AESQ Supplier Forum – AS13100 Deployment

23 February 2023 | Derby, England, UK

Welcome & Introductions

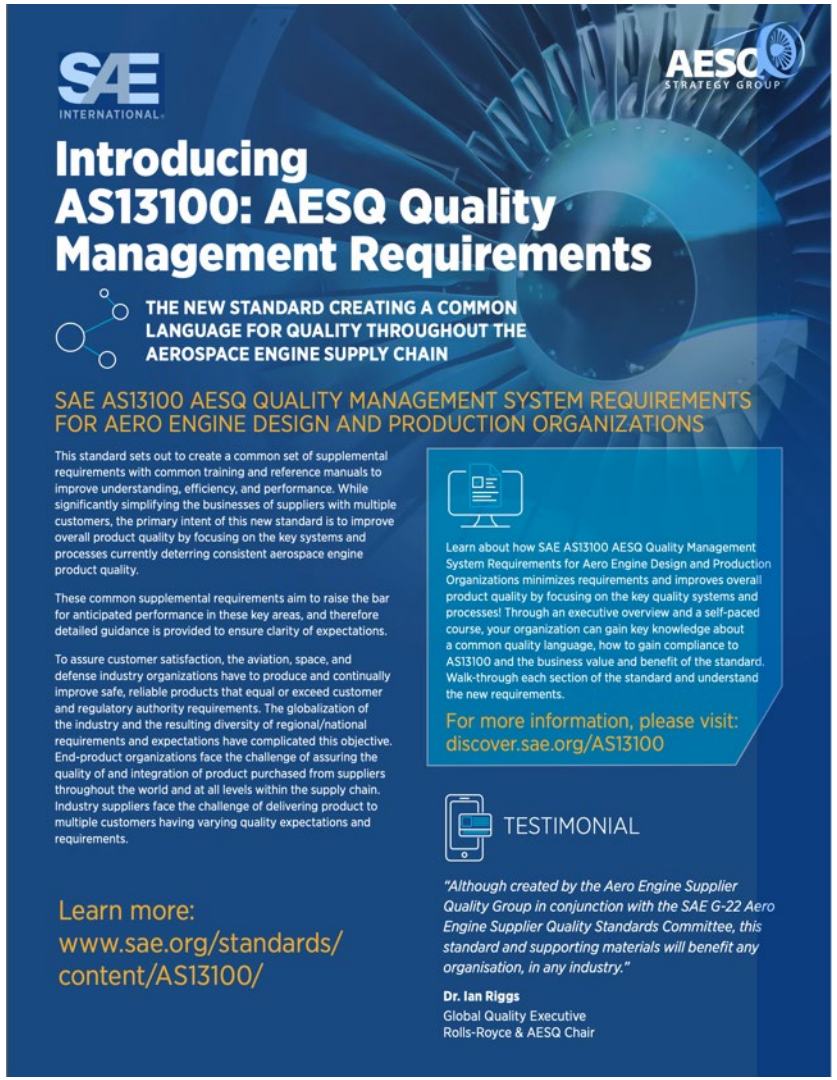
AESQ Supplier Forums

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

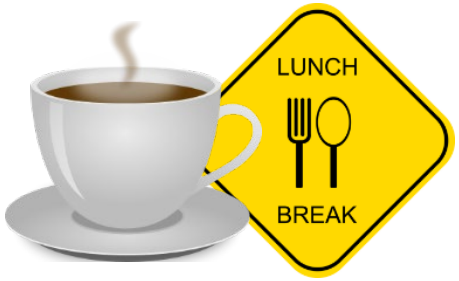
AESQ Supplier Forums provide an opportunity to:

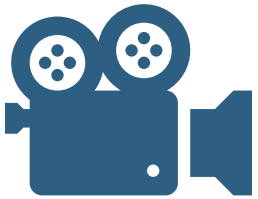
- Provide updates on the work of the AESQ
- Share best practices
- Provide feedback to the AESQ
- Develop a network of practitioners and Subject Matter Experts

AESQ Supplier Forums: Focus on AS13100 Deployment



Housekeeping





Today's event is being recorded and will be available on the AESQ website for viewing

Agenda

Topic	Presenter
Welcome & Introductions	**Barbara Negroe**, Executive Sourcing Quality Leader, GE Aviation
Rolls-Royce Welcome Address	**Sebastian Resch**, Operations Director, Civil Aerospace, Rolls-Royce **Peter Lord**, Quality Director Operations, Civil Aerospace, Rolls-Royce
AESQ Overview, Vision & Objectives	**Jim Wilson**, Sr. Manager, Supplier Quality, & Development, Pratt & Whitney Canada
AS13100 Standard Overview	**Helen Djäknegren**, Director Supplier Quality & Development, GKN Aerospace
Deployment & Transition to AS13100	**Uzam Khan**, Supplier Quality Executive, Civil Aerospace Operations, Rolls-Royce **Jim Wilson**, Sr. Manager, Supplier Quality, & Development, Pratt & Whitney Canada
BREAK – 20 MINUTES	

Agenda

Topic	Presenter
Best Practices for Human Factors	**Ian Riggs**, Quality & HSE Executive, Customer, Assembly & Test, Rolls-Royce, & **Steve Roebuck** Head of Certification, Rolls-Royce
Breakout Session #1 – Subject Matter Interest Groups (SMIGs)	• **APQP & PPAP** (RM13145) – Karl Evans, Rolls Royce • **Human Factors** (RM13010) – Chris Craig, Rolls Royce & Ludovic Chevet, Airbus • **Defect Prevention** (RM13004) – Ian Riggs, Rolls-Royce & Rob Farndon, Rolls-Royce, & **Harj Sanghera**, Rolls-Royce • **Compliance Assessment** (RM13009) and **Quality Audit Methods** (RM13005) – Jim Wilson, Pratt & Whitney, & Pete Bilbie, Rolls-Royce • **Process Control** (RM13006) – Shailesh Shinde, Rolls-Royce • **Sub-Tier Management** – **Helen Djäknegren**, Director Supplier Quality & Development, GKN Aerospace
GROUP PHOTO & LUNCH – 60 MINUTES	
Training Overview	**Jun Sakai**, Chief Engineer, IHI
Breakout Session #2 – Zero Defects	**Uzam Khan**, Supplier Quality Executive, Civil Aerospace Operations, Rolls-Royce

Agenda

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

How to Contribute – Live Poll Questions

How to answer live poll questions:

1. Scan the QR Code on your table
2. Enter the Passcode
3. Answer the Question
4. Add any questions during the day in the Slido App ("Like" a question)

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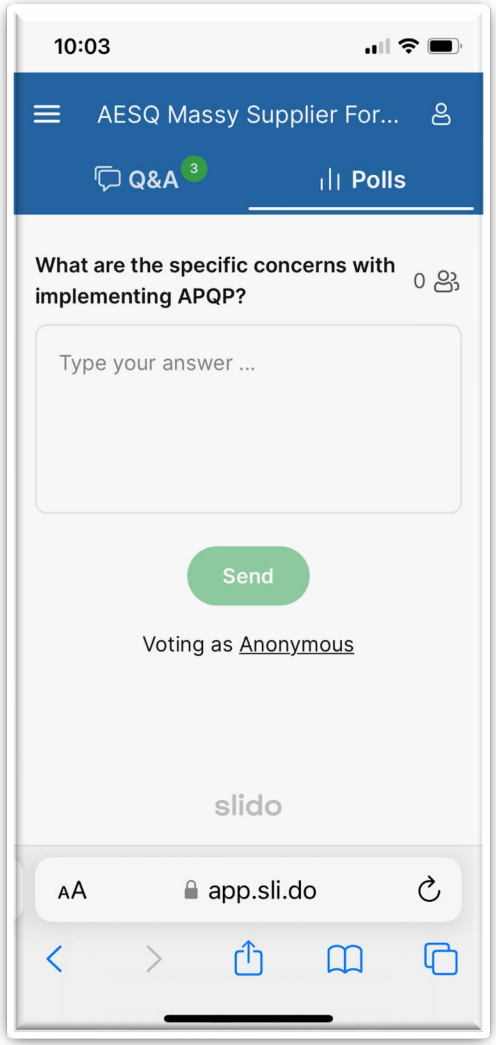
Join at

slido.com

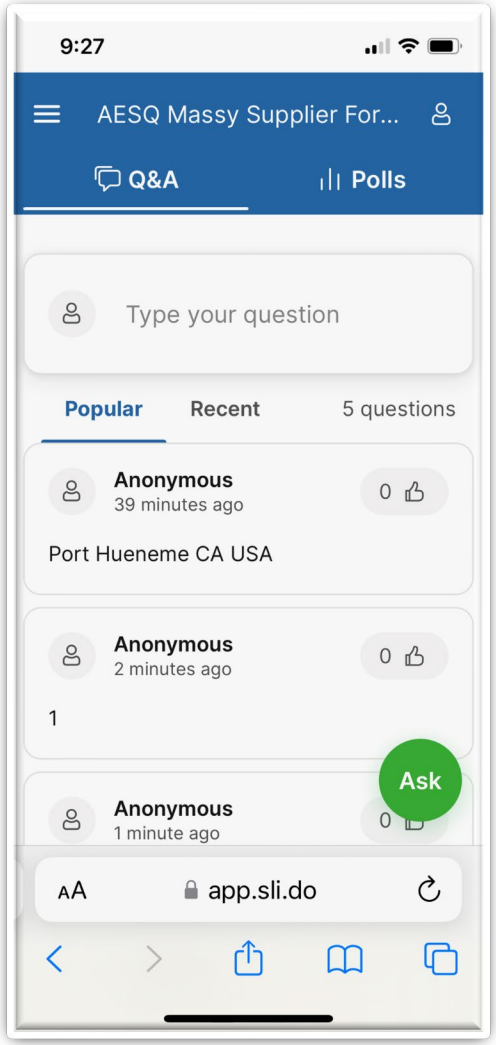
#3593 254

Passcode: **cy7vwf**

How to Use Slido Live Polling App?



Answer Live Poll Questions



Add Your Questions

"Like" Questions

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What is the name of the city where you live?

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What function are you in?

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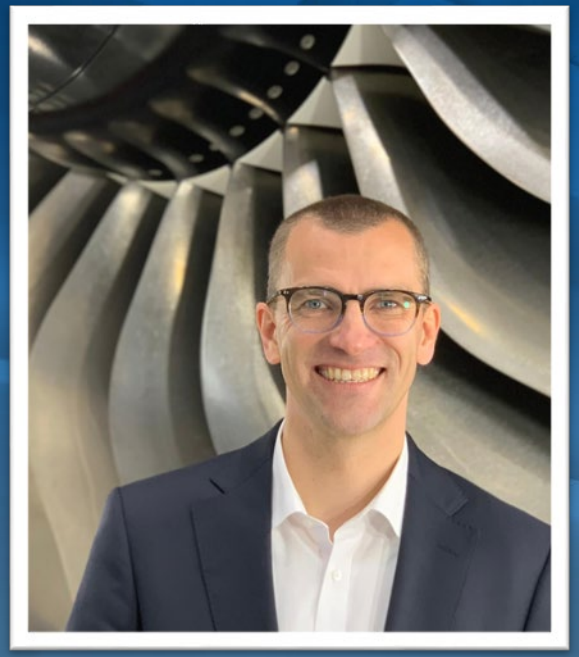
WELCOME ADDRESS



SEBASTIAN RESCH
DIRECTOR OF OPERATIONS
CIVIL AEROSPACE
ROLLS-ROYCE

PETER LORD
DIRECTOR OF OPERATIONS QUALITY
CIVIL AEROSPACE
ROLLS-ROYCE

Our world is changing rapidly…

Rising interest rates

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

High inflation

Reaching highest levels in decades in our home countries

Digitalisation

87%

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

Climate change

91%

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

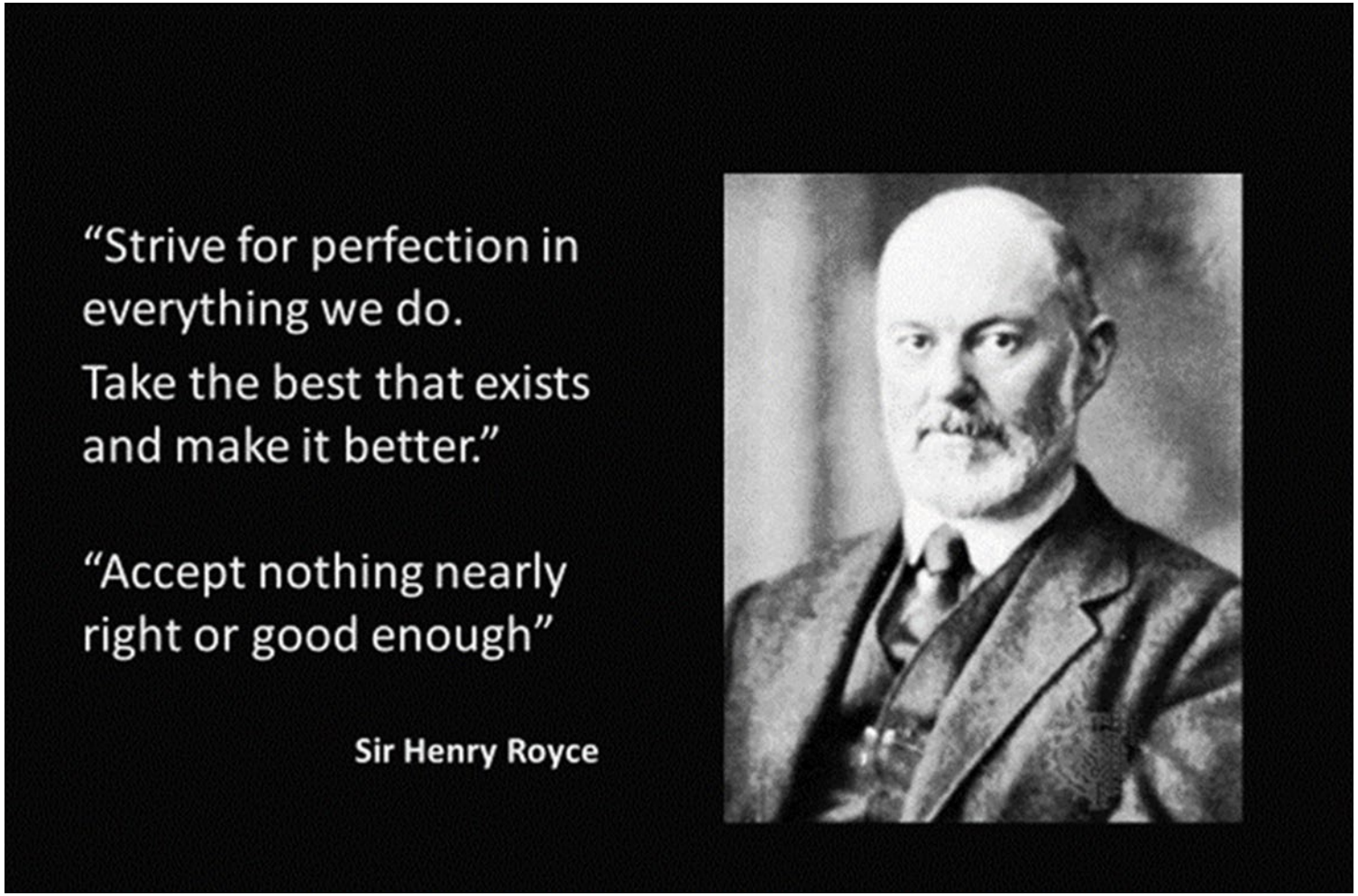
Shifting geopolitics

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

"Today is the slowest day you'll know for the rest of your lives"

Dr Ian Goldin, Professor at University of Oxford

Our world is changing rapidly, but our commitment to Quality has never changed…



Where are we today?

THE GOOD

45%

14600
2022 Concessions

50%

2023 Concessions

THE BAD

£180m

2022 CONQ

Customer Disruption

THE UGLY

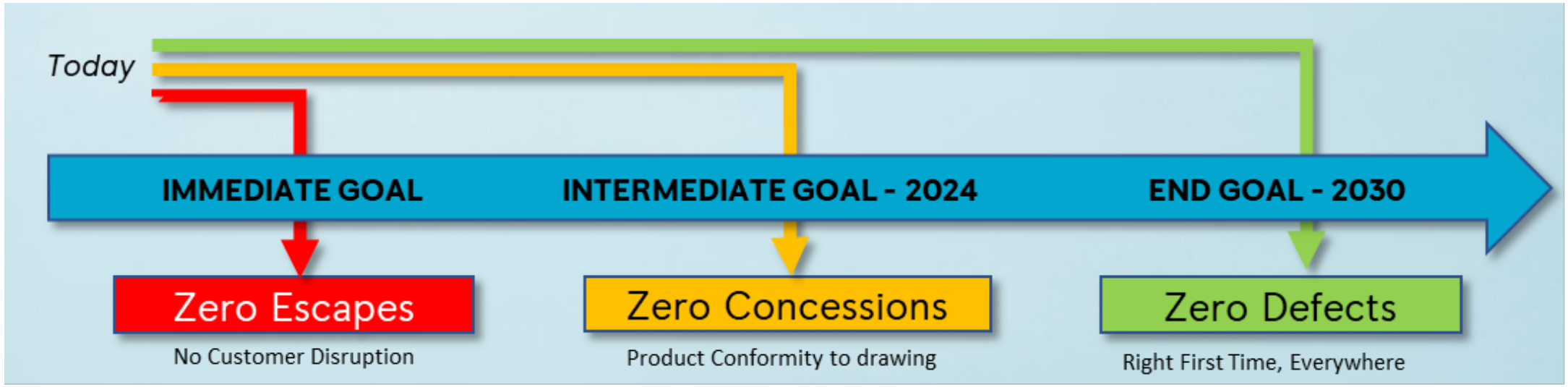
530

Quality Escapes in 2022

30%

2023 Escapes

Our Road to Zero Defects



Pioneering a Culture of Zero Defects

Our Framework for Zero Defects

Our Commitment to the AESQ

Founding Member

Key part of the Writing Team

SABRe 4 is largely AS13100

Represented in all the Subject Matter Interest Groups

Over 200 people trained on the AS13100 Foundation 3 Day training

2030

OUR ZERO DEFECTS MISSION

AERO ENGINE SUPPLIER QUALITY GROUP (AESQ) OVERVIEW

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

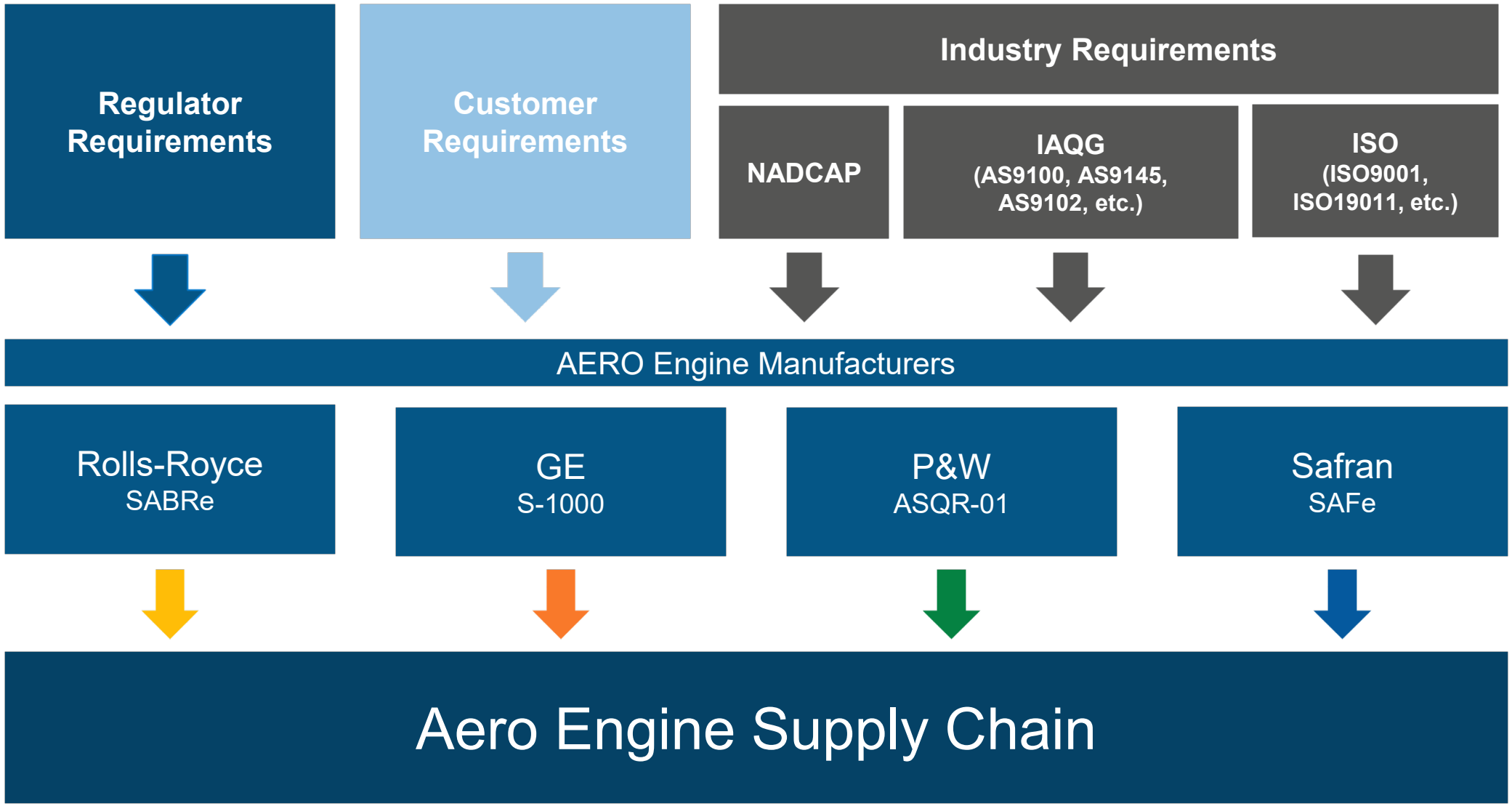
Aero Engine Industry- The world ten years ago

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

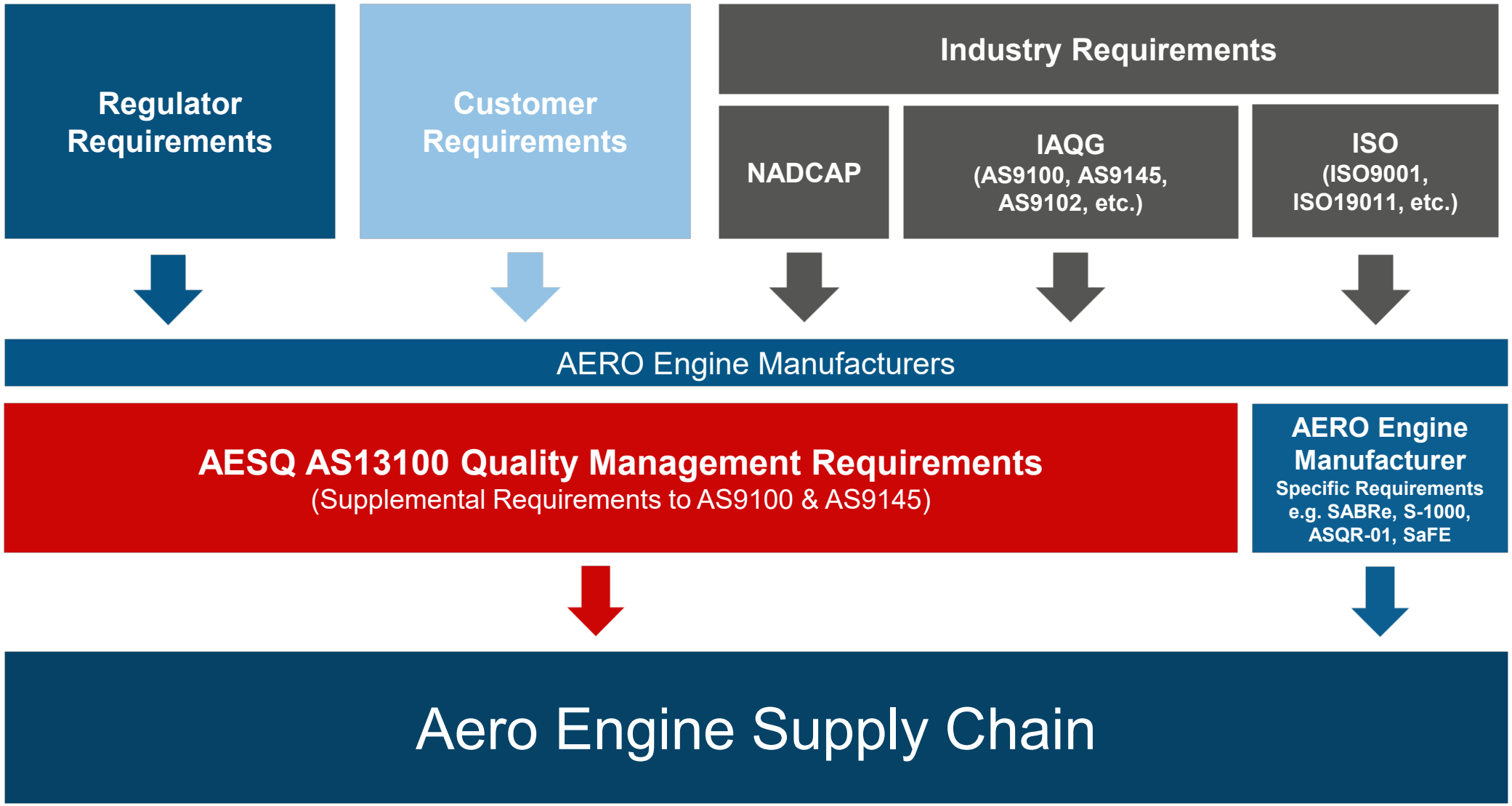
Aero Engine Manufacturers created a Collaboration working group in 2013 to address the challenges with key Global Suppliers

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

Aero Industry Requirements Flowdown in 2012



Aero Industry Requirements Current State



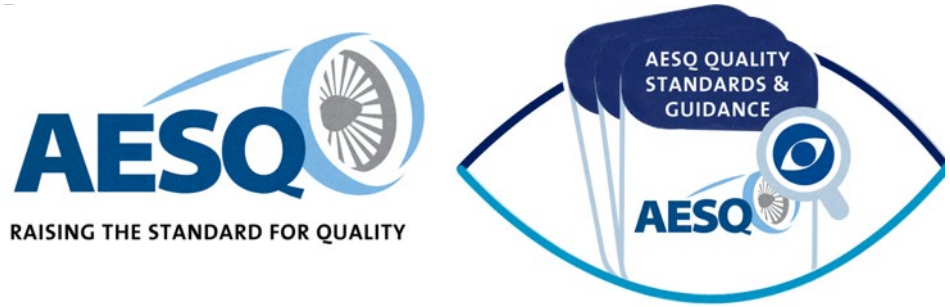
AESQ Vision

Striving for Zero Defects

Vision

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

Guiding Principles



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

AESQ Strategy Group Company Members

AESQ Members

Cincinnati Thermal Spray
Collins Aerospace
Consolidated Precision Products
Parker Meggitt
Rolled Alloys
Solar Atmospheres
Woodward

AESQ Strategy Group Members

Barbara Negroe
Executive Sourcing Quality Leader
GE Aerospace

Lisa Claveloux
Sr. Director Quality
Pratt & Whitney

Helen Djäknegren
Director Supplier Quality
& Development
GKN Aerospace

Uzam Khan
Supplier Quality Executive
Rolls-Royce

Denis Pottier
Head of Purchasing Quality
Assurance Department
Safran Aircraft Engines

Jun Sakai
Chief Engineer
IHI Corporation

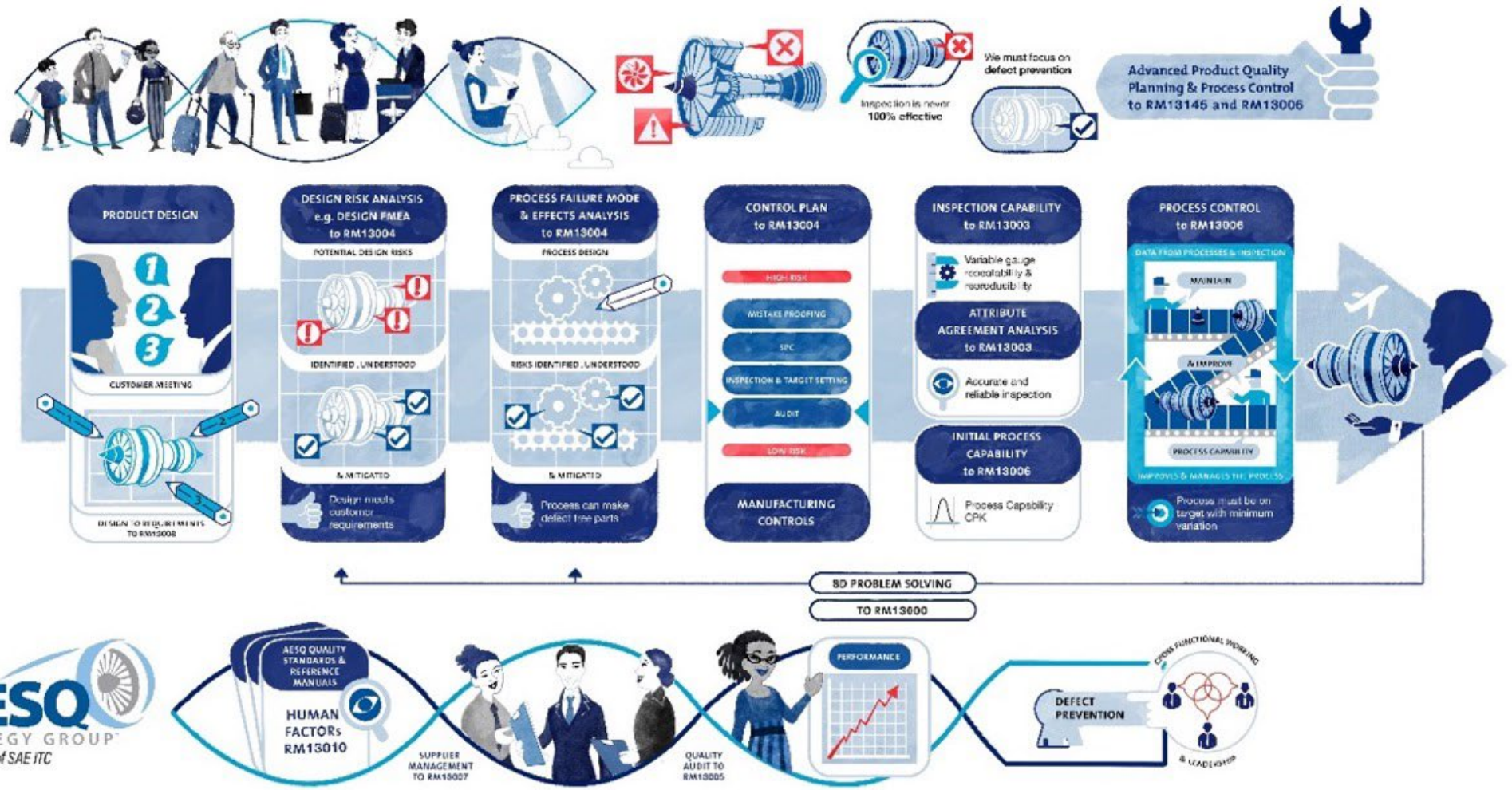
Barrie Hicklin
Sr. Director, Quality Systems
& Regulatory Compliance
Honeywell

Markus Braig
Director Quality Supply Chain
and MRO
MTU Aero Engines

James Clifton
Global Quality Director
Precision Castparts Corp.

Osa Omoruyi
VP Quality
Howmet Engine Systems

Defect Prevention Key Quality Tools for Zero Defects

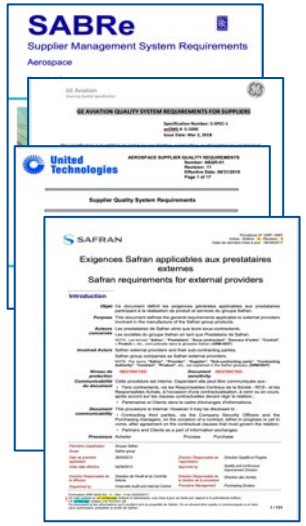


Defect Prevention Tools Must Work as a System

AS13100 OVERVIEW
STRUCTURE & KEY HIGHLIGHTS

HELEN DJÄKNEGREN
DIRECTOR, SUPPLIER QUALITY & DEVELOPMENT
GKN AEROSPACE

AS13100 Creation Process



Starting Point September 2018

OEM Unique Requirements

Engine Maker Supplier Requirements pre AS13100 introduction

Harmonized Requirements

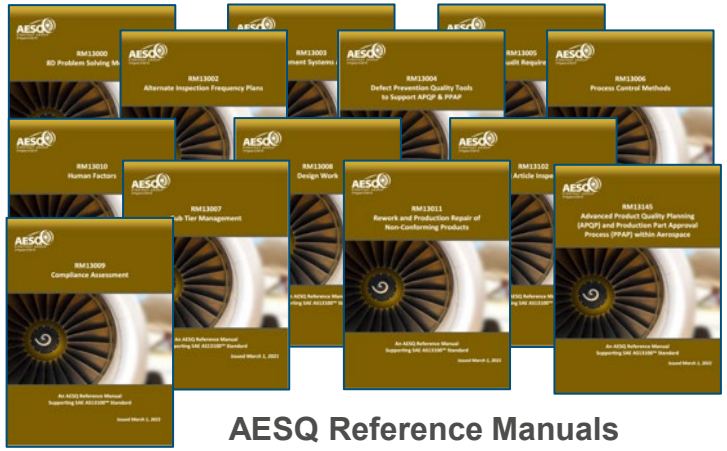
Future Engine Maker Supplier Requirements

Overall Number of Requirements reduced by >50%

Requirements

Existing & WIP AESQ Standards

Supporting Guidance & Best Practice Material



AESQ Reference Manuals

AS13100 Structure

AS13100 Requirements	Chapter A ISO9001/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

Customer Specific requirements are designed to include requirements that could not be harmonized within AS13100.

These documents shall:

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

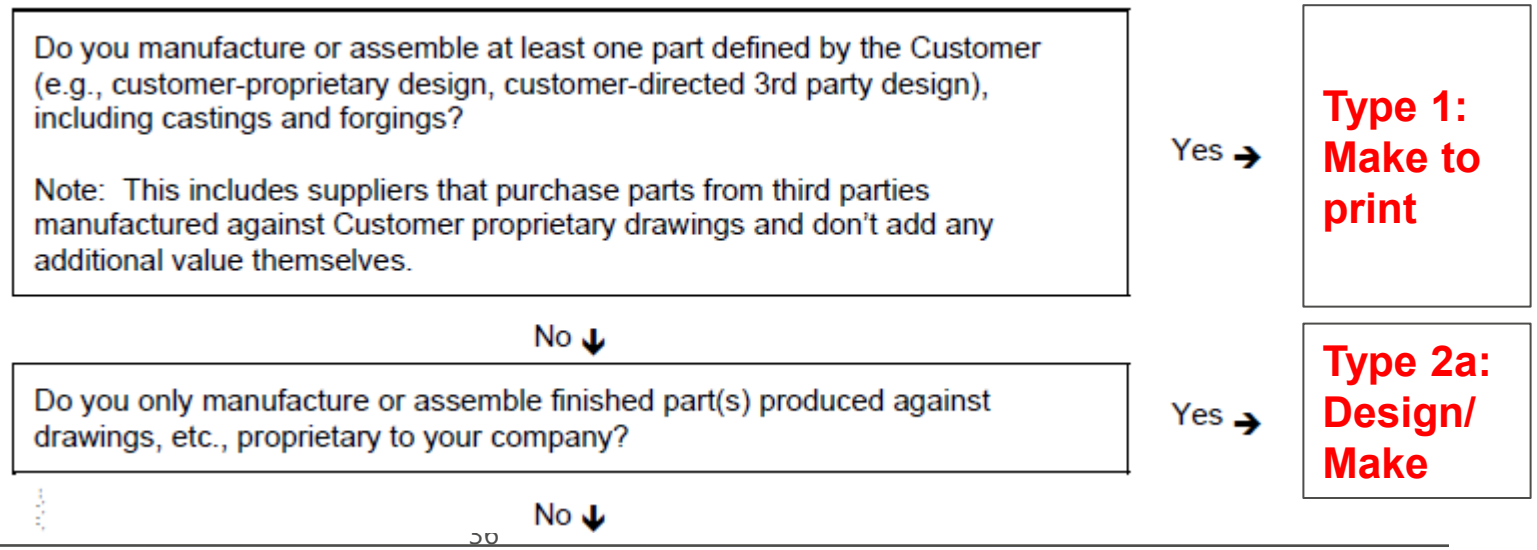
AS13100 Requirement Highlights

What requirements in AS13100 Chapter A apply to my organization ?

1. Determine what type of organization you are in Table 2
2. Agree the type with your customer
3. Identify your applicable requirements in Table 1
4. Deploy

Identify your organization type

Guidance in AS13100 Appendix B



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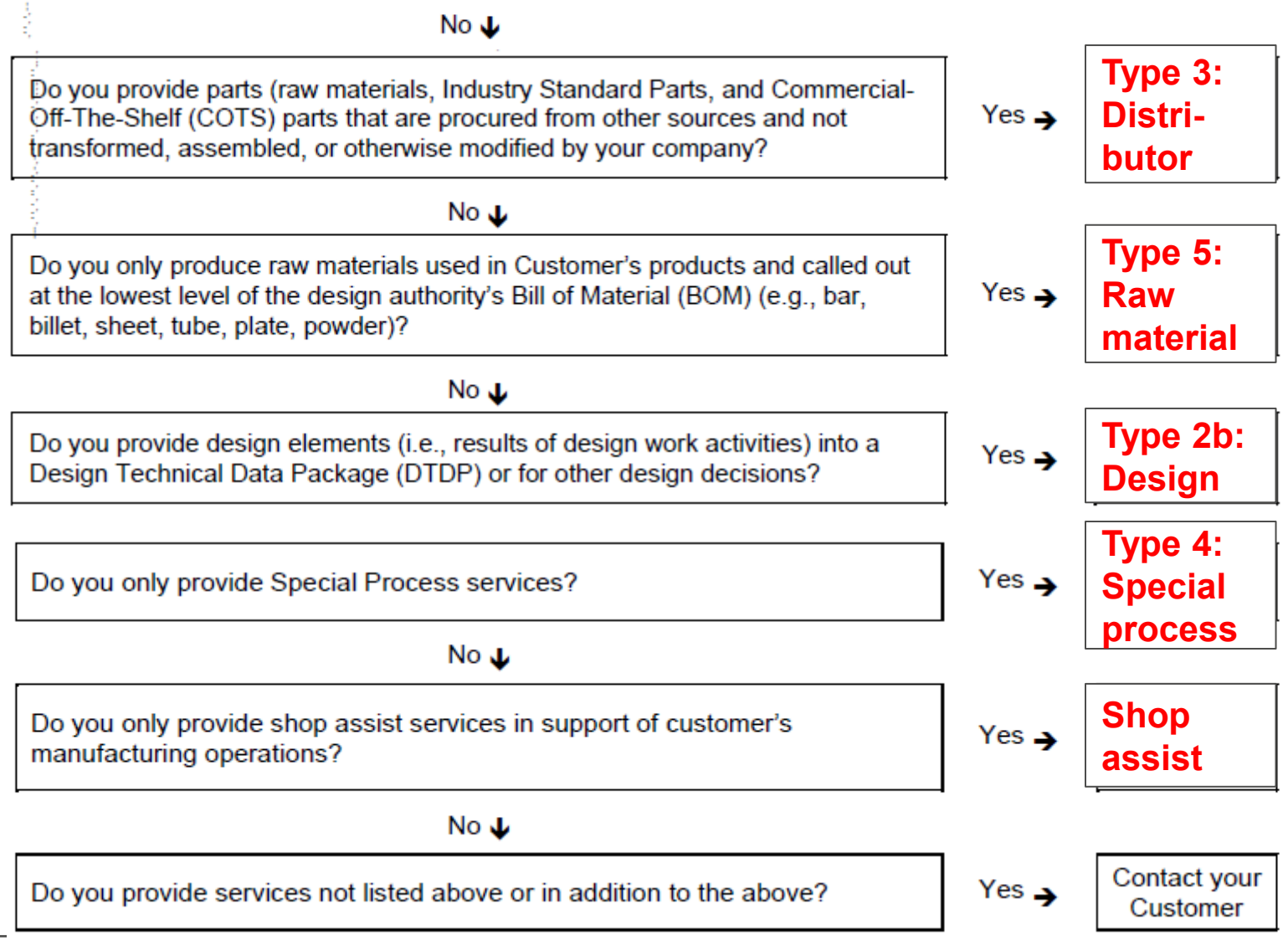
AS13100 Requirement Highlights

Identify your organization type – cont.

Ensure that you agree the type with your customer



AS13100 Requirement Highlights

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.

Identify your applicable AS13100 Chapter A paragraphs in Table 1

Deploy the requirements

slido

Which organization type best describes your organization?

ⓘ Start presenting to display the poll results on this slide.

AS13100 Benefits

1. **Single AESQ Standard aligned to AS9100 / ISO9001**
   - Less Requirements for the Supplier (>50% less)
   - Lower cost (suppliers do not need to buy multiple standards)
2. **Supported by Free Issue Reference Manual Guides**
3. **Will minimise the content of OEM Supplier Requirement Standards (SABRe, S-1000, ASQR-01 and SAFe)**
4. **Creates a common language for Quality, OEMs have adopted standard approaches within their own operations.**
5. **Aligns to relevant existing industry standards (ISO, AS9xxx, Nadcap, etc)**
6. **Supported by global approved training resources**
7. **Enables the AESQ OEMs to provide a harmonised approach to Supplier Development**
8. **Supplier Compliance continues to be assessed through Customer Audit**
9. **Allows AESQ to focus on Supply Chain Capability Development**

AS13100 Requirement Highlights

The current AS13xxx series of standards have been integrated into AS13100;

- AS13000 Problem Solving using 8D
- AS13002 Alternative Inspection Plans
- AS13003 MSA
- AS13004 Process FMEA and Control Plans
- AS13006 Process Control

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

AS13001 DPRV Training will remain unchanged.

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

NEW

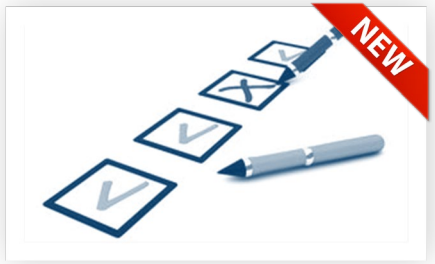
Recognizes NADCAP certification for special processes for both internal and external operations.

(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)

AS13100 Requirement Highlights

AS13100 requires four **Audit Types** to be conducted;

1) Quality Management System Audits
2) Production Process Audits
3) Product Audits
4) Special Process Audits

Organization's to produce an Annual Audit Report to summarize performance for Customer Review (Section 9.2.3)

Auditor Competence Requirements defined for;

- Qualifications
- Education
- Experience
- Ongoing professional development

(Section 7.2.2)

Quality Leaders are required to attend the AESQ **Quality Foundation Training** Class. Also recommended for other key personnel

(Section 7.2.4)

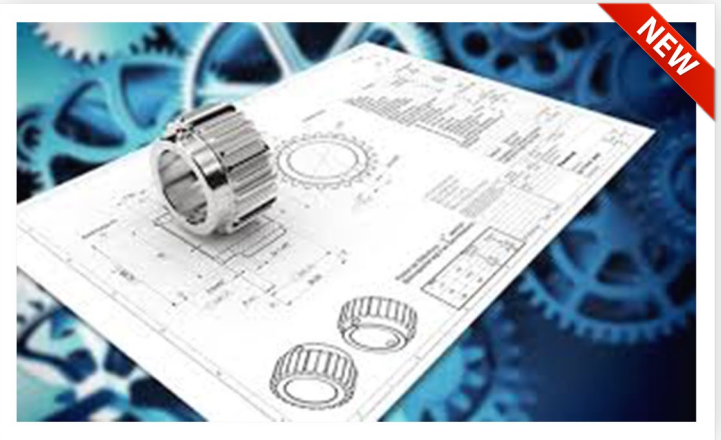
Organizations are required to provide **On the Job Training** that includes customer requirements, regulatory requirements, etc.

(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)

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

(Section 8.4.1)

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

AS13100 Requirement Highlights

Specifies the use of **AS5553** Counterfeit Electrical, Electronic and Electromechanical Parts and **AS6174** for Counterfeit Material

(Section 8.1.4.1 & 8.4.2.1)

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)

Defines the use of **8D Problem Solving** for key issues.

Additional guidance on Problem Solving when 8D's are not required to be included in the Reference Manual RM13000.

(Section 10.2.3)

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)

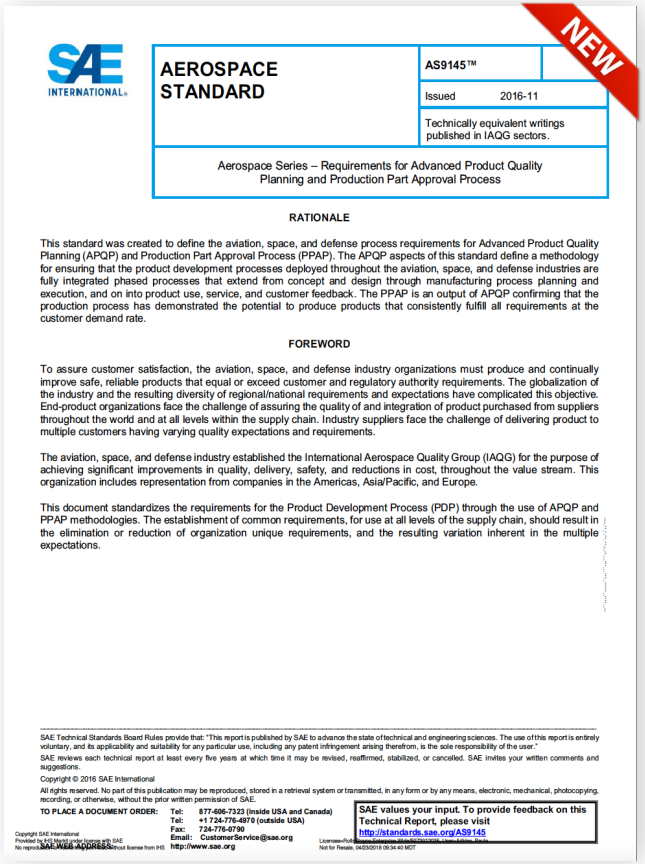
AS13100 Requirement Highlights: Chapter B APQP & PPAP

AS9145 APQP & PPAP required to manage;

- New Product Introduction
- Product & Design Changes
- Source Changes

Additional Quality Tools identified that are not in AS9145 APQP / PPAP

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



NEW

SAE INTERNATIONAL

AEROSPACE STANDARD

AS9145™

Issued 2016-11

Technically equivalent writings published in IAQG sectors.

Aerospace Series – Requirements for Advanced Product Quality Planning and Production Part Approval Process

RATIONALE

This standard was created to define the aviation, space, and defense process requirements for Advanced Product Quality Planning (APQP) and Production Part Approval Process (PPAP). The APQP aspects of this standard define a methodology for ensuring that the product development processes deployed throughout the aviation, space, and defense industries are fully integrated phased processes that extend from concept and design through manufacturing process planning and execution, and on into product use, service, and customer feedback. The PPAP is an output of APQP confirming that the production process has demonstrated the potential to produce products that consistently fulfill all requirements at the customer demand rate.

FOREWORD

To assure customer satisfaction, the aviation, space, and defense industry organizations must 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.

The aviation, space, and defense industry established the International Aerospace Quality Group (IAQG) for the purpose of achieving significant improvements in quality, delivery, safety, and reductions in cost, throughout the value stream. This organization includes representation from companies in the Americas, Asia/Pacific, and Europe.

This document standardizes the requirements for the Product Development Process (PDP) through the use of APQP and PPAP methodologies. The establishment of common requirements, for use at all levels of the supply chain, should result in the elimination or reduction of organization unique requirements, and the resulting variation inherent in the multiple expectations.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://standards.sae.org/AS9145

Additional Quality Tools identified that are not in AS9145 PPAP

1. DFMEA defined as the Design Risk Analysis tool
2. Defines AESQ Guidance Documents for PPAP elements
3. Initial manufacturing Performance Studies
4. Dimensional / non-Dimensional Results

Defines Submission Requirements for PPAP based on Supplier Performance;

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

AS13100 Supporting Reference Manuals

AS13100 Standard defines mandated requirements.

The Standard is supported by free issue Reference Manuals from the AESQ Website:

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

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

Reference Manuals are maintained and updated by the **AESQ Subject Matter Interest Groups** and may be updated at any time when new or revised information becomes available

AESQ is Seeking Feedback on AS13100

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

Email: info@aesq.sae-itc.org


SAE INTERNATIONAL

AEROSPACE STANDARD

AS13100™

Issued 2021-03

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

RATIONALE

This standard has been created by the SAE G-22 Aerospace Engine Supplier Quality (AESQ) Technical Committee to harmonize and simplify supplier quality requirements that are in addition to the requirements of 9100 Quality Management Systems - Requirements for Aviation, Space, and Defense Organizations and 9145 Advanced Product Quality Planning and Production Part Approval Process.

Previously the Aerospace Engine Manufacturers based their supplier quality requirements on 9100 but had differing supplemental requirements and guidance albeit with largely the same intent. These supplemental requirements originate from the need to meet Regulatory, Customer, Industry, and Business requirements that are not explicitly covered by 9100 and 9145.

This standard sets out to create a common set of supplemental requirements with common reference materials 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.

FOREWORD

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.

The SAE G-22 Aerospace Engine Supplier Quality (AESQ) Technical Committee was established under the SAE Aerospace Council to develop, specify, maintain, and promote quality standards relating to the aerospace engine supply chain. The principles defined within this standard may be applicable to other segments of the aviation, space, and defense industries.

The AESQ strategy is to promote defect prevention approaches across the supply chain including those associated with Advanced Product Quality Planning and Process Control to enable the supply chain to achieve Zero Defects.

AS13100 Standard

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada) Tel: +1 724-776-4970 (outside USA) Fax: 724-776-0790 Email: CustomerService@sae.org http://www.sae.org

SAE WEB ADDRESS:

For more information on this standard, visit https://www.sae.org/standards/content/AS13100/

DEPLOYMENT STATUS

UZAM KHAN
SUPPLIER QUALITY EXECUTIVE
ROLLS-ROYCE

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

Where are we?

March 2021
AS13100 Publication

Deployment Started

Target: December 31, 2022
- Transition Completed

Ongoing compliance activities 2023

GE Aviation

Pratt & Whitney
A United Technologies Company

ROLLS ROYCE

SAFRAN
AIRCRAFT ENGINES

Honeywell
Aerospace

MTU
Aero Engines

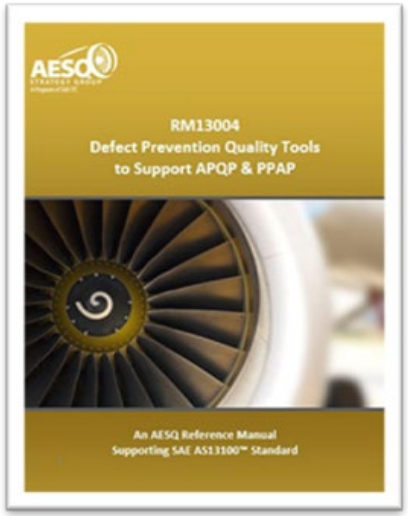
IHI

HOWMET AEROSPACE

GKN AEROSPACE

PCC Precision Castparts Corp.

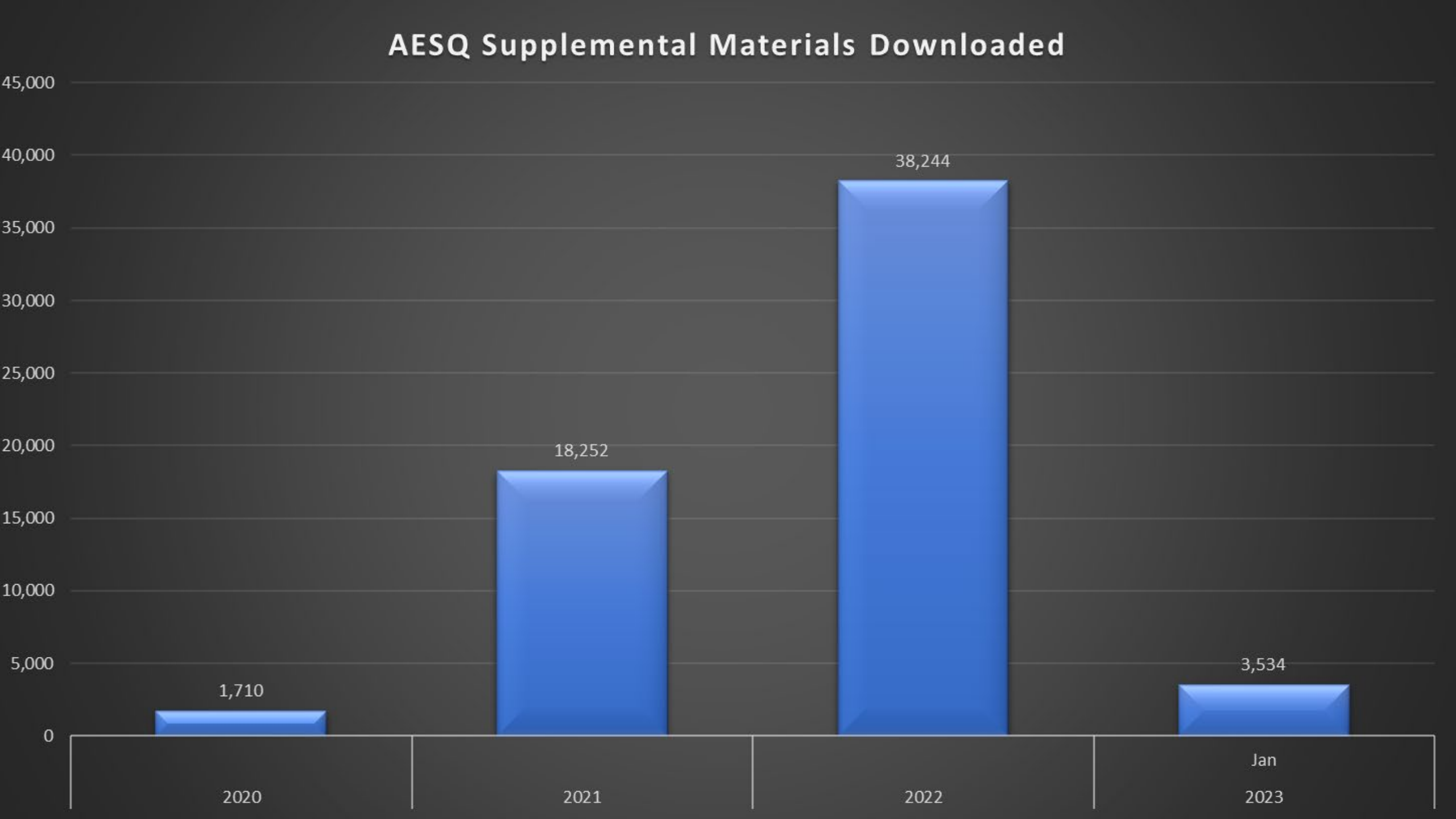
Resources are available for implementation concerns

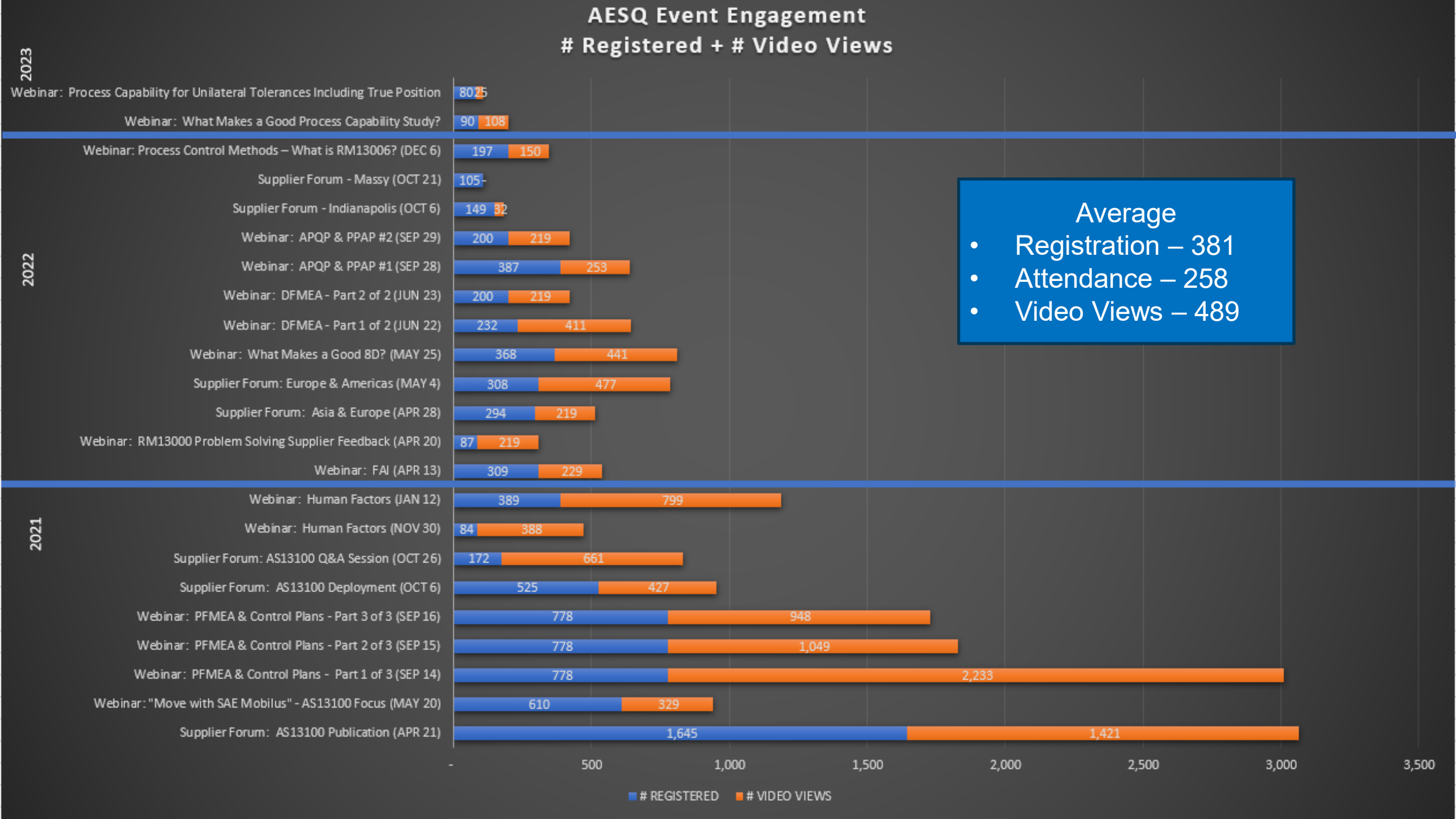


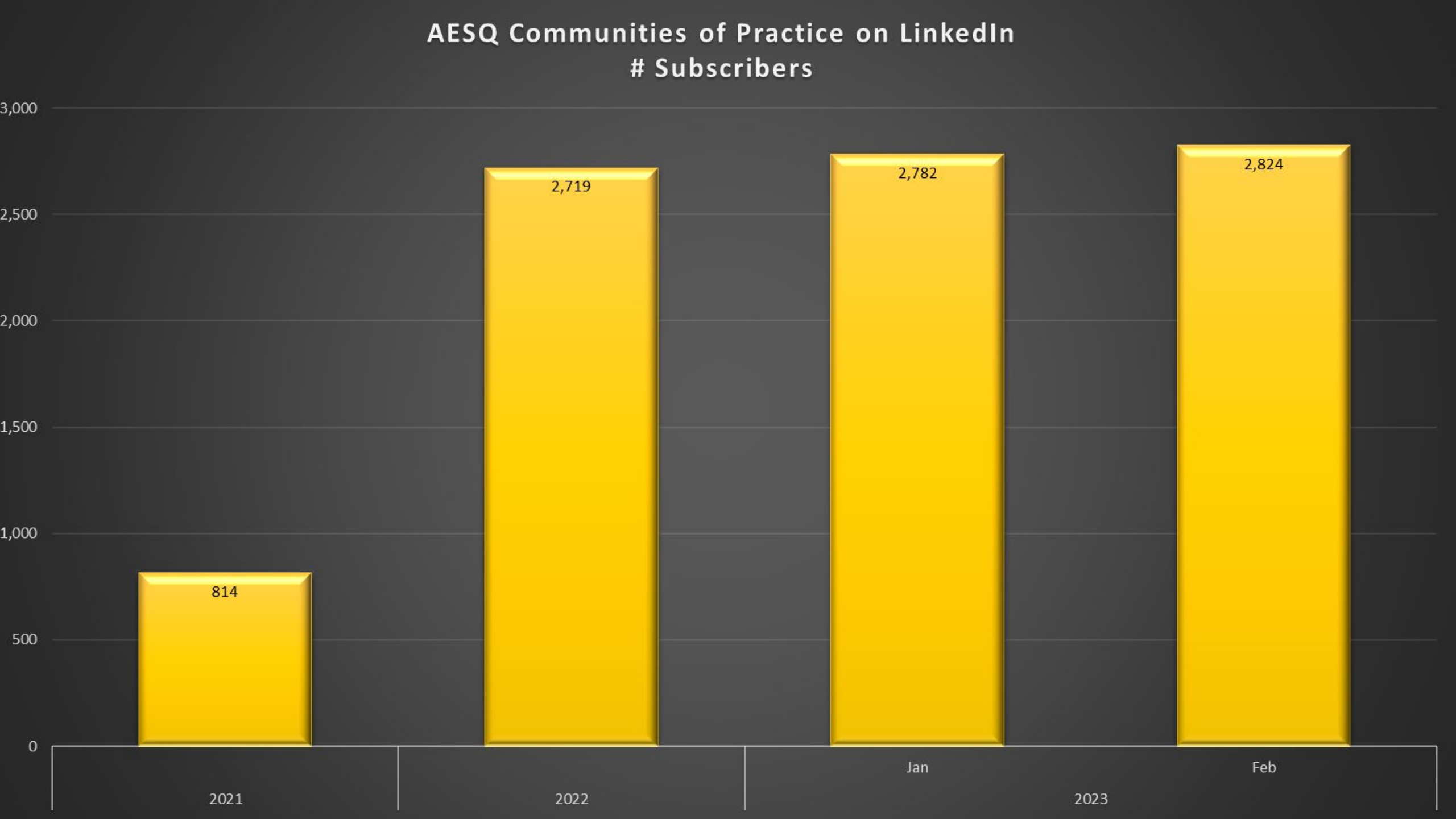
AESQ Subject Matter Interest Groups

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

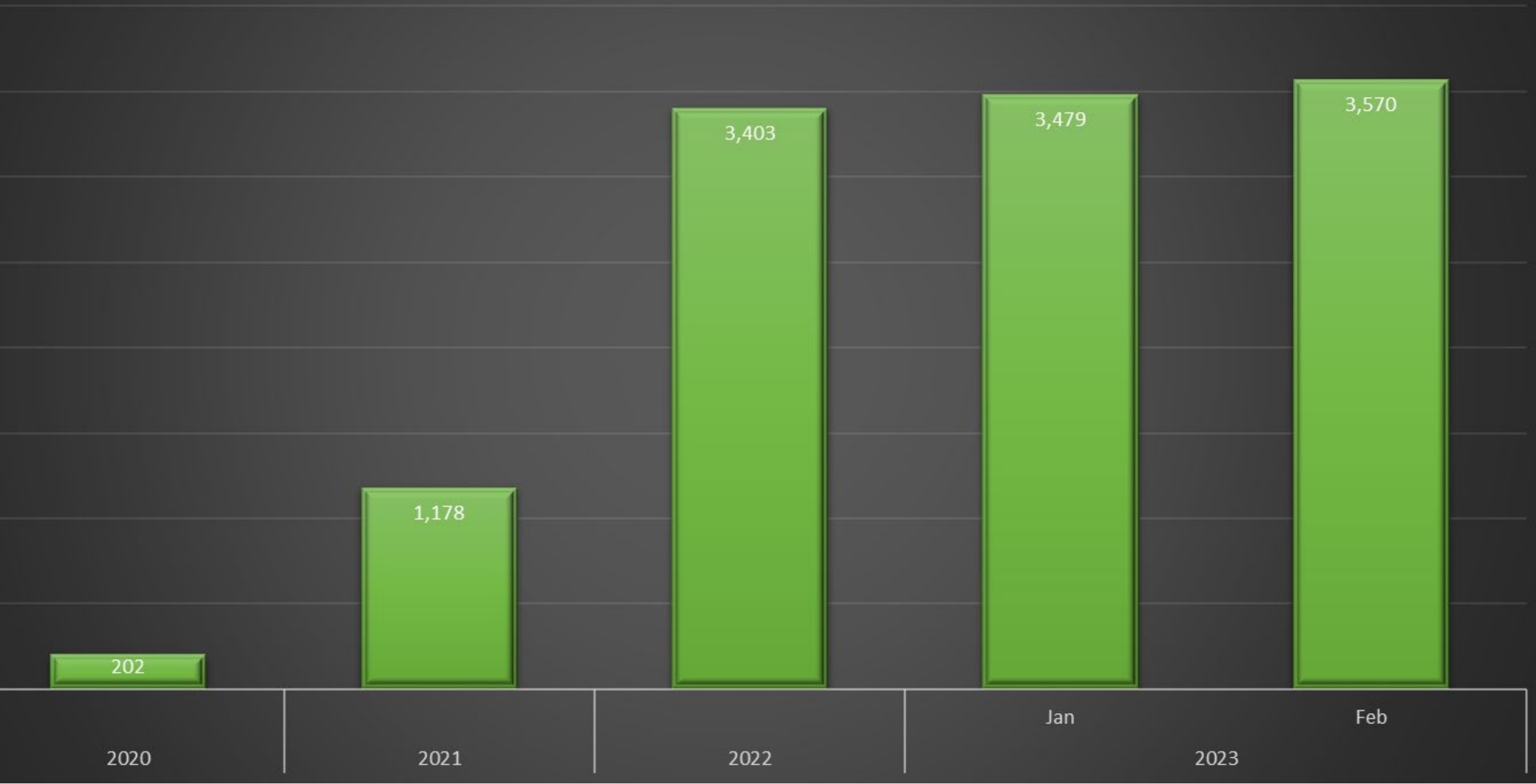
Reference Manual	Associated Forms
RM13000	Problem Solving Methods Including 8D • 8D Interactive Tool (PowerPoint) • 8D Reporting Template (Power Point) • 8D Word Form (Word) • 8D Template (Excel) • 8D Template (PowerPoint)


AESQ Supplemental Materials Downloaded
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1,710
18,252
38,244
3,534
2020
2021
2022
Jan
2023


AESQ Event Engagement
Registered + # Video Views
2023
Webinar: Process Capability for Unilateral Tolerances Including True Position
80
25
Webinar: What Makes a Good Process Capability Study?
90
108
2022
Webinar: Process Control Methods – What is RM13006? (DEC 6)
197
150
Supplier Forum - Massy (OCT 21)
105
-
Supplier Forum - Indianapolis (OCT 6)
149
32
Webinar: APQP & PPAP #2 (SEP 29)
200
219
Webinar: APQP & PPAP #1 (SEP 28)
387
253
Webinar: DFMEA - Part 2 of 2 (JUN 23)
200
219
Webinar: DFMEA - Part 1 of 2 (JUN 22)
232
411
Webinar: What Makes a Good 8D? (MAY 25)
368
441
Supplier Forum: Europe & Americas (MAY 4)
308
477
Supplier Forum: Asia & Europe (APR 28)
294
219
Webinar: RM13000 Problem Solving Supplier Feedback (APR 20)
87
219
Webinar: FAI (APR 13)
309
229
2021
Webinar: Human Factors (JAN 12)
389
799
Webinar: Human Factors (NOV 30)
84
388
Supplier Forum: AS13100 Q&A Session (OCT 26)
172
661
Supplier Forum: AS13100 Deployment (OCT 6)
525
427
Webinar: PFMEA & Control Plans - Part 3 of 3 (SEP 16)
778
948
Webinar: PFMEA & Control Plans - Part 2 of 3 (SEP 15)
778
1,049
Webinar: PFMEA & Control Plans - Part 1 of 3 (SEP 14)
778
2,233
Webinar: "Move with SAE Mobilus" - AS13100 Focus (MAY 20)
610
329
Supplier Forum: AS13100 Publication (APR 21)
1,645
1,421
Average
• Registration – 381
• Attendance – 258
• Video Views – 489
-
500
1,000
1,500
2,000
2,500
3,000
3,500
REGISTERED
VIDEO VIEWS


AESQ Communities of Practice on LinkedIn
Subscribers
3,000
2,500
2,000
1,500
1,000
500
0
814
2,719
2,782
2,824
2021
2022
Jan
Feb
2023

AESQ Newsletter Subscribers



AESQ Deployment Survey Overview

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

- 158 respondents
- Familiar with AESQ for existing AS13000 series documents

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

- 482 respondents
- 608 comments and suggestions analyzed

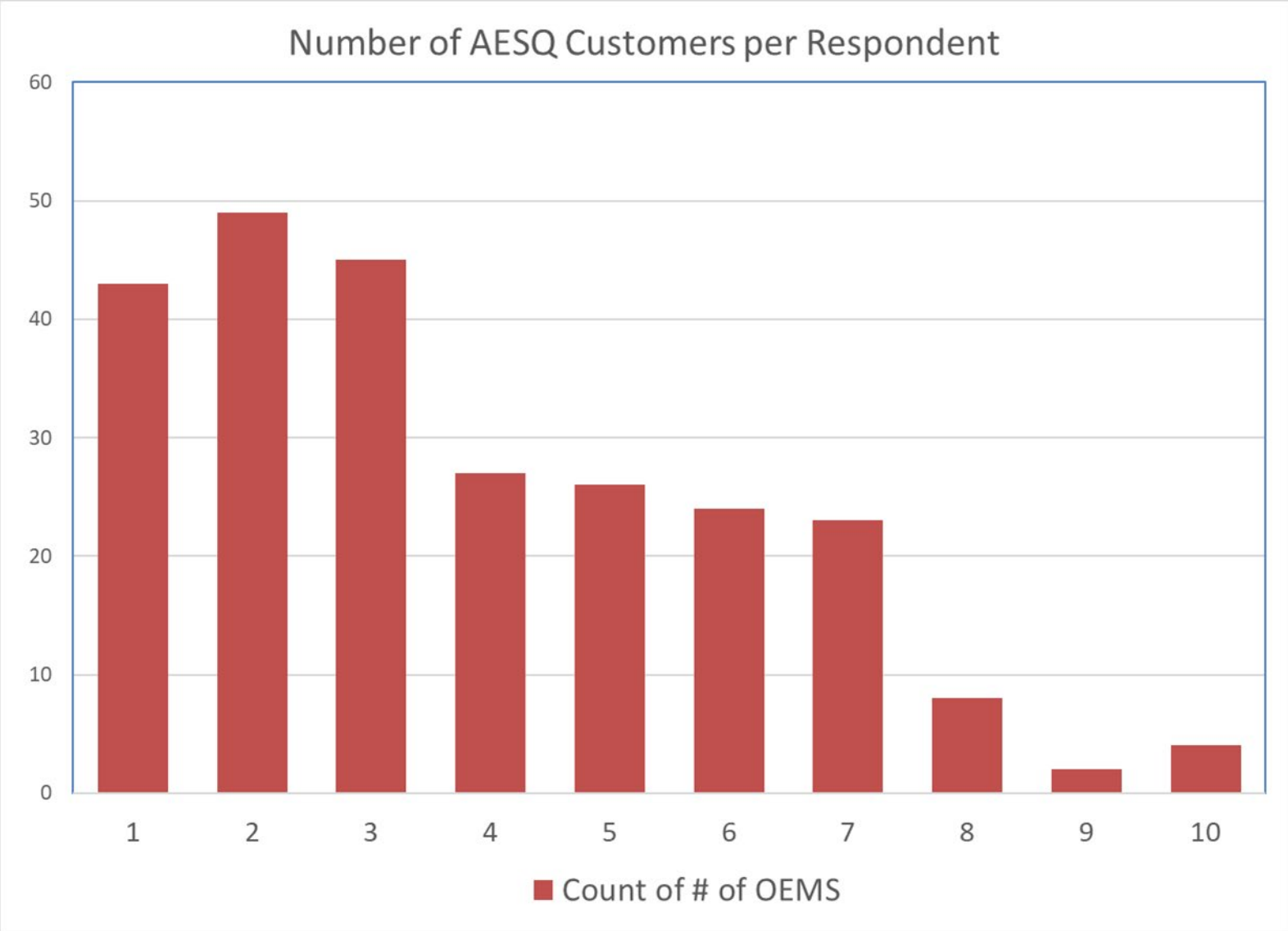
September 2022: Survey targeted to develop plans to help suppliers for Q4

- Same questions from April to build trend and collect feedback on deployment
- 255 respondents

February 2023: Post deployment survey to find opportunities

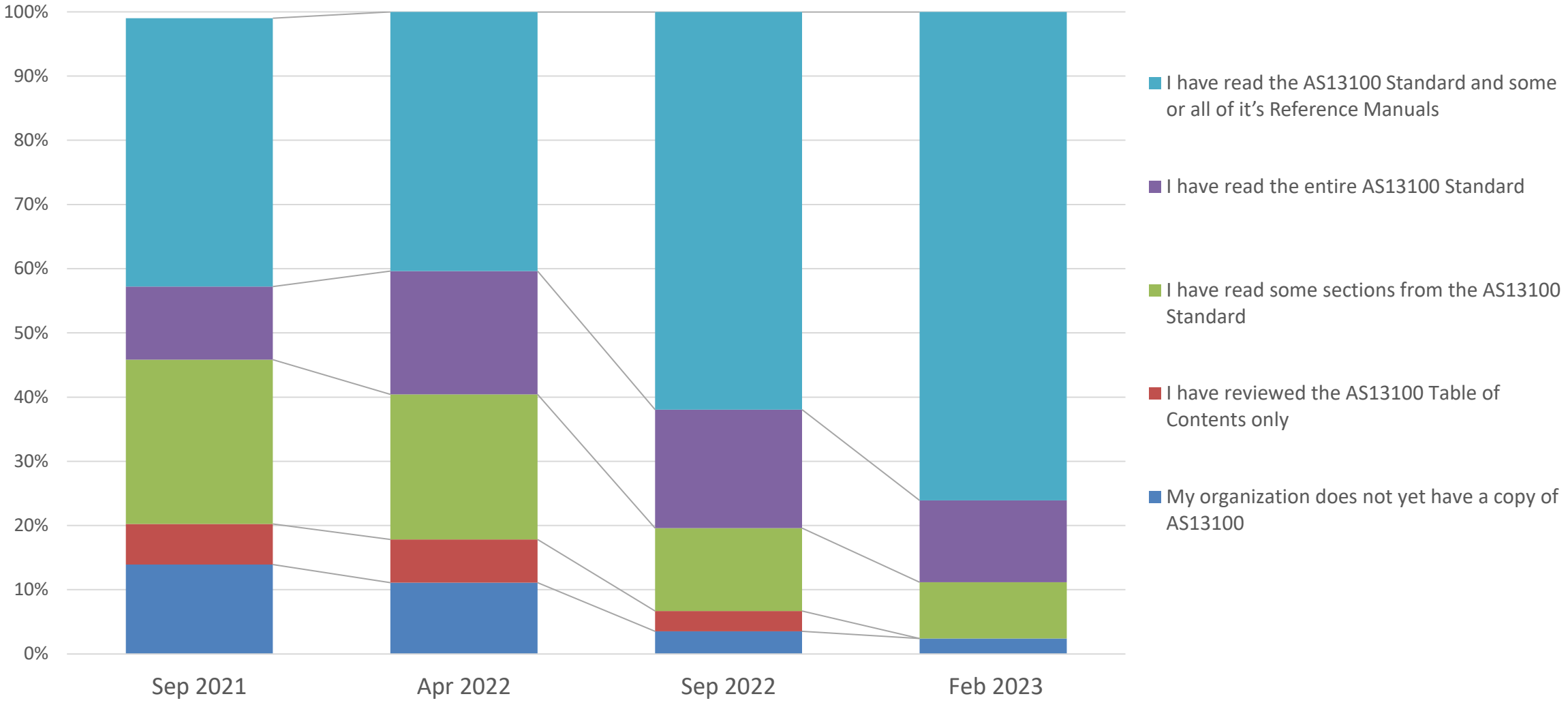
- Continue with similar questions to track evolution
- 251 respondents

Who Responded?

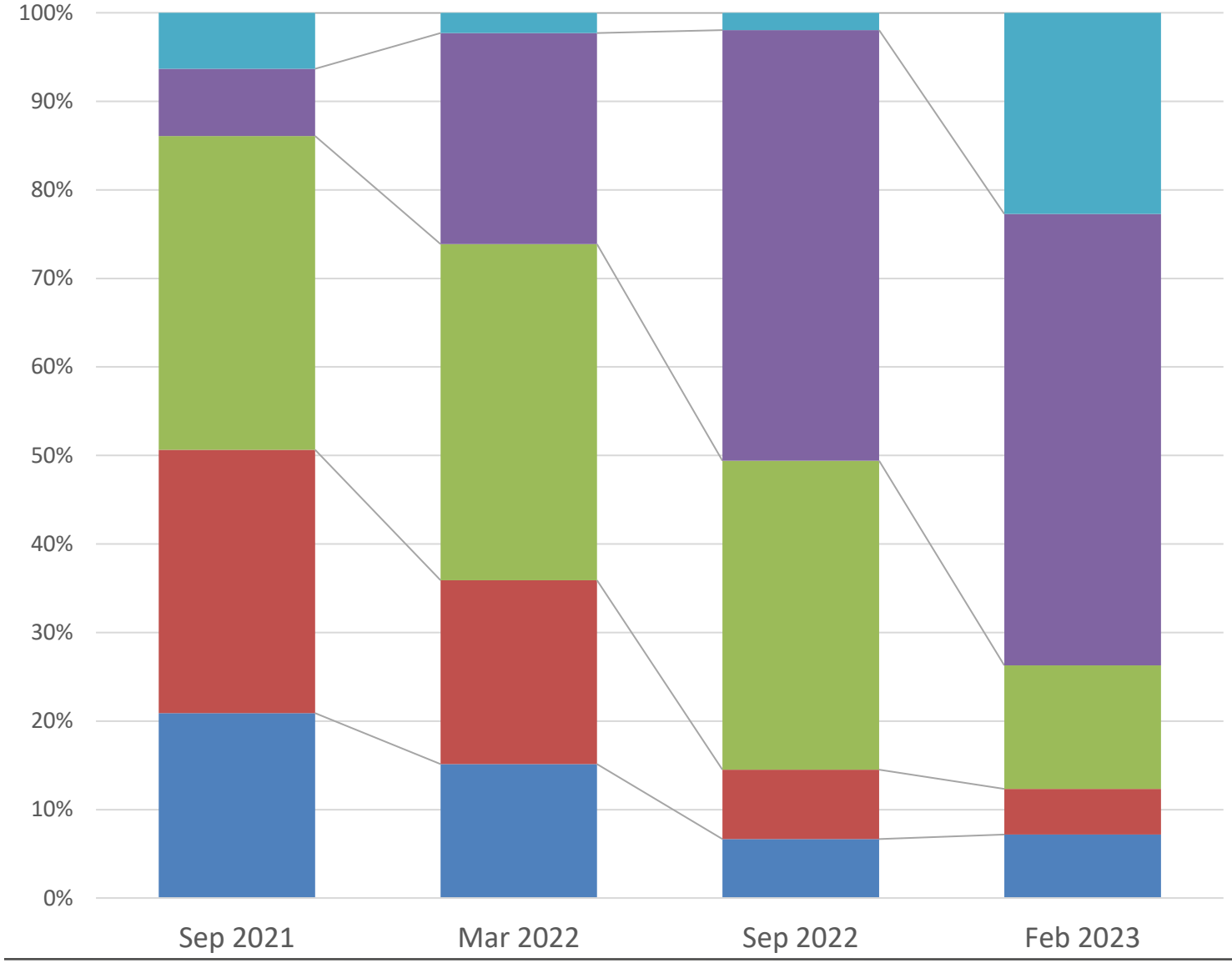


Respondents had an average of 3.75 AESQ customers

Familiarity with the AS13100 standard



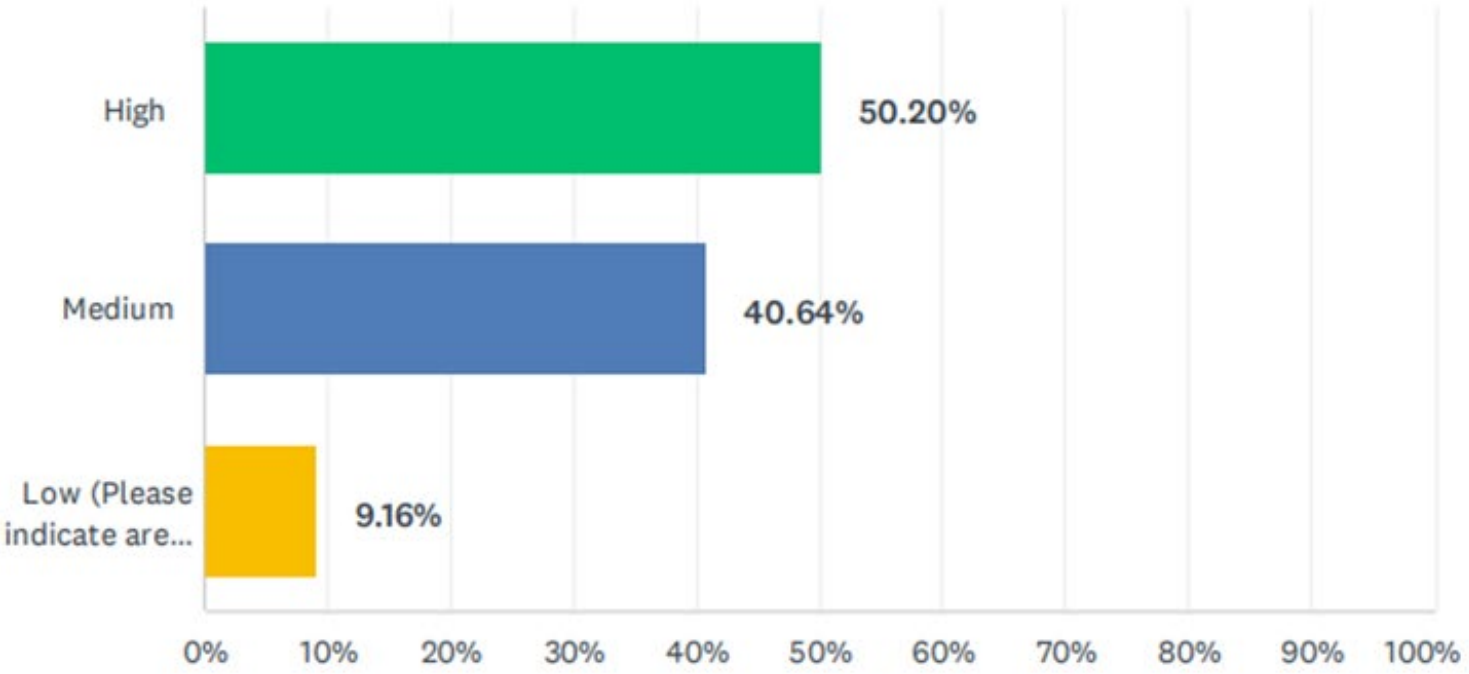
Deployment Status



Deployment Confidence

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

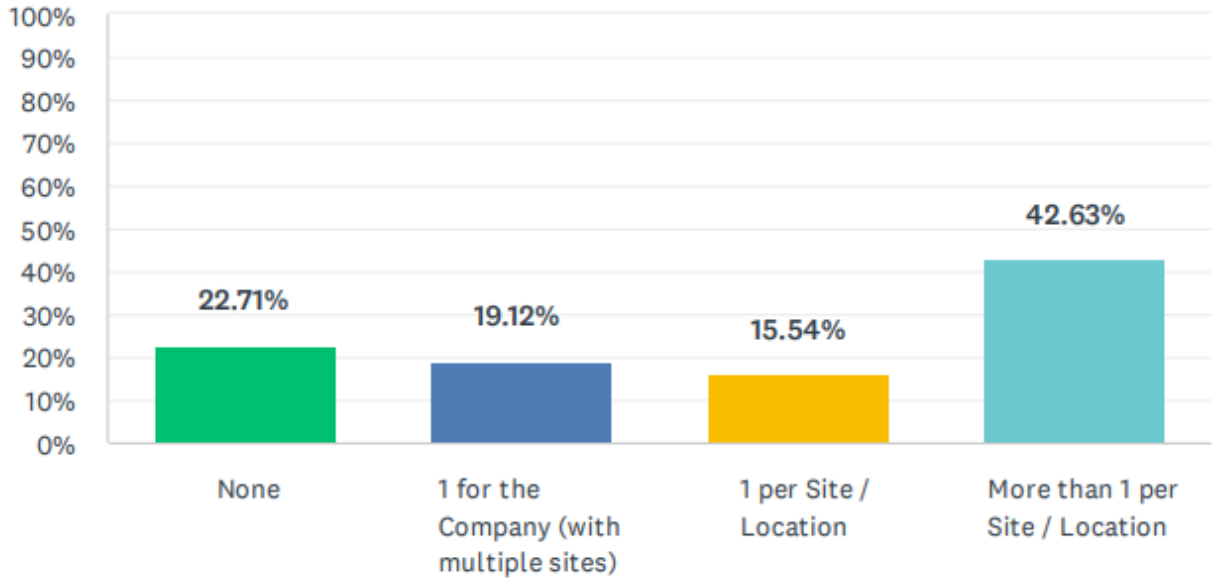
Answered: 251 Skipped: 0



Training

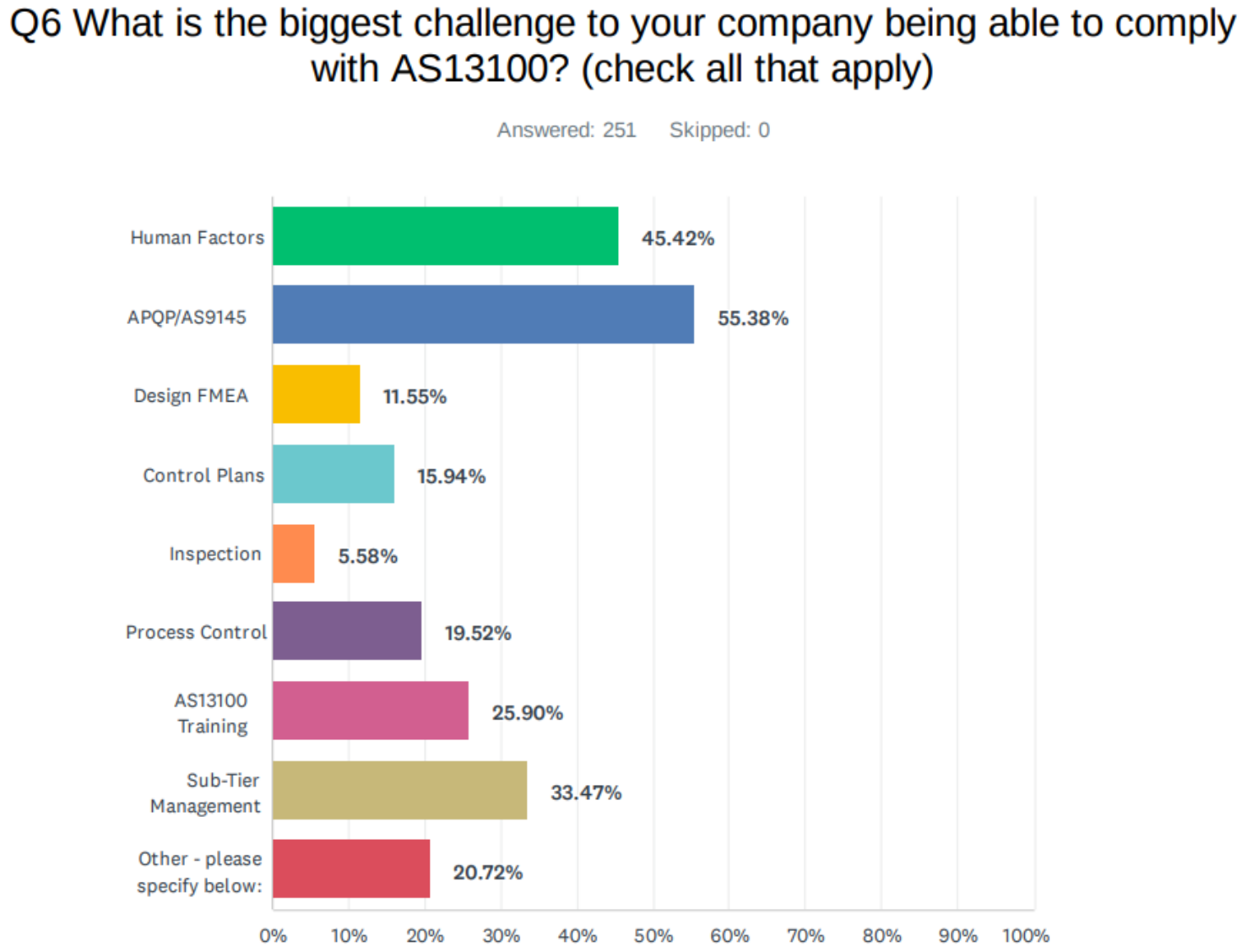
Q2 How many individuals at your company have completed the AS13100 Requirement Training?

Answered: 251 Skipped: 0



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

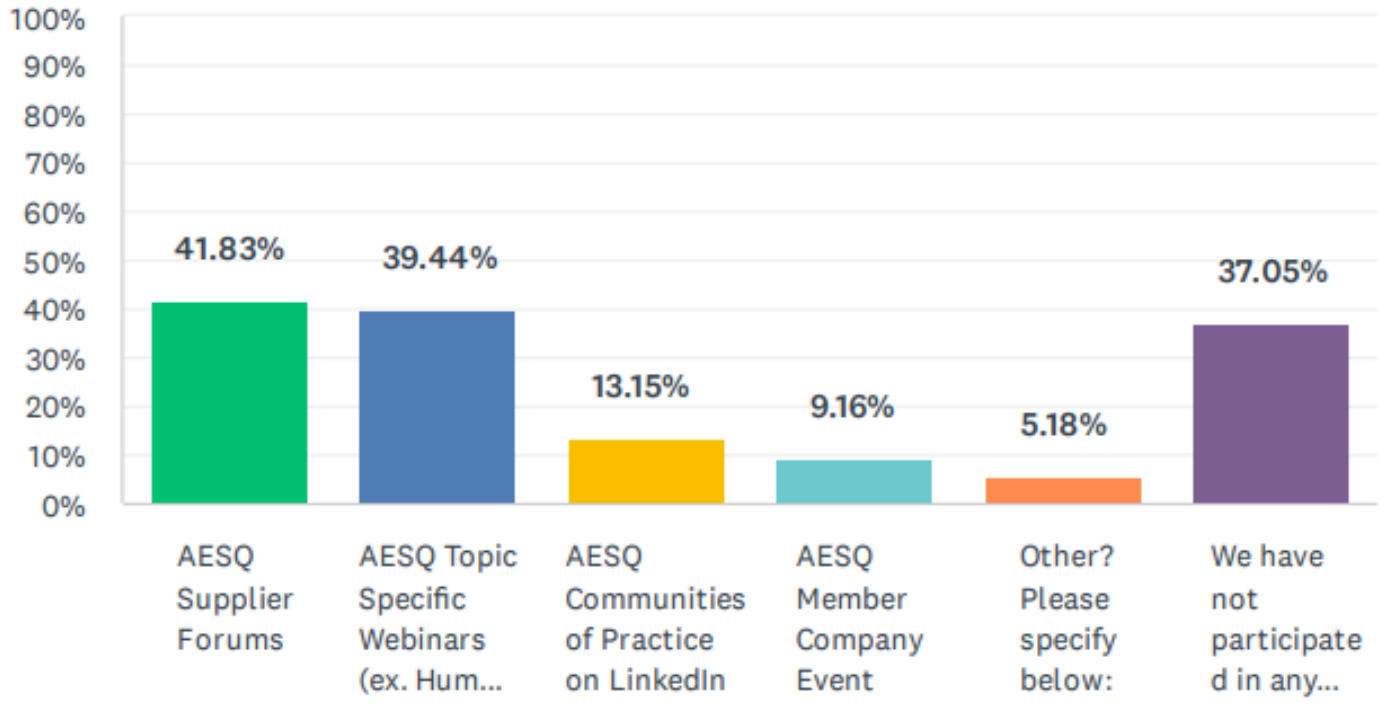
Biggest Challenges



Engagement with AESQ

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

Answered: 251 Skipped: 0



slido

How can the AESQ further support you in effective deployment?

ⓘ Start presenting to display the poll results on this slide.

Break Time

Return in 15 Minutes

Using FMEA to Reduce Human Error in Assembly & Test

Dr Ian Riggs
Quality & HSE Executive
Assembly & Test Operations

Steve Roebuck
Head of Certification & Quality Assurance
Assembly & Test Operations

Site Map

Production Engine Build & Test (PTF)

Sinfin ‘B’ Site (Inc. ILC)

57/58 Bed & Prep Shop

Learning Development Centre (LDC)

Sinfin ‘A’ Site

Our Large Engine Product Portfolio

Trent XWB-84

Trent XWB-97

Trent 1000-TEN

Trent 7000

slido

What is your knowledge of Human Factors?

ⓘ Start presenting to display the poll results on this slide.

slido

What is your knowledge of FMEA?

ⓘ Start presenting to display the poll results on this slide.

30,000
Components

6,000
Manual
Operations

Human Factors play a critical part in assuring Product Quality

RR Deployment Framework

Aligned to the AESQ AS13100 Standard and RM13010 Reference Manual.

Human Factors

The Dirty Dozen

1 Lack of Communication

2 Complacency

3 Lack of Knowledge

4 Distraction

5 Lack of Team Work

6 Fatigue

7 Lack of Resources

8 Pressure

9 Lack of Assertiveness

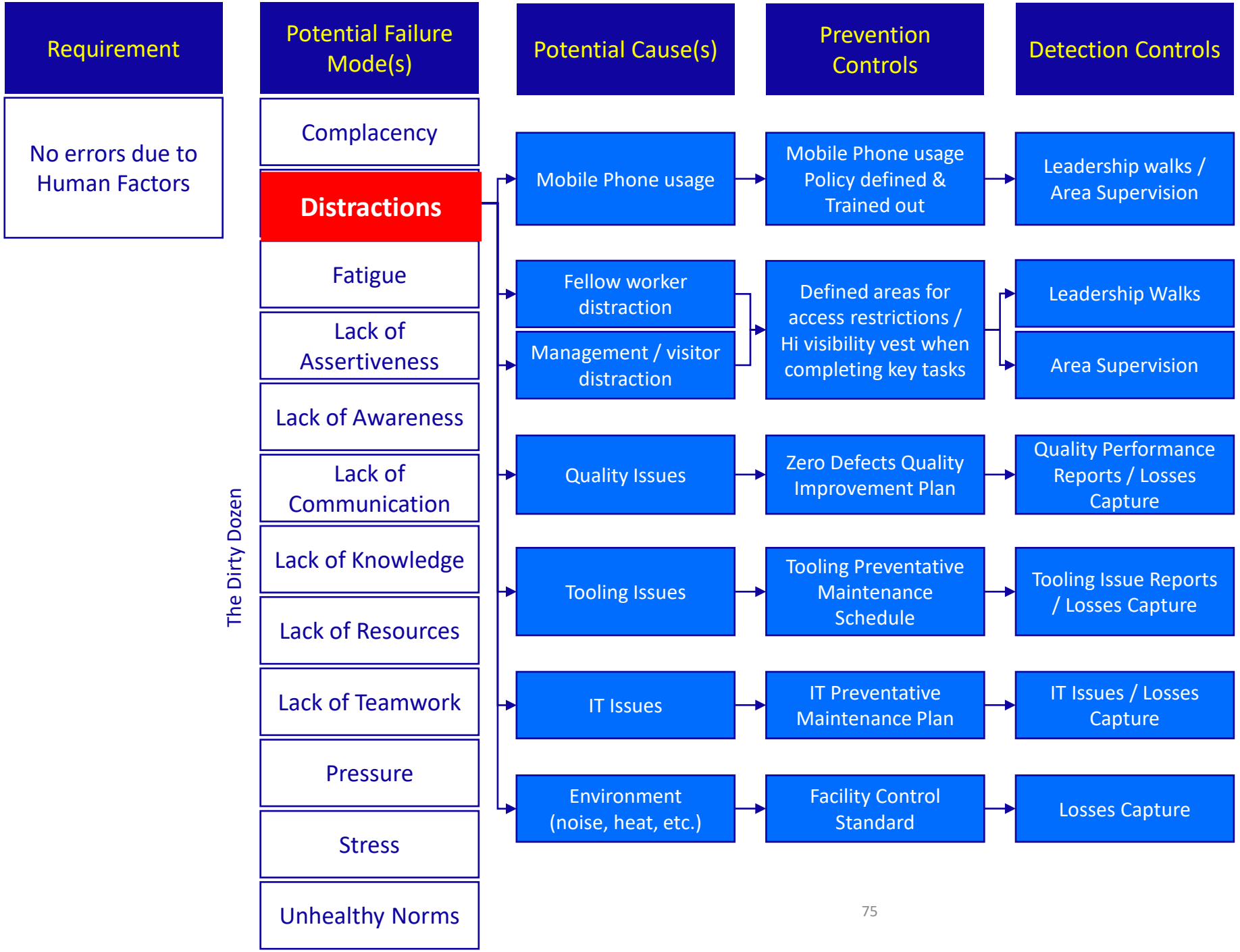
10 Stress

11 Lack of Awareness

12 Norms

Human Factors

Using the FMEA Approach



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

Human Factors FMEA

Let’s have a go!

Scenario – Final Inspection, Friday 2.30 p.m.

- Engine due for delivery at 5 p.m. Lorry waiting outside. Ferry scheduled for 11 p.m.
- The Prince of Wales is due to visit at 3 p.m. and have a picture taken in Final Inspection next to this finished Engine
- Two of the inspection team who should be working on the engine have phoned in sick this morning
- The final paperwork usually takes 3 hours to compile once the engine is finished. The delays mean that the team will only have 2 hours to get it all done.
- Senior Logistics Manager is in the area to get constant updates on progress to ensure the engine will be ready to deliver on time
- The Senior Communications Manager is also in the area to ensure that everything is ready for the royal visit

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

slido

Which of these Dirty Dozen applies to this Scenario?

ⓘ Start presenting to display the poll results on this slide.

Assembly & Test

Human Factors FMEA

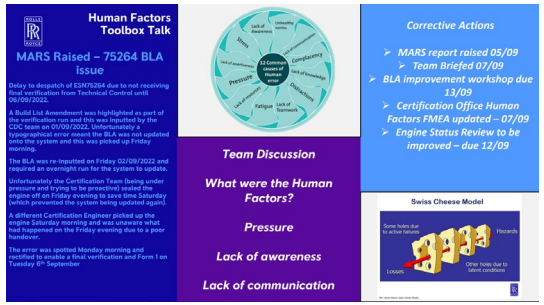
Heat Map

Area	Complacency	Distractions	Fatigue	Lack of						Pressure	Stress	Unhealthy Norms
				Assertiveness	Awareness	Communication	knowledge	Resources	Teamwork			
	1	2	3	4	5	6	7	8	9	10	11	12
Certification Office												
Customer Delivery Centre												
Engine Test												
Engine Build												

Each area will have its own, unique human factor risk profile however some risks will be similar across multiple areas

Human Factors FMEA - Improvement Examples

Lack of Awareness

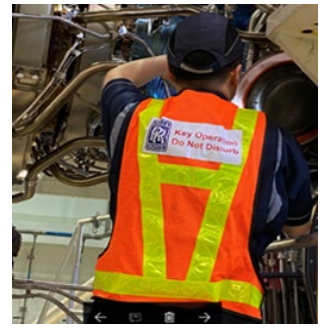


Toolbox Talks

Lack of Communication

New Electronic Shift Handover System (MS Power Apps)

Distractions



Behavioral Nudges

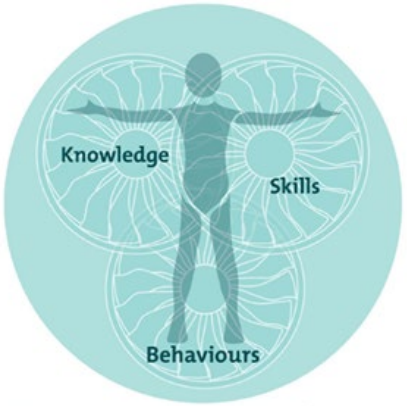
Lack of Teamwork / Pressure

Team Building Away Days

Complacency/Norms

Enhanced Compliance Checking

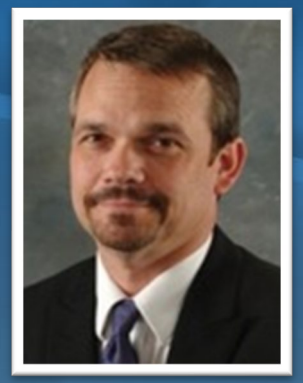
Key Insights



Aerospace Culture

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

BREAKOUT SESSION #1
SUBJECT MATTER INTEREST GROUPS

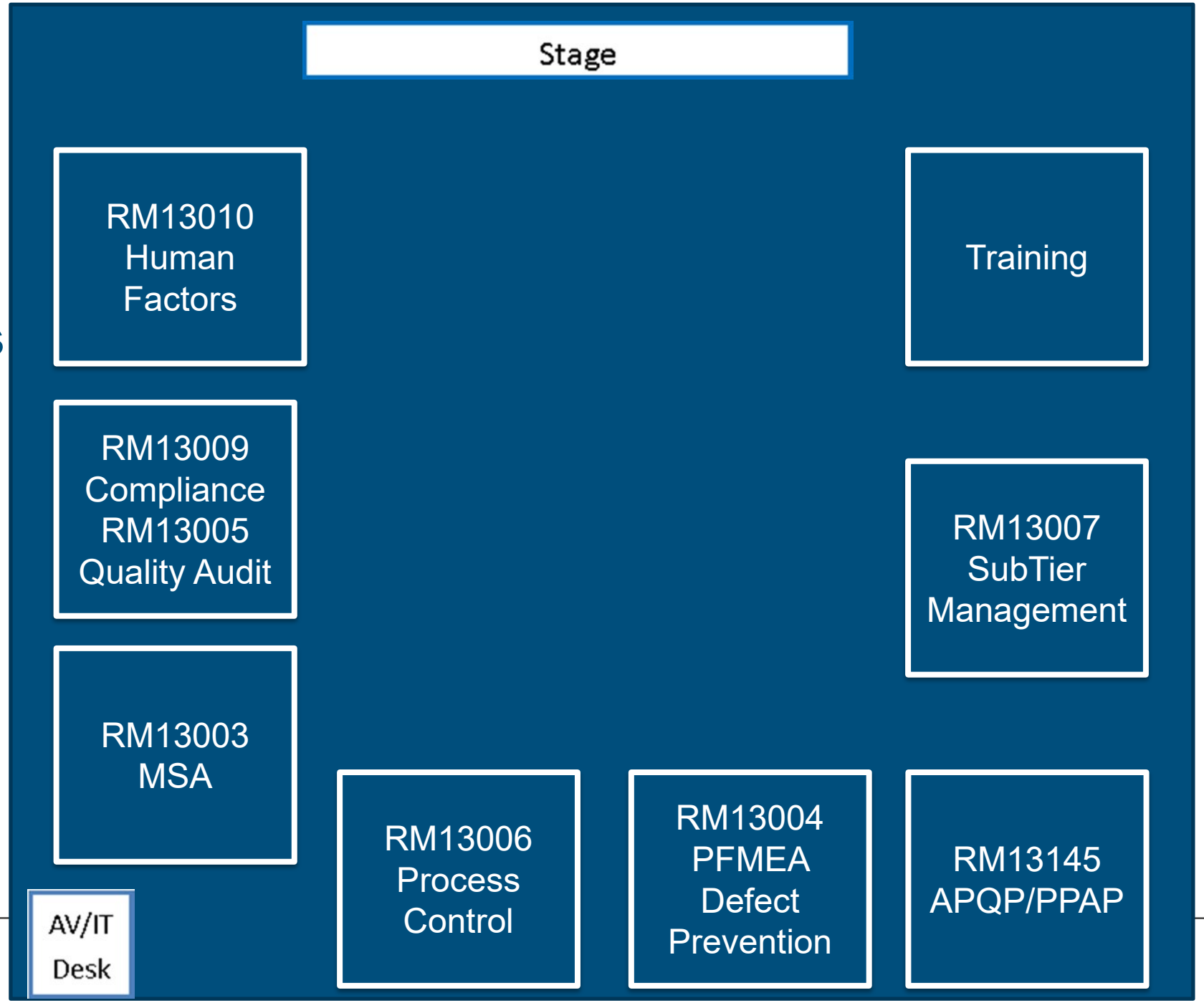


BARRIE HICKLIN
SR. DIRECTOR, QUALITY SYSTEMS
& REGULATORY COMPLIANCE
HONEYWELL

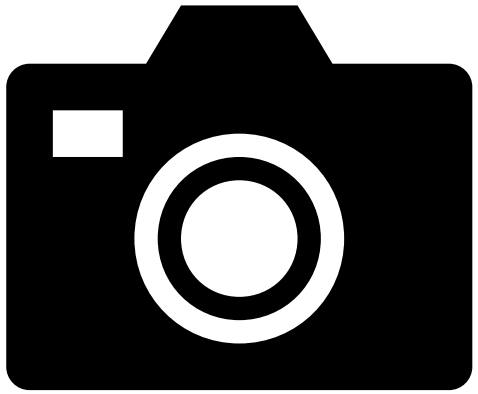
Breakout Session #1: Subject Matter Interest Groups
60 Minutes

Table	Title	Leader
1	Quality Audit (RM13005) Compliance Assessment (RM13009)	Jim Wilson, Pratt & Whitney & Pete Bilbie, Rolls-Royce
2	Human Factors (RM13010)	Chris Craig, Rolls-Royce Ludovic Chevet, Airbus
3	APQP & PPAP (RM13145)	Karl Evans, Rolls-Royce
4	PFMEA Defect Prevention (RM13004)	Ian Riggs, Rolls-Royce & Rob Farndon, Rolls-Royce Harj Sanghera, Rolls-Royce
5	Process Control (RM13006)	Shailesh Shinde, Rolls-Royce
6	SubTier Management (RM13007)	Helen Djäknegren, GKN

Breakout Session #1 – Subject Matter Interest Groups (SMIGs)



Return in 60 Minutes



Group Photo

AESQ AS13100 TRAINING OVERVIEW

JUN SAKAI
CHIEF ENGINEER, CIVIL AERO-ENGINE DIVISION
AERO ENGINE AND SPACE OPERATIONS
IHI CORPORATION JAPAN

Training Program Goals

Support deployment and adoption of AS13100

Knowledge to design, maintain & assess business processes to meet intent of standard

Focus on key concepts, impact to compliance and customer requirements and benefits to business performance

Simplify and clarify the requirements with a standardized training approach

AESQ Approved AS13100 Trainings

Delegated Product Release Verification (DPRV)	AESQ Approved AS13100 Requirements Course	AESQ Quality Foundations Course
DPRV personnel **shall** be trained and certified in accordance with AS13001 Delegated Product Release Verification Training Requirements (7.2.3) Required for DPRV certification and recertification since 2015	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. **Recommended** for functional leaders responsible for creating or managing processes that are impacted by AS13100 Requirements (7.2.4)	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** course. **Recommended** for design engineering, manufacturing engineering and operations roles. (7.2.4)

LEVEL ONE

AS13100
Executive Overview

Five-Part Video Series, 35 minutes

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

No Charge

LEVEL TWO

AS13100
Requirements

On-demand virtual course, 10 hours

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

$399

LEVEL THREE

AS13100
Quality Foundations

Virtual or In Person, 3-Days

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

$1295 in Europe

SAE AS13100 Quality Requirements Course Overview

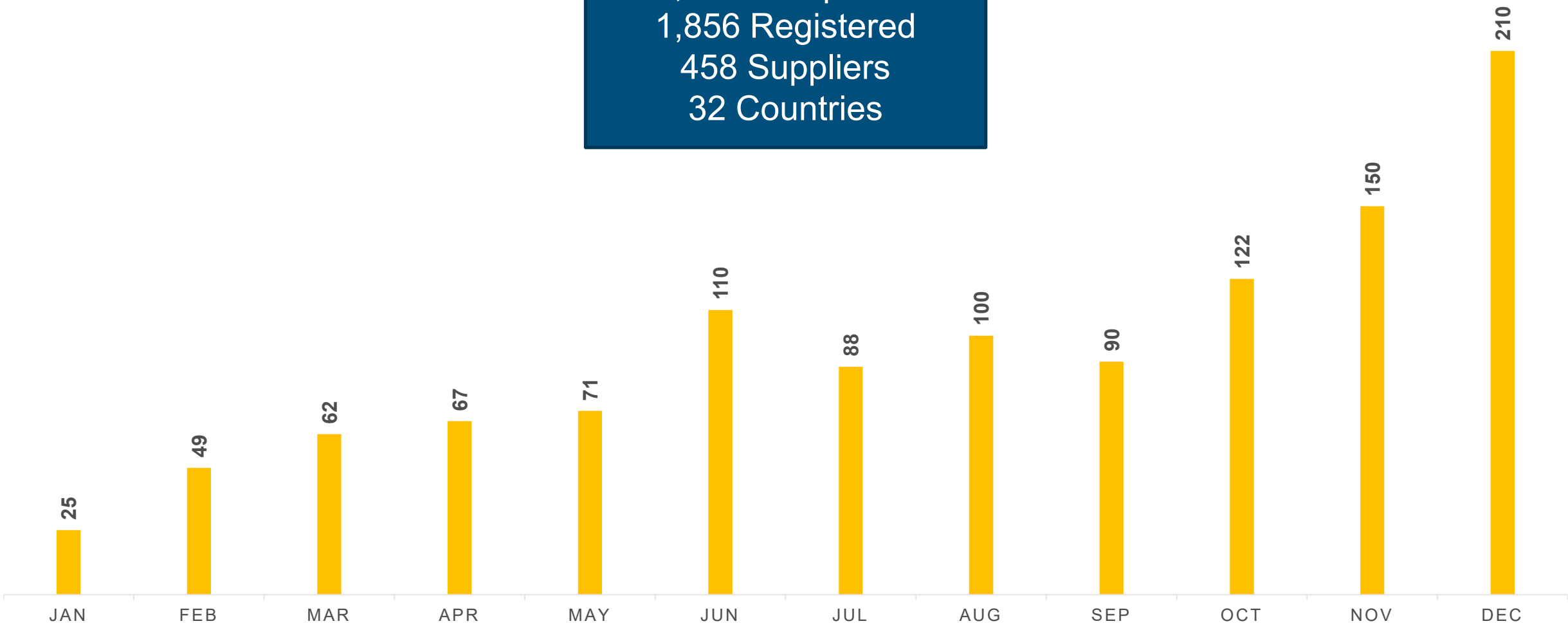
- **Required** for Quality Leaders with responsibility for deploying the requirements of AS13100
- **Recommended** for functional leaders responsible for creating or managing processes that are impacted by AS13100
- Provides knowledge and insight for each of the AS13100 requirements
- Provides knowledge that helps the learner assess, design, maintain and comply with the business processes, which keep you compliant and adds value to the business

SAE AS13100 Quality Foundations Course Overview

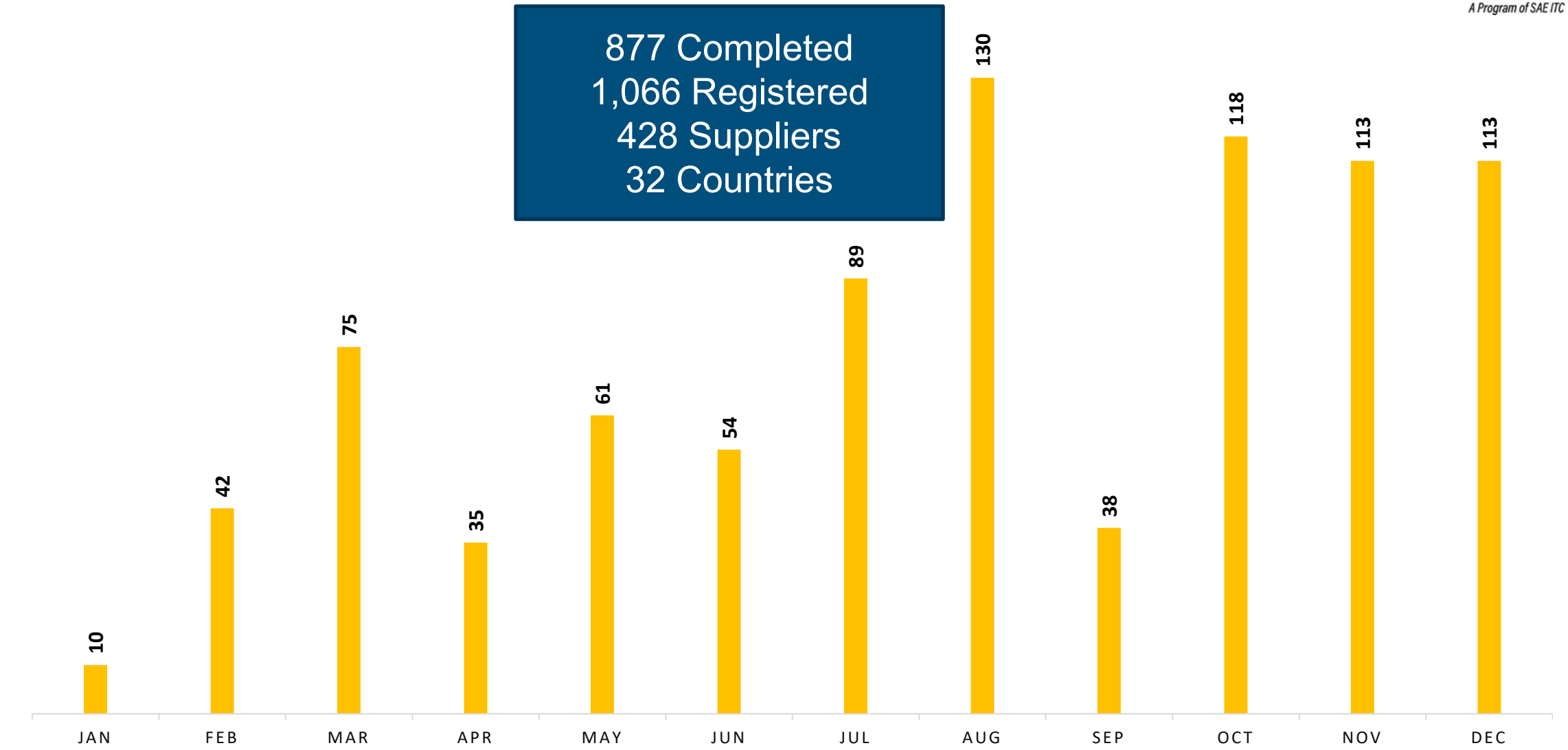
- **Required** for Quality Leaders with responsibility for supporting the design, manufacturing, and assembly operations via AS13100
- Quality Leaders who have completed a recognized OEM training course are exempt from the SAE course.
- **Recommended** for anyone with accountability for the quality of the design, production, assembly and test areas of the organization.
- Joins key quality systems, processes and methodologies to show how they work systemically to focus on Defect Prevention. Provides deeper insight into each of the AESQ supplemental Reference Manuals.

AS13100 Requirements Course Participation 2022

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



Quality Foundations Course Participation 2022



Does Your QMS Meet AS13100 Requirements?

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

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

https//aesq.sae-itc.com/training

https://discover.sae.org/AS13100

BREAKOUT SESSION #2
ZERO DEFECTS FOR EVERYONE

UZAM KHAN
SUPPLIER QUALITY EXECUTIVE
ROLLS-ROYCE

Zero Defects Principles

a) Quality is defined as conformance to customer requirements

b) The quality standard (target) is Zero Defects

c) Defect prevention not Inspection to ensure Quality

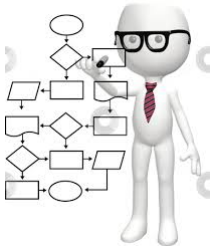
d) Quality is measured through the Cost of non-quality

Rolls-Royce

Getting to Zero Defects…

Chris Customer

Petra Purchase



Mel ME

Den Designer

Leslie Logistics

Quincy Quality

Fran Finance

Izzy Inspector

Olly Operator

Hillary HR

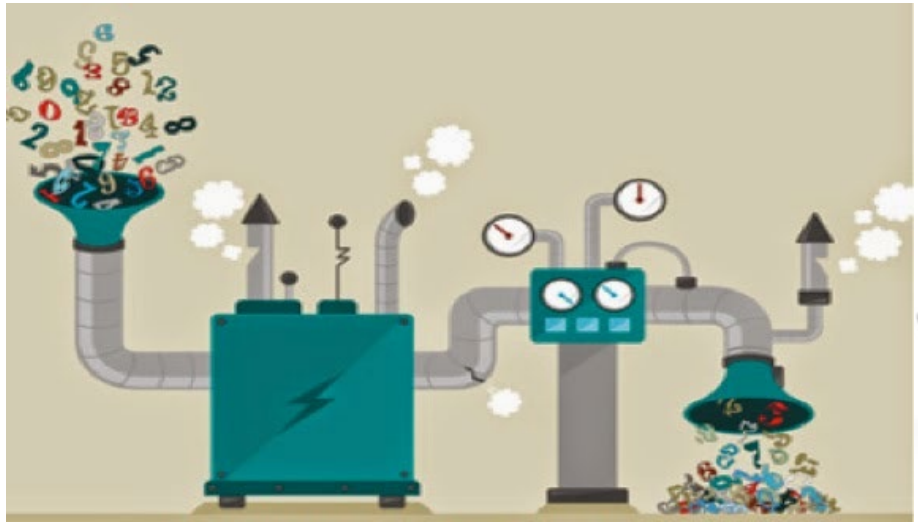
Arrange these characters into a natural value steam and identify what they need to provide to each other to achieve zero defects

Rolls-Royce

Quality Improvement vs Zero Defects

Traditional Improvement

- Wait for something to happen
- See why it happened
- Try and remove the cause so it can't happen again



Zero Defects Thinking

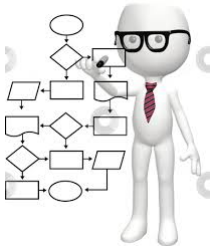
- What do we want to happen
- What could go wrong
- Eliminate / reduce the likelihood of it going wrong
- Manage the process and use feedback to ensure it continues to give us the right outcome

Rolls-Royce

Getting to Zero Defects…

Chris Customer

Petra Purchase



Mel ME

Den Designer

Leslie Logistics

Quincy Quality

Fran Finance

Izzy Inspector

Olly Operator

Hillary HR

Overlay the Zero Defects tools and practices over the value stream

Rolls-Royce

The Quality Value Steam

Chris Customer

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

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

Den Designer

Takes the customer's needs and transforms it into a capable product design that meets the customer's requirements and can be made robustly every time

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

Mel ME

Takes what's important about the product and makes sure the production process is designed to deliver it, every time

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

Olly Operator

Complies to instructions, ensuring products conform to requirements every time, with no rework or concessions

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

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

Izzy Inspector

Verifies the product meets the design intent and can therefore be passed down the value stream

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

Leslie Logistics

Moves the right parts, to the right place in the right amounts just as they are required, without damage/FOD

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

Quincy Quality

Ensures we comply to the required processes so that we do any job right first time

Audit
Regular checks to ensure that all relevant procedures in the RRMS are being compiled to

Petra Purchase

Ensures that our suppliers deliver conforming product, to schedule

SABRe
"Supplier Management System Requirements" is the supplier-facing mirror of the RRMS and is applicable to all suppliers or partners

Fran Finance

Ensures the business fully understands the costs of non quality so we invest wisely to get to zero defects

CoNQ
The total cost of not achieving Zero Defects; scrap, concessions, inventory, productivity, customer dissatisfaction...

Hillary HR

Ensure we are able to recruit and/or develop capable people

Training Plans
Ensure that everyone is capable of doing the jobs they are required to do

Break Time

Return in 25 Minutes

AS13100 FAQ PANEL

BARRIE HICKLIN
SR. DIRECTOR, QUALITY SYSTEMS &
REGULATORY COMPLIANCE
HONEYWELL

AS13100 FAQ Panel

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

PANELISTS:

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

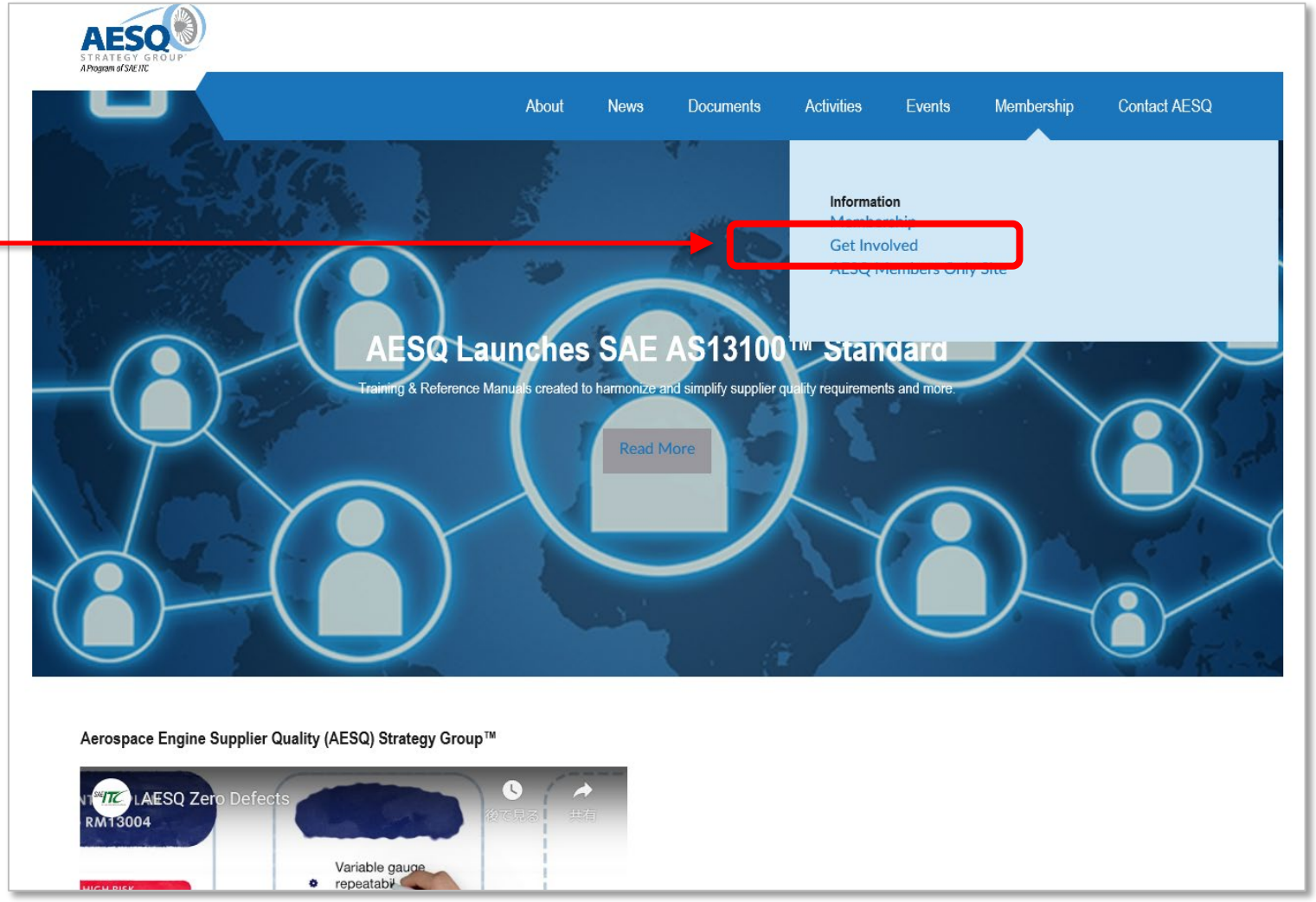
AESQ
HOW TO GET INVOLVED

MARKUS BRAIG
DIRECTOR QUALITY SUPPLY CHAIN AND MRO
MTU AERO ENGINES

“Get Involved” with AESQ

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

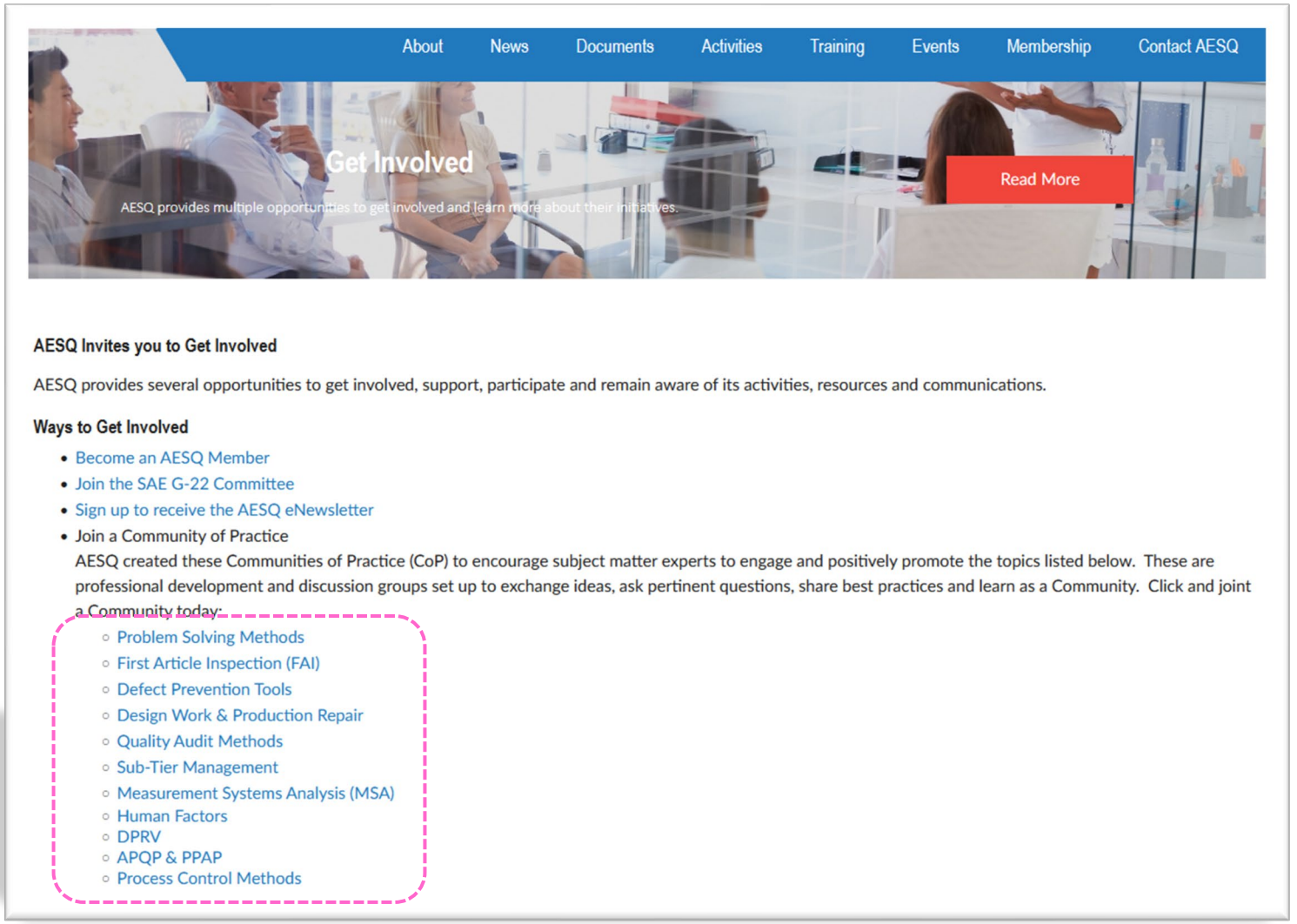
- Click “Get Involved”



“Get Involved” Options

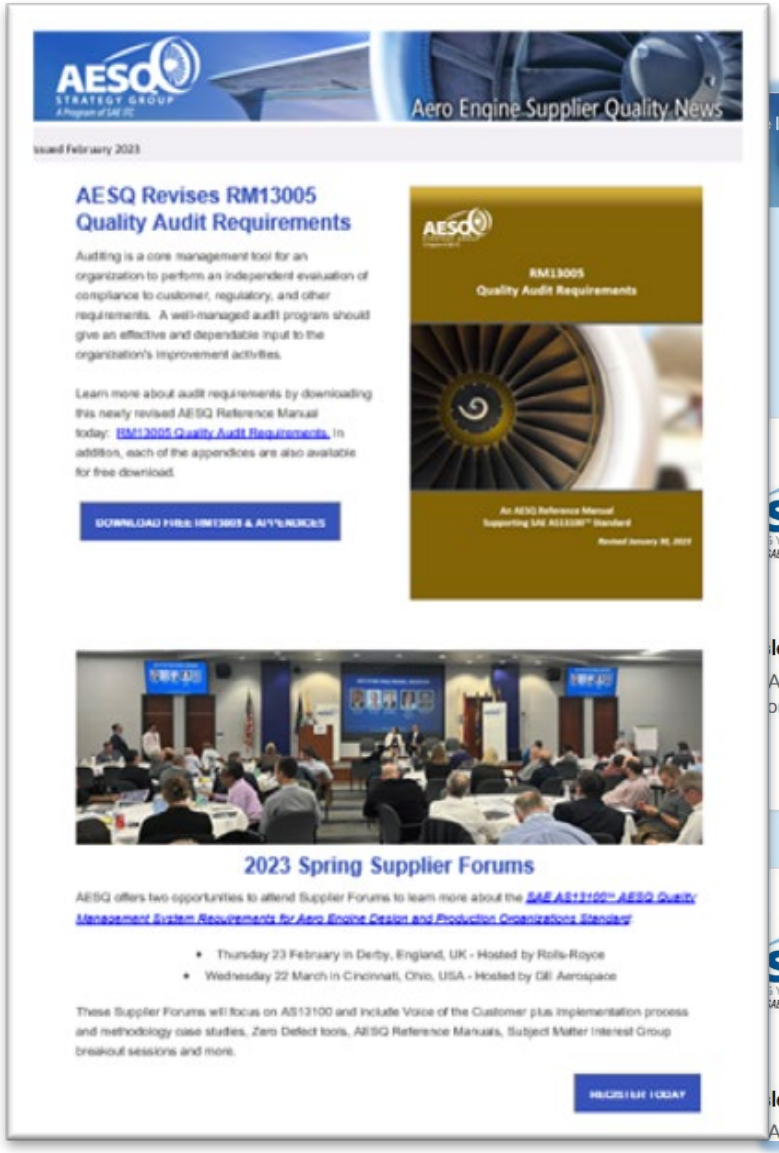
1. Subscribe to receive AESQ’s Newsletter
2. Become an AESQ Member
3. Join the SAE G-22 Standards Committee
4. Join an AESQ Community of Practice on LinkedIn

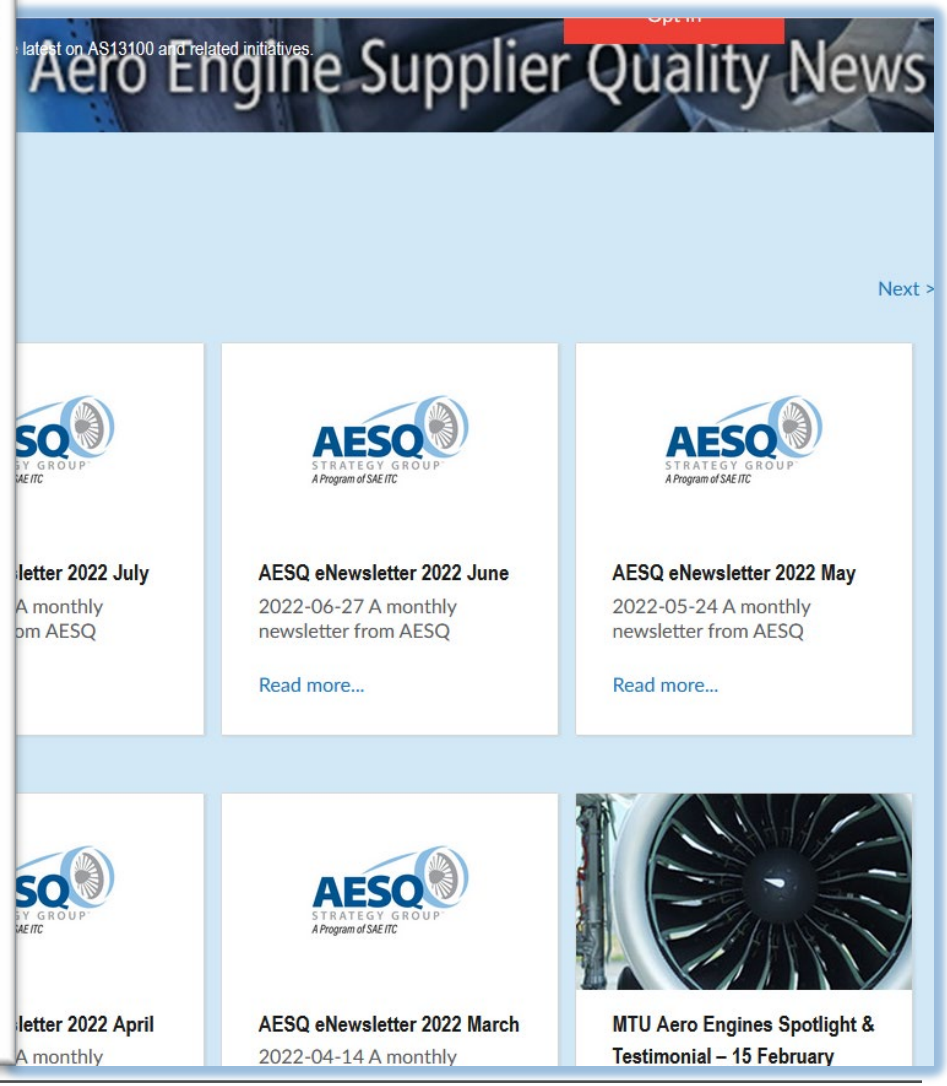
Click on the appropriate link for additional information



“Get Involved” – Sign up to Receive AESQ’s Newsletter

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





“Get Involved” – Become an AESQ Member

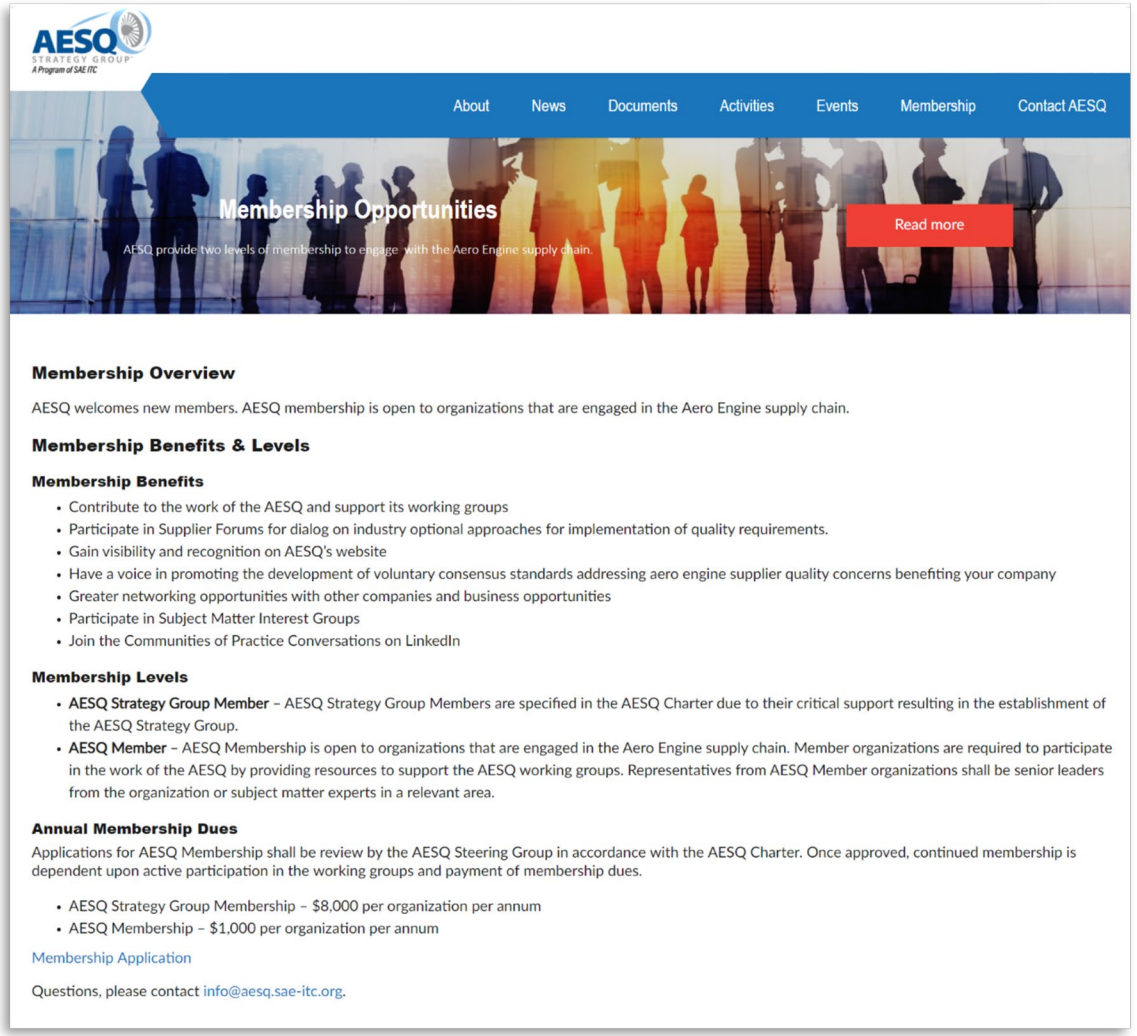
2 Membership Levels:

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

AESQ Member –

- Open to organizations engaged in the Aero Engine supply chain.
- Opportunity to participate in the work of AESQ by providing resources to support AESQ working groups and Subject Matter Interest Groups (SMIGs).
- Representatives shall be senior leaders from the organization or subject matter experts in a relevant area.

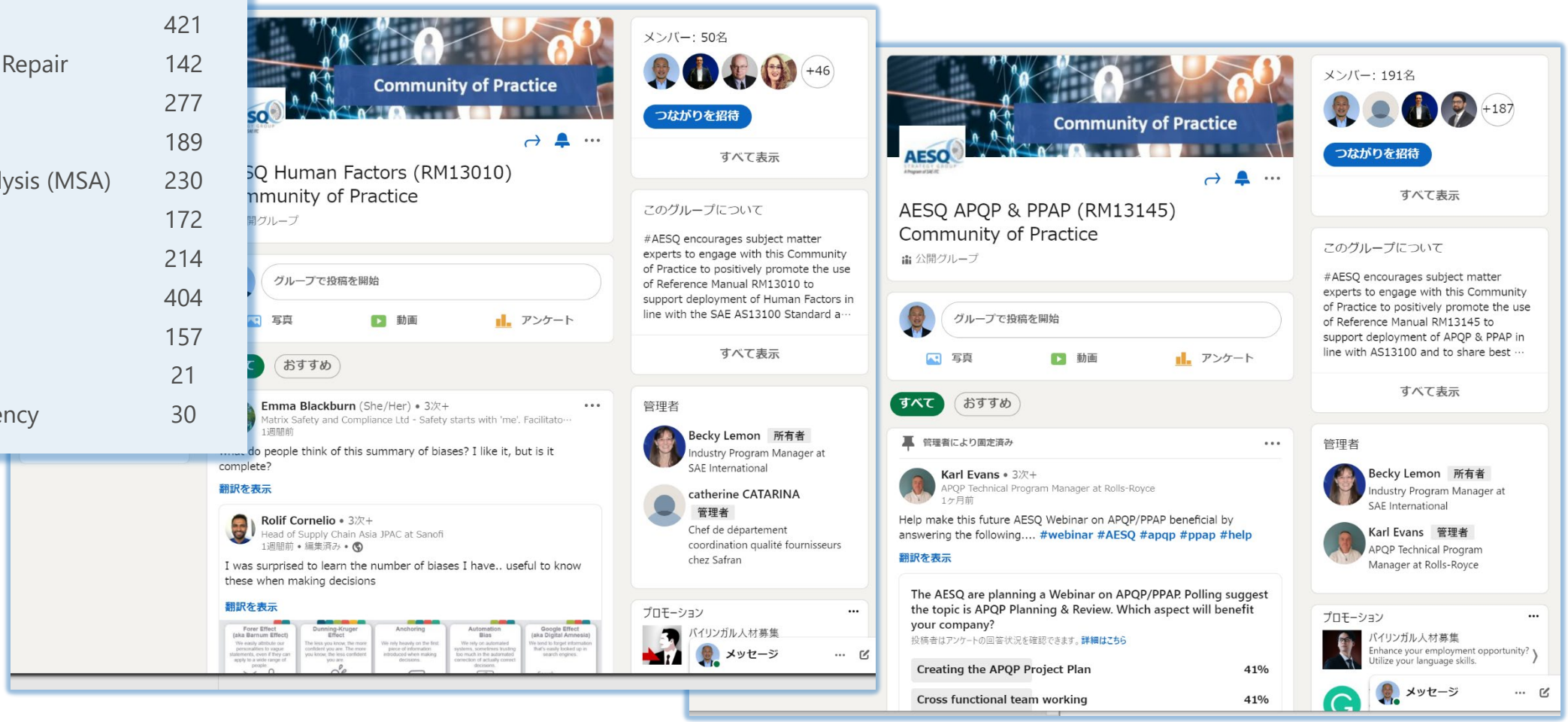
Complete Membership Application at bottom of page



“Get Involved” – Join a Community of Practice

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

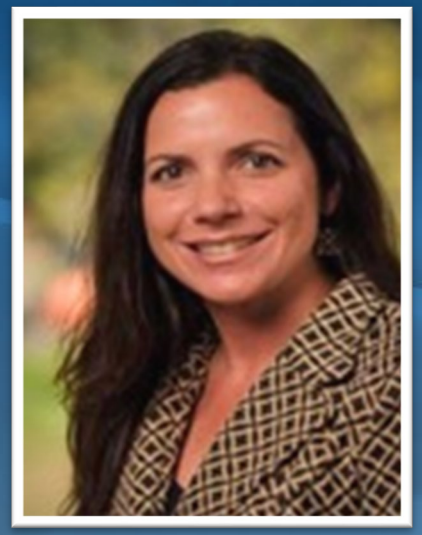
LinkedIn Groups for each Community of Practice are open for anyone to join



“Get Involved” – Additional Options

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

SUMMARY & CLOSE



BARBARA NEGROE
EXECUTIVE SOURCING QUALITY LEADER
GE AVIATION

AESQ
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AESQ Thanks You for Attending!

Stay in Touch: aesq.sae-itc.com

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