

AEROSPACE STANDARD

AS9100 Quality Management Systems - Aerospace - Requirements

AS9110 Quality Management systems - Aerospace - Requirements for Maintenance Organisations

Presented by

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Chairman

AOQ - Aerospace Division

✧ FOREWORD ✧

Aerospace Industry organisations must produce and continue to improve safe/reliable products that meet or exceed customer or regulatory authority requirements to assure customer satisfaction. The globalisation of the aerospace industry, and the resulting diversity of regional/national requirements and expectations, has complicated this objective.

End-product organisations face the challenge of assuring the quality of, and integrating, product purchased from suppliers throughout the world and at all levels within the supply chain.

Aerospace suppliers and processors face the challenge of delivering product to multiple customers having varying quality expectations and requirements. (extracted from SAE WEB site)



Introduction



Kevin D. Mulholland MBus (Quality), FAOQ
Chairman – AOQ Aerospace Division

*T*he spiral of competitive marketeering in an ever decreasing market has lead to organizations scrambling to demonstrate industry best practice levels of maintenance, engineering and logistics supply, to ensure that market pressures do not dilute the very substance of airworthiness.

*T*here are the foundation standards e.g. ISO9001:2000 and Regulatory frameworks within Australia for Military (TAMM Regs) & Civil Aviation (CASA Regs) to provide the moldings for the pillars which support the system so, why do we need an American Aviation Industry Standard AS9100?

Establishing the Need



Are these aircraft components ? Do any of them fit together to make an assembly? How do I know if they are fit for purpose or bogus?



Topic

Members and Friend's Meeting

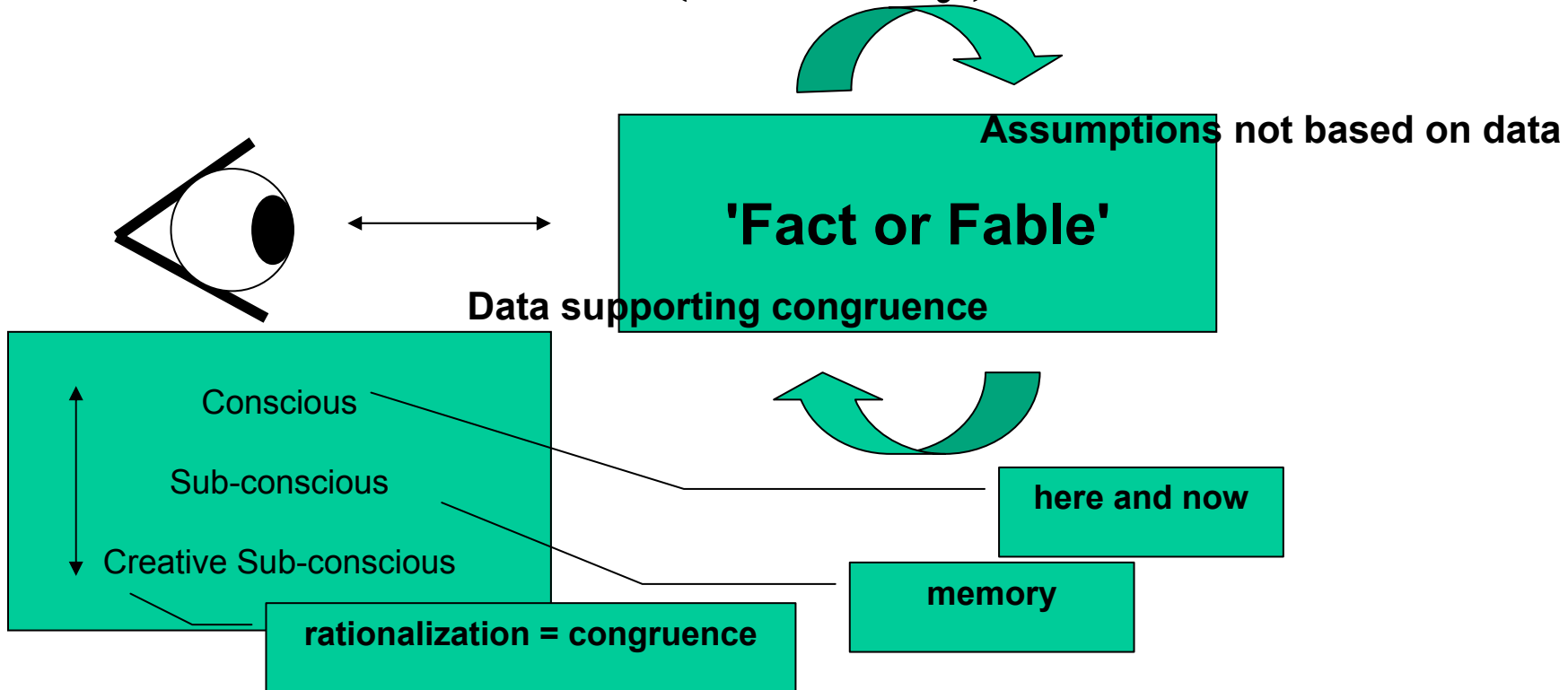
Wednesday, 20th July 2005

**American Aviation (Industry) Standard AS9100
'Fact or Fable'**



Topic – *fact or fable*

American Aviation (Industry) Standard AS9100





Review

- Why would an Industry set standards?
- Business Foundations – System & Process?
- Genesis of Industry Best Practice?
- Where do Industry Regulators fit in?
- What does ‘Assurance’ mean in the Aerospace Industry?

INTERACTION WITH AUDIENCE



Objectives

- **Explore the application of standards**
- **Overlay Airworthiness Regulation**
- **Examine practical application**
- **Conclude with the assumption resolutions**

AGENDA

- Hypothesis
- Organisational Building Blocks
- Aerospace Standards
- Australian Aerospace Regulatory Framework
- Dichotomy of Aerospace Standards
- Conclusions
- Follow-on industry studies



Handouts TRAINING AID ONLY COPIES

- **SAE AS9100**

Aerospace Standard AS9100 Quality Management Systems – Aerospace - Requirements

- **SAE AS9110**

Aerospace Standard AS9110 Quality Management Systems – Aerospace – Requirements for Maintenance Organizations

- **AAP7001.053 (AM1) OVERLAY EXTRACTS**

Australian Air Publication – Technical Airworthiness Management Manual

HANDOUT TO AUDIENCE
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Hypothesis

Fact

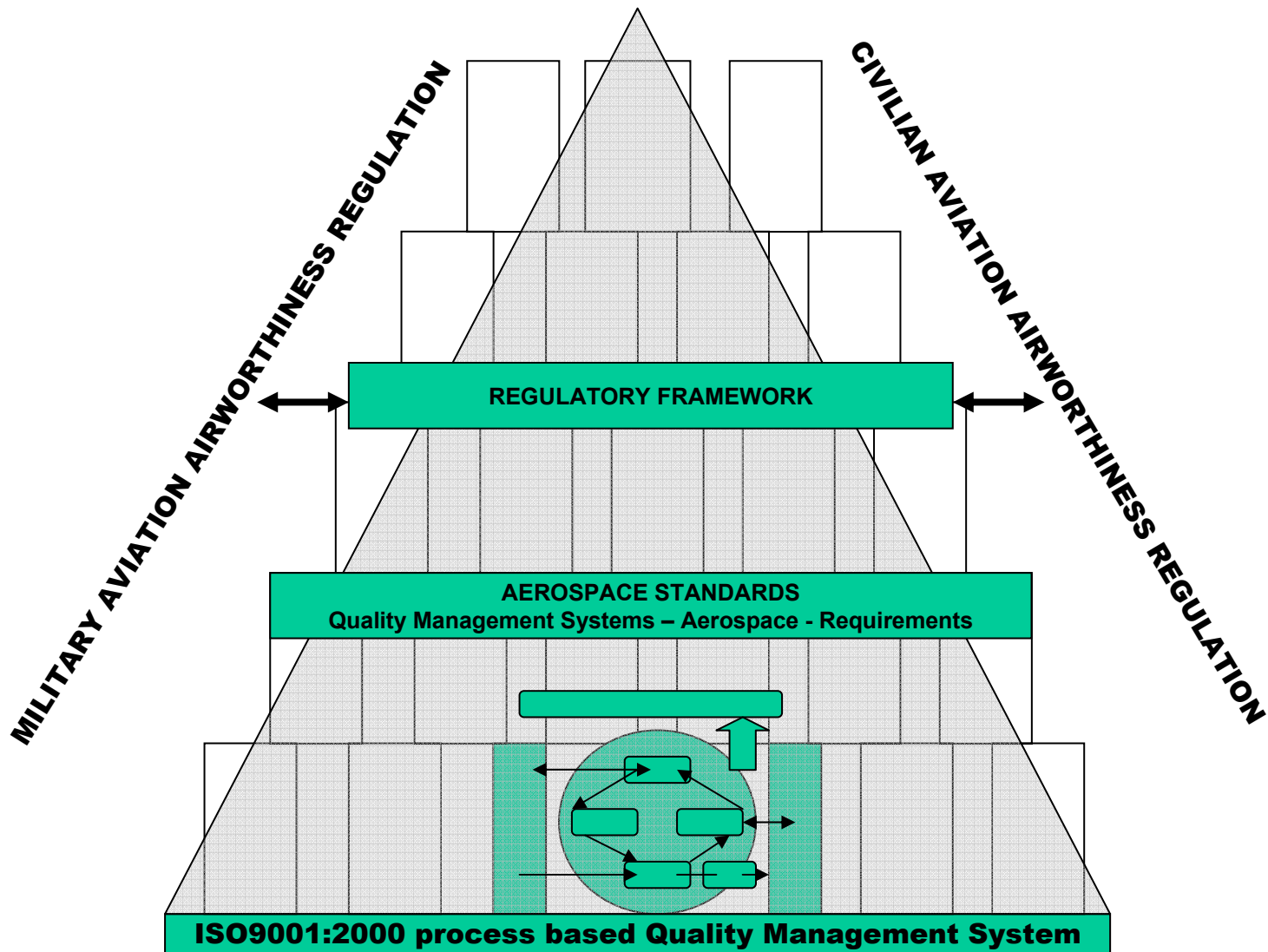
The Australian Aerospace Industry
Has a World Class Airworthiness
Regulatory Standard framework
underpinned by the building blocks
of Internationally recognised
Quality Management Systems
Molded with the glue of
industry standards for quality.

Fable

Technical Committees invent
new standards for quality in
industry to expand on
Internationally recognised
Quality Management System
generic Standards for the
purpose of generating niche
Markets and dominance.

- Embryonic Aerospace Industry organizations build rudimentary systems based on the scope of industry segment market share.
- Systems are modelled on internationally recognised standards for quality management and developed into maturity within a specific technical regulatory framework system congruence and compliance.

Organisational Building Blocks



Aerospace Standards

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Automobile



Aerospace



Commercial Vehicle



Motorsports



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International

Conference on

Environmental Systems and European Symposium on Space Environmental Control Systems

July 11-14, 2005, Rome, Italy

Engineering Propulsion Controls Symposium

September 6-9, 2005, Sterling Heights, Michigan, USA

2005 SAE Future Transportation Technology Conference

September 6-9, 2005, Chicago, Illinois, USA



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The **2005 SAE Handbook**, our annual compilation of ground vehicle standards, is ready to help support your research, development, and production efforts. This new edition will supply the

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automotive engineering

From Ada to outer space

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SAE News & Awards

SAE Celebrates 100 Years: 1905-2005

SAE 100

Commemorate our rich, shared history. Celebrate the future. SAE 100 memorabilia available on the special edition web site



Members Network 20th July 2005

SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

∞ Mobility Engineering ∞



SAE celebrates 100years 1905-2005

About SAE

The Society of Automotive Engineers has more than 84,000 members - engineers, business executives, educators, and students from more than 97 countries - who share information and exchange ideas form advancing the engineering of mobility systems SAE is your one-stop resource for standards development, events and technical information and expertise used in designing, building, maintaining, and operating self-propelled vehicles for use on land or sea, in air or space.

SAE Aerospace Liaisons

SAE maintains liaisons with a number of organisations to fully coordinate its standards, as well as to avoid duplication. Particular effort is made to exchange information with the Aerospace Industries Association (AIA), Airlines Electronic Engineering Committee (ARINC/AEEC), the General Aviation Manufacturers Association (GAMA), the Air Transport Association (ATA), the Radio Technical Commission for Aeronautics (RTCA), European Organisation for Civil Aviation Equipment (EUROCAE), European Association of Aerospace Equipment Manufacturers (AECMA), International Air Transport Association (IATA), Federal Aviation Administration (FAA), Department of Defense (DoD), Joint Aviation Authorities (JAA), American Welding Society (AWS), and Transport Canada

SAE Technical Standards Development

SAE International, through the voluntary work of more than 7,000 committee members and participants, maintains over 8,300 technical standards and related documents

SAE in International Aerospace Standards

- SAE is the administrator of the U.S. Technical Advisory Group (TAG) to ISO Technical Committee 20 - Aircraft and Space Vehicles, and is the International Secretariat for two of its subcommittees, i.e., ISO/TC20/SC9 - Air Cargo and Ground Equipment and ISO/TC20/SC10 - Aerospace Fluid systems and Components. Many SAE air and space committees interface with ISO and provide the majority of the U.S. delegates to their ISO counterpart committees. These activities stimulate communication among international technical experts and provide a valuable service to the international aerospace community.
- SAE Aerospace Standards are used extensively by the military services as well as by the private sector. Over 2,300 SAE Aerospace Material Specifications, covering a vast array of material and processes, are available to the aerospace engineer, and many can be downloaded from the SAE website. Combine these with 2,100 more documents on a wide variety of subjects makes SAE the world's largest producer of non-government Aerospace Standards. Most active Aerospace Material Specifications and Aerospace Standards can be downloaded from the SAE website.

∞ Mobility Engineering ∞

SAE AS9100 Rev B

QUALITY MANAGEMENT SYSTEMS – AEROSPACE REQUIREMENTS ‘INDUSTRY REQUIREMENTS’

SCOPE

- includes ISO9001:2000 quality management system requirements
- specifies additional requirements for a quality management system for the aerospace industry
- additional aerospace requirements are shown in *bold italic* text

CAVEAT

- quality management system requirements specified are complimentary not alternative to contractual or applicable law or regulatory requirements

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SAE AS9110 Issue 2003-01

QUALITY MANAGEMENT SYSTEMS – AEROSPACE – REQUIREMENTS FOR ‘**MAINTENANCE ORGANISATIONS**’

SCOPE

- includes ISO9001:2000 quality management system requirements
- specifies additional requirements for a quality management system for the aerospace Maintenance Organisations
- additional aerospace requirements are shown in ***bold italic*** text

CAVEAT

- quality management system requirements specified are complimentary not alternative to contractual or applicable law or regulatory requirements



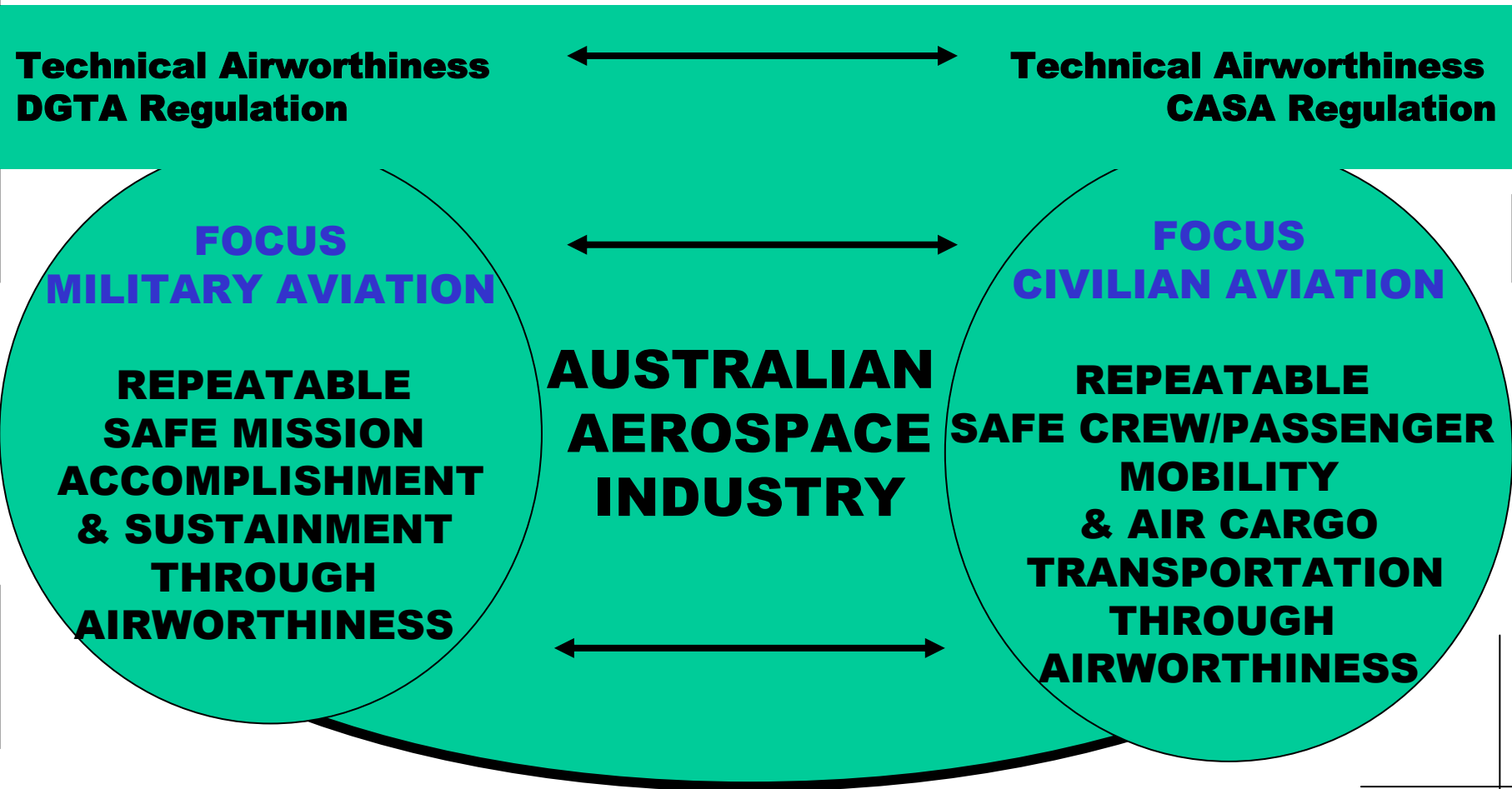
Australian Aerospace Airworthiness Regulatory Framework

**AUSTRALIAN
AEROSPACE
INDUSTRY**





Australian Aerospace Airworthiness Regulatory Framework





FOCUS **MILITARY AVIATION SEGMENT**

This study focuses on the Military Segment of the Australian Aerospace Industry

DGTA – TAMM Regulation & Guidance

**(Legend: DGTA = Director General Technical Airworthiness)
(TAMM = Technical Airworthiness Management Manual)**



**Technical Airworthiness
DGTA Regulation**

**AUSTRALIAN
AEROSPACE
INDUSTRY**

**FOCUS
MILITARY AVIATION**

**REPEATABLE
SAFE MISSION
ACCOMPLISHMENT
& SUSTAINMENT
THROUGH
AIRWORTHINESS**

**AAP7001.053 (AM1)
OVERLAY EXTRACTS**

**RAAF Australian Air Publication
Technical Airworthiness
Management Manual**

Purpose

Regulation of the technical airworthiness of all State aircraft is based upon recognition of the need to have a single technical regulatory framework to preserve the safety of those aircraft

Scope

Airworthiness Technical Perspective (State Aircraft) Designed/Constructed/Maintained

- **Approved Standards**
- **By competent & approved individuals**
- **Who are acting as members of an approved Organization**
- **Whose work is certified as correct, and accepted by the Australian Defence Force**

Technical Airworthiness Management Manual

Applicability of Regulations (State Aircraft Life Cycle)

Regulation 1: General Application

Regulation 2: Type Certification; Service Release; and,
Design Acceptance

Regulation 3: Certification of Authorised Engineering
Organisations – **AEO**

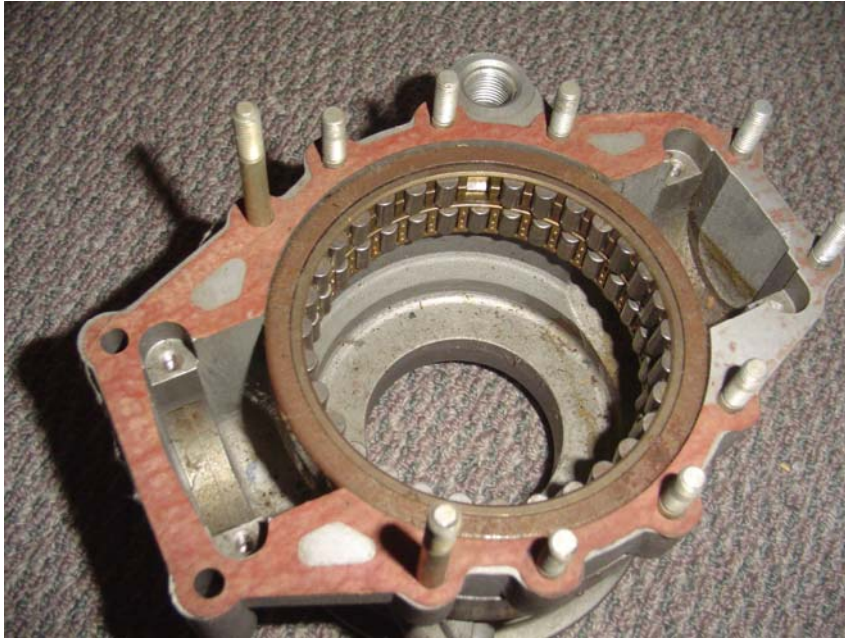
Regulation 4: Certification of Authorised Maintenance
Organisations – **AMO**

**Regulation 5: Aircraft & Aeronautical Product maintenance
& management procedures.**



SUBJECT OF STUDY

Dichotomy of Aerospace Standards



**Is this an
aircraft
component ?**

ANSWER: Yes, this is the body of an hydraulic pump from a specific supersonic military jet. The component was supplied by Abex Corporation Aerospace Division, Oxnard, California USA
How does the technician know that?????

Dichotomy of Aerospace Standards



Product Identification

Generic QMS standard

ISO9001:2000 AS9100Rev B cl 7.5.3 pg 29 AS9110 cl 7.5.3 pg 27

Identification & Traceability: Where appropriate, the organization shall identify the product by suitable means throughout product realization.

Plus + Aerospace Standard

AS9100Rev B cl 7.5.3 pg 29 AS9110 cl 7.5.3 pg 27

The organization shall maintain the Identification of the configuration of the product in order to identify any differences between the actual configuration and the agreed configuration.

Plus + + Defence Airworthiness

What does the TAMM specify ????????????????

Airworthiness Regulatory Standard framework is underpinned by the building blocks of Internationally recognised Quality Management Systems

'TAMM Extract'

- Reg 3.2.6 the applicant has established and will maintain a **3rd Party Certification to ISO9001 or equivalent** relevant to the scope of activity to be performed as an AEO.

TAMM Extract'

- Reg 4.4.4 the AMO shall establish and maintain a **Quality Management System that is acceptable to the Technical Airworthiness Regulator.**

HANDOUT TO AUDIENCE

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Dichotomy of Aerospace Standards



Product Identification

TECHNICAL AIRWORTHINESS MANAGEMENT MANUAL – TAMM

Plus + + Defence Aerospace Airworthiness
TAMM Section 4 Chapter 3

AERONAUTICAL PRODUCT MANAGEMENT PROCEDURES

Guidance

The organization to document in Maintenance Management Plan or cross-reference Aeronautical product management procedures (for both maintenance & logistics)
The systems utilized should, as a minimum maintain full traceability back to the Certificate of Conformity or equivalent document, clearly display the document Serviceability status, and be specific enough to allow the Technical Airworthiness Regulator to gain a working understanding of the Authorized Maintenance Organisations procedures and processes.

Dichotomy of Aerospace Standards

Product Identification

REGULATION

Aeronautical Product

Except where fitted to aircraft or other aeronautical Product, all aeronautical product is to be labeled, to provide the following information:

- Item Name
- Manufacturers part number(s)
- Stock number (where applicable)
- Serial number or batch / lot number (where applicable)
- Status and the date of status change (where applicable)
- Names and signature(s) of person(s) certifying the equipment
- as serviceable or unserviceable (where applicable)

TAMM Reg 5.4.4

Dichotomy of Aerospace Standards

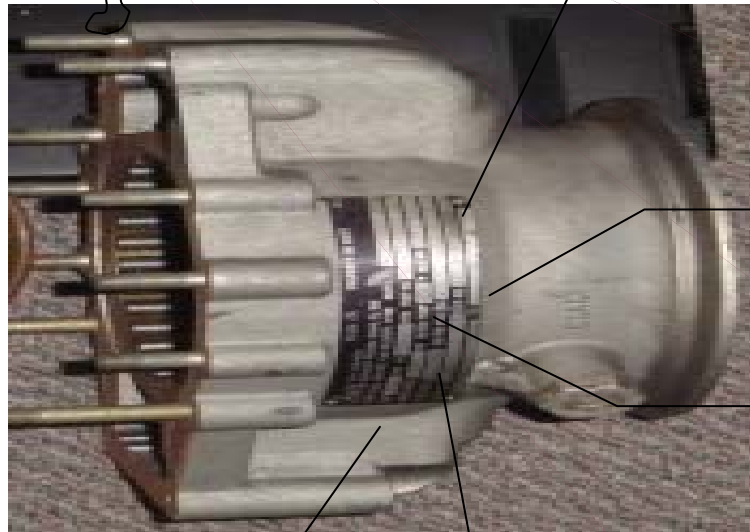
TAMM Reg 5.5.4 Aeronautical Product - Identification

REGULATION

EE59 Serviceable Equipment Label

Item Name: -----
Part No: -----
Serial No: -----

Technician Name & Signature
____ / ____ / ____



Item Name
Pump-Axial Pistons,
Variable Delivery, Hydraulic

Status / Status changer
Model AP12V-17
GD/FW Spec No 0019

Manufacturers Part Number
75250 / 55143

Serial Number or Batch / LOT Number
S/No 8230

Stock Number
NSN 4320-00-082-0512

Dichotomy of Aerospace Standards

Aeronautical Product - Identification

Why Identify?



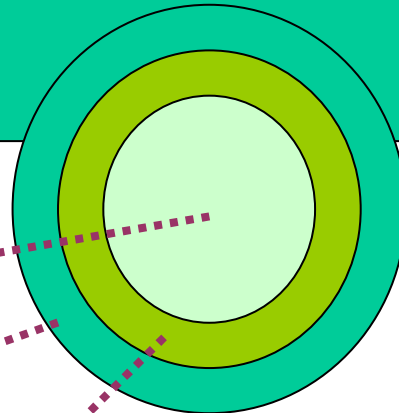
**Aircraft
'crash risk'
minimization**

- need to eliminate **BOGUS aircraft components**
- - be able to isolate **defective components**
- **fit the correct components** to assemblies and aircraft

Dichotomy of Aerospace Standards

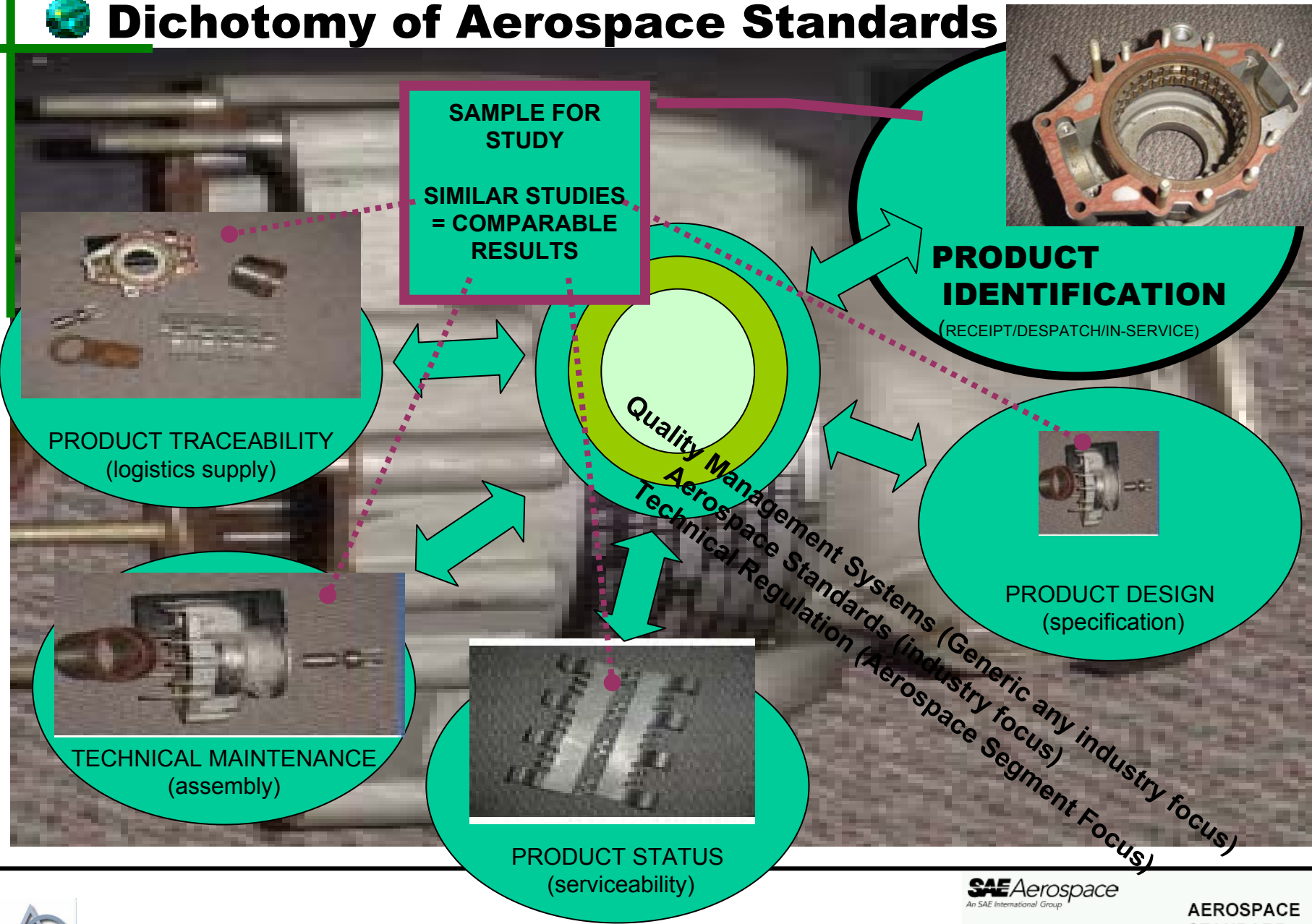
Aerospace Standards AS9100; AS9110 etc, for Quality Management Systems are complimentary (not alternative)

ref: AS99100 cl 1.1



Quality Management Systems (Generic any industry focus)
Aerospace Standards (industry focus)
Technical Regulation (Aerospace Segment Focus)

Dichotomy of Aerospace Standards



EXERCISE

- Research the handouts provided and determine the congruence between standards and regulation for aircraft maintenance
- Determine the requirements for the appointment of a Senior Maintenance Manager
- Express your views on the congruence of the referenced documents

EXERCISE REVIEW

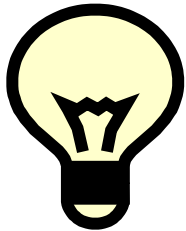
- **Regulation 4.5.3**
 - **Each AMO shall have an appointed SMM who is responsible for the conduct of all maintenance activities within the AMO's authorised scope & level.**
- **SAE9110 cl 5.5.1.2**
 - **Top management shall appoint a manager responsible for ensuring that all maintenance required is carried out in accordance with all organisation, customer and Authority requirements.**
- **ISO9001:2000 cl 5.5.1**
 - **Top management shall ensure that the responsibilities and authorities are defined and communicated within the organisation.**

Conclusion initial study

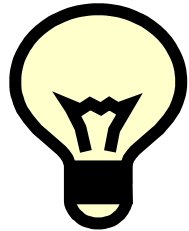
 (to be supported by follow-on studies)



The Australian Aerospace Industry has a World Class Airworthiness Regulatory Standard framework



Airworthiness Regulatory Standard framework is underpinned by the building blocks of Internationally recognised Quality Management Systems



Internationally recognised Quality Management Systems are enhanced *(but not a regulatory specification)* when molded with the glue of aerospace industry standards for quality e.g. AS9100; AS9110

● Conclusion initial study

● congruence

The Australian Defense Aerospace Industry
Has a World Class Airworthiness
Regulatory Standard framework
underpinned by the building blocks
of Internationally recognised
Quality Management Systems Standards
*Molded with the glue of
industry standards for quality.*
'CONGRUENCE'

● **Conclusion initial study**

● **application**

SAE AS9100 Rev B



QUALITY MANAGEMENT SYSTEMS – AEROSPACE
REQUIREMENTS ‘INDUSTRY REQUIREMENTS’

APPLICATION HYPOTHESIS

- **“This standard and complimentary standards for Quality Management Systems within the Aerospace Standard AS9100 series, facilitate the development of mature systems to meet Industry Standards. Application in isolation of the Defence AIRWORTHINESS Regulatory framework, would result in substantial implementation, but critical shortfalls in meeting full STATE aircraft Airworthiness requirements”.**

Follow-on study candidate Hypothesis

AS9100

- Sufficient data from the initial study supports the hypothesis *(as far as verified)*
- Congruence***  fact ~~ fable~~

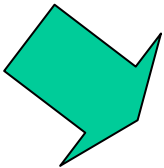
*** i.e. Alignment with Regulatory Framework but complimentary application

- Application to Australian Defence Aviation



follow-on study to verify

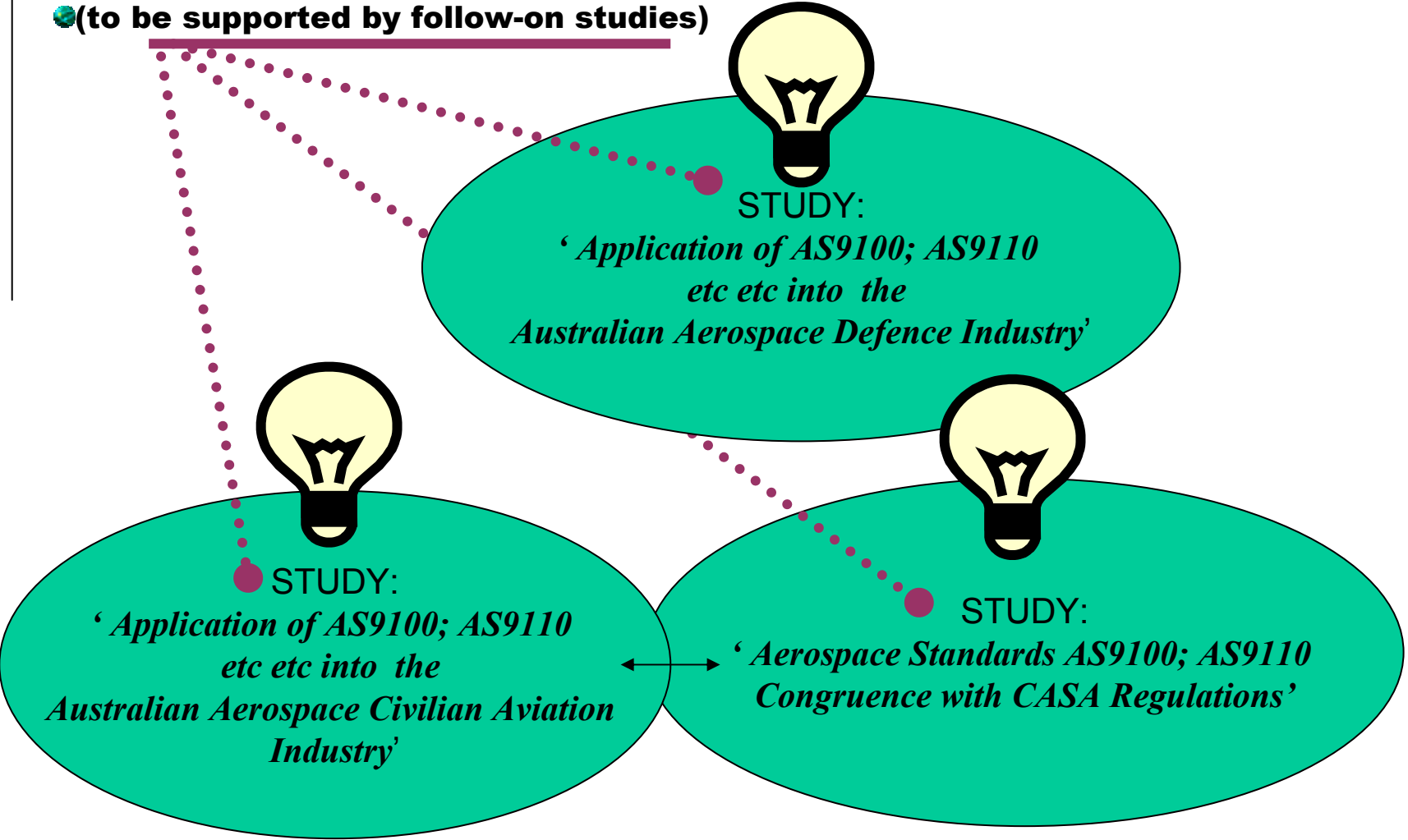
- Application to Australian Civilian Aviation



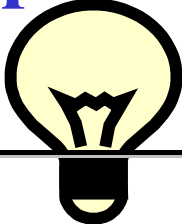
follow-on study to verify.

Follow-on Industry Studies

 (to be supported by follow-on studies)



AOQ – Aerospace Division

‘Industry study  network’

thanks you for your attendance and contribution
tonight!

- Any Questions