Integrated Implementation of Mi-17 Modernization Program and Mi-38 New Generation Transport Helicopter Development

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The concept of the present stage of Mi-8 helicopter upgrade program was developed at the beginning of 90's. The idea was to modernize the helicopter taking into account Afghanistan combat experience. Practice of rotorcraft operation in mountains showed that the first task was to improve the helicopter's altitude performance and to decrease the assault launch time. All this resulted in the Mi-8MTV-1, Mi-8MTV-2, Mi-8MTV-3 modifications' development.

The configuration of these modifications was analogous to that of the basic helicopter. The equipment and fit-out were considerably changed. Thanks to the reliable engine powering the rotorcraft and improved altitude performance the helicopter can execute various combat missions. The new capabilities of the helicopter improve its combat survivability.

Today Kazan Helicopter Plant in cooperation with Mil Moscow Helicopter Plant is developing new practical technical approaches which ensure the upgrade of Mi-8/17-family helicopters with optimal ratio of efficiency to cost. Close cooperation with operators and designers allowed Kazan Helicopter Plant to determine the main directions of the helicopter development.

The Mi-17-V5 helicopters serially manufactured by Kazan Helicopter Plant have the following improvements:

widened LH slide door;

additional RH door;

automatically extending/retracting cargo ramp in the fuselage aft section.

These design changes considerably enhance the helicopter's capabilities in transportation, search-rescue and especially assault launch operations: 36 troops with a complete set of operational items can get out of the helicopter within 15 seconds. Therefore, the Mi-17-V5 became a real leader in its class. In the last year summer

the Mi-17-V5 took part in testing flights conducted under the supervision of Defense Ministry of Greece in the frame of a preliminary program of the tender for combat helicopter purchase. These flights proved the highest performances of Mi-17-V5 helicopter.

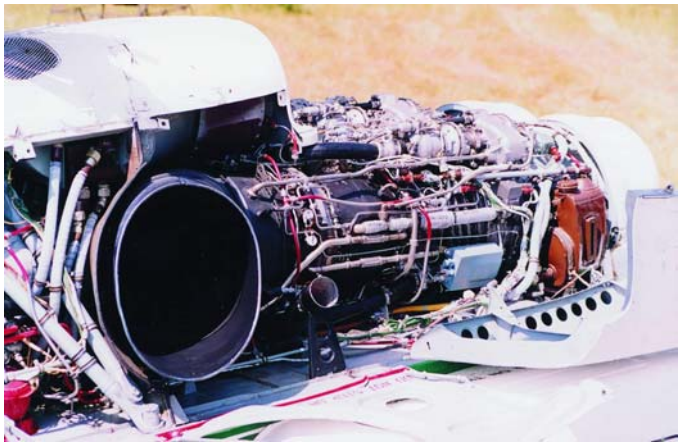
Alongside with the improvements mentioned Kazan Helicopters JSC offers to its customers the following innovations:
adaptation of cockpit to night vision goggles which considerably extends helicopter's use in night operations;
installation of an emergency floatation system, completely tested and certified;
installation of SX-16 search lights with an infrared shutter;
installation of additional navigation equipment, including "Abris" system, to provide satellite navigation, digital mapping, collision warning system;
installation of energy-absorbing pilot's seats.

The additional equipment offered to the customers includes special air-dropping devices for troops landing from a hovering helicopter, Bamby bucket fire-fighting system, etc.
The modernization of Mi-17 helicopter is going on. Now the plant is developing a new upgraded version of the Mi-17-V5. The fuselage geometry of this helicopter will be similar to that of the basic one. It is planned to be equipped with VK-2500 engines of 2400 hp take-off power, as well as with new gear box and transmission, enabling to use the engine power without losses. This helicopter will be outfitted with new blades made of composite materials and a new tail rotor.

The helicopter will be equipped with new avionics of "glass cockpit" type. This ensures the work of 2 crew members and provides the helicopter's automatic control.
The considerably improved performance of the helicopter will increase its operational capabilities. The payload is expected to be increased by 500 kg, the maximum and cruising speeds – by 25 and 20 km/h correspondingly. The hovering and service ceiling will be also heightened.
This work will take about 2-3 years. The Mi-17-V5 development program will be fulfilled in stages. The first stage will include the installation of new VK-2500 engine (with a power limitation of 2050 hp),

new “SAFIR” APU and update avionics. Today the helicopter powered by new VK-2500 engines and APU is under flight tests. As for the avionics, the configuration of the helicopter cockpit with new avionics of glass cockpit type is determined. The avionics is made on the basis of the components produced in Russia. The helicopter equipped with this avionics will be exhibited at MAKS–2001 Aero Show in August, 2001.

Thus, starting from 2002, Kazan Helicopter Plant plans to offer to its customers the next version of Mi-17-V5 helicopter equipped with new engines, APU and avionics. The potential customer is supposed to appreciate the new version of the helicopter. Let us mention some advantages of the helicopter. The number of the crew members is reduced to 2 people. The new cockpit provides improved conditions for crew work. Using up-to-date navigation allows to increase flight safety and to use the helicopter in night conditions. New engines and main gear box give the opportunity to operate the helicopter in mountainous areas (the engine can be started at altitudes up to 6 km).



The emergency power of VK-2500 engine enables to continue the interrupted take-off. The new engine’s service life is also extended. The enhanced performance of VK-2500 engine gives hovering ceiling gain (especially under high temperature conditions) and improves the helicopter performance.

The second stage envisages the upgrade of the rotor system. The helicopter will be equipped with new blades made of composite materials. Nowadays Mil Moscow Helicopter Plant has completed the blades’ flight tests which proved their aerodynamic characteristics.

On the third stage of Mi-17-V5 modernization program Kazan Helicopter Plant is planning to replace transmission. This allows to transmit VK-2500 engine’s entire power to the upgraded rotor system.

Today alongside with the Mi-17-1V Kazan Helicopter Plant offers its transport-passenger version designated as Mi-172. It has some different features in comparison with the basic helicopter. This modification was developed to improve passengers’ safety during the flight.

The Mi-172 has Type Certificate issued by Russian Aviation Register of IAC. It is manufactured with a standard set of avionics, as well as with avionics of glass cockpit type arranged on the basis of the equipment produced by Honeywell company.

Today the plant is working out the autopilot system (en-route flights, approach to WPT, approach for landing, etc).

The helicopter's flight tests are scheduled for the end of 2001.

The Mi-8 is constantly (steadily) modernized helicopter. This allows to manufacturer to receive unique combination of the helicopter reliability and up-to-date customer's requirements. Kazan Helicopter Plant proves this in its everyday activity.

During last 10 years the Mi-8/ 17 helicopter was successfully modernized. But a resource of modernization of any aircraft has some limits. That is why the well-known helicopters of Mi-8/ Mi-17 type should be substitute by new generation Mi-38 helicopter.

Mi-38: Russian-European project

In the beginning of 80's Mil Moscow Helicopter Plant started research aimed to develop new rotorcraft enable to substitute the Mi-8 helicopter which was produced serially since 1965. The work on conceptual (preliminary/draft) design was started in 1987 and took two years. In 1989 the full-scale mock-up of the helicopter designated as Mi-38 was exhibited at Le Bourget and Moscow air-space shows.

In August 18, 1999, at MAKS-99 international exhibition, Euromil company, Mil Moscow helicopter plant, Kazan Helicopter Plant and French-German Eurocopter corporation (the Mi-38 development program's partners) signed a contract for the development and flight tests of Mi-38 helicopter first prototype.

The aims of the first stage are the verification of the helicopter performance, selection of new design approaches and demonstration of the new helicopter to its potential customers. After the first helicopter's tests were successfully finished the partners signed a contract for the program's second stage. It provides for full-scale development and certification of the Mi-38 both in Russia and in the West.

The Mi-38 helicopter project is the biggest one in the "Russia's Federal Civil Aircraft Development Program". It is included in the list of joint projects of Rosaviacosmos company and West-European EADS concern. The project has a governmental support. Its fulfillment is under Russian and French governments' control.

Mil Moscow Helicopter Plant has developed the helicopter design documents. Kazan Helicopter Plant has manufactured the helicopter fuselage. Eurocopter corporation is responsible for the avionics installation. The avionic configuration (set) and delivery schedule were agreed upon by the project's partners.

To decrease the time of helicopter assembly Pratt&Whitney company and Krasny Oktyabr JSC manufactured the engine's and VR-38 main gear box' full-scale mock-ups.

In February, 2001 Euromil and Canadian Pratt&Whitney company signed a contract for cooperation. According to the contract, the first PW-127/5 engine for Mi-38 prototype has been assembled and tested. The engine's inlet module was manufactured in cooperation with Moscow and Kazan engineering plants. The helicopter systems and units are manufactured and delivered to Kazan Helicopter Plant for final assembly according to the schedule. The helicopter assembly is planned to be finished by the end of 2001.

In 2000 Russian Aviamarket enterprise and Eurocopter corporation conducted marketing research to analyze the needs for Mi-38

helicopter. Every company conducted the research program independently, using its own methodology. The results were very optimistic: the potential customer needs a new helicopter. Moreover, if cargo load capacity of the external sling is increased, the scope of operations executed by the Mi-38 will be extended. In this case Mi-38 helicopter will partly perform the functions of the Mi-6, the production of which was stopped.

Today Mi-38 helicopter development program is the biggest Russian international aircraft-building project. The participation in it confirms Russia's status as a world helicopter-building leader.

Nowadays Kazan Helicopter Plant is manufacturing the pilot helicopter and preparing facilities to start serial production of the Mi-38 that is intended to transport 30 passengers. The helicopter is developed by Kazan Helicopters JSC in cooperation with Mil Moscow Helicopter Plant and Eurocopter corporation. Now these three firms are incorporated in the frame of EuroMil Company. The potential customer's needs for the Mi-38 for period from 2003 till 2015 are about 300 units.

The first flight of the Mi-38 is planned in the beginning of 2002.

The Mi-38 is designed as multipurpose transport helicopter. Many modifications of the helicopter intended for operation in different climatic conditions can be developed on the basic version.

The serial production of the Mi-38 is planned to be started at Kazan Helicopter Plant in 2004. Two full-scale prototypes in transport and passenger versions have been produced already. Kazan Helicopters JSC has already begun static tests. Nowadays the plant is in preparation for flight and certificate tests. The pilot helicopter will be powered by PW127. In the end of 2001 the cockpit of the prototype will be equipped with the set of avionics.

The Mi-38 is designed taking into account American and European worthiness requirements.

In conclusion of this report I would like to stress that the Mi-38 is the helicopter with the great capability. Its further modernization allows to improve performance of the Mi-38 that can be resulted in the helicopter's ever-growing use.

Mi-38 medium multipurpose helicopter

Designer	Mil Moscow helicopter plant, EUROMIL
Manufacturer	Kazan Helicopter JSC
Power	2x P&W127T/ V (B) (2x2500 shp)
First flight –	in 2002
Crew / passengers	2/30
Dimensions (length/ height/ width, m) of	
fuselage	19,95/5,13
cargo-passenger cabin	8,7/2,34/1,8
Diameter of main rotor, m	21,1
Number of blades (main + tail rotors)	6+4
Weights and loads (kg)	
maximum takeoff	15600
normal takeoff	14200
basic empty weight	8300
normal load capacity (inside the cabin/ on the external sling)	6000/6000
Performance	
maximum speed, km/h	290
cruising speed, km/h	275
hovering ceiling, m	2500
service ceiling, m	5200
operational range with the load of 3,5 t	800 km
with the load of 6 t	325 km