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The Human Factor in the Aviation Activity of P.M. Nesterov

The article deals with main features of the human factor in the aviation activity of pilot-innovator P.M. Nesterov – dedication, enthusiasm, creativity, professionalism, courage, and patriotism.

The human factor has always been of utmost importance in aviation. There are different approaches to defining this concept. The International Civil Aviation Organization (ICAO) in its documents characterizes the human factor as "the whole complex of aspects of human activity in the aviation system." In particular, the following definition is given: "The human factor is people in their work environment and their relation to equipment, work procedures and physical environment" [1, p.8]. The further development of aviation safety tools has led to changes in comprehension of the role of the human factor in the aviation sphere. The further research was concentrated on the concept of organizational factor, according to which in a situation when a human being makes a catastrophic mistake the system that allowed the person to make this mistake and did not provide him/her with additional means of protection is also to be blamed [2 p. 11].

The human factor was the primary source of aviation in general, since it was created on a voluntary basis, on the initiative and funds of enthusiasts of aviation from various strata who desperately followed the thorny path of the conquerors of the sky, risking their lives during the testing of their aircraft.

This fascination with aviation in the early twentieth century was a decisive factor in the fateful reorientation of Lieutenant P. M. Nesterov, this exemplary artillery officer, to aviation activities. In 1910, in the Caucasus, where he was transferred for one year from Siberia because of health problems, P. Nesterov met with the aviator-enthusiast A. Katsan and mastered the principles of the construction of the glider. He himself noted in "St. Petersburg newspaper" (1913) that his fascination with aviation started in 1910 [3]. At the same time, P. Nesterov "set himself the task of constructing such a device, the movement of which would depend less on the surrounding conditions and would almost completely obey the will of the pilot" [4].

His first practical acquaintance with aeronautics happened in 1909 during his service at the Vladivostok Aeronautics Company as an artillerist-observer. Here he, repeatedly flying on the balloon, learned the practice of flying on airships, offered his own method of correction of artillery fire from the air, studied the scientific works of M. Zhukovsky and D. Mendeleyev on aviation issues [4].

The following important steps on the aviation path were made by P. Nesterov during his stay on a holiday in the summer of 1911 in Nizhny Novgorod. Here he joined the Nizhny Novgorod Aeronautics Society and, with the help of its members, built a glider, which on August 2 made a flight over the outskirts of the city. It actually became the beginning of his independent flying practice. At the same time, M.

Nesterov worked on the development of his own aircraft, and after finishing the design he offered it to the Engineering Department of the Military Ministry. However, the answer was negative. Although later, in the summer of 1913, the Military Ministry approved its draft, but “without the allocation of funds” [5. p.72].

Since the autumn of 1911, P.M. Nesterov studied aviation at the St. Petersburg Officer Aeronautics School. After graduation, he was transferred to the Gatchina Air Squadron, where he carried out his first flight on August 12, and on August 28, 1912 he received the certificate of a pilot-aviator, and on October 5, 1912 - the certificate of a military pilot. The command and colleagues noted his courage and outstanding ability in piloting technique.

In November 1912 P. Nesterov and his aviation detachment were transferred to Warsaw for mastering the "Nieuport" aircraft adopted by the Russian army. When testing the combat vehicles, he proved himself an experienced and brave pilot with an exclusive self-control. Thus, in one of his flights, Nesterov took a height of 1600 m, then turned off the engine and glided down in circles over the Mokotovsky aerodrome, which strongly stirred his pilot-colleagues. Nesterov violated the old canons of piloting and affirmed in practice new ways of aeronautics, the ability to make deep turns. The Nesterov pilot system with the excluded engine helped him escape his death on January 25, 1913, when the gas burned in the carburetor during the flight and the engine stopped [6].

The creativity and design talent of P.N. Nesterov were revealed particularly bright in Kyiv, where he was sent in spring 1913 to serve in the aviation detachment. The young pilot officer arrived with a description, which stated: "Peter Nesterov is an outstanding pilot. Technically prepared perfectly. Vigorous and disciplined. Moral qualities are very good "[7]. He was appointed Chief of the 11th Corps of the 3rd Aviation Company based on the Syrets Military Aerodrome (now it is the territory of the O. Dovzhenko Film Studio), where he continued his studies on figure piloting. P. M. Nesterov not only perfected in the theoretical and practical terms his aeronautical methods, but also distributed them in every possible way. Thus, the pilots of the aviation company, thoroughly studied, according to the program designed by Nesterov, the material part of the aircraft, the features of piloting in different time and weather conditions, worked out the exact landing, etc [4].

Soon P. Nesterov becomes an active member of the Kyiv Aeronautics Society, makes reports on theoretical issues of aviation and piloting technology, informs about the peculiarities of single and group flights he has made, becomes an honorary member of the Scientific and Technical Committee of the KTP, and tests the planes of some members of the KTP, in particular the planes of Ye. Kasyanenko, O. Karpyky, and others [8].

Peter Nesterov did not stop his design work, which was based on the safety of flights. In 1913 he created an experimental star-shaped seven-cylinder air-cooling engine with a capacity of 120 hp. and continued working on the construction of a high-speed aircraft, the completion of which was prevented by the First World War. At the beginning of 1914, he modified the systems of chassis, brakes and wings of the aircraft "Nieuport-IV"[9].

Nesterov got wide popularity in the Russian empire for his long-distance flights. Thus, on August 10-11, 1913, he traveled the Kiev-Oster-Kozelets-Nizhyn-Kyiv route

without preliminary training, and, in several days, repeated the flight, but already consisting of three planes. It was the world's first group flight with four landings. During the flight, for the first time in the history of aviation the cinematographer V. Dobrzhansky conducted a video shooting from the plane [10]. This 30- minutes documentary was shown with great success in the best cinema of Kiev on Khreshchatyk, 38 [8]. Then in March 1914 there were flights from Kyiv to Odesa, to Sevastopol, and on May 11, an 18-hour flight to St. Petersburg with three landings for refueling.

One of the figures, which P. Nesterov dreamt to perform, was a circle in the vertical plane - a "dead loop". After conducting the relevant calculations and conversations with M. E. Zhukovsky, P. Nesterov decided to put the plan into practice. This happened in the presence of several spectators on August 27 (September 9) in 1913 in Kyiv over the Syrets Airfield. Having achieved a height of 800-1000 m, he turned off the Neiuport's engine "Dwarf" with a power of 70 hp and quickly flew down. Having descended to a height of 600 m, P. Nesterov turned on the engine again and the aircraft flown upright, then back and down again, and in a spiral landed on the yard, thus making a closed loop for the first time in the world. This sensational event had become widely known both in the territory of the Russian Empire, and throughout the world. The Parisian newspaper "Maten" on August 30 published an article written by P. Nesterov about his flight. Twelve days later the French aviator A. Pegu, impressed by the article, repeated the "dead loop," which had become known as the Nesterov loop [8].

Analyzing the flight in the article "How I Made a Dead Loop", published in September 1913, P.M. Nesterov emphasized the extremely important role of the human factor in aviation [10].

By the implementation of the "dead loop" P.M. Nesterov entered the history of aviation as the founder of aerobatics. However, along with the high appreciation of this risky flight, some periodicals expressed a rigid critique of P. Nesterov's actions, calling them "acrobatism", "circus bravado", etc.

Contrary to the fact that the experience of P. Nesterov was important for the development of methods of combat use of aviation, his flight caused the discontent of the conservative command. The innovator was even threatened with thirty days' imprisonment for risking state property and his own life [11, p. 66]. However, P. Nesterov was convinced that "figure flights are a pilot's school", and on March 31, 1914, he repeated the "dead loop" [6].

The Kiev Aeronautics Society awarded Peter Nesterov a gold medal for his contribution to the theory of aeronautics and for the first in the world the airplane management in vertical rolls. The Kyiv City Council also awarded Nesterov with a golden badge which became a talisman for the pilot [10].

At the beginning of the First World War, Staff Captain P. Nesterov, along with his aviation detachment, was sent to the 3rd Army of the Southwest Front, which was to defend positions in Eastern Galicia. Besides reconnaissance missions, Nesterov also used his airplane for bombing and air battle. He worked out a special technique for destroying the enemy propeller in an air battle. Nesterov thought about destroying the enemy plane from above with the help of wheels. The wheels in that case were to be used as a ram.

His first and last air ram Nesterov carried out on his "Moran" airplane on August 26 (September 8) in 1914 near Zhovka (37 km from Lviv) against an

Austrian “Albatros” plane. It was the first air ram in the world. Staff Captain P. Nesterov and Austrian pilot Baron F. Rosenthal were killed as a result of serious damage to the planes. For this brave feat P.M. Nesterov was awarded (posthumously) the Order of St. George IV degree. On March 31, 1915, the Russian pilot O.O. Kozakov on the monoplane "Moran III" successfully replicated the Nesterov ram. Nobody dared to repeat such a thing during the entire World War One. Only in the Second World War some pilots on the Eastern front applied air rams in air battles [11, p. 69-71].

So, the aviation activity of P.N. Nesterov testifies to the great importance of the human factor in aviation, which the pilot-innovator himself understood well, and the concrete implementation of various aspects of it contributed to the discovery of a new page in the mastery of airspace in the early 20th century, in the history and development of world aviation.

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