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REVISION NOTE

This standard is raised to Issue 7 to update its content.

HISTORICAL RECORD

This standard supersedes the following:
Def Stan 00-40 Part 1 Issue 6 dated 13 June 2008

Sponsorship

1. This standard provides requirements for MOD practices, procedures and requirements during the design process.

2. This standard has been produced on behalf of the Defence Material Standardization Committee (DMSC) by Committee for Defence Equipment Reliability and Maintainability (CODERM) and reflects the conclusions of consultants among the relevant authorities within the MOD and within Industry.

3. The complete Def Stan 00-40 comprises:
   Reliability and Maintainability
   Part 1: Management Responsibilities and Requirements for Programmes and Plans

4. If it is found to be unsuitable for any particular requirement the MOD is to be informed in writing of the circumstances.

5. Any user of this Defence Standard either within MOD or in industry may propose an amendment to it. Proposals for amendments that are not directly applicable to a particular contract are to be made to the publishing authority identified on Page iv, and those directly applicable to a particular contract are to be dealt with using contract procedures.

6. No alteration is to be made to this Defence Standard except by the issue of an authorised amendment.

7. Unless otherwise stated, reference in this Defence Standard to approval, approved, authorised or similar terms, means the Ministry of Defence in writing.

8. Any significant amendments that may be made to this Defence Standard at a later date will be indicated by a vertical sideline. Deletions will be indicated by 000 appearing at the end of the line interval.
Conditions of Release

General

9. This Defence Standard has been devised solely for the use of the MOD, and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the Crown hereby excludes all liability whatsoever and howsoever arising (including but without limitation, liability resulting from negligence) for any loss or damage however caused when the Defence Standard is used for any other purpose.

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11. The Crown reserves the right to amend or modify the contents of this Defence Standard without consulting or informing any holder.

MoD Tender or Contract Process

12. This Defence Standard is the property of the Crown. Unless otherwise authorised in writing by the MOD must be returned on completion of the contract or submission of the tender in connection with which it is issued.

13. When this Defence Standard is used in connection with a MOD tender or contract, the user is to ensure that he is in possession of the appropriate version of each document, including related documents, relevant to each particular tender or contract. Enquiries in this connection may be made of the Authority named in the tender or contract.

14. When Defence Standards are incorporated into contracts, users are responsible for their correct application and for complying with contractual and other statutory requirements. Compliance with a Defence Standard does not of itself confer immunity from legal obligations.

Related Documents

15. In the tender and acquisition processes the related documents in each Section can be obtained as follows:

a) British Standards

British Standards Institution,
389 Chiswick High Road,
London, W4 4AL

b) Defence Standards

Defence Equipment and Support
UK Defence Standardization,
Kentigern House
65 Brown Street,
Glasgow, G2 8EX

c) Other documents

Tender or Contract Sponsor to advise.

16. All applications to Ministry Establishments for related documents are to quote the relevant MOD Invitation to Tender or Contract Number and date, together with the sponsoring Directorate and the Tender or Contract Sponsor.
17. Prime Contractors are responsible for supplying their subcontractors with relevant documentation, including specifications, standards and drawings.

Health and Safety

Warning

18. This Defence Standard may call for the use of processes, substances and procedures that may be injurious to health if adequate precautions are not taken. It refers only too technical suitability and in no way absolves either the supplier or any user from statutory obligations relating to health and safety at any stage of manufacture or use. Where attention is drawn to hazards, those quoted may not necessarily be exhaustive.

Additional Information

(There is no relevant information)
Introduction

The Defence Standard 00-40 Part 1 has been revised to be less prescriptive, focussing activities on providing progressive Reliability and Maintainability (R&M) assurance. Reliability and maintainability and therefore, Testability, are vital performance characteristics that affect the operational availability, the effectiveness and the whole life costs of defence materiel.

Reliability and maintainability are vital performance characteristics that impact upon the operational availability and the effectiveness and the whole life costs of defence materiel. Thus it is fundamental that from the start of the project, the R&M requirements are continuously analysed, and progressively defined in a requirement which is agreed between the Sponsor (representing the user), the Purchaser (Procuring Authority) and the Supplier (Contractor). Unrealistic, unnecessary or unclear R&M requirements will lead to non-essential and wasteful expenditure in resources, time and effort; and may result in failure to meet the needs of the user.

The R&M achievements of a system depend on all aspects of that system, including hardware, software, people and the man/machine interfaces. R&M engineering is a systems engineering discipline and so R&M programmes must adequately address all these aspects.

This Standard describes the responsibilities of the equipment Sponsor (who specifies the R&M requirements), the Project Manager of the Purchaser (Procuring Authority) and the Supplier (Contractor) towards the R&M specification, the R&M metrics, the acquisition and the supply of materiel that will satisfy the R&M requirements.

General requirements for R&M programmes are set out that are intended to be used throughout the acquisition chain from prime contractor down to individual sub-contractors.

This issue of the Defence Standard continues recognition that different products and technologies require particular or unique engineering activities and now requires that the following objectives shall be satisfied:

a) the Purchaser’s R&M requirements shall be determined and demonstrated to be understood by the Purchaser and the Supplier

b) a programme of activities shall be planned and implemented to satisfy the requirements; and

c) the Purchaser shall be provided with assurance that the R&M requirements have been satisfied.

The Supplier is free to propose the activities required to fulfil the second objective. The third objective is to be satisfied by the provision of progressive assurance, accumulated during the design, the development and the early production processes. This assurance will be provided to the Purchaser by means of R&M Case Reports specified within the R&M Case Evidence Framework. Guidance on the compilation and assessment of an R&M Case is given in Defence Standard 00-42 Part 3.

R&M data form an essential building block of any Integrated Logistics Support (ILS) programme. Therefore, in order to maximise the benefits and to minimise costs it is imperative that ILS and R&M activities are co-ordinated from the outset.

Throughout this Standard, the terms Reliability and Maintainability (R&M) include availability, durability, Reliability Centred Maintenance (RCM) and testability.
Reliability and Maintainability - Management Responsibilities and Requirements for Programmes and Plans

SECTION 1 Responsibilities for Achieving Reliable Systems

1 Scope

1.1 This Part of the Defence Standard provides a general introduction to the means of achieving R&M and details the specific measures to be adopted by the MOD Sponsors, the Project Managers and the contractors. It also recognises that the technical management activities required for the achievement of R&M parameters are dependent upon the particular nature of the materiel being designed, developed and manufactured; and the unique uses to which that materiel will be dedicated when in Service use.

1.2 This Part of the Defence Standard has three main sections describing the responsibilities of:

a) the Sponsor (representing the user); (see Serial 5);

b) the Purchaser (Procuring Authority); (see Serial 6);

c) the Supplier (Contractor) (see Serial 7).

1.3 Section 2 describes general requirements for R&M programmes.

2 Warning

The Ministry of Defence (MOD), like its contractors, is subject to both United Kingdom and European laws regarding Health and Safety at Work. All Defence Standards either directly or indirectly invoke the use of processes and procedures that could be injurious to health if adequate precautions are not taken. Defence Standards or their use in no way absolves users from complying with statutory and legal requirements relating to Health and Safety at Work.

3 References

3.1 The publications shown below are referred to in the text of this standard. Publications are grouped and listed in alpha-numeric order.


Def Stan 00-42 Reliability and Maintainability Assurance Activity, Part 3: R&M Case.

JSP 886 Volume 7, Part 8.03A Maintenance Planning.

3.2 Reference in this Standard to any normative references means in any Invitation to Tender or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated.
3.3 In consideration of Serial 3.2 above, users shall be fully aware of the issue and amendment status of all normative references, particularly when forming part of an Invitation to Tender or contract. Responsibility for the correct application of standards rests with users.

3.4 DStan can advise regarding where normative references documents are obtained from. Requests for such information can be made to the DStan Helpdesk. How to contact the helpdesk is shown on the outside rear cover of Defence Standards.

4 Definitions

4.1 For the purposes of this Defence Standard, definitions and clarifications of the terms is provided by:

- IEC 60050-191 International Electrotechnical Vocabulary, Chapter 191: Dependability and quality of service

4.2 Supplementary definitions are given in:

- ARMP-7 NATO R&M Terminology Applicable to Allied Reliability and Maintainability Publications (ARMPs)
- Defence Standard 00-49 Reliability and Maintainability – MOD Guide to R&M Terminology Used in Requirements

5 Sponsors (Customer) Responsibilities

5.1 This Section describes the responsibilities of the Sponsor (representing the user) in specifying the required R&M characteristics of the eventual system. It is important that throughout the acquisition process the R&M requirements are directly traceable to the original top-level user requirements. This includes R&M related requirements, which may subsequently be specified for sub-systems or sub-contracted items. Even where it is envisaged that the system requirement will be satisfied by off-the-shelf (OTS) purchase it is necessary that operationally justified R&M requirements are specified as a datum for tenders so that the user can assess operational consequences of any R&M shortfall.

5.2 During the process of drafting a User Requirement Document (URD) the Sponsor shall establish a working group to ensure an exchange of R&M views on the project. This working group shall include representatives from the Sponsor, the Procuring Authority, R&M and ILS specialist advisors and other relevant agencies. Preliminary R&M studies may be carried out in support of these exploratory discussions.

5.3 The output from this formal consultation should provide the link between top level URD requirements and the R&M statements subsequently incorporated in the System Requirement Document (SRD). This output is to be recorded in the R&M Case and will show how the R&M statements satisfy the operational and the logistic needs, are technically achievable within reasonable or imposed limits of time and cost and, as far as can be determined at this early stage, will result in the optimum life cycle cost, balanced against performance requirements.

5.4 To support the R&M statements clear definitions of failure need to be developed, so that future achievements (or not) can be assessed subsequently in the programme.

5.5 The output from any feasibility study should contain preliminary R&M estimates and the results of any trade-off studies affecting the R&M as dictated by the draft User Requirement. Any factors identified that could prejudice the achievement of the required levels of R&M shall be highlighted.
5.6 The R&M output from the concept phase should normally include, but not necessarily be limited to, the Initial R&M Case and supporting plans for the development and manufacture phases. These R&M plans should form an integral part of the overall development plan.

6 Procuring Authority (Purchaser) Responsibilities

6.1 The Project Manager of the Procuring Authority shall be responsible for procuring a system to meet the R&M requirements as defined in a Systems Requirement Document (SRD).

6.2 The SRD shall include, at an appropriate level of detail:

a) A statement of the R&M requirements in quantitative terms that are clear and realistic together with the use environment and operational assumptions on which they are founded. It is important at this stage to include clear definitions specific to the project for failure, fault and other R&M parameters;

b) A statement of the maintenance policy and the procedures envisaged, together with any particular maintainability and testability features required (including level of repair considerations). Any constraints on numbers and skills of personnel, tools, test equipment, access and spares holdings should also be stated.

6.3 In defining R&M in quantitative terms care should be taken not to specify the requirements in such a way as to prevent the consideration of design options that might otherwise be more cost effective in attaining the desired results.

6.4 The Project Manager shall ensure that the Sponsor is informed frequently of the project R&M status.

6.5 The Project Manager shall ensure that the agreement of the Sponsor is obtained before any action is taken that may adversely affect the achievement of the required levels of the R&M.

6.6 The Project Manager shall establish an R&M project committee or working group. This group should include representation from R&M stakeholders including specialist advisors, the equipment Sponsor, and, as required, project Integrated Logistic Support, contracts, QA, R&D advisors and the contractor’s design and engineering staff. The activities of this group include:

a) to assist the Project Manager in defining the R&M aspects of the SRD including the assessment criteria for the tender proposals and the methods of assuring the achievement of R&M to acceptable levels of risk;

b) to recommend verifiable milestones within the R&M Case evidence framework against which payments may be made for progressive achievement of the R&M requirements;

c) to provide advice to the Project Manager and the Sponsor on any proposed amendments to project timescales or targets subject to contract and cost factors, and to discuss the potential in-Service effects of the amendments;

d) to assess the results of progress reviews and In-Service R&M demonstrations as presented in R&M Case Reports.

6.7 The Project Manager shall prepare statements of work before each phase of design, development and production, for inclusion in any invitation to tender (ITT) or the contract, that reflect the R&M statements in the SRD. These statements shall include the following where appropriate:

a) the reliability requirements and the environmental and operational conditions and the circumstances under which they are to be obtained;
b) the arrangements for reviewing R&M Case Reports and documentation control of the R&M Case.

c) fault and failure definitions, and any acceptance criteria to be adopted where R&M demonstration tests or trials are required, leading up to full acceptance by the Sponsor;

d) the maintainability requirements for all appropriate levels and depths of repair (see JSP 886, Volume 7, Part 8.03);

e) the maintenance policy to be applied to the system, including, e.g. the adoption of particular strategies such as periodic preventive maintenance, condition based maintenance, corrective maintenance or a combination of these;

f) an indication of the intended contracting strategy e.g. by use of stage payments for the achievement of the R&M requirements including any incentive arrangements;

g) any particular aspects of the R&M requirements that should be specifically addressed and the outputs required.

6.8 The Project Manager shall ensure that the R&M requirements in the contract are clearly and completely understood by the representatives of the Contractor and the representatives of any Sub-contractors.

6.9 The Project Manager shall ensure that the Supplier, in preparing the R&M programme plan, identifies and adequately resources all activities necessary for the satisfactory achievement of the reliability requirements specified in the contract. The programme plan shall also include the provision of an R&M Case together with progressive assurance. Progressive assurance shall be provided throughout the duration of the contract by periodic reports stating progress against planned R&M activities and milestones. This evidence of progressive assurance is to be delivered by means of R&M Case Reports in accordance with the evidence framework within the R&M Case.

7 Supplier (Contractor) Responsibility

7.1 The Supplier is to be responsible for providing a system that satisfies the needs of the Purchaser and thus the following objectives shall be achieved:

a) with the active co-operation of the Purchaser; the requirements of the user shall be shown to be understood;

b) the Supplier shall assess the requirements and define and implement a programme of R&M activities (i.a.w. Section 2 of this standard) to engineer the systems to achieve the requirements, and

c) the Supplier shall substantiate that the R&M requirements are being met by providing information to justify the decisions made on the project, supported by tangible evidence in a timely manner. This assurance shall be delivered through R&M Case Reports in the evidence framework within the R&M Case (See Def Stan 00-42 Part 3).

7.2 The Supplier shall treat the R&M characteristics of the system as key performance parameters and principal design requirements. The R&M programmes shall be fully embedded in the system engineering programme of work of the Supplier, which should fully define the engineering task management and activities to achieve the performance requirements. This will ensure that the R&M characteristics of the system are managed by those Supplier's staff who have the influence, the responsibility and the accountability for producing a reliable and maintainable system.

7.3 The Supplier shall integrate R&M considerations into every stage of the engineering and the manufacturing processes. There shall be clear evidence of the manner the R&M characteristics influence
these processes to assure the achievement of a robust and dependable product, satisfying all the operational and logistic requirements.

7.4 The Supplier shall review the requirement and, if necessary, shall recommend to the Purchaser any changes to this which allow for potential trade-offs providing performance enhancements and/or cost reductions in acquisition or in-Service support.

7.5 The output from these planned activities will be presented as evidence within the R&M Case.

7.6 The R&M programme plans are not to be considered as part of the Integrated Support Plan (ISP), but shall interface with it as described in Serial 8.

8 R&M and Integrated Logistics Support

R&M activities have a highly significant influence on the design of a system for supportability. ILS is a management and technical procedure through which supportability and logistic support considerations are integrated into the design early in the life cycle of a system so that all elements of logistic support can be planned, acquired, tested and provided in a timely and cost effective manner. The R&M programme, therefore, while not a part of the ILS plan, is a major contributor to it. The overall project management plan shall recognise the working relationship between the R&M and the ILS activities and ensure that the outputs from the R&M activities, required as inputs to ILS, are identified and scheduled to be available in time to allow the logistic considerations to influence the design and the trade-off processes and to ensure a close and effective sharing of data and activities between the R&M and the ILS communities.

SECTION 2 General Requirements for R&M Programmes

9 Introduction

9.1 This section provides general requirements to expand the Supplier responsibilities described in Serial 7 of this Defence Standard and to outline specific R&M activities for consideration, with respect to requirements of the contract, for inclusion in the R&M programme plan. The activities of the R&M programme shall be structured to achieve the R&M requirements, and to provide progressive assurance of this achievement. The evidence of progressive assurance will be reported through R&M Case via R&M Case Reports.

9.2 This section provides general requirements for R&M programmes during design, development, production and deployment of materiel and its constituent systems and equipment.

9.3 In this document, durability of materiel is treated as an aspect of reliability and not as a separate system characteristic. If, owing to the nature of the materiel, e.g. mechanical structures, durability need to be treated as a separate characteristic, then the durability requirements shall be specified separately in the contract, and any procedures and methods of assuring their achievement shall be agreed with the Purchaser.

9.4 This document applies to all materiel when referenced, in part or as a whole, in a contract or in a contract purchase order. If any inconsistency exists between the contract requirements and this document then the contract requirements shall prevail.

9.5 Effective R&M programmes need to be tailored to fit the needs and constraints of a specific equipment programme, including availability and life cycle costs. This document is intentionally structured to
discourage indiscriminate blanket application and to encourage and promote the tailoring of the R&M programme tasks.

9.6 In this Defence Standard, the use of the term ‘system’ includes software, human factors and all other aspects relevant to the achievement of R&M.

9.7 R&M programme success requires that the project management of both the Purchaser and the Supplier shall be continuously informed of the programme status and of unresolved problems that could impact on the achievements of the programme milestones so that direction and resources can be reoriented as required.

10 Suppliers (Contractors) Responsibilities

10.1 The Supplier shall establish interfaces between his R&M programme and his internal departments and external agencies to ensure the co-ordinated transmission of relevant data and the avoidance of duplication.

10.2 The Supplier shall perform periodic reviews, at given milestones, at which the status of the R&M programme should be examined systematically in relation to the status of all other work in the contract.

10.3 If the Supplier becomes aware, at any time, that he may be unable to complete his R&M commitments or that he considers the required level of R&M cannot be achieved or that the R&M programme is falling behind schedule, he shall immediately inform the Purchaser of the situation and of his proposals for remedial action.

10.4 The Supplier shall include the following information in the R&M programme plan as appropriate to the phases covered by the contract:

a) R&M Case Reports, as defined by the evidence framework are required to be submitted by the Supplier to the Purchaser. These reports may be combined with other project documentation provided that the R&M information is contained or summarised in separate reports that can be clearly identified within the evidence framework;

b) A description of the R&M relevant activities that have been selected to meet the requirements specified in the contract. The description shall include any activities specified by the Purchaser and indicate the required outputs from these activities and their planned delivery date;

c) A summary of the overall organisational structure, to indicate the involvement of the Supplier’s design, development, production and service support staff with the R&M plan and showing the influence of the R&M engineers on the design activity. This summary should indicate the key appointments for managing the R&M plan and R&M activities, the responsibilities and functions and how nominated personnel for these appointments will be identified to the Purchaser. It will also demonstrate that R&M management has direct access to the senior management in the organisation to ensure that R&M factors are given due consideration with performance, time and cost.

10.5 The Supplier shall also specify to his sub-contractors those records, reports and other documentation that he requires them to prepare, to maintain and to submit to him for approval prior to formal issue.

10.6 The Supplier shall ensure that system elements obtained from his sub-contractors will enable him to meet the R&M requirements. This will be a key criterion in the selection of his sub-contractors, and procedures for their selection shall be available to the Purchaser. All sub-contracts shall include provisions for the Supplier to monitor, review and evaluate the R&M activities of his sub-contractors.
10.7 The Supplier shall ensure that the R&M activities of his sub-contractors are consistent with the overall contract requirements, and that provisions are made for surveillance of their R&M activities. The R&M requirements of the contract, including compliance with this Defence Standard, shall, as far as possible, be reflected in sub-contracts.

10.8 Where Purchaser Supplied or Specified Equipment (PSE) is to be integrated into the system, the Supplier may use R&M data for the PSE supplied by the Purchaser, taking into account its applicability in a changed environment. If applicable data is not available, the Supplier shall propose activities to determine the information required, for agreement with the Purchaser. If subsequent analysis using the data or subsequent testing by the Supplier indicates any inconsistency between the R&M requirements of the PSE and the R&M requirements of the contract, the Supplier shall promptly and formally notify the Purchaser, and shall propose solutions to overcome any potential R&M problems caused by the requirement to use the PSE.

10.9 The Supplier shall include the review of R&M in each design review. Formal design reviews shall be arranged to take place as required by the contract at appropriate stages in the acquisition cycle and shall be referenced in the R&M plans. The design reviews shall be attended by R&M specialists including, where contractually required, the representatives of the Purchaser. R&M shall be included as agenda items for each review so that all concerned with the overall programme may be informed on R&M aspects of the system and of any agreed corrective action. The actions and decisions of design reviews shall be documented by the Supplier and made available to the Purchaser in accordance with the contract. Supplementary information regarding R&M Cases may be required.

10.10 The Supplier shall establish and maintain a Data Reporting, Analysis and Corrective Action System (DRACAS) throughout the contract. The system shall be a documented closed-loop system for reporting, collecting, recording, analysing, categorising, and investigating data and taking timely, effective corrective action. A DRACAS shall be applied to all non-conformances and failures relating to design, manufacturing and test processes that occur during any project activity whether conducted at the premises of the contractor or elsewhere. Operational and usage data, together with operating conditions, shall also be recorded. The DRACAS shall cover all materiel being supplied under the contract and shall provide for the reporting of suspected failures and non-conformances as well as observed failures, failure indications and non-conformances.

10.11 The Supplier shall prepare and structure a data classification system to ensure that all events, such as non-conformances and failures are accurately and completely categorised as to cause, criticality/significance, environment, frequency and chargeability. The Supplier shall agree the criteria for the classification of data with the Purchaser at the outset of the design.

10.12 The supplier shall expand the purchaser supplied definitions of failure/fault down to LRU level, such that the effect on the system of a LRU failure or degraded functioning is clearly defined.

10.13 The R&M programme shall contain activities to ensure that the Purchaser’s requirements are fully understood and defined. The Supplier shall analyse the operating and environmental conditions relevant to the life profile including all mission profiles applicable to the system. This activity will involve dialogue between the Supplier and Purchaser. Where a Use Study has been produced under an Integrated Logistic Support (ILS) programme, it should be taken into account. The purpose of this activity is to identify and quantify the design loads experienced during all phases of the life profile, including production.

10.14 Based on the mission profiles and utilisation data provided by the Purchaser, the Supplier shall determine the duty cycles imposed on the system during the intended operational use.

10.15 From the specified environmental envelope and the system’s operational performance requirements, the Supplier shall determine the environmental conditions to be experienced by each assembly and sub-assembly of the system during each phase of each type of mission and during maintenance and support activities (including storage, transportation, etc.) appropriate to each level of the
system. Should the environmental conditions be insufficiently understood at the outset of the design activity, the Supplier shall include in his R&M programme(s) the necessary activities to determine them sufficiently to produce the design specification. This may require the involvement of the Purchaser. These environmental conditions, which form the basis of subsequent engineering analyses, shall be reviewed regularly throughout the design and development phases to ensure that no part of the environmental envelope, which may be detrimental to the R&M of the system, is overlooked. The review of environmental conditions shall include confirmatory measurements on installed equipment as it becomes available so that appropriate design action can be taken.

10.16 The Supplier shall conduct tests, undertake analyses or make estimates as appropriate to determine the effects of manufacturing, testing, storage, shelf life, packaging, transportation, handling and maintenance on the reliability of the system and shall, if necessary, propose special procedures for field examination, testing and overhaul or reconditioning.

10.17 The Supplier shall carry out an assessment of the risks involved in meeting the R&M requirements, including technology, performance, time-scale and financial aspects. Having identified the risks, the R&M programme shall be structured to reduce the risks to an acceptable level. The project risk assessment shall include the production phase. This shall be integrated into the Project Risk Management Plan.

10.18 The Supplier shall conduct analysis, engineering and test activities to ensure that the design is capable of achieving the R&M performance requirements of the contract and determine appropriate activities for developing the R&M programme(s) and plan their implementation. It is the intention that all activities shall add value to the completed product. The key resources required by each activity shall be identified and described in the R&M programme plan, which shall also identify programme milestones so that progress can be monitored.

10.19 The Supplier shall determine and use the best, cost effective R&M practices appropriate to the product. The incorporation of computer software into the design shall be performed in a structured and documented manner. The impact of software errors on system R&M should be fully understood and documented by the Supplier. This work should be conducted under a project risk analysis study for the materiel to be supplied and a reference to it included in the R&M programme plan.

10.20 Manufacturing and assembly processes may sometimes be harmful to the system if not adequately designed for and considered. The Supplier shall describe how production issues are considered during design to preserve system integrity. Systems shall be designed to withstand both the manufacturing and assembly processes and the integration of software to assembled hardware, intact, and in a reliable condition, with the finished system capable of meeting the Purchaser’s requirements and product needs.

10.21 The Supplier shall ensure that the manufacture of the completed design is within the available process capability. Should the required capability not be available, the Supplier shall indicate how it is to be acquired. Modifications resulting from prototype testing or to ease production shall be assessed to establish the effect on system R&M and the findings presented to the Purchaser.

10.22 The ability of the nominal system design, manufacturing and assembly specifications to meet Purchaser’s requirements and system needs shall be established. The critical parameters affected by design, manufacturing and assembly, and their acceptable range of variability, shall be defined.

10.23 To ensure conformance of process variables to the defined limits and to reduce system variability, the process improvement activities, monitors, and controls of critical product and process parameters shall be established.
11 Progressive Assurance and the R&M Case

11.1 An R&M Case is defined as a reasoned, auditable argument created to support the contention that a defined system will satisfy the R&M requirements. The R&M Case provides an audit trail of the engineering considerations from requirements through to evidence of compliance. It provides traceability through R&M Case Reports accepted by the authority in the evidence framework of why certain activities have been undertaken and how they were judged as being successful, or otherwise.

11.2 During acquisition the R&M Case will be used to demonstrate to the Purchaser that R&M requirements are being achieved. The Case shall contain an overview of the design philosophy used, together with the identification and justification of the R&M programme plan tasks needed to be undertaken during the design, development and production programme in order to demonstrate that the user’s R&M requirements will be met. Evidence that supports R&M achievement will be entered into a declared evidence framework to produce progressive assurance of R&M achievement. Key stages in the evidence framework will be linked to project payment milestones to ensure that R&M programmes deliver the expected levels of R&M at each stage.

11.3 At the beginning of a project the R&M Case shall provide confidence, before committing resources, that the R&M risks will be identified and managed. The Case will be controlled and proceed through a number of stages of increasing detail. This detail provides the body of evidence giving progressive assurance against the R&M requirements. Ultimately, during in-service use the R&M Case should provide confidence that the system remains reliable and maintainable in its operational role.

11.4 The R&M Case must be reviewed and updated if:

a) the system is modified;
b) there are changes in how or where the system is used;
c) there are changes in the R&M requirements;
d) there is a deviation between actual performance and design intention.

Further guidance on producing and evaluating cases may be found in Def Stan 00-42, Part 3.

11.5 The Supplier shall describe his proposed arrangements for support of the system during the commissioning or entry into service phase. In particular, the arrangements for correcting any faults that may arise during this phase shall be described.

11.6 When specified in the contract, product life-cycle management sets up closed-loop procedures to collect data from system field information; this is done to continuously assess and improve the system quality, reliability and cost-effectiveness. This element is a joint Purchaser-Supplier effort to determine any deviation from expected performance, supportability or availability, and to determine the root cause and corrective action(s) necessary to improve them to acceptable levels.
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The DStan file reference relating to work on this standard is 21/40/1.

Contract Requirements

When Defence Standards are incorporated into contracts users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

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