

On Reliability Analysis of Highly Reliable Items

D. VALIS¹, Z. VINTR¹, Miroslav KOUCKY²

¹ University of Defence, Brno, Czech Republic; ² Technical University of Liberec, Liberec, Czech Republic
miroslav.koucky@tul.cz

Abstract

In recent years the intensive efforts in developing and producing electronic devices have more and more critical inference in many areas of human activity. Engineering is one of the areas which have been also importantly affected. The paper deals with dependability namely reliability analysis procedure of a highly reliable item. The data on manufacturing and operating of a few hundred thousands pieces of electronic item are available and they are statistically a very important collection/set. However, concerning some items the manufacturing procedure was not checked and controlled accurately. The procedure described in the paper is based on the thorough data analysis aiming at the operating and manufacturing of these electronic elements. The results indicate some behaviour differences between correctly and incorrectly made elements. It was proved by the analysis that dependability and safety of these elements was affected to a certain degree. Although there is a quite big set of data the issue regarding the statistical comparability is very important.

Keywords: Reliability, dependability, procedure, risk analysis, risk priority, criticality matrix failure, field data, electronic production.

References:

- [1] BMW Group Standard; GS 95003-1 Electrical/Electronic Assemblies in Motor Vehicles – General Information.
- [2] BMW Group Standard GS 95003 (Supplement 1) Electrical/Electronic Assemblies in Motor Vehicles – Tests.
- [3] BMW Group Standard GS 95003-4 Electrical/Electronic Assemblies in Motor Vehicles – Climatic Requirements.
- [4] IEC 600 50 (191) (IEV) 1990. Dependability and quality of services.
- [5] IEC 60605-4 2004. Equipment reliability testing – Part 4: Statistical procedures for exponential distribution – Point estimates, confidence intervals, prediction intervals and tolerance intervals.
- [6] EN 60812 2006. Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA).
- [7] MIL-STD-1629a 1998. Procedures for performing a failure mode, effects and criticality analysis.
- [8] SAE J 1739 2006. Potential Failure Mode and Effects Analysis in Design, Manufacturing and Assembly and for Machinery (Design FMEA, Process FMEA and Machinery FMEA).
- [9] R. Holub 1992. Dependability tests (stochastic methods). Brno: Military Academy, 1992.
- [10] C. Lipson, N.J Sheth 1973. Statistical Design and Analysis of Engineering Experiments; New York: Mc Graw Hill.
- [11] V. Neson 1982. Applied Life Date Analysis, New York: John Wiley and Sons.

[12] K.C. Kapur, L.R. Lamberson 1977. Reliability in Engineering Design; New York: John Wiley & Sons.