

*T. A. Semytkivska, PhD in Engineering Sciences
(Flight Academy National Aviation University, Ukraine)*

*K.N. Shapoval, postgraduate student
(Flight Academy National Aviation University, Ukraine)*

The Concept of Selecting a Training Aircraft

The article considers perspective of civil aviation development as a factor requiring improvement of aviation specialists professional training.

Comparative analysis of aircraft used for pilots professional training is carried out in the article.

Systematization of requirements for training aircraft is proposed in the article.

Forecasting the development prospects of air transport entirely relies on the successes of the economic development of each country.

Progressive technological innovations and corresponding investments contributed to the increase in products in this area by more than 30 times since 1960.

The development of air transport looks quite encouraging in comparison with the general indicators of world production, which in real terms increased more than five times in the same period [1; 2]. For the period up to 2020, the international and domestic flights of both regular passenger and freight traffic are expected to increase. In addition, international shipments tend to increase more rapidly than domestic ones.

According to the International Civil Aviation Organization (ICAO), by 2030 the number of aircraft will double in comparison with 2010, and the number of international flights will increase to 52 million.

In this way, proceeding from the listed facts, the need for professional personnel in the aviation sphere will grow.

The International Civil Aviation Organization (ICAO) warns about the need to take measures to prevent a shortage of pilots, technical personnel and controllers in the next 20 years [2].

At the same time, the aviation industry, like nothing else, requires a special attitude to the security of the services provided. And the safety begins with a worthy preparation first of all pilots, from the process of their training and of course with the practice of flight training. Safety in transport depends on how competently organized the training is, on which plane the practice of initial training is organized, ours depends

As is known, efforts to ensure safety of flights occupy a dominant position. At the same time, the distribution of these efforts across the sectors of the organization, their ranking by priority requires additional in-depth studies. Confirmation of this need is the existing level of security in aviation transport. Speaking of this, the choice of an initial training aircraft should be analyzed first.

It's not a secret, even small aircrafts are quite expensive in case of their purchase and operation. Unfortunately, this fact is often the basis of choice. The article makes an attempt to analyze the requirements for technology of this kind.

It should be noted that in the conditions of a market economy, primary capital investment and flow expenses are reduced to a minimum. In addition, an aircraft intended for initial training should be small, light, with a specified capacity and training opportunities with a professional instructor.

Let's give some list of requirements for the "ideal" training aircraft.

These requirements comply with the ICAO standards and are not in doubt [3], but serve to ascertain:

- a) a conventional control system with good piloting characteristics; basic controls (including brakes) must be duplicated;
- b) an engine with a capacity of 100 horsepower with conventional control;
- c) cruising speed up to 100 knots of true airspeed, with two crew members and with full refueling to ensure flights on the route for a set time;
- d) fueling for three hours flight with two crew members;
- e) an «air-ground-air» communication system, an airborne intercom and an automatic radio compass (ADF) or a VHF radio receiver (VOR) or both;
- f) instruments and equipment for instrument and night flights with appropriate screens and curtains for normal operations using a limited number of instruments;
- g) robust construction and wear-resistant fittings that do not require significant maintenance;
- h) the possibility of placing a third person (an observer, examiner or another cadet).

To date, the market of ultralight and light aircraft is represented by several dozen models with fairly close characteristics.

Earlier on this issue, in detail [4], the characteristics of the most common types of aircraft used for training purposes were considered. We present the results of the analysis based on the requirements of the ICAO.

1. The NARP-1 aircraft meets the three ICAO requirements, namely the control system, the engine power communication system

2. The X-32 "Bekas" aircraft meets only two ICAO requirements, namely engine power and fueling, but this does not compensate for the remaining shortcomings. The X-32 airplane instructor does not have a duplicated "ignition" gas station;

3. The NG-5 aircraft meets the six ICAO requirements, it does not have the ability to only accommodate a third person;

4. The K-10 "SWIFT" aircraft also meets the six ICAO requirements and does not have the ability for a third party and the corresponding strength of the structure. This type distinguishes the possibility of placing instrument equipment in two versions: a more modern digital or analogue;

5. The Yak-52 aircraft meets the seven ICAO requirements, although a third party can't be accommodated. The instructor can simulate device failures with the help of special equipment, but at the same time he has the opportunity to control the aircraft in case of incorrect action of the cadet;

6. The Yak-18 meets eight ICAO requirements, and this is the only aircraft that meets all of the above requirements.

Conclusions

From the foregoing, it follows that ultralight aircraft can't be used to train professional pilots. They have too low speed of flight and not enough equipment.

Such aircraft as NG-5 and K-10 "SWIFT" proved their worth, despite the absence of the possibility of placing a third party. In terms of their characteristics, they also correspond to the values of the velocity. For training at later stages, the heavier Yak-52 and Yak-18T should be used.

As the operational experience of the Flight Academy shows, the strength of the structure suffers from the weight of the aircraft by reducing their weight, which leads to more frequent repairs (namely, chassis racks, as the most loaded ones).

The landing gear of such aircraft were not calculated for intensive "take-offs-landings". Light aircraft have no such problems (at least, so often).

Thus, it is necessary to design a special aircraft for initial training. In the perspective design, all requirements and operating experience must be taken into account.

References

1. Прогноз развития воздушного транспорта до 2015 года: ICAO, 2004.
2. Прогноз развития воздушного транспорта до 2025 года: ICAO, 2007.
3. Руководство по созданию и работе авиационных учебных центров: ICAO, 1983.
4. Наукоємні технології, 2012, №4 (16), Оцінка можливостей систематизації вимог до навчально-тренувального літака. ISSN 2075-0781.