KEY ELEMENTS OF ENGINE HEALTH MONITORING SYSTEM

B.V.A. Patnaik; A.N.V. Rao
Scientist
Gas Turbine Research Establishment (GTRE)
Defence Research and Development Organisation (DRDO)
Ministry of Defence
CV Raman Nagar Post
Bangalore-560 093, India
Email : patnaikbva@gtre.drdo.in

Abstract

Propulsion system is the most complicated and critical system of an aircraft. The data compiled by US Air Force shows that about 37% of aircraft failures are due to Engine failures. Critical parts of engine possess limited life. Therefore safe and economic usage of the engine is of paramount importance. There are several benefits from engine health and life monitoring. The most basic is prevention of catastrophic failure of parts in service and optimum use for a given cost. The secondary uses are to refine, adjust the design missions, mission profiles, mission mixes, operating conditions etc from originally conceived by the designer. Hitherto existing method of preventive maintenance is based on fixed TBO, which do not consider the actual mission exploitation or they insist on a tentative gate based cyclic exchange rates known as Total Accumulated Cycles (TAC) concept. This type of maintenance strategy leads to uneconomical usage of the life critical parts. While very often components are retired without proper exploitation of their life potential, there could be occasions that can have premature failures. Hence a comprehensive health and life monitoring system is essential which can go along with integrated Vehicle health management system. Three important systems play key role in Engine Health Monitoring (EHMS). They are sensing system to gather information on various parameters, data analyzing system towards diagnostics and prognostics, and a decision making system. In the presentation key elements related to analysis, measurements, engine data analysis, material data requirements etc to help the frame work of EHM and to arrive at a EHM development scheme is discussed at length.

Keywords: EHMS; NSMS; HCF; LCF; Creep; Surge; Stall; ROA; TAC