A “SMART” WING WAS TESTED IN A WIND-TUNNEL IN ZHUKOVSKY

News / Manufacturer

Consortium of European companies, which includes 64 enterprises, has completed a research project for development of a “**smart**” (or “morphing”) **wing**, which is able to adjust its aerodynamic configuration and generate reports about its technical condition, Interfax reports with reference to Aviation Week.

It took €51 million and four years to implement the project. The wing’s model was tested in a wind-tunnel of Central Aerohydrodynamic Institute named after N.E. Zhukovsky (located in Zhukovsky town, Moscow Region). The project was designated Saritsu. The wing’s major part is made of composites with integrated carbon nanotubes. Such nanotubes serve as current conductors and protect fuel tanks from arcing. Anyway, the wing must be fitted with a lightning strike protection system. In addition, such solution helps improve electrical grounding.

Developers also integrated several fiber-optic and ultrasonic sensors into the wing in order to monitor its health. Fiber-optic sensors were installed in torsion box, on ribs and stringers and around inspection hatches.

The ultrasonic sensors were installed on the wing’s skin. They are able to assess changes of the airfoils and detect damage. In future a special algorithm will be used to generate recommendations in terms of required repair works.

Moreover, the developers designed a system, which allows the wing to change its geometry depending on flight conditions. In particular, pressure sensors installed on the leading edge of a wingtip are able to detect turbulence. Depending on the obtained data the wingtip may change its configuration in order to reduce turbulence and wing load. Flexible leading edge of the wing may adjust in order to make a flow on the wing's surface laminar.

Several fiber-optic sensors monitor the position of the deflectable leading edge of the wing; the sensors assess the overall curvature of the airfoil. The leading edge is made of fiberglass covered with heating up material, which prevents icing, conducting fibers (protection against lightning strikes) and titan plate in order to protect it from erosion. The overall thickness of these three layers is just 1,2 mm. Moreover, a special reinforcing part is integrated into the leading edge; this component protects the edge against damage, which may be caused by a bird-strike.

Flaps of the "smart" wing comprise several sections covered with an elastic material. Each section is controlled by its own actuator and is able to adjust automatically depending on flight conditions. During development of the wing designers created several tens of demonstration models; each of them was tested. Some of the used technologies have a high degree of readiness.

12 NOVEMBER 2015

SOURCE: RUAVIATION
ARTICLE LINK:
https://to.50skyshades.com/news/manufacturer/a-smart-wing-was-tested-in-a-wind-tunnel-in-zhukovsky