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CBM (Condition Based Maintenance) through Score Normalization of Voice Biometrics

Muhammad Haris Nisar and Syed Sarwar Imam
Center of Advance Studies in Engineering
Islamabad, Pakistan

Abstract

Condition Based Maintenance (CBM) is a type of preventive maintenance that enables replacement of components optimally before the failure of these. It is aimed that optimal output of a component be obtained thus increasing the service life of the components. For the CBM it is mandatory that appropriate measures for the monitoring of the condition of the components are deployed and the correct screening is ensured. For this purpose, in every industry people are assigned the roles and responsibilities so that the defined processes are executed effectively and at the lowest possible cost. Like every other industry, aviation industry has been hit badly by the current economic meltdown. The effects of the meltdown on the aviation industry of developing countries like Pakistan are more pronounced as maintenance of the aircraft is heavily dependent on the foreign vendors and OEMs. This has resulted in the increased maintenance costs and poor delivery schedule of the vendors. In this scenario the focus has been shifted to increase the equipment performance and useful life of the components to obtain the optimized service life of equipment and machinery. This requires an effective new approach to employ systems for real-time condition monitoring, predictive maintenance and Condition Based Maintenance (CBM).

At present the testing plants/equipment of the aircraft components/accessories are subjected to the schedule inspection mostly based on the calendar time and very few on the hours based. In the process whole of the equipment is dis-assembled and its various parts are subjected to the inspection. After the inspection although the parts may be serviceable but there are several items which are once used and cannot be used again. Now when the requirement of new spares for the assembling arises it is learnt that the OEM has not yet delivered the requisite spares even though the orders have been placed and due date of delivery has passed. This results in the production delay of the components which are queued up for the testing or other processes before installation on the aircraft. As a consequence of this delay, the assembly line schedule is disturbed resulting in huge human resource wastage and financial loss. In this paper an attempt has been made to use the modern communication technology to determine the health of the equipment by using voice biometrics. This will enable the monitoring of the performance of the equipment without disassembling it. It will be based on the concept that each part of the equipment when it operates has a specific voice signature and detoriation of that signature detected through sensors will enable to judge the health of the equipment and thus performing the inspection as required.