Swinburne University of Technology Response to the Senate Standing Committee on Rural Affairs and Transport: Pilot training and airline safety, October 2010

Executive Summary

Swinburne University of Technology (Swinburne) is one of the predominant providers of Aviation tertiary programs and pilot training in Australia with over 470 Aviation students currently enrolled in programs from VET, undergraduate degree, and postgraduate coursework programs. Swinburne University of Technology makes this submission that **primarily addresses;**

(a) pilot experience requirements and the consequence of any reduction in flight hour requirements on safety;

(b) the United States of America's Federal Aviation Administration Extension Act of 2010 which requires a minimum of 1500 flight hours before a pilot is able to operate on regular public transport services and whether a similar mandatory requirement should be applied in Australia; and

(j) other related matters.

The Key Points included in the Submission are:

- **Quantity** of training is no substitute for **quality**. The integration of targeted high level educational and practical training programs with advanced technology aircraft and associated training aids delivers a graduate equipped with both the technical and non technical skills required for a flight crew member,
- On going structured mentoring of low time first officers and ongoing education provisions for flight crew should be addressed,
- A number of issues which influenced the United States legislation are directly relevant to a specific accident involving a lower level US commuter airline and result from practices that would not be consistent with a safety management approach to operations,
- After decades of experience in the congested traffic environment of Europe - with the associated demanding cockpit work load – the airlines, the UK Civil Aviation Authority and

the International Civil Aviation Organisation have clearly shown support for the high quality/low hour/competency based training model,

- Recent studies published in the FAA Academy International Journal of Applied Aviation Studies supports the benefits of pilot graduates from accredited collegiate aviation education programs who had flight instructional experience and fewer than 500 hours total time,

- The issues around pilot skills shortage that affect major, regional and the training industry, such as high attrition levels and the development of career pathways, have to be addressed concurrently with any change to required pilot experience levels.

Introduction

Swinburne University of Technology is one of the predominant providers of Aviation tertiary programs in Australia currently offering Aviation programs at various levels;

- VET level (Certificate IV, Diploma and Advanced Diploma)
- Undergraduate Associate and Bachelor degrees (both flying and non flying)
- Postgraduate Masters programs focussed on education and skills upgrading for industry
- Doctor of Philosophy programs - in which research into human factors, safety and operational considerations are given priority.

Currently Swinburne University of Technology has enrolled in its Aviation programs 40 TAFE and 256 undergraduate degree students undertaking flying training, 90 undergraduates in the non flying aviation management stream, and 90 postgraduate coursework students. The majority of these students are domestic, placing Swinburne as a significant provider of Aviation education and training to the Australian aviation sector.

Swinburne University of Technology has been offering a degree level pilot training and education program, Bachelor of Aviation, since 1992. For the provision of flying training programs Swinburne University of Technology has worked closely with Oxford Aviation Academy (Australia), formerly General Flying Services, at Moorabbin Airport, currently the largest flying school in Australia. In addition to educating and training private students Swinburne and Oxford Aviation Academy are major providers to Jetstar Airways and Qantas Airways for their respective cadet pilot programs and Swinburne has been contracted to the regulator CASA for the development and provision of a Diploma in Air Safety Regulation, as an in house training program.

Swinburne University of Technology and Oxford Aviation Academy (Australia) have jointly undertaken significant investment in the development of training programs, syllabus and training infrastructure over the past 15 years. Some of the major developments include;

- Development of integrated education and training programs, which now encompass cadet pilot programs,
- Facilitation of Commonwealth Government FEE-HELP for flying training, thereby extending accessibility of a professional pilot career to a wider socio economic cohort,
- Use of modern digital cockpit training aircraft,
- Implementation of graded flying competencies and standard operating procedures,
- Integration of instrument flight rules rating within the Commercial Pilot Licence syllabus,

- Multi Engine Command Instrument rating, for low hour CPL graduates, by means of digital cockpit gas turbine aircraft,
- Industry focussed graduate outcomes through the Swinburne Aviation Industry Advisory Committee, as well as direct industry cooperation in pilot cadet program development.

Swinburne University of Technology has been concerned for some years at the developing shortage of skilled entrants to the aviation industry particularly with respect to pilots and licenced maintenance engineers and has made previous public recommendations on measures that should be adopted.

2. Matters addressed by Swinburne in relation to the Inquiry

Swinburne University of Technology has elected to address those matters which it considers to be directly relevant to the role of the University in the delivery to the airline industry of pilots trained and educated to required industry standards. To ensure that those standards are correctly interpreted and reflected in the academic and training content contained in the University programs the development, content and mode of delivery of the constituent units are critically reviewed and formally approved by an Industry Advisory Committee. The external membership of the Committee includes senior management representatives from the Flight Management and Operational Management areas of major domestic and International airlines as well as high level representation from the Civil Aviation Safety Authority, the Australian Transport Safety Bureau, Airservices Australia and specialists in airport operations, safety and risk management, security and human factors. At all times the emphasis is on **Quality** rather than **Quantity** of training.

The matters addressed have been drawn directly from the Senate document "Information about the Inquiry".

2.1 a) Pilot experience requirements and the consequences of any reduction in flight hour requirements on safety.

Pilot experience levels imply that once these levels have been obtained a pilot has gained through experience the required attributes to be able to undertake an appropriate aircraft type rating and then discharge their duties as flight crew in a professional and safe manner. The hours based experience levels historically set by the Australian industry are not supported by research and are influenced by past practice and recruitment demand.

It can be argued that a pilot with a CPL gained under a non integrated syllabus with a high hour experience, gained in single pilot operations requiring minimal decision making, will not have achieved the same level of knowledge and attributes as a much lower time pilot that has undergone a structured training program both from abinitio training and from their employer. This is the essence of the **quantity** versus **quality** argument.

Recent studies published in the FAA Academy International Journal of Applied Aviation Studies[1] support the benefits of pilot graduates from accredited collegiate aviation education programs that had flight instructional experience and fewer than 500 hours total time. This study was undertaken to research the success of new pilot indoctrination for first officers in scheduled air carrier

operations. The measure of success being the number of extra training events the pilot required to complete an airline training program. The study also found that the least successful group were those trained at a commercial flight school.

Swinburne University of Technology has been involved in pilot training at airline level since 1992 and the academic staff, in addition to academic qualifications, have experience at executive level in airline flight management, operational management, aircraft design, safety management, human factors and aviation medicine. This background is reflected in the content and delivery of the academic and training syllabi.

- The integration of the theory with the related practical flight training at all stages maximises the learning outcome. In conjunction with the adoption from the beginning of standard airline operation procedures and graded competencies, this prepares the trainee for operating in an airline multi crew environment with emphasis on strict adherence to established procedures in both normal and abnormal situations.
- The inclusion in the programs of the study and practice of Safety Management Systems, Fatigue Management, Risk Management and Human Factors serves to accelerate an understanding and embed a commitment to best practice in these areas from the beginning.
- Computerised flight training devices and advanced flight simulators supplement the aircraft flight training and further prepare the trainees for the airline environment through an introduction to Crew Resource Management – an essential factor in flight crew and cabin crew communication and coordination, particularly in abnormal situations.
- The Swinburne/Oxford Aviation Academy flight training programs advance the proficiency in instrument flight training by integrating this training in the Commercial Pilot Licence (CPL) ahead of any licencing requirement.
- The recovery of an aircraft from abnormal attitudes induced by upsets in extreme turbulence or by aircraft stalling as an outcome of malfunction or mismanagement has only recently been identified as an issue requiring specialised training. However the Swinburne/ Oxford practice has, for some years, been to include aerobatic training as an element of the flight training program to address this matter.
- All Swinburne flight training programs include the training and successful completion of the theory requirements for the CASA approved Air Transport Pilot Licence (ATPL). Until the 1,500 hours of required experience has been accumulated this Licence is considered to be "frozen" but there is a significant value in cockpit operations that can be attributed to the frozen licence.
- Students progress to the multi engine command instrument rating in advanced turbine powered aircraft equipped with digital flight instrumentation and advanced navigation systems. Coupled with this training is further simulator training in Multi Crew Cooperation. It is recognised that, in addition to traditional skills, the new generation of pilots now have to manage integrated information displays, advanced levels of automation and complex airspace situations.
- Students accepted at this stage for airline employment will undergo further aircraft type specific computer based training and both simulator and aircraft endorsement training.

1. Smith,G NewMyer, D Bjerke, E Niemczyk, M Hamilton,R, 2010, 'Pilot Source Study: An Analysis of Pilot Backgrounds and Subsequent Success in US Regional Airline Training Programs' International Journal of Applied Aviation Studies, Vol 10, Number 1, pp73-96.

It is the considered view of Swinburne University of Technology that flight hour requirements on their own are not an adequate preparation for flight crew. The quality of the training is the greatest influencing factor on flight crew being able to undertake safe and professional operations.

2.2 b) the United States of America's Federal Aviation Administration Extension Act of 2010 which requires a minimum of 1500 flight hours before a pilot is able to operate on regular public transport services and whether a similar mandatory requirement should be applied in Australia

A number of issues addressed in the United States Congress "Airline Safety and Federal Aviation Administration Extension Act of 2010" legislation are directly relevant to a specific accident involving a lower level US commuter airline and result from practices that would not be consistent with a safety management approach to operations. In this accident both pilots had in excess of 1500 hours experience, the first officer 2,244 hours total time and the captain 3,379 hours total time.[2] The safety issues discussed in the NTSB Accident Report "focus on strategies to prevent flight crew monitoring failures, pilot professionalism, fatigue, remedial training, pilot training records, airspeed selection procedures, stall training, Federal Aviation Administration (FAA) oversight, flight operational quality assurance programs, use of personal portable electronic devices on the flight deck, the FAA's use of safety alerts for operators to transmit safety-critical information, and weather information provided to pilots."

The above safety issues highlight the need to ensure adequate training outcomes from ab initio through to and including the airline, which cannot be addressed simply by a hours of experience requirement. Indeed the United States Congress "Airline Safety and Federal Aviation Administration Extension Act of 2010" provides that "the Administrator may allow credit based on a determination by the Administrator that allowing a pilot to take specific academic training courses will enhance safety more than requiring the pilot to fully comply with the flight hours requirement".

Through its self accrediting status as a University, Swinburne University of Technology has developed both Bachelor Degree, Associate Degree and VET education and training programs under the overview of the Swinburne Aviation Advisory Committee and in close cooperation with major Australian airlines and its training provider, Oxford Aviation Academy. The degree level programs are similar in structure and content to equivalent programs offered through universities in the United States. In Australia there are a number of university aviation providers whose programs have been developed through their self accrediting status. Benefit in standardisation could be gained through accreditation of these programs through an appropriate professional body such as occurs through the *Aviation Accreditation Board International* in the United States.

It is the considered view of Swinburne University of Technology that a mandatory requirement of 1500 flight hours should not be imposed before a pilot is able to operate on regular public transport services. It is however recommended that consideration be given to the type of training received as a better measure of successful outcome.

2. 'Loss of Control on Approach Colgan Air, Inc. Operating as Continental Connection Flight 3407 Bombardier DHC-8-400, N200WQ Clarence Center, New York February 12, 2009' 2010, National Transportation Safety Board, NTSB/AAR-10/01

2.3 j) Other related matters

2.3.1 Pilot Skills Shortage

In 2008 Swinburne University of Technology made a detailed submission to the Department of Infrastructure and Transport issues paper titled "Towards a National Aviation Policy Statement, April 2008". The Swinburne submission is available on the department's website http://www.infrastructure.gov.au/aviation/nap/files_issues_paper/Swinburne_University_of_Technology.pdf

The Committee is referred to this document, however in summary the submission highlighted;

1. Projected growth in the industry and demand for a future skilled workforce in the sector,
2. Route cuts by regional operators due to insufficient flight crew,
3. Safety concerns due to high pilot attrition rates in regional operators as well in the training industry (flying instructors), the latter additionally impacting on the ability to train future pilots for the Australian industry and the ability to derive export earnings from training pilots for the international market,
4. The numbers of graduates from pilot training programs failing to meet projected industry requirements.

The contributing factors for point 4 above can be attributed to;

a) Limited awareness of and/or promotion of aviation as a career to secondary school students, parents and careers advisors,

b) The high cost of the flying training which, as distinct from the academic content of the program, does not attract Commonwealth Supported Place (CSP) funding. In addition to limiting student numbers it has also largely restricted this career to those socio economic groups able to afford the cost of training. A number of Universities, including Swinburne, are facilitating Commonwealth FEE-HELP for the provision of flying training; however the current life loan limit is inadequate to meet the total cost of training to achieve the required qualifications for airline entry,

c) The lack of a defined career pathway, from obtaining a Commercial Pilot Licence to securing airline employment, and the lack of formalised career development, skills enhancement and mentoring during this period,

d) Limited flight instructor human resources within the flight training industry and the problem in retaining these resources given their attraction to airline employment opportunities,

e) The limitations of the present regulatory training syllabus for pilots. Without reducing standards there is a perceived need to modernise the current theoretical and practical Commercial Pilots Licence syllabi to maintain relevance to the industry and attract the highest level of applicants. This is not to be confused with recent developments in the Multi Crew Pilot Licence (MPL),

f) A predominately aging fleet of training aircraft which are not well suited to modern training syllabi incorporating Standard Operating Procedures. Only large scale, well resourced training organisations can support the level of investment required for new aircraft and flight simulators.

2.3.2 Safety Management, Risk Management and Crew Resource Management Systems

The Civil Aviation Safety Authority of Australia has been at the forefront in requiring Australian airlines to develop and implement these programs. The requirement to implement a Safety Management System is yet to be mandated by the US Federal Aviation Authority (FAA). The application of these concepts to airline decision making and ensuing operational and technical standards is critically important to the overall standard of safety.

Swinburne University of Technology has developed units at both undergraduate and postgraduate level which address both Safety Management and Risk Management to meet the requirements of CASA and the International Civil Aviation Organisation (ICAO).

Crew Resource Management is specifically focussed on the ability to lead or follow, and aims to develop abilities to communicate with associates, apply critical thinking skills and generally perform as a professional aviator. Swinburne University of Technology delivers Human factors concepts, including Safety Management, Risk Management and Crew Resource Management through all three years of the Bachelor degree program.

2.3.3 Further Education

Flight crew and other aviation industry professionals should be encouraged to engage in ongoing education. Swinburne University of Technology postgraduate programs in Aviation Human Factors and Aviation Management are delivered by distance education and offer the opportunity for pilots, engineers and management to further develop their knowledge and skills to build on the basis of their initial qualifications and training. Flight crew worldwide have enrolled in these programs.

Supplementing these programs is an annual three day Seminar Series which is open to industry and addresses issues of significance and topicality in flight operations, safety management and human factors.

2.3.4 Mentoring

Swinburne University of Technology is a strong supporter of the need to supplement initial and type endorsement training with a structured program of employer mentoring to reinforce the standards of procedural performance, human factors and operational compliance, and measure the ongoing development of relatively inexperienced first officers.

It is highly recommended that within an operator's Safety Management System that a structured mentor program is defined.

2.3.5 Support of High Quality Competency Based Pilot Training Models

The 2010 study analysing pilot backgrounds and subsequent success in US regional airline training programs[1] published in the International Journal of Applied Aviation Studies, supported the conclusion that the best performing pilots had graduated from collegiate accredited flight programs with aviation degrees and had received advanced (post-Private) pilot training in college.

In Britain the academically supported competency based model has been the basis for recruitment of new pilot intakes. The first multi-crew pilot licence (MPL) trainees have recently graduated and are currently undertaking the final stage of training to take up co-pilot positions with a British registered airline. The MPL is a low hour competency based pilot training model.

The International Air Transport Association (IATA) is currently working with the International Civil Aviation Organisation (ICAO) to " modernise and revolutionise training and qualification schemes, focussing on competency based training.."[3].

Worldwide there is increasing support by authorities and airlines for high quality competency based training models and the increasing enhancement of these programs with educational delivery.

Swinburne University of Technology stands prepared to expand on the above submission if required by the Senate Standing Committee on Rural Affairs and Transport.

Contact Details

This document has been prepared by;
Aviation Discipline Leader, Stephen Fankhauser
Aviation Lecturer, John Bibo
Faculty of Engineering and Industrial Sciences
Swinburne University of Technology

and has been authorised by;
Professor John Beynon
Dean, Faculty of Engineering and Industrial Sciences
Swinburne University of Technology
M/S H38
PO Box 218
Hawthorn VIC 3122
Australia

3. Learmount,D 2010, 'Future Pilot Supply for the Airlines', Flightglobal, viewed 25th October 2010, http://www.flightglobal.com/articles/2010/09/21/347437/future-pilot-supply-for-the-airlines.html