Relationship Between MRLs and AS6500

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AS6500 Overview

AEROSPACE STANDARD	AS6500	
	Issued 2014-11	
Manufacturing Management Program		

RATIONALE

This standard was created to implement manufacturing management practices aimed at promoting the timely development, production, modification, fielding, and sustainment of affordable products by addressing manufacturing issues throughout the program life cycle.

AS6500 published in November 2014

Requirements Overview of Content

Manufacturing Management System:
Program, Policies, Objectives

Manufacturing planning

- Manufacturing Plan
- Supply chain, materiel management
- Manufacturing technology
- Cost
- M&S
- System Verification
- Workforce
- Tooling/Test Equipment/Facilities

Design analysis for manufacturing

- Producibility analysis
- Key Characteristics
- Process FMEAs

Manufacturing operations management

- Scheduling & control
- Surveillance
- Continuous Improvement
- Process control plans
- Process capabilities
- Production Process Verification
- FAIs / FATs
- Supplier Management
- Supplier Quality

Manufacturing Risk Identification

- Feasibility assessments, MRLs, PRRs

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Manufacturing Risk Identification

- Feasibility assessments, MRLs, ERRs

Relationships Between MRLs and AS6500

Elements of synergy:

1. **Compatibility of MRL criteria and AS6500 requirements**
2. **Conduct of MRL assessments**
3. **Manufacturing Plan**
4. **Cross-references**

TABLE I. Cross reference of MRL threads to SAE AS6500 requirements.

MRL Thread	SAE AS6500 Requirement
Technology and Industrial Base	6.4.1 Supply Chain and Material Management
	6.4.2 Manufacturing Technology Development
Design	6.2.1 Producibility Analysis
	6.2.1c Design Trade Studies
	6.2.2 Key Characteristics
	6.2.3 Process FMEAs
Cost & Funding	6.4.3 Cost
Materials	6.4.1 Supply Chain and Material Management
	6.5.8 Supplier Management
Process Capability & control	6.4.4 Manufacturing Modeling & Simulation
	6.5.3 Continuous Improvement
	6.5.4 Process Control Plans
	6.5.5 Process Capabilities
Quality Management	6.3 Manufacturing Risk Identification
	6.5.2 Manufacturing Surveillance
	6.5.3 Continuous Improvement
	6.5.7 FAIs/FATs
	6.5.8 Supplier Management
	6.5.9 Supplier Quality
Manufacturing Workforce	6.4.6 Manufacturing Workforce
Facilities	6.4.7 Tooling/Test Equipment/Facilities
Manufacturing Management	6.4 Manufacturing Planning
	6.4.5 Manufacturing System Verification
	6.5.1 Production Scheduling and Control
	6.5.2 Manufacturing Surveillance

- **Nearly 100% coverage of MRL topics in AS6500 requirements**
- **AS6500 requires many of the activities being assessed by MRL criteria**

Table excerpted from MIL-HDBK-896A

AS6500 Requirements
6.3 Manufacturing Risk Identification

- **6.3.1 Manufacturing Feasibility Assessments**
  - Conduct assessment for each design alternative
  - Use MRL matrix as a guide
  - Identify immature production processes and manufacturing technologies
- **6.3.2 Manufacturing Readiness Level Assessments**
  - Identify MRL Targets
  - Document manufacturing risks
  - Conduct MRL assessments prior to PDR, CDR, PRR, Milestones
  - Include critical suppliers
  - Implement maturation plans for threads not at target MRL
  - Reference: DoD MRL Deskbook and MIL-HDBK-896
- **6.3.3 Production Readiness Reviews**
  - Prior to production decision
  - MRL assessments should support manufacturing elements
  - More details on PRR in IEEE 15288.2

Similar to SOW checklist in Deskbook section 6.5

AS6500 requires the conduct of MRL Assessments

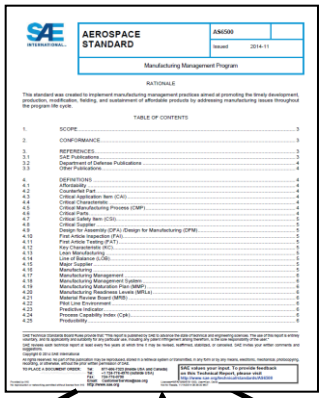
AS6500 Requirements
6.4 Manufacturing Planning

Manufacturing Plan shall include:

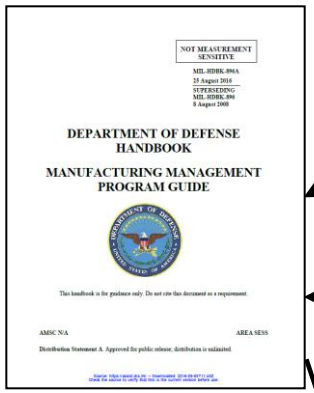
- Manufacturing methods and processes
- Manufacturing technology investments
- Production control
- Producibility
- Material management
- Manufacturing system verification
- Minimization of scrap, rework and repair
- Facilities
- Tooling
- Test equipment
- Capital commitments
- Personnel with appropriate technical skills and training
- Customer furnished hardware, software, and other items
- Customer inspections
- Capacity analysis reflecting effects of other business on resources
- Manufacturing capability for critical manufacturing processes

MRL approach not required to be included in Mfg Plan, but AS6500 requires the documentation of most MRL topics

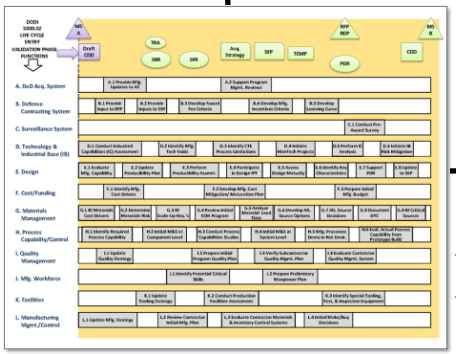
Relationships Among Documents
Cross-References



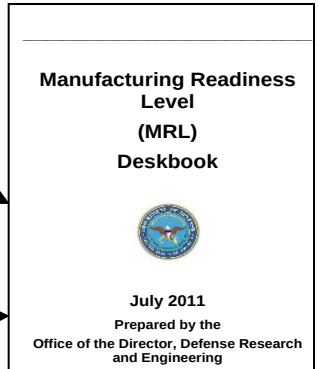
SAE AS6500
Commercial Mfg Management Standard

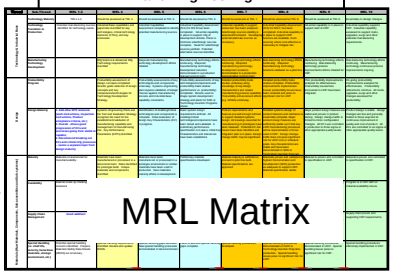


MIL-HDBK-896A
Companion Guide for AS6500



OSD M/Q Body of Knowledge
(In development)





MRL Matrix

Close alignment of related documents

Approved MRL Deskbook Addendum

MRL Working Group published a new Addendum to the MRL Deskbook – will be incorporated into next revision

6.7 MRLs in SAE AS6500

6.7.1 Requirements for Conducting MRL Assessments in AS6500

6.7.2 Requirements for a Manufacturing Plan in AS6500

6.7.3 Requirements for Activities Related to MRL Threads in AS6500

6. Applying MRLs in Contract Language

NEW

6.7 MRLs in SAE AS6500

SAE AS6500, "Manufacturing Management Program," is a standard for requiring proven manufacturing management practices with the goal of delivering affordable and capable systems. It is applicable to all phases of a system acquisition life cycle and may be specified in a contract on any program with manufacturing content. This standard was created to implement manufacturing management practices aimed at promoting the timely development, production, modification, fielding, and sustainment of affordable products by addressing manufacturing issues throughout the program life cycle.

AS6500 was designed to be fully compatible with Manufacturing Readiness Levels. It is not required for successfully implementing MRLs. However, it may help decrease manufacturing risk by requiring the conduct of MRL assessments, the development of a manufacturing plan, and the implementation of other manufacturing best practices.

For additional guidance on AS6500, refer to MIL-HDBK-896A, "Manufacturing Management Program Guide."

6.7.1 Requirements for Conducting MRL Assessments in AS6500

When imposed contractually, AS6500 requires the conduct of MRL assessments prior to major milestone and technical reviews. It also requires organizations to:

- Identify MRL targets
- Document manufacturing risks
- Include critical suppliers in MRL assessments
- Develop and implement manufacturing maturation and risk reduction plans for threads that are not at the target MRL

The standard encourages the use of MRL criteria to support Manufacturing Feasibility Assessments and Production Readiness Reviews.

Although the requirements for MRL assessments in AS6500 do not include all of the recommended Statement of Work elements in section 6.5, "SOW Language for Contracts," they do address many of them. If AS6500 is imposed contractually, the minimum requirements for MRL assessments would be adequately covered.

6.7.2 Requirements for a Manufacturing Plan in AS6500

Section 6.6 of this Deskbook, "Other Deliverables," discusses the option of including plans for implementing MRLs in a Manufacturing Plan. AS6500, Section 7.4, requires the organization to establish and maintain a Manufacturing Plan. [illegible] topics that must be addressed in the plan, including manufacturing technologies, producibility, facilities, tooling, etc. AS6500

Excerpt

Summary

- **MRL topics, criteria, and assessments are thoroughly integrated into AS6500**

- **If the requirements of AS6500 are implemented effectively, then there is a high probability that program/product/process will be at the target MRL**