AS13100 Deployment Virtual Supplier Forum 28 April 2022
Registration Overview

290+ Individuals Registered from 25 Countries
Webinar Overview

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

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

**Please remain on Mute** during the presentation to prevent background noise. We will also be muting all lines at the start of the session.
How to Contribute

Please answer the **Survey Questions** when asked (they are anonymous).

Use the **Chat Function** to ask a question at any time, or to make a comment.

Becky Lemon  
Industry Program Manager  
SAE ITC

Jim Wilson  
Sr Manager, Supplier Quality & Development  
Pratt & Whitney Canada

**#VOTE**
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
Introducing AS13100: AESQ Quality Management Requirements

SAE AS13100 AESQ QUALITY MANAGEMENT SYSTEM REQUIREMENTS FOR AERIAL ENGINE DESIGN AND PRODUCTION ORGANIZATIONS

This standard sets out to create a common set of supplemental requirements with common training and reference manuals to improve understanding, efficiency, and performance. While significantly simplifying the business of suppliers with multiple customers, the primary goal of this new standard is to improve overall product quality by focusing on the key systems and processes that impact customer satisfaction.

These common supplemental requirements aim to raise the bar for expected performance in these key areas, and therefore deliver products that are expected to be customer-focused. Organizations that adopt AS13100 can enhance their supply chain and improve their products, thereby reducing variability and improving performance. For more information, please visit: www.sae.org/standards/content/AS13100/

AESQ Supplier Forum 2022: Focus on AS13100 Deployment

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## Agenda

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>AESQ Overview, Vision &amp; Objectives</td>
<td>Emmanuel Vivier, VP Manufacturing &amp; Supply Chain Deputy, Safran Aircraft Engines</td>
</tr>
<tr>
<td>AS13100 Standard Overview</td>
<td>Earl Capozzi, Associate Director, Discipline Chief Quality &amp; Process Engineering, Pratt &amp; Whitney</td>
</tr>
<tr>
<td>Deployment Introduction &amp; Milestones</td>
<td>Elizabeth Pace, Supplier Quality Strategy, Associate Director, Raytheon Technologies</td>
</tr>
<tr>
<td>Deployment Plans:</td>
<td></td>
</tr>
<tr>
<td>• IHI</td>
<td>Hiroshi Yamamoto, General Manager, Quality System Dept., IHI</td>
</tr>
<tr>
<td>• MTU</td>
<td>Michael Mrosewski, Quality Management Programs, MTU</td>
</tr>
<tr>
<td>• Safran</td>
<td>Catherine Catarina-Graca, Supplier Management System Coordinator, Safran Aircraft Engines</td>
</tr>
<tr>
<td>• Pratt &amp; Whitney</td>
<td>Greg Hyatt, Supplier Metallurgical Control Specialist – Japan, Engineering / Supplier Quality, Pratt &amp; Whitney</td>
</tr>
<tr>
<td>Deployment Dashboard</td>
<td>Elizabeth Pace, Supplier Quality Strategy, Associate Director, Raytheon Technologies</td>
</tr>
<tr>
<td>BREAK – 15 Minutes</td>
<td></td>
</tr>
<tr>
<td>BREAK – 15 Minutes</td>
<td></td>
</tr>
</tbody>
</table>
# Agenda

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Deployment Survey Results</td>
<td>Jim Wilson, Sr. Manager, Supplier Quality, &amp; Development, Pratt &amp; Whitney Canada &amp; Elizabeth Pace, Associate Director, Supplier Quality, Raytheon Technologies</td>
</tr>
<tr>
<td>Focus on APQP Deployment</td>
<td>Karl Evans, APQP Technical Project Manager, Rolls-Royce</td>
</tr>
<tr>
<td>Approach and Advancement Towards AS13100</td>
<td>Mani Rathinam Rajamani, Deputy Manager, Quality Engineering, Tata Advanced Systems Ltd.</td>
</tr>
<tr>
<td>AESQ How to Get Involved</td>
<td>Jun Sakai, Chief Engineer, IHI Corporation</td>
</tr>
<tr>
<td>Questions</td>
<td>Jim Wilson, Sr. Manager, Supplier Quality, &amp; Development, Pratt &amp; Whitney</td>
</tr>
<tr>
<td>Summary &amp; Close</td>
<td>Uzam Khan, Supplier Quality Executive, Rolls-Royce</td>
</tr>
</tbody>
</table>
Use the Chat Function to Ask a Question.

... or just make a comment
POLL QUESTION #1:

What city are your calling in from today?
AERO ENGINE SUPPLIER QUALITY GROUP (AESQ)
OVERVIEW

EMMANUEL VIVIER
VP MANUFACTURING & SUPPLY CHAIN DEPUTY
SAFRAN AIRCRAFT ENGINES
Aero Engine Industry Burning Platform

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

Used the Automotive example of QS-9000 with Ford, GM and Chrysler as the model

- Airline passengers set to double in size over the next 20 years
- Customers expect Zero Defects
- 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 Quality, Cost and Delivery remains a key challenge
Defect Prevention Tools Must Work as a System
Aero Engine Supplier Quality Group Principles

- Aero Engine Manufacturers created a Collaboration working group to address burning platform in 2013 with key Global Suppliers
- Used the Automotive example of QS-9000 with Ford, GM and Chrysler as the model
- Purpose is to:
  - 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
  - Promote the use of standardized 3rd party training
  - Deliver results with pace
  - Focus on effective deployment and improving the capability of the shared supply chains
AESQ Strategy Group Members

AESQ Members
Cincinnati Thermal Spray
Consolidated Precision Products
Meggitt PLC
Solar Atmospheres
AESQ Strategy Group Members

Barbara Negroe
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

Emmanuel Vivier
VP Manufacturing & Supply Chain Deputy
Safran Aircraft Engines

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

Jun Sakai
Chief Engineer
IHI Corporation

Thomas Frank
Senior VP Corporate Quality
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

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AESQ 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.
Aero Industry Requirements Flowdown 2012

Regulator Requirements

Customer Requirements

Industry Requirements

NADCAP

IAQG (AS9100, AS9145, AS9102, etc.)

ISO (ISO9001, ISO19011, etc.)

AER0 Engine Manufacturers

Rolls-Royce
SABRe

GE
S-1000

P&W
ASQR-01

Safran
SAFe

Aero Engine Supply Chain
Product Life Cycle & Current AESQ Document Interaction

AS9145 (PDP) – Kick Off | AS9145 End of Concept (PDR) | AS9145 Design Release (CDR) | AS9145 Initial Prod. Approval | AS9145 Production Launch

1. Planning

2. Product Design & Development
- AS9145 Key PPAP Events
  - Design Records & DRA
  - Process Flow Diagram
  - PFMEA
  - Control Plan
  - Packaging, Preservation & Labelling
  - MSA
  - ICS
  - FAI

3. Process Design & Development

4. Product & Process Validation
- AS9145 APQP Phases
- AS9102 FAIR
- Production Process Run
- PPAP Approval

5. Ongoing Production, use and Post Delivery Service

AESQ 2nd Level Documents
- AS13004 – PFMEA & Control Plans
- AS13003 – Measurement Systems Analysis
- AS13006 – Process Control Methods
- AS13002 – Inspection Frequency Plans

AESQ Systems Documents
- AS13000 – Problem Solving Requirements for Suppliers - 8D
- AS13001 – Delegated Product Release Verification Training Requirements
Example Best Practice Stories

Sam Suzhou make Engine Mounts
16 Part Specific FMEAs using AS13004 created in 3 months
PFMEA led to the Introduction of error proofing and prevention controls
Defect Free since September 2017

Fan Case Delivered Defect Free at PPAP after applying AS13004, AS13003 and AS13006
70 consecutive parts now delivered Defect Free
Manufactured by GKN, Newington
PPAP completed in 6 months instead of the usual 18 months

IPT Turbine Blade machining using AS13006 Real Time SPC
98% of features Cpk >2, the other 2% Cpk >1.67
Zero Defect standard met since production start (5,000 blades)
Aero Industry Requirements Future Vision

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

AESQ – Aerospace Engine Supplier Quality Strategy Group

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AS13100 Creation Process

Existing Engine Maker Supplier Requirements

Future Engine Maker Supplier Requirements

AESQ – Aerospace Engine Supplier Quality Strategy Group
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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.

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

Table 2 defines an agreed set of Certification Requirements, matched to the scope of the supplier’s activities.
RM13009
Compliance Assessment

AS13100 Requirement Highlights

Section 4.3.5 requires the organization to conduct a **Compliance Assessment** of their QMS to ensure that it captures all of the requirements of AS13100 and customer specific requirements.

The results of this review are to be provided to the individual customer and a resolution agreed.

Any compliance gaps must be highlighted to the individual customer and a resolution agreed.

Reference Manual RM13009 provides information to support this requirement.

<table>
<thead>
<tr>
<th>Clause Reference</th>
<th>Clause Title / Subject</th>
<th>Organization Process Reference (or comment)</th>
<th>Compliance Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.3.4.3</td>
<td>Design Reviews – Supplemental Planning</td>
<td>Not a Design responsible supplier</td>
<td>N/A</td>
</tr>
<tr>
<td>7.2.2</td>
<td>Auditor Competence</td>
<td>Auditor competence requirements are defined in our QMS in procedure number CP001, Row D. This procedure fully complies with the requirements of AS13100 clause 7.2.2</td>
<td>G</td>
</tr>
<tr>
<td>7.2.3</td>
<td>Delegated Product Release Verification (DPRV) / Representative Training</td>
<td>All relevant inspection personnel are trained in accordance with the requirement. It is defined in our QMS in procedure number CP009, Row B</td>
<td>G</td>
</tr>
<tr>
<td>7.2.4</td>
<td>AS13100 Requirements Training &amp; AESQ Quality Foundation Training</td>
<td>We have identified five personnel within the business that require the training. Their training plans (job profiles) have been updated to reflect this as a mandated training. Training is scheduled for July (in 3 months time)</td>
<td>A</td>
</tr>
<tr>
<td>7.3.1</td>
<td>Human Factors Awareness</td>
<td>We do not have a Human Factors program at the time. The organization's leadership team is currently reviewing our future approach to HF</td>
<td>R</td>
</tr>
</tbody>
</table>
AS13100 Requirement Highlights

AS13100 Section 8.3 includes common Requirements for Design & Development. Key Supplemental Requirements include:

- Specifies AS9145 APQP & PPAP for Managing New / Changed Product Designs
- Defines Design FMEA approach to meet Design Risk Analysis requirement
- Requires the use of Cross Functional Teams for Design & Development Activities
- Defines requirements for Design for ‘X’ (Manufacture, Assembly, Servicing, Disposal)
- Specifies the use of AS9116 to manage Design Changes

Reference Manual RM13008 Provides Guidance for Design Work
AS13100 Requirement Highlights

AS13100 Section 8.4.1, 8.4.2 and 8.4.3 define the additional requirements for Supplier Evaluation, Selection, Control and Performance Monitoring.

Engineering & Manufacturing Capability

Quality Control Capabilities

Purchasing, Planning & Capacity

Commercial, Legal & Environmental

Supplier Register Maintenance

Product Acceptance

Supplier Surveillance

Supplier Performance Monitoring

Reference Manual RM13007 Provides Guidance for Supplier Management
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 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 Häkan
Brian Murphy
Carrie Sharkey
Catherine Belgacem
Catherine Catarina-Graca
Charles Barry
Chip Svoboda
Chris Bishop
Chris Craig
Dave Goldberg
Earl Capozzi
Ed Briggs
Erika Grimm
Frederic Vetil
Grant Braun
Helen Djäknegren
Hector Mata-Collado
Helmut Weitmann
Herelio Munoz-Morales
Ian Bentley
Ian Riggs
Inger Henström
James Kelly
Jim Barge
Jim Nelson
Jim Wilson
Jonas Nickel
John Calder
Jule Hegwood
Jun Sakai
Jun Teshima
Karen Scavotto
Karl Evans
Kristin Gantz
Larry Bennett
Lars Brandner
Laura Hill
Lena Wendel Eckerbom
Lise Brox
Ludovic Chevet
Marc Boursicot
Marie Partridge
Marnie Ham
Mattias Eriksson
Maura Callahan
Melanie Deroo
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.
AS13100
DEPLOYMENT INTRODUCTION & MILESTONES

ELIZABETH PACE
ASSOCIATE DIRECTOR, SUPPLIER QUALITY
RAYTHEON TECHNOLOGIES
AESQ Released AS13100

A standard establishing supplemental requirements for 9100 and 9145 and applying to any organization receiving it as part of a Purchase Order or other contractual document

Released March 1, 2021 with a compliance date of December 31, 2022

AS13100 leverages the Reference Materials (RM13xxx) developed by the SAE G-22 AESQ committee over the last few years
Benefits of collaboration

Create a common language for Quality in the Aero Engine Supply Chain

Simplification of standards
a) Removal of duplicate / redundant requirements
b) Builds on existing Aerospace Industry Standards where appropriate

Setting higher standards for Quality
a) Adopt best practice from across industry
b) Standards written by industry practitioners
c) Challenging current acceptance thresholds – “raising the bar of quality performance’

Acceleration of Supplier Quality Capability Improvement
a) Aligned Supplier Development activities using Common Quality Tools
b) Availability of Global training and consultancy providers aligned to AESQ requirements
Committed to AS13100 Compliance on December 31, 2022
AS13100 Supplier Preparation Milestone Plan

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

1. Distribution / sharing of Information on AS13100 Training
   - Develop plan for adoption and deployment
   - Conduct internal stakeholder’s meeting on plan and deployment approach
   - Provide organization-wide awareness training on AS13100 to promote adoption and deployment

2. Amend AS9100 Compliance Matrix with AS13100 supplementary requirements
3. Perform Gap Analysis to AS13100 supplementary requirements Rm13009
4. Virtual Supplier Forum 4/21/21
5. Virtual Supplier Forum 10/6/21
6. Amend AS9100 Compliance Matrix with AS13100 supplementary requirements
7. Update QMS procedures to close gaps
8. Train employees in new requirements
9. Conduct Internal AS13100 Pre-Audit
10. Close Gaps with C/A’s

AS13100 Requirements now in effect

Supplier now subject to AS9100/AS13100 audit

Distribution / sharing of Information on AS13100 Training
Develop plan for adoption and deployment
Conduct internal stakeholder’s meeting on plan and deployment approach
Provide organization-wide awareness training on AS13100 to promote adoption and deployment

Update QMS procedures to close gaps
Train employees in new requirements
Conduct Internal AS13100 Pre-Audit
Close Gaps with C/A’s
IHI DEPLOYMENT

HIROSHI YAMAMOTO
GENERAL MANAGER, QUALITY SYSTEM DEPT.
IHI CORP.
1. Company profile of IHI Corporation

- **Year of establishment**: 1853
- **Capital**: 107.1 billion yen (8.3 million dollars converted to 115 yen per dollar)
- **Revenue (Consolidated)**: 1,112.9 billion yen (fiscal 2020) (8.6 billion dollars converted to 115 yen per dollar)

**Number of employees (consolidated)**: 29,149

**Works**:
- **6**

**Branches in Japan**:
- **8**

**Overseas representative offices**:
- **14**

**Overseas affiliates**:
- **143**
  - [Subsidiaries: 121 Affiliates: 22]

**Revenue Compositions by business areas** (Consolidated/fiscal 2020):
- **Resources, Energy & Environment**: 29%
- **Social Infrastructure & Offshore Facilities**: 14%
- **Industrial Systems and General-Purpose Machinery**: 34%
- **Aero Engine, Space & Defense**: 22%

Note: The total may not be 100% owing to the exclusion of "Other" and "Adjustments".

Fiscal 2020
- **Consolidated net sales/sales revenue (billions of yen)**: 1,112.9
- **1,263.1**

Fiscal 2019
- **1,483.4**

Fiscal 2018
- **1,590.3**

Fiscal 2017
- **1,486.3**

Fiscal 2016
- **1,263.1**


Note: The total may not be 100% owing to the exclusion of "Other" and "Adjustments".
2. Profile of Aero-Engine, Space & Defense Business Area

<table>
<thead>
<tr>
<th>President of Business Area</th>
<th>Hideo Morita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing Executive Officer</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employees (as of March 31, 2021)</th>
<th>(consolidated)</th>
<th>6,765</th>
</tr>
</thead>
<tbody>
<tr>
<td>(non-consolidated)</td>
<td>4,212</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation divisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Defense Systems Div.</td>
</tr>
<tr>
<td>- Civil Aero-Engine Div.</td>
</tr>
<tr>
<td>- Space Development Dept.</td>
</tr>
<tr>
<td>- Research &amp; Engineering Div.</td>
</tr>
<tr>
<td>- Manufacturing Div.</td>
</tr>
<tr>
<td>- Life Cycle Solution Div.</td>
</tr>
</tbody>
</table>

**Annual Sales (Unit: 100 million yen)**

(780 thousand dollars converted to 115 yen per dollar)

**Consolidated Sales Ratio (In fiscal 2020)**

- Defense Equipments: 74.6%
- Space Development: 21.4%
- Aero-Engine: 4.0%

President of Business Area: Hideo Morita
Managing Executive Officer: Hideo Morita

Employees (as of March 31, 2021)
(consolidated): 6,765
(non-consolidated): 4,212

**Consolidated Sales Ratio (In fiscal 2020)**

- Defense Equipments: 74.6%
- Space Development: 21.4%
- Aero-Engine: 4.0%
3. IHI Quality Management System Architecture

We are confronting with great challenges to reform IHI Quality management system which is conformable to new or revised requirements.
We have reached Milestone 4 so far.
We are aiming for completing remaining milestones by the end of this year.
### 5. AS13100 Deployment schedule

<table>
<thead>
<tr>
<th>2021FY</th>
<th>2022FY</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 5 6 7 8 9 10 11 12</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
</tr>
</tbody>
</table>

**IHI**
- **4**: AS13100 GAP analysis
- **5**: Create quality plan
- **6**: AS13100/RM GAP analysis
- **7**: Create / Revise Quality procedure
- **8**: Kick Off (1st cycle)
- **9**: Training Auditors
- **10**: Extra internal Audit
- **11**: Customer review / Audit
- **12**: Extra MR

**SC**
- **4**: Introduction to IHI group companies
- **5**: Introduction to supplier
- **6**: Create / Revise purchase documents
- **7**: Education / training
- **8**: Supplier Audit

**Revise Quality procedure as needed**

**QMS activity (1st cycle)**

**2nd Cycle**

**Create education material**

**Extra MR**

We plan AS13100 deployment schedule for internal and supplier, respectively.
6. AS13100 Gap analysis

The result of AS13100 Gap analysis has been verified by each task team in order to revise or create internal procedures related to AS13100.
We are organizing a team and promoting the creation of IHI quality management system based on AS13100 Requirement.

<table>
<thead>
<tr>
<th>Team No.</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF01</td>
<td>General, Internal procedure</td>
</tr>
<tr>
<td>TF02</td>
<td>Human factors</td>
</tr>
<tr>
<td>TF03</td>
<td>Statistical quality control</td>
</tr>
<tr>
<td>TF04</td>
<td>DPRV</td>
</tr>
<tr>
<td>TF05</td>
<td>Design</td>
</tr>
<tr>
<td>TF06</td>
<td>Supplier control</td>
</tr>
<tr>
<td>TF07</td>
<td>APQP/PPAP</td>
</tr>
<tr>
<td>TF08</td>
<td>Process control / PFMEA / control plan</td>
</tr>
<tr>
<td>TF09</td>
<td>FAI</td>
</tr>
<tr>
<td>TF10</td>
<td>Problem solving</td>
</tr>
<tr>
<td>TF11</td>
<td>Audit</td>
</tr>
<tr>
<td>TF21</td>
<td>Education</td>
</tr>
<tr>
<td>TF22</td>
<td>Information and communication technology</td>
</tr>
</tbody>
</table>
We have been communicating with main subsidiary companies about AS13100 deployment status each other regularly.
IHI
Realize your dreams
MTU DEPLOYMENT

MICHAEL MROSEWSKI
QUALITY MANAGEMENT PROGRAMS
MTU AERO ENGINES
AS13100 Implementation Plan @ MTU

MTU AERO ENGINES AG – Michael Mrosewski
AS13100 Implementation Project Organization

**Steering Committee**
Quality (Systems, Inhouse production, supply chain)
Extended: Engineering, Quality inspection, Production

**Every 2 Months**

**Project leader**
Quality

**Every 2 Weeks**

**Core Team Members**
Design, Procurement, Production, Program office, ...

Core team is extended where needed, depending on the relevant topics.

**Experts in Content** Core Team is supported by experts in content as required
Project plan to achieve AS13100 compliance by January 1st 2023

MTU QMS assessment

AS13100 Publication

MTU supply chain flow down

SQN Supplier Information

Definition of need for action

Gap closure and specification updates

Project Review

End of project

Deployment support through the technical supplier management MTU

AS13100 Trainings

Internal Compliance Self-Assessment

MTU AS13100 compliant
## MTU Assessment of the AS13100 requirements

### Example

<table>
<thead>
<tr>
<th>AS13100 Requirement</th>
<th>Responsible Project Key Account</th>
<th>Responsible Expert</th>
<th>MTU Standard</th>
<th>PROJECT START AS13100 fulfilled? (yes/partly/no)</th>
<th>Necessary Action</th>
<th>Responsible Person</th>
<th>Due date</th>
<th>PROJECT END AS13100 fulfilled? (yes/no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. CONTEXT OF ORGANIZATION</td>
<td></td>
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</tr>
<tr>
<td>4.2.1 Understanding the Needs and Expectations of Interested Parties - Supplemental Requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yes</td>
<td></td>
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</tr>
<tr>
<td>The organization shall ensure on-site right of entry to its customers and their respective governmental and regulatory agencies, third parties mandated by the customer and contracting parties accompanying the customer’s representatives including access to documented information and the ability to conduct audits, review of quality investigations, and to verify product and processes. Right of entry includes access to the applicable areas of organization facilities as well as related supplier and business partner facilities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yes</td>
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</tr>
</tbody>
</table>
Achievements and Challenges

- Chapter A & C: Requirements allocated to MTU standards and processes. Actions are defined.
- Chapter B: APQP implementation requires definition and transfer into new processes.
- Supplier Flow Down established and communication about the implementation status

Next steps

- Complete action plan as defined
- AS13100 training of the MTU organization to establish the new standard
- Close contact to the supply base to support deployment and evaluation of the implementation status
SAFRAN AIRCRAFT ENGINES
DEPLOYMENT

CATHERINE CATARINA-GRACA
SUPPLIER MANAGEMENT SYSTEM COORDINATOR
SAFRAN AIRCRAFT ENGINES
Safran, a world leader in aerospace
SAFRAN GROUP Activities

**Aircraft propulsion:** proven innovation and reliability to support aircraft manufacturers and airlines

**Aircraft equipment:** a complete range of products and services

**Aircraft interiors:** an extended range for all types of aircraft to enhance passenger comfort

**Defense:** protecting citizens through technology

**Space:** state-of-the-art technologies to drive progress

*through AvioGroup, a 50/50 joint company between Safran and Airbus, and its Avantrepsa subsidiary
SAFe: A Safran Project

SAFe = A « ONE SAFRAN » project

SAFe = 3 main documents

- GRF-0033: Compliance matrix to requirements
- GRM-0123: Provider Handbook
- GRP-0087: Procedure of quality requirements for external providers including CSR charter

- SAFe 2020 issued Dec 2020
- One Safran Company leads the deployment for the whole group

SAFe = A « ONE SAFRAN » project

○ Activity Sector
○ Activity Type

<table>
<thead>
<tr>
<th>Code</th>
<th>Activity Sector label</th>
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</thead>
<tbody>
<tr>
<td>S1</td>
<td>Civil &amp; Military engines</td>
</tr>
<tr>
<td>S2</td>
<td>Civil &amp; Military aviation and space equipment and systems Unmanned aerial vehicles (UAVs)</td>
</tr>
<tr>
<td>S3</td>
<td>Cabin / Seats</td>
</tr>
<tr>
<td>S4</td>
<td>Non-aeronautical defense</td>
</tr>
<tr>
<td>S5</td>
<td>Automotive / Railway</td>
</tr>
<tr>
<td>S6</td>
<td>Other sectors</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Activity type label</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Build-to-print Provider</td>
</tr>
<tr>
<td>B</td>
<td>Build-to-spec Provider</td>
</tr>
<tr>
<td>C</td>
<td>Dealer, Stockist, distributor</td>
</tr>
<tr>
<td>D</td>
<td>Aeronautical maintenance service Provider</td>
</tr>
<tr>
<td>E</td>
<td>Non production service Provider</td>
</tr>
<tr>
<td>F</td>
<td>Production Interoperations Service Provider</td>
</tr>
<tr>
<td>G</td>
<td>Manufacturer of catalog parts, Standard, Standardized (COTS)</td>
</tr>
</tbody>
</table>
Statements

AS13100 issued March 2021

AS13100 will be flown down to Only S1 Suppliers.

Few Safran companies are concerned:
mainly Safran Aircraft Engines

SAFe won’t Be modified before 2024 to prevent mixing messages -> Supply Chain

On Going Project since June 2021
Safran Aircraft Engines Deployment

<table>
<thead>
<tr>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Milestone 1:</strong> GAP analysis being conducted. Member company committed to deployment by Dec 2022.</td>
</tr>
<tr>
<td><strong>Milestone 2:</strong> Project Plan Identified and Approved by Member Executive.</td>
</tr>
<tr>
<td><strong>Milestone 3:</strong> Communication plan executed internally</td>
</tr>
<tr>
<td><strong>Milestone 4:</strong> Communication plan executed to supply base.</td>
</tr>
<tr>
<td><strong>Milestone 5:</strong> Training plan executed internally</td>
</tr>
<tr>
<td><strong>Milestone 6:</strong> Training plan executed to supply base</td>
</tr>
<tr>
<td><strong>Milestone 7:</strong> AS13100 Flowed to supply base in accordance with Company plan</td>
</tr>
</tbody>
</table>
Safran Aircraft Engines Deployment - **MILESTONE 1**

1. GAP Aircraft Engines
   - Review RM13009 for SAFRAN Aircraft Engines: Internally
   - Answer as supplier
   - Review main difficulties
   - AS13100 learning curves for those involved in GAP analysis

2. GAP with SAFe
   - Identify Supplemental requirements SAFe → RM13009
   - Identify Supplemental Requirements RM13009 → SAFe

3. Gap with suppl. Rqt with Aircraft Engines
   - Identify Safran Aircraft Engines specific supplemental requirements → RM13009
Chapter B: APQP: Few GAPS
Action Plan launched and finalized
Section 7.2.1 Requires organizations to provide On the Job Training that includes:
- customer requirements,
- Internal requirements
- regulatory requirements
This requirement also applies to contract and agency personnel.
Persons whose work can directly affect quality shall be informed about the consequences on nonconformance to the customer.

Section 7.2.2 defines the Auditor Competence Requirements including;
- Qualifications
- Experience
- Maintenance (Ongoing professional development)
RM13005 will provide further details.

Section 7.2.4 requires the organization to ensure that Quality Leaders attend the AS13100 Requirements on-line course and the AESQ Quality Foundation Training Course. The course includes training in;
- Applicable Regulations
- Customer Requirements
- APQP & Process Control Quality Tools
This course is also recommended for other key personnel.

AS13100 defines the requirements for Supplier Evaluation, Selection, Control and Performance Monitoring.

(Section 8.4.1)

NEW

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)
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)

**Chapter B**

**APQP PPAP**

Defines the use of 8D Problem Solving for customer escapes.

Compliance to **AS9146 FOD Prevention**
Section 4.3.5 requires the organization to conduct a **Compliance Assessment** of their QMS to ensure that it captures all of the requirements of AS13100 and customer specific requirements.

The results of this review are to be provided to the customer upon request.

Any compliance gaps must be highlighted to the individual customer and a resolution agreed.

Reference Manual RM13009 provides information to support this requirement.

**SAFe Compliance Matrix already exists:**

Part of communication kit is : comparison of these 2 excel files:

- If SAFe Matrix is completed → Excel file with missing requirements to fullfill AS13100
- If RM13009 is completed → Excel file with missing requirements to fullfill SAFe
Safran Aircraft Engines Deployment - **MILESTONE 2 ; 3 AND 4**

**Milestone 2**
- Project Plan...Member Executive.
  - Approved June 29th 2021

**Milestone 3**
- Comm. plan internally
  - In process For **main actors**; Communication preparation in process for whole « players » / all company → **OBJ 3rd Trimester 2022**
  - Communication / training has been launched with main actors

**Milestone 4**
- Commun. Plan to supply base
  - Communication preparation In Process : Few GAPs with our requirements – Training / Tools / communication KITs done for SAFe are common to AS13100 messages - Finishing Gaps with other Safran Aircraft Engines requirements -- > **OBJ Second Trimester**
Safran Aircraft Engines Deployment - MILESTONE 5 ; 6 AND 7

Milestone 5
Training plan executed internally
- Already started with main Actors but will be extended during Summer 2022

Milestone 6:
Training plan executed to supply base
- Starts September 2022

Milestone 7:
AS13100 flow down to supply chain
- Will be flown down Summer 2022 with communication Kit and equivalences with SAFe / Safran Aircraft Engines specific requirements → Saves Time
ASQR-01 Rev 9, 2/2/2015
AS13000 – Problem Solving Requirements for Suppliers - 8D

ASQR-01 Rev 10, 11/1/2016
AS13001 – Delegated Product Release Verification Training Requirements
AS13002 – Inspection Frequency Plans
AS13003 – Measurement Systems Analysis

UTCQR 09.1 Rev 6, 2/19/2019
AS13004 – PFMEA & Control Plans
AS13006 – Process Control Methods

ASQR-9.2 Rev 2, 1/28/2019 (Formatted based on AS9145)
AS9145 – Requirements for Advanced Product Quality Planning and Production Part Approval Process

TRANSITION OF ASQR-01 -> AS130XX
ASQR JOURNEY HAS PROGRESSED, AND NOW IF INFLUENCED BY AS13100
AS13100 GAP ASSESSMENT
UNITIZED RM13009 AND THE ASQR-01 NEW SUPPLIER CHECKLIST
TRANSITION OF ASQR-01 -> AS13100

ASQR JOURNEY HAS PROGRESSED, AND NOW IF INFLUENCED BY AS13100
ASQR-01 Revision 12
Current requirements of ASQR-01 Rev 11 at 174 pages forecast to drop to 102 pages, a 41% reduction.

“Shalls” forecasted to be reduced by more than 23%

ASQR-01, Revision 12 based now on International Aerospace Standard AS13100

With the addition of:
- Human Factors
- Sub-tier Management
- Internal Audit and Auditor Competencies
- Design and Development

ASQR JOURNEY HAS PROGRESSED, AND NOW IF INFLUENCED BY AS13100
TRANSITION OF ASQR-01 -> FUTURE STATE
ENSURING PW SPECIFIC NEEDS ARE CAPTURED

Formatting will align with AS9100, AS9145, & A13100 paragraph sections
Will apply to PWA & PWC
Target release Q2
ASQR-01 / AS13100 COMMUNICATIONS
STANDARD AND HOSTED COMMUNICATIONS ARE BEING DEPLOYED

PW conducting multiple events to facilitate adoption of AS13100
Linkage to FAQs on AS13100 and ASQR-01 communicated
Material is hosted on the PW and PWC Supplier Portal.
AS13100
DEPLOYMENT DASHBOARD

ELIZABETH PACE
ASSOCIATE DIRECTOR, SUPPLIER QUALITY
RAYTHEON TECHNOLOGIES
### Deployment Strategy Group Dashboard

<table>
<thead>
<tr>
<th>Company</th>
<th>Milestone 1</th>
<th>Milestone 2</th>
<th>Milestone 3</th>
<th>Milestone 4</th>
<th>Milestone 4b</th>
<th>Milestone 5</th>
<th>Milestone 6</th>
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<td>Safran</td>
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<td>In Work</td>
<td>In Work</td>
<td>Complete</td>
</tr>
</tbody>
</table>

### Milestones

- **Milestone 7**: AS13100 compliance by supply base
- **Milestone 6**: Training plan executed to supply base
- **Milestone 5**: Training plan executed internally
- **Milestone 4b**: Flow down of the Standard to the supply base.
- **Milestone 4**: Communication plan executed to supply base.
- **Milestone 3**: Communication plan executed internally.
- **Milestone 2**: Project Plan Identified and Approved by Member Executive. (All have committed to deployment of Dec 2022 but plan to get there can vary.)
- **Milestone 1**: GAP analysis being conducted. Member company committed to deployment by Dec 2022.

**December 31, 2022**
Member companies in process of rolling out new flow downs

All member companies are working on flow downs over next few months (COMPLIANCE IS ALIGNED)

All members companies committed to AS13100 standard compliance December 31, 2022

Company specific requirements will be reduced

AS13100 is supported by free issue reference manual guides, LinkedIn Communities of Practice and Webinars

Common training requirements are being provided by 3rd party professionals and is available globally
### Subject Matter Interest Groups Status

<table>
<thead>
<tr>
<th>Subject Matter Interest Group</th>
<th>Team Leader</th>
<th>Deputy Team Leader</th>
<th>Team Size</th>
<th>Charter</th>
<th>Regular Meetings</th>
<th>Activity Schedule</th>
<th>Web Page</th>
<th>Linkedin/COP Page</th>
<th>Events</th>
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<tbody>
<tr>
<td>Problem Solving Methods</td>
<td>Marnie Ham (GE)</td>
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<td>DPRV Training (AS13001)</td>
<td>Earl Capozzi (P&amp;W)</td>
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<td>Process Control (incl. Inspection Frequency) (RM13002 &amp; RM13006)</td>
<td>Pete Teti (P&amp;W)</td>
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<td>MSA (RM13003)</td>
<td>Simon Gough-Rundle (RR)</td>
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<td>Defect Prevention Quality Tools (RM13004)</td>
<td>Ian Riggs (RR)</td>
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<td>Quality Audit Methods</td>
<td>Tony Pailing (RR)</td>
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<td>Sub-tier Management</td>
<td>Vince Miller (Howmet)</td>
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<td>Design Methods (RM13008)</td>
<td>Lena Eckerbom Wendel (GKN)</td>
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<td>Human Factors (RM13010)</td>
<td>Catherine Catarina-Graca (Safran)</td>
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<td>First Article Inspection</td>
<td>Carrie Sharkey (RR)</td>
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<td>APQP &amp; PPAP (RM13145)</td>
<td>Karl Evans (RR)</td>
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</table>
11 Communities of Practice (CoP) Launched - 1,532 Members Collectively (as of April 25)
<table>
<thead>
<tr>
<th>Event</th>
<th>Format</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>AESQ RM13000 Problem Solving Supplier Feedback Webinar</td>
<td>Virtual</td>
<td>April 20, 2022</td>
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<tr>
<td>AESQ Virtual Supplier Forum – April 28</td>
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<td>April 28, 2022</td>
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<tr>
<td>AESQ Virtual Supplier Forum - May 4, 2022</td>
<td>Virtual</td>
<td>May 4, 2022</td>
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<tr>
<td>AESQ AS13100 &amp; RM13004 Key Requirements for Design FMEA Webinar – Part 1</td>
<td>Virtual</td>
<td>June 22, 2022</td>
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<td>Virtual</td>
<td>June 23, 2022</td>
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Pause

Return in 15 Minutes
Pause

Return in 14 Minutes
Return in 12 Minutes
Pause

Return in 10 Minutes
Pause

Return in 6 Minutes
Pause
Return in 5 Minutes
Pause

Return in 2 Minutes
ELIZABETH PACE
ASSOCIATE DIRECTOR, SUPPLIER QUALITY
RAYTHEON TECHNOLOGIES

JIM WILSON
SR MANAGER, SUPPLIER QUALITY & DEVELOPMENT
PRATT & WHITNEY CANADA
Feedback and Survey Overview

August 2021: First survey of suppliers on the general knowledge of AS13100 and the AESQ

- 158 respondents
- Familiar with AESQ for existing AS13XXX documents
- Create a baseline for deployment well before the deadline
- Basic AS13100 familiarity
- Collected feedback to drive actions

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 being analyzed for actions
Respondent Demographics

Respondent Location

- North America: 69%
- Asia: 15%
- Europe: 16%

Respondent Company Size

- 0 - 99: 36%
- 100 - 499: 23%
- 500 - 999: 8%
- 1000 - 4999: 8%
- 5000+: 4%
Respondents Supply to Multiple AESQ Members

Number of Respondents

Respondents have an average of 3.75 AESQ customers

- GE Aviation
- Rolls-Royce
- Pratt & Whitney
- Safran
- MTU Aero Engines
- GKN Aerospace
- IHI
- Honeywell
- Howmet Aerospace
- PCC Structural
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.
Where Can We Help?

Percent of Respondents

- APQP/AS9145: 45%
- Human Factors: 35%
- Sub-Tier Management: 30%
- AS13100 Training: 25%
- Control Plans: 20%
- Process Control: 15%
- Design FMEA: 10%
- Inspection: 5%
Learning Opportunities Offered by the AESQ

Recorded Past Events

- AESQ MH-1500: Problem Solving Methods Supplier Feedback Webinar presented April 20, 2022
- AESQ 1st Article Inspection (PAI) MH-1502 Webinar presented April 19, 2022
- AESQ NWA: Water Quality Workshop presented January 12, 2022
- AESQ Material Factors Webinar presented November 16, 2021

Upcoming Webinars

LinkedIn: Communities of Practice

10 COMMUNITIES OF PRACTICE (COP) LAUNCHED - 1,393 MEMBERS COLLECTIVELY
What You Told Us

AS13100 Implementation vs. Training Status

- 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
Launch Your Company Into a Good Position for Compliance

UNDERSTAND YOUR POSITION
Complete GAP Analysis and Document closure plan

GET INVOLVED
Sign up for webinars and communities of practice

FURTHER YOUR KNOWLEDGE
Reach out for training opportunities
APQP DEPLOYMENT

KARL EVANS
APQP TECHNICAL PROJECT MANAGER
ROLLS-ROYCE
Higher quality is synonymous with increased product safety.

The primary objective is to improve quality and reduce cost.

A common process up and down the supply chain removing wasted effort and mis-communications.

Products reach faster maturity with fewer engineering changes and defects in the early stages of production and product use.

Proactive toolbox to focus cross-functional teams on risk identification and mitigation early in the process.

Provides a foundation for successful ongoing change management – design modification, works transfers, changes to manufacturing method.
Application within Rolls-Royce of AS13100/9145 APQP and PPAP

**Ourselves**…Rolls-Royce Civil Aerospace is fully committed to APQP, PPAP and Cross functional working.

**Our Customers**…they are asking for this.

**Our Suppliers**…AS13100 APQP and PPAP means we have significantly reduced our Customer Specific Requirements.

**AS13100 APQP & PPAP Timing Chart**

<table>
<thead>
<tr>
<th>Phases of Advanced Product Quality Planning (APQP)</th>
<th>AESQ Production Part Approval Process (PPAP) Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Planning</td>
<td>CR</td>
</tr>
<tr>
<td>2. Product Design and Development</td>
<td>FA</td>
</tr>
<tr>
<td>3. Process Design and Development</td>
<td>PPP</td>
</tr>
<tr>
<td>4. Product and Process Validation</td>
<td>PPR</td>
</tr>
<tr>
<td>5. On-going Production, Use and Post-delivery Service</td>
<td>Production Process Plan</td>
</tr>
</tbody>
</table>

**Rolls-Royce Management System**

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.
Our Journey to APQP

2010
- **Quality Improvement drivers**
  - Build in Quality

2017
- **Quality Management Processes**
  - PPAP
  - IPPR

2021
- **Quality Planning Activities**
  - SPC
  - CCF > KCF
  - PFMEA
  - DFMEA
  - KPC/CI

2022
- **APQP and PPAP**
  - APQP Early trials

**Adoption of Industry Standards**
- NPI Requirements
  - No industry std
  - RR Specifics (extensive)
- APQP & PPAP
  - No industry std
  - RR Specifics (lots)
- APQP & PPAP
  - AS9145
  - RR Specifics (fewer)
- APQP & PPAP
  - AS13100/ AS9145
  - RR Specifics (min.)

Quality Improvement drivers:
- Build in Quality
- Zero Defects

Quality Planning Activities:
- SABRe
  - #1: NPI Requirements
    - No industry std
    - RR Specifics (extensive)
  - #2: APQP & PPAP
    - No industry std
    - RR Specifics (lots)
  - #3: APQP & PPAP
    - AS9145
    - RR Specifics (fewer)
  - #4: APQP & PPAP
    - AS13100/ AS9145
    - RR Specifics (min.)
Self reflection on our APQP implementation

Pillars of success:

1. Leadership engagement, organisational commitment and management support

2. Cross-functional teams – it's a team sport of more than one function/department

3. Effective project planning and Managing the project to ensure on-time completion of defined deliverables and outputs

Leadership:
- Senior Sponsorship & engagement in concepts
- Business Plan Deployment alignment
- Novel learning practices:
  - APQP Games & simulations
  - Video bite size learning

Cross Functional Teams:
- Launch framework
- Define RACI for activities and Elements
- Building “User Case” value streams (network diagram)
- Functional coaches (DE, ME, PM, Purchase)
- Adopting AS13100 (RM13145) tools:
  - APQP / PPAP Timing Plan
  - Application Matrix

Project Planning & Management:
- Alignment of APQP and PPAP Events to business change management decisions
- RAPID Decision making for Events
- Visual Management / Kanban Boards for the teams.

Foundations:
Sponsor (right shadow), Champions (remove barriers), Function Leaders (develop their people) and Core Team (right practices & tools)
### Project Planning & Management

- Confirm decision makers – RAPID for each APQP & PPAP Event.
- Define practices for concern management

### Develop Leaders of Change

- Est. Deployment Champion(s) – to remove barriers to success.
- Est. Functional Leads – to develop their people capability.
- Est. Core team – to ensure the right practices and tools are available.

### It’s a Team Sport

- Clear cross functional accountability – RACI for each Planning Deliverable and APQP Element.

### Each time you start

- Upfront requirements capture – Establish and confirm these as early as possible with Customers & stakeholders

### People Process

- Availability of capable people – Maintain Training plan and people planning process

### Progress with a Plan

- Utilise RM13145 – Applications matrix act as your menu… Events, deliverables & Elements
- APQP & PPAP Timing Plan gives you a Planning template
Let's Grow our Community

Search LinkedIn “AESQ Community of Practice”

APQP & PPAP
- Zero Defects Tools
- Measurement System Analysis
- Problem Solving
- Human Factors
- Etc

Use “RM13145” it contains a volume of good practices

AESQ Community of Practice

It's Good To 'Talk'

Raise questions, share ideas & good practices
APPROACH AND ADVANCEMENT TOWARDS AS13100

MANI RATHINAM RAJAMANI
DEPUTY MANAGER – QUALITY ENGINEERING
TATA ADVANCED SYSTEMS LIMITED

AESQ – Aerospace Engine Supplier Quality Strategy Group
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APPROACH AND ADVANCEMENT TOWARDS AS13100

Apr 28, 2022

“Propelling India Forward”

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CONTENTS

• TASL INTRODUCTION.
• TASL JOURNEY WITH AESQ™ TEAM.
• TASL AS13100 TRANSITION & DEPLOYMENT FRAMEWORK
• AS13100 TASL TRANSITION MILESTONE PLAN
• TRANSITION COMMON QUESTIONS/CHALLENGES AND THEIR MITIGATIONS.
• AESQ™ AS13100 REQUIREMENTS STRUCTURE.
• AS13100 DEPLOYMENT - QMS STRATEGY, GAP-ANALYSIS & CALLOUTS STUDY.
• AS13100 vs CUSTOMER SPECIFIC REQUIREMENTS SUPPLIER UNDERSTANDNG.
• APPROACH TO INTEGRATION OF APQP AND APQP CORE TOOLS.
• AS13100 DEPLOYMENT SUPPORT AT SUB-TIER SUPPLIERS.
• AS13100 PRACTITIONER & APQP CFT TRAININGS.
• TOOLS FOR EFFECTIVE IMPLEMENTATION OF AS13100.
• POTENTIAL BENEFITS OF IMPLEMENTING AS13100
• AS13100 TRANSITION BEST PRACTICES & LESSONS LEARNT
TATA ADVANCED SYSTEMS LIMITED (TASL)

Who are We & What We Do?

- **NAGPUR**
  - TASL - N
  - Metallic & Composite COE Facility

- **HYDERABAD**
  - TASL and JV’s (TSAL, TLMAL, TBAL)
  - Metallic, Assembly & Aero-engines COE Facility

- **BENGALURU**
  - TASL – B
  - Composite COE Facility

**Engineer Services**
- Special Processes
- Tool Design & Fabrication
- Sheet Metal Forming
- Composite Structures
- Metal Machining
- Aero-Engine Components Manufacturing, Special Process & Assembly

**Major Assemblies & Airframes**

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TASL JOURNEY WITH AESQ™ TEAM

Qualify as an Aero-Engine Detail Parts Supplier.

First Aero-Engine Projects Qualification & Contract

OCT, 2017
Apply and Join G-22 Aero-Engine Supplier Quality (AESQ™) as a Liaison Member.

MAY, 2018
Participation in Aero-Engine AS13006 Standard Feedback Review

JUL & DEC, 2020

APR, 2021
TASL AS13100 TRANSITION & DEPLOYMENT FRAMEWORK

**CY 2021: PLANNING**
- Identify, collect, collate, study and recognize requirements and utilize guidance materials for deployment.

**CY 2022 Q1 & Q2: EDUCATE & EXECUTE**
- Develop and deploy procedures, process flows, training, softwares and tools.

**CY 2022 Q3 & Q4: REVIEW & EFFICACY**
- Monitor and report effectiveness of implementation with actions for improvement.

**CY 2023: IMPROVE & SUSTAIN**
- Continually strive for improvement of process, people, performance to achieve zero defects.

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AS13100 TASL TRANSITION MILESTONE PLAN

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

1. AS13100 Publication
   a. Attend Virtual Supplier Forum
   b. Flowdown from GE-A (S1000) for AS13100 Requirements
   c. Conduct CIB for Change Impact and Actions of S1000 Revision change

2. SAE Press Release
   a. Attend Training from GE-A on S1000 and AS13100 Standard changes training
   b. Procure AS13100 Standard and Reference Manuals
   c. Distribution / sharing of Information on AS13100 Standard and Reference Manuals

3. Reference Manuals published
   a. Amend AS9100 Compliance Matrix with AS13100 & supplementary requirements
   b. Prepare the AS13100 Compliance Matrix for Identifying the Gaps and changes in existing QMS
   c. Perform Gap Analysis to AS13100 & supplementary requirements
   d. Conduct internal stakeholders meeting on plan and deployment approach

Amend Procedures for inclusion of AS13100 requirements with identification of solutions for effective deployment

Provide organization-wide awareness training on AS13100 to promote adoption and deployment

Implement requirements

Checklist:
- Train and deploy AS13100
- Conduct internal stakeholder meetings
- Prepare AS13100 Compliance Matrix
- Conduct Gap Analysis
- Implement changes

Assessment:
- Conduct AS13100 Pre-Audit
- Close Gaps with CAPA's (If Any)
- Close Customer Audit Gaps with C/A's

All Audits subject to AS9100/AS13100 audit

Complete AS13100 Transition Plan subject to External audits

118

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COMMON QUESTIONS/CHALLENGES AND THEIR MITIGATIONS

- Why New requirements?
- Additional Documentation Workload
- I don’t understand it. It's too difficult
- Why now? Current process is working good.
- Why is it so important? What's the point?
- I don’t have enough time
- We already tried it but didn’t work
- Why is it only an Aero-Engine mandated customer requirement.
- Its not applicable for the entire Aerospace industry.
- I already have an established process set in place.
- I will take care of my work & improvements
- I don’t have additional resources

Increase Awareness on Industry Developments and Best Practices.
Transition from Reactive to a Proactive and preventive mindset.
Focus on Long-Term benefits and Improvements.
Practitioner Training for improved Responsibility and Skills.
Development of Software and Tools for ease of efforts
Improve Linkage and Integration of requirements with current Processes.

Mitigation Responses related to

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AESQ™ AS13100 REQUIREMENTS STRUCTURE

Chapter A
9100 QMS

Chapter B
9145 APQP/PPAP

Chapter C
CORE DEFECT PREVENTION TOOLS

Representation of the structure of ISO 9001:2015 Standard in the PDCA cycle

9100 SUPPLEMENTAL REQUIREMENTS TRANSITION OF AS1300x STANDARDS

13 REFERENCE MANUALS

GUIDANCE FOR REQUIREMENTS DEPLOYMENT

INTEGRATED CHAPTER A, B AND C WITH NEW PRODUCT INDUSTRIALIZATION
AS13100 QMS DEPLOYMENT STRATEGY
(QMS VS STANDARD VS CUSTOMER REQUIREMENTS STUDY)

Perform Gap Analysis (RM13009) for

<table>
<thead>
<tr>
<th>Applicable Sites</th>
<th>OEM Programs of</th>
</tr>
</thead>
<tbody>
<tr>
<td>TASL Hyderabad</td>
<td>GE-A</td>
</tr>
<tr>
<td>TSAL Hyderabad</td>
<td>GE-A &amp; RR</td>
</tr>
<tr>
<td>TASL Bangalore</td>
<td>GE-A, RR and P&amp;W</td>
</tr>
<tr>
<td>TASL Nagpur</td>
<td>RR</td>
</tr>
</tbody>
</table>

Customer Flowdown Documents

Standard and 13 Reference Manual Requirements

Update QMS Documentation for Customer Specific and Standard requirements.
- QM – No Update
- AEOM – Create
- QAP - Update
- SOP – Update
- POI – Create
- Software - Update
- Templates - Create
AS13100 GAP-ANALYSIS APPROACH USING RM13009

**For Applicable Clauses**, brainstorm with process owners on incorporation steps of:
- Standard and Customer requirements.
- suggested RM Guidance process.
- Process flow and Steps.
- Implementation Timeline.
- Change Requests.
- Procedure Updates.
- Trainings.
- Audit reporting and results review.

**For Not Applicable Clauses**, Record Rationale in Documented Information.
AS13100 CHAPTER A (QMS) CALLOUTS

Similar analysis done for AS13100 Chapters B, C and Customer Specific Flowdown documents
## SUPERSEDING REQUIREMENTS UNDERSTANDING METHODOLOGY

<table>
<thead>
<tr>
<th>Call-out Type</th>
<th>Customer Documents (S1000, SABRe4, ASQR01, etc.)</th>
<th>AS13100 Standard</th>
<th>Understanding</th>
<th>Recommended Actions</th>
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</thead>
<tbody>
<tr>
<td>Shall</td>
<td>Shall</td>
<td>Shall Requirement</td>
<td>Incorporate requirements in existing QMS Process.</td>
<td></td>
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<tr>
<td>Shall</td>
<td>Should, May, Can</td>
<td>Shall Requirement</td>
<td>Customer and Applicable statutory, regulatory requirements supersedes, hence incorporate requirements in existing QMS Process.</td>
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</tr>
<tr>
<td>Should, May, Can</td>
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<td>Supplier should discuss and follow Voice of Customer (VOC) for implementation</td>
<td>Mutually agree on Applicability for incorporation or exclusion.</td>
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<td>Shall Requirements</td>
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<td></td>
</tr>
<tr>
<td>See RM13--- Documents</td>
<td>See RM13---</td>
<td>Review the associated statement for determining the applicability</td>
<td>Review the associated statement for determining the applicability</td>
<td></td>
</tr>
</tbody>
</table>
APPROACH ON INTEGRATION OF APQP AND PROGRAM GATES

1. Planning
   - Product Requirements
   - Project Targets

2. Product Design and Development
   - Customer Specific Requirements
   - Feasibility Assessment
   - PFD, PFMEA, CP, Process Key Characteristics, MSA Plan

3. Process Design and Development
   - Production Readiness Review
   - FAIR

4. Product and Process Validation
   - Production Process Run
   - Initial Production Approval
   - Production Launch

5. Ongoing Production, Service and Post Delivery Support
   - PPAP Approval

Advanced Product Quality Planning Phases, PPAP Events and Key Deliverables

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PRE-PRODUCTION - PROCESS DESIGN

APPROACH ON INTEGRATION OF APQP CORE TOOLS

Customer Design Documentation

Input Significant / Fixed Process Substantiation Process Steps

PROCESS FLOW DIAGRAM

Determine and Record Product, Process KC, Mitigation Actions, Prevention and Detection Controls

PROCESS FMEA

Process Control Methods Implementation

CONTROL PLAN

Measurement System Adequacy & Capability Analysis

MSA STUDY

Process Capability & Performance Analysis

INITIAL PROCESS CAPABILITY STUDY

Process Stability and Continual Improvement

Product Realization and Acceptance

BEFORE & AFTER SPC STUDY

Post FAI - Product & Process Validation

Process Design & Acceptance

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PROCESS FMEA AS PROACTIVE RISK ANALYSIS TOOL

DFMEA
Customer Inputs: Severity, Design, Failure Modes and Product KC’s

Process Flow

Process Steps, Product KCs & CIs

Material Release to Shipment of Conforming product

PGMEA Action Plan with Resp. and Estimated Date of Completion and Revised RPN Number.

Explore New Processes for Defect Prevention and Detection Controls

Process Risk Analysis (PRA)

Part PFMEA

RPN – As per RM13004

Process KCs & Product KCs, CIs that require monitoring

Standardized Best practice

Baseline / Reference Process PFMEA

Control Plan

GD&T SHEET
CPD’s and Product KC’s (Critical, Major and CPD)

Functional Owner: Manufacturing Engineering
Functional Team Members: Customer Representatives (Design, MAE, PQE, Sourcing), Quality, Production, Supply Chain.

Past MRB’s Inputs from Customer

Type of Defect

Past MRB Pareto Chart

S.No. Count Feature Type Possible Defects
1 39 Small Hole Dia Diameter Over Size
2 25 Total Length Length Under Size
3 22 Groove Dia Diameter Over Size
4 22 ID Profile Over Size
5 15 Top Hole Dia Diameter Over Size
6 15 Small Hole position Out of Tolerance
7 14 Datum A Thickness Undersize
8 13 Dent
9 11 DAT B Diameter Over Size
10 7 Rib Height Height Under Size

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CONTROL PLAN AS PROCESS CONTROL TOOL

Process KCs, Product KCs & CIs that require monitoring

Proper measurement device and technique

Control Plan

Process Control Methods

Specific Instructions for measuring & monitoring - Controls and reaction plans

SPC Analysis and Run charts

Inspection Plan

Work Instructions

Functional Owner: Manufacturing and Quality Engineering
Functional Team Members: Customer Representatives (Design, MAE, PQE, Sourcing), Quality, Production, Supply Chain.
MSA STUDY FOR MEASUREMENT CAPABILITY CONTROL

- Template Development for MSA Plan and Gage RR
- Mutually Agreed Selection of Characteristics for MSA Study like
  - Product-Process KC's, Critical and Major Characteristics.
  - Characteristics with Past MRB and Tighter Tolerances.
- Selection of Instruments based on Feature Size, Tolerance, Feature Type and measurement system capability.
- MSA commonly Applied when
  - New measurement instruments used,
  - Change in Design tolerances implemented,
  - External Turnbacks/escapes occur, etc.
- Analyze Failure modes of Inspection process.
- Determine Need for Type 1 Gage study, when applicable.
- Collect Data from production parts for Gage RR analysis and Review for Improvements.

<table>
<thead>
<tr>
<th>Measurement system variation</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10%</td>
<td>ACCEPTABLE</td>
</tr>
<tr>
<td>10% - 30%</td>
<td>MARGINAL</td>
</tr>
<tr>
<td>&gt;30%</td>
<td>UNACCEPTABLE</td>
</tr>
</tbody>
</table>

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**AS13100 DEPLOYMENT SUPPORT AT SUB-TIER SUPPLIERS**

**Supporting Activities:**
- Standardize and simplify the supplier quality flowdown requirements.
- Trainings to Sub-tier Cross Functional Teams for deployment.
- Support suppliers to improve current QMS processes.
- Periodic reviews on supplier performance and improvements.
- Integrate supplier surveillance audits to check effectiveness of implementation.
- Rewarding suppliers with best performance.

**Aero-Engine OEM Customer Specific Documents**

<table>
<thead>
<tr>
<th>Machining suppliers</th>
<th>Special Process suppliers</th>
<th>Raw Material suppliers</th>
<th>Distributors</th>
<th>Other suppliers</th>
</tr>
</thead>
</table>

- Supplier categorization and AS13100 Applicability matrix mapping
- Customer Specific and AS13100 supplier quality requirements Flowdown
- Conduct Trainings of Customer and Standard requirements
- Identifying risks & challenges, proactively mitigate In process manufacturing defects
- Mutually mitigate risks & challenges and explore opportunities and improvements
- Support Deployment through sharing of Best practices
- Periodic performance monitoring and surveillance Audits to check sustenance
AS13100 PRACTITIONER & APQP CFT TRAININGS

AS13100 SUPPLEMENTAL QUALITY MANAGEMENT SYSTEMS REQUIREMENTS TRAINING

LEAN, 6 Sigma, 5 'S' Practitioner
MSA Practitioner
8D Problem Solving Practitioner
DPRV Personnel
Lead Auditor for Internal Audits
PPAP Coordinator
APQP Project Owner
SPC Practitioner

*AESQ™ Quality Executive Overview

Leadership

Clause 6, 8.1 & 8.2 APQP Project Plan
Program Management

Support Functions (Plant Engg, PPC, IE, etc.)

Supply Chain Management

Administrative Functions (HR, Admin, etc.)

Clause 7

Engineering

Manufacturing Engineering

Process Planners

Quality Assurance & Supplier Quality

Process Control Methods

PPAP Coordinator

PFD, PFMEA and CP

Human Factors training

APQP Project Owner

PPAP Coordinator

Process Control Methods

SPC Practitioner

8D Problem Solving Practitioner

MSA Practitioner

DPRV Personnel

Lead Auditor for Internal Audits

*AESQ™ Quality Foundation Training for Quality Leaders = QF204 and Equivalent Trainings.

*CFT Team for QMS & APQP Implementation.

*Clause 8.3 requirements Excluded

9100 Clause 5

Clause 8.4 Supply Chain Risk
Clause 7

Clause 6, 8.1, 8.2, 8.5 PFD,PFMEA, CP

Production Clause 8.5

Supervisors and Machine Engineers

Special Process Engineers

Quality Control

Quality Assurance & Supplier Quality

Special Process & NDT Quality

Quality Engineering

Clause 8.2, 8.6

Clause 4, 8.4, 8.7, 9, 10

Clause 8.5, 8.6, 8.7

Clause 8.5, 8.6, 8.7

Clause 4, 8.6, 9, 10 MSA & SPC

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POTENTIAL BENEFITS OF IMPLEMENTING AS13100

- Improved Internal and External communication
- Increased Throughput and Productivity
- Improved Knowledge management
- Error proofing product and process designs
- Adopt Industry Best Practices
- Aid to Meet Key Process Performance Indicators
- Feedback based process Improvements
- Promotes Continual Improvement
- Proactive, Early Detection and mitigation of quality and design issues
- Evaluate and Improve process performance and capability
- And Many More
AS13100 TRANSITION BEST PRACTICES & LESSONS LEARNT

- Early Engagement of Leadership and Customers
- Integration of APQP and Program Management
- Customer best practice deployment
- Focus on Process Improvement Initiatives

Promotes CFT involvement for Compliance and Improvements
Standardized Baseline Supplier Audit requirements
Enhances capability to meet KPI's and Customer satisfaction
Defect Prevention with Rapid Industrialization
TASL AS13100 TRANSITION PHASES AND FOCUS

Focus on OEM Specific Document Compliance and Approvals

Focus on Transition Plan to meet Standard and OEM Specific Document before next customer audits.

Focus on Customer Audits and Approvals w.r.t AS13100 and OEM Specific document requirements.
AESQ

HOW TO GET INVOLVED

JUN SAKAI
CHIEF ENGINEER
IHI CORPORATION
How to Get Involved - Overview

- To achieve implementation target, entire OEM & Supply Chain are encouraged to get involved.

- There are many ways;
  - To be informed of interested topics
  - Join in a Community
  - To be a Member

AESQ Strategy Group

AESQ Member

SAE G-22 Standards Writing Committee

AS13100 Subject Matter Interest Group

Community of Practice (CoP)

Training

Communication

Deployment

SAE Trainings

eNewsletter

SNS(Linkedin,etc)

Supplier Forum

Reference Manuals

OEM & Supply Chain

AS13100 Published 2021/3/1

2021

2022

AS13100 Implementation 2022/12/E
“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

Click on the appropriate link for additional information
POLL QUESTION #3: Have you already joined LinkedIn for any of the Communities of Practice? (Yes/No)

- Join a Community of Practice
  - Problem Solving Methods
  - First Article Inspection (FAI)
  - Defect Prevention Tools
  - Design Work & Production Repair
  - Quality Audit Methods
  - Sub-Tier Management
  - Measurement Systems Analysis (MSA)
  - Human Factors
  - DPRV
  - APQP & PPAP
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
“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
“Get Involved” – Additional Options

- Attend AESQ Events (Supplier Forum, Webinar)
- Take a AS13100 Training Course
- Download Reference Manuals
- Watch the “Zero Defects” Video
- Listen to a Podcast
QUESTIONS?

JIM WILSON
SR MANAGER, SUPPLIER QUALITY & DEVELOPMENT
PRATT & WHITNEY CANADA
Question & Answer “Q&A” Ground Rules

We will now accept questions via the Chat function focused on but not limited to today’s presentations including:

- AS13100 Standard
- AS13100 Training
- AESQ Reference Manuals
- Deployment and Transition

Please avoid questions regarding:

- Commercialism
- Pricing
- ITAR
- Export Control
Use the “Chat” Function to Ask a Question..

... or just make a comment
SUMMARY & CLOSE

UZAM KHAN
SUPPLIER QUALITY EXECUTIVE
ROLLS-ROYCE
Summary

All resources will be available on the AESQ website within a few days.

An email will be sent to all registrants with a link.
AESQ Thanks You for Attending!

Stay in Touch: aesq.sae-itic.com