

Effectively Dealing with the Proliferation of Aerospace and Defense Standards

IHS Whitepaper

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As a recent Underwriters Laboratories Inc. newsletter points out, quality standards are vital to managing the global nature of today's business world¹, whether for manufacturers or suppliers in the aerospace or defense industry. At the same time, the trend toward globalization means the number of standards, regulations, and standards-related organizations any one aerospace or defense company has to deal with continues to grow.

Maintaining standards compliance across different Quality Management Systems (QMS) as specified by various bodies has become far more demanding than ever. From research required for standards selection, to verifying the reliability of information used, to reporting and documentation, the added time and costs associated with maintaining standards compliance have created new business challenges for the aerospace and defense industries.

Fortunately, these increased compliance expectations for aerospace and defense manufacturers and suppliers can be effectively dealt with through:

- careful and methodical research of the particular standards that apply in each case
- leveraging the power of third-party tools, such as online databases with search and document management solutions

From No Standards, To Domestic Standards, To Global Standards

Standards for the aerospace and defense industries are a must, whether they are military standards initiated by the Department of Defense (DoD), or international standards such as the aerospace-specific AS 9100 QMS. At the same time, finding a QMS solution that is effective, while reasonably priced, and allowing for profitability is an ongoing challenge.

The need for manufacturing and industry standards was clearly underscored in World War I, when

armament manufacturers using different definitions of an inch led to a high percentage of shells failing to explode. In World War II, the UK experienced repeated accidental detonations during the weapons manufacturing process, calling for written procedures and on-site government inspections².

Before the end of WWII, the U.S. Congress considered proposals for unifying the activities of the military into a department of national defense, setting the stage for increased standardization through coordination of various departments under a single governing body.

Over the next 40 years, standardization and Quality Management Systems in the aerospace and defense industries evolved from their infancy to nation-specific requirements, and then to international requirements.

Significant Events in the Evolution of Today's Aerospace and Defense Standards	
1947	National Military Establishment is formed. Renamed the Department of Defense (DoD) in 1949.
1959	U.S. develops Quality Program Requirements standards for military supplier procurement conformance.
1968	NATO adopts Allied Quality Assurance Procedures (AQAP) for procurement of NATO equipment.
1971	British Standards Institution (BSI) publishes first UK quality assurance standard, BS 9000 .
1987	Initial ISO 9000 document is released, influenced by numerous standards in use around the world.
1994	DoD issues memorandum reducing reliance on military standards in favor of commercial standards.
2005	DoD issues new memorandum permitting use of defense standards, partially reversing its previous position .

Challenges and Issues of Today's Standards Climate

This rapid, post-WWII development of standards, requirements, and standards-related organizations has saddled today's aerospace and defense manufacturers and suppliers with a standards climate where:

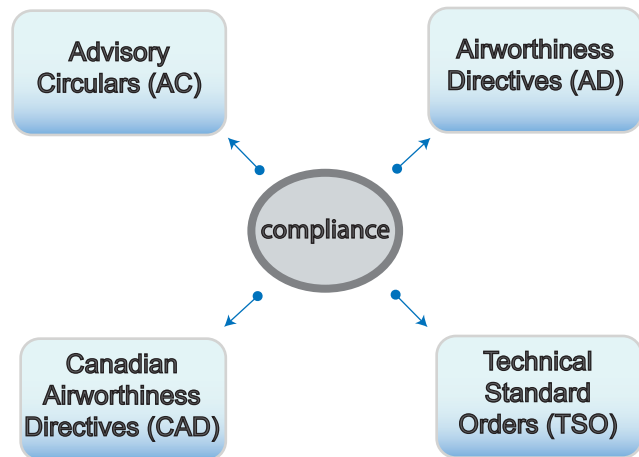
- both historic and current standards can apply to the same product
- both domestic and international standards can apply to the same product
- the company can choose between various approved Quality Management Systems when seeking compliance for a given product

In other words, despite the universal proliferation of standards over the last four decades, there is no single QMS or standards-related organization that provides truly global standards. For example, an aerospace industry manufacturer concerned about maintaining compliance needs to consider:

- **Advisory Circulars (AC)** published by the Federal Aviation Administration (FAA) as a public information resource, although most AC's are non-regulatory and non-binding.
- **Airworthiness Directives (AD)** issued by the FAA in response to deficiencies and/or unsafe conditions found in aircraft, engines, propellers or other aircraft parts. AD's must be followed to maintain FAA compliance.
- **Technical Standard Orders (TSO)** prescribing minimum performance standards for parts, materials, etc. used on civil aircraft. To maintain FAA compliance, the latest revision of a given TSO must be followed, unless a company has permission to continue work under the old TSO.
- **Canadian Airworthiness Directives (CAD)** developed and administered by Transport Canada to maintain the highest level of safety and security possible. CAD's must be followed if the aeronautical product in question is to be registered or

manufactured in Canada.

This example is far from an exhaustive examination of the various standards, regulations, standards-related bodies, and conditional criteria that apply to the manufacture of a single aeronautical product.



Furthermore, despite the ever increasing number of standards-related bodies, there is no single organization to regulate compliance to the multiple standards continually being created. Rather, the responsibility for compliance management falls on the shoulders of the aerospace and defense manufacturers and suppliers themselves.

A current example involves the introduction of the European Union's Restriction of Hazardous Substances (RoHS) and Waste Electrical and Electronic Equipment (WEEE) directives. Such green initiatives require manufacturers of electrical products or components to keep material declarations outlining the materials used in the electronic parts and components of any given product. In this case, the burden is on the manufacturer to meet the RoHS and WEEE standards while also verifying the accuracy of the materials data provided by their suppliers.

Identifying Those Standards That Apply

In order for aerospace and defense manufacturers and suppliers to maintain compliance in such a complex standards environment, careful and methodical research is required to identify the specific standards, or QMS options, that apply to a given product.

With such a wide range of standards to choose from, aerospace and defense manufacturers and

suppliers can often reduce the time required to identify standards appropriate to their specific product by taking their lead from those standards most commonly procured by others in their industry segment. For example, the table below lists the most common aerospace standards and regulations acquired from a third-party standards supplier:

Standard/Requirement	Description
SAE AS 9100B Quality Management Systems - Aerospace – Requirements	This standard includes ISO 9001:2000 (Footnote 1) quality management system requirements and specifies additional requirements for a quality management system for the aerospace industry. Technically Equivalent to AECMA prEN 9100.
SAE AS 9102A Aerospace First Article Inspection Requirement	This SAE Aerospace Standard (AS) establishes requirements for performing and documenting the First Article Inspection (FAI). Technically Equivalent to AECMA prEN 9102; superseding SAE AS 9012.
AIA/NAS NAS 410 NAS Certification & Qualification of Nondestructive Test Personnel-REV 2	This standard establishes the minimum requirements for the qualification and certification of personnel involved in nondestructive testing (NDT). These requirements include training, experience and examinations for personnel performing NDT in the aerospace manufacturing, service, maintenance and overhaul industries.
NEMA WC 27500 Standard for Aerospace and Industrial Electrical Cable	This standard contains requirements for finished cables. These cables are intended for signal and low-voltage power applications with defined environment or temperature conditions found in commercial aircraft, military aircraft, and high performance vehicles.
DLA MIL-STD-202G CHG NOTICE 1 Test Method Standard Electronic and Electrical Component Parts	This standard establishes uniform methods for testing electronic and electrical component parts, including basic environmental tests to determine resistance to deleterious effects of natural elements and conditions surrounding military operations, and physical and electrical tests.

Third-party standards suppliers can also simplify the process of standards research, identification and procurement through offering up-to-date databases with powerful search and document management tools. Such standards management solutions can provide a centralized access point to the full spectrum of standards and regulations produced by the various standards-related bodies pertaining to the aerospace and defense industries.

How IHS Simplifies the Aerospace and Defense Standards Challenge

IHS (<http://www.ihs.com>) is an industry-leading third-party standards supplier providing solutions for companies using aerospace and defense standards and specifications. IHS provides an integrated, online solution for the searching, researching, procuring, and tracking of both current and historic standards. In turn, IHS simplifies the process of effectively dealing with the proliferation of aerospace and defense standards while increasing ROI by decreasing the time and costs involved.

Resources

¹"Aerospace Standards – Thinking Business Globally." Underwriters Laboratories Inc. 15 Aug. 2006 <http://www.ul-asia.com/news_nl/2005-Issue14/page3.htm>.

²"ISO 9000." Wikipedia. 15 Aug. 2006 <http://en.wikipedia.org/wiki/Iso_9000>.

"Aerospace's AS9100 QMS Standard." Quality Digest. 15 Aug. 2006 <<http://www.qualitydigest.com/may02/html/as9100.html>>.

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"Defense Standard." Wikipedia. 15 Aug. 2006 <http://en.wikipedia.org/wiki/Defense_Standard>.

"United States Department of Defense." Wikipedia. 15 Aug. 2006 <http://en.wikipedia.org/wiki/U.S._Department_of_Defense>.

About IHS Inc.

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