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Standard

Performance-Based Failure Review Board (FRB) Requirements

Approved American National Standard

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Performance-Based Failure Review Board (FRB) Requirements

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Abstract

This Standard provides the basis for developing the performance-based Failure Review Board (FRB), which is a group consisting of representatives from appropriate project organizations with the level of responsibility and authority to assure that root causes are identified and corrective actions are effected in a timely manner for all significant failures. Although good engineering practice suggests that most product development projects should include a formal FRB, the basic FRB functions may devolve to a single individual on small projects. Planning and reporting requirements and analytic tools are provided for contractors. The linkage of this Standard to the other standards in the new family of performance-based reliability and maintainability (R&M) standards is described, and a large number of keyword data element descriptions (DED) for use in automating the FRB process are provided.

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Foreword

Although the terms quality and reliability are often used interchangeably, they have different meanings. *Quality*, as used in this standard, is the ability of a product to meet the workmanship criteria established by an organization. A different but often used definition of quality is, "the set of all desired attributes that can be put in a product." In this sense, quality cannot be achieved without achieving the desired reliability. *Reliability* is the ability of a product or system to perform its intended function(s) for a specified time or number of operating cycles. A high-quality product may not be a high-reliability product even though it conforms to stringent workmanship specifications. The ISO 9000 series of standards that establish the ability of an organization to consistently produce high-quality products do not necessarily establish that same organization's ability to consistently deliver high-reliability products. Consequently, the ISO 9000 series certification process, which serves as the main international reference for quality program requirements in business-to-business dealings, is not the appropriate reference for international or domestic reliability program requirements. A more suitable reference is the suite of AIAA S-102 performance-based reliability and maintainability (R&M) standards, which provides a framework for quantifying and improving the performance of R&M practices.

Annex A lists the 35 standards in the AIAA S-102 performance-based R&M standards document tree. These standards provide criteria for rating the capability of R&M practices, and they represent proven approaches for planning and implementing the product life cycle R&M Program. The S-102 R&M capability-rating criteria allow organizations to:

— specify a level of R&M Program performance,

— plan the activities to achieve a level of R&M Program performance,

— appraise the performance of an R&M Program or individual practice, and

— identify the activities necessary to improve the performance of an R&M Program or individual practice.

The S-102 R&M capability-rating criteria (Annex B in all S-102 standards) are intended to aid organizations in assuring that their R&M Programs are a "value-added" contribution to the product development effort. *There is no intent to prescribe a universal methodology for quantifying the evaluation or improvement of R&M Programs or individual practices.* The S-102 R&M capability-rating criteria reflect the collective body of knowledge of the S-102 Working Group, which was chartered by the AIAA Standards Executive Council to develop and approve the S-102 standards. The S-102 Working Group is composed of R&M experts that represent the government and industry sectors affected by the S-102 standards.

This standard establishes uniform requirements for a performance-based Failure Review Board (FRB). The principles of a performance-based FRB can be learned from this document alone, but its proper use requires careful planning for which the prerequisite is understanding associated S-102 documents and identifying the desired FRB data products for the systems engineering process. What distinguishes this standard from a past and present FRB standards are the following:

— It provides consistent criteria for rating the "capability" of the FRB process.

— It provides consistent criteria for rating the "maturity" of the FRB data products.

— It calls for knowledge-based approaches to identify, analyze, and manage test anomalies that pose unacceptable risk.

— For a Capability Level 3 or above FRB process, it calls for the collection and review of existing lessons learned, and the generation and formal approval of new lessons learned.

— For a Capability Level 4 or above FRB process, it calls for the use of predefined R&M data parameters to facilitate the exchange of FRB data products among computer-aided analysis tools and other project databases.

At the time of approval, the members of the AIAA Performance-Based Reliability & Maintainability Standards Working Group were:

Tyrone Jackson (Chair)	SRS Technologies
Lily Lau	The Aerospace Corporation
David Oberhettinger	NASA Jet Propulsion Laboratory
Walt Willing	Northrop Grumman Electronic Systems
Steve Harbater	Northrop Grumman Integrated Systems
Alazel Jackson	Raytheon Space and Airborne Systems
Jan Swider	Pratt & Whitney Rocketdyne, Inc.
Dev Raheja	Design for Competitiveness
Jeff Merrick	Merrick Consulting
Ken Gibson	Boeing Space and Intelligence Systems
James French	RMS Partnership
Dawson Coblin	Lockheed Martin Space Systems Company
Ari Jain	Reliability Consultant
Terry Hardy	Federal Aviation Administration

The above consensus body approved this document in June 2006.

The AIAA Standards Executive Council (Mr. Amr ElSawy, Chairman) accepted the document for publication in July 2008.

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1 Scope

This standard establishes uniform requirements and criteria for a performance-based Failure Review Board (FRB). The performance-based aspect of this standard requires that the organization's FRB capability be rated according to predetermined criteria for process capability and data maturity. Although it is a common industry practice for the FRB to be chaired by the Project Reliability Engineering Lead, this standard does not mandate any particular organizational structure for implementing the FRB.

1.1 Purpose

The primary purpose of the FRB is to review failure trends, significant failures, and corrective action status, and to assure that appropriate follow-up actions or corrective actions are taken in a timely manner and properly implemented, verified, and documented. The baseline FRB is a group of representatives from appropriate project organizations with the level of responsibility and authority to assure that root causes are identified and corrective actions are effected in a timely manner for all significant failures. Although good engineering practice suggests that most product development projects should include a formal FRB, the basic FRB functions may devolve to a single individual on small projects.

1.2 Application

This standard applies to acquisitions for the design, development, fabrication, test, and operation of commercial, civil, and military systems, equipment, and associated computer programs. Annex B of this standard provides capability-rating criteria that are intended to categorize the capability of sets of activities commonly found in FRB processes. The capability level criteria provide the logical order of activities for improving the effectiveness of an existing FRB process in stages. Therefore, an existing FRB process may be improved by using the FRB capability level criteria to develop a list of minimally acceptable activities, and then compare that list to the activities of the existing process. This comparison identifies the activities that need to be added to the existing FRB process.

This standard also applies to the integration of the FRB database with the Failure Reporting, Analysis and Corrective Action (FRACAS) database. However, specification of this standard should not require the contractor to use a particular computer-aided design (CAD) system. Rather, the FRB database should be implemented using the computerized tools of the contractor's choosing, given that those tools are validated to process input data and generate output data that are compatible with the data definitions in this Standard.

2 Applicable Documents

2.1 Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies:

1) AIAA S-102 (Draft) Performance-Based R&M Program General Requirements

AIAA S-102.1 Performance-Based R&M Management

2) AIAA S-102.1.1 (Draft) R&M Program Planning Requirements

3) AIAA S-102.1.2 (Draft) Subcontractor and Supplier Monitoring and Control Requirements

4) AIAA S-102.1.3 (Draft) R&M Program Working Groups and Review Requirements

AIAA S-102.2 Performance-Based R&M Engineering and Analysis