Welcome & Introductions

140+ Individuals Registered from 18 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
Housekeeping

Today’s event is being recorded and will be available on the AESQ website for viewing.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome &amp; Introductions</td>
<td><strong>Barbara Negroe</strong>, Executive Sourcing Quality Leader, GE Aviation</td>
</tr>
<tr>
<td>Rolls-Royce Welcome Address</td>
<td><strong>Sebastian Resch</strong>, Operations Director, Civil Aerospace, Rolls-Royce</td>
</tr>
<tr>
<td></td>
<td><strong>Peter Lord</strong>, Quality Director Operations, Civil Aerospace, Rolls-Royce</td>
</tr>
<tr>
<td>AESQ Overview, Vision &amp; Objectives</td>
<td><strong>Jim Wilson</strong>, Sr. Manager, Supplier Quality, &amp; Development, Pratt &amp; Whitney Canada</td>
</tr>
<tr>
<td>AS13100 Standard Overview</td>
<td><strong>Helen Djäknegren</strong>, Director Supplier Quality &amp; Development, GKN Aerospace</td>
</tr>
<tr>
<td>Deployment &amp; Transition to AS13100</td>
<td><strong>Uzam Khan</strong>, Supplier Quality Executive, Civil Aerospace Operations, Rolls-Royce</td>
</tr>
<tr>
<td></td>
<td><strong>Jim Wilson</strong>, Sr. Manager, Supplier Quality, &amp; Development, Pratt &amp; Whitney Canada</td>
</tr>
</tbody>
</table>

**BREAK – 20 MINUTES**
## Agenda

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Practices for Human Factors</td>
<td>Ian Riggs, Quality &amp; HSE Executive, Customer, Assembly &amp; Test, Rolls-Royce, &amp; Steve Roebuck Head of Certification, Rolls-Royce</td>
</tr>
</tbody>
</table>
| Breakout Session #1 – Subject Matter Interest Groups (SMIGs)         | • **APQP & PPAP** (RM13145) – Karl Evans, Rolls Royce  
• **Human Factors** (RM13010) – Chris Craig, Rolls Royce & Ludovic Chevet, Airbus  
• **Defect Prevention** (RM13004) – Ian Riggs, Rolls-Royce & Rob Farndon, Rolls-Royce, & Harj Sanghera, Rolls-Royce  
• **Compliance Assessment** (RM13009) and **Quality Audit Methods** (RM13005) – Jim Wilson, Pratt & Whitney, & Pete Bilbie, Rolls-Royce  
• **Process Control** (RM13006) – Shailesh Shinde, Rolls-Royce  
• **Sub-Tier Management** – Helen Djäknegren, Director Supplier Quality & Development, GKN Aerospace |
| Training Overview                                                    | Jun Sakai, Chief Engineer, IHI                                                                                                                                                                     |
| Breakout Session #2 – Zero Defects                                   | Uzam Khan, Supplier Quality Executive, Civil Aerospace Operations, Rolls-Royce                                                                                                                     |
## Agenda

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BREAK – 20 MINUTES</strong></td>
<td><strong>MODERATOR:</strong> Barrie Hicklin, Sr. Director, Quality Systems &amp; Regulatory Compliance, Honeywell Aerospace</td>
</tr>
<tr>
<td>AS13100 FAQ Panel</td>
<td><strong>PANELISTS:</strong> Karl Evans, APQP Technical Project Manager, Rolls-Royce Helen Djäknegren, Director Supplier Quality &amp; Development, GKN Aerospace Ian Riggs, Quality &amp; HSE Executive, Customer, Assembly &amp; Test, Rolls-Royce Markus Braig, Director Quality Supply Chain and MRO, MTU Aero Engines Chris Craig, Senior Operations Quality Manager, Rolls-Royce</td>
</tr>
<tr>
<td>AESQ How to Get Involved</td>
<td>Markus Braig, Director Quality Supply Chain and MRO, MTU Aero Engines</td>
</tr>
<tr>
<td>Summary &amp; Close</td>
<td>Barbara Negroe, Executive Sourcing Quality Leader, GE Aviation</td>
</tr>
</tbody>
</table>
How to Contribute – Live Poll Questions

How to answer live poll questions:

1. Scan the QR Code on your table
2. Enter the Passcode
3. Answer the Question
4. Add any questions during the day in the Slido App (“Like” a question)
Join at slido.com
#3593254

Passcode: cy7vwf
How to Use Slido Live Polling App?

Answer Live Poll Questions

Add Your Questions

“Like” Questions
What is the name of the city where you live?
What function are you in?
WELCOME ADDRESS

SEBASTIAN RESCH
DIRECTOR OF OPERATIONS
CIVIL AEROSPACE
ROLLS-ROYCE

PETER LORD
DIRECTOR OF OPERATIONS QUALITY
CIVIL AEROSPACE
ROLLS-ROYCE
Our world is changing rapidly...

Rising interest rates
Central banks raising interest rates to highest levels since 2008 financial crash—making it more expensive to invest in our future

High inflation
Reaching highest levels in decades in our home countries

Digitalisation
87% of business leaders expect digitalisation to fundamentally shift how businesses operate. A small number of first movers likely to win

Climate change
91% of the global GDP is now covered by net zero targets. How we monetize from the energy transition remains a core challenge for the industries we operate in

Shifting geopolitics
De-globalization and regionalisation to be expected. Supply chains being re-designed to guarantee delivery

“Today is the slowest day you’ll know for the rest of your lives”

Dr Ian Goldin, Professor at University of Oxford

The information in this document is proprietary and confidential to Rolls-Royce and is available to authorised recipients only—copying and onward distribution is prohibited other than for the purpose for which it was made available. Rolls-Royce content only.
Our world is changing rapidly, but our commitment to Quality has never changed...

“Strive for perfection in everything we do. Take the best that exists and make it better.”

“Accept nothing nearly right or good enough”

Sir Henry Royce
Where are we today?

**THE GOOD**
- 45%  
  - 14600  
  - 2022 Concessions

**THE BAD**
- £180m  
  - 2022 CONQ

**THE UGLY**
- 530
  - Quality Escapes in 2022

- 50%
  - 2023 Concessions

- 30%
  - 2023 Escapes

Customer Disruption
Our Road to Zero Defects

**Today**

- **IMMEDIATE GOAL**
  - Zero Escapes
  - No Customer Disruption

- **INTERMEDIATE GOAL - 2024**
  - Zero Concessions
  - Product Conformity to drawing

- **END GOAL - 2030**
  - Zero Defects
  - Right First Time, Everywhere
Pioneering a Culture of Zero Defects

Enable  significant business benefit by driving to zero defects

Protect  the business by ensuring that non-conformance and process deviations are managed safely with minimal customer disruption

Assure  compliance to our regulatory and management system requirements

TODAY

TOMORROW
Our Framework for Zero Defects
## Our Commitment to the AESQ

<table>
<thead>
<tr>
<th>Founding Member</th>
<th>Key part of the Writing Team</th>
<th>SABRe 4 is largely AS13100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Represented in all the Subject Matter Interest Groups</td>
<td></td>
<td>Over 200 people trained on the AS13100 Foundation 3 Day training</td>
</tr>
</tbody>
</table>
2030

OUR ZERO DEFECTS MISSION
AERO ENGINE SUPPLIER QUALITY GROUP (AESQ) OVERVIEW

JIM WILSON
SR. MANAGER, SUPPLIER QUALITY, & DEVELOPMENT
PRATT & WHITNEY CANADA
Aero Engine Industry - The world ten years ago

- Customers expect Zero Defects
- Airline passengers projected to double in size over the next 20 years
- Increasing level of supplier-made engine content
- Global Supplier Footprint
- Large number of common suppliers between engine manufacturers
- Wide range of Aerospace engine supplier businesses, from <$1M to >$2B
- Improving Safety, Quality, Delivery and Cost remained a key challenge

Aero Engine Manufacturers created a Collaboration working group in 2013 to address the challenges with key Global Suppliers

Used the Automotive example of QS-9000 with Ford, GM and Chrysler as the model
Aero Industry Requirements Flowdown in 2012

Regulator Requirements

Customer Requirements

Industry Requirements

NADCAP

IAQG (AS9100, AS9145, AS9102, etc.)

ISO (ISO9001, ISO19011, etc.)

AERO Engine Manufacturers

Rolls-Royce
SABRe

GE
S-1000

P&W
ASQR-01

Safran
SAFe

Aero Engine Supply Chain
Aero Industry Requirements Current State

Regulator Requirements

Customer Requirements

Industry Requirements

NADCAP

IAQG (AS9100, AS9145, AS9102, etc.)

ISO (ISO9001, ISO19011, etc.)

AERO Engine Manufacturers

AESQ AS13100 Quality Management Requirements
(Supplemental Requirements to AS9100 & AS9145)

AERO Engine Manufacturer Specific Requirements
e.g. SABRe, S-1000, ASQR-01, SaFE

Aero Engine Supply Chain
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.
Guiding Principles

• Simplify and Standardize Aero Engine supplier requirements through the removal of duplication and waste
• Create a common language for Quality
• Build on existing industry standards, where they exist
• Create Requirements that are simple, prescriptive, and auditable
• Deliver results quickly
• Promote the use of standardized 3rd party training
• Focus on effective & supportive deployment
AESQ Strategy Group Company Members

AESQ Members

Cincinnati Thermal Spray
Collins Aerospace
Consolidated Precision Products
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

Jun Sakai
Chief Engineer
IHI Corporation

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

AESQ – Aerospace Engine Supplier Quality Strategy Group
This document slide does not contain ITAR or EAR technical data. The content of this presentation slide is proprietary and confidential information of the AESQ. It is not permitted to be distributed to any third party without the written consent of the AESQ.
Defect Prevention Tools Must Work as a System
HELEN DJÄKNEGREN
DIRECTOR, SUPPLIER QUALITY & DEVELOPMENT
GKN AEROSPACE
AS13100 Creation Process

Engine Maker Supplier Requirements pre AS13100 introduction

Harmonized Requirements

Future Engine Maker Supplier Requirements

Overall Number of Requirements reduced by >50%

Requirements

Existing & WIP AESQ Standards

Supporting Guidance & Best Practice Material

AESQ – Aerospace Engine Supplier Quality Strategy Group

This document slide does not contain ITAR or EAR technical data. The content of this presentation slide is proprietary and confidential information of the AESQ. It is not permitted to be distributed to any third party without the written consent of the AESQ.
### AS13100 Structure

<table>
<thead>
<tr>
<th>AS13100 Requirements</th>
<th>Chapter A ISO9001/AS9100 Rev D Supplemental Requirements</th>
<th>Chapter B APQP &amp; PPAP AS9145 Supplemental Requirements</th>
<th>Chapter C Defect Prevention Quality Tools to Support APQP &amp; PPAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clause Number</td>
<td>1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
</tbody>
</table>

**Example Extract**

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 Customer Specific Requirements**

**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>
<thead>
<tr>
<th>Determine what type of organization you are in</th>
<th>Agree the type with your customer</th>
<th>Identify your applicable requirements in Table 1</th>
<th>Deploy</th>
</tr>
</thead>
</table>

**Identify your organization type**

<table>
<thead>
<tr>
<th>Identify your organization type</th>
<th>Guidance in AS13100 Appendix B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1: Make to print</td>
<td>Yes ➔</td>
</tr>
<tr>
<td>Type 2a: Design/Make</td>
<td>Yes ➔</td>
</tr>
</tbody>
</table>

**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?

No ➔

Note: This includes suppliers that purchase parts from third parties manufactured against Customer proprietary drawings and don’t add any additional value themselves.

Yes ➔

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

No ➔

Cont on next slide
AS13100 Requirement Highlights

Identify your organization type – cont.

Ensure that you agree the type with your customer
### AS13100 Requirement Highlights

**Table 1** provides a guide to the applicability of AS13100 Sections to Organization scope.

<table>
<thead>
<tr>
<th>AS13100 Paragraph Reference</th>
<th>Type 1: Make to Print</th>
<th>Type 2A: Design and Manufacture</th>
<th>Type 2B: Design Only</th>
<th>Type 3: Distributor</th>
<th>Type 4: Special Process</th>
<th>Type 5: Raw Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3.1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.3.2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.3.3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.3.4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.3.5</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.4.3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.1.1.1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.2.1.1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.3.1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6.1.3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7.1.3.1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7.1.5.1.1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7.1.5.1.2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7.1.5.1.3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Identify your applicable AS13100 Chapter A paragraphs in Table 1

Deploy the requirements
Which organization type best describes your organization?

① Start presenting to display the poll results on this slide.
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)
AS13100 Requirement Highlights

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

Organizations are required 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**

- **Specifications of AS5553 Counterfeit Electrical, Electronic and Electromechanical Parts**
  - AS5553 and AS6174 are specified for Counterfeit Material,
  - Section 8.1.4.1 & 8.4.2.1

- **Verification of Correct Metallic Raw Material**
  - 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

- **Customer Scorecards**
  - The organization shall ensure it uses the customer created scorecard to prioritize improvement actions,
  - The organization must strive for 100% Quality, & Delivery performance,
  - Section 9.1.2.1

- **8D Problem Solving**
  - 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
AS13100 Requirement Highlights: Chapter B APQP & PPAP

AS9145 APQP & PPAP required to manage;
- New Product Introduction
- Product & Design Changes
- Source Changes

Additional Quality Tools identified that are not in AS9145 APQP / PPAP
1. Pre-launch Control Plan
2. Supply Chain Risk Management Process

Additional Quality Tools identified that are not in AS9145 PPAP
1. DFMEA defined as the Design Risk Analysis tool
2. Defines AESQ Guidance Documents for PPAP elements
3. Initial manufacturing Performance Studies
4. Dimensional / non-Dimensional Results

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

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

• Clarifications
• Grammar & Spelling
• Suggested Improvements
• Other?

Email: info@aesq.sae-itc.org
DEPLOYMENT STATUS

UZAM KHAN
SUPPLIER QUALITY EXECUTIVE
ROLLS-ROYCE

JIM WILSON
SR. MANAGER, SUPPLIER QUALITY, & DEVELOPMENT
PRATT & WHITNEY CANADA
Where are we?

- March 2021: AS13100 Publication
- Deployment Started
- Target: December 31, 2022 - Transition Completed
- Ongoing compliance activities 2023
Resources are available for implementation concerns

AESQ Subject Matter Interest Groups

- Advanced Product Quality Planning (APQP) & Production Part Approval Process (PPAP)
- Defect Prevention Tools to Support APQP & PPAP
- Design Work & Production Repair & Rework
- Measurement Systems Analysis (MSA)
- Sub Tier Management
- Process Control Methods
- Human Factors
- Problem Solving Methods
- DPRV Training
- Quality Audit Methods
- First Article Inspection

Reference Manual

- RM13000

Associated Forms

- Problem Solving Methods Including 8D
  - 8D Interactive Tool (PowerPoint)
  - 8D Reporting Template (PowerPoint)
  - 8D Word Form (Word)
  - 8D Template (Excel)
  - 8D Template (PowerPoint)
AESQ Communities of Practice on LinkedIn

# Subscribers

- **2021**: 814
- **2022**: 2,719
- **Jan**: 2,782
- **Feb**: 2,824
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

Timeframe:
- Sep 2021
- Apr 2022
- Sep 2022
- Feb 2023
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
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 are...: 9.16%

Deployment Confidence
Training

Q2 How many individuals at your company have completed the AS13100 Requirement Training?

Answered: 251  Skipped: 0

- 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%
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 (ex. 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%
How can the AESQ further support you in effective deployment?
Break Time

Return in 15 Minutes
Using FMEA to Reduce Human Error in Assembly & Test

Dr Ian Riggs
Quality & HSE Executive
Assembly & Test Operations

Steve Roebuck
Head of Certification & Quality Assurance
Assembly & Test Operations
Production Engine Build & Test (PTF)

57/58 Bed & Prep Shop

Learning Development Centre (LDC)

Sinfin ‘B’ Site (Inc. ILC)

Sinfin ‘A’ Site

Site Map
Our Large Engine Product Portfolio

Trent XWB-84
Trent XWB-97
Trent 1000-TEN
Trent 7000
What is your knowledge of Human Factors?

① Start presenting to display the poll results on this slide.
What is your knowledge of FMEA?
Human Factors play a critical part in assuring Product Quality

30,000 Components

6,000 Manual Operations
RR Deployment Framework

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

The Dirty Dozen

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

Let’s have a go!
Scenario – Final Inspection, Friday 2.30 p.m.

• Engine due for delivery at 5 p.m. Lorry waiting outside. Ferry scheduled for 11 p.m.

• The Prince of Wales is due to visit at 3 p.m. and have a picture taken in Final Inspection next to this finished Engine

• Two of the inspection team who should be working on the engine have phoned in sick this morning

• The final paperwork usually takes 3 hours to compile once the engine is finished. The delays mean that the team will only have 2 hours to get it all done.

• Senior Logistics Manager is in the area to get constant updates on progress to ensure the engine will be ready to deliver on time

• The Senior Communications Manager is also in the area to ensure that everything is ready for the royal visit

Slido Poll: Which of the Dirty Dozen apply to this scenario?
Which of these Dirty Dozen applies to this Scenario?

① Start presenting to display the poll results on this slide.
Each area will have its own, unique human factor risk profile however some risks will be similar across multiple areas.
Human Factors FMEA - Improvement Examples

- Lack of Awareness
- Lack of Communication
- Distractions
- Behavioral Nudges
- Complacency/Norms
- Toolbox Talks
- New Electronic Shift Handover System (MS Power Apps)
- Team Building Away Days
- Enhanced Compliance Checking

The information in this document is proprietary and confidential to Rolls-Royce and is available to authorised recipients only – copying and onward distribution is prohibited other than for the purpose for which it was made available. Rolls-Royce content only.
Key Insights

- In a Manual Assembly Environment Human Factors can have a significant impact on business performance.
- The structured approach of FMEA has proven to be an important tool to identify Human Factor Issues to drive preventive action.
- We have learned that:
  - a) Including Human Factor risks into the Product PFMEA creates too much ‘noise’ – hence a separate Human Factor FMEA approach is used.
  - b) A reference style Human Factor FMEA approach can be used for high level analysis but each area will have a unique ‘signature’.
  - c) It is an easy concept for the teams to use.
  - d) It necessitates the engagement with the wider workforce to validate the findings.
  - e) Creates cross functional / high value discussions that lead to better insights.
  - f) It drives improvements based on risk.
  - g) Improved awareness and issue reporting where deployed (>200% increase).
Breakout Session #1: Subject Matter Interest Groups
60 Minutes

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quality Audit (RM13005) Compliance Assessment (RM13009)</td>
<td>Jim Wilson, Pratt &amp; Whitney &amp; Pete Bilbie, Rolls-Royce</td>
</tr>
<tr>
<td>2</td>
<td>Human Factors (RM13010)</td>
<td>Chris Craig, Rolls-Royce Ludovic Chevet, Airbus</td>
</tr>
<tr>
<td>3</td>
<td>APQP &amp; PPAP (RM13145)</td>
<td>Karl Evans, Rolls-Royce</td>
</tr>
<tr>
<td>4</td>
<td>PFMEA Defect Prevention (RM13004)</td>
<td>Ian Riggs, Rolls-Royce &amp; Rob Farndon, Rolls-Royce &amp; Harj Sanghera, Rolls-Royce</td>
</tr>
<tr>
<td>5</td>
<td>Process Control (RM13006)</td>
<td>Shailesh Shinde, Rolls-Royce</td>
</tr>
<tr>
<td>6</td>
<td>SubTier Management (RM13007)</td>
<td>Helen Djäknegren, GKN</td>
</tr>
</tbody>
</table>
Breakout Session #1 – Subject Matter Interest Groups (SMIGs)

- RM13010 Human Factors
- RM13009 Compliance RM13005 Quality Audit
- RM13003 MSA
- RM13006 Process Control
- RM13004 PFMEA Defect Prevention
- RM13145 APQP/PPAP
- Training
- RM13007 SubTier Management
Return in 60 Minutes

Group Photo

Time for Lunch
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
# AESQ Approved AS13100 Trainings

<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

$1295 in Europe
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 AS13100 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

This document slide does not contain ITAR or EAR technical data. The content of this presentation slide is proprietary and confidential information of the AESQ. It is not permitted to be distributed to any third party without the written consent of the AESQ.
Quality Foundations Course Participation 2022

877 Completed
1,066 Registered
428 Suppliers
32 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
BREAKOUT SESSION #2
ZERO DEFECTS FOR EVERYONE

UZAM KHAN
SUPPLIER QUALITY EXECUTIVE
ROLLS-ROYCE
Zero Defects Principles

a) Quality is defined as conformance to customer requirements

b) The quality standard (target) is Zero Defects

c) Defect prevention not Inspection to ensure Quality

d) Quality is measured through the Cost of non-quality
Getting to Zero Defects…

Arrange these characters into a natural value steam and identify what they need to provide to each other to achieve zero defects.
Quality Improvement vs Zero Defects

**Zero Defects Thinking**
- What do we want to happen
- What could go wrong
- Eliminate / reduce the likelihood of it going wrong
- Manage the process and use feedback to ensure it continues to give us the right outcome

**Traditional Improvement**
- Wait for something to happen
- See why it happened
- Try and remove the cause so it can’t happen again
Getting to Zero Defects…

Overlay the Zero Defects tools and practices over the value stream
The Quality Value Steam

**DFMEA**
- Identifies the aspects of the product that are important to meeting customer requirements, to prioritise improvements.

**PFMEA**
- Identifies the aspects of the production process that are important to meeting product requirements, to prioritise improvements.

**CONTROL PLAN**
- Specifies variables in the manufacturing process that need to be controlled to guarantee that the design features produced are conforming.

**SPC**
- Real-time graphical means of monitoring and controlling a process so as to prevent non-conformance.

**MSA**
- Ensures that the inspection systems are fit for purpose and capable of measuring the design features.

**PACKAGING STANDARDS**
- Ensures that the product is fully protected during transportation and storage.

**CUSTOMER SPECIFICATION**
- Clearly defines what the customer wants, embedded in the purchase order.

**Sets the expectation of what the product or service must do to satisfy the requirements.**

**DEN Designer**
- Takes the customer’s needs and translated in to a unique product design that meets the customer’s requirements to be made reliable every time.

**Mel ME**
- Takes what’s important about the product and makes sure the production process is designed to deliver it, every time.

**Chris Customer**
- Takes the customer’s needs and translated into a unique product design that meets the customer’s requirements to be made reliable every time.

**Izzy Inspector**
- Verifies the product meets the design intent and can therefore pass down the value stream.

**Olly Operator**
- Complies to instructions, ensuring products conform to requirements every time, with no reworks or concessions.

**Quincy Quality**
- Ensures we comply to the required processes so that we do any job right first time.

**Petra Purchase**
- Ensures that our suppliers deliver conforming product, to schedule.

**Fran Finance**
- Ensures the business fully understands the costs of non-quality so we invest wisely to get to zero defects.

**Hillary HR**
- Ensures we are able to recruit and/or develop capable people.

**Leslie Logistics**
- Moves the right parts, to the right place in the right amounts just as they are required, without damage/FOD.

**Hillary HR**
- Training Plans
  - Ensure everyone is capable of doing the jobs they are required to do.

AESQ – Aerospace Engine Supplier Quality Strategy Group

This document slide does not contain ITAR or EAR technical data. The content of this presentation slide is proprietary and confidential information of the AESQ. It is not permitted to be distributed to any third party without the written consent of the AESQ.
Break Time

Return in 25 Minutes
BARRIE HICKLIN
SR. DIRECTOR, QUALITY SYSTEMS &
REGULATORY COMPLIANCE
HONEYWELL
AS13100 FAQ Panel

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

PANELISTS:

• Karl Evans, APQP Technical Project Manager, Rolls-Royce
• Helen Djäknegren, Director Supplier Quality & Development, GKN Aerospace
• Ian Riggs, Quality & HSE Executive, Customer, Assembly & Test, Rolls-Royce
• Markus Braig, Director Quality Supply Chain and MRO, MTU Aero Engines
• Chris Craig, Senior Operations Quality Manager, Rolls-Royce
AESQ

HOW TO GET INVOLVED

MARKUS BRAIG
DIRECTOR QUALITY SUPPLY CHAIN AND MRO
MTU AERO ENGINES
“Get Involved” with AESQ

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

1. Subscribe to receive 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” – Sign up 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.
“Get Involved” – Additional Options

• Attend AESQ Events (Supplier Forums, Webinars) or Watch Videos Online

• Take a AS13100 Training Course

• Download AESQ Reference Manuals (RMs)

• Watch the “Zero Defects” Video
SUMMARY & CLOSE

BARBARA NEGROE
EXECUTIVE SOURCING QUALITY LEADER
GE AVIATION
AESQ Thanks You for Attending!

Stay in Touch:  aesq.sae-itec.com