taking Action on Women in ICT Women in ICT National Forums Action Report*, the Information and Communications Technology Council, Ottawa, March 2008, pp.1-3.

[19] Engineers Canada and Canadian Council of Technicians and Technologists, *Achieving Diversity: Strategies that Work*, prepared by Prism Economics and Analysis, Ottawa, December 2008, http://www.engineerscanada.ca/, accessed June 2012.

2. Employers can increase diversity by partnering with settlement and community organizations that can channel qualified job-seekers to them,
3. Deliberate steps to expand recruitment channels have few financial costs,
4. Four elements are needed for successful programs to increase participation by underrepresented groups: programs should start early in elementary school, continue through secondary school, into post-secondary through support networks and mentorship, and outreach programs need to be activity focused,
5. Role models are important for any under-represented group,
6. Bridging programs are needed to enable motivated students to acquire the necessary high school credits,
7. Success is not easy but is possible,
8. Stable funding is important,
9. Partnerships at the national, provincial/territorial and local level are critical success factors.[20]

The second study by Engineers Canada and the Canadian Council of Technicians and Technologists, *Right for Me?* focused on the factors that shape attitudes of young women towards careers in engineering and technology.[21]

The findings of this study were that:

- A large majority of young women do not have a good understanding of what engineering and technology careers entail and therefore cannot aspire to those careers,
- Those young women with an understanding of engineering and technology careers did not often have an interest in postsecondary studies in engineering or technology,
- A large majority of young women have negative perceptions of engineering and technology occupations,
- Young women do not have role models who encourage them to consider engineering and technology careers.

Recommendations to deal with these findings include: preparing specialized career information and promotion geared towards women, mentoring and role modelling for high school girls, and career promotion strategies.

[20] Ibid, p. 78-82.

[21] Engineers Canada and Canadian Council of Technicians and Technologists, *Right for Me? A Study of Factors that Shape the Attitudes of Young Women towards Mathematics and Science and towards Careers in Engineering and Technology*, prepared by Prism Economics and Analysis, Ottawa, March 2009, http://www.engineerscanada.ca/, accessed June 2012.

V. Aboriginal Aerospace Employment Initiative

The Aboriginal Skills and Employment Training Strategy (ASETS) was an initiative of Human Resources and Skills Development Canada, a program designed to link Aboriginal training needs with labour market demands, providing training and skills upgrading and help finding a job. ASETS is an integrated approach to Aboriginal labour market programs linking training to labour market demand.

HRSDC funded the Aboriginal Aerospace Employment Initiative[22], a project under the ASETS and its predecessor program. This project brought together a partnership of the Manitoba Aerospace Human Resources Coordinating Committee, the Centre for Aboriginal Human Resource Development and three Manitoba industry partners (Boeing Canada Technology, Standard Aero and Bristol Aerospace Ltd.). The project provided at least 200 Aboriginal participants with literacy, essential skills, vocational training and on-the-job training to work in the aerospace industry. The Government of Canada invested $5.2 million in this project. The funding agreement was concluded on March 30, 2012 and the program is now closed.

HRSDC has provided $375,000 to the Native Council of P.E.I. for the Strengthening and Mentoring Aboriginal People for Realistic Training to Employment (SMART) program to help Aboriginal people break through barriers. This program provides training opportunities and work experiences for skilled occupations in the aerospace industry, among others, by providing skills development and training-to-employment opportunities to 20 Aboriginal clients. This program is being funded by HRSDC from September 2011 to July 2014.

VI. Strategy for Increasing Aboriginal Participation in the Construction Labour Force (Construction Sector Council)

The Construction Sector Council has undertaken a series of initiatives to increase the numbers of Aboriginals in the construction labour force. The construction sector in Canada faces a number of pressures and constraints on meeting current and future labour force requirements, including an aging workforce, slower growth in the labour force, construction booms in regions and sub-sectors.

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[22] Human Resources and Skills Development Canada, *Aboriginal Skills and Employment Training Strategy (ASETS), and Aboriginal Aerospace Employment Initiative*, http://www.hrsdc.gc.ca/eng/employment/aboriginal_training/projects/project_profiles/aaei.shtml, website accessed June 2012.

The sector responded by looking to the Aboriginal community as a source of future labour for the construction industry. The Construction Sector Council and the Aboriginal Human Resource Development Council of Canada jointly commissioned a study in 2003 and a follow-up study in 2005, *A Study of Aboriginal Participation in Canada's Construction Industry*[23], to quantify the Aboriginal construction workforce. This study also sought to determine whether existing services and resources were effective in linking Aboriginal youth to construction employment and to assess the capacity to increase the numbers of Aboriginal persons entering into the construction industry.

Key findings from this study included:

- Strong growth and prospects for the construction sector were confirmed,
- Aboriginal workers have a higher propensity to choose construction as a career choice than non-Aboriginal workers,
- Aboriginal people are inclined towards the trades in higher proportions than non-Aboriginal people,
- Several recruitment, training, education and awareness strategies and programs exist to connect Aboriginals to the industry,
- However, the lack of knowledge and awareness about trades and the reduction of vocational training in schools limit access to construction. Further, a large number of Aboriginal persons lack the essential skills needed in the labour market,
- Replacement demand for an aging workforce in construction will require a large number of new Aboriginal workers to replace currently employed Aboriginal workers, and to replace non-Aboriginal workers, who will retire in the next ten years.

The *Study* provided a number of steps for the Construction Sector Council, employers and industry associations, unions, Aboriginal communities and governments. The Construction Sector Council proceeded, in 2010, to develop *A Canadian Strategy for Increasing Aboriginal Participation in the Construction Labour Force*[24]. This strategy, built upon a theme of engagement by stakeholders, has five parts:

1. leadership
2. outreach, recruitment and retention
3. apprenticeship
4. training
5. partnering.

[23] Construction Sector Council, *A Study of Aboriginal Participation in the Construction Industry*, Executive Summary and Full Report, Fall 2005, Ottawa, Canada, www.csc-ca.org or www.ahrdcc.com, accessed June 2012.

[24] Construction Sector Council, *A Canadian Strategy for Increasing Aboriginal Participation in the Construction Labour Force*, October 2010, Ottawa, Canada, www.csc-ca.org, accessed June 2012.

This strategy specifies the roles and activities for each of the stakeholder communities. In this strategy, the Construction Sector Council has the role of promoting the employment of Aboriginal people in construction; articulating the business case for employing Aboriginal people, developing and promoting tools and resources for recruitment, assessment, training and retention; providing online information; developing industry-wide policy templates for employers and labour groups; recognizing industry leaders who support Aboriginal employment; and sharing best practices with sector stakeholders. Examples of promotional products the Construction Sector Council has produced for this strategy are an Aboriginal Construction Careers website (http://www.csc-ca.org/en/products/Aboriginal-construction-careers-website), *How to Present your Skills and Experience to the Construction Industry: A Workbook for Aboriginal People*, and a *Brochure: Hiring Aboriginal Ironworkers.*

VII. Aboriginal Participation Initiatives Project (Electricity Sector Council)

The Electricity Sector Council began a comprehensive Aboriginal Workforce Initiative in 2008 with a number of elements, including a comprehensive strategy, demonstration projects, human resources guides, best practices studies, and adapting human resources tools to industry needs. The project involved consultation with industry, Aboriginal peoples, labour unions, educational institutions, government and others. The report of this initiative concluded that there is a compelling case for increased participation of Aboriginal peoples in the electricity and renewables sector.[25]

Challenges would need to be overcome. Among these barriers are: attracting Aboriginal workers to the sector, difficulties in acquiring relevant job readiness skills, personal and family challenges to completing transition to apprenticeship and electricity careers, and workplace practices that are not fully inclusive of Aboriginal workers and culture. The report identified ten "gates to success" for best practices and successful initiatives:

1. Establish a focus
2. Operationalize what "success" means
3. Invest effort to build effective partnerships
4. Tailor to the community
5. Start early (really early)
6. Consider the full "employment life cycle"
7. Maintain required standards
8. Be "high touch" (i.e. maintaining close-knit relations with participants and employers)
9. Invest in relationships

[25] Electricity Sector Council, *Aboriginal Workforce Participation Initiatives Project*, Ottawa, Canada, 2011, http://www.brightfutures.ca/en/projects/aboriginal.shtml, accessed June 2012.

10. Support the Aboriginal cultural experience.

The *Aboriginal Workforce Participation Initiatives Project* Report reviewed eight initiatives by organizations in the electricity and renewables sector which demonstrated success in engaging First Nations, Métis, Inuit workers and communities.

The Electricity Sector Council also carried out two demonstration projects as part of this initiative: 1) a series of science camps for Aboriginal youth to encourage careers in science, mathematics and technology; and 2) pre-trades orientation and skills upgrading.

The Electricity Sector Council developed a number of "strategic assertions" from this activity about how to promote and increase participation of Aboriginal peoples in the electricity and renewables sector. These "strategic assertions" include:

1. Maintain a focus on issues related to developing, attracting and retaining skilled Aboriginal workers to the electricity industry workforce,
2. Create concurrent improvements in all stages of the employment cycle,
3. Focus on pragmatic initiatives and tools directly related to labour force development, outreach, hiring, retention,
4. Undertake initiatives with cross-cutting themes of collaborative local relationships and partnerships, building capacity among stakeholders, and focus on positive and sustainable outcomes.

VIII. Promoting Essential Skills and Apprenticeship Training in Aboriginal Communities across Canada (Canadian Apprenticeship Forum)

The Canadian Apprenticeship Forum in partnership with Aboriginal organizations conducted a series of workshops across Canada in early 2011. The purpose was to create awareness of essential skills tools, and to share strategies for successful initiatives to prepare Aboriginal workers to complete apprenticeship training and obtain employment in the skilled trades.

The Canadian Apprenticeship Forum focused on essential skills because weaknesses in this area are a barrier to participation by many workers in apprenticeship training. They regard essential skills upgrading as important for Aboriginal students who have high drop-out rates from school and are less likely to complete apprenticeship training.

The report of the workshops provides a list of recommendations based on what the participants said could be acted upon by apprenticeship stakeholders. These recommendations include:

- Communicate with employment counsellors who serve Aboriginal clients on an on-going basis,

- Create guides and materials for an Aboriginal audience to promote effective interventions, share practices and lessons,
- Provide educators with essential skills and apprenticeship tools that establish links for Aboriginal students between school curricula and its practical application in the trades,
- Communicate career awareness programs for Aboriginal people,
- Profile industry events for Aboriginal people to learn about hiring processes, schedules and workplace readiness,
- Identify and communicate what financial and training resources are available for Aboriginal apprentices,
- Create an on-line mentoring network for Aboriginal youth and apprentices to learn about what it is like to work in the trades.

Assessing the essential skills of potential apprentices and developing actions enables a more successful learning outcome for Aboriginal apprentices. Employers expect that apprenticeship candidates will meet high industry standards and operate in a safe workplace. The Canadian Apprenticeship Forum regards improving essential skills for Aboriginal candidates and apprentices is important for employment in the trades, and enables workers to complete their apprenticeship and receive their Certificate of Qualification.

IX. Forest Products and Aboriginal Talent (Forest Products Sector Council)

The Forest Products Sector Council (FPSC) has undertaken its Advancing Aboriginal Inclusion Project in conjunction with the Assembly of First Nations and other related organizations. The purpose of this two-year initiative was to conduct research, and develop and disseminate tools and strategies to increase Aboriginal employment in the forest products sector. [26] The project involved regional, facilitated workshops, demographic and statistical research, and a national symposium.

The report from this initiative, *Conversation and Collaboration: Building the future of Canadian Forest Products Sector with Aboriginal Talent*, provides several examples of what it terms "promising practices and successes". Several are described here:

- Tembec initiative: the company has a full-time Manager of Aboriginal Relations, a policy to guide how the company works with Aboriginal people, funding for First Nations who work with Tembec and jobs for community members in its operations.
- Weyerhaeuser has a licence for the Kenora Forest under which First Nations shareholders manage forestry operations through a partnership.

[26] Forest Products Sector Council, *Conversation and Collaboration: Building the future of Canadian Forest Products sector with Aboriginal Talent*, Ottawa, December 2011, http://fpsc-cspf.ca/aboriginalinclusion.php, accessed June 2012.

- Alberta-Pacific Forest Industries has a 10 percent Aboriginal workforce, joint-venture and partnership agreements with Frist Nations companies, student support and community liaisons.
- A number of post-secondary education institutions offer Aboriginal-specific initiatives to provide forestry specific training. [27]

The report identifies a number of challenges to increasing Aboriginal participation in the forest products sector, including: image, training, cultural awareness, Aboriginal self-determination, competition and the forestry industry downturn. On the other side, the opportunities include location and the industry's proximity to Aboriginal communities, opportunities to share experience and partnerships, and access to capital.

Critical success factors were identified. Respect and flexibility is needed by both parties. Thinking outside the box of standard industry practices is needed. Commitment to new relationships and making them work must be a priority. Multi-stakeholder partnerships are a recommended tool. An inclusive workplace must be created though cultural awareness training for all employees, mentorship and in-house supports for Aboriginal workers.

Finally, recommendations from this initiative include:

1. Target youth, recruitment and retention,
2. Undertake Aboriginal-specific labour market research,
3. Training tied directly to the needs and demands of industry,
4. A sector-wide effort to address the "image deficit" of the forest products industry.[28]

X. Helmets to Hardhats

Helmets to Hardhats[29] (H2H) is a United States program which places men and women from the Armed Forces into building and construction careers. The objective of the program is to provide career transition advice and web-based tools for ex-service personnel. The web-based tools use Helmets to Hardhats employees and volunteers to take an active role in linking veterans to career and training opportunities in construction. Participants visit the web site, create their profile, browse career and training opportunities, and forward their profile to the career providers though the website.

[27] Ibid, pp. 8-11.

[28] Ibid, pp. 12-20.

[29] Helmets to Hardhats, http://helmetstohardhats.org/, accessed June 2012; and the Building and Construction Trades Department, AFL-CIO, http://www.buildingtrades.ca/About-Us.aspx, accessed June 2012.

Helmets to Hardhats is administered through a joint labour-management committee, under U.S. labour relations legislation, and is funded by private foundations, employers, employer associations and unions. One of the special features of this initiative is that it enables U.S. veterans to use their education benefits under the G.I. Bill to pay for training and career transition for construction trades and occupations. The initiative steers candidates to apprenticeship programs in their area for a construction career. The website states that Helmets to Hardhats is different from other initiatives in that it acts as an informed advocate for candidates who help to facilitate the hiring process. Helmets to Hardhats is not a union-only program but it does require that employers participate in proven and approved apprenticeship training programs. Further, the initiative works to ensure that participants receive the appropriate standard of living in the community where they are working. Participating employers gain access to a pool of construction industry candidates who have been successful in a previous military career. The initiative provides tools for employers to locate job seekers with specialized skills, hands-on experience and professional discipline which may not be available in the workforce.

On January 6, 2012, Prime Minister Harper announced a $150,000 contribution through Veterans Affairs Canada's Community Engagement Partnership Fund to support Helmets to Hardhats in Canada. The Canadian initiative, modelled on the U.S. initiative, provides veterans, Canadian Forces members and reservists access to construction careers including apprenticeships in building trades. The Canadian contribution assists with start-up costs, website development and promotional materials. The Canadian Helmets to Hardhats program is scheduled to begin in 2012.

XI. Second Career (Ontario Ministry of Training, Colleges and Universities)

The Ministry of Training, Colleges and Universities (MTCU) of the Government of Ontario launched the Second Career[30] program in June 2008 to assist workers laid off in downsized industries (particularly manufacturing) to obtain career advice, retraining and financial support to help them find jobs in high-demand occupations in Ontario. Second Career is a cost-sharing grant to support training or education up to $28,000, based on the recipient's need, which may require a contribution by the recipient. The grant can be used for tuition, book, instructional materials, transportation and a basic living allowance, with additional amounts available for special needs. The Second Career program is available to workers who have been laid off since January 2005, are unemployed or are working in an interim job, and are choosing to retrain in a career that is in demand, which include trades and technician and technologist occupations.

[30] Ministry of Training, Colleges and Universities, http://www.tcu.gov.on.ca/eng/secondcareer/index.html, accessed July 2012.

Second Career provides assistance through Employment Ontario to applicants who have been assessed, based on their active job search, employment history, education, labour market prospects, training request and experience and occupational skills. Eligible training must be in a new career, with good job prospects in the area, and delivered through a community college or private career college.

Second Career exceeded its three year target of 20,000 laid-off workers after the first 16 months; the program is permanent and continues to assist laid-off workers. As of June 8, 2012, eligibility guidelines for Second Career were changed to enable more laid-off people to apply. MTCU conducted a survey of Second Career students which showed that 93 percent graduated and over 61 percent found jobs within an average of three months.[31]

[31] Ibid, http://www.tcu.gov.on.ca/eng/secondcareer/qna.html#display, accessed July 2012.

3.3 Comparative Analysis

The largest and key aerospace occupations discussed above are, in the main, characterized as science-based, technical and specialized. These characteristics form a barrier to recruiting large numbers of women, Aboriginals and skilled trades from other industries because these characteristics are not found in abundance in the labour force generally and specifically amongst the target groups.

Exhibit 5 provides a summary comparison of the eleven initiatives.

Exhibit 16
Summary Comparison of Diversity Initiatives

	Initiative	Sector	Type	Industry Involvement	Applicability to Aerospace and Space
I	Women in Aerospace	Aerospace	Promotion, employers guide	Women's organization and aerospace HR organization	Employers guide for readiness, recruitment and retention
II	Women in Construction	Construction	Study, symposium, engagement strategy	Sector Council and others	Trades promotion and adaptability
III	Women in ICT	ICT	Study, national forums, strategy	Sector Council and others	ICT and technology occupations
IV	Women in Engineering and Technology	Engineering and Technology	Study	Sector Council	Engineering and technology occupations
V	Aboriginal Aerospace Employment	Aerospace	Funding program; on-the-job training	HRSDC, Aboriginal groups and industry	Essential skills, assembly and trades training
VI	Strategy for Increasing Aboriginal Participation in Construction	Construction	Study, symposium, engagement strategy	Sector Council and others	Essential skills, trades training and retention
VII	Aboriginal Participation Initiatives	Electricity	Study, strategy, demonstration projects, guides, best practices, HR tools	Sector Council and others	Essential skills, trades training and retention
VIII	Promoting Essential Skills in Aboriginal Communities	Apprenticeship	Workshops, strategy	Sector Council and others	Essential skills, trades training and retention
IX	Forest Products and Aboriginal Talent	Forest Products	Study, tools, strategy	Sector Council and others	Essential skills, trades training and retention
X	Helmets to Hardhats	Construction	Career transition advice	Industry and community groups	Career transition for skilled trades
XI	Second Career	Various	Funding program; Career transition advice and support	MTCU, industry	Career transition for skilled trades

These initiatives can be viewed on several dimensions.

First, the initiatives fall into four broad categories on a continuum: essential skills; mathematics, science and technology awareness and capacity; occupational specialization; and skills upgrading and career transition. Each initiative focuses on one of these categories for the target group.

Second, most of the initiatives have a specific sectoral and target group focus, although the challenges and barriers they seek to address are common to many sectors. The initiatives cover aerospace, construction, information and communications technologies, electricity, and forest products. Ontario's Second Career program was originally aimed on career transition for laid off automotive workers but the program is available to workers laid off from any industry.

Third, most initiatives have a research or study element, a consultation/outreach element, a partnership element, and a strategy with deliverables or action items.

A five step model for increasing participation in aerospace of women, Aboriginals and unemployed skilled workers can be derived from these initiatives:

1. Readiness – preparing a receptive work environment for the target groups and essential skills upgrading for employment
2. Skills training and upgrading – providing specific skills and training opportunities and programs for the target group, both pre-employment training to meet industry standards and provide specialized knowledge, and post-employment training to provide advanced skills
3. Recruitment – focusing programming and initiative effort on the specific target group
4. Retention – maintain respect and dignity for workers generally in the workplace and specifically for the target group, providing a work environment which recognizes the special workplace characteristics of the target group, and provides opportunities for career development
5. Partnerships – with employers, employee and target group organizations.

3.4 Considerations and Options

Increasing Participation of Women in Aerospace

The key issue for recruiting and retaining women into the aerospace and space industry is attracting women into mathematics, science and technology. Women interested in science currently are attracted to the biological sciences which lead to careers in medicine, nursing pharmacy, etc. in relatively large numbers. Women are underrepresented in engineering and technology occupations which carries through to being underrepresented in feeder disciplines for aerospace (like mechanical or electrical engineering), and therefore, being underrepresented in aerospace and space. Mechanical and industrial engineering and technology occupations present an indirect route to attract women into aerospace because the labour markets for these occupations are considerably larger than for aerospace as such. This issue is one that cuts across most technology intensive manufacturing industries.

The two other issues for women's participation in aerospace are recruitment and retention. It is a challenge hiring qualified women with the technical skills but once they are hired retaining them through their careers is difficult.

Exhibit 17
Options for Increasing Participation of Women in Aerospace

Step	Objective	Considerations	Options
1. Readiness	Increase mathematics and technology awareness and capability for girls and young women	• Objective is shared with engineering, ICT and technology sectors • Not viable for aerospace alone • Requires promotional activities in schools and universities	• Identify and work with other sectors on mathematics, science and technology awareness for girls and women
2. Skills training and upgrading	Specialized skills for aerospace	• Training programs in aerospace specialties exist for assembly workers, technicians, technologists and engineering • Employer funding and support for on-the-job skills upgrading	• Regional/local skills upgrading programs could be shared among aerospace and space employers
3. Recruitment	Increased hiring of women into assembly, trades, and technology occupations for	• Women in related science and technology disciplines may not	• Focused recruitment efforts in colleges and universities for women

	aerospace	have awareness of aerospace and aerospace jobs (e.g. from colleges for trades, technicians and technologists, and from mathematics, physics, ICT, mechanical engineering)	in feeder programs for aerospace • Build career paths demonstrating applicability of technology skills to aerospace
4. Retention	Mid-career flexibility to enable women to remain in aerospace and have families	• Workplace practices and behaviours need to be assessed and modified to achieve equity in behaviour and outcomes • Workplace training for supervisors and male employees in sensitivity to women in the workplace • Accommodation to enable women to maintain career paths through personal transitions for child rearing and care for parents • Small and mid-sized companies have difficulty accommodating alternative career paths because of they have few people in particular occupations • Appropriate workplace behaviour needs to be instilled into different work settings from offices to production and field operations	• Sector-wide initiatives and promoting best practices targeted to small and mid-sized companies
5. Partnerships	Bring together key stakeholder groups on a sectoral, regional and community basis	• Companies, sectoral organizations and educational institutions require long term commitments to increasing women's participation in aerospace	• Long term partnerships to specific educational initiatives based on recruitment and retention needs of local aerospace companies

Increasing Participation of Aboriginal Ancestry Persons in Aerospace

The key issue for the participation of Aboriginal persons in aerospace and space is somewhat different than for women. Lower educational attainment and high school and university completion rates limit the pool of Aboriginal persons available to be recruited into aerospace. Successful initiatives targeted for Aboriginal persons focus, as a first step, on increasing essential skills as a condition of workplace readiness. The second step is a focus is on acclimatizing young Aboriginals to technology and technical skills, as an avenue into trades, technology occupations and professions.

Another dimension is the regional concentration of Aboriginal populations compared to the regional concentration of the aerospace and space industry. Although some companies are found across Canada, aerospace is concentrated in a small number of areas: the Montreal, Toronto, Winnipeg, Vancouver regions, Nova Scotia, and PEI. Winnipeg has the largest Aboriginal population for an urban area, with the Aboriginal population of over 70,000 representing about 10 percent of the total. Vancouver has a large Aboriginal population of about 40,000 but it represents 1.9 percent of the total. The Aboriginal population in Montreal and Toronto of 17,900 and 26,600 respectively represent about 0.5 percent of the total in each region.[32]

Initiatives aimed at Aboriginal workers for aerospace need to be specific to the regional characteristics of the population. In Winnipeg and Montreal, with local concentrations of Aboriginals, initiatives can be targeted to communities. In Toronto and Vancouver, with large but diffuse populations, broad-based Aboriginal organizations become more significant.

Exhibit 18
Options for Increasing Participation of Aboriginal Ancestry in Aerospace

Step	Objective	Considerations	Options
1. Readiness	Essential skill preparation for aerospace trades Increase mathematics and technology awareness and capability	• Essential skills in math and literacy are a pre-requisite for aerospace manufacturing • Acclimatizing youth to the manufacturing environment and working with complex machinery is also necessary • Pathways for school-to-work and internships offer intermediate steps • Few Aboriginals are	• Identify and work with Aboriginal organizations on essential skills training for aerospace manufacturing and trades • Identify and work with Aboriginal organizations and other sectors on mathematics, science and technology awareness for Aboriginal youth • Work with these

[32] Statistics Canada, 2006 Census, Aboriginal Population Profile.

		enrolled in post-secondary studies in engineering, science and technology • Aerospace is too small an industry to resolve society-wide issues	organizations to increase awareness of aerospace careers
2. Skills training and upgrading	Specialized skills for aerospace	• Training programs in aerospace specialties exist for assembly workers, technicians, technologists and engineering • Employer funding and support for on-the-job skills upgrading • Customized training modules for Aboriginal youth and skilled trades can build on existing materials	• Regional/local skills upgrading programs could be shared among aerospace and space employers
3. Recruitment	Increased hiring of Aboriginals for assembly, trades, and technology occupations for aerospace	• Aboriginals in related science and technology disciplines may not have awareness of aerospace and aerospace jobs (e.g. from colleges for trades, technicians and technologists, and from mathematics, physics, ICT, mechanical engineering)	• Focused recruitment efforts in colleges and universities for Aboriginal persons in feeder programs for aerospace
4. Retention	Sensitivity and adaptability to Aboriginal culture and norms	• Workplace practices and behaviours need to be assessed and modified to achieve equity in behaviour and outcomes • Small and mid-sized companies have difficulty accommodating multicultural norms • Appropriate workplace behaviour needs to be instilled into different work settings from offices to production and field operations	• Sector-wide initiatives and promoting best practices targeted to small and mid-sized companies
5. Partnerships	Bring together key stakeholder groups on a sectoral, regional and community basis	• Companies, sectoral organizations and educational institutions require long term	• Long term partnerships for specific educational initiatives based on recruitment and

		commitments to increasing Aboriginal participation in aerospace • Partnerships with Aboriginal organizations are the basis for reaching the Aboriginal community and the sustainability of initiatives	retention needs of local aerospace companies

Increasing Participation of Unemployed Skilled Workers from other Industries

The analysis above of current and future human capital needs in the aerospace industry shows industries which have occupations and labour markets that aerospace can draw on for skills. Opportunities to recruit from these industries increase when labour markets for these occupations are loose. Considerable restructuring is occurring in manufacturing and technology industries, and unemployment of skilled workers from these industries is relatively high. At the same time, labour markets are tight in primary, resource and construction industries, some of which also compete for related skills and occupations, particularly for manufacturing trades like machinists, sheet metal workers, and welders.

Exhibit 19
Options for Increasing Participation of Unemployed Skilled Workers from other Industries

Step	Objective	Considerations	Options
1. Readiness	Not applicable		
2. Skills training and upgrading	Specialized skills for aerospace	• Training programs in aerospace specialties exist for assembly workers, technicians, technologists and engineering • Customized re-training modules for skilled trades can build on existing materials	• Regional/local skills upgrading programs could be shared among aerospace and space employers
3. Recruitment	Increased hiring of skilled workers for assembly, trades, and technology occupations for aerospace	• Skilled workers in related trades and technology disciplines may not have awareness of aerospace and aerospace jobs • Outreach to unemployed skilled workers through local	• Focused recruitment efforts in regions where precision and technology manufacturing are downsizing

		employment services may be only way to pinpoint candidates	
4. Retention	Career paths for skilled workers with long term employment prospects	• Mid-career transition to high-technology manufacturing may require adaption to higher standards and production norms	• Sector-wide initiatives and promoting best practices targeted to small and mid-sized companies
5. Partnerships	Bring together key stakeholder groups on a sectoral, regional and community basis	• Downsizing employers may not be in a position to engage in long-term initiatives • Regional, community and employee organizations may be avenues	• Local Partnerships for recruitment needs of local aerospace companies • Sector-wide initiatives to promote the aerospace industry to target specialized skilled workers

Appendix 1: List of Interviewees

Composites Atlantic, Lynn Wagner, Director Human Resources, and Peggy Slade, Human Resources

CAE, Nathalie Bourque, Director, Human Resources

COM DEV, Paul Dyck, Vice-President Human Resources

Eurocopter, Jackie Hudson, Human Resources

Magellan, Jo Ann Ball, Vice-President Human Resources

MDA, Richard Juren, Chief Operating Officer

Pratt & Whitney Canada, Suzanne Coupal, Human Resources Director, and Catherine Bedard, Manager of Recruitment Talent Centre and International Strategy

Viking Air, Robin Ambrose, Human Resources Manager

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Appendix 3: Achieving Diversity: Strategies that Work (Engineers Canada and Canadian Council of Technicians and Technologists)

(Please click on the title page to open the pdf document.)