Welcome to Everyone

Over 230+ registered from 22 Countries
AESQ Supplier Forums

Typically held twice a year, rotating around North America, Europe and Asia

AESQ Supplier Forums provide an opportunity to:

• Provide updates on the work of the AESQ
• Share best practices
• Provide feedback to the AESQ
• Develop a network of practitioners and Subject Matter Experts
AESQ Supplier Forums: Focus on AS13100 Deployment

Introducing AS13100: AESQ Quality Management Requirements

SAE AS13100 AESQ Quality Management System Requirements for Aero Engine Design and Production Organizations

This standard sets out to create a common set of supplemental requirements with common training and reference manuals to improve understanding, efficiency, and performance. While significantly simplifying the processes of suppliers with multiple customers, the primary reason for the new standard is to improve the product quality in the entire system across aerospace industry. This required the concentrating on the production and service providers throughout the world to ensure the quality of the product. The standard sets out to improve the processes of suppliers with multiple customers, increasing customer satisfaction and improving the efficiency of the entire supply chain.

Learn more:
www.sae.org/standards/content/AS13100/

AESQ – Aerospace Engine Supplier Quality Strategy Group

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Webinar Overview

We are recording today’s webinar and will distribute the video link following the close of the webinar. It will also be posted on the AESQ website for free viewing.

We will take questions during today’s webinar using the Chat feature.

Please remain on Mute during the presentation to prevent background noise.
<table>
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<th>Topic</th>
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<tr>
<td>Welcome &amp; Introductions</td>
<td>Barbara Negroe, Executive Sourcing Quality Leader, GE Aerospace</td>
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<tr>
<td>AESQ Overview, Vision &amp; Objectives</td>
<td>Lisa Claveloux, Sr. Director, Quality, Pratt &amp; Whitney</td>
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<tr>
<td>AS13100 Standard Overview</td>
<td>Helen Djäknegren, Director Supplier Quality &amp; Development, GKN Aerospace</td>
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</table>
| Deployment & Transition to AS13100   | Jim Wilson, Sr. Manager, Supplier Quality, & Development, Pratt & Whitney Canada  
   | Earl Capozzi, Associate Director, Discipline Chief, Quality & Process Engineering/Supplier Quality, Pratt & Whitney |
| Best Practices for Human Factors     | Steve Roebuck, Head of Quality Assurance and Certification, Rolls-Royce    |
| Training Overview                    | Earl Capozzi, Associate Director, Discipline Chief, Quality & Process Engineering/Supplier Quality, Pratt & Whitney |
| AESQ How to Get Involved             | Jun Sakai, Chief Engineer, IHI                                             |
| AS13100 Question & Answer            | Markus Braig, Director, Quality Supply Chain and MRO, MTU Aero Engine      |
| Summary & Close                      | Barbara Negroe, Executive Sourcing Quality Leader, GE Aerospace            |
How to Contribute – Live Poll Questions

How to answer live poll questions:

1. Scan the QR Code
2. Enter the Passcode
3. Answer the Question
4. Add any questions during the day in the Slido App & “Like” a question
How to Use Slido Live Polling App?

Answer Live Poll Questions

Add Your Own Questions

“Like” Questions
What is the name of the city where you live?
Have you attended previous AESQ Supplier Forums?
What function are you in?

1️⃣ Start presenting to display the poll results on this slide.
AERO ENGINE SUPPLIER QUALITY GROUP (AESQ) OVERVIEW

LISA CLAVELOUX
SR. DIRECTOR, QUALITY
PRATT & WHITNEY
### Improving Safety & Quality
Remained a Key Challenge

<table>
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<tr>
<th><strong>AS13100 Overview</strong></th>
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<tr>
<td><strong>What prompted AESQ to form? – View From 2013</strong></td>
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</tbody>
</table>

- Unprecedented production ramp ahead
- Expanding global supplier footprint and increasing supplier engine content
- Common supply base, multiple OEM customers
- Customers required engine OEM’s to improve management of supply base
- Aerospace Engine Supplier Quality [AESQ] group formed to supplement AS9100, and later AS9145, for critical safety nature of engines
Why is AS13100 important

• All engine manufacturers are driving process control through APQP [Advanced Product Quality Planning]

• Despite the same foundational requirements, each were flowing different terminology, processes and tools

• Needed simpler and more consistent guidance for the supply base

• Asked for a forum to share best practices from across industry

• Needed to challenge current acceptance thresholds- raising the bar of performance for the whole industry, ex. product safety

• Essential to accelerate supplier capability through common development & training
AS13100 Overview

Aerospace Engine Supplier Quality Group

Vision

To establish and maintain a common set of Quality Requirements that enable the Global Aero Engine Supply Chain to be truly competitive through lean, capable processes and a culture of Continuous Improvement

Driving to Zero Defects

Guiding Principles

- Simplify & standardize requirements
- Common Quality language
- Build on existing industry standards [AS9100, AS9145]
- Standardized 3rd party training
- Supportive deployment

Collaborators:
- Cincinnati Thermal Spray
- Collins Aerospace
- Consolidated Precision Products
- Parker Meggitt
- Rolled Alloys
- Solar Atmospheres
- Woodward
AS13100 Overview

Aero Engines requirements flowdown

2013

- Differing supplemental requirements to AS9100 [Regulatory, Customer, business] and guidance albeit with largely the same intent

2023

- Creates a common set of supplemental requirements
- Simplifies the compliance for suppliers with multiple customers
- Common reference materials to support understanding, efficiency, and effective deployment of foundational quality tools
AESQ Strategy Group Company Members

AESQ Members

Cincinnati Thermal Spray
Collins Aerospace
Consolidated Precision Products
ITP Aero
Parker Meggitt
Rolled Alloys
Solar Atmospheres
Woodward
AESQ Strategy Group Members

Barbara Negroe
Executive Sourcing Quality Leader
GE Aerospace

Lisa Claveloux
Sr. Director Quality
Pratt & Whitney

Helen Djäknegren
Director Supplier Quality & Development
GKN Aerospace

Uzam Khan
Supplier Quality Executive
Rolls-Royce

Denis Pottier
Head of Purchasing Quality Assurance Department
Safran Aircraft Engines

Barrie Hicklin
Sr. Director, Quality Systems & Regulatory Compliance
Honeywell

Markus Braig
Director Quality Supply Chain and MRO
MTU Aero Engines

James Clifton
Global Quality Director
Precision Castparts Corp.

Jun Sakai
Chief Engineer
IHI Corporation

Lisa Claveloux
Sr. Director Quality
Pratt & Whitney

Markus Braig
Director Quality Supply Chain and MRO
MTU Aero Engines

James Clifton
Global Quality Director
Precision Castparts Corp.

Osa Omoruyi
VP Quality
Howmet Engine Systems
Defect Prevention: Key Quality Tools for Zero Defects

Defect Prevention Tools Must Work as a System
What Does Success Look Like?

• Leaders advocating for process control- speaking the language
• Common tool usage, processes control is the way we work
• Developing proficiency through common Industry training
• Culture of product safety and quality felt into the tiers of the supply base
• Continuous Improvement of the AS13100 standard- feedback from supply base, OEM’s, customers

Mindset shift- Belief that zero defects is achievable
AS13100 OVERVIEW
STRUCTURE & KEY HIGHLIGHTS

HELEN DJÄKNEGREN
DIRECTOR, SUPPLIER QUALITY & DEVELOPMENT
GKN AEROSPACE
9.3 Management Review

9.3.1 General Reference 9100D:09/2016 requirements.

9.3.2 Reference 9100D:09/2016 requirements.

9.3.2.1 Management Review Inputs - **Supplemental Requirements**

Management Reviews shall be conducted at least annually and consider the following performance topics:

- Cost of Poor Quality (COPQ).
- Manufacturing / Assembly Right First Time / First Pass Yield.
- Customer scorecards (where available).
- Human Factors reporting.

### AS13100 Structure

<table>
<thead>
<tr>
<th>Clause Number</th>
<th>DFMEA</th>
<th>Process Flow Diagram</th>
<th>PFMEA</th>
<th>Control Plan</th>
<th>MSA</th>
<th>Process Capability</th>
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<tbody>
<tr>
<td>1</td>
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<td>3</td>
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**Example Extract**
Customer Specific requirements are designed to include requirements that could not be harmonized within AS13100. These documents shall:

- Require Compliance to AS13100
- Signpost to Customer Specific Documents (where required)
- Definition of customer specific acceptance thresholds called out in AS13100 e.g., Cpk, GR&R scope, etc.
- Additional Customer Specific requirements not defined within AS13100
- Define company specific key roles and accountabilities for approvals
- Includes specific IT interface requirements
AS13100 Requirement Highlights

What requirements in AS13100 Chapter A apply to my organization?

Determine what type of organization you are in Table 2

Agree the type with your customer

Identify your applicable requirements in Table 1

Deploy

Identify your organization type

Guidance in AS13100 Appendix B

Do you manufacture or assemble at least one part defined by the Customer (e.g., customer-proprietary design, customer-directed 3rd party design), including castings and forgings?

Yes ➔ Type 1: Make to print

No ➔

Do you only manufacture or assemble finished part(s) produced against drawings, etc., proprietary to your company?

Yes ➔ Type 2a: Design/Make

No ➔
### AS13100 Requirement Highlights

**Identify your organization type – cont.**

Ensure that you agree the type with your customer.

<table>
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<tr>
<th>Question</th>
<th>Yes →</th>
<th>No ↓</th>
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<tbody>
<tr>
<td>Do you provide parts (raw materials, Industry Standard Parts, and Commercial-Off-The-Shelf (COTS) parts that are procured from other sources and not transformed, assembled, or otherwise modified by your company?</td>
<td>Yes → Distri-butor</td>
<td>Type 4: Special process</td>
</tr>
<tr>
<td>Do you only produce raw materials used in Customer’s products and called out at the lowest level of the design authority’s Bill of Material (BOM) (e.g., bar, billet, sheet, tube, plate, powder)?</td>
<td>Yes → Raw material</td>
<td>Type 5: Raw material</td>
</tr>
<tr>
<td>Do you provide design elements (i.e., results of design work activities) into a Design Technical Data Package (DTDP) or for other design decisions?</td>
<td>Yes → Design</td>
<td>Type 2b: Design</td>
</tr>
<tr>
<td>Do you only provide Special Process services?</td>
<td>Yes → Shop assist</td>
<td>Type 4: Special process</td>
</tr>
<tr>
<td>Do you only provide shop assist services in support of customer’s manufacturing operations?</td>
<td>Yes →</td>
<td></td>
</tr>
<tr>
<td>Do you provide services not listed above or in addition to the above?</td>
<td>Yes → Contact your Customer</td>
<td></td>
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</table>
AS13100 Requirement Highlights

Identify your applicable AS13100 Chapter A paragraphs in Table 1

Deploy the requirements

Table 1 provides a guide to the applicability of AS13100 Sections to Organization scope.
Which organization type best describes your organization?
**AS13100 Benefits**

1. Single AESQ Standard aligned to AS9100 / ISO9001
   - Less Requirements for the Supplier (>50% less)
   - Lower cost (suppliers do not need to buy multiple standards)

2. Supported by Free Issue Reference Manual Guides

3. Will minimise the content of OEM Supplier Requirement Standards (SABRe, S-1000, ASQR-01 and SAFe)

4. Creates a common language for Quality, OEMs have adopted standard approaches within their own operations.

5. Aligns to relevant existing industry standards (ISO, AS9xxx, Nadcap, etc)

6. Supported by global approved training resources

7. Enables the AESQ OEMs to provide a harmonised approach to Supplier Development

8. Supplier Compliance continues to be assessed through Customer Audit

9. Allows AESQ to focus on Supply Chain Capability Development
AS13100 Requirement Highlights

AS13100 organizes its additional requirements aligned to AS9100 and AS9145 standard structures. It also includes requirements to other AS series standards including:

- AS9102 First Article Inspection
- AS9146 FOD
- AS9115 Deliverable Software
- AS9116 Design Change Process
- AS9117 DPRV
- AS5553 Counterfeit Parts (EEE)
- AS6174 Counterfeit Parts

The current AS13xxx series of standards have been integrated into AS13100:
- AS13000 Problem Solving using 8D
- AS13002 Alternative Inspection Plans
- AS13003 MSA
- AS13004 Process FMEA and Control Plans
- AS13006 Process Control

Free issue Reference Material is available to support the deployment of AS13100.

AS13001 DPRV Training will remain unchanged.

Recognizes NADCAP certification for special processes for both internal and external operations.

(Section 4.3.3)
Organization's are required to include **Human Factors** within the scope of their QMS (Section 4.4.3, 5.1.1.1, 5.2.1.1 and 7.3.1)

An agreed set of **Certification Requirements**, matched to the scope of the supplier’s activities is defined (Section 4.3.3)

The organization shall conduct a **Compliance Assessment** of their QMS to ensure that it captures all of the requirements of AS13100. Any gaps must be agreed with the individual customer. (Section 4.3.5)
AS13100 Requirement Highlights

AS13100 requires four Audit Types to be conducted;
1) Quality Management System Audits
2) Production Process Audits
3) Product Audits
4) Special Process Audits
Organization’s to produce an Annual Audit Report to summarize performance for Customer Review (Section 9.2.3)

Quality Leaders are required to attend the AESQ Quality Foundation Training Class. Also recommended for other key personnel (Section 7.2.4)

Auditor Competence Requirements defined for;
- Qualifications
- Education
- Experience
- Ongoing professional development
(Section 7.2.2)

Organizations are required to provide On the Job Training that includes customer requirements, regulatory requirements, etc. (Section 7.2.1)
AS13100 Requirement Highlights

Common **Record Retention** policy for OEMs
(Section 7.5.3.5)

Requirements for **Design & Development** defined including the use of **DFMEA** for Design Risk Analysis
(Section 8.3)

Compliance to **AS9146 FOD Prevention** is required in Design Requirements (8.3.3.3), Production Control (8.5.4.1) and Supplier Control (8.4.2.1)

**AS13100** defines the requirements for Supplier Evaluation, Selection, Control and Performance Monitoring.
(Section 8.4.1)
AS13100 Requirement Highlights

Specifies the use of AS5553 Counterfeit Electrical, Electronic and Electromechanical Parts and AS6174 for Counterfeit Material (Section 8.1.4.1 & 8.4.2.1)

The organization shall verify that the correct metallic raw material is used e.g. through the use of hand held spectrometry. (Section 8.5.1.4.1)

The organization shall ensure that it uses the customer created scorecard to prioritize improvement actions. The organization must strive for 100% Quality, & Delivery performance. (Section 9.1.2.1)

Defines the use of 8D Problem Solving for key issues. Additional guidance on Problem Solving when 8D's are not required to be included in the Reference Manual RM13000. (Section 10.2.3)
Additional Quality Tools identified that are not in AS9145 APQP / PPAP

1. Pre-launch Control Plan
2. Supply Chain Risk Management Process

Defines Submission Requirements for PPAP based on Supplier Performance;

1. Submit Warrant only to customer, Retain evidence at Supplier
2. Submit PPAP evidence to customer and Retain all documents
3. Witness at Supplier
AS13100 Supporting Reference Manuals

AS13100 Standard defines mandated requirements. The Standard is supported by free issue Reference Manuals from the AESQ Website:

→ [https://aesq.sae-itc.com/content/aesq-documents](https://aesq.sae-itc.com/content/aesq-documents)

Reference Manuals provide industry best practice guidance and case study material on how to deploy quality tools effectively. Reference Manuals are maintained and updated by the AESQ Subject Matter Interest Groups and may be updated at any time when new or revised information becomes available.
AESQ is Seeking Feedback on AS13100

• The AS13100 writing team is currently working on an update of the standard
• Target date for publication is Year end 2023
• 108 suggestions under review
  • Clarifications
  • Grammar & Spelling
  • Suggested Improvements

All ideas for improvement is appreciated.
Send to Email: info@aesq.sae-itc.org
DEPLOYMENT & TRANSITION TO AS13100

JIM WILSON
SR. MANAGER, SUPPLIER QUALITY, & DEVELOPMENT
PRATT & WHITNEY CANADA

EARL CAPOZZI
DISCIPLINE CHIEF; QUALITY & PROCESS ENGINEERING / SUPPLIER QUALITY
PRATT WHITNEY

AESQ – Aerospace Engine Supplier Quality Strategy Group
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Where are we?

March 2021
AS13100 Publication

Deployment Started

Target: December 31, 2022
- Transition Completed

Ongoing compliance activities 2023
## Implementation Resources

### AESQ Subject Matter Interest Groups

<table>
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<th>AESQ Subject Matter Interest Groups</th>
<th>Reference Manual</th>
<th>Associated Forms</th>
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<tr>
<td>Advanced Product Quality Planning (APQP) &amp; Production Part ApprovalProcess (PPAP) RM13145</td>
<td>RM13000</td>
<td>Problem Solving Methods Including RD</td>
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<tr>
<td>Design Work &amp; Production Repair &amp; Rework RM13008 &amp; RM13011</td>
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<td>• RD Interactive Tool (PowerPoint)</td>
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<td>Sub Tier Management RM13007</td>
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<td>• RD Reporting Template (PowerPoint)</td>
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<td>Human Factors RM13010</td>
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<td>• RD Word Form (Word)</td>
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<td>DPRV Training RM13001</td>
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<td>• RD Template (Excel)</td>
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<td>First Article Inspection RM13102</td>
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<td>• RD Template (PowerPoint)</td>
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<td>Defect Prevention Tools to Support APQP &amp; PPAP RM13004</td>
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**AESQ™ Defect Prevention Tools to Support APQP & PPAP Subject Matter Interest Group**

**AESQ Process Control Methods (RM13006) Community of Practice**

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**AESQ – Aerospace Engine Supplier Quality Strategy Group**

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AESQ Event Engagement
# Registered + # Video Views

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Average:
- Registration – 346
- Attendance – 234
- Video Views – 489
AESQ Communities of Practice on LinkedIn
# Subscribers

- 2021: 814
- 2022: 2,719
- 2023: 3,112
AESQ Newsletter Subscribers

- 202 in 2020
- 1,178 in 2021
- 3,403 in 2022
- 3,991 in 2023
AESQ Deployment Survey Overview

August 2021: First survey of suppliers on the general knowledge of AS13100 and the AESQ
  • 158 respondents
  • Familiar with AESQ for existing AS13000 series documents

April 2022: Follow up survey targeted to better understand the aero-engine supply base’s AS13100 implementation status
  • 482 respondents
  • 608 comments and suggestions analyzed

September 2022: Survey targeted to develop plans to help suppliers for Q4
  • Same questions from April to build trend and collect feedback on deployment
  • 255 respondents

February 2023: Post deployment survey to find opportunities
  • Continue with similar questions to track evolution
  • 251 respondents
Who Responded?

Respondents had an average of 3.75 AESQ customers.
Familiarity with the AS13100 standard

- I have read the AS13100 Standard and some or all of its Reference Manuals
- I have read the entire AS13100 Standard
- I have read some sections from the AS13100 Standard
- I have reviewed the AS13100 Table of Contents only
- My organization does not yet have a copy of AS13100

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</table>

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The organization believes we are now compliant with AS13100.

The RM13009 gap analysis has been completed and a gap closure action plan is in place.

The compliance gap analysis of RM13009 has been initiated and is in process.

We have purchased a copy of AS13100 and are reviewing it.

Compliance activities have not yet begun.
Deployment Confidence

Q5 What level of confidence do you have that your company is/will be fully compliant to AS13100?

Answered: 251  Skipped: 0

- High: 50.20%
- Medium: 40.64%
- Low (Please indicate area...): 9.16%
Q2 How many individuals at your company have completed the AS13100 Requirement Training?

- Requirements training is the online training
- Expectations that it is required to conduct effective gap analysis
- We have set a minimal of 1 per company, but expect more for effective deployment
Biggest Challenges

Q6 What is the biggest challenge to your company being able to comply with AS13100? (check all that apply)

Answered: 251  Skipped: 0

- Human Factors: 45.42%
- APQP/AS9145: 55.38%
- Design FMEA: 11.55%
- Control Plans: 15.94%
- Inspection: 5.58%
- Process Control: 19.52%
- AS13100 Training: 25.90%
- Sub-Tier Management: 33.47%
- Other - please specify below: 20.72%
Engagement with AESQ

Q7 Have you participated in any of the following AESQ events or activities? (select all that apply)

Answered: 251    Skipped: 0

- AESQ Supplier Forums: 41.83%
- AESQ Topic Specific Webinars (e.g., Human...): 39.44%
- AESQ Communities of Practice on LinkedIn: 13.15%
- AESQ Member Company Event: 9.16%
- Other? Please specify below: 5.18%
- We have not participated in any: 37.05%
Using an FMEA approach to REduce HUMAN ERROR

A Rolls-Royce Case Study

Steve Roebuck
Head of Certification & Quality Assurance
Rolls-Royce Civil Aerospace Operations
Aero Engine Assembly Operations

30,000 Components

6,000 Manual Operations

HUMAN FACTORS play a critical part in assuring PRODUCT QUALITY & SAFETY
What is/are Human Factors?

Human Factors can influence us at work every day and can negatively impact performance without us knowing it!

Being aware and understanding Human Factors plays an important role in Manufacturing and Assembly Operations.

The primary focus of any Human Factors initiative is to improve safety, quality, and efficiency by reducing and managing human errors made by individuals and organizations.

There are many disciplines around the study of human factors but today we are going to focus on the Dirty Dozen (12 most common causes of human error).
How many of the Dirty Dozen can you name?
Human Factors

The Dirty Dozen

1. Lack of Communication
2. Complacency
3. Lack of Knowledge
4. Distraction
5. Lack of Team Work
6. Fatigue
7. Lack of Resources
8. Pressure
9. Lack of Assertiveness
10. Stress
11. Lack of Awareness
12. Norms
## Human Factors

### Using the FMEA Approach

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Potential Failure Mode(s)</th>
<th>Potential Cause(s)</th>
<th>Prevention Controls</th>
<th>Detection Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>No errors due to Human Factors</td>
<td>Complacency</td>
<td>Distractions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fatigue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of Assertiveness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of Awareness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Dirty Dozen</td>
<td>Lack of Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of Teamwork</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stress</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unhealthy Norms</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Simplified FMEA template for illustration purposes only. Some columns are missing e.g. the scoring is not included)
**Human Factors**

**Using the FMEA Approach**

(Simplified FMEA template for illustration purposes only. Some columns are missing e.g. the scoring is not included)
### Assembly & Test

#### Human Factors FMEA

#### Heat Map

<table>
<thead>
<tr>
<th>Area</th>
<th>Complacency</th>
<th>Distractions</th>
<th>Fatigue</th>
<th>Assertiveness</th>
<th>Awareness</th>
<th>Communication</th>
<th>Knowledge</th>
<th>Resources</th>
<th>Teamwork</th>
<th>Pressure</th>
<th>Stress</th>
<th>Unhealthy Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certification Office</td>
<td>Green</td>
<td>Red</td>
<td>Green</td>
<td>Red</td>
<td>Red</td>
<td>Green</td>
<td>Green</td>
<td>Red</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Final Inspection</td>
<td>Green</td>
<td>Red</td>
<td>Green</td>
<td>Red</td>
<td>Red</td>
<td>Green</td>
<td>Red</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Engine Test</td>
<td>Green</td>
<td>Red</td>
<td>Green</td>
<td>Red</td>
<td>Red</td>
<td>Green</td>
<td>Red</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Engine Build</td>
<td>Red</td>
<td>Green</td>
<td>Red</td>
<td>Green</td>
<td>Green</td>
<td>Red</td>
<td>Red</td>
<td>Green</td>
<td>Red</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
</tbody>
</table>

Each area will have its own, unique Human Factor risk profile (and this will change over time)
## Human Factors FMEA – Certification Team Extract

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Failure Mode</th>
<th>Potential Effect</th>
<th>Severity</th>
<th>Class.</th>
<th>Potential Cause(s) of the Failure Mode</th>
<th>Prevention Control(s) for the Potential Causes</th>
<th>Occurrence</th>
<th>Detection Controls of the Failure Mode and/or the Potential Causes</th>
<th>Detection</th>
<th>RPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Distraction</td>
<td>Distraction</td>
<td>Delays to despatch of the engine</td>
<td></td>
<td></td>
<td>Paperwork Errors</td>
<td>Gated Process</td>
<td></td>
<td>Individual Observation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Pressure</td>
<td>Pressure</td>
<td>Escape to the customer</td>
<td></td>
<td></td>
<td>Delivery Pressure</td>
<td>Team allocation of tasks/daily meeting</td>
<td></td>
<td>Individual Observation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Communication</td>
<td>Lack of Communication</td>
<td>Escape to the customer</td>
<td></td>
<td></td>
<td>Poor handover of engine</td>
<td>Daily engine review</td>
<td></td>
<td>Engine status board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Resources</td>
<td>Lack of Resources</td>
<td>Delays to despatch of the engine</td>
<td></td>
<td></td>
<td>Lack of consumables</td>
<td>Consumable champion</td>
<td></td>
<td>Weekly 5S audit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Awareness</td>
<td>Lack of Awareness</td>
<td>Repeat escapes to the customer</td>
<td></td>
<td></td>
<td>Unaware of errors made</td>
<td>Weekly team meeting to feedback errors</td>
<td></td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Scenario 1 – Final Inspection

Final Inspection includes three main activities;
• Post Test Engine Inspection
• Engine Preparation for Transport
• Final Documentation for Certification

When engines get to Final Inspection they have a specific time window to complete these activities before the transportation is ready to take it off site to be delivered to the customer.

The teams work a 12 hour shift pattern and provide 24 hour cover, seven days per week.

Any delays to this process can cause disruption to the transportation and customer delivery schedule. Delays can be caused by;
• Quality issues found at inspection
• Resource constraints (e.g. Absence to key personnel)
• Paperwork discrepancies
Which of these Dirty Dozen applies to this Scenario?

1. Start presenting to display the poll results on this slide.
Key Benefits

• Increased Awareness of Human Factors risks across the teams/organisation

• Increased engagement on Human Factors improvements

• Majority of improvements are low cost but high impact

• Increased levels of Human Factors reporting

• Reduction in errors/escapes
Human Factor FMEA: Tips for Success

**Tips for Effective Deployment include;**

a) Develop FMEA at the team level (Can be done for Operational or Transactional Processes/Teams)

b) Ensure that the team is Cross Functional

c) Use REFERENCE FMEAs and adapt them to the local situation

d) Create Tangible Mitigation Actions based on Risk

e) Conduct Regular Reviews with the team and keep the FMEA updated

f) Keep it Simple!
Please use the Chat Function to ask any questions
Training Program Goals

- Support deployment and adoption of AS13100
- Knowledge to design, maintain & assess business processes to meet intent of standard
- Focus on key concepts, impact to compliance and customer requirements and benefits to business performance
- Simplify and clarify the requirements with a standardized training approach
<table>
<thead>
<tr>
<th>Delegated Product Release Verification (DPRV)</th>
<th>AESQ Approved AS13100 Requirements Course</th>
<th>AESQ Quality Foundations Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPRV personnel <strong>shall</strong> be trained and certified in accordance with AS13001 Delegated Product Release Verification Training Requirements (7.2.3)</td>
<td>The organization <strong>shall</strong> ensure that Quality Leaders with responsibility for deploying the requirements of AS13100 within the organization are trained in the requirements of AS13100 and related Quality Mgmt. Standards. <strong>Recommended</strong> for functional leaders responsible for creating or managing processes that are impacted by AS13100 Requirements (7.2.4)</td>
<td>The organization’s Quality Leaders with responsibility for supporting the design, manufacturing, and assembly operations via AS13100 <strong>shall</strong> undergo training in the AESQ Quality Foundations course. <strong>Recommended</strong> for design engineering, manufacturing engineering and operations roles. (7.2.4)</td>
</tr>
</tbody>
</table>
LEVEL ONE

AS13100 Executive Overview

Five-Part Video Series, 35 minutes

- Executive perspectives from across the industry detailing why compliance to AS13100 is critical to your company’s success
- Training FAQs address who should enroll in AESQ trainings.

No Charge

LEVEL TWO

AS13100 Requirements

On-demand virtual course, 10 hours

- Guides the user through each section of the AS13100 standard, providing knowledge that supports the requirements and business processes to meet the intent of the standard
- Recommended for functional leaders responsible for creating or managing processes that are impacted by AS13100

$399

LEVEL THREE

AS13100 Quality Foundations

Virtual or In Person, 3-Days

- Live instructors provide an overview of the AS13100 Standard, and a detailed exploration of the guidance provided in the Reference Manuals
- Recommended for design engineering, manufacturing engineering and operations roles

$1095
SAE AS13100 Quality Requirements Course Overview

✔ Required for Quality Leaders with responsibility for deploying the requirements of AS13100

✔ Recommended for functional leaders responsible for creating or managing processes that are impacted by AS13100

✔ Provides knowledge and insight for each of the AESQ supplemental requirements

✔ Provides knowledge that helps the learner assess, design, maintain and comply with the business processes, which keep you compliant and adds value to the business
SAE AS13100 Quality Foundations Course Overview

- **Required** for Quality Leaders with responsibility for supporting the design, manufacturing, and assembly operations via AS13100

- Quality Leaders who have completed a recognized OEM training course are exempt from the SAE course.

- **Recommended** for anyone with accountability for the quality of the design, production, assembly and test areas of the organization.

- Joins key quality systems, processes and methodologies to show how they work systemically to focus on Defect Prevention. Provides deeper insight into each of the AESQ supplemental Reference Manuals.
AS13100 Requirements Course Participation 2022

- 1,144 Completed
- 1,856 Registered
- 458 Suppliers
- 32 Countries

JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC

25  49  62  67  71  110  88  100  90  122  150  210
AS13100 Requirements Course Completions 2023

528 Completed
451 Registered
43 Suppliers
70 Countries

Jan 150
Feb 94
Mar 124
Apr 84
May 76
Quality Foundations Course Participation 2022

877 Completed
1,066 Registered
428 Suppliers
32 Countries

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

10 42 75 35 61 54 89 130 38 118 113 113
Quality Foundations Course Completions 2023

- Jan: 142
- Feb: 85
- Mar: 145
- Apr: 41
- May: 39

- 452 Completed
- 346 Registered
- 70 Countries
Does Your QMS Meet AS13100 Requirements?

Trainings are available in multiple formats and can also be delivered privately to your organization.

https://aesq.sae-itc.com/training
https://discover.sae.org/AS13100

Developed in partnership with the AESQ and the G-22 writing committee SMEs
AESQ

HOW TO GET INVOLVED

JUN SAKAI
CHIEF ENGINEER
IHI

AESQ – Aerospace Engine Supplier Quality Strategy Group
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“Get Involved” with AESQ

- Go to AESQ Homepage
  https://aesq.sae-itc.com/
- Click “Get Involved”
“Get Involved” Options

1. Subscribe to AESQ’s Newsletter
2. Become an AESQ Member
3. Join the SAE G-22 Standards Committee
4. Join an AESQ Community of Practice on LinkedIn

Click on the appropriate link for additional information
“Get Involved” – Subscribe to Receive AESQ’s Newsletter

- Issued monthly
- Learn about AESQ’s current activities
- Complete online form to begin receiving
“Get Involved” – Become an AESQ Member

2 Membership Levels:

AESQ Strategy Group Member – specified in the AESQ Charter due to their critical support resulting in the establishment of the AESQ Strategy Group.

AESQ Member –

• Open to organizations engaged in the Aero Engine supply chain.

• Opportunity to participate in the work of AESQ by providing resources to support AESQ working groups and Subject Matter Interest Groups (SMIGs).

• Representatives shall be senior leaders from the organization or subject matter experts in a relevant area.

Complete Membership Application at bottom of page
“Get Involved” – Join a Community of Practice

LinkedIn Groups for each Community of Practice are open for anyone to join

<table>
<thead>
<tr>
<th>Communities of Practice</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Solving Methods</td>
<td>301</td>
</tr>
<tr>
<td>First Article Inspection (FAI)</td>
<td>278</td>
</tr>
<tr>
<td>Defect Prevention Tools</td>
<td>421</td>
</tr>
<tr>
<td>Design Work &amp; Production Repair</td>
<td>142</td>
</tr>
<tr>
<td>Quality Audit Methods</td>
<td>277</td>
</tr>
<tr>
<td>Sub-Tier Management</td>
<td>189</td>
</tr>
<tr>
<td>Measurement Systems Analysis (MSA)</td>
<td>230</td>
</tr>
<tr>
<td>Human Factors</td>
<td>172</td>
</tr>
<tr>
<td>DPRV</td>
<td>214</td>
</tr>
<tr>
<td>APQP &amp; PPAP</td>
<td>404</td>
</tr>
<tr>
<td>Process Control Methods</td>
<td>157</td>
</tr>
<tr>
<td>Compliance Assessment</td>
<td>21</td>
</tr>
<tr>
<td>Alternate Inspection Frequency</td>
<td>30</td>
</tr>
</tbody>
</table>

LinkedIn Groups for each Community of Practice are open for anyone to join.
“Get Involved” – Additional Options

- Attend AESQ Events (Supplier Forums, Webinars) or Watch Videos Online
- Take a AS13100 Training Course
- Download AESQ Reference Manuals (RMs) & Templates
- Watch the “Zero Defects” Video
AS13100 Question & Answer

MARKUS BRAIG
DIRECTOR QUALITY SUPPLY CHAIN AND MRO
MTU AERO ENGINES
Use the “Chat” Function to Ask a Question…
SUMMARY & CLOSE

BARBARA NEGROE
EXECUTIVE SOURCING QUALITY LEADER
GE AEROSPAC
What Does Success Look Like?

- Leaders advocating for process control - speaking the language
- Common tool usage, processes control is the way we work
- Developing proficiency through common Industry training
- Culture of product safety and quality felt into the tiers of the supply base
- Continuous Improvement of the AS13100 standard - feedback from supply base, OEM's, customers

Mindset shift - Belief that zero defects is achievable
AESQ Thanks You for Attending!