6. Applying MRLs in Contract Language

**NEW**

**6.7 MRLs in SAE AS6500**

SAE AS6500 is a standard for requiring manufacturing management best practices applicable to all phases of a system acquisition life cycle. This standard may be specified in a contract on any program with manufacturing content. It requires proven manufacturing management practices with the goal of delivering affordable and capable systems. 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.

SAE’s AS6500, “Manufacturing Management Program,” was designed to be fully compatible with Manufacturing Readiness Levels. However, where this Deskbook is reference and guidance, and the MRL matrix contains the criteria assessments are conducted, AS6500 ***requires*** the conduct of MRL assessments, the development of a manufacturing plan, and the implementation of other manufacturing best practices that will help ensure decreased risks in manufacturing and ultimately program success.

**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 6.4, requires the organization to establish and maintain a Manufacturing Plan. The standard lists topics that must be addressed in the plan, including manufacturing technologies, producibility, facilities, tooling, etc. AS6500 does not specifically require the Manufacturing Plan to address MRLs, nor does it require the plan to be a deliverable document.

However, since many of the topics that must be addressed in the Manufacturing Plan per AS6500 correspond to MRL threads, it can be a useful source of information when conducting MRL assessments.

**6.7.3 Requirements for Activities Related to MRL Threads in AS6500**

The MRL matrix is a collection of criteria against which manufacturing maturity is measured. The criteria themselves do not contractually direct that certain activities be accomplished. AS6500 is a tasking document that can require many of those activities be accomplished.

Using Key Characteristics (KCs) as an example, the criteria for MRL 6, Sub-thread B.2, Design Maturity, states that, “Preliminary design KCs have been identified…” The MRL matrix does not require a contractor to identify KCs. Rather, it is an expectation for what should take place, in this case, with respect to KCs prior to PDR. On the other hand, AS6500 specifically requires organizations to identify KCs in the Technical Data Package. If the requirements of AS6500 are implemented, then the criteria of MRL 6, Sub-thread B-2 should be satisfied.

The activities required by AS6500 and the criteria in the MRL matrix are highly complementary (refer to Figure 6-1). While not every topic addressed by MRLs is covered, AS6500 requires activities that correspond to many of the topics addressed in the MRL criteria. Ideally, if AS6500 is implemented effectively, then there is a high probability that the activities being assessed by the MRL criteria will have been accomplished and the product/process will successfully achieve the target MRL.

| MRL Thread | 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  |

**Figure 6-1. Mapping of MRL Threads to AS6500 Requirements**