

**MATERIAL PERFORMANCE INVESTIGATION ON THE FAILURE OF AN
AIRCRAFT
(ABT-18) NOSE WHEEL STRUT**

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ABSTRACT

The study investigated the cause and mechanism of failure of the nose wheel strut of a trainer aircraft with respect to material selection. Various methods and tests ranging from visual examination via unaided eye and fractography, hardness tests, chemical analysis and microstructural examination were employed for the study. The results show chevrons on the fracture surface which indicates fatigue failure characteristic of brittle fracture. Also, the fractograph shows incidence of a ductile pull and high energy fracture. This is evident by the cone shape of the fractograph and the observed tear. Hardness tests results showed high discrepancy between the values of the failed and undamaged samples indicating loss of strength and ductility in the failed sample as a result of fatigue.

The outcome of chemical analysis revealed that the component is made from medium carbon steel of the tough grade instead of the required spring steel. Therefore, a major cause of the failure can be linked to improper material specification for the nose wheel strut. The failure mechanism was further confirmed by microstructural examination which revealed fatigue cracks propagated from inclusions in the microstructure of the failed sample.

KEYWORDS: Nose Wheel Strut, Fatigue, Failure, Fractograph, Strength, Ductility