Welcome & Introductions

130+ Individuals Registered from 7 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 practice
• Provide feedback to the AESQ
• Develop a network of practitioners and Subject Matter Experts
2022 AESQ Supplier Forums: Focus on AS13100 Deployment

Introducing AS13100: AESQ Quality Management Requirements

THE NEW STANDARD CREATING A COMMON LANGUAGE FOR QUALITY THROUGHOUT THE AEROSPACE ENGINE SUPPLY CHAIN

This standard sets out to create a common set of supplemental requirements with common training and reference materials to improve understanding, efficacy, and performance. While significantly simplifying the business of suppliers with multiple customers, the primary intent of the new standard is to deliver product quality and traceability in the key systems and demonstrate consistent quality assurance through a single source.

These common supplemental requirements aim to raise the bar for product quality performance in these key areas, and therefore demand an organization to ensure customer satisfaction, the value, scope, and achieve industry-wide quality that is produced and continually improved with robust, reliable products that equal or exceed customer expectations. Organizations in the aerospace industry now have a clear, common language that supports long-term sustained growth.

For more information, please visit: discover.sae.org/AS13100

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

Testimonial

"Through created by the Aerospace Engine Supplier Quality Group in conjunction with the SAE 6-29 Aircraft Engine Quality Standards Committee, this standard and supporting materials will benefit any organization, in any industry."

Dr. Ian Yrigoy GKN Quality Executive Rolls-Royce & AESQ Chair

AESQ – Aerospace Engine Supplier Quality Strategy Group

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<tr>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome &amp; Introductions</td>
<td>Barbara Negroe, Executive Sourcing Quality Leader, GE Aviation</td>
</tr>
<tr>
<td>Rolls-Royce Welcome Address</td>
<td>Candice Bineyard, Director of Programs - Defense, Rolls-Royce</td>
</tr>
<tr>
<td>AESQ Overview, Vision &amp; Objectives</td>
<td>Lisa Claveloux, Sr. Director Group Quality, Pratt &amp; Whitney</td>
</tr>
<tr>
<td>AS13100 Standard Overview</td>
<td>Larry Bennett, Consulting Engineer, Global Sourcing Quality, GE Aviation</td>
</tr>
<tr>
<td>Deployment Milestones</td>
<td>Elizabeth Pace, Supplier Quality Strategy, Associate Director, Raytheon Technologies</td>
</tr>
<tr>
<td></td>
<td>Ricardo Banuelas, Head of Continuous Improvement, Rolls-Royce</td>
</tr>
<tr>
<td></td>
<td>Jim Wilson, Sr. Manager, Supplier Quality, &amp; Development, Pratt &amp; Whitney Canada</td>
</tr>
</tbody>
</table>

BREAK – 15 Minutes
## Agenda

<table>
<thead>
<tr>
<th>Topic</th>
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</table>
Branden J. Workman, Sr. Quality Aerospace North America, SKF  
Steve McMulkin, Head of Manufacturing Quality, Parker Meggitt |
| Training Overview                               | Earl Capozzi, Associate Director, Discipline Chief, Quality & Process Engineering/Supplier Quality, Pratt & Whitney |
| **GROUP PHOTO & LUNCH – 75 MINUTES**            |                                                                           |
| OEM Requirements Session                        | Larry Bennett, Consulting Engineer, Global Sourcing Quality, Supply Chain Division, GE Aviation  
Tracey Lockhart, Head of Quality and Continuous Improvement, Defence, Rolls-Royce  
Jim Wilson, Sr. Manager, Supplier Quality, & Development, Pratt & Whitney Canada  
Denis Pottier, Head of the Purchasing Quality Assurance Department, Safran Aircraft Engines  
Catherine Catarina-Graca, Supplier Management System Coordinator, Safran Aircraft Engines |
<table>
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</tr>
</thead>
</table>
| AS13100 FAQ Panel      | MODERATOR: Barrie Hicklin, Sr. Director, Quality Systems & Regulatory Compliance, Honeywell Aerospace  
**PANELISTS:**  
Larry Bennett, Consulting Engineer, Global Sourcing Quality, Supply Chain Division, GE Aviation  
Catherine Catarina-Graca, Supplier Management System Coordinator, Safran Aircraft Engines  
Jim Wilson, Sr. Manager, Supplier Quality, & Development, Pratt & Whitney Canada  
Earl Capozzi, Associate Director, Discipline Chief, Quality & Process Engineering/Supplier Quality, Pratt & Whitney |
|                        | BREAK – 15 Minutes                                                         |
| Zero Defects Journey   | Barrie Hicklin, Sr. Director, Quality Systems & Regulatory Compliance, Honeywell |
| AESQ How to Get Involved | Helen Djaknegren, Director Supplier Quality & Development, GKN Aerospace |
| Summary & Close        | Barbara Negroe, Executive Sourcing Quality Leader, GE Aviation             |
Rolls-Royce Indianapolis: Home to the largest RR Manufacturing site in North America

People:
3,300 Employees – over 1,175 Engineers and 1,000 UAW Hourly
One of the largest manufacturers in Indianapolis
Annual sales $2.5 Billion

Primary Customers:
US Navy, Army & Air Force, Lockheed-Martin, Embraer, Cessna, Bell Helicopter and Robinson

Supply Chain:
Annual spend of over $1.2 Billion
565 North American suppliers
Key Facilities

Main manufacturing assembly and test
- Excellence
- Performance
- Victory

The Meridian Center

Single Crystal Operations
LiftSystem focus factory
Compressor banded stators
Controls test and mfg.
Purdue Technology Center
As an industry with **Zero Defects**, we will:

- Save money year on year avoiding unnecessary costs and penalties
- Have stable, capable processes that are predictable
- Have confidence in our ability to deliver products on time and on cost
- Have satisfied customers
AERO ENGINE SUPPLIER QUALITY GROUP (AESQ) OVERVIEW

LISA CLAVELOUX
SR. DIRECTOR, QUALITY
RAYTHEON TECHNOLOGIES
PRATT & WHITNEY DIVISION
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 (AS9100, AS9145, AS9102, etc.)
  - 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
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.

AESQ Vision

Striving for Zero Defects
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 – Aerospace Engine Supplier Quality Strategy Group

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Executive Sourcing Quality Leader
GE Aviation

Lisa Claveloux
Sr. Director Quality
Raytheon Technology Corp.

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

Thomas Frank
Senior VP Corporate Quality
MTU Aero Engines

James Clifton
Global Quality Director
Precision Castparts Corp.

Osa Omoruyi
VP Quality
Howmet Engine Systems

Jun Sakai
Chief Engineer
IHI Corporation

Lisa Claveloux
Sr. Director Quality
Raytheon Technology Corp.

Helen Djäknegren
Director Supplier Quality & Development
GKN Aerospace

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Defect Prevention Tools Must Work as a System
AS13100 OVERVIEW
STRUCTURE & KEY HIGHLIGHTS

LARRY BENNETT
CONSULTING ENGINEER, GLOBAL SOURCING QUALITY
SUPPLY CHAIN DIVISION
GE AVIATION
# Product Life Cycle & Current AESQ Document Interaction

<table>
<thead>
<tr>
<th>AS9145 (PDP)</th>
<th>Kick Off</th>
<th>End of Concept (PDR)</th>
<th>Design Release (CDR)</th>
<th>Initial Prod. Approval</th>
<th>Production Launch</th>
</tr>
</thead>
</table>

### 1. Planning

- **AS9145 APQP Phases**
  - AS9145 Key PPAP Events
    - Design Records & DRA
    - Process Flow Diagram
    - PFMEA
    - Control Plan
    - Packaging, Preservation & Labelling
    - MSA
    - ICS
    - FAI

### 2. Product Design & Development

- **AS9145 PPAP Element Timing**
- **AESQ 2nd Level Documents**
  - AS13004 – PFMEA & Control Plans
  - AS13003 – Measurement Systems Analysis
  - AS13006 – Process Control Methods
  - AS13002 – Inspection Frequency Plans
  - AS13000 – Problem Solving Requirements for Suppliers - 8D
  - AS13001 – Delegated Product Release Verification Training Requirements

### 3. Process Design & Development

### 4. Product & Process Validation

### 5. Ongoing Production, use and Post Delivery Service

---

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

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## AS13100 Structure

<table>
<thead>
<tr>
<th>AS13100 Requirements</th>
<th>Chapter A 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</td>
<td>1 2 3 4 5 6</td>
<td>D FMEA / Product KCs / Process Flow Diagram / PFMEA / Process KCs / Control Plan / MSA / Process Capability</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

Designed to Include Customer Specific 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
• Defines company specific key roles and accountabilities for approvals
• Includes specific IT interface requirements
# AS13100 Requirement Highlights

## Organization Types

1. **Type 1: Make to Print**
2. **Type 2A: Design and Manufacture**
3. **Type 2B: Design Only**
4. **Type 3: Distributor**
5. **Type 4: Special Process**
6. **Type 5: Raw Material**

### Table 1

<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>
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</tbody>
</table>

Table 1 provides a guide to the applicability of AS13100 Sections to Organization scope.
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 Guidance Material will be made available to support the deployment of AS13100.

Also integrates draft standards on Audit (AS13005) and Sub-tier Management (AS13007)

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)

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)

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

Organizations are required to comply with the customer’s Supplier Code of Conduct and implement their own (Section 5.1.2.1).
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 (8.4.2.2)

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

The organization shall verify that the correct metallic raw material is used e.g. through the use of hand held spectrometry. (Section 8.5.1.1)

Specifies the use of AS5553 Counterfeit Electrical, Electronic and Electromechanical Parts and AS6174 for Counterfeit Material (Section 8.1.4.1 & 8.4.2.3)

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 Guidance Document GD13000. (Section 10.2.3)
AS9145 APQP & PPAP required to manage;
- New Product Introduction
- Product & Design Changes
- Source Changes
- Major Quality Issues

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 Core Writing Team: Thank you for sticking with it, every Wednesday, for two & a half years, even during the pandemic, to get it published.
Thank you to the 99 Subject Matter Experts who created the Reference Manuals

Aaron Stahl
Adam Rogers
Ake Winkvist
Andrew Stout
Anil Oenuer
Barrie Hicklin
Benoit Gottie
Björkälv Håkan
Brian Murphy
Carrie Sharkey
Catherine Belgacem
Catherine Catarina-Graca
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Melanie Renault
Michael Cera
Michael Cosenza
Michael Fuehner
Michael Gerhmann
Michael Stock
Mike Cosenza
Nathalie Noblet
Nick Watling
Nicolas Reignier
Olivier Castets
Patrice Richen
Paul Gorg
Paul Hacker
Perr Rendell
Pete Bilbie
Pete Teti
Peter Papadopoulos
Phil Bamforth
Rebecca Lemon
Ricardo Banuelas
Rich DeMary
Richard Baker
Richard Bolingbrook
Rob Farndon
Robert Starcke
Roger Persson
Rudi Braunrieder
Simon Gough-Rundle
Song Gao
Stefan Gehring
Stefan Lund
Steve Christensen
Steven Finup
Susie Neal
Sverker Johnson

Thomas Herter
Thomas Schmitt
Tobias Kranz
Todd Angus
Tony Pailing
Vince Miller
Ward Baun
Wilibald Schoder
Wolfgang Wagner
Yvonne Mansson
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.
AERO ENGINE SUPPLIER QUALITY GROUP (AESQ) OVERVIEW

DEPLOYMENT & TRANSITION TO AS13100

EARL CAPOZZI
DISCIPLINE CHIEF; QUALITY & PROCESS
ENGINEERING / SUPPLIER QUALITY
PRATT WHITNEY
TRANSITION TO AS13100 FROM AS130XX

AS9145 – Requirements for Advanced Product Quality Planning and Production Part Approval Process. 2016 - November

AS13000 – Problem Solving Requirements for Suppliers - 8D 2014 - May

AS13001 – Delegated Product Release Verification Training Requirements 2015- February

AS13002 – Inspection Frequency Plans 2015 - March

AS13003 – Measurement Systems Analysis 2015 - February

AS13004 – PFMEA & Control Plans 2017 - August

AS13006 – Process Control Methods 2018 – September
TRANSITION TO AS13100 FROM AS130XX

With the adoption of AS13100 we:
- Reduced set of requirements from 174 pages to 102 pages a 49% reduction in pages
- “Shalls” reduced more than 23%
- With the addition of:
  ✓ Human Factors
  ✓ Sub-tier Management
  ✓ Internal Audit and Auditor Competencies
  ✓ Design and Development
- AS13100 leverages the AESQ developed Reference Manuals (RM13xxx) as guidance on how to comply to requirements stated in AS13100. 603 pages of free guidance.
AS13100 Creation Process

Starting Point
September 2018

Existing Engine Maker Supplier Requirements

Future Engine Maker Supplier Requirements

Existing & WIP AESQ Standards

Supporting Guidance & Best Practice Material

OEM Unique Requirements

AS13100 Standard

AESQ – Aerospace Engine Supplier Quality Strategy Group
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Major Changes within AS13100

Five new key areas within AS13100 to focus Producers

AS13100 leverages the AESQ developed Reference Manuals (RM13xxx) as guidance on how to comply to requirements stated in AS13100.

P&W to utilize reference document when educating supply base

- RM13000 Problem Solving Methods (8D)
- RM13002 Alternate Inspection Frequency Plans
- RM13003 Measurement System Analysis
- RM13004 Defect Prevention Quality Tools
- RM13005 Quality Audit Methods
- RM13006 Process Control Methods
- RM13007 Sub Tier Management
- RM13008 Design Work
- RM13009 Compliance Assessment (with Form) -- GAP ASSESSMENT
- RM13010 Human Factors
- RM13011 Rework and Production Repair of Non-Conforming Products
- RM13102 First Article Inspection
- RM13145 Advanced Product Quality Planning (APQP) and Production Part Approval Process (PPAP)

Updates likely required to your QMS
AS13100
DEPLOYMENT INTRODUCTION & MILESTONES

ELIZABETH PACE
ASSOCIATE DIRECTOR, SUPPLIER QUALITY
RAYTHEON TECHNOLOGIES

JIM WILSON
SENIOR MANAGER, SUPPLIER QUALITY ASSURANCE AND DEVELOPMENT
PRATT WHITNEY
Where are we?

- **March 2021**: AS13100 Publication
- **October 2021**: Deployment Started
- **April 2022**: Deployment Ongoing
- **Target: December 31, 2022**: Transition Complete
AESQ Deployment Team Milestone Plan

Key milestones to achieve compliance to AS13100 by 12/31/2022

- AS13100 Publication
  - 1

- SAE Press Release
  - 2

- Reference Manuals published
  - 3

- Virtual Supplier Forum 4/21/21
  - 4

- Amend AS9100 Compliance Matrix with AS13100 supplementary requirements
  - 5

- Perform Gap Analysis to AS13100 supplementary requirements Rm13009
  - 6

- Virtual Supplier Forum 10/6/21
  - 7

- Supplier now subject to AS9100/AS13100 audit

- 3 MONTHS LEFT

- Update QMS requirements
- Train employees in New Requirements
- Conduct internal AS13100 Pre-Audit
- Close Gaps with Corrective actions
- Supplier Pulse

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Committed to AS13100 compliance on December 31, 2022

All OEMs have released supplier quality requirements invoking AS13100
Compliance Expectations

What can I expect on January 1st, 2023 when AS13100 becomes contractual?

• AESQ members will be checking compliance with their own suppliers individually
• All suppliers will need to be able to demonstrate compliance to AS13100
  – Best method to do that is to complete the RM13009 Self-Assessment and provide a copy to AESQ customers that request it along with any gaps that were identified and the plan/timetable to close those gaps.
  – Producing an Annual Audit Report outlined in AS13100 Section 9.2.5 and described in RM13005 covering 2022 audits, while not technically required, would also be a good way to demonstrate to all AESQ customers that internal and sub-tier audits are under control
• AESQ members may request to see each supplier’s 2023 internal and supplier audit plans meeting the requirements of AS13100
• AESQ members may begin to audit to the requirements of AS13100 in order to confirm compliance with high-risk suppliers
The AS13100 Quality audits team is also working on an improved AS13100 Self-Assessment checklist and hopes to have it published by end of October.

**Goals include:**

- Include guidance, where applicable, both to describe objective evidence needed or to guide Auditors in interpreting the section’s “shall” consistently across different Auditors/AESQ members
- Include references to RM documents for more information
- Include an indicator that an AESQ member has additional requirements to each question in their own documents
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
- Basic AS13100 familiarity

April 2022: Follow up survey targeted to better understand the aero-engine supply base’s AS13100 implementation status

- 13 questions, both objective and open-ended
- 482 respondents to date
- 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
- Develop plans based off the feedback and help suppliers are asking for
- 255 respondents to date
Survey Evolution

AS13100 Familiarity

- 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

Survey results for different months:
- Sep 2021
- Apr 2022
- Sep 2022
Survey Evolution

Implementation Status Evolution

- 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
Who Responded?

Respondent's Customers

Respondents had an average of 3.75 AESQ customers

Number of Respondents

<table>
<thead>
<tr>
<th>Company</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE Aviation</td>
<td>180</td>
</tr>
<tr>
<td>Rolls-Royce</td>
<td>160</td>
</tr>
<tr>
<td>Pratt &amp; Whitney</td>
<td>140</td>
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<tr>
<td>Safran</td>
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<tr>
<td>MTU Aero Engines</td>
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<td>Honeywell</td>
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<td>GKN Aerospace</td>
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<td>IHI</td>
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<tr>
<td>Howmet Aerospace</td>
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<tr>
<td>PCC Structural</td>
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</table>

Respondent's Customers

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<tr>
<td>IHI</td>
<td>40</td>
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<tr>
<td>Howmet Aerospace</td>
<td>20</td>
</tr>
<tr>
<td>PCC Structural</td>
<td>10</td>
</tr>
</tbody>
</table>
Resources are available for implementation concerns

Implementation Concerns

- APQP
- Human Factors
- AS13100 Training
- Sub-Tier Management
- Control Plans
- Process Control
- Design FMEA
- Inspection
Smaller businesses are asking for help in implementation

AESQ can help:
- Member companies will partner with their suppliers to close gaps
- Communities of Practice on LinkedIn are available
- Best Practice Examples from three suppliers today
Training requirements and how the AESQ can help

Intent:
• Company needs to understand the requirements of the standard for deployment

Expectations:
• People shall complete the 3 Day Foundations training. If not trained by year end, the Foundations training will need to be in the closure plan.

How can the AESQ help?
• More Live training sessions (Oct)?
• Options to certify a companies training?
• Auditor training class from AESQ?
• Do we want a COP of deployment to smaller co.?
In response to your feedback....

In today’s event you will see:

• Training overviews and opportunities
• How to get involved in AESQ
• FAQs and places to ask questions (highlights of the Communities of Practice on LinkedIn)
• Best practice examples from three partner suppliers
APQP AND PPAP

ADVANCE PRODUCT QUALITY PLANNING
PRODUCTION PART APPROVAL PROCESS

RICARDO BANUELAS
HEAD OF CONTINUOUS IMPROVEMENT
ROLLS-ROYCE
AS13100 APQP and PPAP

Requirements are achievable through alignment of best practices.

- AS9145 Published (2016)
- AS13100 Published (2021)

AS9145

- AS13100 APQP
- AS13100 APQP & PPAP

Best Practice

AS13100 APQP & PPAP

RM13145

AS13100 / RM13145 APQP & PPAP

AESQ – Aerospace Engine Supplier Quality Strategy Group

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Why APQP & PPAP for Aerospace?

The primary objective is to improve quality and reduce cost. Higher quality is synonymous with increased product safety.

Cost of Quality through Product Life Cycle

- DEVELOPING PRODUCT & /OR PROCESSES WHEN IN PRODUCTION IS COSTLY –
  - Redesign
  - Re-qualifications
  - Escape Investigations

The primary objective is to improve quality and reduce cost. Higher quality is synonymous with increased product safety.

- Proactive tools focus cross-functional teams on risk identification & mitigation early in the process.
- Products reach faster maturity with fewer engineering changes and defects in the early stages of production & product use.
- Provides a foundation for successful ongoing change management – design and/or manufacturing change, Works Transfers
View APQP as a Flight

OUR FLIGHT PATH FOR MANAGING PRODUCT AND / OR PROCESS CHANGE

Product Development Process (PDP)
- Kick Off
- End of Concept (PDR)
- Design Release (CDR)
- Initial Production Approval
- Production Launch

Phases of Advanced Product Quality Planning (APQP)
1. Planning
2. Product Design and Development
3. Process Design and Development
4. Product and Process Validation
5. On-going Production, Use and Post-delivery Service

AESQ Production Part Approval Process (PPAP) Events
- CR
- FA
- PPP
- PRR
- FAI
- PA
- Production Process Run

Product Status
- Prototype/test product
- Production trial products
- Production products
The APQP Flight Path

OUR FLIGHT PATH FOR MANAGING PRODUCT AND / OR PROCESS CHANGE

APQP & PPAP Events
Our flight path checks....

Planning deliverables
Get off the ground...

APQP & PPAP Elements
Specifics we do on the journey...

Design
Develop
Validate
Leadership Test

**Topic** | **Question**
---|---
Referring to Planning deliverables (x8), APQP & PPAP Events (x12) and APQP & PPAP Elements (x27). | Are each and everyone required to be used every time? (NPI, Works transfer, manufacturing changes)

Referring to APQP design, development and validation activities for product & processes. | Should these soley be delivered by one function within your business?

Referring to the use of APQP & PPAP Events – your flight path checks. | Should these be an integrating part of your organisations Project Management & Review structures?

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

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J&L MACHINE COMPANY
AS13100 IMPLEMENTATION STRATEGY

SEAN KEANE
DIRECTOR OF ENGINEERING
J&L MACHINE COMPANY INC.
J&L Machine Company, Inc.
50 & 62 Batson Drive Manchester, CT 06042
Sean Keane
Director of Engineering
J&L Machine Co. Inc.
About Us

• J&L Machine Co. Inc. is a self-release Tier 1, Type 1 manufacturer of flight critical and major rotating parts, servicing customers in both military and commercial aviation, as well as ground power applications.
• Founded in 1979 and located in a recently expanded manufacturing facility in Manchester, CT.
• 58 Employees on 2 shifts
• 52,000 total square foot facility housed with the latest technology for precision machining and inspection.
## Capabilities

<table>
<thead>
<tr>
<th>CNC Turning Equipment – 26 Total</th>
<th>CNC Milling Equipment – 14 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 × Mori Seiki SL-8 40” swing</td>
<td>1 × CNC Bridgeport</td>
</tr>
<tr>
<td>1 × Mori Seiki SL-6 37” swing</td>
<td>1 × Mori Seiki MV-65 5 Axis</td>
</tr>
<tr>
<td>1 × Slant 7 36” swing</td>
<td>1 × Mori Seiki MV-55 4 Axis</td>
</tr>
<tr>
<td>1 × CNC Bullard</td>
<td>1 × Deckle Maho DMU 125 P 5</td>
</tr>
<tr>
<td>12 × Johnford ST 40B 31” swing</td>
<td>1 × Matsura MC-800VGII 5 Axis</td>
</tr>
<tr>
<td>4 × Johnford ST 40CX 39” swing</td>
<td>1 × Nigata HN63P 5 Axis</td>
</tr>
<tr>
<td>2 × Johnford ST 40</td>
<td>2 × DMG Mori DMU 65</td>
</tr>
<tr>
<td>1 x You Ji</td>
<td>1 x DMG Mori DMU 85</td>
</tr>
<tr>
<td>2 x DMG Mori SL-603/1000</td>
<td>1 x Mori Seiki NV-7000</td>
</tr>
<tr>
<td>2 x Mori Seiki DV-5100</td>
<td>1 x Mori Seiki MNV-5000</td>
</tr>
<tr>
<td>1 x Haas</td>
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</tr>
</tbody>
</table>
## Capabilities

<table>
<thead>
<tr>
<th>Manual Milling &amp; Turning Equipment</th>
<th>Miscellaneous and Special Process</th>
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</thead>
<tbody>
<tr>
<td>4 × Bridgeport Model 6-X005</td>
<td>2 × Micromatic 723 Hone Machine</td>
</tr>
<tr>
<td>1 × Mazak Engine Lathe 44” Swing</td>
<td>1 x Barnes Hone HV-1000</td>
</tr>
<tr>
<td>4 × Mori Seiki MH-1000G 33” Swing</td>
<td>2 × Sutton Barrel CENTRI-FLOW</td>
</tr>
<tr>
<td>1 × Mori Seiki MH-850 19” Swing</td>
<td>1 × Schenck Static Balancing Machine</td>
</tr>
<tr>
<td>5 × VTL Bullard 44” Thru 56” Swing</td>
<td>1 × JRI Part Wash Machine</td>
</tr>
<tr>
<td>1 x VTL Bullard (small)</td>
<td>1 × Zeiss Acura CMM</td>
</tr>
<tr>
<td>3 X Zeiss Contura CMM</td>
<td></td>
</tr>
<tr>
<td>1 x J &amp; L Meteorology Optical Comparator</td>
<td></td>
</tr>
<tr>
<td>3 x 2D Data Matrix Dot Peen Marking</td>
<td></td>
</tr>
<tr>
<td>6 x Trimos Setting Instruments –</td>
<td></td>
</tr>
<tr>
<td>Butterfly polish (manual and auto)</td>
<td></td>
</tr>
<tr>
<td>Assembly</td>
<td></td>
</tr>
</tbody>
</table>
AS13100

- Systematic way of controlling your process.
- J&L has used AS13100 tools for 18 years as part of our management system
  - Contract Review, identifying risk and mitigating potential issues prior to production
  - PFD, PFMEAs, and Control Plans for all KCs, PPAP, and new product.
  - GR&R for all Key Characteristics
  - Capability analysis for all Key Characteristics
  - Manage your suppliers
AS13100 Self Assessment

Self Assessment Tool Results Summary

<table>
<thead>
<tr>
<th>Organization Name:</th>
<th>J&amp;L Machine Co. Inc.</th>
<th>Date:</th>
<th>9/27/2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed By:</td>
<td>Sean Keane</td>
<td>Version:</td>
<td>N/C</td>
</tr>
</tbody>
</table>

Proportional View of Reds, Ambers and Greens

RADAR Chart View of Compliance %

Section Percent Achieved
Planning

• Contract Review – Minimize your risk
  – Engineering, Production, Quality completes the contract review.
  – Consults with machine operators
• Items of risk are discussed during all hands meetings, production meetings, management reviews, and if necessary with the customer.
• Reviewing single points of failure
• Start your PFD and PFMEA
Support

• Machine Maintenance is vital
  – Onsite maintenance
  – Contracted machine support
• 6S and climate controlled work environment
• Training – Skills Matrix
• Include people involved
  – Development of process
  – Improvements
  – Corrective actions
• MSA important to understand the capability of your gages
• Records retention and retrieval must be easily accessible
Operations

• Keep your product and your employees safe
• Keep a good relationship with your customer and have an open dialogue
• J&L uses NX, Solidworks, Mastercam for developing programs and operation sheets
• **NO VERBAL AGREEMENTS OR WORK INSTRUCTIONS**
Tools to help with 8D (Root Cause and Corrective Action) Process
• PPAP (Production Part Approval Process)
• Six Sigma
• Lean
• 6S (Sustain, Standardize...)
• VSM (Value Stream Mapping)
• TPM (Total Preventive Maintenance)
• Six Sigma, SPC (statistical process control) and Process Certification
• Capacity Analysis
Improvement

Before
Cpk 1.24

After
Cpk 1.90

NEW IN-PROCESS GAGE FOR ID
Results

SATISFIED CUSTOMER
Results

• 98% On-time deliveries for the last 6 months
• 86% Compliant per AS13100 Checklist, gaps are mostly procedure updates.
• 0 Escapes for the 12 months
• 2 QNs for the last 12 months
• 30 Full PPAP Approvals
SKF
AS13100 IMPLEMENTATION STRATEGY

BRANDEN J. WORKMAN
SENIOR QUALITY ASSURANCE NORTH AMERICA
SKF AEROSPACE
SKF solutions for airframe, helicopter, engine and gearbox applications

**Aeroengine bearings**
- Custom-engineered solutions for aircraft powerplants and transmission equipment
- Ball bearings, cylindrical, taper and spherical roller bearings and thin section bearings — from 8 mm i.d to 800 mm o.d.
- Thin section bearings from 19 mm to 1 016 mm o.d.
- Hybrid bearings (ceramic rolling elements), integrated bearing assemblies
- Specialty balls — steel and ceramic

**Elastomeric solutions**
- Bearings, isolators and dampers
- Main and tail rotor bearings, driveline gimbals, gearbox isolators and more

**Airframe bearings**
- Custom-engineered solutions for "Integrated bearings"
- Wide range of solutions for airframe bearings such as plain, ball and roller bearings

**Sealing solutions**
- Main-shaft bearing compartment seals including carbon face seals and carbon circumferential seals
- Metallic and non-metallic sealing rings, bearing damper rings
- Radial lip shaft seals: gearbox, transmission, engine, oil and grease seals
- Aerospace gaskets and boots
- Linear motion/fluid power seals

**Airframe units**
- Wide range of airframe units based on composite technology and bearing integrated solutions
- Integrated and concurrently engineered solutions of bearings and composite solutions

**Airframe composite rods**
- Composite rods for structural and motion control applications
AS13100 Implementation Strategy - General

SKF Aerospace is comprised of six North American and three European sites that support the AESQ community.

The nine sites manufacture five distinctly different product types; each site / product line has its own unique challenges to implement.

Similar to any project of this size developing a robust plan is paramount.

Our approach was to perform the gap analysis at the ‘corporate level’ first; and each individual site level second.

RM13009 self assessment tool was the roadmap used for this plan development.

The RM13009 self assessment is a starting point; modify, or adjust, the template as needed to suite your business.
AS13100 Implementation Strategy – RM13009

What worked for SKF was to:

- Add a row for each specific requirement; not just the high-level clause
- Add a row for each specific customer specific requirement (SABRe4, ASQR-01, etc)
- Add columns for who owns each specific review step, what document(s) contain or will contain the requirement, and determining if each specific clause will be incorporated as part of the entire QMS or just AESQ applicability

<table>
<thead>
<tr>
<th>Clause</th>
<th>Clause Title</th>
<th>Organization Process Reference (or comment)</th>
<th>Compliance Status</th>
<th>Currently in Aero Qd (Y/N/NA)</th>
<th>Incorporate into Aero Qd or supplement (Standard/Supplement/NA)</th>
<th>Comments</th>
<th>Review Assigned To</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3.1</td>
<td>Organizational Roles, Responsibilities and Authorities - Supplemental \ Requirements</td>
<td>G0100</td>
<td>N/A</td>
<td>A</td>
<td>Standard</td>
<td>G0100 to be updated to clearly mention the reqmts</td>
<td>Edmond</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Personnel responsible for conformity to product requirements shall have the authority to stop and correct quality problems.</td>
<td>G0100</td>
<td>A</td>
<td>Y</td>
<td>Standard</td>
<td>§ 4.1 covers this requirement</td>
<td>Edmond</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Where the process design prevents immediate shutdown upon detection of a quality problem, then the product or service shall be contained so that it is prevented from being delivered to the customer.</td>
<td>P0446</td>
<td>G</td>
<td>N</td>
<td>Standard</td>
<td></td>
<td>Edmond</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Where production is run across different shifts there shall be personnel identified that are accountable for ensuring conformity to product requirements.</td>
<td>G0100</td>
<td>A</td>
<td>Y</td>
<td>Standard</td>
<td>G0100 to be updated to clearly mention the reqmts</td>
<td>Edmond</td>
</tr>
</tbody>
</table>
AS13100 Implementation Strategy – Step 1

For SKF Aerospace Chapter A [AS13100 + specific customer requirements] has 428 applicable requirements

The first hurdle is getting past the ‘sticker shock’

A thorough review revealed many of the requirements were already fully, or partially, built into our QMS

The number of gaps identified was alarming, but what was more concerning was the magnitude of some of the gaps
AS13100 Implementation Strategy – Step 2

The second hurdle is developing the plan to address the large magnitude gaps; with initial focus on the gaps outside of Quality’s historical influence, or control (i.e., Top Management, Supply Chain, Design, Human Resources)

Quality Assurance was responsible to ensure each area understood what exactly their required improvements were

Next, each responsible area had to create their action plan to comply; Quality Assurance had to assist with this plan development

Not every requirement is created equal – prioritization is critical – each plan has to consider effort to achieve compliance versus the value

At this point, a complete Compliance Plan can be created
AS13100 Implementation Strategy – Step 3

To *accelerate the change* focus started on the low effort – high value improvements

These improvements typically involved standardization amongst the different sites or departments – eliminating redundancy [ex. standardizing human factor incorporation, defining audit types and applicable template, and utilizing applicable Reference Manual forms]

https://aesq.sae-itc.com/supplemental-material

<table>
<thead>
<tr>
<th>Reference Manual</th>
<th>Associated Forms</th>
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<tbody>
<tr>
<td>RM13000</td>
<td>Problem Solving Methods Including 8D</td>
</tr>
<tr>
<td></td>
<td>• 8D Interactive Tool (PowerPoint)</td>
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<td></td>
<td>• 8D Reporting Template (PowerPoint)</td>
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<td>• 8D Word Form (Word)</td>
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<td>• 8D Template (Excel)</td>
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<tr>
<td></td>
<td>• 8D Template (PowerPoint)</td>
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<td>RM13002</td>
<td>Alternate Inspection Frequency Plans</td>
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<td>• Alternate Inspection Frequency Plan Worksheet (Excel)</td>
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<td>RM13003</td>
<td>Measurement Systems Analysis</td>
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<tr>
<td>RM13004</td>
<td>Defect Prevention Quality Tools</td>
</tr>
<tr>
<td></td>
<td>• RM13004 Template and Examples (Excel)</td>
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<td>• DFMEA Template (Excel)</td>
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<tr>
<td>RM13005</td>
<td>Quality Audit Methods</td>
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<tr>
<td></td>
<td>• Appendix B Risk Assessment (Excel)</td>
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<tr>
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<td>• Appendix C Quality System Audit (Word)</td>
</tr>
<tr>
<td></td>
<td>• Appendix D Production Process Audit (Excel)</td>
</tr>
<tr>
<td></td>
<td>• Appendix E Management Review (PowerPoint)</td>
</tr>
<tr>
<td></td>
<td>• Appendix F Annual Audit Report (Excel)</td>
</tr>
<tr>
<td>RM13006</td>
<td>Process Control Methods</td>
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<tr>
<td></td>
<td>• Appendix A Assessment Checklist (Excel)</td>
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<td>• Appendix B Process Capability Plan (Excel)</td>
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<td>• Appendix C Training Syllabus (Word)</td>
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<tr>
<td>RM13007</td>
<td>Sub Tier Management</td>
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<td>RM13008</td>
<td>Design Work</td>
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<td>RM13009</td>
<td>Compliance Assessment</td>
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<tr>
<td></td>
<td>• Compliance Assessment Workbook (Excel)</td>
</tr>
<tr>
<td>RM13010</td>
<td>Human Factors</td>
</tr>
<tr>
<td></td>
<td>• Appendix 2 Investigation Human Factor Checklist (pdf)</td>
</tr>
</tbody>
</table>
AS13100 Implementation Strategy – Step 4

High effort – high value improvements are what will drive the Zero Defect approach – proactive tools such as MSA, Cpk, FMEAs all support this effort.

Focus on part number specific actions, for the proactive tools, versus part family will greatly impact resources, but should hopefully provide long term value.

These activities must be viewed as a marathon and not a sprint.
AS13100 Implementation Strategy – Struggles

Implementation effort has encountered many struggles along the way

• Supply Chain understanding / acceptance

• Attempts to justify implementation cost versus return on investment

• Need to develop different solution for the same requirement across different sites / different product lines

• Intermittent demand and low quantity part numbers
AS13100 Implementation Strategy

You are not alone!

No one individual, no one site, no one company has the perfect approach

Continue to review the AESQ Supplier Forum materials, attend your Prime customer’s periodic webinars, contact your colleagues within the industry, etc.

Collaboration is key
PARKER MEGGITT
AS13100 IMPLEMENTATION STRATEGY

STEVE McMULKIN
HEAD OF MANUFACTURING QUALITY
PARKER MEGGITT
AS13100 Deployment Strategy

AS13100 – Parker Meggitt Group implementation

ENGINEERING YOUR SUCCESS.
Agenda

- Parker - Meggitt site coverage
- Timeline
- Milestone Status by Site
- Cumulative performance
- % Compliance by sites
- Combined compliance
- Key Risks / Gaps
- Training
- Summary
- Next steps
## Parker - Meggitt Sites

<table>
<thead>
<tr>
<th>Site</th>
<th>Quality Rep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ansty Park</td>
<td>Pepe Elsworth</td>
</tr>
<tr>
<td>Cincinatti</td>
<td>Jim Morano</td>
</tr>
<tr>
<td>Erlanger</td>
<td>Eric Carter</td>
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<tr>
<td>Fareham</td>
<td>Tom Williams</td>
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<tr>
<td>Fribourg</td>
<td>Stéphane Marchetti</td>
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<tr>
<td>Loughborough</td>
<td>Les Elphee</td>
</tr>
<tr>
<td>Irvine</td>
<td>Cynthia Melchior</td>
</tr>
<tr>
<td>North Hollywood</td>
<td>Ramon Williams</td>
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<tr>
<td>Oregon</td>
<td>Jeff Bryson</td>
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<tr>
<td>Portland</td>
<td>Justin Hackett</td>
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<tr>
<td>Saltillo</td>
<td>Daniel Mendoza</td>
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<tr>
<td>San Diego E&amp;E</td>
<td>Chris Harris</td>
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<tr>
<td>San Diego ES</td>
<td>Emmanuel DeBrand</td>
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<tr>
<td>Simi Valley</td>
<td>Greg Lewin</td>
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<tr>
<td>Troy</td>
<td>Sandy Hendrickson</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Thao Nguyen</td>
</tr>
<tr>
<td>Xiaman</td>
<td>Amanda Wang</td>
</tr>
</tbody>
</table>
Milestone Status By Site

AS13100 Site Status

- 6-Sept - Gap Closure
- 5-May - Gap Analysis Review
- 4-Apr - Gap Analysis
- 3-Mar - AS13100 Training
- 2-Feb - SLC Training Overview
- 1-Jan - AS13100 Site Review
Cumulative Performance

- All sites are at 61% to the milestones, should be at 66%
- 2 sites currently have not submitted their gap analysis bringing the % down
- Documents recently released at the Group level are driving training and communication and will close quite a few gaps
% Compliance by Site submissions (RM13009)
Combined AS13100 compliance

Overall Compliance All Sites
## Key Risks/Gaps

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2.1.1</td>
<td>Establishing the QP - Human Factors</td>
<td>Release of MQA-33 Human Factors</td>
</tr>
<tr>
<td>7.1.5.1.1</td>
<td>MSA</td>
<td>MSA not currently being performed on quite a few sites, retrain on material</td>
</tr>
<tr>
<td>7.1.5.1.2</td>
<td>Conduct MSA</td>
<td></td>
</tr>
<tr>
<td>7.1.5.1.3</td>
<td>Confirm Acceptance of MSA</td>
<td></td>
</tr>
<tr>
<td>7.1.5.1.4</td>
<td>Agree Improvement Actions -MSA</td>
<td></td>
</tr>
<tr>
<td>7.2.4</td>
<td>AESQ Quality Foundation Training</td>
<td>Parker Meggitt 3 - Day Foundations Course Being Launched</td>
</tr>
<tr>
<td>7.3.1</td>
<td>Human Factors Awareness</td>
<td>MTR-31 Human Factors Training Underway</td>
</tr>
<tr>
<td>7.5.3.4</td>
<td>Damage to Records - Inform Customer</td>
<td>MQA-20 Updated</td>
</tr>
<tr>
<td>8.5.1.2.1</td>
<td>Validation and Control of Special processes - Supplemental Requirements</td>
<td>Sampling of NDT - MQA-31 Inspection Under Revision</td>
</tr>
<tr>
<td>9.2.5</td>
<td>Annual Audit Report</td>
<td>Being Conducted Monthly - Sites Need Rolled up Performance</td>
</tr>
<tr>
<td>9.3.2.1</td>
<td>Management Review Inputs - Supplemental Requirements</td>
<td>Human Factors To Be Considered - no current metric</td>
</tr>
<tr>
<td>19.1</td>
<td>Pre-Launch Control Plan</td>
<td>To Be Instituted On Next New Project/Design</td>
</tr>
</tbody>
</table>
Training

• Level one – SAE Executive overview, completed by all applicable sites

• Level two – SAE AS13100 requirements course (10 hours approx.), completed by all applicable sites

• Level three – SAE 3 day Quality foundations course, Completed by Group Head of Manufacturing Quality
  
  • Parker Meggitt will deliver equivalent 3 day quality foundations course for applicable sites (Pilot course TBC for end of Nov 2022 @ Ansty Park)

• Parker Meggitt has its own Learning academy and all required training is available. Approx. 800 Meggitt engineering professionals have been trained this year in all 14 foundation course modules
Parker- Meggitt AS13100 Summary

- Monthly site leadership review ongoing
- Monthly Group review with sites is ongoing
- GE - AS13100 Quarterly reviews
- Milestone Tracker – reported monthly
- Gap closure is aided by GBMS updates
Next steps

• Group Quality to Continue to work with sites to mitigate risks & close Gaps

• Complete Gap assessment audits

• Deliver pilot AESQ equivalent 3 day foundations course to all applicable sites

• Share best practices /lessons learned with all applicable sites
TRAINING OVERVIEW

EARL CAPOZZI
ASSOCIATE DIRECTOR, DISCIPLINE CHIEF
QUALITY & PROCESS ENGINEERING / SUPPLIER QUALITY
PRATT & WHITNEY
Executive Overview

Introducing SAE AS13100
The New Industry Standard for Quality

This exciting new standard creates a common language for quality throughout the supply chain. Watch our video series for executive perspectives from across the industry, and learn how compliance is critical to your company’s success.
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
7.2.4 AS13100 Requirements Training and AESQ Quality Foundations Training - Supplemental Requirements

The organization shall 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 Management Standards through an AESQ approved AS13100 Requirements training course. This course is also recommended for functional leaders responsible for creating or managing processes that are impacted by AS13100 Requirements.

In addition, the organization’s Quality Leaders with responsibility for supporting the design, manufacturing, and assembly operations via AS13100 shall undergo training in the AESQ Quality Foundations Training course. This course is also recommended for design engineering, manufacturing engineering and operations roles.

Equivalent training that meets the AESQ AS13100 Requirements and Quality Foundations course syllabi shall be approved by the AESQ.
<table>
<thead>
<tr>
<th><strong>Required Training</strong></th>
<th></th>
</tr>
</thead>
</table>
| **Delegated Product Release Verification (DPRV)** | DPRV personnel shall be trained and certified in accordance with **AS13001 Delegated Product Release Verification Training Requirements**  
(7.2.3) Requirement since 2015 |
| **AESQ AS13100 Quality Requirements Course** | The organization shall 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 through an **AESQ approved AS13100 Requirements** training course.  
(7.2.4) Requirement since 2021 |
| **AESQ Quality Foundations Course** | The organization’s Quality Leaders with responsibility for supporting the design, manufacturing, and assembly operations via AS13100 shall undergo training in the **AESQ Quality Foundations** Training course.  
(7.2.4) Requirement since 2022 |
Certified by Probitas Authentication™ an independent third party. They track attendees and maintain everyone's ongoing credentials and record against the requirements.

In the aerospace industry, the Delegated Release Process Verification process establishes a uniform set of requirements by which a supplier may be granted authority to ship product. This removes or minimizes source and/or receiving inspection by the delegating organization, or their third-party representatives.

Successful completion of this course satisfies the respective customer training requirement for initial self-release delegate qualification.
Five Part Video Series, 35 minutes
Executive perspectives from across the industry detailing why compliance is critical to your company's success

AS13100 Executive Overview
Launched Q3 2020
No cost

AS13100 Requirements
Launched Q2 2021
$399

AS13100 Quality Foundations
Launched Q1 2022
$1095

In-Depth Courseware

8D Problem Solving RM13000
AS9100 D Internal Auditor

Measurement System Analysis RM13004
AS9100 Standard Training

FMEA & Control RM13004
AS9100 Auditor Training

Human Factors RM13010
AS9100 Lead Auditor Training

APQP / PPAP (incl. AS9145) RM13145
Internal Auditor RM 13005

AS9100 Lead Auditor Training
Lead Auditor RM 13005
SAE AS13100 Executive Overview Videos

This exciting new standard creates a common language for quality throughout the supply chain.

Watch this free video series with executive perspectives from across the industry and how compliance is critical to your company’s success:

1. The Aerospace Industry
2. Formation of AESQ
3. The Need for AS13100
4. Overview of AS13100
5. Summary
AS13100 Webinars

On ongoing series of short videos: *Live and On Demand*

Executive perspectives from across the industry detailing how AS13100 compliance will affect these topics:

- AS13100 APQP and PPAP for Supply Chain to RM13145
- AS13100 Design FMEA to RM13004
- AS13100 What Makes a Good 8D? RM13000
- AS13100 First Article Inspection (FAI) to RM13102

No cost
AS13100 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.
Is this On Demand Course for You?

☑️ Individuals accountable for defining the organization’s processes or developing its quality management system to meet customer, regulatory, and industry requirements.

☑️ Quality Leaders and those leaders from other functional areas:

- Design
- Business
- Program Management
- Engineering
- Manufacturing
- Auditors
- Operations
- Purchasing
This course is On Demand, and includes 10 modules aligned to the AS13100 Standard:

• Introduction to AS13100 (Intro to Section 3)

• Chapter A: 9100 Quality Management System – Requirements for Aviation, Space and Defense Organizations – AESQ Supplemental Requirements

• Chapter B: AS9145 Advanced Product Quality Placement (APQP) and Production Part Approval Process (PPAP) – AESQ Supplemental Requirements

• Chapter C: Core Defect Prevention Quality Tools to Support APQP and PPAP – Supplemental Requirements
QUALITY FOUNDATIONS COURSE
OVERVIEW
**Required** for Quality Practitioners with accountability for deploying the requirements of AS13100.

**Recommended** for functional practitioners responsible for creating, managing or deploying processes that are impacted by AS13100.

*Exception* for GE Suppliers who have prior attendance in Supplier Orientation or QF204/GE Aviation Supplier Training.
SAE AS13100 Quality Foundations Course Overview

This three-day course is offered either online, or on-ground.

Key quality systems, processes and methodologies to show how they work as part of a system focused on defect prevention.

Supports quality professionals, at all levels in the organization, to understand how these tools and processes work and what are the characteristics of successful deployment.

Recommended for functions with accountability for the quality of the design, production, assembly and test areas of the organization.
SAE AS13100 Quality Foundations Course

Is this Course for You?

✅ Individuals operationalizing the organization’s processes and deploying its quality management system to meet customer, regulatory, and industry requirements.

✅ Quality practitioners and those from other functional areas:

- Design
- Business
- Program Management
- Engineering
- Manufacturing
- Auditors
- Operations
- Purchasing

The intent is, at a minimum, site quality leaders will attend training.
JIM WILSON
SENIOR MANAGER, SUPPLIER QUALITY ASSURANCE AND DEVELOPMENT
PRATT WHITNEY
AS13100 Internal and Supplier Audit Requirements

Background

- Prior to AS13100, Organizations were mostly left to their own to design and execute internal audit and supplier surveillance audit plans
  - Largely followed the AS9100 (or other certification) audit trail
  - Some incorporation and flowdown of customer-required audits
  - Basic sub-tier surveillance and varying greatly between suppliers

AS13100 Audit Types

- Four distinct internal and supplier audit types are identified in AS13100:
  - Quality System audits
  - Production Process audits
  - Product audits
  - Special Process audits
AS13100 Auditor Training Requirements

Background

• At the same time as identifying the four audit types, the AESQ has the goal of improving the quality of internal and supplier Auditor qualification and training

• Minimum Auditor qualifications were set for:
  • Initial training (table 5)
  • Overall experience (table 6)
  • Maintaining qualification (table 7)
AS13100 Auditor Training Requirements

RM13005 improvements under review

- Correcting significant grammar, punctuation, and spelling issues
- Improving the interpretation of the Lead Auditor and Internal Auditor training requirements
- Examining the expectation by the AESQ members for what activities Lead Auditors are responsible for
- Reviewing the ongoing Auditor certification requirements for Special Process Auditors (e.g. # audits per year)
- Addressing requirements for suppliers not certified to AS9100
OEM REQUIREMENTS SESSION

Larry Bennett
GE Aviation

Tracey Lockhart
Rolls-Royce

Jim Wilson
Pratt & Whitney
Canada

Denis Pottier
Safran Aircraft
Engines

Catherine Catarina
Safran Aircraft
Engines
AS13100 Customer Specific Requirements – GE Unique

Intro
- GE S-Specs – Quality Requirements – Special Processes

Section 4
- Priority parts review
- Affiliate requirements

Section 8
- Order of precedence
- Change in design – electronic application
- Source Problem Reports
- Purchased raw material – testing requirements
- Fastener supplier requirements
AS13100 Customer Specific Requirements – GE Unique

Section 8 (Continued)
- APQP – Applicability based on manufacturing complexity/risks
- Serialization – numbering
- Hardware Release – DSQR
- Electronic nonconforming material process

Section 9
- Alternate inspection – electronic application
- Product Audit requirements

Section 16
- FAI per S-1002
- PPAP – submission based on manufacturing complexity/risk

Section 17
- PPAP submission- electronic application/process
Tracey Lockhart
Head of Quality and Continuous Improvement, Defence
Rolls-Royce
AS13100 Customer-Specific Requirements; Rolls-Royce

SABRe 3; Full compliance to all previous requirements

Section 4.3 Determining the Scope of the Quality Management System

New supplier approval type and AS13100 compliance

- Acceptable Compliance by End 2022; AS13100 Self Assessment and a Plan to close the gaps to the agreed timeframe in place

Section 6 Actions to Address Risks and Opportunities

Comply with the Rolls-Royce Supplier Enhanced Cyber Security Standard

Section 8.1.3 Product Safety

Conduct training every 4 years on product safety supported by Product Safety Awareness Briefing pack developed by Rolls-Royce

Section 9.1.1.1 Monitoring and Measurement of the Manufacturing Process

Achieve the Process Minimum Standards using the Benchmarking Assessment Tool for applicable processes

- Acceptable Compliance by End 2022; Required process minimum standard agreed with RR and a plan in place to complete the assessments by end of 2023

Section 10.3 Continual Improvement

Demonstrate a commitment to zero defects by establishing the appropriate improvement plans and programmes
Jim Wilson
Sr. Manager, Supplier Quality, & Development
Pratt & Whitney Canada
AS13100 Customer-Specific Requirements – P&W

Intro

Clarification of AS13100 and the RM’s

Section 4

60 days to incorporate new requirements

Deliverable software to ASQR-07.5 (and non-deliverable in Section 8)

Multiple additions to QMS Certification Requirements Table 2

Section 7

Significant-Out-Of-Tolerance on M&TE equipment

Table 4: MSA Acceptance Limits – new Gage R&R acceptance levels

P&W DPRV program requirements

Retention period starting date

Retention on radiographs of non-serialized parts

Section 8

Critical parts per ASQR-09.1

P&W-specific forms to communicate
Section 8 (cont.)
Handheld spectrometry only on request
Operator self-verification programs needing P&W approval

Section 9
Sampling to ASQR-20.1 and alternate inspection approvals
Product and Production Process Audits included in risk analyses only

Section 10
Verification of corrective actions – 3 manufactured lots
Temporary Key Characteristics

Section 17
PPAP submission- submission, approval, deferral, and element contents

Section 18
Not applicable to P&W

Section 21
Initial Process Capacity studies requirements
SAFRAN AIRCRAFT ENGINES

Denis POTTIER
Head of the Purchasing Quality Assurance Department
Safran Aircraft Engines

Catherine CATARINA
Supplier Management System Coordinator
Safran Aircraft Engines
## Gaps Analysis AS13100 vs SAFe

<table>
<thead>
<tr>
<th>AS13100 Requirements</th>
<th>Chapter A 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</td>
<td>11 12 13 14 15 16 17 18 19</td>
<td>DFMEA Process KCA Process Flow Diag PFMEA Process Control FMEA MSA Process Capability</td>
</tr>
<tr>
<td>More SAFe</td>
<td><img src="image" alt="Checkmarks" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Common AS13100 & SAFe
- **AS13100 (20)**
- **SAFe (44)**

### Examples
- **Section 7.2.1**
  - Requires organizations to provide On the Job Training
- **Section 7.2.(2&4)**
  - AS13100 Requirements training and AESQ Quality Foundations Training
- **Section 8.5.1.1.1**
  - Control of Equipment, Tools, and Software - Supplemental Requirements

### SAFe vs AS13100
- **Covered**: 84%
- **Not Covered**: 16%
More SAFe versus AS13100: Some examples

Chap. 5 Corporate Social Responsibility

Chap. 7 Regulatory watch process

Chap. 8 Obsolescence

Chap. 10 Scrap rate
ZERO DEFECTS JOURNEY

Barrie Hicklin
SR. DIRECTOR, QUALITY SYSTEMS &
REGULATORY COMPLIANCE
HONEYWELL AEROSPACE
Does your company formally recognize Zero Defects as a goal?
How would you assess your capability to assess a programme of Zero Defects?

ⓘ Start presenting to display the poll results on this slide.
What do you see as your greatest barrier?
What would help you most?
AESQ

HOW TO GET INVOLVED

HELEN DJAKNEGREN
DIRECTOR SUPPLIER QUALITY & DEVELOPMENT
GKN AEROSPACE
“Get Involved” with AESQ

- Go to AESQ Homepage
  https://aesq.sae-itc.com/

- Click “Get Involved”
“Get Involved” Options

1. Sign up to receive AESQ eNewsletter
2. Become an AESQ Member
3. Join the SAE G-22 Committee
4. Join a Community of Practice on LinkedIn

Click on the appropriate link for additional information
"Get Involved" – Join a Community of Practice

LinkedIn Groups for each Community of Practice is now open for anyone to join.
“Get Involved” – Sign up to Receive AESQ’s eNewsletter

- Issued monthly
- Learn about AESQ’s current activities
- Complete online form to begin receiving

AESQ – Aerospace Engine Supplier Quality Strategy Group

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"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.
• Required to participate in the work of AESQ by providing resources to support AESQ working groups.
• 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” – Subject Matter Interest Groups

- Follow AESQ’s Subject Matter Interest Groups
- Sign up for a Subject Matter Interest Group Webinar
AESQ Posters

• Download to Print
  – 11” x 17”
  – 36” x 24”
  – 108” x 72”
“Get Involved” – Additional Options

• Attend AESQ Events (Supplier Forums, Webinar) or Watch Video Online

• Take a AS13100 Training Course

• Download Reference Manuals

• Watch the “Zero Defects” Video
SUMMARY & CLOSE

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