

AIRCRAFT FLIGHT CONTROL AND UTILITY HYDRAULIC ACTUATORS: DESIGN, TESTING AND CERTIFICATION

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Abstract

Aircraft design is an example of complex engineering and actuation system is one of the critical and flight safety part of an aircraft. Actuation system technology has moved from manual flight control to latest power-by-wire flight control through passing of hydro-mechanical and fly-by-wire actuation system over the decades. The application of Actuators in an aircraft is more and more varied and important. They are used for Wings, Landing Gear, Flight Controls, Flaps, Air Brakes and other structures like Doors, Landing Ramps as well as holding them in a specific position at a required moment. Basically; actuators are employed to drive large loads using hydraulic power where hydraulic pressure is generated by a pump and used to drive the load at different places or locations. These actuators need to undergo detailed performance/qualification testing to establish that they are safe to fly and to get airworthy by certifying agencies. This paper discusses about Specification, Design, Testing and Certification aspects of such actuators and gives a glimpse of basic approach to design, architecture and special features with particular reference to servo hydraulic rotor actuator. This paper also explains the methodology for theoretical estimation of seal friction as well as way of its validation to consider this significant aspect in a hydraulic actuator design.

Keywords: Hydraulic Pressure; Hydraulic seal; Rotor actuator; Seal friction; Servo valve