MANUFACTURING
OF MC-21-300 TEST AIRCRAFT

Installation of the modular and final assembly line is completed at the Irkutsk Aviation Plant.

MC-21-300-0001 first flight test aircraft is under preparation for flight tests.

MC-21-300-0002 ground test aircraft is completing additional assembly for static tests.

MC-21-300-0003 and MC-21-300-0004 aircraft are in the process of assembling.

Applications to obtain type certificate were submitted to:

- ROSAVIATION in July 2016;
- EASA in October 2016.
The aircraft is under preparation for flight tests:

- fuselage has been tested for airtightness;
- on-board measurement systems and equipment have been installed;
- aircraft systems are undergoing adjustment procedures;
- the aircraft is switched to electric power;
- frequency response tests have been started to identify frequencies of natural oscillations of the structure.
Assembly works of the MC-21-300-0002 aircraft for static tests to be conducted in TSaGI, are near completion.
AIRCRAFT FOR FLIGHT TESTS

Manufacturing of **MC-21-300-0003** and **MC-21-300-0004** components, units, and assemblies is established.

Assembling of **MC-21-300-0003** aircraft is being performed at the Irkutsk Aviation Plant.
STRENGTH TESTS

Strength tests ensure safe operation of aircraft during entire life. Unprecedented large-scale strength tests have been implemented, as the significant part of the airframe is made of composites.

- **Static tests** to identify ability of the aircraft’s construction to withstand high one-time loads
- **Endurance tests** to ensure prognosis of construction behavior under repetitive loads, indicative for typical operation
- **Climate tests, bird-strike tests, lightning-strike tests, fire-resistance tests, etc.**

Tests are performed at TsAGI, TsIAM, Aviatest
The following tests have been accomplished:

- hundreds of similar-in-design samples representing operation of major structural elements;
- fin;
- stabilizer;
- landing gear;
- full-scale samples of high-lift devices and empennage made of composites (flaps, aileron, air-brake, spoilers, elevators, and rudders).

Fin tests

Stabilizer tests
STRENGTH TESTS

Isolated testing of composite wing:

- four prototypes of wing box have been tested;
- testing of the full-scale wing box sample is going on.
STRENGTH TESTS

Endurance tests

- Regular fuselage section has passed 47,000 load cycles.
- Fuselage tail section has passed 240,000 load cycles.
- Each load cycle has corresponded to real flight.
Environmental durability tests

- Fuselage nose and fin sections have successfully passed bird-strike test at maximum speed.
- Stabilizer is being prepared for bird-strike test.
- Certification tests of windshield, radome, and nose landing gear door for direct lightning strike and static discharge have been successfully passed.
- Wing high-lift devices and empennage are being prepared for environmental static and life-cycle tests.
Testing and refining of aircraft systems, equipment and structural elements are being performed with the use of over 100 test benches, including 4 integration ones.

Integration test benches

- Test bench of electrical power supply systems.
- Iron Bird (Test bench of hydraulic systems and machinery with hardware-in-the-loop simulation of integrated flight control system, and with general aircraft equipment control system).
- Electronic Bird (avionics suite test bench).
- Test bench for electronic and hardware-in-the-loop simulation of integrated flight control system.

Tests are being performed at TsAGI, GosNIIAS, Airspace Systems DB
SYSTEM TESTING

Test bench of electrical power supply system (EPSS)

- Full scope of EPSS functional testing under normal conditions has been performed to support first flight.
- Tests for failure and abnormal conditions are almost completed.
SYSTEM TESTING

Iron Bird

- First stage of landing gear functional test (extension, retraction, steering) has been completed.
- Integrated flight control system and hydraulic system testing is being performed.
SYSTEM TESTING

Test bench for electronic and hardware-in-the-loop simulation of integrated flight control system

- Algorithms and aircraft controls are being tested.

- Full scope of development and test-pilot assessment of controller’s algorithms and hardware, as well as manual aircraft and engines control means while simulating flights according to AP-25 Airworthiness Regulations, Section “Flight”, has been completed.

- Independent testing of genuine flight controller is being performed, flight crews are being trained for the first flight.
SYSTEM TESTING

Electronic Bird

- Integration of all electronic airborne systems into avionics suite is being performed.
- Development and supervision of the overall indication-and-signalization concept of MC-21 flight crew cabin is being performed at the prototyping test bench (a component of Electronic Bird).
PW1400G-JM – Pratt & Whitney

Certified:

- in FAA (USA) in May 2016
- In Russia in September 2016

PD-14 – ODK

The second stage of flight tests started.
NEW TESTING FACILITY

- Works for creation of flight tests infrastructure at Irkutsk Aviation Plant and Yakovlev DB Flight Test Facility at Zhukovsky are close to completion.
- The flight information processing facility is being established in the new hangar in Zhukovsky.
Pilot training simulators have been built:

- procedural simulator;
- KTS MC-21-300 full-flight integrated simulator with motion system.

Manufacturing of crew cabin simulator prototypes is close to completion.
THANK YOU FOR ATTENTION!