

2017 Aerospace Industry Survey Analysis

On behalf of the Aerospace Industry Reference Committee (IRC), IBSA Manufacturing conducted a survey in October 2017 to gather industry intelligence on current workforce arrangements and challenges as well as future training needs.

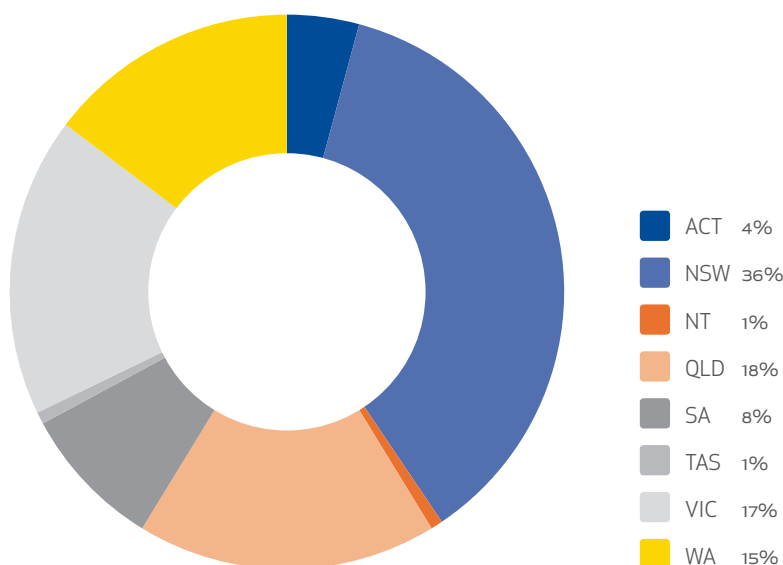
The survey results will inform the Aerospace IRC Industry Skills Forecast and assist in identifying future training package development work. The survey consisted of two sections:

- 1 covered general information about the industry; and
- 2 covered information about apprenticeships in the industry

Please find below an analysis of the survey results.

Survey Respondents Profile

In total, 143 respondents completed the survey across all states and territories as indicated in the figures below:



Over 80% of total respondents work within Aviation Maintenance and are Licensed Aircraft Maintenance Engineers (LAMEs).

Respondents to the survey indicated that they primarily maintain civil aircraft as follows:

- Fixed wing turbine – large 40%
- Fixed wing turbine – small 10%
- Fixed wing piston 10%

The type of maintenance undertaken includes:

- Aircraft Mechanical 40%
- Aircraft Avionic 29%
- Structures 13%
- Component Mechanical 10%

The top ten technologies maintained are:

- 1 Air Cycle air-conditioning
- 2 AC generation (alternating current)
- 3 Fixed fire suppression
- 4 Full Authority Digital Engine Control (FADEC)
- 5 Satellite Navigation
- 6 Oxygen Storage
- 7 Oxygen generation
- 8 Automatic Dependent Surveillance Broadcast (ADS-B) Structural
- 9 Composites
- 10 Fly by wire flight controls

Attachment A provides a respondent profile for key states.

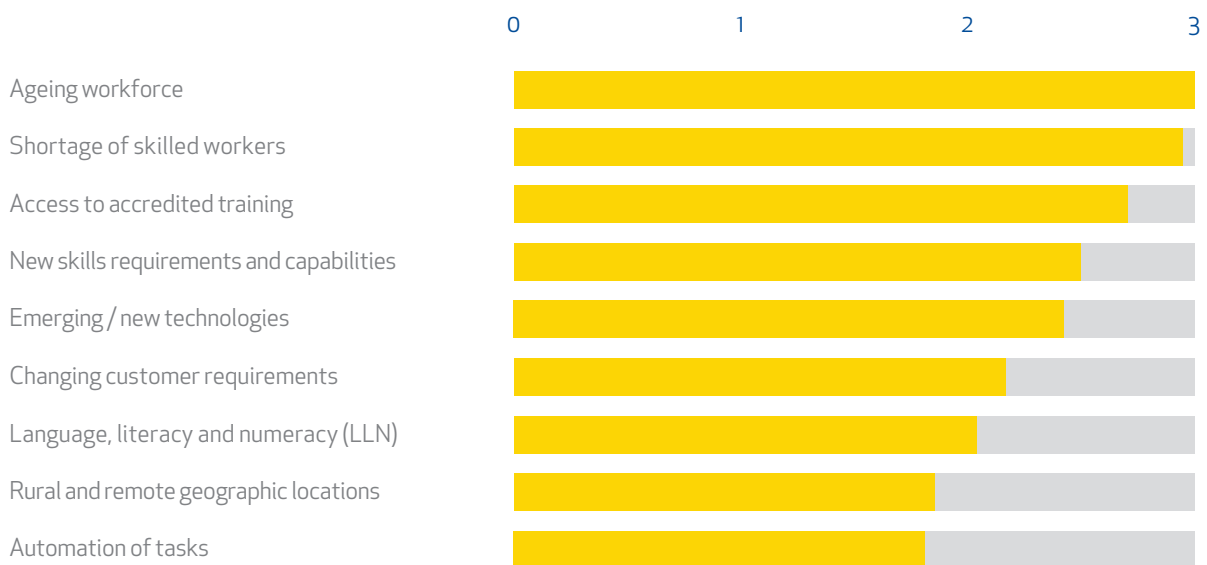
The Department of Defence also conducted a Vocational Education and Training (VET) Industry and Workforce Survey in November 2017. A summary of the Aerospace sector results is provided in Attachment B.

Section 1: General Industry Information

The broad industry trends and changes identified by respondents include:

- 1 The growing **Skills Gap** between experienced LAMEs and new qualified entrants. This gap is further compounded by an ageing workforce and very few new entrants to the industry.
- 2 **Insufficient Training** to apprentices has resulted in a lack of depth in skills and knowledge in the industry.
- 3 **Diminished Quality and Standards** which are influenced by cost reduction business models, a reduction in the amount of preventative maintenance and the continuing devaluation of skills.
- 4 **Technology Changes** with technology advancing rapidly and more integrated systems there is a tendency toward automation of tasks. Other changes include increased use of computer based fault finding, greater number of unmanned ports to which aircraft fly and increased provision of remote support via digital mediums.
- 5 **Licensing and Regulation** is resulting in higher overheads and increased operational costs. A wide variety of license requirements for individuals have reduced overall aircraft knowledge. Increased use of drones and the lack of laws and regulations in relation to unmanned and autonomous aircraft.

When asked to rate the level of impact (Low = 1, Medium = 2 or Significant impact = 3) of specific workforce challenges respondents rated the ageing workforce and a shortage of skilled workers as key challenges for the industry. Automation of tasks was rated as the challenge which had the least impact on the industry as shown in the following figure.



The table below shows which workforce challenges were rated as having the highest and lowest impact in each state.

	NSW	QLD	VIC	WA	Other
Highest impact	Shortage of Skilled workers	Ageing Workforce / Shortage of Skilled workers	Shortage of Skilled Workers	Ageing Workforce	Ageing Workforce
Lowest impact	Rural and remote geographic locations	Automation of Tasks	Rural and remote geographic locations	Rural and remote geographic locations	Language, literacy & numeracy (LLN)

In regard to **access to accredited** training, Victoria had the highest weighted impact score followed by New South Wales as indicated below.

Access to accredited training, weighted average impact score:

VIC	NSW	WA	Other	QLD
2.73	2.68	2.5	2.5	2.3

Respondents went on to identify the following key changes to impact their workforce over the next 3-5 years.

- 1 **Changes in industry conditions** including:
 - increased used of contract labour and sending work offshore
 - anti-competitive work contracts, changing penalty rates, and shift arrangements
 - continuing devaluation of skills and experience in favour of a 'flexible' workforce
 - increasing workload, time pressures to rectify aircraft and larger fleet sizes have resulted in unsustainable productivity practices
- 2 **Ageing Workforce** - with most skilled LAMEs 50 years or older the industry needs to consider the physical requirement of the roles and how to replace the skills and experience about to leave the industry.
- 3 **Quality of Training** which has resulted in new entrants to the industry having a lack of basic skills depth and knowledge. There has also been a shift to training apprentices in higher technology areas which has resulted in a skills deficit in the general aviation sector. The industry is also inadequately prepared to train workers in regard to changes in technology.

- 4 **Emerging Technologies** increasing reliance on technologies to assist in fault identification, integrated avionic and mechanical systems, increased use of software based systems, and new aircraft types and structures. A key challenge will be to change the perception that these new technologies will require less maintenance.
- 5 **Financial Pressures** in regard to high operational and training costs as well as the impact of economic uncertainty.

The range of technologies or skills reported by respondents as having left the industry or diminished in importance in the last decade fell into the following categories:

Category	% of respondents	Category	% of respondents
Maintenance Skills	40	Apprentices	5
Basic Skills	20	Quality	3
Level of Training	11	Development Opportunities	2
Technology	9	Technical Skills	2
Avionics	7	Licensed Pathways	1

The **maintenance skills** reported as having left the industry include:

- general and deep understanding of component maintenance, repair, overhaul and testing
- diverse skill set to maintain general aviation fleet
- skills and knowledge to overhaul and restore fabric and wood covered aircraft components
- heavy maintenance checks (closure of maintenance facilities)
- in house repair facilities or workshops to undertake fitting-machining and hose-tube maintenance
- undertaking manual adjustments as required due to heavy reliance on automated systems
- sheet metal skills
- detailed cleaning, surface refinishing, and painting skills
- fault finding and troubleshooting skills
- wiring modification and installation

The **basic skills** reported as having diminished over the last decade include:

- underpinning hand skills and mechanical aptitude
- engineering skills and knowledge
- instrument, electrical and systems knowledge
- basic work skills and common sense
- cross category knowledge

In regard to the **level of training**, the closure of a key training institute was reported as having an effect on the industry as well as less access to refresher and specialist training. Respondents also noted there appeared to be less on the job training and a lack of theoretical knowledge.

Respondents ranked the following workforce skills in order of importance within their organization (highest to lowest importance):

- 1 Design Mindset / Thinking Critically / System Thinking / Solving Problems
- 2 Learning Agility, Information Literacy, Intellectual Autonomy and Self-Management
- 3 Communication, Virtual Collaboration and Social Intelligence
- 4 Science, Engineering and Mathematics
- 5 Technology
- 6 Language, Literacy and Numeracy (LLN)
- 7 Data Analysis
- 8 Managerial / Leadership
- 9 Customer Service and Marketing
- 10 Environment and Sustainability
- 11 Finance
- 12 Entrepreneurial

New job roles the industry is currently developing skills for include:

- 1 Roles related to **licensing and regulation** such as LAMEs, B1 License holders, Airworthiness and Safety Inspectors
- 2 **Managerial and leadership** roles including aviation, people and project management as well as supervisory roles
- 3 Roles related to **new technologies** such as avionics, digital systems integration, new aircraft types and composite structures
- 4 **Engineering** roles covering cross trade mechanical skills, fibre optics and technical research

In preparing for new skills industry has experienced the following challenges:

- **Access to Training** respondents reported that training had been diluted with many employers moving to more cost effective training models such as online or web-based courses and there were fewer opportunities to undertake refresher or specialised training due to the cost or availability of training
- **Cost of Training** is prohibitive
- **Management issues** in getting assistance and support from employers
- **Time Management** in regard to employers allowing time to undertake the training, some respondents reported needing to take time off work to complete training
- **Meeting licencing and industry requirements** was reported as difficult by some respondents which was compounded by regulatory changes. Respondents also noted difficulty in keeping current with industry standards and new regulations

In regard to the future workforce a quarter of total respondents indicated:

- their organisation intended to employ apprentices in the near future, and
- they would need to recruit for new and emerging job roles and skills requirements within the next 3-5 years

Number of respondents reported organisation intending to employ or recruit for:

	NSW	QLD	WA	VIC	Other
Apprentices in the near future	13	8	5	5	2
Emerging job roles in next 3 – 5 years	13	4	4	9	5

When looking at the number of respondents that reported that their organisation was intending to employ apprentices in the near future or recruit for emerging job roles (see table above) the following can be noted:

- NSW and WA: equally focused on apprentices and emerging job roles
- QLD: higher focus is on apprenticeships rather than emerging job roles
- VIC and Other States: increased focus on emerging job roles over apprenticeships

When seeking a new employee, respondents valued broad generic skills as applicable to a range of aircraft/systems more than specialised skills focused on particular aircraft/systems as shown in the figure below.



When seeking a new employee 44% of respondents looked for specific VET or Higher Education qualifications when recruiting staff. The qualifications specified include:

- Certificate III level qualifications (new recruits to have completed an apprenticeship)
- Certificate IV Aeroskills
- CASA License Holder
- Diploma level qualification (Industry specific)

The respondents that didn't look for specific qualifications valued:

- Common sense
- Hands on skills and basic practical aptitude
- Attitude and interest in the industry

Other challenges respondents reported include:

Global mobility: employers bringing in foreign workers has reduced investment in skills and apprentice training.

Changing work and career values: The industry struggles to maintain people in managerial and leadership roles which results in limited long-term planning.

Changing work and career values: Lower pay rates have resulted in young people leaving the industry.

Innovation ahead of regulation: The decisions of regulatory bodies on licensing requirement impact ability to undertake work.

Section 2: Information on Apprentices

In regard to employment of apprentices:

- 60 respondents work with organisations which have employed apprentices over the last 10 years
- 40 respondents work within organisations which currently employ apprentices

This shows a significant decrease over the last 10 years in the employment of apprenticeships particularly in New South Wales and Victoria (see table below).

Number of respondents reported that organisations:

	NSW	QLD	WA	VIC	Other
Have employed apprentices previously	25	9	5	14	7
Currently employ apprentices	14	8	5	8	5

75% of the respondents whose organisations currently or have previously employed apprentices reported that they had noticed a decline in apprentices' abilities.

The most common way apprentices currently engage with training is via on the job, followed by block release. Over 85% of respondents were not satisfied with the training provided to their apprentices; reasons include:

- Most said **training not linked to industry expectations** citing:
 - the curriculum being delivered does not align with the skill set required to service the general aviation sector
 - it's complex, disorganised and there is a lack of communication with industry
 - training has been unable to consolidate theory with hands on practice in a real environment resulting in a lack of basic skills
 - it's not specialised and detailed enough for different aircraft trade streams

- training appears to be rushed and apprentices pushed through
- schedule changes by the training organisations severely impact work programming
- ‘qualified’ apprentices often need to resit licensing exams
- focus on completing assessment requirements rather than actual practical learning
- Some said **industry not meeting training requirements (20%)** closure of key maintenance facilities has limited opportunities for apprentices to hone skills and employers are not exposing learners to sufficient tasks.
- Some said **unsuitable students (17%)** there appears to be a lack of basic skills and knowledge as well as decreased initiative.

38% of respondents felt that the training for their apprentices lacked practical (hand skills). The figure below shows which areas of training for practical skills could be improved for apprentices.



A further 27% of respondents felt that the training for their apprentices lacked theoretical (knowledge). The figure below shows which areas of training for theoretical knowledge could be improved for apprentices.



Respondents also indicated the following areas of training in relation to soft skills could be improved for apprentices.



Attachment A – Respondent profile by key state

	NSW	QLD	VIC	WA	Other
% respondents Aviation Maintenance	79%	84%	84%	81%	85%
% respondents LAMEs	77%	84%	88%	71%	75%
% maintain Civil Aircraft	100%	80%	100%	100%	90%
Aircraft type maintained (Top 2 responses)	<ul style="list-style-type: none"> Fixed wing turbine large (75%) Fixed wing turbine small (25%) 	<ul style="list-style-type: none"> Fixed wing turbine large (60%) Fixed wing piston (40%) 	<ul style="list-style-type: none"> Fixed wing turbine large (100%) Aircraft components (7%) 	<ul style="list-style-type: none"> Fixed wing turbine large (100%) Fixed wing turbine small (33%) 	<ul style="list-style-type: none"> Fixed wing turbine large (80%) Fixed wing piston (30%) Rotary wing piston (30%)
Maintenance undertaken (Top 2 responses)	<ul style="list-style-type: none"> Aircraft Mechanical (81%) Aircraft Avionic (56%) 	<ul style="list-style-type: none"> Aircraft Mechanical (80%) Aircraft Avionic (40%) 	<ul style="list-style-type: none"> Aircraft Mechanical (73%) Aircraft Avionic (67%) 	<ul style="list-style-type: none"> Aircraft Mechanical (83%) Aircraft Avionic (67%) 	<ul style="list-style-type: none"> Aircraft Mechanical (70%) Aircraft Avionic (50%)
Top technologies maintained	<ul style="list-style-type: none"> Fixed fire suppression (88%) Sat Navigation (84%) FADEC engine control (84%) AC generation (84%) Air Cycle air-conditioning (84%) 	<ul style="list-style-type: none"> Structural Composites (80%) AC generation (80%) Air Cycle air-conditioning (70%) 	<ul style="list-style-type: none"> AC generation (100%) Air Cycle air-conditioning (100%) FADEC engine control (93%) Oxygen generation (93%) Fixed fire suppression (93%) 	<ul style="list-style-type: none"> FADEC engine control (100%) Air Cycle air-conditioning (100%) Oxy-Storage (100%) Fixed fire suppression (100%) 	<ul style="list-style-type: none"> FADEC engine control (90%) Air Cycle air-conditioning (90%) Fixed fire suppression (90%) AC generation (80%) Oxy-Storage (80%)

Attachment B

Department of Defence, 2017-18 VET Industry and Workforce Survey Summary of Aerospace Sector Results

Workforce – Key Changes

New or emerging Defence job roles requiring new skills development were identified as:

- Networks air and ground integration
- The use of drone technology for professional imagery capture and exploitation
- Low observable air frames

The following new challenges faced by Defence as result of new or emerging job roles were identified as:

- Overlap between current job roles
- Operation of drones to capture imagery

Key changes anticipated to impact the Defence Aerospace workforce over the next 3-5 Years were identified as:

- Increased network requirement, increased cyber awareness and Defence
- Low observable air frame support
- Drone technology and imagery support

Defence ranked the following organisational skills in order of importance to their industry:

- 1 Science, Engineering and Mathematics
- 2 Technology
- 3 Thinking Critically
- 4 Language, Literacy and Numeracy (LLN)

New Innovation was a new workforce skill nominated in the responses

The technologies and skills identified as having left the Defence industry or diminished in importance in the last 15 years and have impacted the workplace include:

- decreased reliance on heavy engineering support within the ADF uniform presence
- less equipment reliant on deep level maintenance more contracted support
- increased number of components require fewer servicing skills due to a higher degree of throw away items in general

The following table recognises the nominated impact (low, moderate or significant) each workforce challenge places on the Defence industry.

Workforce Challenge	Low	Moderate	Significant
Ageing workforce	Significant		
Change in Government Policy / Legislation	Significant		
Changing supply chain relationships	Significant		
Language, literacy and numeracy (LLN)	Significant		
Automation of roles	Moderate		Low
New and emerging technologies	Moderate		Low
New skills and capabilities	Moderate		Low
Organisational reform	Moderate		Low
Shortage of skilled workforce	Low	Moderate	
Skilled workforce changing requirements	Low	Moderate	

Job Roles and Developing Capability

Anticipated recruitment – in the next 3 to 5 years - due to new or emerging job roles and skillsets are anticipated:

- Yes, cyber and networking skill sets

Challenges experienced in preparing for new skills or capability – the following responses were recorded:

- Yes, experience and training alignment not yet in place particularly in emerging technologies

Formal qualifications are desirable for the Defence Aerospace Industry when developing capability or recruiting:

- Sometimes (100% of respondents)

Defence Aerospace Apprentices:

The table below shows the number of current registered Defence apprentices in the Aerospace trades:

Qualification	MEA40615 - Certificate IV in Aeroskills (Avionics)	MEA40715 - Certificate IV in Aeroskills (Mechanical)	MEA41315 - Certificate IV in Aeroskills (Structures)
Active Apprenticeships as at 05 MARCH 2018	332	326	37

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