

TECHNICAL PROPOSAL

Upgrade helicopters for night flights



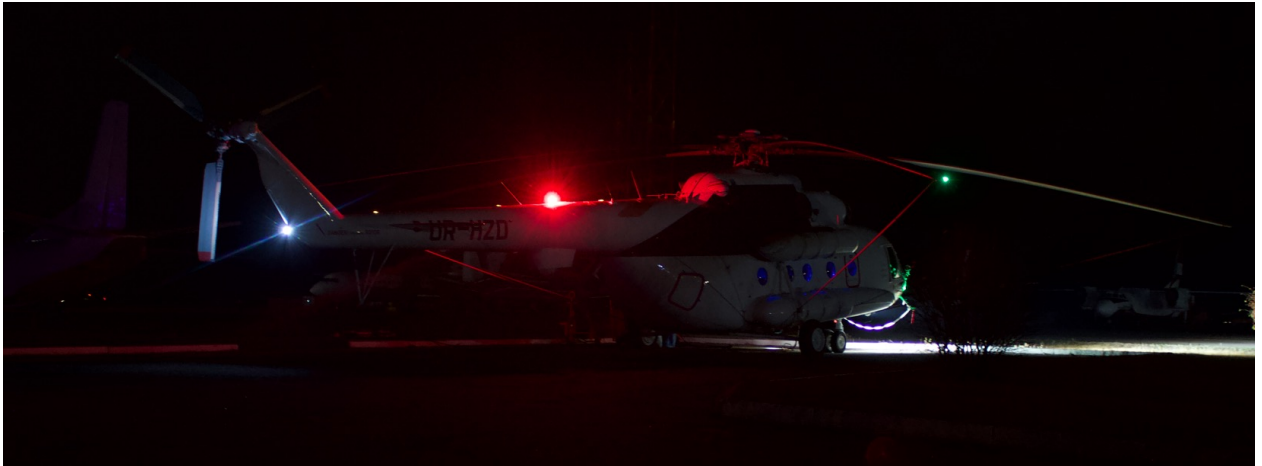
TECHNICAL PROPOSAL

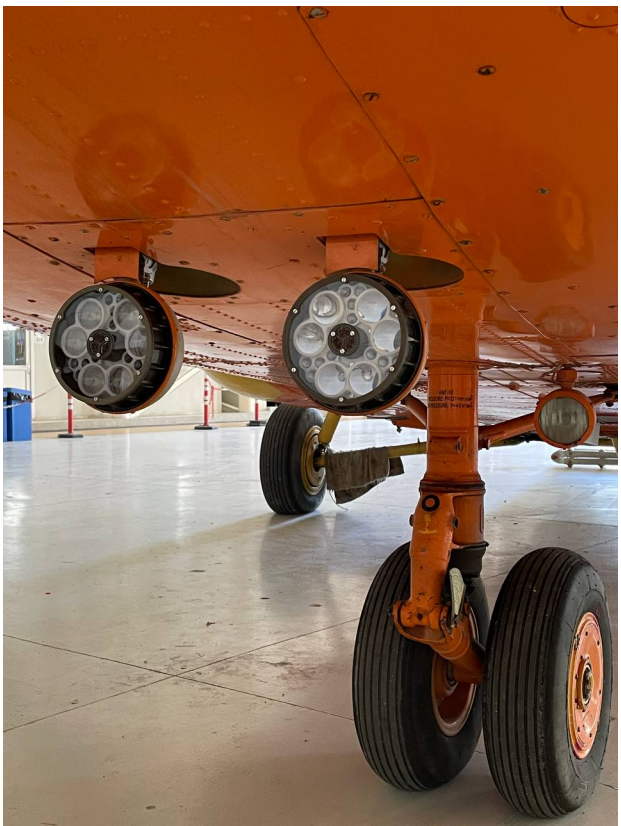
We specialize in the development, production and operating of flight simulator systems for training of pilots, as well as carries out design and manufacturing of modern lighting equipment for aircrafts, with in-depth specifics of the use of night vision systems. The company is approved by the State Aviation Administration of Ukraine as Part-21 design and manufacturing organizations, as well as the STC and service bulletin holder for NVG upgrade of Mi-8/17/171 helicopters and their modifications.



TECHNICAL DESCRIPTION

The NVG Upgrade project implement the possibility of NVG-aided night operations of helicopters by replacing internal and external lighting equipment, as well as painting the internal surfaces of the cockpit to black matt to minimize light reflections and glares on the NVG.





Miniature lamps

Branded LEDs with special NVIS filters that reduce the excess infrared radiation from LEDs to the levels required by MIL-STD-3009 specification.

Materials and electronic components can operate continuously in wide temperature range from -55°C to +85°C.



Lamp fixtures

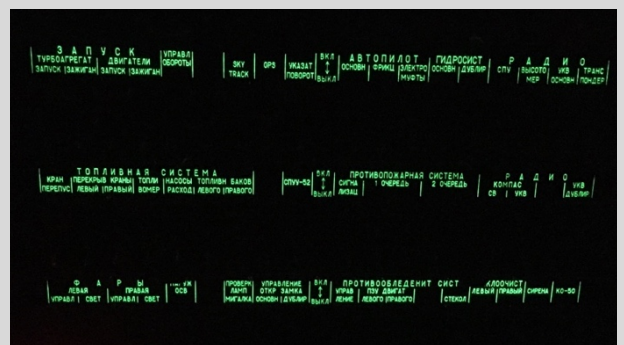
New improved lamp caps are used to illuminate instruments and indicators on dashboards and panels accurately. The caps are specifically designed to work with miniature LED lamps. The caps provide uniform illumination of instrument scales, while protecting the area around the instruments from parasitic illumination, which allows minimizing glare and reflections of lamps in the cockpit windows.

Lamp holders for illuminated panels are equipped with silicone seals, resistant to extreme environmental factors.



Illuminated panels (with backlit)

Chromaticity and radiance of internally illuminated panels are compliant with MIL-STD-3009 requirements and provide uniform and clear illumination of circuit breakers labels.



LED brightness dimmers

Digital brightness regulators (with pulse-width modulation) are used, which provide precise and smooth adjustment at all brightness levels (1024 gradations).



NVIS filters for additional avionics equipment

Special optical filters with a wear-resistant coating are used for displays and gas-discharge indicators. The filters block a range of near-infrared spectrum that affects the NVG, while the screen remains sunlight-readable. As a result, improves perception of information from the screens during the NVG operation.



Dual mode search-landing lights

The lamps have an active cooling system with a large thermal inertia. In case of overheating of the LEDs, the built-in control system automatically smoothly reduces the brightness of the lamp, thereby eliminating the possibility of failure or degradation of the LEDs.

High-efficiency LEDs deliver $>250,000\text{cd}$ of white light and $>70\text{W/sr}$ of infrared (IR) light (at $+35^\circ\text{C}$ ambient temperature).

The luminous flux ensures the visibility of the ground surface from an altitude of up to 200m.



The optics of the lamp forms a focused beam of light with a narrow viewing angle, and completely cuts off the side illumination, which can reflect from the fuselage and interfere with the crew's NVG.



External lighting

Distinguishing features:

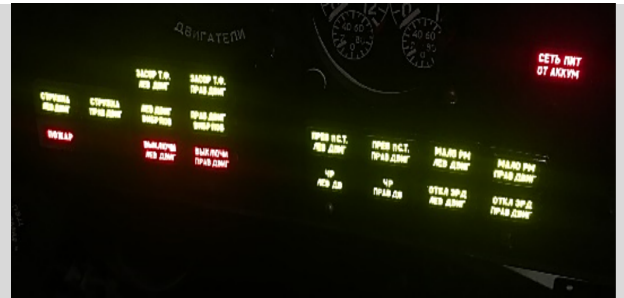
- Confirm to requirements of CS-29 and MIL-STD-3009;
- Lightweight and durable;
- Anti-vandal design (hard anodized duralumin cases, polycarbonate covers);
- Reliable electronic components;
- Specialized sealing materials.



Advisory, caution and warning annunciators

Miniature lamps, operating with special optical filters, which enhance contrast and clarity of labels.

Modified annunciators are compliant with MIL-STD-3009 and CS-29 requirements - do not affect the NVG in the night as well as provide excellent readability under direct sunlight.



NVG with helmets

The NVG Upgrade Project include 3x PNL-3M NVG (PCO, Poland) and 3x LH250 (MSA, France) / THL-5NV (FAS, Poland) helmets with headset and NVG mount.

We also provide specialized training for crews on the specifics of adjusting and operating NVG with helmets, as well as the features of aircraft piloting and crew interaction. The training is carried out by an approved ATO pilot instructor with experience in conducting such training.



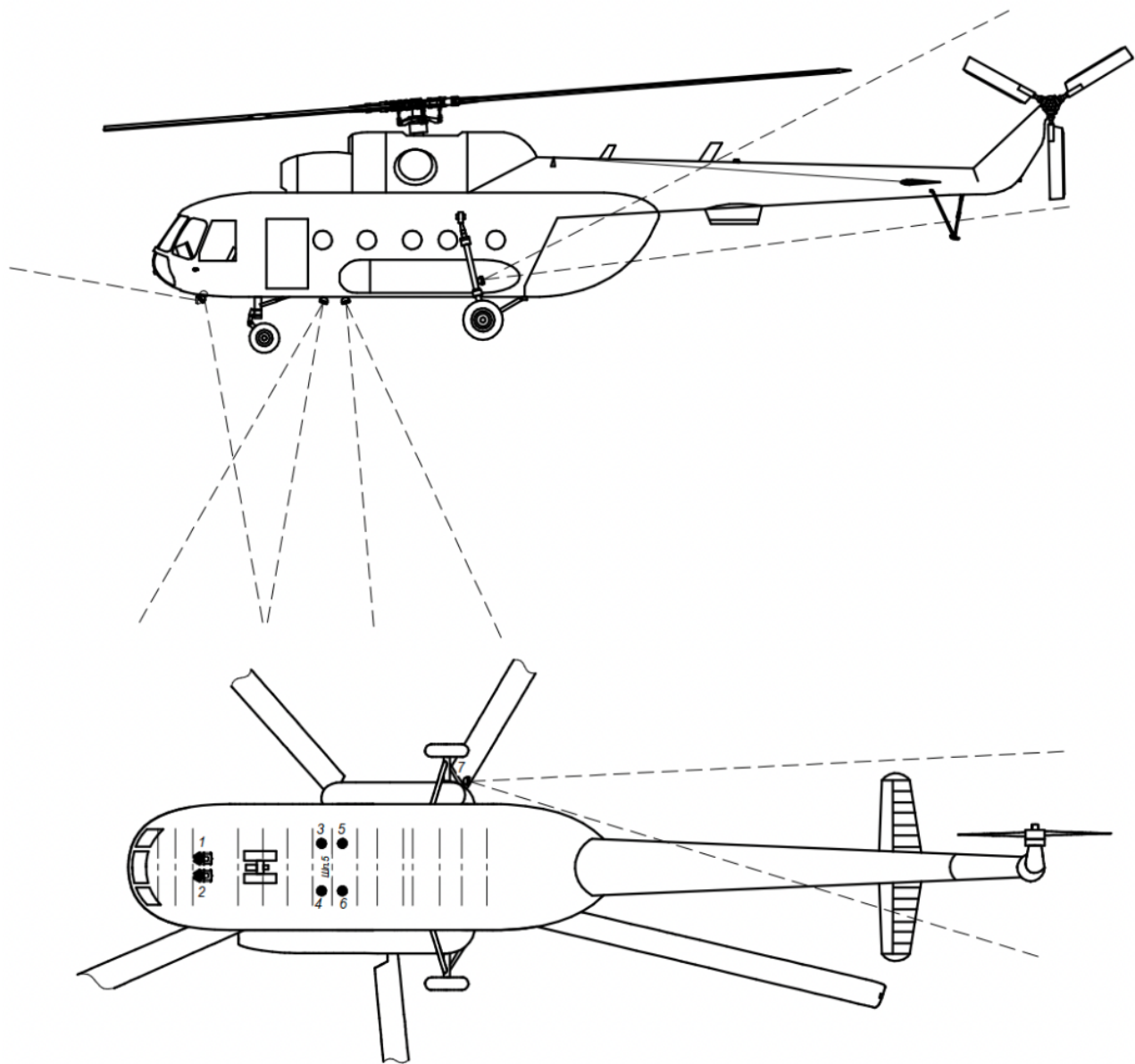
Cockpit painting

For the best performance of NVG, operating in upgraded cockpit all panels and visible surfaces are painted in black matt paint for absorbing any possible reflections.





Optional dual-mode landing lights



DELIVERY SET

1. Dual-mode (visible/infrared) external lighting:

- Left and right search/landing lights
- Taxi light
- Navigation lights
- Anti-collision light
- Blade tip lights

2. Cockpit NVIS-compatible equipment:

- Miniature LED lamps and fixtures
- Illuminated LED panels (with backlit)
- Brightness dimmers
- NVIS filters for additional avionics equipment

3. General NVIS-compatible LED lamps:

- Dome lights in the cockpit (white/green)
- Dome lights in cargo, radio and tail compartment (white/blue)
- Utility lights (white)

4. NVIS-compatible advisory, caution and warning annunciators:

- Miniature LED lamps
- Optical filters and legends
- Brightness dimmers

5. Night vision equipment:

- 3x NVG
- 3x aviation helmets

6. Spare parts:

- External and internal lighting equipment

7. Documentation amendments:

- Flight Manual, Maintenance Manual, Maintenance Program, Wiring Diagrams
- Certificate of Release to Service

8. Optional dual-mode landing lights:

- Set of additional search/landing lights with mounting system (5pcs)
- Control panel for pilot/copilot

SUMMARY

A distinctive feature of our technical solution is an integrated approach to the operation of NVG on Mi-8/17/171 helicopters - from the certified development and production of the equipment to the training of flight personnel.

The use of a modern electronic components and technologies, as well as test-proven technical characteristics that meet the requirements of MIL-STD-3009 and CS-29 determine the advantages of this choice for the End User.