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Bearing Retainer Designs and Retainer Instability Failures in Spacecraft Moving Mechanical Systems
(2012) *Tribology Transactions*, 55 (4), pp. 503-511. Cited 16 times.

Abstract
Bearing retainer instability is one of the major causes of failure in the ball bearings used in spacecraft systems. These bearing failures lead to mission failure or performance degradation of the spacecraft. The instability is characterized by intermittent torque fluctuations and severe audible noise in both low- and high-speed bearings. It also generates severe transient forces that result in high cage wear or fracture. A series of retainer designs was made and the possibility of instability under various operating conditions of a momentum/reaction wheel used in a spacecraft was studied. Various tests such as run-in test, temperature test, and overlubrication test were conducted to study the instability and select a design that is stable under all operating conditions. The study results showed that square pocket retainers are more stable compared to circular pocket retainers. © 2012 Copyright Taylor and Francis Group, LLC.

2-s2.0-84863511769
Document Type: Article
Publication Stage: Final
Source: Scopus