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PROBLEMS OF CONTINUED AIRWORTHINESS THE AIRCRAFT FLEET OF UKRAINE

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Abstract. *The state and the problems associated with continuing airworthiness of the existing fleet of Ukrainian aircraft of Soviet and foreign production, through the creation of centers for its maintenance with the involvement of young professionals*

Keywords: Aeronautical engineering; aircraft fleet; maintenance; maintenance center.

1. Introduction

One of the components of the aircraft operation process is to maintain it in a state of airworthiness. In its turn, this process is represented by a wide range of maintenance and repair of aircraft.

If the processes of online maintenance are performed, as a rule, the technical staff of the airlines using simple equipment and devices, the execution of severe forms of maintenance requires availability of qualified personnel, more investment of time, a wide range of equipment, tools and appliances. In addition, it is associated with high material costs for the owner of aircraft.

When the corresponding operational time or calendar time is achieved to the management of the airline the question arises: Where to perform scheduled maintenance work on aeronautical engineering, especially foreign-made?

Solution to this problem may be multilateral, which main feature is the absence on the territory of Ukraine organizations of foreign aircraft maintenance.

Therefore, the operator must optimize the choices of a foreign organization by the criterion remoteness of maintenance organization this type of aircraft, cost of works and its quality and, moreover, the expectation of queues for maintenance and terms of its performance.

It is necessary to take into account that a charter flight operated in the airspace of several States require additional financial costs.

2. Review of Research Results

In this context there are actual following questions, which are related to the organization of maintenance centers for the implementation severe maintenance

forms of foreign-made aircraft. About these matters mentioned in report of Boris Rybak (Executive Director of Infomost Consulting, Russia) at the forum "Wings of Russia" [5]. For Ukraine it is more acceptable since the park of foreign-made aircraft has higher percentage in relation to all registered civil aircraft [3]. In addition, the short distances between major administrative centers, which have airports enables the rational location of aircraft maintenance centers

3. Purpose of the work

Materials of this article, in our opinion, will be useful to operators and the State Aviation Administration of Ukraine in order to further develop ways of maintaining the airworthiness of aircraft on Ukrainian territory.

In addition, the organization of foreign production aircraft maintenance centers should lead to substantial cost savings and efficiency of aviation transportations, as well as to partially solve the question related to organization of new workplaces for technical staff.

4. Analysis of the technical state of the aircraft fleet

Analysis of aircraft Park operated in Ukraine shows that quite a large part constitute, unfortunately, aircraft of foreign production. So as of 2006, the share of foreign-made aircraft was approximately 23.5 % of the total fleet of aircraft with Ukrainian registration [1]. In accordance with the register of civil aircraft in Ukraine on December 2013 this percentage has already reached more than 45 % [3].

This has happened on a number of objective and subjective reasons, the main ones are:

- reducing funding for research and development activities in the field of improvement and development of new aircraft conform to nowadays requirement (such as requirements of market services and appropriate requirements of International Civil Aviation Organization and European Aviation Safety Agency);

- low competitiveness of the newly emerging domestic aircraft to meet the needs of a narrow segment of transportation market needs;

- aspiration to acquire aircraft conform to nowadays requirement and having a relatively low cost, which allows to create super profit;

- total collapse of the economy in the state and the transition to the consumption position – all to acquire abroad at lower prices and ostensibly better quality; the customs regulations on imported goods and services also contribute to this.

This percentage continues to grow not in favor of the domestic aircraft industry.

As it is known, aeronautical engineering, like any other engineering, has the ability to grow old both morally and physically. Maintaining aeronautical engineering to be able airworthiness sometimes becomes inadvisable. For the successful continuation of its activities, operators are forced to look for other AC. Analysis of market opportunities offered AC, inevitably leads to the fact that compels operators to acquire foreign-made aircraft.

Wear of aeronautical engineering operated in Ukraine is more than 70 % [1]. Despite this aircraft of former Soviet Aeroflot currently continues to operate thanks to a substantial margin of safety, reliability and durability, well-functioning system maintenance. However, the operation of those aircraft in the majority becomes not profitable.

Worn – not the main problem of Soviet-made aircraft.

Problems of another kind do "headache" for carriers.

The first problem – high fuel consumption.

During the last years of aviation kerosene in Ukraine increased by almost twice – now it costs about \$ 2000 per ton.

So the 102-seater Yak-42, which can reach speeds up to 740 km / h, an hour flight consumes 2.5 ... 2.6 tonnes of kerosene.

For comparison:

- Boeing 737-500 with 138 passengers, consumes 2.3 tons of fuel per hour;

- Airbus 320 with a seating capacity of 180 passengers per hour consumes 2.5 tons of kerosene.

The second problem of Soviet-made aircraft – their inconsistency quality standards and safety, accepted in the West.

For example, despite the sufficient reliability of the An-24 use it to transport passengers practically stopped, for several reasons: economic, age, level of comfort offered, excessive restrictions on noise and engine emissions and requiring insurers.

Not accidentally major airlines that deal with transportation between Kiev and industrial and tourist centers – Odessa and Simferopol, Donetsk (Dniproavia, DonbasAero and Ukraine International Airlines) – started using medium-range aircraft of foreign manufacturers (Boeing 737-500, Airbus 320) [1].

This has necessitated the development and deployment of operating technologies and M of foreign production AC with relatively small residual value (due to long term operation).

Another "attractive" feature of this aircraft is the condition of its operation by state as that theoretically does not limit the duration of use. However, the operation of AC by state involves quite modern and advanced system of monitoring its technical state and airworthiness.

5. Status and analysis of the aircraft operation process in Ukraine

Domestic maintenance organizations (formerly ATB), in the majority, are not ready to carry out proper maintenance of acquired foreign aircraft. The main reasons are the lack of certified personnel, the lack of the necessary specialized tools, equipment, control verification equipment and laboratories.

For example, in [2] stated:

«(a) No aircraft with either a Transport Category (Passenger) or Transport Category (Cargo) Certificate of Airworthiness and used for Commercial Air Transport may fly unless a certificate of release to service has been issued by an organisation for maintenance carried out on the aircraft or an aircraft component intended for fitment to such an aircraft.

(b) No organisation may certify for release to service an aircraft with either a Transport Category (Passenger) or Transport Category (Cargo) Certificate of Airworthiness and used for Commercial Air Transport unless either approved in accordance with this MAR-145, or accepted in accordance with the MAR 145.10(c) alternative. Except where stated otherwise in subparagraph (e), no organisation may maintain such an aircraft unless

either appropriately approved in accordance with this MAR-145 or accepted in accordance with the MAR 145.10(c) alternative, or working under the quality system of an appropriately approved or accepted MAR-145 maintenance organisation. NOTE: A MAR-145 approval is not required for the pre-flight inspection.

(c) No organisation may certify for release to service an aircraft component intended for fitment to an aircraft with either a Transport Category (Passenger) or Transport Category (Cargo) Certificate of Airworthiness and used for Commercial Air Transport unless either approved in accordance with this MAR-145, or accepted in accordance with the MAR 145.10(c) alternative. Except where stated otherwise in subparagraph (e), no organisation may maintain such an aircraft component unless either appropriately approved in accordance with this MAR-145 or accepted in accordance with the MAR 145.10(c) alternative, or working under the quality system of an appropriately approved or accepted MAR-145 approved maintenance organisation» [2].

However, despite these difficulties, larger airlines (UIA DonbasAero), which is owned by wealthy foreign or domestic tycoons, could afford to buy foreign-made aircraft. They were able to collect, train, certify, and maintain the required level of qualification as pilots and technical staff, mostly abroad. They also were able to purchase equipment, tools, appliances, organize and certify maintenance organizations meeting the requirements EASA Part-145.

In order to use foreign-made aircraft for regular transportation within Ukraine, airlines will have to raise tariffs. And it is fraught outflow of passengers: the demand for regular air flights is exposed to price influence [1].

Purchase of new aircraft did not appear even in the medium-term plans of the largest airlines of Ukraine.

Just produced aircraft as a rule, become the property of lessor company in which role are:

- the transnational corporations;
- the world's largest banking conglomerates;
- the company, created with the participation of States.

Lessors give aircraft for air carriers in long-term lease. Standard term of the lease agreement – 3 ... 5 years, after which the parties may renegotiate it under new terms.

According to the International Finance Corporation (IFC), four Ukrainian companies are

providing leasing aircraft. Domestic aircraft financed only one of them – the state company "Ukrtransleasing": 4 aircraft An-140 in the airline's fleet "Aeromist-Kharkiv".

Others airlines, and they were the majority, gradually "were dying," as most branches of national economy. Because they continued to operate the remaining Soviet Aeroflot aircraft at its the same technical basis of scheduled preventive method. In some cases, operators were forced to carry out a modification of these aircraft for international flights.

Aerosvit Airlines staff calculations show that the ratio of price/quality for aircraft, which have age 8-10 years, is much more profitable of new.

And for the price it is most advantageous to acquire aircraft age 10...15 years. However, the aircraft leasing tariff is inversely proportional to the cost of maintenance. The older the plane, the less has to pay to the lessor, and more – repairers. As a result, the costs for the owners of new aircraft, and the owners of old aircraft, roughly the same.

Leasing system should provide tax incentives or subsidies for state interest rate on lease payments. The ideal solution would be a partial state funding for the aviation industry. But in the budget deficit to implement such plans is practically impossible.

Acquisition of aircraft older than 15 years of leasing is fraught with low reliability, reducing availability to aircraft flight operations, flight delays, replacing aircraft performing scheduled flights. In this case, it is forcing operators to invest additional funds to maintain a sufficient level of reliability and providing the required level of airworthiness.

At the same time, operators are forced to perform maintenance aircraft in foreign organizations as domestic were not, and in most cases there is no so far.

The need to perform maintenance in foreign organizations is forcing operators to search for the nearest foreign maintenance organizations engaged in certain types of maintenance qualitatively at a lower price.

Despite this, in addition to the above, operators have to pay a substantial customs fee for the temporary export aircraft and then import it back. It is necessary to organize international flights in both directions, which is also associated with additional costs.

All this suggests the organization on the territory of Ukraine network of centers for maintenance of foreign aircraft, depending on the manufacturers. In our view, this will to minimize the consumption of budget funds and expense of airlines. In addition, it will create new jobs and keep the currency in the

country, as well as to supplement the budget by a reasonable taxation of these organizations.

Surviving aviation transport structures in some regions (Kyiv, Lviv, Kharkiv, Donetsk, Dnipropetrovsk, Simferopol, Nikolaev, Odessa) allow reasonable place these centers practically for all foreign aircraft operating in Ukraine.

Peculiar geopolitical situation of Ukraine and its relatively small territory, allow almost any types of aircraft to carry out a successful flight from home base to the maintenance centers, located on the territory of Ukraine. Lower prices for works by foreign aircraft maintenance, eliminating a number of customs barriers should be of interest, both domestic and foreign operators located near Ukraine to implement a variety of maintenance services to foreign aircraft on the territory of Ukraine.

6. Engineering staff

The organization of aircraft maintenance centers will inevitably entail a demand for technical staff capable and authorized to perform such types of M in specific types of aircraft.

Specialists of this profile prepared in the Soviet era, in the majority, are unlikely to engage in this activity for several reasons.

First – this is the age, despite the opportunity and sufficient practical experience and an apparent readiness to perform. Sometimes these work and operations are known for older professionals, but they cannot perform the work legally. Since they do not have formal admission to these works on aircraft specific type of foreign manufacture. They do not have a certificate for this activity in accordance with the requirements of Part-66.

Second – to prepare engineering staff having advanced age by transition training and learning English in most cases, is not rational.

Third – the position of Part-66.15 requires that: "... Certified personnel must be able to read, write and communicate in an understandable level language (s) which is written technical documentation, and procedures necessary to support the issuance of a certificate - a permit to operate."

Therefore, a technical staff owns not only the spoken language, but aviation technical.

It is considerably more rational and economically advantageous to train aviation professionals with knowledge of English. Such specialists are issued by the National Aviation University in Kiev.

National Aviation University now educates a sufficient number of aviation engineering personnel

who could successfully, after a fairly short courses and training to perform their duties on maintenance of foreign production aircraft. It is even more real that the training of the aviation engineers carried out the so-called "English project".

This project provides the study of all disciplines in English. It essentially increases their competitiveness in the selection of specialists aircraft maintenance organization.

For example, the proportion of students trained in English project specialization of "Technical Maintenance and Repair of Aircrafts and Aeroengines" and who have graduate from National Aviation University in 2014 is about 54%, while in the training set in 2013, this proportion is already more than 61 %.

This is due not only to the state and natural order "dropout" students in the learning process, but also planning their future employment at step receipts in aviation university.

7. Conclusions

1. Creating in Ukraine network of centers for maintenance of foreign aircraft, will provide:

- more efficient use of aircraft;
- substantial cost savings for operators;
- significant decrease in the cost of air transportation of passengers;
- will increase the ridership.

In addition, it will partially provide employment for graduates aviation universities.

However, the organization of maintenance centers require significant one-time funding. These funds can take a long-term loan, or to attract foreign investment through the establishment of joint enterprises, or by share participation of the airlines, or something, and another simultaneously.

2. Newly created maintenance organizations, in principle, be able to maintenance all types of aircraft:

- aircraft of foreign manufacture;
- outdated Soviet-made aircraft equipment that is in operation;
- newly created domestic aircraft certified according to international requirements.

This will prevent unreasonable competition among such organizations and prevent the creation of irrational outdated structures of such enterprises.

3. The establishment of such organizations will provide practical orientation of future graduates by

firms developers of aircraft, through practice and training of students in the course of their training. In this process will be interest to both parties: the Ministry of Education and Science and the State Aviation Administration of Ukraine.

References

[1] <http://kontrakty.com.ua/show/rus/article/45/4220068006.html>

[2] MAR 145.1 General (AMC & IEM 145.1).

[3] Register of civil aircraft Ukraine at 16.12. 2013.

[4] Reliability analysis fleet of Ukraine. State aviation administration of Ukraine. Center aircraft operational reliability at the national aviation university. Quarterly release. – K. : NAU, 2013. – С. 59 [in Ukrainian].

[5] Rybak B. Maintenance and repair foreign aircraft: the pace of localization and restrictions, – Access mode: www.ato.ru.2 [in Russian].

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У статті розглядаються стан і проблеми, зв'язані з підтриманням льотної придатності існуючого парку повітряних суден України радянського та іноземного виробництва, шляхом створення центрів по їх технічному обслуговуванню із залученням молодих спеціалістів.

На території України відсутні сертифіковані організації з технічного обслуговування іноземної авіаційної техніки. Організація подібних центрів дозволить істотно скоротити час, кошти, підвищить ефективність використання повітряних суден і знизити вартість перевезень.

Матеріали статті будуть корисні для експлуатантів, Міністерства освіти і науки, Державній авіаційній службі України.

Ключові слова: Авіаційна техніка; парк повітряних суден; технічне обслуговування; центр технічного обслуговування.

Ю.П. Пучков¹, Н.Ф.Молодцов², А.В. Ругайн³, Д.В. Попов⁴. Проблемы поддержания летной годности парка воздушных судов Украины

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В данной статье сделана попытка обоснования организации центров технического обслуживания иностранной авиационной техники по типам фирм разработчиков. Организация подобных центров позволит существенно сократить время, средства, повысит эффективность использования воздушных судов и снизит стоимость перевозок.

Материалы статьи будут полезны для эксплуатантов, Министерства образования и науки, Государственной авиационной службе Украины.

Ключевые слова: Авиационная техника; парк воздушных судов; техническое обслуживание; центр технического обслуживания.

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