METALLURGICAL FAILURE ANALYSIS AND STRESS ANALYSIS ON MAIN WHEEL TIE BOLT BOEING 737-800

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Abstract
Main Wheel Tie Bolt is a component on the Landing Gear Assembly that serve s to tightening inboard wheel half and outboard wheel half on main wheel. Main Wheel Tie Bolt become critical component which meant in case of damage to aircraft safety can be disrupted. This investigation is based on case of failure component Main Wheel Tie Bolt of on Boeing 737-800 at August 15th 2009. Investigation processes need to be carried out for preventing another similar failure case.

This failure investigation is conducted by several steps of investigation. Investigation was started by collection of data and background information of the component, continued by preliminary examination on failed component. From the failed component, that was taken some samples that will be called as specimens, and then continued by macroscopic observation, fractography, and chemical composition analysis using Optical Emissions Spectrometry (OES) method. Next steps were metallography, hardness testing by Rockwell C, and identification of operational loading.

By conducting this research, evidences show that the initial mechanism of failure due to porosity or inclusion located on the threaded sub-surface area resulting in crack initiation and then growth to the core of threaded shaft. Fracture patterns are seen showing a fatigue and static failure patterns. Failure mode are fatigue failure mode with a high stress and low cycle fatigue failure with the type of tensile stress. Maximum and minimum tensile stress was 886.94 MPa and 824.09 MPa, respectively. This value of stress was still under yield stress of tie bolt.

Key Words: Main Wheel Tie Bolt, Fatigue Pattern, Investigation, Failure, Porosity, Inclusion.
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