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Helicopters for Foreign Missions

Czech Air Force Mi-171Sh helicopters modernisation

The Army of the Czech Republic began international operations several years ago. To achieve full interoperability with NATO member countries the Czech Air Force had to upgrade its helicopter fleet. To begin the upgrade process, 5 Mi-171Sh transport helicopters received additional equipment to help prevail over hostile conditions and demanding tasks. LOM PRAHA, a contracting partner of the Ministry of Defense of the Czech Republic, provided the upgrades.

■ Original instrument boards have been redesigned completely

As a derivative of the Mi-8/17 helicopter, the Mi-171Sh received several improvements. Ulan Ude Aviation Plant, its original producer, met many customers´ requirements (including those of Soviet pilots deployed in the Soviet and Afghan war). For example, starboard cargo cabin doors were added for faster disembarkment. In addition, customers could request either a fast rope exit system, or a rear walkway ramp. The ramp made cargo handling and troop disembarkment easy.

Mi-171Sh helicopters received more powerful TV3-117VM turboshaft engines tailored to mountainous and extreme temperature conditions which nearly doubled the service ceiling limit. The Mi-171Sh helicopters acquired by the Czech Air Force are started by a Czech Safir 5K/G auxiliary power unit (APU) enabling the helicopters to be used in altitudes of up to 6,000 meters. Also, an air conditioner can be installed. Normally, Mi-171Sh helicopters carry six weapon racks; however, the Czech Mi-171Sh helicopters can only carry additional fuel tanks on their external pylons. In comparison, Croatia´s Mi-171Sh helicopters are equipped with four external racks that can carry B-8V20 pods with 80mm unguided missiles. Internal changes included a new BUR 1-2Zh digital flight data recorder with enhanced capacity. The Mi-171Sh helicopters may be deployed at night using night vision goggles.

Acquisition

Prior to arrival of Mi-171Sh helicopters, the Czech Republic engaged in difficult negotiations with Russia. The Czech-Russian intergovernmental agreement on "Russia´s debt settlement" signed in 1994, and another agreement on "Supplying Russian military equipment in terms of Russia´s debt settlement against the Czech Republic" signed in 2002, stated that the Russians would deliver seven Mi-24V attack helicopters, three An-70 aircraft, and other military equipment. However, the supply of AN-70 aircraft fell behind schedule so the Russian's offered Il-76MF medium-range transport aircraft instead. The National Armament Authority of the Ministry of Defense of the Czech Republic made a study and recommended that the Chief of General Staff not accept Russia´s proposal, and instead request other military equipment. Finally, the Army of the Czech Republic acquired 16 Mi-171Sh transport helicopters and 17 Mi-35/24V attack helicopters.

Foreign Operations

Even though the Mi-171Sh helicopter is a fairly new aircraft, its Mi-171 avionics package is obsolete, and fails to meet NATO requirements for foreign operations. Since the Czech Air Force is supposed to deploy its helicopter fleet in foreign humanitarian and war operations, it required helicopter upgrades which the Ulan Ude Aviation Plant could not provide. The Army of the Czech Republic priority need was for transport helicopters, therefore, the Mi-171Sh helicopters were upgraded first.

■ Missile warning system sensor works against IR shoulder launched missiles

Upgrade

The upgrades were provided by LOM PRAHA, a Czech state enterprise founded by the Ministry of Defense. LOM PRAHA is the only company within NATO and EU member coun-

tries certified by the Mil Design Bureau for Mi-8/17 helicopter repair and overhaul.

Due to the Mi-171Sh upgrade program, LOM PRAHA built a development center to provide all technical, organizational, and logistical works on the upgrade prototype. It includes an integration phase on an avionics stand, installation of the avionics systems, and test flights. Generally speaking, there has not been a similar project of such size within the Czech aircraft industry to work on Russian military equipment. To cover the project legally, LOM PRAHA signed an agreement with EDB Mil for close cooperation in the Mi-171Sh upgrade project. Thus, Russian engineers and technicians helped supervise and partially shared some electromechanical work.

However, the 16 Mi-171Sh helicopters were under an OEM (Original Equipment Manufacturer) warranty, which restricted potential upgrades. This issue was to be resolved by an intergovernmental agreement between the Russian Federation and the Czech Republic. In 2004, after mutual negotiations, both countries cooperated on 30 scientific and technological projects. Finally, in April 2007, the agreement on "Mi-24V and Mi-171Sh helicopters overhauls and upgrades" was signed by Deputy Minister Martin Bartak in Moscow. In addition, both parties signed another agreement on the "Legal protection of intellectual property throughout the military-technical cooperating".

■ Anti-Missile Protection system includes chaff and flare dispensers

It took more than three years to conclude these legal agreements which were considered the most difficult aspect of the project. The Russians guaranteed to meet concerns about project documentation, upgrade work, and spare parts supply, whereas, the Czechs were obligated to cover all expenses including fees for acquiring the documentation. In addition, the agreement stipulates that supplies shall be preferably of a Russian origin. However, if this cannot be realized (e.g., in avionics), LOM PRAHA may acquire the parts from other subcontractors.

Upgraded Mi-171Sh Helicopters

Both the avionics hardware and software are of an open architecture nature. The avionics system has to meet Czech Air Force requirements; therefore, its components must be advanced in terms of production method, technology, function, and compatibility. In general, the aim is to minimize the need for additional development of the future avionics system.

The selection of Mi-171Sh avionics must respect NATO Standardization Agreements (STANAG) and International Civil Aviation Organization (ICAO) standards, and the Convention on International Civil Aviation, Article 37. In addition, the selected avionics system must comply with

■ Mi-171Sh helicopter upgrade program started in 2007

USA MIL-STD standard requirements and civil international standards such as JAA (EASA)/ FAA or RTCA (Joint Aviation Authorities/Federal Aviation Agency or Requirements and Technical Concepts for Aviaton).

Upgraded components:

➤ Navigation system with FMS CMA 9000 computer integrating with the original radio-navigation sensors (e.g. ARK-15 radio compass) and the new GPS, CMA 3024 of VOR/ ILS NAV 4500, and DME 4000 global navigation system sensor units. Terrain orientation is provided by an on-board computer and a new RN-6 digital map generator. The RN-6 can be used when preparing the full flight mission at the Command and Control center.

➤ Communications system with a new N-301A intercom and new VHF/UHF TALON radios for both civil and military operations. Moreover, the cockpit is equipped with a Matra radio used within the Integrated Rescue System of the Czech Republic to deploy helicopters involved in Czech humanitarian missions.

➤ Though, not typical for the Czech Air Force, these helicopters were equipped with a SATCOM phone useful mainly in remote areas. The SATCOM phone can be used from any place in the world to keep the Command and Control center regularly informed of a helicopter's current position.

➤ AN/APX-119 IFF transponder gives the helicopter accurate "friend-foe" identification.

➤ AMPS self-defense system consists of a Missile Warning System, chaff and flare dispensers, and an infrared jammer which provides high protection against infrared guided missiles.

➤ The cockpit lay-out was entirely changed and meets pilot ergonomics needs. The key change includes multi-functional displays (4.22 x 4.22inches and 6 x 8inches) on both instrument boards.

➤ Helicopters are equipped with a new emergency CVFDR Cockpit Voice/Flight Data Recorder and an ELT 503 emergency locator transmitter.

➤ Additional ballistic protection (Dyneema and Kevlar) good against up to a 7.62mm round penetration or splinters was installed to protect crew and passengers.

➤ Original inner and outer lighting was not fully compatible with modern night vision goggles, therefore, it was replaced with new "NVG friendly" and "NVG only" modes.

■ New Night Vision Goggle friendly anti-collision rotation beacons

LOM PRAHA developed a new device for disembarkment using "Fast Rope".

Conclusion

The Czech Air Force now owns highly sophisticated transport helicopters capable of operation within the most demanding conditions. The upgraded Mi-171Sh helicopters with new avionics and airframe systems may be ranked among most effective NATO aircraft. Moreover, the Czech defense and aircraft industry gained the capability to perform complex avionics and airframe upgrades of Russian aircraft. Compared to other foreign aviation companies, LOM PRAHA upgraded the 16 Mi-171Sh helicopters legally while supported by EDB Mil. ■

Mi-171Sh Technical Data Sheet	
Main Rotor Diameter	21.29 m
Fuselage Length	18.40 m
Length (including rotors)	25.35 m
Weight	7.240 kg
Take-off Weight	13.000 kg
Maximum Speed	250 km/h
Flight Range	610 km
Service Ceiling	6.000 m
Hovering Ceiling	3.980 m