



Aircraft maintenance engineer shortage – crisis and opportunities

October 2022

Crisis

‘The aircraft maintenance skilled labour shortage is at crisis point, both LAMEs and AMEs across all trades. To overcome this all levels of government and industry need to work together to implement a safe, commonsense approach prioritising easy-to-implement policies to reduce the current barriers within the industry.’

Matthew Wheatley

Sigma Aerospace Tamworth

There is a shortage of licensed aircraft maintenance engineers (LAME) in Australian aviation, a shortage now at crisis point. If we do not address this immediately, the continuing airworthiness of the Australian aircraft fleet will be significantly compromised, more aviation maintenance organisations will be forced to close their hangar doors, threatening the future viability of the Australian aviation industry and the critical transport infrastructure that it provides.

Maintenance organisations, particularly those in regional areas, are struggling to employ and retain LAMEs. If an apprentice commences their apprenticeship today, by way of context, it is at least three years until they gain their aircraft engineer licence, and more likely to be four to five years.

The warning signs have been apparent for many years, as evidenced in the extensive 2015 University of New South Wales report: ‘The Future of Aircraft Maintenance in Australia’¹. Sadly, the report’s many recommendations largely remain unactioned. It is critical we address the factors contributing to this crisis and implement pragmatic solutions to secure the Australian aircraft maintenance sector into the future.

The following recommendations are founded on extensive consultation with industry and capture their concerns. This paper provides:

- » Background – ‘how did we get here?’
- » Recommendations for positive, pragmatic, and value-adding reforms to resource the sector in the short- and long-term.

¹ Australian Research Council Linkage Project 11011000335



Image: Bombardier Q400 aircraft | © Victor - Flickr

How did we get here?

Until June 2011, an Australian aircraft engineer licence was gained by completing CASA's 'basic exams' for the theory component, and a workplace schedule of experience (SOE) for the practical component. CASA regulated and managed this under Civil Aviation Regulation (CAR) 31. Under this pathway, depending which state or territory the apprentice was from, they could gain the required experience, complete the exams, and be granted their aircraft engineer licence four years after beginning their apprenticeship.

In June 2011, this CAR 31 pathway transitioned to the European Union Aviation Safety Agency (EASA)-based Part 66 licensing system. The licensing syllabus changed considerably, going from a licence with five categories (airframe, engine, electrical, instrument and radio) to a licence with two categories, B1 (mechanical) and B2 (avionics). At the same time, a Diploma in Aeroskills (Mechanical or Avionics) was introduced.

Under Part 66, apprentices study the theoretical component through a CASR Part 147-approved maintenance training organisation (MTO) that is also approved as a registered training organisation (RTO). They complete the practical component by undertaking in-house training at an approved maintenance organisation (AMO) and recording this in a journal of experience (JOE).

However, at the time of transition in 2011, apprentices were instructed to complete a Certificate IV in Aeroskills as it was eligible for state and territory funding, whereas the new Diploma in Aeroskills was not. These pioneering apprentices and employers were bewildered and disgruntled when, after completing the seemingly traditional 'four-year apprenticeship', they discovered that gaining a Certificate IV in Aeroskills did not provide a licence outcome and that to be licensed, they had to complete the Diploma of Aeroskills. Unsurprisingly, many left the industry.

It is widely accepted that the decline in apprenticeship employment numbers began at this time. The industry did not (and largely still does not) understand this apprentice training and licensing pathway, and as a result, has stopped employing apprentices. Those who have employed apprentices have found the majority of their apprentices have not become licensed in the same timeframe as they would have traditionally under CAR 31, if at all.

Several RAAA member AMOs were consulted during the research for this paper. Until 2011, commensurate with their business, many organisations employed at least one apprentice in each of the four-year apprenticeship years (one first-year apprentice, one second-year and so on).

Since 2014, there has been a rapid decline in the apprentice intake. Supporting evidence can be found in the maintenance licensing figures in CASA annual reports: from FY 2006/2007 to 2015/2016 annual licences issued averaged 297. From FY 2016/2017 to 2020/2021, this figure had dropped to 135 per year.



**2006/2007
- 2015/2016**
297

av. licences/yr

**2016/2017
- 2020/2021**
135

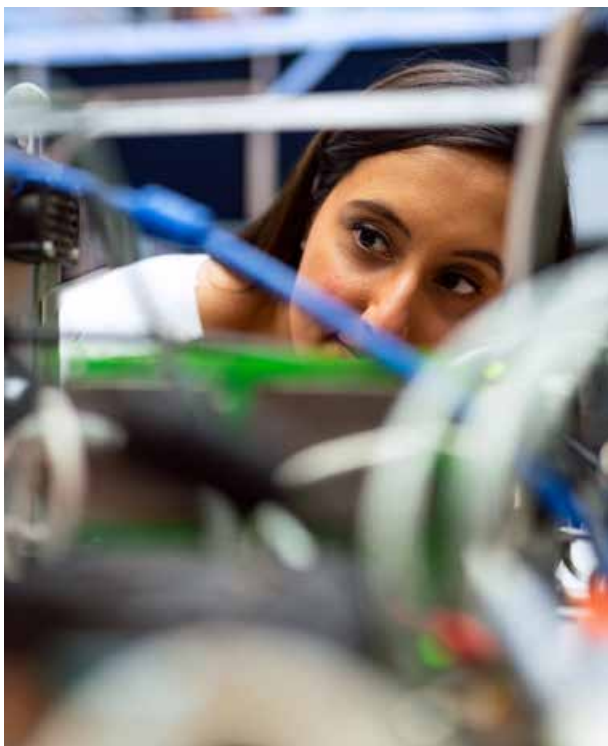


av. licences/yr

Source: CASA annual reports

The lack of future proofing is a major factor in the reduction of LAMEs in our industry today due to:

- » AMOs and apprentices (still) not understanding the current licensing pathway, despite it being introduced in 2011.
- » Unlike the previous CAR 31 pathway, the current diploma pathway is perceived to be extremely difficult, particularly the theory component. It is also extremely difficult and expensive to access outside major cities. Therefore, the industry at large has struggled to accept it.
- » Overwhelmingly, industry believes that the MTOs' main concern is generating income, not producing LAMEs. This perception is very real and a significant reason why AMOs are not employing apprentices.
- » Next-generation tradespeople are aware of traditional trades such as plumbing, hairdressing and carpentry; however, many do not know that aircraft engineering is even a career pathway.



Opportunities

Aircraft engineering provides an exciting, challenging and rewarding lifelong career. With the predicted exponential growth in future aircraft types, powered by alternate fuels and new methods of propulsion, the growth of uncrewed aircraft operations, and the potential for advanced air mobility, Australia will need even more licensed aircraft engineers to maintain these diverse aircraft safely.

We can recover from this current crisis. CASA, Part 147 MTOs and indeed industry are aligned with a strong desire to collaborate and build a strong Australian LAME workforce, to 'grow our own' licensed aviation engineers.

In the short term however, we will need to recruit LAMEs from overseas, as we cannot 'make' enough to meet this crisis.

To support this, we make the following short- and long-term recommendations for increasing the supply of new domestic LAMEs, and for ensuring we provide a realistic pathway for international LAMEs, ex-Defence LAMEs and for those who have left the industry and wish to return.

'The aviation engineering shortage is now beyond critical; if things don't start improving, we will have to start parking planes at the back of hangars and closing their doors.'

Dean Mooney
East Air Cairns

1. Recognition of international LAME licences

Globally, many countries have implemented training standards comparable with the stringent Australian CASR Part 66 standards.

Currently, to attain an Australian aircraft engineer licence, LAMEs from all international countries except New Zealand must complete some, if not all, of the Diploma of Aeroskills to attain a Part 66 licence. This can take several years.

The following short-term realistic solutions can be implemented with government and CASA support:

- » CASA recognition of international engineer licences from countries with comparable training standards (such as South Africa, Singapore and EASA-contracting states).
- » The LAME would have to pass Module 10 (Aviation Legislation) and the employing AMO deem the LAME competent.
- » CASA to permit foreign licences to be issued with exclusions
- » Government to add 'aircraft engineering' immediately to the Federal Priority Migration Skilled Occupation list. This would expedite entry into all Australian states and territories for these skilled workers.
- » To support those regional AMOs who find it increasingly difficult to recruit and retain LAMEs, the federal and state governments to provide further incentives for the LAMEs and their families to remain in the regional area for a certain time (recommended five years).



2. Education to support current and future LAMEs

Due to its complexity, eleven years after it was first introduced, there is still a significant lack of understanding of the current licensing pathway. This prevents AMOs either from employing apprentices or, if they have, being able to guide them during their apprenticeship to become licensed within the traditional timeframe.

Overwhelmingly, industry feels that the previous CAR 31 licensing pathway was better than our current Part 66 pathway. Industry education has to be urgently improved, so that industry can be champions of emerging LAMEs. Without this critical training and a resulting change in mindset, the uncertainties around the apprenticeship pathway will continue to have a negative impact on our supply of LAMEs.

CASA must partner with industry (and their associations) to promote the aircraft engineering pathway. This includes:

- » CASA developing for AMOs and apprentices, with input from MTOs, a plain English 101 course guide, which clearly outlines each step of the apprenticeship pathway.
 - › It would outline a training plan; for example, when the apprentice should have the knowledge and skills to change a tyre, replace a leading edge or the main rotor head, or change an engine.
 - › This training package could be introduced by a subject matter expert at the CASA Aviation Safety Seminars. Subject matter experts would also need to be available to provide ongoing advice as necessary.
- » MTOs engaging with the industry at a 'grassroots' level to drive improved recruitment pipelines and gain industry trust.

- » Provide robust education regarding the CASA 'Self Study Pathway' introduced in August, 2021. CASA are to be congratulated for the correspondence circulated in September, 2022; however, the target market is still unsure how the pathway actually works.
- » Industry participating in careers expos and programs such as the Women in Aviation initiative and state-sponsored job expos.
- » The Australian Skills Quality Authority (ASQA) and RTOs providing access to the Certificate II in Aircraft Line Maintenance or Certificate II in Aeroskills for all school-based students who are eligible for VET (Vocational and Education Training) across Australia (currently this is limited to Queensland and the Northern Territory). These certificates provide an introduction to aircraft maintenance, with the expectation the student will become an apprentice after high school.
- » Access to the Certificate II requires industry engagement with MTOs in the VETiS (Vocational and Education Training in Schools) program to generate interest in aviation for our school students.
- » We recommend that an industry committee is created so industry is collectively aligned and can drive this in collaboration with the MTOs.

3. Create a pathway for other experienced engineers

To encourage experienced engineers to join the civilian engineering sector, we strongly recommend that CASA:

- » Create an avenue for previous CAR 31 licence holders to return to the industry without the need to complete all module gap knowledge
- » Provide a pathway for ex-defence force personnel to enter the civilian industry.

4. Remove challenges associated with Diploma in Aeroskills examinations

The current Diploma in Aeroskills requires a higher level of academic aptitude than the previous CAR 31 pathway, meaning some aircraft engineering apprentices who are mechanically talented, but without strong academic aptitude, struggle to pass examinations at the Diploma level.

Mitigating the challenges of the current exam model could assist apprentices to pass these exams without compromising the necessary underpinning academic knowledge.

- » CASA to interpret CASR Part 66 to permit individual module subject exams to be held after completing each subject, rather than waiting for the completion of the entire module's content.

Module 12, for example, comprises eight subjects, which could take approximately two years to complete, meaning apprentices are forced to retain this technical information for that time. If they were able to take the exam after each subject, the failure rate would reduce, without diluting the required theoretical knowledge.

- » In line with CASA and ICAO requirements, the current exam pass mark is 75 per cent. If students' marks are under that, they must wait at least 90 days (or 30 days with remediation training) before they can re-sit the exam.

We recommend that if the student's mark is between 65 and 74 per cent, they be permitted to re-sit the exam as early as the following day without penalty.

- » Regulations state that when maintaining aircraft or aeronautical products, aircraft engineers refer to instructions for continuing airworthiness.

In line with this and while the student still must have a comprehensive knowledge of the subject at hand, we recommend CASA and MTO permit open book examinations.

5. Permit issuing of an aircraft engineer licence with exclusions

CASA's General Aviation Workplan 2022 acknowledges the requirement for '... more progressive, less onerous maintenance licence pathways ...'.

The general aviation (GA) sector provides a strong training ground for engineers to learn how to 'engineer' and troubleshoot non-complex aircraft – many a brilliant engineer has been born from GA because of the skills they learned there.

LAMEs will typically progress into airlines for fixed-wing, or offshore operations for helicopters, at some time in their career. The experience gained during their time in GA benefits these organisations significantly.

As the GA sector supports all aircraft maintenance sectors, accordingly we must provide more flexible training solutions for GA.

Currently the Part 66 regulation does not prevent an aircraft engineer licence from being issued with exclusions; however, the Part 66 Manual of Standards does. We understand CASA is currently reviewing their interpretation of the regulation so that they can support this concept.

Permitting a licence to be issued with exclusions would enable a tailor-made, flexible career pathway. For example, if a LAME intends to work only on small helicopters or basic fixed wing aircraft, they do not need to study pressurisation (E16). If they choose to work later in their career on more complex aircraft, say a B737, they would do the necessary study to have that exclusion removed.

The following modules could be exempted from the training:

- » Module 4 – Electronic fundamentals
- » Module 5 – Digital techniques electronic instrument systems
- » As applicable to the desired licence outcome – Modules 15 (gas turbine engine), 16 (piston engine) and 17 (propeller).

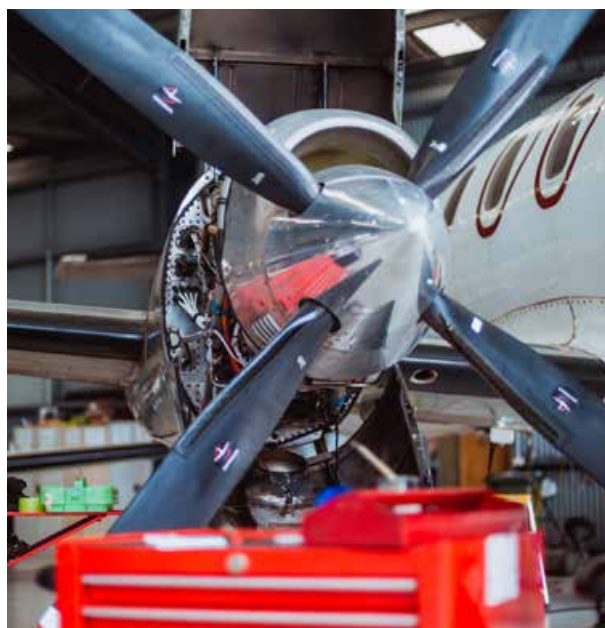
6. Government incentives to employ aviation apprentices

There is now funding for a Diploma qualification in all states and territories. While progressive, the amounts are inconsistent across the jurisdictions.

Currently, many AMOs do not have an apprenticeship program. In particular, it is disappointing that some major airlines do not have a commensurate apprenticeship program. By offering GA AMO trained and licensed engineers employment incentives GA companies simply cannot match, the major AMOs benefit. The GA companies are denied a return on their training investment.

While difficult to mandate, to ensure the longevity of the industry, all AMOs have a responsibility to employ as many apprentices as their number of supervising LAMEs permits. We recommend that federal, state and territory governments provide incentives to employ apprentices; for example, during a tender process, organisations which employ apprentices could be favoured.

Of note, to their credit, this year the Northern Territory Government funded fifteen pre-apprenticeship training courses. Not all of them have been filled to date, possibly due to lack of advertising/awareness.



7. Align theory training delivery nationally & create a National Aviation Academy

Currently, the states and territories control apprentice training and its funding, contributing to the disparity in training delivery. For example, the Northern Territory allows certain modules to be studied away from the trade school setting, whereas Western Australia does not.

The Diploma in Aeroskills (mechanical) and (avionics) qualifications sit under the Australian Qualifications Framework (AQF) (i.e., the vocational and educational training system), which in turn sits within the portfolio of the Department of Employment and Workplace Relations (DEWR).

To eliminate disparity in training, we recommend strongly that:

- » all MTOs deliver the theory training syllabus that is aligned with the CASR Part 66 Manual of Standards to assure academic consistency for all apprentices
- » a National Aviation Academy be created. Training for both civilian and defence apprentices would be conducted under this national model, therefore providing consistency in training and funding.

This was one of the recommendations of 2015's 'The Future of Aircraft Maintenance in Australia' report. The burgeoning uncrewed, electric aircraft, and advanced air mobility sectors make 'an innovation-oriented aircraft maintenance workforce' more critical than ever.

To help develop the training capacity required to build an innovation-oriented aircraft maintenance workforce, and to ensure that maintenance training makes a significant contribution to Australia's education exports, a National Aerospace/Aviation College (NAAC) should be established, with nationally-networked branches in each state and territory. It would draw on the combined resources of the university and TAFE sectors, gain recognition as a Part 147 category maintenance training organisation, a registered training organisation and a nationally registered higher education provider, and have support from aerospace and aviation industry employers for the in-depth provision of practical skills training and experience.

About the author of this document

Sheridan Austin is proud of her over 25 year-aviation experience. Her aircraft engineering career started with National Jet Systems in Darwin, where she was an AME and hands-on aircraft maintenance planner before moving into maintenance control and then a quality and safety role.

A passion for aircraft engineering compliance and the recognition that many aircraft maintenance organisations needed help in understanding and complying with aviation regulations, led her to found Aviation QMS - Quality & Management Services in 2009 to support them.

Sheridan is a passionate industry advocate, and gives back to the industry by participating in CASA technical working groups and working with apprentices, AMEs and licensed and emerging LAMEs to help them to navigate their way through regulatory requirements.

Contact

p | (02) 6162 0305
e | administration@raaa.com.au
w | raaa.com.au

