

STUDY ON NON-LINEAR CONTACT STRESS AND PROGNOSIS ANALYSIS OF LUG JOINTS WITH MISFITS

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Abstract

Components of aircraft and other large scale structures are generally made in parts in order to facilitate easy manufacturing, assembly and dis-assembly. Lug joints with fasteners are preferred in several aerospace applications where their purpose is to connect primary load carrying members. Study on structural integrity of these types of joints becomes mandatory from the safety point of view. This requires in-depth understanding of science and technology of Structural Health Monitoring (SHM) at these joints. Analysis presented here deals with the critical locations of interference and clearance fit lug joints which continuously operate under fatigue loading. Both interference and clearance fits exhibit non-linear contact-stress variation above certain load level and this effect needs to be addressed for both fatigue and monotonic loading. The maximum Pull or Push loads causes high stress concentrations at critical locations along the pin-hole interface. With continuous usage of the component, crack like damages initiate at these locations and they grow till failure of the component. The non-linear prognosis analysis is carried out to generate the data required for SHM at any stage which can be used to estimate remaining life of the component.

Keywords: Lug joint, Interference fit, Clearance fit, Prognosis