FAILURE ANALYSIS LOW PRESSURE TURBINE BLADE IN APU TSCP700-4B DC-10-30 AEROPLANE

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Abstract

Low pressure turbine is one of the vital equipment in an aeroplane. Function of the low pressure turbine is extracting heat gas kinetic energy into mechanical energy that is used to move parts that are inside machines such as fans and compressors. Failure at low pressure turbine can cause the engine inflight shutdown. In this case, the low pressure turbine blade was found failure in Auxiliary Power Unit TCSP700-4B engine. Therefore, it is necessary to analyze the failure.

Failure analysis is performed in several stages, such as preparation stage, data collection stage, and data processing stage. Preparation phase includes field trips; identification of problems; study of literature, as well as the formulation of the problem and objectives. Data collection phase consisted of field studies; macroscopic observation to see the shape and appearance of the surface damage by naked eye and under a stereobinocular microscope; microscopic observation using Scanning Electron Microscope and the testing of chemical composition using X-Ray Fluorescence method to determine the specimen material and the chemical composition of surface, and metallographic testing to see the specimen microstructure.

By doing this research, it is known that the failure is caused due to contact between the blade and shroud. The blade is also suspected broken due to stress concentration caused by oxidation and carbide which is occurred at the grain boundaries. Catastrophic failure mechanism is initiated by the failure of the
oil supply tube which causes overheating in the bearing, causing the shaft of the low pressure turbine down and turbine blade made contact with the shroud. Theoretical stress calculations with Rankine, Von Mises and Tresca showed a smaller value than the strength of the material so it can be concluded that the design of the blade safe.

**Keywords:** APU, failure analysis, inflight shutdown, low pressure turbine blade.