



Automotive Industry Action Group

THE-6

Reliability Methods for Improved Product Dependability White Paper

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FOREWORD

Invitation

This White Paper has been developed to help gain feedback from parties interested in reliability methods. The AIAG Reliability Methods Work Group extends an invitation to all interested individuals to join and participate in further developing this white paper into a detailed guideline document. Please contact Co-Chairs Mark Braun at (219)-461-7611, Keith Radak at (313)-592-5227, any one of the Work Group members listed in Appendix G, or fill out the Maintenance Request at the back of this document with your suggestions and comments.

Mission Statement

The goal of the AIAG Reliability Methods Work Group is to provide a summary document of commonly suggested methods and guidelines for reliability analysis. This summary is based on a review of current industry practices performed by a team of reliability professionals assembled from the automotive / truck and heavy equipment industries.

Expected Benefits

Common practices will aid in communication, streamline the negotiation of reliability terms in contracts, and promote better cooperation among all the entities involved in producing a reliable final product.

Readers / Customers

Readers are expected to be technical and managerial personnel from companies involved in designing, manufacturing, marketing, and purchasing parts or systems in the automotive/truck and heavy equipment industries.

Background / Approach

The Truck and Heavy Equipment Reliability Work Group representatives and colleagues generated the following list of needs to addressed:

- Summary of Reliability Engineering ("Cradle to Grave")
- Common Reliability Guidelines / Practices
- Cost of Reliability Analysis Methods (Risk / Benefit Analysis)
- Reliability Reporting Methods (With focus on ease of showing and explaining)
- Reliability Tool Workbook

Technical Notice

The term "Reliability" has been applied knowingly within this document to various topics that technically lie in the domains of "maintainability" and "durability". Additionally, topics are included that are more commonly identified with "quality assurance", "quality control", and "quality improvement". These "technical errors" were committed to provide a more comprehensive document and to facilitate more widespread and easier use by persons not grounded in technical terminology and techniques. Summarily,

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the term "reliability" has been used according to its common usage and understanding within the truck and heavy equipment sector, in spite of, occasional technical impropriety.



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1.0 INTRODUCTION

1.1 Overview

The following chapters go into detail on the use of specific reliability tools in the various steps of product development from concept to launch and beyond. Because activities vary depending on the program phase, this White Paper is organized by phase. During the concept phase, testing evaluates the reliability potential of a product. This examination assists in selecting a final concept, identifies any high technical risks, and provides cost-effectiveness and trade-off information. Reliability requirements are set in the engineering development phase. Activities may include data collection, failure analysis, corrective action, and establishing reliability goals. In the design verification and validation phase, control activities are managed to ensure that the stated reliability requirements are being met. Failure data are statistically analyzed and the emphasis is on overall system planning. The purpose of testing during the process verification and validation phase is to evaluate reliability prior to the post launch monitoring/improvement phase.

1.2 Reliability Resources

There are many resources available for specifying reliability. Listed below are several that can and have been successfully used to support a reliability program.

- Internal sources of policy and documentation:
 - Corporate policy for reliability
 - Corporate organization for reliability
 - Reliability data collection systems
 - Product reliability design goals
 - Reliability prediction and allocation
 - Reliability procedures for design and performance validation
 - Reliability test procedures
- External sources of helpful planning aids:
 - QS-9000 – Advanced Product Quality Planning (APQP)
 - Reliability Programs for Systems and Equipment – MIL-STD-785
 - Reliability Tool Kit – Recommended Practices—USAF Rome Laboratory
 - Customer's Product Reliability Requirements
 - Competitor's Reliability Performance Assessment
 - Detailed Reliability Program Development Flowchart
- For further study refer to Web sites listed in Appendix C.