

Research Work Title

The Modification of Design and Manufacture of the Cockpit Windshields for Large Airplanes



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Abstract

Due to the difficult flight conditions that should meet the pilot's and co-pilot's optical needs, the windshields of the passenger planes are considered an important part of an airplane. Therefore, to ensure safety and airworthiness as well as proper maintenance requirements, it is necessary to design, construct, install, and maintain these windshields according to national requirements and regulations of the Civil Aviation Authority of the Islamic Republic of Iran (CAA.IRI) and International Civil Aviation Organization (ICAO). The country's passenger fleet greatly demanded these windshields for Fokker 100, Boeing 737, and Boeing MD. However, their supply was faced with some challenges such as difficulty in finding reliable sources, the grounding of the country's air fleet until the supply time, lack of after-sale services, etc. To overcome these challenges, this project aims to design and construct the cockpit windshields for large airplanes after obtaining the required certificates, including Design Organization Approval (DOA), Production Organization Approval (POA), and Supplemental Type Certificate (STC) from competent national authorities. The approval process for obtaining these certificates started in 2010. Therefore, to improve the lifespan of the windshields, meet the needs of the national passenger fleet optimally, and provide grounds for export, the installation of the windshields on airplanes included the following modifications:

- Designing an optimized polymer interlayer;
- Designing metal components according to the latest aviation standards;
- Designing nano-heater layers according to the coating uniformity proportional to the geometry of the windshields, and the fabrication procedure;
- Improving the materials used in conductive busbars and the fabrication method;
- Designing a thermistor by changing the wire format to ceramic one;
- Designing a uniform geometry to prevent humidity penetration into the structure.

