

Reliability modeling of mechanical and electrical products based on reliable operating space envelope

G.B. Zhang¹, †*Y. Wang¹, and Y. Ran¹

¹College of Mechanical Engineering, Chongqing University, Chongqing, China

*Presenting author: yangwang_me@foxmail.com

†Corresponding author: yangwang_me@foxmail.com

Abstract

To calculate the operating range of mechanical and electrical products above certain reliability requirements precisely, a reliability analysis model based on reliable operating space envelope was established. Evaluating indicators in different dimensions of different function units were considered in this model. Reliable operating space envelope was proposed to quantify the reliable operating range of the mechanical and electrical products. Load, operating conditions and failures data were related. On the other hand, reliability allocation was quantified according to the character of each function unit to adjust different industry standards instead of implicit functions about time. Furthermore, an optimization method was proposed to improve the reliable operating range. Analysis of examples proved that such a modeling approach could be useful for evaluating and designing the reliability of the mechanical and electrical products.

Keywords: Reliability, Dimensions, Function units, Evaluation indicators, Optimization