

عنوان مقاله:

Reliability Design of Mechanical Systems Subject to Repetitive Stresses

محل انتشار:

دوازدهمین کنفرانس بین المللی چالشهای نوین در مهندسی صنایع و مدیریت عملیات (سال: 1397)

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نویسنده:

Seong woo Woo - Reliability Association of Korea

خلاصه مقاله:

The basic reliability concepts – parametric ALT plan, failure mechanism and design, accelerated testing with action plans, and checking if product achieves the reliability targets – were used in the development of a parametric accelerated life testing method to improve the reliability of mechanical systems subjected to repetitive stresses. To calculate the acceleration factor of the mechanical system, a generalized life-stress failure model with a new effort concept was derived. The new sample size equation with the acceleration factor also enables engineer to uncover the faulty designs affecting reliability during the design process of the mechanical system. Consequently, it might help companies to improve product reliability and avoid recalls due to the product failures in the field. As the improper product designs are experimentally identified by this new reliability design method, the mechanical system might improve its reliability. As case study, we have studied the reliability of a newly designed Freezer drawer. In the first ALT, the handles were being fractured because of design flaws due to the repetitive opening/closing with the food loads. As the total handle width increases, the handle design was corrected. In the second ALT, the slide rails also fractured because they did not have enough strength to withstand repetitive opening and closing of the drawer with the food loads. Additional reinforced ribs, reinforced boss, and an inner chamber in slide rails were provided to improve the design of the slide rails.

کلمات کلیدی:

Failure mechanics and design, Life-stress model, Acceleration factor, Sample size equation, Parametric ALT

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