UDC 629.73.07 (043.2)

V.O. Maksymov, PhD, O.I. Yurchenko
(National Aviation University, Ukraine)

Influence of the New Paperless Maintenance Procedures on the Continuing Airworthiness Personnel Training

The trend of the global civil aviation development in the next twenty years is analyzed. The idea to develop new approaches to the education and training of aviation specialists in accordance with requirements ICAO, Part-66 and Part-147 is proposed.

According to the forecast of the International Association of Aviation Transport (IATA) [1] in the global civil aviation serious changes are expected. In particular, by 2028 about 12,000 aircraft of sunset aircraft will be decommissioned. As shown in Fig. 1, the share of new aircraft will be about 60%, the aging fleet will be about 10%, and the mature aircraft will be about 30%. A distinctive feature of aircraft of the new generation is the total application of information technology. This concerns either engineering solutions, for example, in the creation of avionics components, control systems and other functional aircraft systems, or the aircraft continuing airworthiness procedures as well.

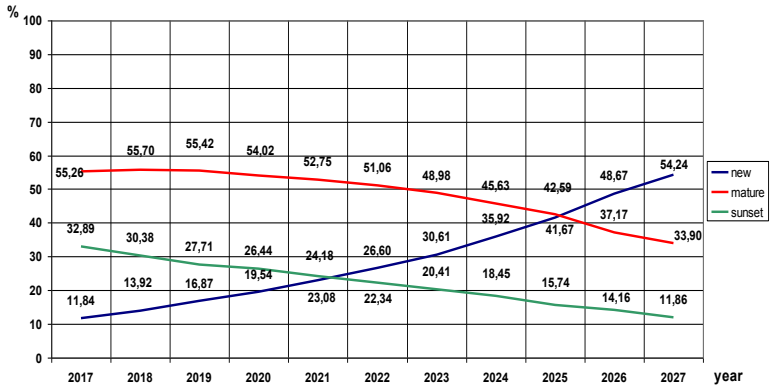

Fig. 1. Global civil aviation aircraft fleet changes

The so-called "paperless" technologies will find wide application, either for maintenance or for repairs and overhauls current and major repairs. As shown in Fig. 2 by 2028 it is planned to switch completely to paperless technologies for continuing airworthiness.

According to the IATA forecast in the Eastern Europe region, by 2037, the market for airworthiness maintenance of aircraft and components is expected double increase approximately. At the same time, the structure of the market by types of work will practically not change. Modifications of aircraft and their components will amount

to approximately 8%, maintenance: base - 13%, line - 15%, components - 20% and engines - 44%.

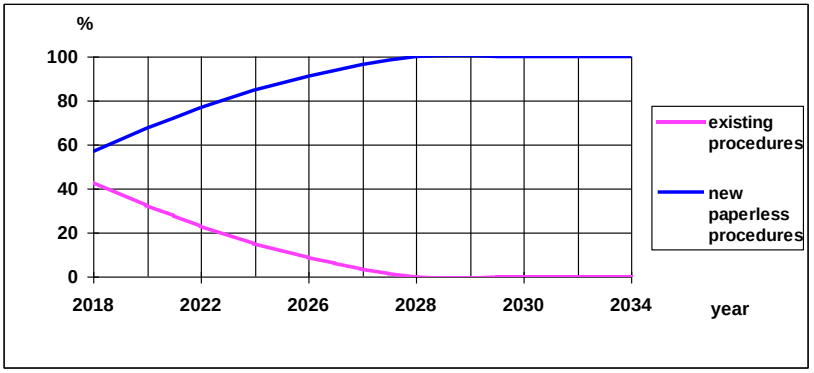

Fig. 2. Paperless maintenance procedures implementation forecast

A special place will be occupied by the creation of integrated safety management systems and the quality of maintenance, which is provided for by the standards and recommended ICAO practice [2-4].

An important issue is the development of mathematical models with a quantitative assessment of human reliability in the technical maintenance of aviation engineering. This will contribute to improve the quality management of the work of aviation specialists in specific operating conditions. In the articles [5-7] the scheme of the formation of efficiency and quality of the processes of maintenance of aviation engineering shows.

The introduction of IT technology separates the technological processes of maintaining airworthiness to the more narrow specialization of aviation personnel.

Today, while operating only modern types of aircraft, the airline collects data 2.4 times more than in 2016, and it is predicted that in the next 10 years the generation of data will be 40 billion times more, which entails not only a review of the bases technical service, but also its combination with the IT industry and the formation of new professions. That is, the role of such data not only increases, but also begins to affect the market of aviation services: continuing airworthiness; flight operation, development of airline strategies and training of specialists, etc.

Analysis of the current world trends in aircraft operations and maintenance shows that the improvement of the already existing system for the continuing airworthiness of the aircraft and its components will always be relevant. The growing role of the collection, preservation, processing and analysis of an increasing array of operational data already now requires a revision of the bases of the maintenance and their integration with IT technologies through the implementation of the paperless technologies for documenting.

Also artificial intelligence for the maintenance, repair and overhaul procedures will be required [8, 9]. This problem could be solved on the basis of the entropy approach.

According to forecasts, by 2028 a significant growth of the demand for certified specialists in the field of continuing airworthiness is expected. So, in 2018, 201 specialists (bachelors, masters) were trained at the Academic and Research Aerospace Institute of the National Aviation University as aircraft airworthiness managers, then in 2028 the need for these specialists will be about 500 people.

At the same time, their training should be conducted on fundamentally new standards, which should include the use of IT technologies and the use of artificial intelligence. In this regard, training programs and certification requirements for aviation personnel (Part-66), as well as training organizations for maintenance personnel (Part-147), should be substantially reviewed.

Conclusions

1. By 2028 the paperless technologies with using of artificial intelligence will be implemented in the global civil aviation.

2. During the period from 2018 to 2028 the structure of the fleet of civil aircraft will change significantly, which will require the development of new approaches for education and aviation specialists training, especially for the airworthiness of the aircraft and its components.

References

1. IATA presentation: NATIONAL TRADE STRATEGY OF UKRAINE. SECOND NATIONAL STAKEHOLDER CONSULTATION. Author Chris MARKOU, Kyiv, Ukraine, 2018.

2. В. О. Максимов, Г. В. Таран. “Інтеграція систем управління безпекою польотів і якості”, 2017, «АВІА-17»: Матеріали XIII Міжнародної науково-технічної конференції «АВІА-17» (19-21 квітня 2017 р., Київ). Kyiv, Ukraine: NAU, 2017 – К.: НАУ, 2017. – С. 17.34-17.37.

3. Бабак В.П., Харченко В.П., Астанін В.В., Максимов В.А. Безпека авіації. К.: Техніка, 2004. – 584 с.

4. Максимов В.А. Оптимизация ресурсов изделий авиационной техники на базе использования полетной информации. Проблемы оптимизации системы технической эксплуатации авиационной техники: Сб.научн.тр. - Киев: РИО КИИГА, 1984. – с.56-59.

5. Вибір та обгрунтування показників якості робіт при ТО АТ. / В. І. Бурлаков, О. І. Юрченко, М. В. Корсуненко // Матеріали VI МНТК «АВІА-2004» (26-28 квітня 2004 р., Київ). – К: НАУ, 2004. Том 3. – С. 36.44-36.47.

6. Модель технологічного процесу технічного обслуговування авіаційної техніки. / С. О. Дмитрієв, В. І. Бурлаков , О. І. Юрченко // Вісник НАУ. – 2005. – № 3(25). –С. 64-68.

7. Моделі керування якістю технічного обслуговування авіаційної техніки. / М. В. Корсуненко, І. А. Слєпухіна, В. С. Шаповаленко, О. І. Юрченко // Вісник НАУ. – 2005. – № 4(26). –С. 81-85.

8. A. V. Goncharenko, “Several Models of Artificial Intelligence Elements for Aircraft Control,” 2016 IEEE 4th International Conference on Methods and Systems of Navigation and Motion Control (MSNMC): Proceedings of the Conference. (Oct. 18-20 2016, Kyiv). Kyiv, Ukraine: National Aviation University (NAU), 2016, pp. 224–227.

9. A. V. Goncharenko, “Aircraft operation depending upon the uncertainty of maintenance alternatives,” Aviation, 21, 4, pp. 126–131, 2017. https://doi.org/10.3846/16487788.2017.1415227.