

Failure Analysis and Fatigue Life Estimation of a Shaft of a Rotary Draw Bending Machine

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Abstract : Human consumption of the Earth's resources increases the need for a sustainable development as an important ecological, social, and economic theme. Re-engineering of machine tools, in terms of design and failure analysis, is defined as steps performed on an obsolete machine to return it to a new machine with the warranty that matches the customer requirement. To understand the future fatigue behavior of the used machine components, it is important to investigate the possible causes of machine parts failure through design, surface, and material inspections. In this study, the failure modes of the shaft of the rotary draw bending machine are inspected. Furthermore, stress and deflection analysis of the shaft subjected to combined torsion and bending loads are carried out by an analytical method and compared with a finite element analysis method. The theoretical fatigue strength, correction factors, and fatigue life sustained by the shaft before damaged are estimated by creating a stress-cycle (S-N) diagram. In conclusion, it is seen that the shaft can work in the second life, but it needs some surface treatments to increase the reliability and fatigue life.

Keywords : failure analysis, fatigue life, FEM analysis, shaft, stress analysis

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