عنوان مقاله:

Estimation of Catastrophic Failure in Brittle Mechanical Components of Machine Tools

محل انتشار:

اولین کنفرانس بین المللی و هفتمین کنفرانس ملی مهندسی ساخت و تولید (سال: 1384)

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خلاصه مقاله:

A probabilistic analysis of the fatigue crack growth for estimation of reliability degradation on the critical mechanical component of high speed machine tools is presented on the basis of fracture mechanics and theory of random process. The loading is postulated to be stationary, narrow-band random Gaussian process and consequently, randomized Paris-Erdogan law is applicable. As a mechanical model that is representative of critical component of the machine, a thin plate having a central crack is analyzed by two analytical methods “stochastic averaging (SA)” and “linear fatigue damage accumulation (LFDA)’’. The aforementioned plate is being analyzed by probabilistic finite element method (PFEM) on the basis of Monte-Carlo simulation. It is shown that SA method presents the most conservative results for brittle materials comparing with FEM and LFDA. We also show the more reliable component .of machine tools degrades very fast in uncontrolled environmental and operating conditions

کلمات کلیدی:

machine tools, the weakest link model, Fatigue damaged linear accumulation, Monte Carlo simulation, Random fatigue crack growth, Random loading,Reliability Reduction, Stochastic averaging