



**PRESIDENT'S DEPARTMENT
AIR LINE PILOTS ASSOCIATION, INTERNATIONAL**

1625 MASSACHUSETTS AVENUE, NW □ WASHINGTON, DC 20036 □ 1-888-FLY-ALPA (1-888-359-2572)
FAX 202-797-4007

April 9, 2010

Docket Operations, M-30
U.S. Department of Transportation
1200 New Jersey Avenue, SE
West Building Ground Floor
Room W12-140
Washington, DC 20590

Subject: Docket No. FAA-2010-0100; Notice No. 10-02, ANPRM on New Pilot
Certification Requirements for Air Carrier Operations

Dear Sir/Madam:

The Air Line Pilots Association, International (ALPA), which represents nearly 53,000 pilots who fly for 38 airlines in the U.S. and Canada, has reviewed the subject Advance Notice of Proposed Rulemaking (ANPRM) and offers the following comments.

The best and most important safety feature on an airplane is a well-trained, highly motivated, professional pilot. Despite great advances in aircraft technology that have immeasurably improved safety, the flight crew is still responsible for making hundreds of decisions on each and every flight to operate in the safest manner possible. Unfortunately, present circumstances – which include the U.S. economy, continued fallout from the 9/11 attacks, changing airline business models, a shrinking supply of military trained pilots, and many other factors – have made it much more difficult than in the past to provide a reliable source of qualified airline pilot candidates. A full discussion of these and many other related topics is provided in a September 2009 ALPA white paper entitled "*Producing a Professional Airline Pilot: Candidate Screening, Hiring, Training and Mentoring*," which is provided as an attachment to these comments.

ALPA has been actively engaged in discussions for some time with government, industry and academia regarding training, licensing, and qualification standards for the next generation of airline pilots. The Association applauds the publication of this ANPRM as a means of collecting viewpoints from all affected parties on this very important subject.

A number of accident and incident investigations in the past few years have highlighted the qualities needed by pilots to safely assume responsibility for the transport of passengers and cargo in part 121 operations. These findings have underscored what ALPA members have always known: the airline piloting profession is highly demanding and requires pilots to possess and exhibit a high degree of ability, judgment, excellent flying skills, and in-depth knowledge of their aircraft, the national airspace system, weather, and many, many other aviation-related subjects.

Federal Aviation Regulations (FARs) parts 61 and 121 have failed to keep pace with the dynamic airline industry. The regulations under consideration by this ANPRM – FAR part 61 – were first published in an era in which common business practices, driven not by regulation but by the supply of pilots and equipment in use, dictated that low-time, commercial-certificated pilots could only get airline jobs flying small, slow, propeller-driven aircraft and as flight engineers on jet transports. Pilots would traditionally fly several years and thousands of hours before even being given an opportunity to upgrade to first officers on high-performance jet transports. Today, it is not uncommon for new-hire pilots to be employed as first officers of high-altitude, high-performance aircraft carrying 50 or more passengers in highly complex part

121 operations. This reality demands that airlines hire pilots with *more* knowledge and *greater* skills than the new-hire airline pilots of the past, but in fact, just the opposite is happening at some airlines. Due to economic pressures, some "regional" airlines actually seek out and hire the very *least* experienced pilots meeting FAA minimum requirements because they are willing to accept the lowest compensation in order to build flight time and use that experience to progress to larger, more stable airlines.

It is noteworthy that before code-sharing with regional partners began, all flying was done by the pilots of an airline on a single pilot-seniority list. This practice ensured that newly hired airline pilots – even those with thousands of hours of military or civilian flight time – had several years of airline operations experience before assuming the command responsibilities of an airline captain. However, as competitive cost concerns increased with the advent of post-deregulated start-up carriers, the "legacy" airlines began to outsource the flying to as many as a dozen new "regional" partners flying 30- to 50-seat propeller aircraft and 50- to 90-seat jets. The "legacy" airlines then began the practice of having their "partners" bid against each other to maintain these "fee for departure" outsourcing contracts. As the legacy airlines replaced more and more mainline flying by this outsourcing scheme to regional operators, they furloughed hundreds of highly experienced pilots, effectively replacing them with lower-paid and lower-experienced pilots.

It is clear, therefore, from these and other dynamics in the industry today that these regulations must be updated to ensure that a high standard of aptitude, knowledge and training are met by anyone flying an aircraft in part 121 operations.

Furthermore, it is our strong belief that the regulations should be amended to make a sharp distinction between training and certification requirements for part 121 operations and those for other types of commercial operations. The traveling public expects, and deserves, flights of part 121 airlines to be conducted only by the most highly qualified and experienced pilots. In our further remarks, we will recommend specific ways in which airline pilots should be held to a higher standard than those pilots engaged in non-Part 121 operations.

We disagree with the comment made in the "Background" section of this document which states, in part, "The accident focused attention on whether a commercially-rated copilot in part 121 operations receives adequate training...specifically in various weather conditions..." In fact, the NTSB's investigation of the accident outside of Buffalo, NY on February 12, 2009, focus was much broader. The Board questioned the adequacy of current FAR Part 61 certification, training and experience requirements for preparing a pilot to perform the duties of an airline pilot in Part 121 operations. Our comments will reflect the need for addressing all known inadequacies in these areas.

The "Background" section also notes that the ANPRM is not seeking comments on air carrier hiring or training requirements. We believe that the agency should solicit comments on changes or additions to FAR part 121 hiring and training requirements in light of all that has transpired since the Buffalo accident. Making necessary improvements to part 61, while needed, is only a partial solution; the airlines must also be required to set a higher bar for flight officer candidates. Amendments to FAR part 121 should include requirements to:

- Ensure that all prospective flight crewmembers undergo comprehensive pre-employment screening, to include skills, knowledge, aptitudes, and airmanship pertaining to the aircraft which they will operate
- Institute a formal mentoring program for new first officers aimed at giving them the guidance and support that they need to succeed in all aspects of their employment
- Provide standards for command and leadership training of first officers upgrading to captain
- Provide more comprehensive and realistic stall-avoidance and -recognition training

Question 1A. *Should the FAA require all pilot crewmembers engaged in part 121 air carrier operations to hold an ATP certificate? Why or why not?*

Yes, the FAA should – by a certain date – require all pilots hired by a part 121 airline to hold an ATP certificate obtained in accordance with the new requirements described below. We recommend that the agency amend FAR part 61 to provide for the creation of a “121 Air Carrier Endorsement.”

Today under part 61, a pilot may legally be hired to pilot an airline aircraft with a commercial certificate obtained in as few as 250 hours (or 190 hours under part 141/142) of flight experience, all of which may be in single-engine, piston-powered, single-pilot aircraft, with completion of a home-study course on aeronautical knowledge, and passage of a few multiple choice exams which can be purchased and studied before taking the tests. Even requiring first officer candidates to hold an ATP issued under today’s rules is not an adequate solution to our pilot qualification problems. Part 61 aeronautical knowledge requirements for an ATP certificate apply the very same lax course work and testing standards as for obtaining the commercial certificate. The ATP can also be earned while flying only single-engine, single-pilot, piston-powered aircraft, experience which is unsuited for preparing a pilot to fly for a part 121 operator.

While it is true that most new-hire pilots exceed these minima in one or more ways, the “race to the bottom” that has become emblematic of the airline industry’s business model underscores the need for pilots to be *required* to have the right kind and amounts of flight experience and a much more thorough education. An examination of the approach used by two of today’s training organizations – both of which are successful in placing their graduating pilots with airlines – is very illustrative in this regard.

The first is a flight training school that accepts pilots 18 years of age and older holding an FAA commercial certificate, and instrument and multi-engine ratings. Students graduate from the program in approximately 7 months after receiving 80 hours of ground school on airline indoctrination and operations, 40 hours of CRM and airline briefings, several hours of simulator training and 250 hours of on-the-job training as a first officer of a turboprop aircraft with paying passengers onboard. It is certainly worth noting that in four of the most recent part 121 accidents, half of the crewmembers were graduates of flight training academies which emphasize brevity of both training time and academics. An in-depth study has not been done on the training which these pilots received, but it appears that these outcomes have more than a mere coincidental association with such training organizations.

The other organization is a university which offers a Bachelor of Science degree in aviation to those pursuing a career as a professional airline pilot. This program combines commercial, instrument and multi-engine flight training with 120 college credit hours of rigorous academic study over a four-year period. The academic coursework is focused on educating and training the student on areas specifically related to piloting large, turbo-jet aircraft in the part 121 environment.

Based on our members’ experience, the graduates of the longer, more rigorous course of study and practical experience will be considerably better prepared to enter the workforce and more likely to succeed in an airline environment than the graduates of the training school. This is so in part because airline flying demands that professional airline pilots gain a considerable amount of knowledge that cannot be imparted in a short time or by adhering strictly to current part 61 licensing criteria. The amount of discipline and dedication needed to complete a university program also helps to self-select those who are most likely to succeed in the demanding airline environment. The vast majority of new airline pilots have completed four or more years of college, so requiring such scholastic achievement will not place an unreasonable or inequitable burden on aspiring airline aviators.

Accordingly, we recommend that the FAA develop a new, additional section within FAR part 61 which includes the following provisions:

1. Create a new "121 Air Carrier Endorsement" on the ATP which would require the following minimum qualifications:
 - a. Minimum age of 23 and hold Class I medical
 - b. Pre-hire screening by the airline for aptitude and capabilities
 - c. Successfully complete a course of thorough academic instruction and testing on numerous areas of knowledge needed to excel as an airline pilot. This instruction should be received from an accredited aviation program offered by a college or university; the actual number of hours and subjects to be covered in this course should be determined by an Aviation Rulemaking Committee (ARC) which will write new regulations that are required to improve all aspects of the ATP certification process.
 - d. Score a passing grade on a new, improved, and more objective ATP knowledge exam
 - e. Acquire not fewer than 1,500 hours of total flight time and meet all other current aeronautical experience requirements in part 61.159.
 - f. Included in the minimum of 1,500 hours of total time, log at least 200 hours of operating experience and/or flight training time as a flight crewmember in multi-crew operations in multi-engine aircraft and/or simulators.

2. Create a new "restricted" ATP certificate with a "121 Air Carrier Endorsement" to be issued to those pilots who meet all requirements described in number one (1) above, except for age and/or total flight time of at least 1,500 hours. Holders of this certificate would be required to have a Bachelor of Science degree in aviation from an accredited college or university and at least 750 hours of flight time. Certificate holders would be prohibited from acting as pilot in command of FAR part 121 aircraft until all qualifications are met for an unrestricted ATP certificate.

We further recommend that FAR part 121 be amended to require that:

- Those pilots already engaged in airline service at the time of the new rule's effective date would be "grandfathered" from the new rules.
- All pilots, prior to serving as pilot in command of FAR part 121 aircraft, hold an unrestricted ATP certificate with a "121 Air Carrier Endorsement," plus have at least 12 months of service or 700 hours of airline flight experience at their carrier.
- All first officers upgrading to captain receive thorough classroom instruction on command and leadership skills and responsibilities.

Pilots engaged in non-part 121 operations which require an ATP could continue to use today's part 61 rules to obtain that certificate.

The military and most, if not all, of the accredited institutions that offer flight programs have academic and flight training programs that would meet or exceed our recommended requirements.

Our recommendations for improving pilot training and licensing would permit several paths for obtaining either an unrestricted or restricted ATP with "121 Air Carrier Endorsement," which would include the following:

- Rated military pilot – Credit military certification towards an "121 Air Carrier Endorsement" on the ATP, either restricted or unrestricted, based on flight time, age and experience of the holder. No additional academic instruction would be required, although demonstration of knowledge of civilian operations would be required and a minimum of 200 hours of operating experience and/or flight training time in multi-crew, multi-engine aircraft/simulators would be necessary.
- Holder of ATP certificate under today's part 61 requirements – Obtain unrestricted ATP with "121 Air Carrier Endorsement" after completing accredited aviation academic instruction and at least 200 hours of operating experience and/or flight training time in multi-crew, multi-engine aircraft/simulators.

- Holder of commercial certificate under today's part 61 requirements – Obtain unrestricted or restricted ATP with "121 Air Carrier Endorsement" after acquiring required accredited academic instruction and flight time, as appropriate.
- Anyone – Obtain necessary aviation academic instruction from an accredited college or university, and obtain required operational flight experience/training time as described above.

Question 1B. *If a part 121 air carrier pilot does not hold an ATP certificate, should he or she nevertheless be required to meet the ATP certificate aeronautical knowledge and experience requirements of § 61.159, even if he or she is serving as SIC? Why or why not?*

These pilots should meet the enhanced ATP aeronautical knowledge and experience requirements to be contained in a new section of part 61 as described above. The current ATP certificate knowledge requirements are inadequate for modern part 121 operations and should not be used as a standard for future airline-endorsed ATP licensing requirements.

Question 2A. *Are aviation/pilot graduates from accredited aviation university degree programs likely to have a more solid academic knowledge base than other pilots hired for air carrier operations? Why or why not?*

As is discussed above, we believe that the answer is "yes." First, in order to graduate from a university with an aviation degree, the individual must have an aptitude that enables him or her to progress through the program. As a result, screening will naturally ensue as part of the acceptance process and continue throughout the program of study. Second, an accredited university's academic program will very likely be more in-depth on the knowledge requirements currently outlined in the regulations, provide more up-to-date instruction on technology, operations, and the operating environment, and produce a better-rounded individual. Third, academic training is best reinforced when flight training is conducted at the same university.

Question 2B. *Should the FAA consider crediting specific academic study in lieu of flight hour requirements? If so, what kind of academic study should the FAA accept, and to what extent should academic study (e.g., possession of an aviation degree from an accredited four-year aviation program) substitute for flight hours or types of operating experience?*

We believe very strongly that the FAA should give much greater emphasis to academic instruction for future airline pilots. The agency should write new regulations which require all future airline pilots to (1) hold an ATP and (2) successfully complete an accredited course of aviation academic instruction from a college or university to obtain that certificate.

We believe that it would be reasonable to develop a method of establishing equivalence whereby academic instruction from an accredited four-year aviation program could be substituted for a certain number of flight hours. In today's economic environment, there are very limited opportunities for pilots to build airline-pertinent flight time, which underscores this viewpoint. Fewer hours of flight experience could be offset by a pilot obtaining a solid flight education and flight training geared specifically toward air transport flying. We suggest that successful completion of at least a Bachelor of Science degree in an aviation curriculum from an accredited university program – combined with air transport-specific flight training – could require as few as 750 hours of total flight time to include not fewer than 200 hours of operating experience and/or flight training in multi-engine aircraft/simulators in a multi-crew environment.

Question 2C. *If the FAA were to credit academic study (e.g., possession of an aviation degree from an accredited four-year aviation program and/or completion of specific courses), should the agency still require a minimum number of flight hours for part 121 air carrier operations?*

Yes. As stated above, obtaining an unrestricted ATP with a "121 Air Carrier Endorsement" should require at least 1,500 hours of flight time. A first officer holding an unrestricted ATP would, per our recommendations, fly at least 700 additional hours as a first officer, and therefore have not fewer than 2,200 hours total time before upgrading to captain.

Some have suggested that, regardless of academic training, the FAA should require a minimum of 750 hours for a commercial pilot to serve as SIC in part 121 operations. Is this number too high, or too low, and why?

We believe that the optimum condition is for all airline pilots to hold an unrestricted ATP with a "121 Air Carrier Endorsement;" the requirements for that new certificate are described above. However, ALPA will support the issuance of a restricted ATP with a "121 Air Carrier Endorsement" to be used by first officers provided that all ATP-related qualifications are met, except for the age-23 requirement and 1,500 hours of total time. We believe that 750 hours would be a minimum amount of flight experience to be issued a restricted ATP certificate with the "121 Air Carrier Endorsement," but we strongly disagree with merely increasing the number of flight hours as a means of improving standards for new airline pilots. A solid foundation of aviation-specific academic instruction should be required for all future airline pilots.

Question 3A. *Should the FAA propose a new commercial pilot certificate endorsement that would be required for a pilot to serve as a required pilot in part 121 air carrier operations? Why or why not?*

As we have said above, we fully support the concept of a new "121 Air Carrier Endorsement," but it should be applied only to the ATP and restricted ATP certificates, not the commercial certificate. We agree with comments made by legislators in hearings last year: airline pilots should hold ATP certificates. The current issuance of the same type of commercial certificate for all types of for-hire flying – from banner towing to part 121 jet operations – is confusing and does not account for the very different levels of expectations and responsibilities of very different types of operations. We believe that the FAA should continue to issue commercial certificates, but they should not be acceptable for part 121 flying, per our comments above.

Question 3B. *If so, what kinds of specific ground and flight training should the endorsement include?*

This question is answered above.

Question 3C. *The FAA expects that a new endorsement would include additional flight hour requirements. At a minimum, the FAA requests comments on how many hours should be required beyond the minimum hours needed to qualify for a commercial pilot certificate. Some have suggested that the FAA require a minimum of 750 hours for a commercial pilot to serve as SIC in part 121 operations. Is this number too high, or too low, and why?*

This question is answered above. We do not support the concept of an airline endorsement for use with a commercial license.

Question 3D. *The FAA is considering proposing to require operating experience in a crew environment, in icing conditions, and at high altitude operations. What additional types of operating experience should an endorsement require?*

Airline-related ATP training should include high-workload environments, mountainous terrain, low-visibility environments and other types of experience which can be encountered in part 121 operations. Flight training for these requirements could be difficult or impractical depending on the location where it is given (e.g., icing training in Hawaii). At a minimum, the restriction on an ATP certificate with a "121 Air Carrier Endorsement" should not be removed prior to the certificate holder obtaining relevant training and experience as we have described above.

Question 3E. *Should the FAA credit academic training (e.g., a university-awarded aviation degree) toward such an endorsement and, if so, how might the credit be awarded against flight time or operating experience? We are especially interested in comments on how to balance credit for academic training against the need for practical operating experience in certain meteorological conditions (e.g., icing), in high-altitude operations, and in the multi-crew environment.*

This question is answered above.

Question 4A. *Would a carrier-specific additional authorization on an existing pilot certificate improve the safety of part 121 operations? Why or why not?*

We do not see the value of a "carrier-specific" endorsement on ATP certificates. However, if the carrier has a unique type of operation, we would recommend additional training be provided by that carrier on subjects specific to their operating environment, aircraft, dispatch, etc. Consistent with our response to question 3D, we support any additional training that the airlines give to help their pilots operate more knowledgeably and safely in all conditions that may be encountered during line operations.

Question 4B. *Should the authorization apply only to a pilot who holds a commercial certificate, or should it also apply to the holder of an ATP certificate?*

Any such additional training should apply to any pilot flying for the carrier.

Question 4C. *Should such an authorization require a minimum number of flight hours? If so, how many hours should be required?*

It is not clear from the ANPRM what the authorization would permit the certificate holder to do that would be different from today's regulations. It does not appear that there would be any advantage to establishing a minimum number of flight hours in order to receive the authorization.

Question 5A. *Can existing monitoring, evaluation, information collection requirements, and enforcement associated with pilot performance be modified to improve pilot performance?*

In our view, there is no need to modify existing monitoring, evaluation, and information collection requirements, but there is a need to expand the use of established voluntary safety data collection programs. These programs include flight operations/quality assurance (FOQA), implementation of safety management systems (SMS) and non-punitive reporting programs such as the Aviation Safety Action Program (ASAP); line-operations safety audits (LOSA), pilot mentoring programs, and many others. ALPA

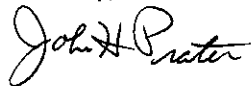
is strongly opposed to regulatory enforcement as a means of enhancing safety or improving pilot performance; we believe that it actually has the opposite effect.

Question 5B. *If so, what specific modifications should be considered?*

This question is answered above.

We appreciate the opportunity to provide our comments on this most important initiative. In order to address these concerns expeditiously, we urge the FAA to create an Aviation Rulemaking Committee (ARC) to write a proposed new rule to amend parts 61 and 121 as we have described.

Sincerely,

A handwritten signature in cursive script that reads "John H. Prater".

John H. Prater, President

Attachment

11

ALPA WHITE PAPER

AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

1625 Massachusetts Avenue, N.W., Washington, D.C. 20036
703-481-4440 ■ MEDIA@ALPA.ORG ■ WWW.ALPA.ORG

Producing a Professional Airline Pilot

Candidate Screening, Hiring,
Training, and Mentoring



Air Line Pilots Association,
International

September 2009

**Producing a Professional
 Airline Pilot**
*Candidate Screening, Hiring,
 Training, and Mentoring*

Table of Contents

Executive Summary..... i

Introduction..... 1

The Need to Improve Pilot Screening, Hiring, Training, and Mentoring..... 3

Training Providers..... 10

Conclusions..... 13

Recommendations 16

Appendix 1, Typical Pilot Career Progression..... 20

Appendix 2, Comparison of Licensing Requirements 21

Appendix 3, Examples of Accidents in Which Pilot Training and Performance
 Deficiencies Were Identified..... 22

Executive Summary

Since the tragic events of September 11, 2001, a number of factors have converged that challenge the assumptions underlying the current processes used for airline pilot screening, hiring, training, and mentoring. The purpose of this paper is to explore the *status quo* and offer recommendations on ways in which regulators and industry can work together to improve the way industry produces professional airline pilots.

The fallout from September 11 — consolidation, changes in consumer travel habits, and economic uncertainty — has altered the business models of the mainline airlines. These business models now include branded networks that include a greater level of flying being performed by their regional feed partners. Code sharing and fee-for-departure (FFD) agreements create a larger virtual network, and when passengers purchase tickets from a mainline airline, it is very likely, if not certain, that one of their flights will be on a code-share or FFD partner of that airline. Passengers deserve, but in many cases are not receiving, an equivalent level of safety when buying a mainline ticket and flying on code-share or FFD aircraft.

This same industry turmoil has had a negative effect on the desirability of the airline pilot career. Career quality and uncertainty combined with a markedly changed pilot-hiring pool has created additional challenges for airline-pilot hiring practices. In short, many pilots in the current pool of applicants lack the level of experience that generations of pilots ahead of them had when they came into the airlines. In many cases, airlines have not adjusted to hiring

Producing a Professional Airline Pilot

Candidate Screening, Hiring, Training, and Mentoring

less experienced pilots resulting in deficiencies in airline pilot applicant screening, as well as subsequent pilot training and mentoring and ultimately pilot performance. Pilot qualification requirements and regulator oversight of airline pilot training in the United States and Canada have not kept pace with these industry changes.

Today's archaic regulations allow airlines to hire low-experience pilots into the right seat of high-speed, complex, swept-wing jet aircraft in what amounts to on-the-job training with paying passengers on board. Investigations of recent accidents reveal that safety margins have been eroded at some carriers as a result.

A complete overhaul of pilot selection and training methods is needed. A number of recommendations are made herein that can be effectively used to restore the use of pilot-applicant screening processes, institute enhanced training methods, procedures, and devices, as well as increase mentoring of pilots by their more experienced colleagues.

Introduction

The best and most important safety feature on any airplane is a well-trained, highly motivated and professional pilot. Despite great advances in aircraft technology that have immeasurably improved safety, the flight crew is still responsible for making hundreds of decisions on each and every flight to operate in the safest manner possible. When an aircraft system malfunctions, when severe weather threatens the flight, or when any of dozens of other internal or external influences impact the planned operation, the flight crew must quickly and accurately assess the situation and take appropriate corrective actions. This can only be safely and effectively accomplished by pilots trained to the highest standards.

The phrase "low-experience pilot" is used extensively in this paper. As used herein, it refers specifically to a pilot who is hired by an airline to operate the controls of an aircraft with limited or minimal operational knowledge, skills, professionalism, and/or proficiency to do so in a manner that does not compromise safety. It is a subjective definition by design. A high-time pilot may, for example, be a "low-experience" airline pilot if nearly all of his previous flight time has been accumulated in small, slow, single-engine aircraft. A low-time pilot may *not* meet the definition of a "low-experience" pilot if, for example, he or she has had sufficient education, training, and flight time in transport category aircraft or simulators, and brings a very professional approach to the flight deck.

A distinction is also made between airline flying and all other types of flying, a distinction that the Federal Aviation Regulations do not consistently make. For example, a pilot who obtains a commercial pilot's license



Producing a Professional Airline Pilot

Candidate Screening, Hiring, Training, and Mentoring

by meeting just the barest minimum requirements may legally be employed by a banner tow company, a sightseeing operation, or as a first officer at an airline. However, the safety of the traveling public demands that airlines hold their pilots to the highest possible standards. Airline pilots should be held to a higher standard of competency, knowledge, and training than pilots in other flight operations.

Flying today's complex airline aircraft in very congested and complicated airspace is a challenging undertaking by even experienced pilots. For reasons that will be discussed in this paper, low-experience pilots are hired by some airlines and expected to operate in these conditions without the benefit of learning the art of airmanship and gaining experience under the tutelage of veteran pilots over a protracted period as was historically the case.

Not surprisingly, these pilots, who perform as well as their experience, knowledge, and skills will permit, often exhibit deficiencies in the following areas, which ultimately impact safety:

- The ability to resolve differences between a flight simulator, which may be used in a majority of flight training, and an actual aircraft carrying passengers.
- Ability to configure the aircraft in a timely manner and in accordance with company procedures under a variety of conditions and situations.
- Achieving a stabilized approach by maintaining strict airspeed and vertical path parameters when ATC gives a clearance to conduct a visual approach.
- Adapting to last-minute changes required by ATC, or rapid changes in weather conditions, especially near the airport in high-workload situations.
- Demonstrating situational awareness during line flight operations.
- Ability to efficiently and effectively communicate and understand ATC voice communications while operating the aircraft.
- Ability to prioritize and integrate company dispatch requirements and maintenance reporting tasks into the operation of the aircraft with passengers on board.
- Acting in a professional manner at all times.



Deficiencies can place an extraordinary amount of pressure on the captain, who may not have a great deal of flight experience him/herself, to instruct and mentor while performing other requisite duties.

The Need to Improve Pilot Screening, Hiring, Training, and Mentoring

In order to improve pilot performance there must first be an understanding of the current challenges surrounding pilot workforce and training issues including regulatory shortcomings, and airline screening, hiring, training, and mentoring practices.

The Impact of the Mainline Airlines' Business Model

Mainline airlines are frequently faced with pressures on their marketing plan that result in the use of their regional feed code-share or FFD partners, whether it be economic, passenger demand, or essential air service. These code-share or FFD airlines provide this service and feed the mainline carriers through their hub cities. Before the practice of code-sharing or FFD with regional partners, virtually all flying was done by the pilots of that airline. The pilots of the airline were all trained to and met the same higher-than-minimum regulatory standards.

Code-share and FFD agreements typically result in the mainline carriers exerting a great deal of pressure on the regional airlines to provide their service at the lowest possible price. The mainline airlines grant these outsourcing code-share and FFD contracts to the regional carriers for short periods (e.g., two to seven years). As a result, the overriding concern by the regional carriers has become lowering costs to today's substandard levels to prevent being replaced by another airline at the end of their contract. Most recently, some larger regional carriers have subcontracted with smaller regional airlines to operate these routes for them. This results in the mainline carrier's brand name and paint scheme being used by a third party. In some extreme cases, airlines are outsourcing a majority of their routes to regional airlines and furloughing their own pilots. This in essence is replacing their experienced pilots with low-experience pilots flying for the low-paying regional operator, all under the livery of an established brand. This creates a very unstable career environment for pilots, resulting in cycles of furloughs and terminations, stress, and fatigue.

Aircraft leasing and fuel costs are relatively fixed expenses, which leaves labor and training costs as variables in which the smaller carrier may have some ability to decrease its costs to service the route.

It is not uncommon that training at such carriers is conducted only to FAA-required minimums. However, these low-experience pilots obviously need more training than more experienced airline pilots to gain equivalent knowledge of the operating environment, aircraft, and procedures before flying the line.

Regulators should require that airlines implement Safety Management Systems (SMS) to develop a safety culture that develops mitigations to the risks created by the main-line business model.

The Changed Airline Entry-Level Pilot Demographic

Entry-level pilots hired by the airlines over the past few years in the United States and Canada generally have less experience than the pilots that airlines hired in prior years. In some cases,

Producing a Professional Airline Pilot

Candidate Screening, Hiring, Training, and Mentoring

pilots barely meet regulatory minimums as commercial pilots. As explained in this paper, unless significant changes are made, this trend of hiring pilots with less and less experience is expected to continue well into the future.

The number of people pursuing a career as an airline pilot has decreased significantly because of the high cost of training, low initial pay, and uncertain career prospects. The military, once a reliable source of highly experienced pilots, now trains considerably fewer pilots and retains more of its pilots who choose to remain in the service.

Because there are fewer experienced pilots available for hire, many airlines have lowered their minimum hiring requirements. In some cases, the hiring requirements have been lowered to the minimum allowable to acquire a commercial pilot license (see Appendix 2).

Historically, airlines have required thousands of hours of flight experience before they would consider hiring a pilot to serve as a first officer. Although even the major airlines have hired low-time pilots when the pool of experienced pilots was diminished (e.g., during Vietnam War), they were hired as flight engineers and they learned the trade by watching highly experienced pilots operate the controls. Once employed, the pilot progressed by system seniority, which offered the advantage of exposing the pilot to a variety of aircraft experiences, while being mentored by senior pilots, prior to being awarded a captain's position. However, there are few flight engineer positions remaining, and the overall pilot progression has undergone a significant compression at many carriers (see Appendix 1).

The regional airlines, and more recently some mainline carriers, are now accepting pilot candidates with much less flying experience than before. Some airlines are employing pilots who possess the bare minimum licenses and ratings to fill the right seat while carrying passengers on board. In addition, the rapid progression to captain at some airlines, due to pilot turnover, means that opportunities for mentoring by seasoned pilots have been significantly reduced. Although many airlines are presently furloughing pilots due to the recession, the long-term forecast is for greatly increased hiring to start soon and continue for many years. The airline industry is struggling with how it will find enough pilots to fill the needs. According to Boeing Training and Flight Services (previously called Alteon), airlines around the world will need to hire some 367,600 pilots, 17,000 per year, between 2005 and 2024 just to support new aircraft deliveries.¹ According to Boeing, no region of the world will need more pilots than North America over the next 20 years. The U.S. and Canada have about 64,000 jetliner pilots today, but will need more than 128,000 by 2025.²

Ultimately, working conditions, compensation, and benefits will need to improve significantly in order to draw a sufficient number of new pilots into the profession. New training methods alone will not be able to attract enough people to the profession to fill the projected pilot needs through 2025.

¹Robert W. Moorman, "Express to the Sky," *Air Transport World*, March 2007.

²James Wallace, "Boeing Unit Tries to Speed Pilot Training to Fill High Demand," *Seattle Post-Intelligencer*, April 30, 2007.

Producing a Professional Airline Pilot

Candidate Screening, Hiring, Training, and Mentoring

Weakened Pilot Applicant Screening

Many airlines in the past had an extensive screening process that included background checks, psychological tests, academic knowledge tests, simulator flying skill evaluations and medical exams. Over the past several years, airlines have phased out many of these screening processes due to their associated costs, and because it has become increasingly more difficult to find an adequate number of qualified pilots.

However, those processes helped the airlines select only the individuals who were qualified and exhibited the qualities to be motivated, safe, and professional pilots. Pilots who did not possess these qualities were not hired. It is inappropriate to lower the hiring standards to compensate for the lack of individuals with those qualities. Airlines need to return to the practice of using appropriate and thorough screening processes to help ensure that their new-hires have the skills, knowledge, and professionalism necessary to fly scheduled operations.

Inadequate First Officer Regulatory Requirements

The U.S. Federal Aviation Regulations (FARs) and Canadian Aviation Regulations (CARs) are less rigorous than their European counterparts concerning certification requirements for pilots who may be hired as commercial airline pilots (see Appendix 2). The U.S. and Canadian regulations require minimal academic achievement and, depending on the training certification regulation used, only 250 and 200 hours respectively of total flight time, with none of it required in the type of aircraft or operating environment that today's new-hire airline pilots will experience. When those regulations were written, which have not been significantly revised in decades, it was never envisioned that they would be used as minimum requirements for new-hire first officers on highly complex turbine-powered aircraft.

U.S. FAR 121.437(b) requires that pilots acting as second-in-command (SIC) of aircraft requiring two pilots possess at least a commercial pilot certificate, an instrument rating, and an appropriate class rating such as a multiengine class rating but not a type rating. Until recently, this applied to both domestic and international operations. However, International Civil Aviation Organization (ICAO) Annex I, Chapter 2, paragraph 2.1.3.2, establishes an aircraft type-rating standard for both the captain and SIC. The FAA elected not to follow this standard for many years under the requirements of FAR 121.437, which only required a type rating of the captain.

In 2004, the FAA, in an effort to conform to ICAO standards, began requiring that all pilots who fly internationally as a required crewmember have an SIC type rating. These "SIC type ratings" ensured that both captains and SICs held the appropriate certificates under ICAO standards when operating outside of the United States. For those who fly only domestically, the SIC has the option of not completing the full type-rating requirements and receive an "SIC Privileges Only" type-rating endorsement instead. There is no practical test required for the issuance of the "SIC Privileges Only" pilot type rating.

While ICAO-compliant, not all regulators require an equivalent amount of academic study and testing to qualify for a Commercial Pilot License (CPL). As already mentioned, the Joint

Producing a Professional Airline Pilot *Candidate Screening, Hiring, Training, and Mentoring*

Aviation Authority (JAA), now called the European Aviation Safety Agency (EASA), is an excellent example. The single biggest difference between EASA and FAA and Transport Canada (TC) standards for the CPL are their respective knowledge requirements (see Appendix 2). The FAA and Transport Canada theoretical knowledge requirements are simply not as demanding. For example, the FAA has no minimum number of hours for ground school; TC has 80 hours, whereas EASA requires 500 hours. In addition, EASA has multiple written exams, while FAA requires only one, which is a single multiple-choice exam that can be completed in a very short time. Sitting for the EASA written exams requires approximately 30–40 hours. The FAA actually publishes its written-exam questions, and vendors legally provide what they believe to be the correct answers. This allows a student to buy a book and memorize the questions and answers without ever actually studying the material from which the questions were drawn. EASA, conversely, does not provide its written exam questions in advance.

Similar discrepancies exist for the Airline Transport Pilot License (ATP) (see Appendix 2). While the FAA and TC specify no minimum number of ground school hours, EASA requires 750 hours. Again, there are multiple exams by EASA and only one by the FAA and TC, with the FAA once again publishing its exam questions and vendors providing the likely answers. In addition, because the FAA and TC require only a single written exam for each license, it is theoretically possible a pilot could miss all questions in a particular area (e.g., weight and balance) for a license and still pass and become an airline pilot. During the flight skills test, ICAO's ATP standards require an applicant to perform as pilot-in-command (PIC) of a multi-pilot, multi-engine airplane with a copilot, and EASA's ATP requires the applicant to show proficiency in operating as copilot on multi-pilot, multi-engine airplanes. Neither the FAA nor TC requires an ATP applicant to show proficiency in a multi-pilot airplane, either as a copilot or as the PIC with a copilot.

It is clear that FAA and TC regulations governing the training and education of future airline pilots are inadequate. We believe that not only will more rigorous academic and skills instruction, testing, and evaluations increase pilot performance, they will also help to cultivate pilot professionalism. ALPA believes that the current training and testing required for a pilot to qualify as a first officer for a passenger or cargo airline operating under FAR Part 121 or CAR 705 should be more rigorous. In addition, the "SIC Privileges Only" type rating should be eliminated from the FARs.

The current FAA regulations put first officers' recurrent training on a 12-month schedule whereas captains are on a six-month schedule. Compounding this disparity is the fact that some U.S. airlines forgo actual recurrent "training" in the simulator on every other recurrent cycle, or in some cases even more often. When the recurrent training is skipped, both captains and first officers are merely given a simulator flight test called a proficiency check (PC) without any warm-up practice time to get used to the differences between the simulator and the aircraft and more importantly without any actual training provided, only evaluation.

With the first officers' 12-month training cycle and alternate sessions being merely a PC, it could be two years before a first officer received any flight training in a simulator following his

or her initial training. The effective result, if every other recurrent training event is replaced with a PC, is that first officers receive one-fourth of the training that captains receive in that two-year cycle before a first officer receives additional flight training. Even if every recurrent training event included flight training in a simulator, the first officer still receives only half as much training due to his or her 12-month schedule. A good step toward providing better training for first officers is the FAA's Notice of Proposed Rule Making (NPRM) published in January 2009, which proposes nine-month training intervals for both captains and first officers and requires pairing captains with first officers for training and evaluation.

Airline Training Programs—Not All Created Equal

There is a growing realization based on what has been learned in a few more recent accident investigations (see Appendix 3) and also from our members' experience, that some of the carriers' training programs are insufficient to ensure that their pilots can perform all their duties proficiently before flying with paying passengers on board. Some airlines, rather than training to competency and proficiency, are training to FAA minimums, and safety issues are becoming apparent as a result. The traveling public deserves, but is not receiving, One Level of Safety among all airlines.

Few airlines tailor their training programs based on their new-hires' past flying experience. The low-experience new-hire pilot's background should be taken into account by the airlines and training adjusted accordingly. "One-size-fits-all" training is inadequate in today's environment.

Some airlines—including both mainline and regional carriers—provide their pilots training that far exceeds the minimal requirements of the regulations. When pilot experience at the new-hire level dropped, these airlines extended their training programs and increased, by a factor of two or more over that required by regulations, the initial operating experience (IOE) program for these pilots to compensate. However, some carriers who hire low-experience pilots are not adjusting their training accordingly.

The airlines hiring low-experience pilots typically do not offer compensation packages enabling them to attract experienced pilots. Such carriers often serve as the "training" grounds for new-entrant pilots who need to build time before applying to one of the mainline carriers. In addition to compensation, another aspect that can suffer at these carriers is the training that they provide to their pilots. This is of significant concern since the training for low-experience pilots should be more thorough than the training programs for experienced pilots.

Airlines with very thin profit margins may have increased pressure to treat training as a cost item because they are unable to quantify the return on investment to train beyond regulatory minimums and pressure from competing airlines that have already cut their costs through reduced training. Given the high cost of training, airlines are motivated to provide it as quickly and cheaply as possible. It is an undesirable race to the bottom for minimum-required training.

Another factor complicating the effort to train pilots to proficiency is that over the past few decades, there has been a significant increase in the number of specific items that must be trained and/or checked with no change in the minimum hours required by regulation for the training. Simulator periods that were scheduled for four hours 40 years ago are still four hours in length, despite the fact that now there are many more topics that must be covered than before—such as Controlled Flight Into Terrain (CFIT), Traffic Alert and Collision Avoidance System (TCAS), Head-Up Displays (HUD), Category II/III operations, wind shear, area navigation (RNAV), upset recovery training, and more. This makes it difficult to find time to practice maneuvers that were performed marginally but to the required minimums.

At one regional airline, initial CRJ training is comprised of nine Full Flight Simulator (FFS) periods in 36 hours of training. For purposes of comparison, in 1979 a major airline's DC-9 transition course was comprised of 19 FFS periods, or 76 hours, followed by an airborne element of three takeoffs and landings.

It should be noted that the NPRM mentioned previously proposes that recurrent simulator training be increased from four hours to eight. If adopted, this will help ensure more thorough training and put airlines already training to well above minimum requirements on a more level playing field with those training to minimums. Some of the pressure to decrease training at airlines already providing more than the minimum required training may be relieved. This pressure is caused by competitors cutting their costs by training only to the minimum requirements and potentially allowing them to cut ticket prices, but at the expense of pilot training and ultimately safety.

Airlines should continually evaluate their training programs and make adjustments where appropriate. This continuous training program improvement effort should include collecting and examining de-identified safety data from the airline's flight operations in a way that will spot deficiencies specific to pilot experience levels. This data should then be used to develop and implement appropriate training improvements in a proactive manner.

Command Training

An airline captain must have skills far beyond simply being able to operate the aircraft from the captain's seat. The captain must be able to organize the efficient cooperative activity of all flight crew, cabin crew, and ground crew to ensure the safe planning and conduct of the flight from gate to gate. He or she must be able to maintain control of situations under adverse conditions and in the face of pressure to compromise standards in the interest of operational expediency. The need to maintain command authority has arguably increased due to the continuing decline in experience levels of other crewmembers.

Airlines should be required to provide specific command training courses for new captains to instill in them the skills to lead on the flight deck. In addition to basic skills such as aeronautical decision making and crew resource management, new captains should receive training to reinforce effective communication, leadership, conflict resolution, and judgment necessary to properly lead a crew, exercise command authority, and maintain the highest levels of safety in the face of internal or external pressures.

Mentoring

Mentoring is a form of instructing in which seasoned pilots share their experiences to help newer pilots increase their proficiency. In many cases, this mentoring takes the form of captains mentoring first officers, but could also be an experienced first officer providing counsel to a new-hire on company policies, piloting technique, aircraft systems, etc. Much of this mentoring can be informal if pilots have the opportunity to interact away from the actual flight, but can and should also be formalized in the interest of transferring the maximum amount of knowledge across experience levels. This training must go beyond just written statements in the airline's manuals.

Captains should be taught to be cognizant of the standardization and tempo of the flight deck. A first officer may be challenged not only by the complexity of the aircraft and operational environment, but also by flying with different captains who may not use similar operating procedures or set a rushed or fast tempo on the flight deck. As a first officer finds himself or herself operating outside of familiar operating procedures, they tend to lose confidence. Captains may incorrectly identify this situation as a lack of proficiency by the first officer.

Airlines should consider as part of their mentoring program incorporating a process that includes a private, non-recorded critique by the captain of the first officer's performance. This should not be used as a means to discipline or punish first officers, but as a way to enhance their training and ultimately their skills and professionalism.

Airline Instructor Training and Selection

Although regulations stipulate that airlines must train their instructors and evaluators, the training given them is often somewhat superficial. Regulators need to increase the ground school and testing requirements to qualify to be an airline instructor. Instructors of low-experience pilots must be thoroughly familiar with flight operations and have considerable knowledge of instructional techniques and curriculum design. Since there is a growing trend toward a shorter period between the acquisition of aeronautical skills and the need to perform as an effective crewmember in airline operations, the instructors and evaluators at airlines also need to possess knowledge in primary training techniques. Future airline instructors may have to possess current flight instructor certificates, and airlines provide training to their instructors to ensure that they maintain the skill set necessary for primary flight training.

Motivated instructors and evaluators are central to preparing well-trained airline pilots. The airlines must staff their Training departments with individuals who have demonstrated abilities to instruct.

Airline Management Structure

Many accidents and incidents highlight pilot training as a contributing factor (reference Appendix 3 for examples). Currently the FAA requires airlines to have five management positions: director of Safety, director of Operations, director of Maintenance, a chief pilot, and a chief inspector. The agency should require another position, director of Pilot Training, to be specifically responsible for the functions, content, and direct oversight of the pilot training program. This function would help ensure that pilot training programs at each airline keep

pace with the changes due to such factors as the experience levels of pilots being hired, new regulatory training requirements, industry recommendations, and other issues.

Training Providers

A person interested in learning to fly has many available options. Most flight training in the United States and Canada is provided through four avenues: colleges/universities; flight training organizations (FTOs); Fixed Base Operators (FBOs); and the military. Each of these various pilot training providers have their own set of positive and negative attributes, but they can all produce well-qualified and experienced pilots.

Historically, pilots have followed one of two predominant paths to be hired by an airline: civilian or military. Both paths required significant commitments of time and sacrifice.

If an aspiring airline pilot chooses the civilian route, he or she obtains a commercial pilot certificate—after earning the private pilot license—plus an instrument rating, multiengine rating, and often a flight instructor certificate, all of which can cost in excess of \$50,000, typically at their own expense. Until recently, after getting these certificates and ratings, the individual might have been able to get a job flight instructing, flying a light twin-engine aircraft for a charter company, freight company, or get a corporate flying position. Once turbojet experience could be placed on the resume, the prospective pilot became competitive enough to apply as first officer with a regional, national, or major airline. This process often took years to complete, with the pilot gaining a wide variety of experience in the process (see Appendix 1). However, in the last few years, this career path has been severely truncated due to a shrinking economy and fewer opportunities to build flight time. Because some airlines are reducing their hiring requirements to just the regulatory minimums, civilian pilots are being hired without the experience they used to get prior to flying for an airline.



Pilots who choose the military route undergo a disciplined flight training program in an environment that is essentially “immersion training” where pilot candidates do nothing but flight and academic training daily for periods often exceeding a year. Following that, they then gain valuable flight experience, oftentimes in high-performance jet aircraft, again in an atmosphere of constant training and at no out-of-pocket cost to the pilot. One significant difference between this process and the civilian process is that the military pilots’ salary is fixed regardless of the amount of flight time logged. Often due to limited military budgets or operational needs, a military pilot may log less flying time than his civilian counterpart. Additionally, every military flight has some element of training or evaluation involved, even in

Producing a Professional Airline Pilot

Candidate Screening, Hiring, Training, and Mentoring

combat. In order to maintain pilot proficiency with limited flying time, the military provides a significant amount of ground training when pilots are not actually flying. This takes the form of formal classroom sessions, structured simulator training, and, equally important, “hangar flying” sessions where pilots exchange experiences; that is, undergo mentoring, gaining from each other’s knowledge and each other’s mistakes as well. This produces highly competitive candidates for the airlines when the pilot’s military commitment is completed. Even though fewer actual flight hours may have been gained in the military, the industry has found that pilots from such a rigid training program are well prepared to join the ranks of airline pilots. However, as mentioned earlier, unlike in the past, the pool of available military pilots is smaller, and many of these pilots are choosing to remain in the military rather than leave to fly for the airlines. When one considers that a military pilot may be provided base housing, benefits, and a decent salary, it is certainly logical that those pilots would not leave the military to earn \$16,000 to fly for an airline.

Another method of flight training successfully used by airlines in Europe for many years is called *ab initio* training. Under this scenario, an airline provides all the training required for someone with little or no flying experience to be qualified as an SIC for his or her airline. Essentially, the airline screens, hires, and trains their future pilots from a pool of very qualified individuals in exchange for a work commitment of multiple years. To date, this method has not been widely used by airlines in the United States or Canada. However, this may change as the demand for pilots increases and airlines find it increasingly difficult to find qualified pilot candidates.

Although most FTOs are reputable and produce very well trained pilots, there are some who have earned reputations as “pilot factories” for their propensity to churn out low-experience pilots in a matter of months who exhibit deficiencies such as those mentioned earlier. These training organizations meet current regulatory minimum training requirements, which highlights the inadequacy of current airline pilot qualification regulations. Advantages to these FTOs are that they typically provide the benefit of large training fleets of aircraft and simulators, permanent training facilities, and affiliations with airlines that help pilots progress to permanent employment after completing training. A problem not exclusive to these FTOs, but perhaps more pronounced, is that they typically have a high turnover of instructor pilots because the positions are not viewed as a feasible career. Therefore, instructor positions are just used as a stepping stone toward building the minimum experience requirements for being hired by an airline. This instructor retention problem is more pronounced at the larger academies versus other training providers because of the comparatively large number of students, resulting in instructors’ building time quickly and transitioning to the airlines as first officers in short order. Because of such high turnover, the quality of instruction suffers.

The most desirable benefit to students is preferential hiring offered by the airlines through these FTOs, which permits pilots to gain employment with less flight experience than has historically been required. For the flight schools, the financial incentive is to complete a student’s training in the shortest time and place them with an airline. Some airlines pay fees to the academies to help ensure a steady stream of applicants.

Producing a Professional Airline Pilot

Candidate Screening, Hiring, Training, and Mentoring

While large FTOs have produced many good pilots, they have also exposed weaknesses in the certification and evaluation process. Some academies lack a formal or adequate ground school. Typically, only pre- and post-flight briefings are conducted and minimal ground instruction is given to the students just prior to their certification checkride.

Since some designated flight examiners who work for these large FTOs may make most, if not all, of their livelihood from testing student pilots from a single school, there may be an implicit incentive and/or pressure from the school or airline to pass students in spite of marginal or subpar performance. The FTO may also place some pressure on the examiner to pass marginally performing students. Examiners may be influenced by an FTO's pressure to pass students, knowing that they can be replaced at any time.

Competency-Based Training

In November 2006, the International Civil Aviation Organization (ICAO) amended Annex 1 to include a new grade of pilot certificate called the Multi-crew Pilot License (MPL). The MPL is an alternative to traditional training and licensing methodologies and can train a candidate with no prior flight experience to be a competent flight crewmember. The MPL training program uses a competency-based approach in lieu of the "required-hours" approach found in traditional training methodologies and the FARs/CARs.

The training necessary for a candidate to be issued an MPL or traditional certificates through a similar competency-based process may provide benefits when developed and implemented properly with adequate regulatory oversight. It may be possible to use these concepts and employ other innovative technologies to efficiently train competent flight crewmembers in commercial air operations through a focused and expedited training program. To ensure that adequate experience is received by the pilot through the MPL process, an airline should be linked with an FTO providing such training to pilots to ensure that their SOPs are taught and equipment trained on during the entire training process.

Use of Simulators in Training

Flight simulation has been used for many years to successfully train pilots. Flight simulation has not only improved pilot training, it has also reduced the risk associated with learning in an aircraft while realizing a significant reduction in the expense of training flights.

During the past 30 years, regulations have made allowances for training in flight-simulation training devices (FSTDs) and full-flight simulators (FFS) for training applied to obtaining pilot certificates and airline initial and recurrent training. These devices have improved students' motor skills for learning flight by reference to instruments, automation training, monitoring and management, and the handling of irregular and emergency procedures training. FSTDs have also allowed for the integration of soft-skills training such as Threat and Error Management (TEM), and Crew Resource Management (CRM).

As training continues to move toward total reliance on FSTDs, the advantages of a real-world training environment for pilots will need to be maintained through simulation. This

Producing a Professional Airline Pilot

Candidate Screening, Hiring, Training, and Mentoring

can be achieved to an extent through FSTD technology advances that have improved six-axes-of-motion capabilities, visual capabilities, flight control loading, and use of interactive ATC communications software. Unfortunately, the one element that cannot be created in a simulator is a healthy respect for the potential loss of life and limb that may result from poor decisions and/or airmanship.³

Pilot training via simulators is greatly enhanced through the use of motion because it is essential to recreate the actual flight environment as closely as possible. In a study conducted in 1978, J.R. Hall established that the pilot's acceptance of a simulator for training in lieu of an actual aircraft was dependent on the presence of motion, even if a wide field-of-view visual display system was provided. His research concluded that motion was especially important for instrument flight, since it provides direct and immediate feedback.⁴ Training must be able to mimic the real world in order to determine if the trainee performance level is reduced while dealing with stress and distractions that occur on the line.⁵

A basic limitation of simulators is that they lack fidelity in regimes outside normal flight. Advances in simulator fidelity are necessary so that maneuvers such as recovery from full aerodynamic stalls can be practiced with greater realism.

Conclusions

1. Entry-level pilots hired by the airlines over the past few years in the United States and Canada, as well as around the world, have less experience than did entry-level pilots in the past.
2. One impact of the mainline's business model on regional airline pilots is that it truncates their progression and allows them to become captains more quickly and with less experience than in the past.
3. In the past, low-experience pilots entering the industry would learn a great deal about airline flying by serving as a flight engineer. That position rarely exists on any aircraft in the United States or Canada anymore.
4. Many experienced pilots have left the profession and are unwilling to return because of the unstable career environment that currently exists. In addition, with the projected needs for large numbers of new airline pilots over the next decade or so, it is likely there will not be enough experienced/qualified pilots coming up through the general aviation and military ranks to meet the airlines' demands.

³"The Need for Motion in Flight Simulation," ALPA White Paper Statement of Position, September 2007.

⁴J. R. Hall, "Motion Versus Visual Cues in Piloted Flight Simulation" (AGARD-CP-249). Paper presented at the Flight Mechanics Panel Specialists' Meeting on Piloted Aircraft Environment Simulation Techniques, Brussels, Belgium., April 1978.

⁵P. Tsang and M. Vidulich, Introduction, in P. Tsang and M. Vidulich (Eds.), *Principles and Practice of Aviation Psychology* (pp. 1–18). Mahwah, NJ: Lawrence Erlbaum Associates, 2003.

This situation, coupled with the cost of training and an insecure career path, makes it likely that fewer people will choose the profession. These factors will continue to greatly contribute to a sharply reduced pool of experienced pilots from which airlines may hire.

5. Because fewer experienced pilots are available, numerous airlines have chosen to lower their hiring requirements, in some cases to the regulatory minimums.
6. Current regulatory minima were developed decades ago and were based on the expected career path and experience progression at that time. The environment has changed to where now minima-time pilots are being hired immediately into the pilot seat of swept-wing, high-performance jet aircraft.
7. Aviation forecasts indicate a huge demand for additional pilots in the industry through 2025, which will exacerbate the trend of airlines hiring pilots with very little experience.
8. Low-experience, minima-time pilots struggle to perform their flight duties proficiently. These deficiencies can impact margins of safety and place an extraordinary amount of pressure on the captain, who may also have limited experience and find it difficult to instruct and mentor the first officer while performing other requisite duties.
9. New training methods alone will not be able to attract enough people and produce enough qualified pilots to the profession to fill the projected pilot position openings through 2025. Most airlines do not presently offer an attractive, well-compensated, and stable career path. The piloting career will need to become dramatically more desirable to attract sufficient pilots to the profession to fulfill the projected needs.
10. One-size-fits-all airline training programs are inadequate to address the varied experience levels and resultant needs of pilots being hired today.
11. Airline training deficiencies have been found to be causal factors in several recent accidents.
12. The FAA's regulatory qualification requirements of a first officer are inadequate to ensure that they have the skills and knowledge needed before starting to fly for an airline. More rigorous academic and skills training, testing, and evaluation will improve pilot performance and help to cultivate pilot professionalism.



13. The FAA's recurrent training requirements for first officers can result in them receiving one-fourth the training that captains receive.
14. Regulatory minimums for initial operating experience for new captains and first officers may be inadequate to address the pilot's level of experience and proficiency.
15. Some airlines have reduced or eliminated many of the valuable screening processes used in the past to identify capable and professional pilot candidates.
16. Few airlines provide training on how to mentor less experienced pilots.
17. Although regulations stipulate that airlines must train their instructors and evaluators, the training given them is somewhat superficial. Motivated instructors and evaluators at the airlines are central to preparing well-trained, proficient, and professional airline pilots.
18. A continuous training program improvement effort should include collecting and examining de-identified safety data from the airline's flight operations to identify deficiencies specific to pilot experience levels.
19. Some Flight Training Organizations (FTOs), referred to as "pilot factories," churn out new pilots after only a few months of training. These pilots are hired as SICs immediately upon training completion. The pressure to produce pilots quickly has resulted in low-experience pilots flying the line who demonstrate many deficiencies and compromise safety.
20. Training programs using a competency-based approach coupled with stringent academic curricula in lieu of the "required hours" approach in traditional training methodologies should be explored as a means to better train and qualify those pilots coming into the airlines with minimal flight time.
21. As training continues to move toward greater reliance on FSTDs, the advantages of a real-world training environment for pilots will need to be maintained in the simulated environment. Motion appropriate to the task being trained and/or evaluated is required because it helps replicate real-world conditions and provides a more valuable training experience. In addition, the high-volume ATC communications and dense traffic environments that airline pilots encounter must be replicated in the simulator.
22. Simulators lack fidelity in regimes outside of normal flight. Simulator fidelity advances are needed so that maneuvers like aerodynamic stalls can be practiced in a realistic manner.

Recommendations

1. All airlines' initial pilot training programs should provide sufficient training in the classroom and simulator to provide pilots with the knowledge and skills necessary to perform proficiently prior to initial operating experience (IOE).
2. Airlines should replace one-size-fits-all training with individualized training that focuses on students' weaknesses and compensates for their varied backgrounds.
3. Regulators should ensure that airlines are training their pilots to proficiency in the following areas, which have been identified as particularly problematic for low-experience pilots:
 - a. The ability to receive and transmit radio communications with ATC at high-traffic-density airports.
 - b. The ability to maintain situational awareness of aircraft status and position, meteorological conditions, and proximity to other aircraft when accomplishing multiple tasks during high-workload environments and while performing irregular or emergency procedures.
 - c. The ability to achieve a stabilized approach by maintaining strict airspeed and vertical path limits when ATC gives a clearance to conduct a visual approach.
 - d. The ability to react and improvise within the limitations of the aircraft in order to accept changes from ATC or as dictated by meteorological conditions.
4. Regulators should implement more rigorous academic requirements, including multiple aeronautical knowledge exams to ensure adequate knowledge in all appropriate facets of aviation (e.g., weather, aerodynamics, weight and balance, etc.) for a pilot to qualify as a first officer under FAR Part 121 or CAR 705.
5. FAA should eliminate the "SIC privileges only" rating.
6. First officers should be trained to the same standards and at the same intervals as captains.
7. Regulators should require airlines to develop and implement thorough screening processes to help ensure that those hired have the aptitude to maintain the highest levels of safety, professionalism, and performance.
8. Airlines should provide aircraft training and practice in both manual mode and in varying levels of automated flight modes. An educational focus on remaining vigilant to monitor, track, and manage automation when it is engaged is required.

9. Airlines should provide specific command training courses for new captains to instill in them the skills to lead on the flight deck. In addition to basic skills such as aeronautical decision making and crew resource management, new captains should receive training to reinforce the skills, aptitudes, judgment, and professionalism necessary to properly lead a crew, exercise command authority, and maintain the highest levels of safety in the face of internal or external pressures.
10. Regulators should require airlines to develop formal programs to mentor and assist in the career development of pilots.
11. More extensive initial airline indoctrination training programs, including additional IOE and more frequent line observations, are needed to mitigate the deficiencies that low-experience pilots exhibit.
12. Airlines should collect and analyze operational safety data specific to pilot experience levels on an ongoing basis to develop and implement appropriate training improvements proactively.
13. Regulators should increase the ground school and testing requirements to qualify to be an airline instructor. Airlines should develop and implement improved instructor screening processes and instructor training to ensure that motivated and highly skilled instructors are provided to train their line pilots.
14. Regulators should require that airlines employ a director of Pilot Training who is specifically responsible for the functions, content, and direct oversight of the pilot training program.
15. Regulators should ensure that there is an adequate surveillance and audit program conducted by mainline carriers when they utilize regional airlines in a code-share agreement. This surveillance and audit system should ensure that pilot training by the regional code-share partner produces proficient, professional pilots.
16. Regulators should require airlines to incorporate Safety Management Systems (SMS) to help cultivate an appropriate safety culture that encourages quality pilot training.
17. Training providers that offer flight training programs designed for individuals pursuing a career as an airline pilot should incorporate the following into their curriculum:
 - a. Multi-crew training, including crew resource management, in advanced aircraft with advanced avionics and other aircraft systems (e.g., FMS, turbine systems, aircraft controls, automation, etc.).

-
- b. Sufficient actual aircraft flight time to develop good communication skills with ATC and the ability to demonstrate good aviating skills in the real world.
 - c. Transition training from piston-aircraft to transport-category turbojet aircraft, as needed.
 - d. A strong career track for instructors within their organizations resulting in the hiring and retention of skilled instructors.
18. Regulators, airlines, and training providers should, in consultation with official pilot representatives of pilot representative associations, develop training curriculums that focus on proficiency and academics rather than hour-based licensing minimums.
19. Regulators should require airlines to have a direct link with FTOs providing competency-based (e.g., MPL) training or its equivalent to pilots they plan to employ at the completion of the training program. This link must result in use of that airline's operating procedures and aircraft equipment throughout the training.
20. When training relies primarily on flight simulators, regulators should require motion in the simulators when used for flight training credited toward a pilot certificate, rating or currency, as appropriate to the task.

Simulator manufacturers and aircraft manufacturers should collaborate to enhance simulator fidelity in regimes outside normal flight so that maneuvers such as aerodynamic stalls can be trained, practiced, and evaluated in a realistic manner.

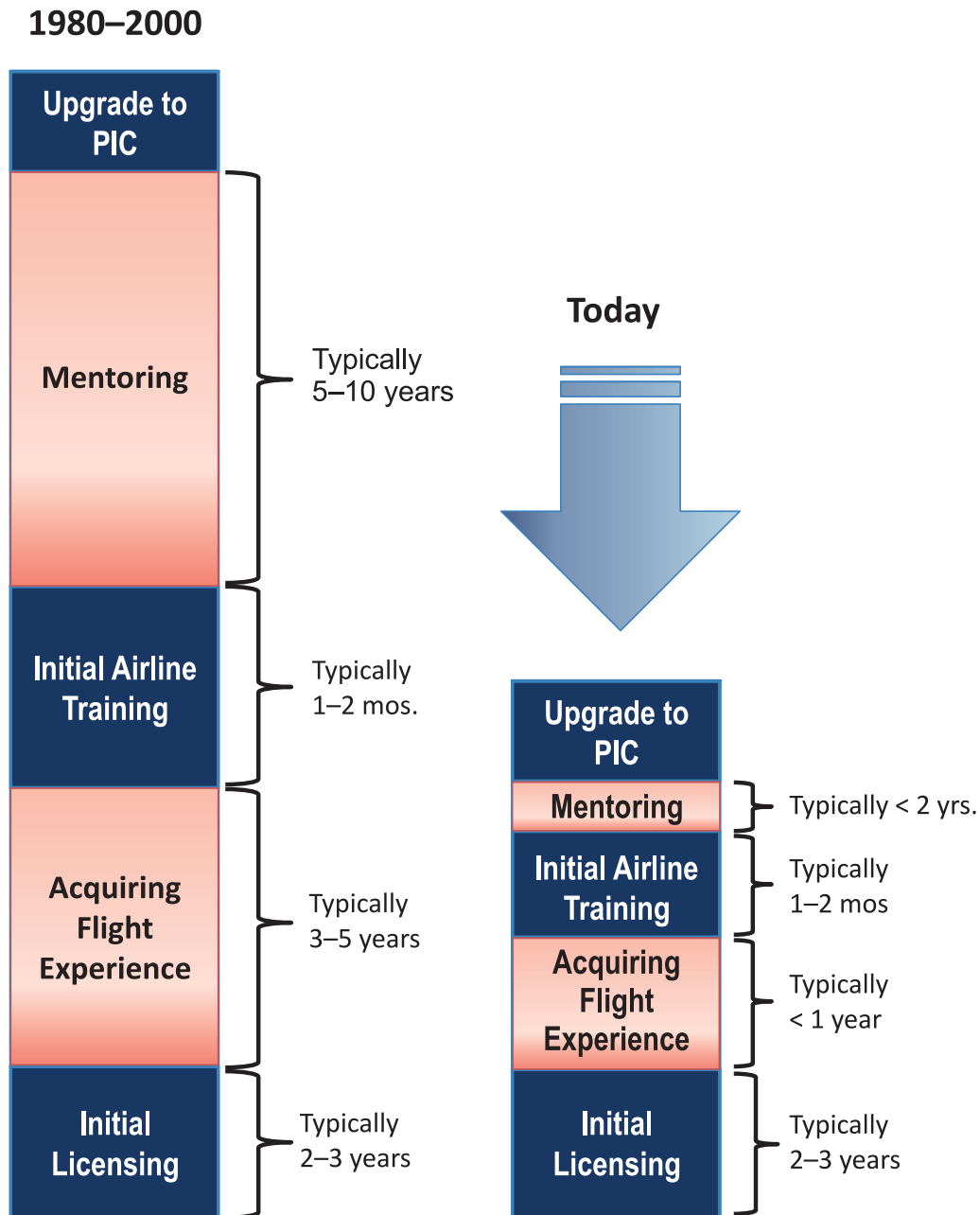


REFERENCES

- ALPA. 2007. “The Need for Motion in Flight Simulation.” White Paper Statement of Position, September.
- ALPA. 2008. “Safety Committee Statement of Position: The Multi-Crew Pilot License,” April.
- International Air Transport Association. 2009. International Training and Quality Initiative, Spring 2009 Report.
- Moorman, Robert W. 2007. “Express to the Sky.” *Air Transport World*, March.
- “Multi-Crew Pilot License.” 2008. ALPA Administrative Policy Manual, Section 80, September.
- O’Hare, D. 2003. “Artificial Seasoning: Enhancing Experienced-Based Training for Aviation.” In G. Edkins and P. Pfister (Eds.), *Innovation and Consolidation in Aviation* (pp. 171–77). Burlington, VT: Ashgate Publishing.
- Tsang, P., and Vidulich, M. 2003. Introduction. In P. Tsang and M. Vidulich (Eds.), *Principles and Practice of Aviation Psychology* (pp. 1–18). Mahwah, NJ: Lawrence Erlbaum Associates.
- Wallace, James. 2007. “Boeing Unit Tries to Speed Pilot Training to Fill High Demand.” *Seattle Post-Intelligence*, April 30.

Appendix 1

Typical Pilot Career Progression



Source: ALPA Training Council 2009

Appendix 2

Comparison of Licensing Requirements

Following is a summary comparison of the training requirements contained in International Civil Aviation Organization (ICAO) standards and recommended practices, and regulations from FAA, Transport Canada, and the European Aviation Safety Agency (EASA). The regulation summaries pertain to the Commercial Pilot License (CPL) and Air Transport Pilot (ATP) license. An ATP is required of all captains in both the United States and Canada; a first officer must hold at least the CPL in both countries.

CPL Elements				
	ICAO	FAA	Transport Canada	EASA/ NPA 200817b
Minimum Age	18	18	18	18
Knowledge/ Ground School Instruction	No specified minimum number of ground school hours	No specified minimum number of hours	Minimum of 80 hours	500 hours
Written Exam	No reference is made to an exam(s), just demonstrate knowledge	> 70% on a single required exam	> 60% on a single required exam	Shall pass examinations
Experience/ Flight Time	200 hrs. total time	250 hrs. total time	200 hrs. total time	180 hrs. total time
Skill/Flight Test	Required	Required	Required	Required

ATP Elements				
	ICAO	FAA	Transport Canada	EASA
Minimum Age	21	23	21	21
Knowledge/ Ground School Instruction	No minimum number of ground school hrs.	No minimum number of ground school hrs.	No minimum number of ground school hrs.	750 hrs. of ground school
Written Exam	No reference is made to an exam(s), just demonstrate knowledge	≥ 70% on single required exam	> 70% on single required exam	Shall pass examinations
Experience/ Flight Time	1,500 hrs. total time	1,500 hrs. total time	1,500 hrs. total time	1,500 hrs. total time
Skill/Flight Test	Required: Perform, as pilot-in-command of a multi-engined aeroplane with a copilot	Required. Single, multi-engine ATPs are offered	Required: Flight test in multi-engine aircraft required	Required: Proficiency to operate as copilot on multi-pilot, multi-engine aeroplanes

Appendix 3

Examples of Accidents in Which Pilot Training and Performance Deficiencies Were Identified

Three notable accidents have occurred within the past five years that have brought scrutiny to the adequacy of airline hiring, training, and mentoring practices.

Following is a brief summary of each accident and a portion of what was learned about their causation.

1. Pinnacle Flight 3701, Oct. 14, 2004, CRJ-200, near Jefferson City, MO—repositioning (FAR Part 91) flight crashed following high altitude stall, dual engine flameout, and no relight:
 - No training on high-altitude stall recognition and recovery techniques
 - Simulator fidelity not robust enough to properly simulate high-altitude stall avoidance and engine relight procedures.
 - No emphasis in training on engine flameout and restart procedures nor was there any effort on the FAA's part to ensure that this was included in training programs.
 - Little training in place to account for crewmembers coming from turboprop aircraft in transitioning to higher performance regional jets.
 - High altitude operations were not discussed or demonstrated during any ground or flight simulator training. Generally, high altitude operations were only discussed in the jet-upset module during initial training.
 - Pinnacle training and guidance on climb procedures was very limited at the time of and prior to the accident. This lack of training created the erroneous impression among pilots that there is no performance limit that might become a factor in the climb.
2. Comair Flight 5191, Aug. 27, 2006, CRJ-100, Lexington, KY—crashed on takeoff from the wrong runway:
 - The investigation found that both pilots involved in the accident were trained as required by the Federal Aviation Regulations and Comair procedures in addition to receiving high marks from fellow pilots and evaluators.
 - In spite of that training, the NTSB found that the crew did not adhere to sterile cockpit procedures, nor did they accomplish any checks to ensure they were on the proper runway.
 - Review of their flight time showed that both pilots were highly experienced by total flight time and flight time in the Canadair Regional Jet, yet became confused by the airport marking and signage.
 - The aviation industry and the FAA have not established standardized flight crew procedures to verify that their aircraft are on the proper runway.

Producing a Professional Airline Pilot

Candidate Screening, Hiring, Training, and Mentoring

3. Colgan Air (Continental Connection) Flight 3407, Feb. 12, 2009, Bombardier Dash 8 Q 400, near Buffalo, NY—crashed on approach (Note: the investigation on this accident continues at the time this document is being published and therefore all comments below are facts uncovered in the investigation and publicly released. There are no conclusions or suggestions of accident causation expressed.)
 - No training provided in full stall recovery
 - No training provided in stick pusher operation and appropriate crew reaction
 - The crew seems not to have noticed a significant, rapid airspeed decay, which suggests a lack, either in experience or training (or both), in basic airmanship. This leads to the concern that current training is based on certain presumptions of underlying basic skills that may not be accurate.