AESQ STRATEGY GROUP™
A Program of SAE ITC

AS13100 Deployment Question & Answer Session 26/27 October 2021

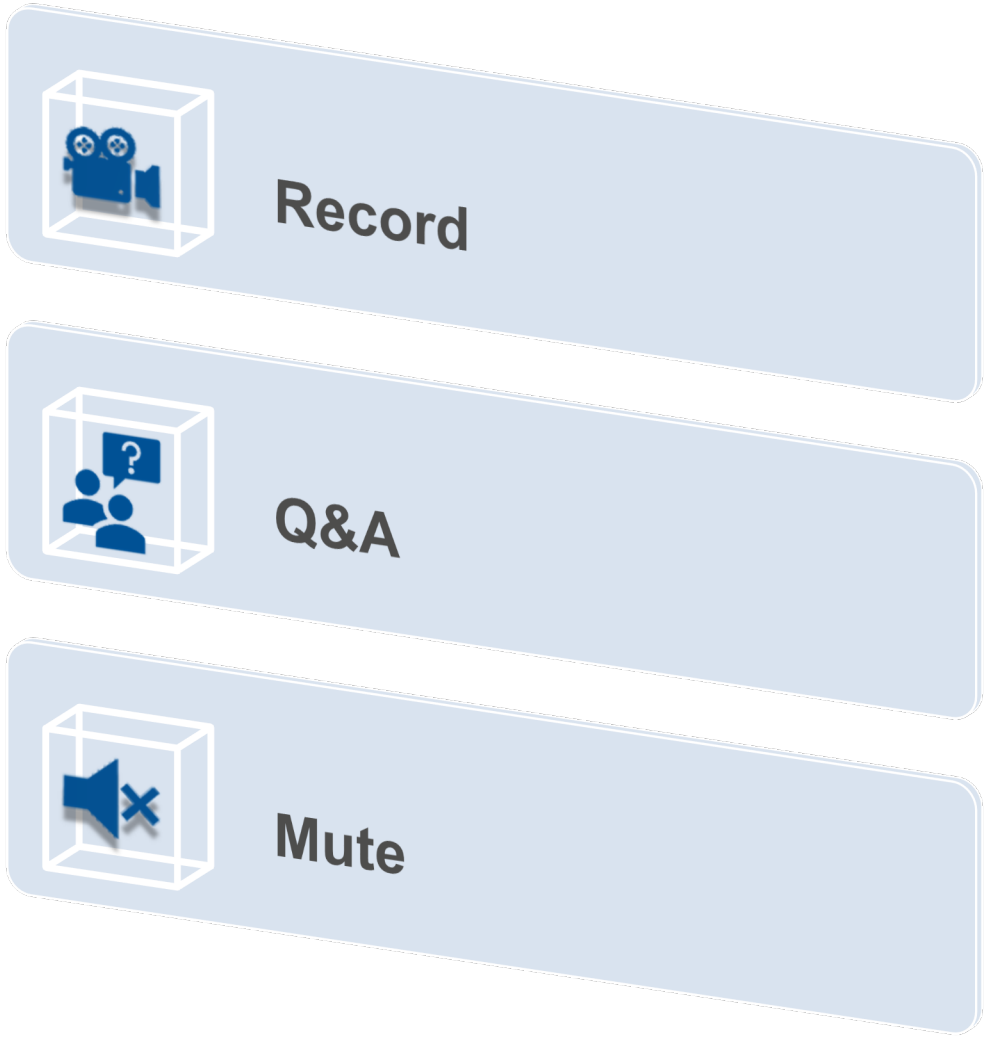
Welcome to Everyone

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.



How to Contribute

Becky Lemon
Industry Program Manager
SAE ITC

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

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

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

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

AESQ Supplier Forum 2021: Focus on AS13100 Deployment

AESQ STRATEGY GROUP
A Program of SAE ITC

SAE INTERNATIONAL

AESQ STRATEGY GROUP

Introducing AS13100: AESQ Quality Management Requirements

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

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

This standard sets out to create a common set of supplemental requirements with common training and reference manuals to improve understanding, efficiency, and performance. While significantly simplifying the businesses of suppliers with multiple customers, the primary intent of this new standard is to improve overall product quality by focusing on the key systems and processes currently deterring consistent aerospace engine product quality.

These common supplemental requirements aim to raise the bar for anticipated performance in these key areas, and therefore detailed guidance is provided to ensure clarity of expectations.

To assure customer satisfaction, the aviation, space, and defense industry organizations have to produce and continually improve safe, reliable products that equal or exceed customer and regulatory authority requirements. The globalization of the industry and the resulting diversity of regional/national requirements and expectations have complicated this objective. End-product organizations face the challenge of assuring the quality of and integration of product purchased from suppliers throughout the world and at all levels within the supply chain. Industry suppliers face the challenge of delivering product to multiple customers having varying quality expectations and requirements.

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

Learn about how SAE AS13100 AESQ Quality Management System Requirements for Aero Engine Design and Production Organizations minimizes requirements and improves overall product quality by focusing on the key quality systems and processes! Through an executive overview and a self-paced course, your organization can gain key knowledge about a common quality language, how to gain compliance to AS13100 and the business value and benefit of the standard. Walk-through each section of the standard and understand the new requirements.

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

TESTIMONIAL

"Although created by the Aero Engine Supplier Quality Group in conjunction with the SAE G-22 Aero Engine Supplier Quality Standards Committee, this standard and supporting materials will benefit any organisation, in any industry."

Dr. Ian Riggs
Global Quality Executive
Rolls-Royce & AESQ Chair

Agenda

Barbara Negroe
GE Aviation

Larry Bennett
GE Aviation

Lisa Claveloux
Pratt & Whitney

Elizabeth Pace
Pratt & Whitney

Uzam Khan
Rolls-Royce

Catherine Catarina-Graca
Safran Aircraft Engines

Earl Capozzi
Pratt & Whitney

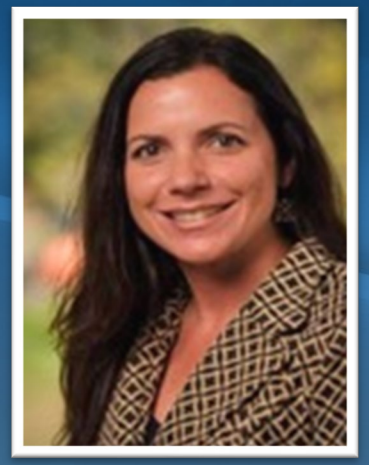
Jun Sakai
IHI

Jim Wilson
Pratt & Whitney

AGENDA			
	Topic	**Presenter**	**Duration**
1	AESQ Overview, Vision & Objectives	Barbara Negroe	10
2	AS13100 Standard Overview	Larry Bennett	15
3	Question & Answer	Jim Wilson	60
4	Future Events	Jun Sakai	5
5	Summary & Wrap Up	Barbara Negroe	5

Use the Chat Function to Ask a Question…

AERO ENGINE SUPPLIER QUALITY STRATEGY GROUP (AESQ) OVERVIEW



BARBARA NEGROE
EXECUTIVE SOURCING QUALITY LEADER
GE AVIATION

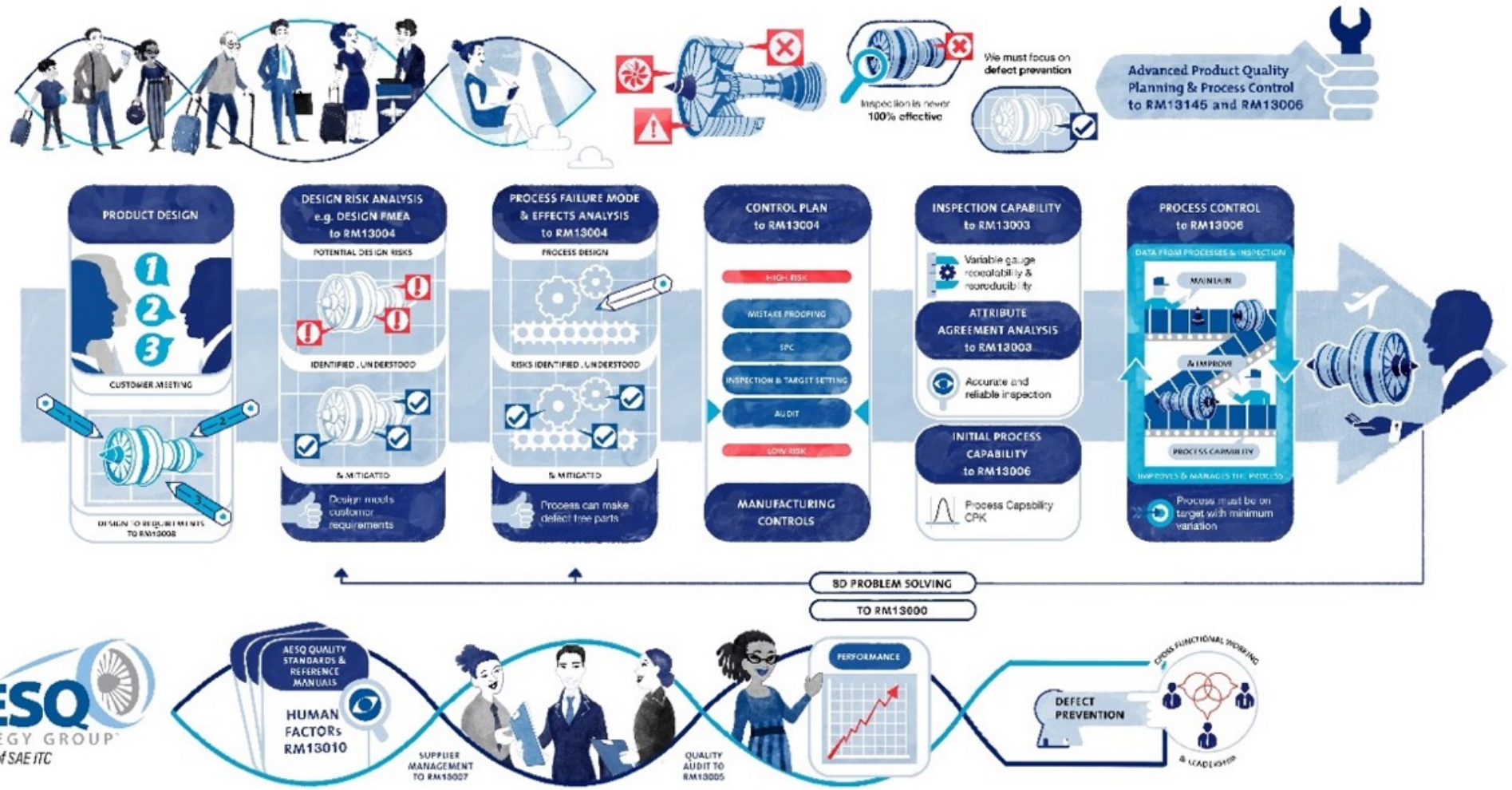
Aero Engine Industry Burning Platform

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

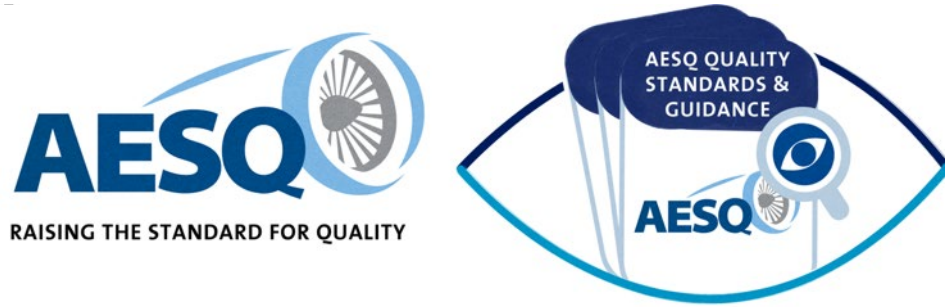
- Airline passengers set to double in size over the next 20 years
- Customers expect Zero Defects
- Increasing level of supplier made engine content
- Global Supplier Footprint
- Large number of common suppliers between engine manufacturers
- Wide range of Aerospace engine supplier businesses, from 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

Defect Prevention Key Quality Tools for Zero Defects



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

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
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Emmanuel Vivier
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Safran Aircraft Engines

Jun Sakai
Chief Engineer
IHI Corporation

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

Thomas Frank
Senior VP Corporate Quality
MTU Aero Engines

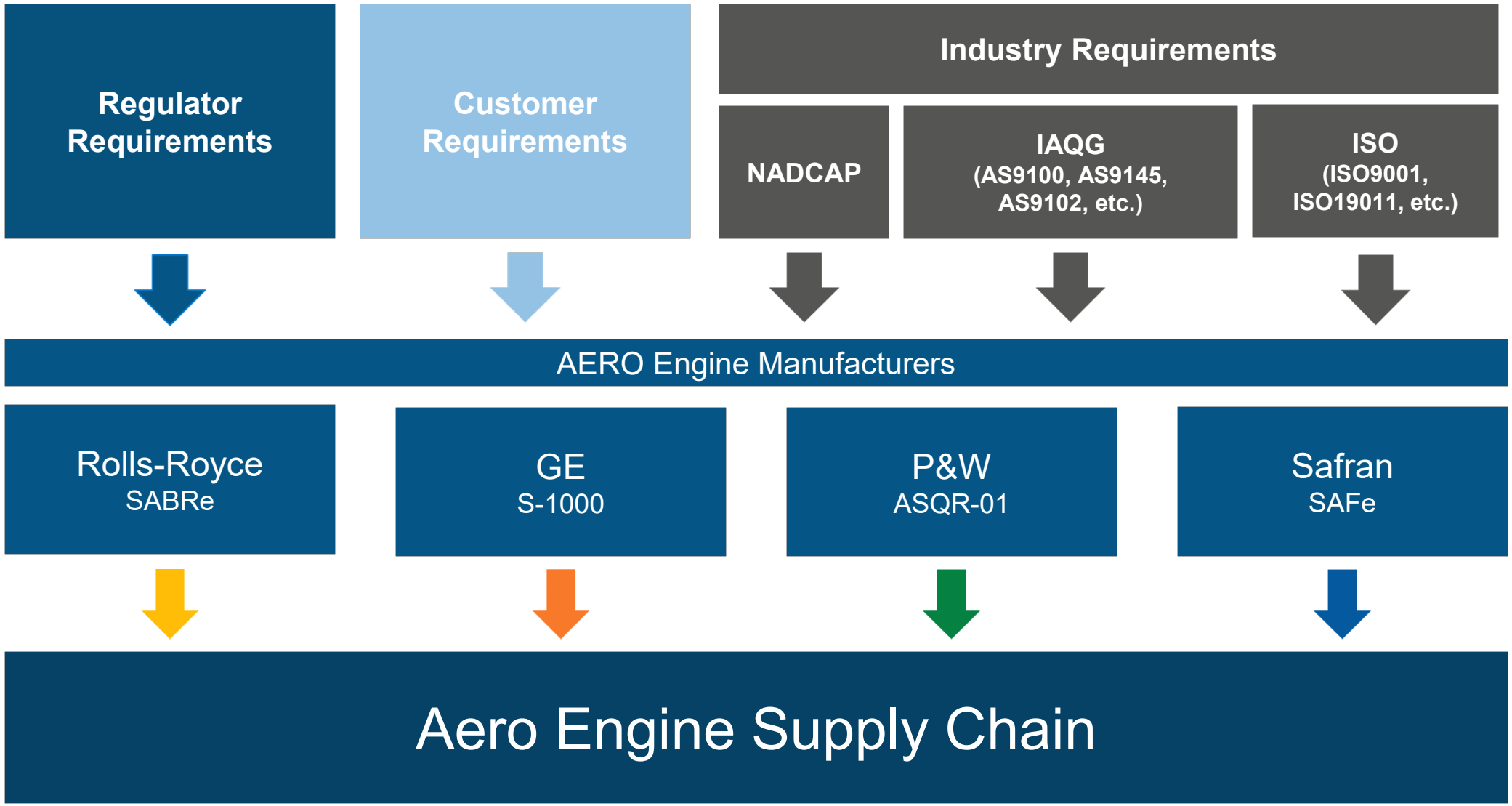
James Clifton
Global Quality Director
Precision Castparts Corp.

Osa Omoruyi
VP Quality
Howmet Engine Systems

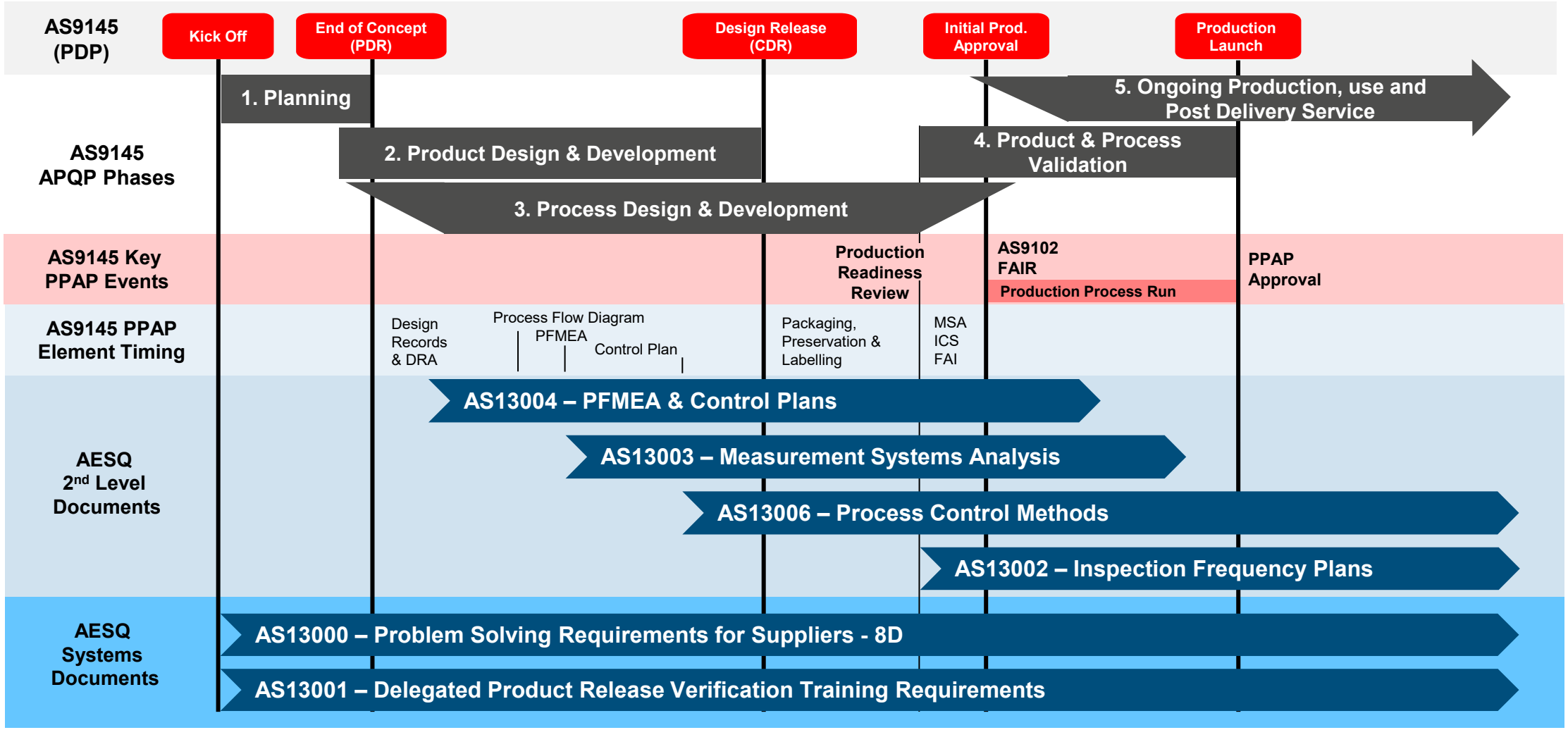
AESQ Vision

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



Product Life Cycle & Current AESQ Document Interaction



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

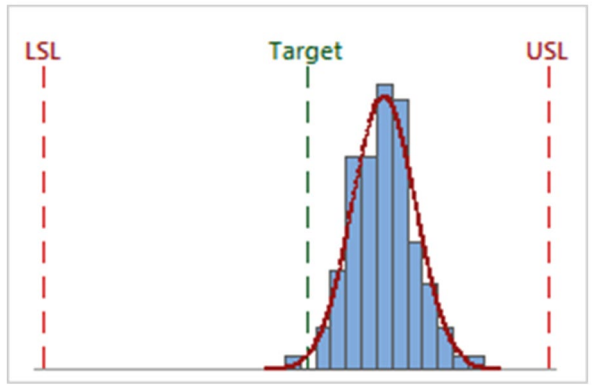
Defect Free since September 2017

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

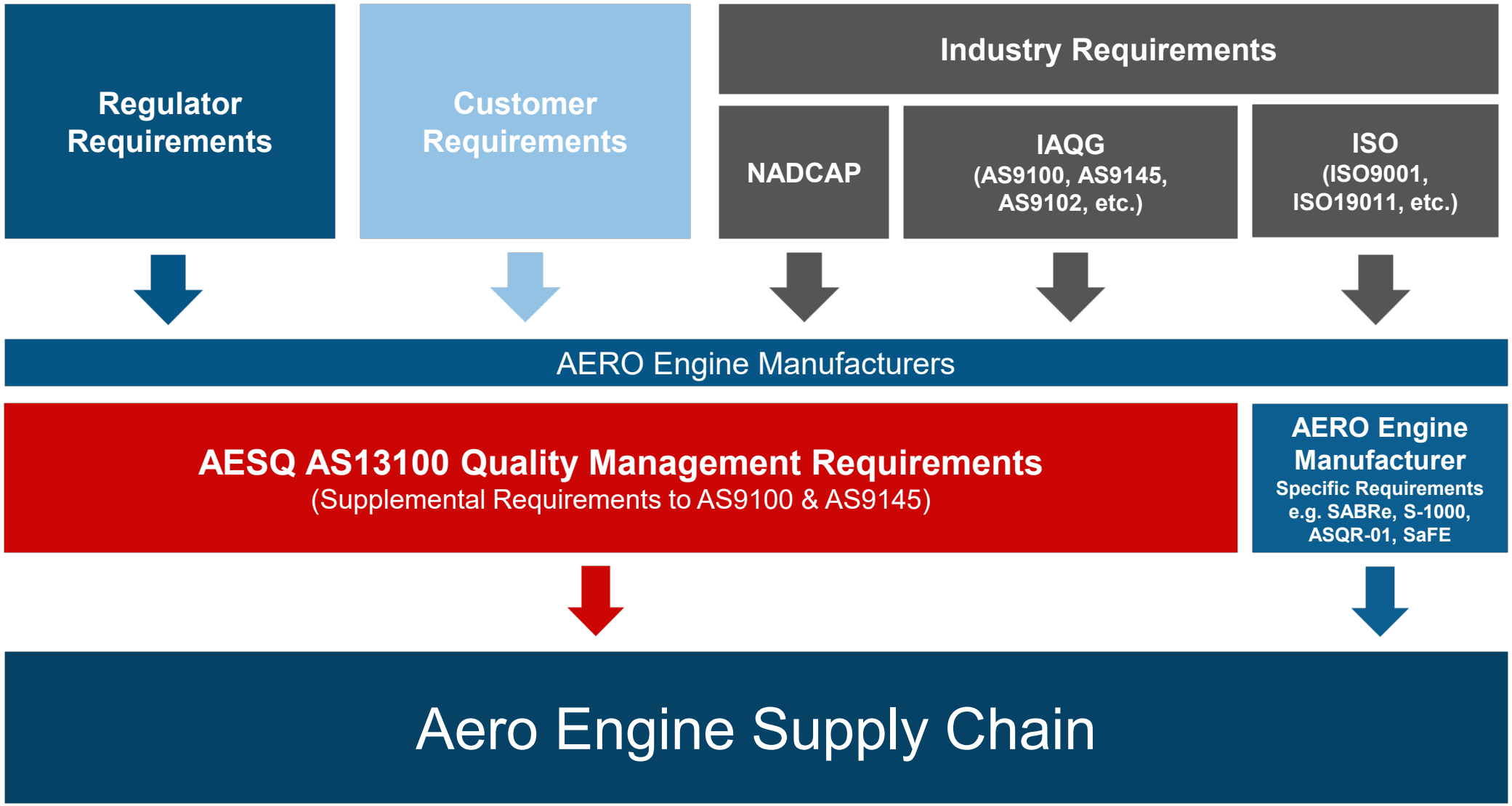
98% of features Cpk >2, the other 2% Cpk >1.67

Zero Defect standard met since production start (5,000 blades)

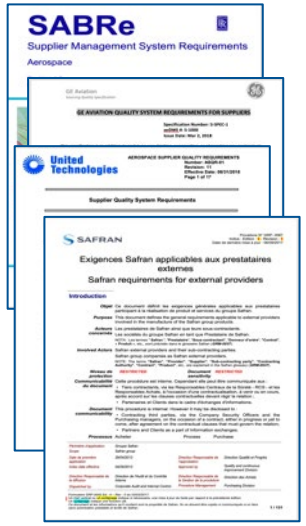
AS13100 OVERVIEW
STRUCTURE & KEY HIGHLIGHTS

LARRY BENNETT
CONSULTING ENGINEER, GLOBAL SOURCING QUALITY
SUPPLY CHAIN DIVISION
GE AVIATION

Aero Industry Requirements Future Vision



AS13100 Creation Process



Starting Point September 2018

OEM Unique Requirements

Future Engine Maker Supplier Requirements

Existing Engine Maker Supplier Requirements

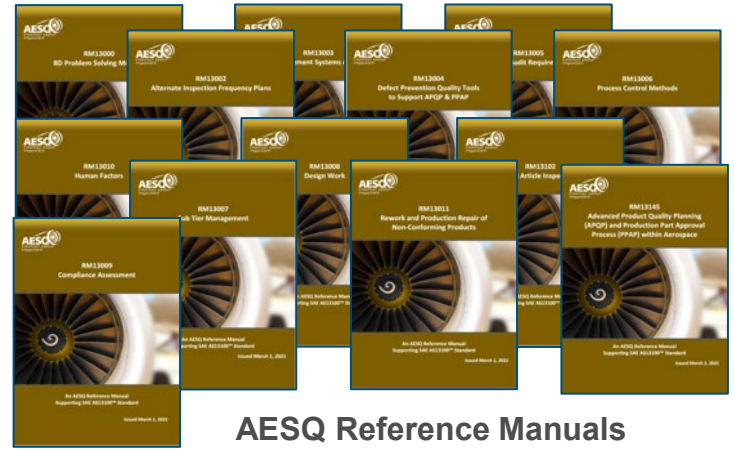
Harmonized Requirements

Overall Number of Requirements reduced by >50%

Requirements

Existing & WIP AESQ Standards

Supporting Guidance & Best Practice Material



AESQ Reference Manuals

AS13100 Structure

AS13100 Requirements	Chapter A AS9100 Rev D Supplemental Requirements										Chapter B APQP & PPAP AS9145 Supplemental Requirements						Chapter C Defect Prevention Quality Tools to Support APQP & PPAP							
Clause Number	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	DFMEA	Product KCs	Process Flow Diag.	PFMEA	Process KCs	Control Plan	MSA	Process Capability

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

POLL QUESTION #1: Which organization type best describes your organization?

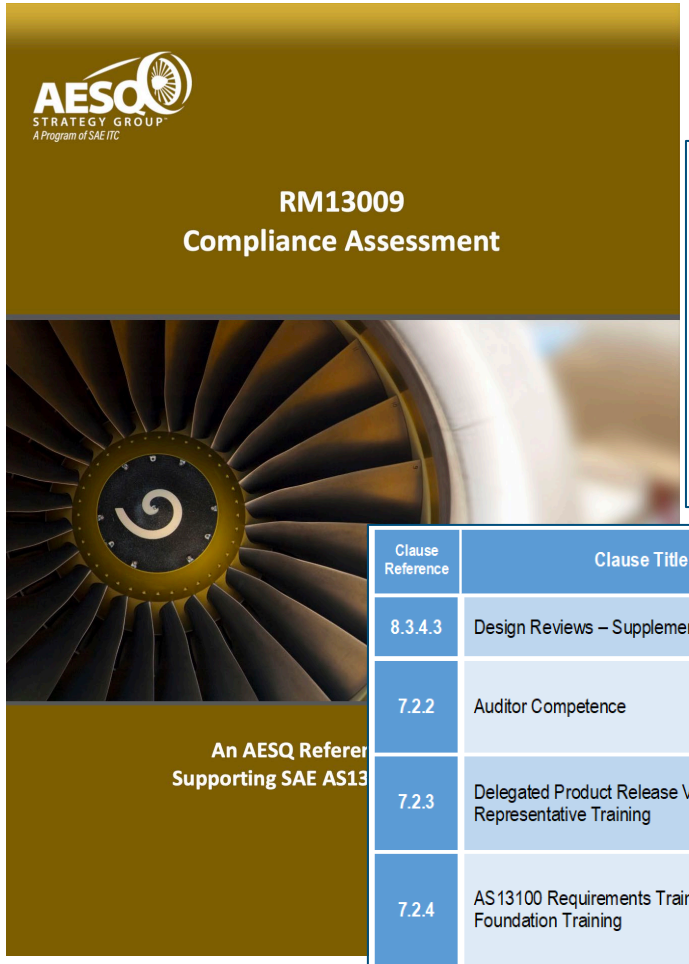
AS13100 PARAGRAPH REFERENCE	ORGANIZATION TYPE					
	TYPE 1: MAKE TO PRINT	TYPE 2A: DESIGN AND MANUFACTURE	TYPE 2B: DESIGN ONLY	TYPE 3: DISTRIBUTOR	TYPE 4: SPECIAL PROCESS	TYPE 5: RAW MATERIAL
4.3.1	X	X	X	X	X	X
4.3.2	X	X	X			
4.3.3	X	X	X	X	X	X
4.3.4	X	X	X	X	X	X
4.3.5	X	X	X	X	X	X
4.4.3	X	X	X	X	X	X
5.1.1.1	X	X	X	X	X	X
5.2.1.1	X	X	X	X	X	X
5.3.1	X	X	X	X	X	X
6.1.3	X	X	X	X	X	X
7.1.3.1	X	X	X	X	X	X
7.1.5.1.1	X	X			X	
7.1.5.1.2	X	X			X	
7.1.5.1.3	X	X			X	

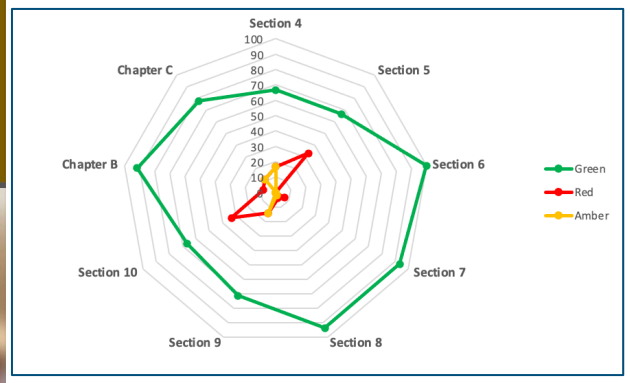
Table 1 provides a guide to the applicability of AS13100 Sections to Organization scope.

ORGANIZATION TYPE	QMS APPROVAL (MINIMUM REQUIREMENT)
Type 1: Make to Print and Type 2A: Design and Manufacture. **Manufacture, inspect, test, and certify the conformance of semi-finished and/or finished products (installed on aerospace engines or a component of such a product) to proprietary engineering drawings whether customer design, or organization design.**	9100 registration.
Type 2B: Design only. **Contracted Design Responsible Organization / Partner / Supplier tasks Organizations.**	As defined by Customer's requirements.
Type 3: Distributor.	9120 registration.
Type 4: Special Process (2.3). **As part of an Organizations manufacturing scope and/or Special Process Houses.**	Nadcap or Customer's requirements.
Type 5: Raw Material. **Manufacture, inspect, test, and certify the conformance of Raw Material to proprietary engineering specifications.**	ISO9001 registration.
Production Shop Assist Only. **Offload of planned manufacturing operations.**	Per Organizations Requirements based upon scope of work, unless specified by the customer.
External Calibration or Laboratory Service Provider.	ISO / IEC 17025 or National Equivalent, e.g., UKAS, COFRAC, NIST.
Industry Standard Part or Industry Standard Raw Material Manufacture.	ISO9001 registration.
Castings and Forgings produced to a proprietary design.	9100 registration.

Table 2 defines an agreed set of Certification Requirements, matched to the scope of the supplier's activities.

AS13100 Requirement Highlights





Clause Reference	Clause Title / Subject	Organization Process Reference (or comment)	Compliance Status
8.3.4.3	Design Reviews – Supplemental Planning	Not a Design responsible supplier	N/A
7.2.2	Auditor Competence	Auditor competence requirements are defined in our QMS in procedure number QP005, Rev D. This procedure fully complies with the requirements of AS13100 clause 7.2.2.	G
7.2.3	Delegated Product Release Verification (DPRV) Representative Training	All relevant inspection personnel are trained in accordance with this requirement. It is defined in our QMS in procedure number QP009, Rev B.	G
7.2.4	AS13100 Requirements Training & AESQ Quality Foundation Training	We have identified five personnel within the business that require this 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).	A
7.3.1	Human Factors Awareness	We do not have a Human Factors program at this time. The organization's leadership team are currently reviewing our future approach to HF.	R

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.

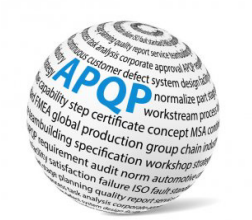
The results of this review are to be provided to the customer upon request.

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

Reference Manual RM13009 provides information to support this requirement.

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.

Dr Ian Riggs
Rolls-Royce
Writing Team Leader

Larry Bennett
GE Aviation
Writing Team Deputy Leader

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Raytheon

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Pratt & Whitney

Jim Wilson
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Safran Aircraft Engines

Paula Adkins
Rolls-Royce

Peter Amsden
Pratt & Whitney

Thank you to the 99 Subject Matter Experts who created the Reference Manuals

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Ake Winkvist
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Benoit Gottie
Björkälv Håkan
Brian Murphy
Carrie Sharkey
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Paul Hacker
Perr Rendell
Pete Bilbie
Pete Teti
Peter Papadopoulos
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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:

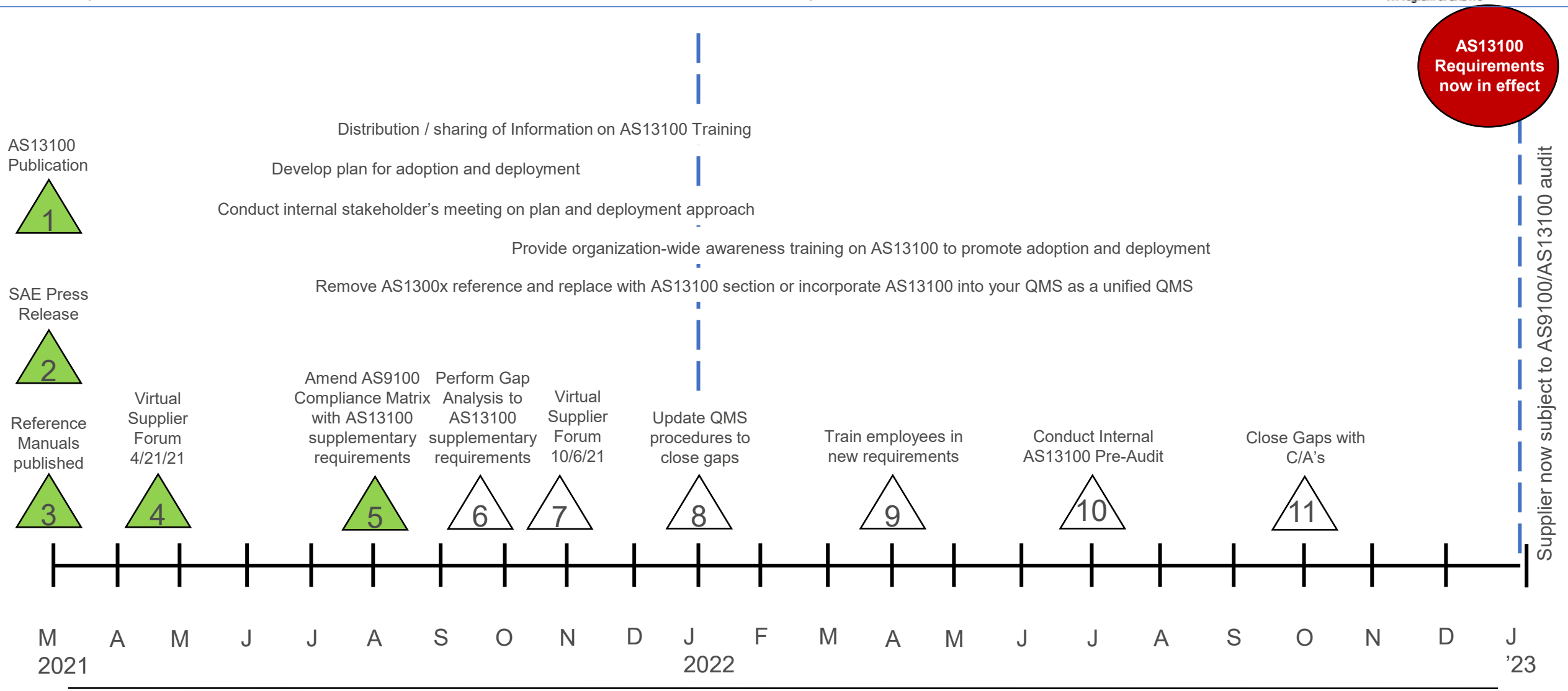
→ https://aesq.sae-itc.com/content/aesq-documents

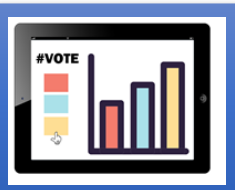
Reference Manuals provide industry best practice guidance and case study material on how to deploy quality tools effectively.

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 Supplier Preparation Milestone Plan

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





POLL QUESTION #2:

AESQ STRATEGY GROUP
A Program of SAE ITC

Where is your company in the deployment of AS13100?

Please choose the option that best describes where you feel your company is:

1. Still trying to figure out what this means to my company
2. Performing the gap analysis utilizing RM13009
3. Updating my procedures to close gaps
4. Conducting the Quality Foundation training with my employees
5. Conducting Internal Pre-Audit

QUESTIONS?

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

Question & Answer “Q&A” Ground Rules

We will now accept questions via the Chat function focused on but not limited to:

- 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…

FUTURE EVENTS

JUN SAKAI
CHIEF ENGINEER
IHI CORPORATION

Future Events

- Review videos and presentations from previous Supplier Forums on the AESQ website.
- Watch for future events:
  - AESQ Human Factors Webinars:
    - 30 November 2021 | 9am – 11am Paris (+1 GMT)
    - 12 January 2022 | 4pm – 6pm Paris (+1 GMT)
  - AESQ Supplier Forums
    - April 2022

Visit the AESQ website for more information on these exciting events!

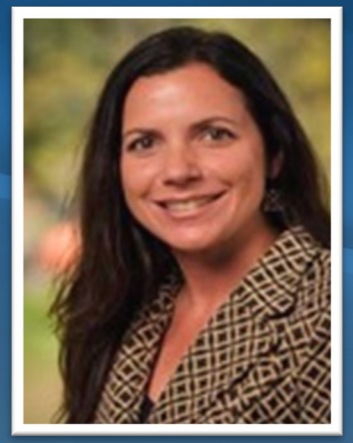
“Get Involved” – Communities of Practice

- Join an AESQ **Community of Practice** on LinkedIn
- 7 Communities of Practice are active
- Visit Subject Matter Interest Groups page on AESQ website or
- Search LinkedIn “AESQ Community of Practice”

AESQ Subject Matter Interest Groups

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

SUMMARY



BARBARA NEGROE
EXECUTIVE SOURCING QUALITY LEADER
GE AVIATION

Summary

AESQ Thanks You for Participating!

Stay in Touch: aesq.sae-itc.com