

TURBO-PROPS AIRCRAFTS OF EUROPEAN FLYING COMPANIES

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The aim of the thesis is to provide a comprehensive eyeview of current status and extent of use of turboprop aircrafts by European airlines. The work is divided into three main chapters and several sections. The first chapter presents the theoretical background to the problem. The second chapter analyzes the reasons for the purchase and operation of turboprop aircrafts by European companies, as well as perspectives of their next purchase for the needs of companies. The third chapter presents a summary of today's problems in terms of the European air transport market. All information is summarized by available literature, by type and availability in tabular or pictorial form.

Key words: air transport, turboprop aircraft, regional airline, aircraft fleet, tactical and technical data

1 INTRODUCTION

Regional air transport has a significant role in the development of domestic and foreign markets air transport. Its quality affects customer's decisions to visit destinations. Participants expect shipment transportation services provided a reasonable structure, requiring complex quality services for reasonable price you are willing to pay. The role not only meet the needs of relocation, but also time spent in the aircraft. The key is the availability of target sites - a factor that largely assumed and determines the success of the company in a highly competition. This in short-distance transport flows not only from other air carriers, even in terms of other forms of transport. These differences can be minimized increase in performance, comfort, safety and reliability. It is these links to regional airports can be considered an advantage of particular importance to the development of local economies in the region.

Regional air companies to deploy their lines for which there is less demand and therefore are less busy. Used mainly due to their lower consumption fuel, for short distances and airports with short take-off runways. The work is to use area European airlines turboprop aircraft companies, why and how to classify their lines, as well as the possibility of future purchases.

2 THE THEORETICAL BACKGROUND OF TURBOPROP AIRCRAFT

Turboprop engines use the same than current technology, but turbo offer significantly higher efficiency in temperate decrease speed. Engineers built a turbo engines on the same

principles, but the propeller efficient use of engine control, while the jet engine depends solely on the performance created by fuel in the turbine. Turbo using air from the front of the engine create tension, which pushes the aircraft forward. Turboprop engines are about the same way, but use the same amount again energy produced at the output of the turbine management of the propeller, which pulls the plane forward. The advantage of allowing efficient operation at significantly lower fuel consumption. Advanced aerodynamics and efficiency of turboprops engines provide the best compromise between fuel consumption and speed. In Europe, most turboprop aircraft operated manufacturer ATR, Bombardier and Saab.

2.1 ATR

Currently leading the ATR manufacturer of turboprops in the world second largest European manufacturer of aircraft. Company is constantly striving to maintain and develop their own high standards. ATR is a single turbo aircraft certified ETOPS 120 (conditions governing the operation of the newer twin-engine transport aircraft on routes where the aircraft some point find themselves at a distance greater than 60 minutes flying time from the nearest airport). It allows aircraft to fly to distant destinations, where No other regional aircraft can not fly. ATR aircraft are certified in various areas operations at airports with short landing area, a narrow landing area, untreated (unpaved) landing area, slope tracks up to 4.5%. They also have a certificate of operation in extremely severe natural conditions, as operation in extremely cold environments, up to -54°C , the temperature equal to or less than $+35^{\circ}\text{C}$, sand and

salty environment. ATR 42 aircraft is wing aircraft with two turboprop engines placed under wing. In August 1984, he played first flight ATR 42. The first improved version of the ATR 42 was 300. ATR 42-320 version is identical to the -300, but is equipped with more powerful engines. Another version of the ATR 42-400, which can ride up 48 passengers. This version too is not materialized, because less than a year after its introduction, she was offered to version -500. Machine rises from 457 m to 5182 m in less than 10 minutes, as the travel speed is around 500 km / h. Aircraft ATR 42 are generally able to carry about 50 passengers, where seats are placed on four in a row with the central aisle. ATR 72 is derived from the ATR 42. Both types are equipped with the same avionics and have identical cockpit, allowing the crew having a certificate to fly ATR 42 fly with type 72 without need for retraining. The default is for 68 - 72 passengers, depending on the version and requirements customer, the seats are distributed over four in line with the middle aisle. The first flight of the airplane is held in October 1988. The first version of the ATR 72 - 200, is able to ride a standard 66 passengers, but by adjusting the size luggage compartment can be achieved location to 72 seats. Version of the -210 important for determining its flights to cities with high altitude or very hot climates, and for airports with short take-off runways. A newer version of the ATR 72-500 is from version -210. It differs from it six leaf propellers and some structural the changes. It also has a higher maximum take-off weight and greater range. In the aircraft cabin version provides space to accommodate up to 74 passenger seats.

2.2 Saab

The first commercial aircraft company Saab flew in 1940 and has since created a wonderful series aircraft by their unique abilities and affordability at a fraction of the cost. Saab companies - Scania and Fairchild concluded in 1980 agreement on joint development and marketing of small regional turboprop aircraft. The development SF-340, the emphasis was on simplicity control, maintenance, dispatching, and of course safety. SF-340 was designed for 33-35 passengers and crew dyadic. The first flight prototype took place 25.1.1983. The second

prototype and first serial machine was completed in one year and received the European and American certification. Saab 340 turboprop is universal plane with half the operating costs, provides a peaceful,acious and comfortable place in the cabin. The standard version carries 34 passengers, while the left side are self- a pair of seats right in the aisle between them. At the same time provides the cargo space. Saab 340 is between air passengers favorite due to its flexibility, comfortable and reliable the performance. In 1985 the company began to consider Saab the successor to its successful type Saab 340. It should be 58 place turboprop airplane designed for regional lines to 1800 km and should be competition for emerging regional jets. Cruising speed of the new airplane to be up to 660 km / h and the highest fuel economy was achieved on lines overflight times not exceed 90 minutes. Although it was a new airplane of slightly lower rate than current regional aircraft, its consumption was significantly lower. Saab 2000 is modified and extended version Saab 340. Production Saab 2000 continued rate of three airplanes a month, but more orders lose much. Due to the increasing competition is still current more economical regional aircraft (Bombardier CRJ, Embraer ERJ 145), was at the end of production for Crossair delivered only a few dozen airplanes. The extension allows the body to transport 58 passengers, while the distribution of seats is as follows - on the left are separate seats a pair of right in the middle of the aisle. Simultaneously also has space for cargo. Aircraft provides reliable performance, comfort and service low operating costs. The maximum speed of 665 km / h is one of the fastest turboprop commercial aircraft market. Due to its ability to operate on short runways, high speed climb available and 9,450 m is a powerful tool for developing regional airline markets.

2.3 Bombardier

Bombardier is a global transportation company, which owns a worldwide network of service centers. It operates two high-field Business - Aerospace and Rail right. The company is the third largest civil aircraft in the world. Since 1989, reported market twenty-eight successful new aircraft. De Havilland Canada DHC developed

four-aircraft Dash 7. Although his first years took place in 1975, has about five years later began work on its successor. It all began with Dash 8 aircraft, the project was to beginning in Havilland Aircraft Company of Canada - founded in 1928. The idea to create a regional communications equipment operating from short runways surrounded by obstacles located in urban centers, was born in the 70 years in USA. One of the ideas to increase the capacity of major, major airports have been transferred regional perations to places with short runways. DHC-8 was an instant hit. In response to the demand of modern regional aircraft in the early 80 years appeared on the market number of regional aircraft with similar capacity 30-56 places - ATR 42, Saab 340 and Embaer 120. The original version, named Dash 8-100, flight in 1983. The extended model Dash 8-300 first flew in 1987 and the air lines was said in the second half of next year. In pressurized cabin is a place for 50-56 passengers. The seats are arranged side by side for four the middle aisle. Cruising speed of this version is 436 km / h. Like other companies, Canadian manufacturer of aviation equipment, further modified the dragon the airplane, this time for 70 people and today is the model known as Dash 8-400. Compared to earlier models built received 400 extended cab model and much more powerful engines. With the new drive units, except for much higher speed, has also excellent performance in terms of rate of climb. Q400 is able to cope with competition between regional jet aircraft.

3 THE ANALYSIS OF TURBOPROP AIRCRAFT IN EUROPE

Most regional airlines transport passengers and cargo turboprop aircraft, which are ideal in terms of their capacity, simple and quick service at the airport, and last but not least, thanks abilities to operate at airports that are located in difficult accessible terrain, or have short take-off runway. Reasons European airlines are buying a classified turboprop aircraft on its routes, the economy their operations, as well as prospects for their further purchase, are analyzed in this paper.

3.1 Golden Air

The airline has no plans to expand its own network of tracks, but is always open new opportunities. Fleet consisting of Saab aircraft and ATR remain core airline operation. The company focuses not only on the operation, but and to reduce negative impacts on operations Environment and Sustainable Development through effective use of resources.

3.2 Darwin Airline

Airline's fleet now consists of six Saab 2000 aircraft and two Dash Q400. The company operates no current aircraft. Saab 2000, was selected after an accurate analysis of the available models as ideal to operate from the airport to Lugano main a target destination, and also include among the fastest in its category. Dash 8 - Q400 is very modern, technologically most advanced, fastest and most convenient turboprop aircraft in its category. Dash 8 - Q400 provides speed jet combined with the advantages of turboprop.

3.3 Airlinair

Airlinair specializes in only one type aircraft - ATR, and to ensure efficiency and required performance. As a result, the company placed on the regional aviation market. Currently, aircraft fleet consists of 25 aircraft that are in daily use. Airlinair chose ATR aircraft for their characteristics and respect the environment, as it is economical and less polluting aircraft at short distance actually using at least fuel, thereby releasing carbon dioxide and less.

3.4 Danish Air Transport

Today the company has a fleet of 16 turboprop aircraft, composed of twelve ATR aircraft, two aircraft, two Saab 340 and two Dash 8 - 100. The current use of freight MD87 and MD83 aircraft. It follows that representation turboprop aircraft in the fleet is 88%. ATR 42 aircraft can be equipped for projects with a combined area of passengers and cargo in the cab.

3.5 Eurolot

The company currently owns a fleet of twin-engine turboprop regional aircraft at short distances, fourteen ATR 72 and three Embraer 175 jets, where many turboprop aircraft is 83% of the total number of owned aircraft. The company will introduce in the first half of 2012 to service eight new aircraft Bombardier Q400 NextGen. A further six aircraft This type of plan in the coming purchase months. The Company intends these aircraft to develop its network of regional routes, and operate flights to destinations that operates on the basis of cooperation with LOT Polish Airlines. Planes were selected because of their operational flexibility that is essential for consistent with market competition. Capacity aircraft will, as required by the company, 78 jobs.

3.6 Czech Airlines

Czech Airlines fleet currently consists of 38 modern and safe aircraft. For travel to different parts of the world use three aircraft manufacturers - Airbus, Boeing and ATR. The turboprop aircraft are: four ATR 72-202, used for short flights, for example. in Berlin Venice and Kosice, and eight ATR 42-320/500 to short flights, for example. in Bratislava, Ljubljana and Krakow. Compared with jet aircraft is representation in a volume of turbo 32%.

3.7 Polet Airlines

The plane, which forms the basis of passenger fleet transport is one of the fastest turboprop aircraft in the world - Saab. In its fleet company owns five in version 2000 and five in version of the 340. It also owns 15 jet aircraft. In this case, the share turboprop aircraft in the fleet 40%. Using foreign aircraft for regional transport company provides its passengers with a high comfort and safety.

3.8 Austrian Airlines

In the last few years GermanWings Airlines replacing aircraft with high power fuel other models with lower fuel consumption. Diversity allows fleet choosing the right types of

aircraft in each destination. The company owns 80 jet aircraft and 14 turboprop aircraft - Bombardier Q400, offering space for 76 passengers. They might only be 18% foreign representation in the fleet of the company, as these aircraft used mainly for subsidiary GermanWings Arrows for its regional flights.

3.9 Aer Arann

In 2007, Aer Arann has signed an agreement worth 180 million euros to supply ten new ATR 72-500. Decision of to purchase turboprop aircraft, as opposed to jets, has been carefully calculated. The reason the contract was based on the fact that turboprop aircraft are the most economical way how to carry passengers on short distance. The decision to update the company and renew fleet with new ATR aircraft is an optimal choice for providing highest level of comfort on board customers.

3.10 Air Nostrum

Company's fleet includes, in addition to current aircraft, and five ATR 72-500 aircraft. These company uses short, where they are competitive jet aircraft in costs, but also on flights to destinations where are short take-off runways (Melilla). Aircraft have been carefully selected for their structure and are characterized by their particular excellent results for short and medium routes.

3.11 Luxair

Luxair operates a modern and comfortable aircraft, environmentally friendly, high efficiency and low emissions of gases allow rapid transport to the target. Modern fleet is based on the highest standards of quality, comfort and safety. Turboprop aircraft are represented by five Bombardier Q400 aircraft, representing 30% of the total fleet. In turboprop aircraft owns jets, two Embraer ERJ-135, six Embraer ERJ-145 and four Boeing 737.

3.12 Air Berlin

It has one of the most modern aircraft

fleets in Europe. Machines with which it flies, have very low fuel consumption and longer terms thus contribute to reducing harmful aviation emissions. The quiet and comfortable turboprop aircraft type Bombardier Q400, reducing average consumption and emissions caused by the fleet. Number of aircraft Airberlin increasing expansion of supply routes. Airberlin advocates of economic and environmental reasons, fuel economy.

3.13 Air Dolomiti

Currently the company has a owned eleven ATR 72 aircraft to guarantee the company's load factor increase of 17%. Were selected because of good value power / fuel consumption. At the same time the company owns and five Embraer E195 jets. Representation of the turboprop aircraft in the air Fleet Company, a share of 69%.

4 EVALUATION OF THE ISSUE TURBOPROP AIRCRAFT

When world oil prices began to rise, anywhere. This impact is felt more than in aviation. Any increase in oil prices has a direct impact the world's airlines, as modern world rely on aviation to a greater extent than many people realize. Although the In 2009, a temporary rise in prices slowed oil prices, many airlines around the world had to revise their economic models and plans for the future. One result of these activity is apparent turbo boost orders among regional airlines companies. Turboprop aircraft decides experiencing a great comeback with two, remaining, major producers of these aircraft - ATR and Bombardier. Between 2002 and 2007 than was the economic crisis, sales turboprop aircraft increased by more than 700%. Now account for about 37% of regional sales aircraft with fewer than 110 seats. In 2002 it was only 11%. The short lines will not be current aircraft ever so economical and efficient than turboprop, which is effective at low altitudes and at lower speeds, while the current is fully functional at high altitude and at high speed. The fact that the turbo fly at much lower altitudes increases the effectiveness of short lines as spend a smaller percentage of their time to climb a great height. Requirements for

commercial air industry are constantly evolving. Except pervasive need for a better, safer and cost-efficient aircraft, there is a growing demand for environmentally friendly solutions. Aerial industry seeks to ensure the survival of regional transport. Airlines can significantly reduce operating costs by 35% to 45% by next-generation turboprop aircraft. Jets have a significant impact on philosophy of ATM. Since usually fly at relatively short distances at high altitudes heights, the end result is a significant increase number of aircraft movements, which will accelerate the need create additional airspace capacity. Turbo-jet aircraft are compared one great advantage - they can leave the land and runway at different input and exit points, while large aircraft must navigate to the end of the runway. In this sector should be emphasized primarily to maintain competitiveness utility industry and its citizens for action the international arena. The regional air industry in Europe has been a great revival thanks ATR aircraft, which allow saving fuel. Aircraft market is evolving in favor regional jet aircraft.

5 CONCLUSION

At a distance of less than 500 km turboprop aircraft consume per passengers by 15% less fuel than a car by 60% less than similarly sized jet. Of the total number of fuel deliveries for the entire the transportation sector consumes about aviation 12%, because the planes are now produced by 70% efficient than 40 years ago. It is these characteristics of turboprop aircraft to move level jet, which are increasingly frequently substituted for short-haul distance. I think the turboprop aircraft have their vital role in air traffic conducted by the European Regional airlines. The need to use the available capacity of the aircraft and airport runways in smaller cities makes this service to consolidate its position in the fierce competition of large carriers. I would like also pointed out that by 2007, while there was the global economic crisis, turboprop aircraft accounted for only 11% of the total sold to regional aircraft. Although there are turboprop aircraft disadvantages are less obstructive to demotivation airlines to decide the purchase of jet and turboprop aircraft. The continuous

development of these technologies gradually minimizes the differences. Most companies in its fleet combine both types of aircraft the existence of a clientele requesting rapid transportation, as well as several a higher price. The second part of the preferred transportation for lower price, where transit time is not a major role. It is this fact ensures survival turboprop aircraft for regional markets aviation. The problem with limiting higher utility turboprop aircraft impact is land transport, which strongly competes regional jets, as in the minds of the lay public still felt that air transport is expensive.

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