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# Challenges of Aviation Personnel Training at Higher Educational Institutions

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The Ukrainian airlines' fleet consists of civil aircrafts, 80 percents of which are manufactured abroad, in particular in the United States of America and in Western Europe. That is why it requires training of aviation specialists who perform maintenance operations of foreign and national modern aircrafts in accordance with the international standards. Principal aspects of national educational standards for aircrafts maintenance personnel training harmonization with EASA Regulations have been analyzed to show how to adjust the educational and training programs and curricula for training of aircrafts maintenance personnel according to Part-66 standards.

**Keywords:** higher educational institution, aviation personnel, aviation personnel training standards, ICAO, EASA, aircrafts maintenance, Part-66, Part-147.

## 1. INTRODUCTION

Taking into account the forecasts that the volume of air traffic flow will increase, the airlines demand for modern aircrafts of various types, classes and functions continues to grow. The analysis of the aviation industries of Ukraine and the Commonwealth of Independent States (CIS) shows that this problem can be solved owing to further growth of the airlines fleets and the number of aircrafts manufactured in Western Europe and the USA. The use of foreign aircrafts provides high level of safety, rise in the effectiveness of airlines, as well as an increase in the number of jobs and higher level of aviation personnel salary [1,2].

Perspectives of the national aviation industry regarding the manufacturing of modern aircrafts do not give much reason for optimism. For instance, the situation around modern Ukrainian aircrafts An-140, An-148 and An-158 remains unclear. As a matter of fact, despite the high level of demand, only a little number of these aircrafts has been released due to the extremely high competition in the global market of aircrafts, inefficiency of the national system of after-sales service and the need for serious changes in aircrafts design on the basis of the results of the initial operation.

It is clear that changes in the structure of the airlines' fleet inevitably cause the need for changes in aviation personnel training standards in order to ensure the compliance with maintenance procedures for foreign and national modern aircrafts.

## 2. PROBLEM SOLVING

Initial, recurrent and upgrading trainings of highly qualified aviation specialists for the aviation industry are conducted in Ukraine, mostly at the National Aviation University which has got the 80-year history. Today, the National Aviation University is one of the most powerful Ukrainian universities having the status of research institutions. At the National Aviation University in Kyiv, 13,700 full-time students and 5,900 distance learning students are being trained in accordance with the programs for Bachelor and Master degrees in 53 fields of training and 75 specialties. 1,150 of these students are foreign citizens from 43 countries of the world. The University also includes some institutions located in various regions of Ukraine, among them the Flight Academy and seven colleges, where 11,500 students are being trained.



Two European regional centers of the International Civil Aviation Organization (ICAO) and national training centers successfully perform training activities at the National Aviation University. In particular, during the 2013-2014 academic year, these centers provided recurrent and upgrading trainings to more than 1,200 aviation specialists working in the fields of aviation security and safety, from 25 countries of the world.

Educational standards of aviation specialists trainings in Ukraine have been stated by the Ukrainian law "On Higher Education". Standards of initial, recurrent and upgrading trainings are determined by the documents issued by the Ministry of Education and Science and the Ministry of Infrastructure of Ukraine, in particular by the State Aviation Administration.

The globalization of aviation activities requires adopting aviation laws and regulations to the standards and recommended practices of the ICAO.

Up till now some aviation educational institutions of CIS-countries train aviation specialists who are partially capable of operating aircrafts manufactured in the United States of America and Western Europe [1,3]. Consequently, aviation companies constantly demand aviation specialists who have been trained in accordance with the European standards. Moreover, the lack of specialists capable of performing maintenance operations of modern aircrafts increases every year due to the increase in the number of foreign aircrafts in the national airlines' fleet. As a result, aviation companies have to retrain the graduates of these institutions in order to achieve their compliance with the international standards, which requires additional costs and time. Eventually, this fact discredits aviation educational institutions.

It should be noted that it takes at least five years, three years of which are for professional training, and at least two years for practice, to prepare modern aviation experts in the area of aircrafts maintenance according to the European standards.

It is worth mentioning that civil aviation of European Union (EU) member states operates according to the ICAO standards as well as European aviation regulations. The regulations developed by the EU can be implemented not only by member states but also by other countries of the European and North Atlantic region. The implementation of EU regulations in all countries of European and North Atlantic ICAO region has

started the process of more active harmonization of the national regulatory issues with EU region. This process is headed by European Aviation Safety Agency (EASA), which has the function of the European regulatory authority.

EASA was established on July 15, 2002 and began its full-scale operations in 2008 when Joint Aviation Authorities (JAA) stopped to function. The main difference between EASA and JAA is that EASA has legal powers of a regulatory authority in all EU countries. The responsibilities of EASA include conducting analysis and research of safety, authorizing foreign operators, giving advice pertaining to the drafting of EU legislation, implementing and monitoring safety rules (including inspections in the member states), giving type-certification of aircrafts as well as the approval of organizations involved in the design, manufacture and maintenance of aeronautical products [4].

The European Aviation Safety Agency adopted common standards of aircrafts maintenance personnel training (Part-66) for all EU countries and common requirements for aviation educational institutions that train specialists in accordance with these standards (Part-147). EASA Part-66 Standard specifies aircrafts maintenance personnel training and licensing performed by Civil Aviation Authorities of the Member States.

In addition to common standards of training and licensing, Part-66 establishes regulations for monitoring of national aviation administrations and common requirements for the educational process in order to ensure mutual recognition of the qualification of aviation specialists in all EU countries.

Part-66 specifies certain requirements for the language of operating documentation on the aircrafts type and aircrafts maintenance certification procedures. Part-66 Standard contains sufficient specific requirements, which, in our opinion, enhance the responsibility of students and teachers and, ultimately, the quality of the educational process. Module control is performed in the form of a test or written exam. The test is considered to be passed in case the number of correct answers is not less than 75% of their total number in the module test.

According to specific requirements of Part-66 Standards, the applicant has no right to take the test again during the year after the failure. His instructor, in this case, is not allowed to continue the training functions. Part-66 Standards also permit individual studying of module materials,



which is followed by obligatory testing carried out by an aviation educational institution that complies with Part-147 Standard. The maximum period specified for all examination procedures of the modules is 10 years from the date of the first module test.

EASA Part-147 Standard establishes requirements for educational institutions, providing training of aviation specialists in accordance with Part-66 Standard. These requirements cover all aspects of education, including requirements for personnel, logistics and other fields of training. In particular, teachers (instructors) and examiners shall undergo upgrading on modern technology, practical skills, human factors and new methods of training at least once every 24 months.

During theoretical classes, the number of students in groups should not exceed 28 people, and during practical classes, respectively, 15 people per one instructor. Students who have passed the examinations in basic training modules and examinations in typical training modules in higher educational institutions in accordance with Part-147 Standard, receive certificates recognized all over the European Union.

The quality management system of specialist training in accordance with Part-147 Standard must have feedback to ensure timely elimination of deviations in the activities of an educational institution. Once every two years, EASA carries out audits and inspections of the quality of training process in aviation educational institutions.

A positive feature of EASA Part-66/147 Standards is that they are common for all organizations and institutions. The methods of training require a strict logical approach to presentations of materials as well as continuous dynamic response to changes of aircrafts operating conditions.

The National Program of adaptation of the Ukrainian regulatory system to the European Union legislation was developed in order to apply the European rules and standards in Ukraine. "The Rules of Maintenance Training Organizations Approval (Part-147)" and "On Approval of the Rules for Issuing Certificates of Aircrafts Maintenance personnel (Part-66)" EC 2042/2003 from 20 November 2003 were implemented in 2011, which are fully harmonized with the Ukrainian regulatory system and the National Air Code. If these documents are implemented in the country, the certification of personnel and approval of aircrafts maintenance organizations are provided

in total compliance with these standards [5, 6, 7, 8].

The problem is how to harmonize the national specialist training standards developed by the Ministry of Education and Science of Ukraine with EASA Part-66/147 Standards in aviation educational institutions providing aircrafts maintenance professional training. The National Aviation University has got a successful approach to the adjustment of educational standards with the EU regulatory system, but currently the university can offer only theoretical training of all categories of maintenance personnel (A, B1, B2, C). The next step in training is on-the-job training in maintenance organizations certified in accordance with Part-147 [6, 7, 8].

In Europe, Aircrafts Maintenance Certifying Personnel have to comply with Part-66 Certifying Staff. Part-66 is based on the older JAR system, and the required training level follows the ATA 104 system. There are 3 levels of authorization which are as follows:

- Category A (Line Maintenance Mechanic): Basic A category License, Task Training (Level depends on Task Complexity), Company Certification Authorization for specific Tasks ("A category").
- Category B1 (Mechanical) and/or B2 (Avionics) (Line Maintenance Technician): Basic B1/B2 category License, Type Training (i.e. Line and Base Maintenance).
- Category C (Base Maintenance Certifying Engineer): Basic C category license, Type Training (Line & Base Maintenance).

Training programs complied with Part-66 Standard for aircrafts maintenance categories B1 and B2 can be harmonized with educational programs of aircrafts maintenance personnel training in accordance with the higher education standards of Ukraine. Part-66 Standard requires that maintenance specialists of categories B1 and B2 go through 17 educational modules (2440 hours), 50-60% of which is practical training.

According to the Higher Education Standards of Ukraine, during the four-year period specified for Bachelor training, the preparation time equals 240 ECTS credits. 160 ESTC credits are contact hours and 80 ESTC credits are individual studying. The educational standards specify 48-60 credits for optional subjects, which can be used for studies of module materials. A large number of Part-66 modules can be studied during the period of



Bachelor training. It should be noted that 1 ECTS credit is equal to 30 hours of studying time.

The higher aviation educational institutions can harmonize their educational and professional training standards with the EU regulations, namely with Part-66 and Part-147. It is necessary to analyze existing education processes and curricula in order to determine which modules of common aeronautical programs can be credited and which modules should be studied and examined additionally. At the same time, the course materials of some special modules of Part-66 Standard, in particularly related to the international aviation regulations, a variety of specific technical characteristics of modern aircrafts and their operation, etc., can be selected by higher aviation educational institutions. The volume of relevant subjects (48-60 ECTS credits or 1440-1800 hours) is completely available.

Along with this, maintenance mechanics (category B1) that are trained according to the Part-66 standards are allowed to provide maintenance of modern foreign and national aircrafts, in comparison with their colleagues who are trained according to the educational standards of the Ministry of Education and Science. To get the same license (category B1), aeronautical engineers have to study some special Part-66 modules additionally after graduation from aviation higher educational institutions, and several years of practical work.

It is necessary to emphasize that the state authorities should play a more active role in ensuring the transition of aviation higher educational institutions to train aviation specialists in accordance with modern international standards by means of administrative, financial and practical support. In order to make this transition possible, the compliance of national education standards with EASA Part-66 standards must be achieved, which does not require significant financial resources.

It would be appropriate to mention that the designers and operators of the modern Ukrainian An-148 faced the problem that the maintenance personnel were insufficiently trained to perform operations on modern aircrafts. That is why it is necessary to implement EASA standards into the aviation specialist training processes. Those who graduated from aviation higher educational institutions in the past years were not trained according to the standards of EASA. If these graduates are willing to carry out the maintenance of modern aircrafts, including aircrafts

manufactured abroad, they are supposed to go through the whole course of training.

Taking into account that many thousands of graduates of the past years are not allowed to take part in aircrafts maintenance procedures, state authorities such as the State Aviation Administration, and aviation higher educational institutions of Ukraine should try to find a legal basis for solving this problem. When referring to the agency of aviation personnel licensing, the applicant must submit not only the appropriate application form, but the professional diploma of relevant educational qualification and its academic record transcript received at an aviation higher educational institution, as well as the curricula and subjects which he/she studied.

Now the problem is not settled because it is very difficult to determine the number of Part-66 modules the applicant should pass according to the results of prior studying at aviation higher educational institution, and how many modules he/she should additionally study and pass. Additional training of graduates of previous years for Part-66 modules that have to be passed could be arranged, in our opinion, using the facilities of aviation higher educational institutions and creating separate training structures that would operate on a contractual basis and be regarded as a Part-147 standard approved organization.

### 3. CONCLUSIONS

The current state of the aviation industry is characterized by a steady increase in the number of Western European and the USA aircrafts in the airlines' fleet structure, which requires the harmonization of national standards of training aviation specialists, including aircrafts maintenance personnel, with EASA Part-66 standards. To provide trainings of aircrafts maintenance personnel in aviation higher educational institutions in accordance with the EASA Part-66 standards, it is necessary to:

1. Familiarize all managing and academic staff of aviation higher education institutions with EASA Part-66/147 standards.
2. Organize the certification of specially established training structures at aviation higher education institutions in accordance with Part-147 standards.
3. Adjust the educational and training programs and curricula for training of aircrafts maintenance personnel with Part-66 standards.



4. Analyze the possible options for those who graduated from aviation higher educational institutions in the past years to complete an additional training in accordance with the Part-66 standards in order to get license for the maintenance of national and foreign aircrafts.

Maintenance Personnel" (Part-66). [Electronic resource]. – URL: [www.zakon2.rada.gov.ua/laws/show/z0987-11](http://www.zakon2.rada.gov.ua/laws/show/z0987-11)

It is clear that both the State Aviation Administration and aviation higher educational institutions are interested in a positive solution of this problem. We presume that implementation of these measures will give an opportunity to aeronautical students and those who graduated from aviation higher education institutions in the past years not to undergo the whole course of training, but to pass the required modules additionally. As a result, these specialists will be more demanded in their native countries and will get the chance to have relevant jobs abroad.

## REFERENCES

- [1] Zarubinska I., Polukhin A. Challenges of aircrafts maintenance personnel training standards harmonization. Kyiv. Proceedings of the sixth world congress "Aviation in the XXI-st century". – 2014. 87-91 pp.
- [2] Civil Aircrafts Register of Ukraine. 2014. [Electronic resource]. – URL: [www.avia.gov.ua/documents/rcps/vrcps](http://www.avia.gov.ua/documents/rcps/vrcps).
- [3] Petukhov, V. New aircrafts types and new standards of training specialists. Moscow. Air Transport Observer. – 2012. – №126. [Electronic resource]. – URL: [www.aex.ru/fdocs/3/2012/2/8/20769/](http://www.aex.ru/fdocs/3/2012/2/8/20769/)
- [4] The European Aviation Safety Agency (EASA). [Electronic resource]. – URL: [www.casa.europa.eu/the-agency/agency-organisation-stru](http://www.casa.europa.eu/the-agency/agency-organisation-stru)
- [5] Air Code of Ukraine №3393-VI dated 19.05.2011. Kyiv. Press of the Parliament of Ukraine. – 2011. – № 48-49. – 536 p. [Electronic resource]. – URL: [www.zakon2.rada.gov.ua/laws/show/3393-17/page](http://www.zakon2.rada.gov.ua/laws/show/3393-17/page)
- [6] Law of Ukraine № 1629-IV dated 18.03.2004 "On the National Program of Adaptation of Ukraine's legislation to the European Union law". [Electronic resource]. – URL: [www.zakon4.rada.gov.ua/laws/show/1629-15](http://www.zakon4.rada.gov.ua/laws/show/1629-15)
- [7] [Order of the Ministry of Infrastructure of Ukraine №237 dated 27.07.2011 "The Rules of Maintenance Training Organizations Approval" (Part-147). [Electronic resource]. – URL: [www.zakon2.rada.gov.ua/laws/show/z0986-11](http://www.zakon2.rada.gov.ua/laws/show/z0986-11)
- [8] Order of the Ministry of Infrastructure of Ukraine №238 dated 27.07.2011 "On Approval of the Rules for Issuing Certificates of Aircrafts

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