

# Розвиток, бойове застосування та озброєння авіації

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## TRENDS IN THE IMPROVEMENT OF THE EQUIPMENT OF THE MILITARY PILOTS

*Analysis of the application of military aviation in local wars showed that the efficiency of the performance of the combat tasks and the probability of pilot's survival at impact the enemy or failure of aviation equipment significantly depends on the pilot's equipment. The world tendencies of improvement of the military pilot equipment are analyzed in the article.*

**Keywords:** *flight suit, military pilot equipment, pilot helmet, military pilot outfit, pilot uniform.*

### Statement of the problem

Kharkiv National Air Force University studies showed that the efficiency of performance of the combat tasks significantly depends on pilot's equipment. Also its quality depends on the survival of pilots during aircraft impact of the opponent or a failure of aviation equipment. Therefore, the military pilot's equipment is permanently improved and it is important for command of the Air Force (AF) of Ukraine to track these changes for making decision to apply these changes in troops.

**Purpose of the article** is to analyze global trends of improvement of military pilot's equipment such as the pilot helmet and the pilot jumpsuit.

### Basic material

The pilot combat equipment complex is a set of items that make up the gear the pilot required to perform combat tasks. To it belongs: pilot protective helmet, pilot maintenance uniform, pilot jumpsuit, altitude-compensating costume, overloading costume, oxygen mask, personal weapon (when participating in combat) and caring emergency stock. The most modern helmet is those that are created for the pilots of the U.S. fighter F-35 and Russian T-50.

Fighter F-35 is the first aircraft without the usual tactical display, instead of which display is integrated in pilot helmet. The name of the new F-35 device is Helmet Mounted Display System (HMDS). It is designed by Vision Systems International (USA) in partnership with the Kaiser Electronics and Elbit Systems Ltd. (Israel).

The F-35 Gen III HMDS provides a next-generation user interface that integrates the pilot more

tightly than ever into the aircraft's avionics. The system gives F-35 pilot unsurpassed situational awareness by displaying critical flight information and sensor video throughout the entire mission. HMDS serves as the virtual head-up display, enabling the F-35 to become the first tactical fighter in 50 years without a traditional head-up display. By fully integrating three advanced technologies – head-up display, helmet-mounted display and visor-projected night vision - the F-35 Gen III HMDS provides revolutionary capability to the cockpit [1].

Its key benefits are: provides enhanced situational awareness; integrated, virtual head-up display on the helmet visor for critical flight and mission information with a smooth transition to Helmet Mounted Display zymology; night vision capability built into the helmet; lightweight helmet with optimal center of gravity for maximum comfort and reduced pilot fatigue; provides weapons targeting by looking at and designating targets, and target verification when receiving steering cues from onboard sensors.

Its key features are: binocular, 30-by-40-degree wide-field-of-view with 100 percent overlap; virtual head-up display; look-through-aircraft capability; high accuracy tracking with auto-bore sighting; active noise reduction; digital night vision sensor; lightweight and well balanced helmet; custom helmet liner for precise fit and comfort; multiple interpupillary distance settings; video recording; picture in picture; compatible with eyeglasses and laser eye protection devices.

The F-35 Gen III HMDS offers a fully integrated day and night solution through advanced, next-generation features. Pilots in aircraft equipped with the system can look at a target to aim their weapons while

maintaining spatial orientation of their surroundings and continually monitoring critical flight information. For night missions, the HMDS projects the night vision scene directly onto the visor, eliminating the need for separate night-vision goggles. The HMDS provides a lightweight helmet, with optimized center of gravity and maximum comfort for reduced pilot fatigue. In addition it is provided tactical information in the form of a simplified image of the objects that they represent. To identify the affiliation of the purposes involved different colors. The symbols are placed on the background of physical maps, while the scale of the map is changed at the request of the pilot (fig. 1). The data, coming on the board outside are treated onboard computer, analyzed her authenticity and in case of a positive conclusion provided by the pilot. Computer also determinate the zone of destruction of the enemy's missile, the size of which varies depending on the altitude, the vantage point emitting a signal, etc. Near the marks of the air target displays aviation means of destruction, which are

available on board the F-35. Each target gets the tag, which determines the optimal means of destruction [2].

British BAE Systems has also developed for fighter pilots new helmet "Striker II. Its main component is lower weight night vision device, which transmits the information and displays high-definition picture on glass helmet. It eliminates the need to use heavy devices of night vision, which reduces the load on the head and neck of an airline pilot. The helmet provides accurate transmission of images and transition from day to night without manual adjustment and the adjustment. In a new development used a complex system of sighting, which greatly reduces the time of capture. Its basis is a computer which continuously synchronizes the position of the pilot head with the sight.

New Russian pilot helmet receives information from a large number of sensors and replaces multiple devices. Information that requires pilot, is displayed on the glass of the helmet, which is 350 grams lighter previous designs.



Fig. 1. F-35 Helmet Mounted Display System

Changes in aircraft maintenance uniforms are associated with the invention of fire-resistant meta- fibers in the 1960s in the United States, and later in France. The first fire-resistant coverall entered US army in 1968. The typical composition of the first meta-aramid fabrics had 95% of meta-aramid and 5% para-aramid. Para-aramid needed to decreasing thermal shrinkage of the tissue under the influence of an open fire. In the early 1970s meta-aramid replaced cotton and nylon in United States pilots jumpsuits. In the 1990s for the flight of the clothes were created by the fibres, which-\* allow you to apply camouflage. With the cam-

ouflage aim-aramid fabric has sewn for PJ army aircraft pilots, which became more universal uniform and combines flying, the everyday and the field uniform

The current model flight suit for the US military is the CWU-27/P. It is the flight suit worn by United States Army, Navy, Air Force and Marine Corps pilots. They are manufactured in accordance with military specification MIL-C83141A using producer-dyed fabric made from 92% meta-aramid fiber, 5% para-aramid fiber, and 3% conductive fiber. The zippers are made from meta-aramid with solid brass teeth and the thread is made from para-aramid.

In addition to the USA France had own development program of meta-aramid

Research began by French Rhne-Poulenc company, which that later merged with AMOCO Fabrics&Fibers in a collaborative enterprise called Kermel, that produces non-combustible fiber's that haven't analogs anywhere in the world. Recently in flight suit of European pilots began to be used the fabric of Kermel V70 Satin interlacing density 250 g/m<sup>2</sup> and 230 g/m<sup>2</sup>. In 2011 the Kermel introduced flight coverall R-GO7 that has combined design with a fire-resistant fabric and fire-resistant knitted mesh. Due to non-shrinkage in hot water and high color stability such flight suit after five years of operation look like new [3,4].

### Conclusions

From the above we can draw conclusions about what the world tendencies of improvement of the equipment of military pilots is the use of fighter pilots protective helmets with miniature displays and manufacturing flight suit from fire-resistant meta-aramid fibers.

When determining the appropriateness of use in the pilot helmet with the miniature devices must take into account the fact that for this you will need to upgrade existing planes. The technical possibility and cost-effectiveness of such modernization required to examine separately.

The use of fire-resistant reinforced fabric in flight suit is advisable to start with the purchase of an experimental batch of such uniforms. Based on the results of its trial use to determine the possibility of establishing pilot fire-resistant fabric uniform manufacture reinforced under license the enterprises in Ukraine. It should be assumed that the uniform from fire-resistant fabric will be in demand by many other public and private entities.

For making a decision on implementing these trends in the AF of Ukraine it needs to examine their cost-effectiveness and technical ability.

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### ТЕНДЕНЦІЇ УДОСКОНАЛЕННЯ ЕКІПРОВКИ ВІЙСЬКОВОГО ЛЬОТЧИКА

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*Аналіз застосування військової авіації в локальних війнах показав, що ефективність виконання бойових завдань і виживання льотчика при вогневій протидії противника або відмовах авіаційного обладнання значно залежить від екіпіровки льотчика. У статті проаналізовано світові тенденції удосконалення екіпіровки військового льотчика.*

**Ключові слова:** екіпіровка військового льотчика, льотний комбінезон, шолом льотчика, спорядження військового льотчика, льотна уніформа.

### ТЕНДЕНЦИИ СОВЕРШЕНСТВОВАНИЯ ЭКИПИРОВКИ ВОЕННЫХ ЛЕТЧИКОВ

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*Анализ применения военной авиации в локальных войнах показал, что эффективность выполнения боевых задач и выживания летчика в при огневой противодействия противника или отказах авиационного оборудования значительно зависит от экипировки летчика. В статье проанализированы мировые тенденции совершенствования экипировки военного летчика.*

**Ключевые слова:** экипировка военного летчика, летный комбинезон, шлем летчика, снаряжение военного летчика, летная униформа.