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By Carlos Vergas

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In conclusion, the entire staff at Aviation Consulting Association would like to welcome all of the readers to the Aviation Consulting Journal. We welcome any comments you may have about our articles and welcome any future contributors to our publication.

Relevant Retirement Age for Pilots

By Antonio Soares and Carlos Vergas

Introduction

In 1960, the Federal Aviation Administration (FAA) passed legislation requiring a mandatory retirement age of 60 years old for pilots operating under FAR 121 operations *(*Liner, 1994). Part 121 covers operations of large commercial passenger aircraft, smaller propeller aircraft with ten or more passenger seats, and common carriage operations of all-cargo aircraft with a payload capacity of 7500 pounds (Doganis, 2005). Although Liner's study found no statistical evidence to support the Age-60 rule, the reasons cited for the adoption of the arbitrary number of 60 were medical, economic, and political (Liner).

Background

On Jan. 15, 1958, ALPA signed its first jet contract with National Airlines in anticipation of the airline adding DC-8s to its fleet. It was the beginning of jet age and airlines were scrambling to replace their piston-driven aircraft with jets and turboprops (Wells, 1993). One airline argument was the idea older airline pilots might not be able to adapt to the physical and mental demands of flying at higher altitudes in faster and more sophisticated aircraft.

Another suspected airline argument was the concern for an aging pilot population. Airlines wanted to start jet operations quickly and feared the aging pilot population might hinder the objective. In addition, a fresh supply of military pilots, who received jet training in the military, was available. It was suspected airline managers recognized the savings in time and expense by recruiting military pilots instead of having to train their existing aging pilots on jet equipment.

In 1959, the nation's oldest airline pilot retired from Northwest Airlines at the age of 65 (Francis, 2005). That same year, the FAA estimated approximately 40 active airline pilots were over the age of 60. Although the industry was young, the number of pilots over the age of 60 was expected to rise in the years to come.

In 1959, there was no government regulation prohibiting airlines from using pilots past a certain age. However, several airlines sought to impose their own mandatory-retirement policies on aging pilots. Western Airlines, TWA, and American Airlines tried to implement policies to retire pilots based on age. Pilots of each airline filed grievances to resist the implementation of the policies. In all cases, an arbitrator ruled in favor of the pilots. In the grievance filed against Western Airlines, the arbitrator wrote in his decision that age 60 is in itself not enough to disqualify a pilot from service.

Although the pilots of Western and TWA went back to work, American Airlines refused to comply with the binding arbitration. American's president, Cyrus Smith, chose to ignore the ruling and continued to enforce the company's mandatory-retirement policy. American's disregard for the arbitrator's decision was just one of many issues that led to a 20-day pilot strike that began December 20, 1958. In addition, three American Airlines pilots filed a grievance.

Cyrus Smith appeared on the cover of *Time* magazine and was labeled as the father of commercial jet travel. Two months later, American was the first airline to provide permanent transcontinental jet service. It was thought Cyrus Smith's plan to retire his older pilots would hinder American's ability to expand its jet operations. On January 10, 1959, Cyrus Smith gave in to many of the union's demands. As a part of the strike settlement, Cyrus Smith agreed to reinstate the three pilots who filed the grievance.

Prior to the end of the strike, congress created the FAA. President Eisenhower appointed retired Air Force Lieutenant General Elwood "Pete" Quesada to head the new agency. Cyrus Smith and Elwood Quesada were friends and served together during World War II. This fact raised suspicions about their dealings.

In a February 5, 1959 letter, Cyrus Smith suggested to Elwood Quesada that it might be necessary for the FAA to designate a suitable age for pilot retirement. In addition, Cyrus Smith sent a letter to Air Line Pilot Association's (ALPA) president Clarence Sayen. In the letter, Cyrus Smith requested ALPA help persuade the FAA to establish a mandatory retirement age for pilots. Clarence Sayen refused with the argument ALPA would support by the System Board of Adjustment's decision in favor of the pilots. Cyrus Smith

continued to state his case with the FAA by supporting his argument with a company study of American Airlines pilots. The study found younger pilots required less training time to make the transition from propeller to jet airliners.

The FAA produced two proposals supporting a maximum age of 55 for pilots to receive a type rating in turbojet aircraft and a mandatory retirement age of 60 for all airline pilots. Elwood Quesada convened a panel of experts to review the proposals. The panel supported the mandatory-retirement recommendation and decided against an age-55 turbojet rating limitation. The FAA also rejected the American Airline study and supported the base of its justification of the rule on the medical criteria.

Medical

The FAA conducted five studies on the relationship of pilot age to accidents between 1999 and 2004. The first four studies were requested by the Senate Appropriations Committee, which requested in 1999 the FAA study and provide data regarding relative accident rates based on pilot age. The FAA's Civil Aerospace Medical Institute (CAMI) conducted a four-part study. The four studies were as follows: 1) annotated bibliography of the scientific literature (1990-1999), 2) re-analysis of the Chicago Tribune study data (1999) relating pilot age and accident rates, 3) empirical analysis of accident rates by pilot age for professional pilots holding Air Transport Pilot (ATP) and Class 1 medical certificates between 1988 and 1997, and 4) empirical analysis of accident rates by pilot age for professional pilots holding ATP or Commercial Pilot and Class 1 or Class 2 medical certificates between 1988 and 1997.

The results of the 2004 study conducted by the FAA were similar to those reported in the third and fourth empirical studies. The accident rate increased with pilot age. The patterns of findings across the three empirical studies found there appears to be a relationship between pilot age and accident rate. The studies were limited by the fact the pilot groups were older.

The age 60 limit is within the age range during which sharp increases in disease mortality and morbidity occur. At some age, every individual reaches a level of increased infirmity leading to decreased reliability. However, the age limit for each individual will vary and cannot be predicted. There is a progressive anatomic, physiological, and cognitive decline associated with the aging variable in severity and between individuals. Science studies do not absolutely support the age of 60 as a limit for commercial passenger pilot retirement.

As people age, they experience more illnesses, disorders, and suffer more cognitive decline. Cardiovascular disease rises with age at a higher rate between ages 55 and 65. In addition, cardiovascular disease remains the most frequent cause of death in pilots and the general population. With this increased incidence of cardiovascular disease in the older population, the risk for unexpected events could be a threat to safety of flight. Cardiac events during flight have continued to occur in low numbers over the years.

Other health conditions may increase the number of incidences with aging. Some health conditions present greater difficulties of detection and risk assessment than cardiovascular disease detection. For example, cerebrovascular disease, malignancies, endocrine dysfunction, neurological disorders, psychiatric disorders, and a decline in sensory and motor capabilities are just a few diseases that are difficult to detect. There has been an increasing awareness of the more subtle adverse conditions affecting performance, such as those related to cognitive functioning.

There are many complicated health issues. Pilots take mandatory medical exams once or twice a year depending on ratings. Thirty five-year old pilots take a one time mandatory EKG test. Forty-year old pilots take an EKG test every year. The FAA Flight Surgeons Office tracks the results of the EKG tests. The FAA follows up any discrepancies with the EKG tests. With the frequent medical exams, most medical issues are discovered early. With regard to cognitive issues, those are assessed in simulator and during pilot recurrent training. Other than the EKG testing criteria, the assessment through to the age of 60 is consistent.

Economic

One of the arguments for the mandatory retirement age was the airlines' cost transition to jets. Jets were a new technology (Wells, 1993). The cost and amount of training needed to re-train existing pilots was higher than hiring jet trained military pilots.

Military jet trained pilots were also younger than the existing workforce. Pilot's salaries are directly tied to years of service. A pilot is not compensated based on performance, as with most other professions. Therefore, the jet trained military pilots would earn lower salaries than existing airline pilots.

Airlines transition pilots between different types of aircraft with relative ease today. The systems and performance of newer aircraft incorporate similar technologies. The cost of transitioning in today's dollars is more manageable.

Today's economic conditions have resulted in labor groups conceding wages and benefits. The pilot group has conceded their share of wages and benefits, including reduction in pensions. The Age-60 rule adds an income burden to the pilot group for five years from retirement until he/she is able to collect social security.

Another economic factor that may influence the outcome of this debate is the forecasted pilot shortage (Lowe, 2001). Pilot labor forecasts are predicting a shortage for the next few years. If the shortage is realized, an economic argument may support the mandatory retirement age to be amended with the support from politicians, airlines, and the FAA.

Political

One of the arguments for the FAA implementation of the mandatory retirement age of 60 was American Airlines' political influence in Washington, the relationship of American Airlines CEO with the head of the FAA, and ALPA. The rule still exists because ALPA remains a strong proponent of mandatory retirement. ALPA fought and filed suite against the FAA at first to prevent the implementation of the rule and later to overturn the ruling. ALPA battled for 20 years until the early 1980's when they switched their position (Francis, 2005). ALPA's decision was based on the changing demographics of the pilot union. After deregulation, more airlines were hiring younger pilots. The younger pilots wanted earlier promotions, which were going to be delayed if the older pilots were allowed to fly until the age of 65. Now that the demographics changed, ALPA is revisiting the issue. With a high percentage of mandatory retirements over the next 7 years, the issue was again debated in Congress last year.

Pilots have argued age discrimination. The Age Discrimination in Employment Act of 1967 (ADEA) prohibits employment discrimination against individual unless the employer can establish the limitation, such as age, is an occupational qualification. The FAA has commissioned studies on the age issue. The FAA has not been able to conclude increasing the age limit to 65 would maintain the same level of safety. Since studies have not found the safety margin would not be compromised, the FAA has been successful in maintaining that Age-60 rule as an occupational qualification for pilots.

Conclusion

The age 60 mandatory retirement rule for pilots is an issue that divides many in the pilot community. The issue comes up for review every time pilot demographics change, airline economic hardships are endured, or political environment changes. It is clear from reviewing public comments and relevant literature concerning the Age-60 rule the issue controversial with no right answer.

The medical evidence and supporting tests cannot prove or disprove how different individuals are going to perform between age 60 and 65. The current medical evaluation protocol is rigorous and consistent up to retirement. Performance needs to be evaluated on an individual basis through the same evaluation process.

With an impending pilot shortage, the mandatory retirement age of pilots may need to be amended. The cost of higher salaries for keeping the current workforce employed through the age of 60 may be justified. According to experts, the number of pilots predicted to exit the industry greatly out weigh the entering pilot group. The number of pilots nearing retirement is increasing. This change in demographics could increase the political pressure on Washington, the FAA, ALPA, and air carriers to amend the Age-60 rule.

The International Civil Aviation Organization (ICAO) adopted the Age-60 rule for its member states. ICAO was expected to revise their position because many of their member states have already increased their retirement age to 63 or 65. There are already pilots above the age of 60 flying foreign carriers into United States airspace. Other ICAO countries are proving the same safety margin with pilots above the age of 60. However,

for now the age Congress and the FAA can agree on is 60 years of age.

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Aircraft Maintenance and Scheduling

By Carlos Vergas

Introduction

The airline industry's profitability has fluctuated in the 1960s, 1970s, 1980s, and 1990s (Gritta, Chow, & Freed, 2003) and continues to fluctuate. Sustaining profitability for global airlines has been a problem since 1960 (Doganis, 2003). Both aircraft maintenance and aircraft scheduling strategize for the optimum plan. However, many times optimum individual department plans contradict the overall revenue objective. The organization of the article is in five sections, (a) background, (b) aircraft maintenance planning, (c) aircraft scheduling, (d) problem, and (e) conclusion.

Background

The air carrier industry has falling unit costs, demand growth, and profit losses (Doganis, 1985). The net profit of the airline industry worldwide between 1960 and 1990 did not exceed seven percent (Doganis, 1991). From 1964 to 1967 and in 1978, the airline industry earned over four percent in net profit (Doganis). Between 1960 and 1990, the airline industry produced four periods of net profit (Doganis). From 1990 to 1998, the airline industry produced a net profit of two percent or better in 1996, 1997 and 1998 (Doganis, 2001). Corporate profits grew and beat Wall Street's expectations in 1999 and 2000 (Kalinowski, 2001). In 2002 and 2003, the impact of the terrorist attack on September 11, 2001 in the United States, the economic recession, SARS, and the war in IRAQ were sources for the resulting losses of the airline industry (Gritta, Chow, & Freed, 2003). In 2004, the industry lost $5 billion and air carriers continued to file for bankruptcy (Higgins, 2005).

The airline industry does not use profitability measures widely used by other industries due to the difficulty of estimating real asset values (Doganis, 1991). Airlines have varying depreciation policies, varying equipment lease and purchase policies, and receive government subsidies (Doganis). The profitability measures selected by the airline industry include either annual operating profit as a percentage of total annual operating revenue or total operating revenue as a percentage of operating expenses (Doganis). The annual operating profit method is calculated by the International Civil Aviation Organization (ICAO). Within the annual operating profit measure method, the operating profit does not include interest charges and the net profit includes payment of interest and other non-operating items (Doganis). Using ICAO's profitability measure, the world airlines have experienced six distinctive financial phases between 1960 and 2004 (Doganis, 2001).

During the 1960s, the unit costs declined, profit margins increased, and load factors decreased (Humphreys, 1976). Revenue yields decreased in

the 1960s at a lesser rate than costs (ICAO, 1988). In the 1960s, the fares also decreased at a lesser rate than costs (ICAO).

In 1968, the load factors decreased below 50 percent and unit costs began to rise, reducing the profit margin through 1970 (McDougall, 1988). The period of 1968 to 1975 was representative of cyclical net profits (Doganis, 1991). The airlines reacted with an adjustment to load factors (Doganis). Fuel prices affected the load factor adjustment during the Arab-Israeli war of October 1973 (Maclaury, 1978). The increase in fuel prices continued through 1975 (Maclaury). The world airlines were also affected by inflation, which affected operating costs (Doganis, 1991). The economic recession of Europe and the U.S. affected passenger transport (Doganis). These events combined and pushed many airlines into financial hardship (Doganis).

From 1975 to 1978, the world airlines financially improved with a decrease in fuel prices and other costs (Miller III, 1976). The load factors remained above 55 percent (Miller III). This economic prosperity only lasted three years (Peterson, 1990).

Form 1979 to 1983; airlines were affected by the rise of fuel prices in 1978 (Erfle & McMillan, 1990). The high load factors were not enough to compensate for the decreasing ticket prices (Erfle & McMillan). In 1980, 1981, and 1982, airlines recorded a loss before paying interest (Fraser & Kannan, 1990). Braniff and Laker Airways went bankrupt while other air carriers increased debt or took cash infusions from there respective governments or investors (Lengnick-Hall, Organ, & McFillen, 1985). In 1980, IATA member airlines lost $1,850 million and $1,900 million in 1981 (Doganis, 1991). In 1982, the IATA member airlines lost $1,800 million (Doganis). Singapore Airlines benefited from lower labor costs was profitable during in 1982 (Doganis). The airline industry also experienced a period of liberalization, internationally, and deregulation in the U.S. (Warren & Findlay, 1998).

From 1984 through 1989, the airlines experienced favorable financial performance (Chow, Gritta, & Hockstein, 1988). The airline industry was positively affected by lower fuel prices and an increase in demand from improving world economies (Chow, Gritta, & Hockstein). The financial performance peaked in 1987 and 1988 (Doganis, 1991). Although financial performance improved, airlines were managing debt accumulated during the poor performance of the early 1980s (Doganis). The interest payments for airlines totaled approximately $4 to $4.5 billion (Doganis, 2001). Despite the improved financial performance 1980s, in 1986, the bombing of Libya, the terrorism activity in Europe, and the terrorism acts in the Middle East, resulted in profit losses for multiple airlines with service to U.S. and Europe (Andrews, 1989).

From 1990 to 1993, the airline industry experienced another financial downturn (Doganis, 2001). The fuel prices began to rise and the economic condition in the U.S. and Britain worsened (Meyer & Menzies, 1999/2000). The economic conditions were also negatively impacted by the invasion of Kuwait in 1990 and the war that followed in 1991 (Doganis, 2001). Eastern Airlines, Air Europe, Pan American, Midway, and TEA went bankrupt by the end of 1991 (Doganis). The conditions worsened in 1992 with overcapacity and falling yields resulting in market share battles (Gilson, 2000). From the top twenty largest airlines in the world, only British Airways, Cathay, Singapore Airlines, and Swissair produced a net profit between 1991 and 1993 (Gilson). Asian airlines continued to operate profitably between 1991 and 1993 (Doganis, 2001).

Airlines required capital to survive in the early 1990s (Doganis, 2001). Airlines from the European Union received $10.4 billion in state aid through 1995 (Journal of Economic Literature, 1999). In 1997, Alitalia received $1.7 billion in state aid (Doganis). Other privatized airlines received capital injections from shareholders (Doganis).

From 1994 onward, the airlines began to reduce costs and demand started to rise (Doganis, 2001). The improvement trend continued through 1997 (Costa, Harned, & Lundquist, 2002). In 1998, the airline industry was profitable (Costa, Harned, & Lundquist). Although these were profitable times, annual interest payments for the IATA's members doubled from $1.8 billion in 1988 to $3.6 billion in 1992 (Doganis, 2001).

As the U.S. airlines reached net profits of $6 billion in 1997, the Asian airlines were operating with profit losses (Natalisa & Subroto, 2003). The Asian airlines were affected by economic crisis in the second half of 1997 (Natalisa & Subroto). The

Asian airlines were affected by increasing fuel costs, interest charges and debt repayments (Doganis, 2001). Japan Airlines posted a net loss of $513 million, Korean Airlines lost $424 million, Philippine Airlines lost $253 million and Asiana lost $425 million for the 1997 year (Doganis).

In 1998, the East Asian airlines were unprofitable (Sadi & Henderson, 2000). Cathay Pacific was unprofitable and Philippine Airlines almost went bankrupt after a pilot strike (Sadi & Henderson). In Indonesia, two large domestic airlines stopped operations and Garuda almost ceased to operate.

Although unprofitable East Asian airlines affected the European and North American airline routes to East Asia, 1998 was better than 1997 for these airlines in terms of air carrier profitability (Lederer & Nambimadom, 1998). The profitability was helped by lower fuel prices (Doganis, 2001). Despite the financial success, the airlines were still trying to recover from the poor economic conditions of the early 1990s (Doganis).

In 1999, airlines were profitable despite warning signs by airline chairpersons (Reece & Sobel, 2000). The concern was overcapacity and lower yields (Doganis, 2001). The situation was further affected by domestic air carriers operating with low cost margins in Europe and the U.S. (Doganis). The costs also started to rise with OPEC countries imposing production quotas on oil production (Doganis). The Brent Crude Oil rose from $10.28 per barrel in February 1999 to $28.14 in February 2000 (Doganis). Because the airline fuel prices followed, those airlines that did not hedge fuel prices were influenced (Doganis).

In the period from 2000 and 2003, the airlines experienced another cyclical downturn (Gritta, Chow, & Freed, 2003). It was aggravated by higher fuel prices and a higher supply versus demand problem (Doganis, 2001). Airlines also had to address large debt with banks in order to survive (Treasury & Risk Management, 2001). Several airlines filed for bankruptcy including United Airlines and US Airways (Doganis).

In 2004, the airline industry showed some signs of recovery (Tarry, 2004). The passenger traffic started to increase and there was a better balance between demand and supply (Tarry). The low returns being produce continued to create challenges for attracting capital investment (Tarry). Air carriers continue to be challenged to find savings and optimize operational plans. Aircraft maintenance and aircraft scheduling are two opportunity areas to generate savings and optimize operational plans.

Aircraft Maintenance

Aircraft maintenance planning departments create and optimize plans for executing both line maintenance and heavy maintenance. The intent is to maximize check yield with both line and base checks. Aircraft maintenance planning departments attempt to optimize facility utilization. These departments try to optimize both human resources and material resources. In addition, aircraft maintenance departments try to minimize aircraft downtime.

In the process of achieving the optimum plan, there are several restrictions. Aircraft maintenance departments are restricted by FAA approved maintenance programs. These departments are restricted by facility locations and sizes. Unions and labor force skill sets also pose restrictions during the planning process. Lastly, aircraft maintenance departments are restricted by aircraft availability.

Aircraft Scheduling

Aircraft scheduling departments create and optimize the service schedule, which drives the aircraft schedule. The scheduling departments optimize the flow of available landing slots. These departments optimize market operations, including flight frequency. The scheduling department attempts to optimize the available seats with the ideal flight times.

In the process of achieving the optimum schedule to fly, there are several restrictions. The scheduling departments are restricted by bilateral agreements and airport operations in multiple countries. Available aircraft and markets to serve restrict these departments. Lastly, scheduling departments are restricted by crew rules (both union and FAA mandated) and time zones.

Problem

Aircraft Maintenance's ideal plan, considering check yield, facility use, resource use, and aircraft downtime, often conflict with the

optimum flight schedule. Aircraft Scheduling's ideal plan, considering landing slots, market operations, frequency, available seats, crew issues, and time zones, often conflict with the optimum aircraft maintenance plan. Conflicts could be avoided under ideal conditions, such as aircraft purchase preplanning inputs remaining static, future aircraft schedules not changing, approved maintenance programs not changing, and resources not growing or declining. However, ideal conditions are not reality. Reality is a state of constant movement in both the areas of aircraft maintenance and aircraft scheduling.

Conclusion

To resolve this problem, several things must happen. First, aircraft maintenance planning must accept a culture of fluid input variables. Second, aircraft scheduling must accept a culture of fluid input variables. Both aircraft maintenance and aircraft scheduling must accept revenue optimization as the common goal between both planning areas. Lastly, technology has to bridge the gap between both plans with revenue forecast as the common goal of the system. The technology solution needs to be shared and supported by both planning areas, aircraft maintenance planning and aircraft scheduling.

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