AESQ Supplier Forum – AS13100 Deployment

8 June 2023 | Virtual

Welcome to Everyone

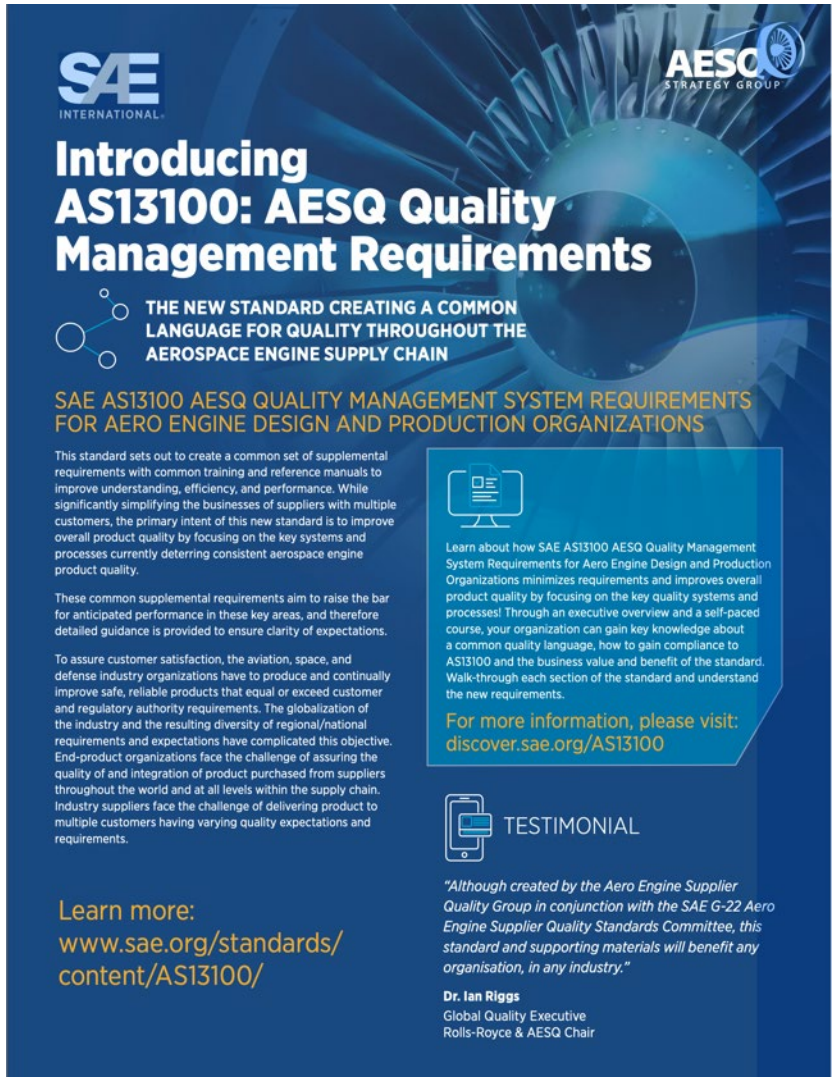
AESQ Supplier Forums

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



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.

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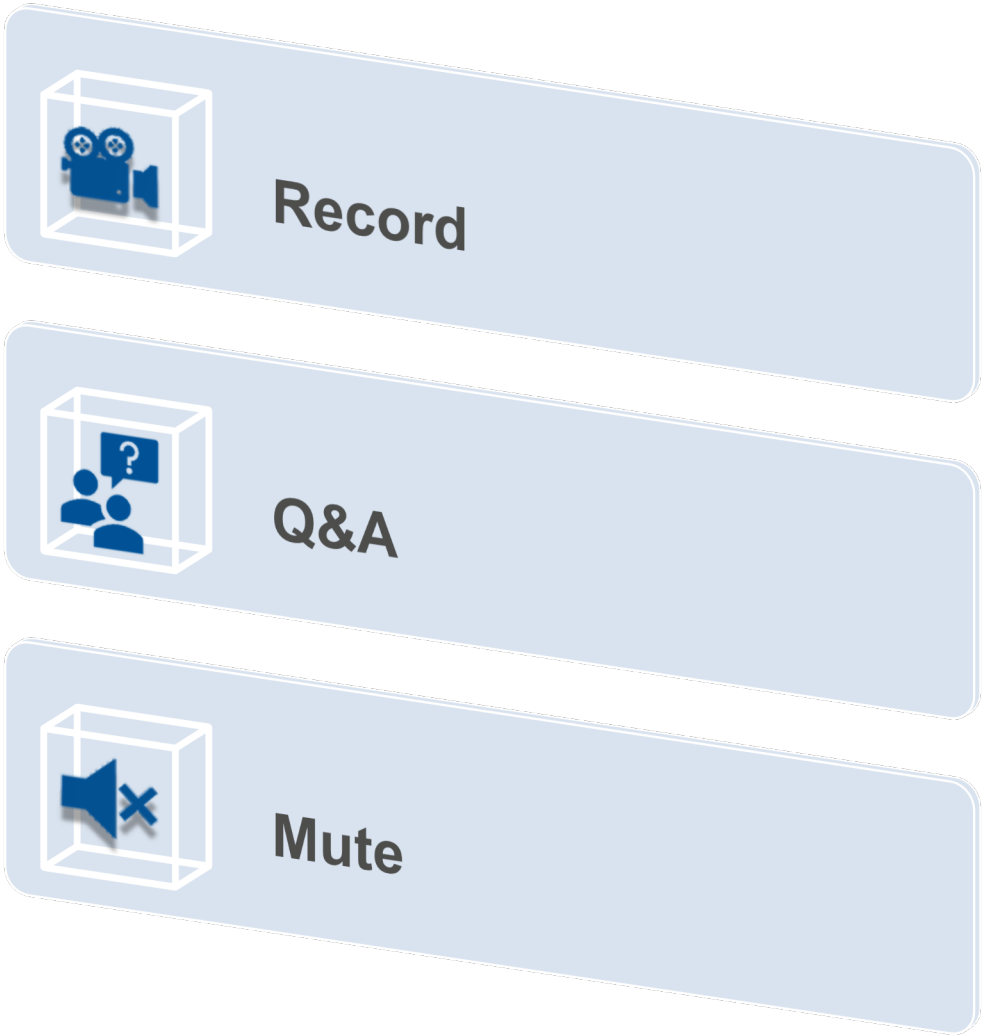

Agenda

Topic	Presenter
Welcome & Introductions	**Barbara Negroe**, Executive Sourcing Quality Leader, GE Aerospace
AESQ Overview, Vision & Objectives	**Lisa Claveloux**, Sr. Director, Quality, Pratt & Whitney
AS13100 Standard Overview	**Helen Djäknegren**, Director Supplier Quality & Development, GKN Aerospace
Deployment & Transition to AS13100	**Jim Wilson**, Sr. Manager, Supplier Quality, & Development, Pratt & Whitney Canada **Earl Capozzi**, Associate Director, Discipline Chief, Quality & Process Engineering/Supplier Quality, Pratt & Whitney
Best Practices for Human Factors	**Steve Roebuck**, Head of Quality Assurance and Certification, Rolls-Royce
Training Overview	**Earl Capozzi**, Associate Director, Discipline Chief, Quality & Process Engineering/Supplier Quality, Pratt & Whitney
AESQ How to Get Involved	**Jun Sakai**, Chief Engineer, IHI
AS13100 Question & Answer	**Markus Braig,** Director, Quality Supply Chain and MRO, MTU Aero Engine
Summary & Close	**Barbara Negroe**, Executive Sourcing Quality Leader, GE Aerospace

How to Contribute – Live Poll Questions

How to answer live poll questions:

1. Scan the QR Code
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4. Add any questions during the day in the Slido App & “Like” a question

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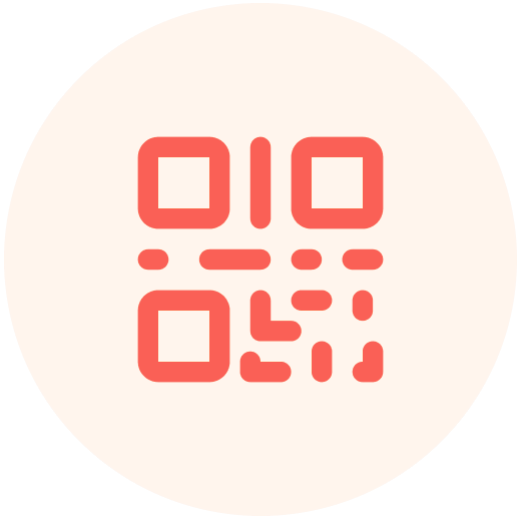

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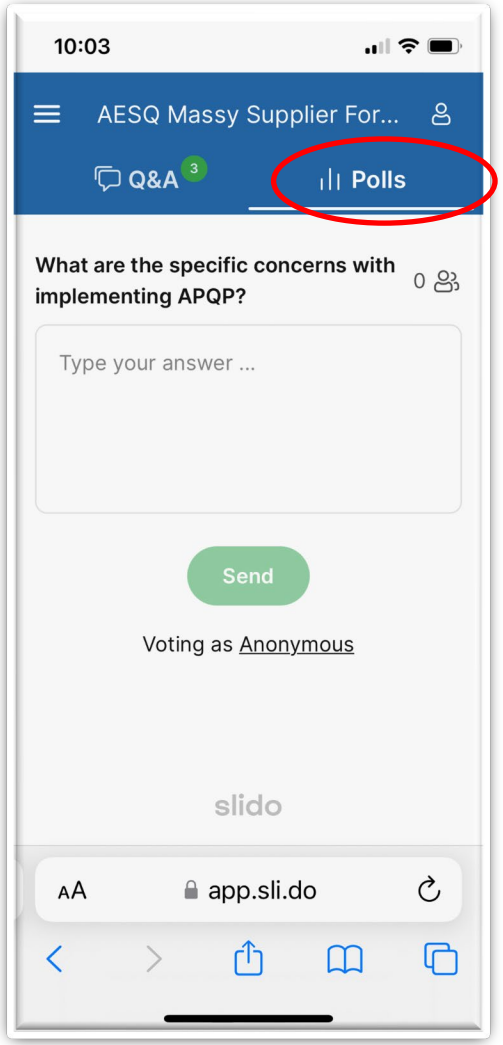
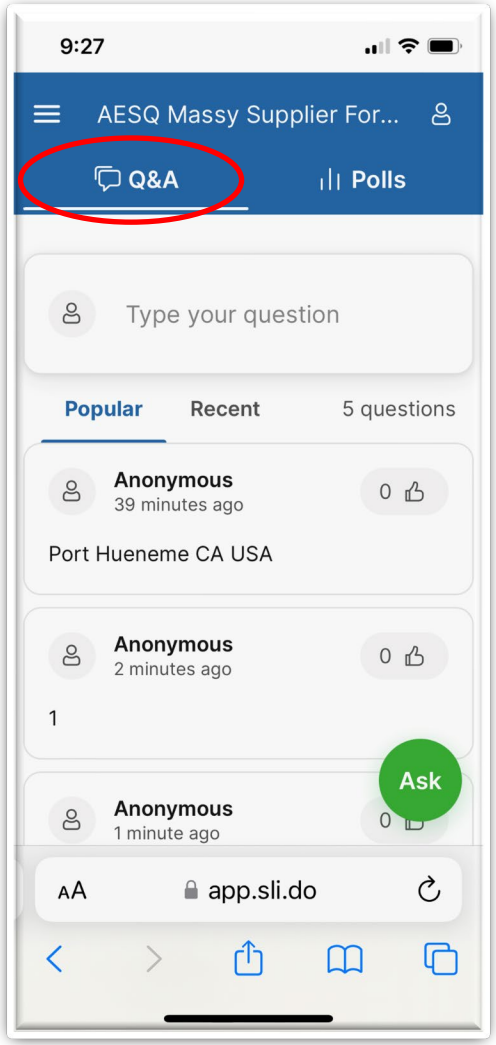


Answer Live Poll Questions



Add Your Own Questions

"Like" 👍 Questions

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What is the name of the city where you live?

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Have you attended previous AESQ Supplier Forums?

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What function are you in?

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AERO ENGINE SUPPLIER QUALITY GROUP (AESQ) OVERVIEW

LISA CLAVELOUX
SR. DIRECTOR, QUALITY
PRATT & WHITNEY

AS13100 Overview

What prompted AESQ to form? – View From 2013

- Unprecedented production ramp ahead
- Expanding global supplier footprint and increasing supplier engine content
- Common supply base, multiple OEM customers
- Customers required engine OEM's to improve management of supply base
- Aerospace Engine Supplier Quality [AESQ] group formed to supplement AS9100, and later AS9145, for critical safety nature of engines

AS13100 Overview

Why is AS13100 important

- All engine manufacturers are driving process control through APQP [Advanced Product Quality Planning]
- Despite the same foundational requirements, each were flowing different terminology, processes and tools
- Needed simpler and more consistent guidance for the supply base
- Asked for a forum to share best practices from across industry
- Needed to challenge current acceptance thresholds- raising the bar of performance for the whole industry, ex. product safety
- Essential to accelerate supplier capability through common development & training

Improving Product Safety & Quality Remained a Key Challenge

AS13100 Overview

Aerospace Engine Supplier Quality Group

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

Driving to Zero Defects

Guiding Principles

- Simplify & standardize requirements
- Common Quality language
- Build on existing industry standards [AS9100, AS9145]
- Standardized 3rd party training
- Supportive deployment

GE Aerospace

Pratt & Whitney

Rolls-Royce

SAFRAN Aircraft Engines

MTU Aero Engines

GKN Aerospace

Honeywell Aerospace

Howmet Aerospace

IHI

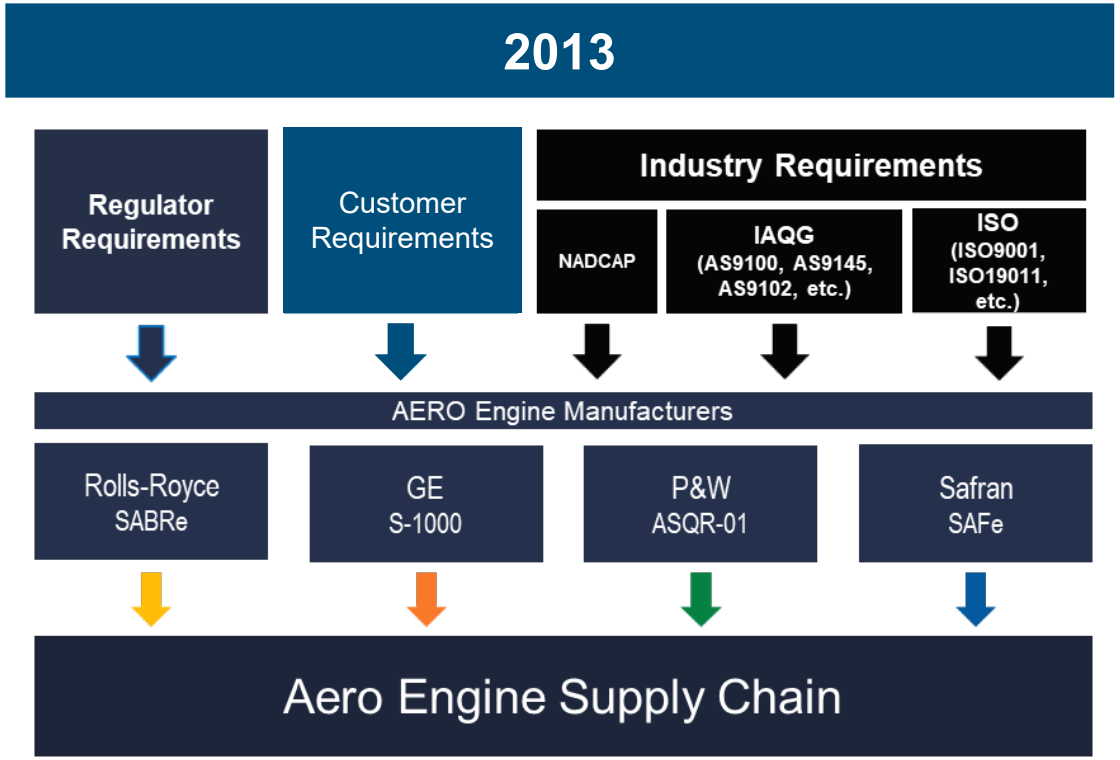
PCC Precision Castparts Corp.

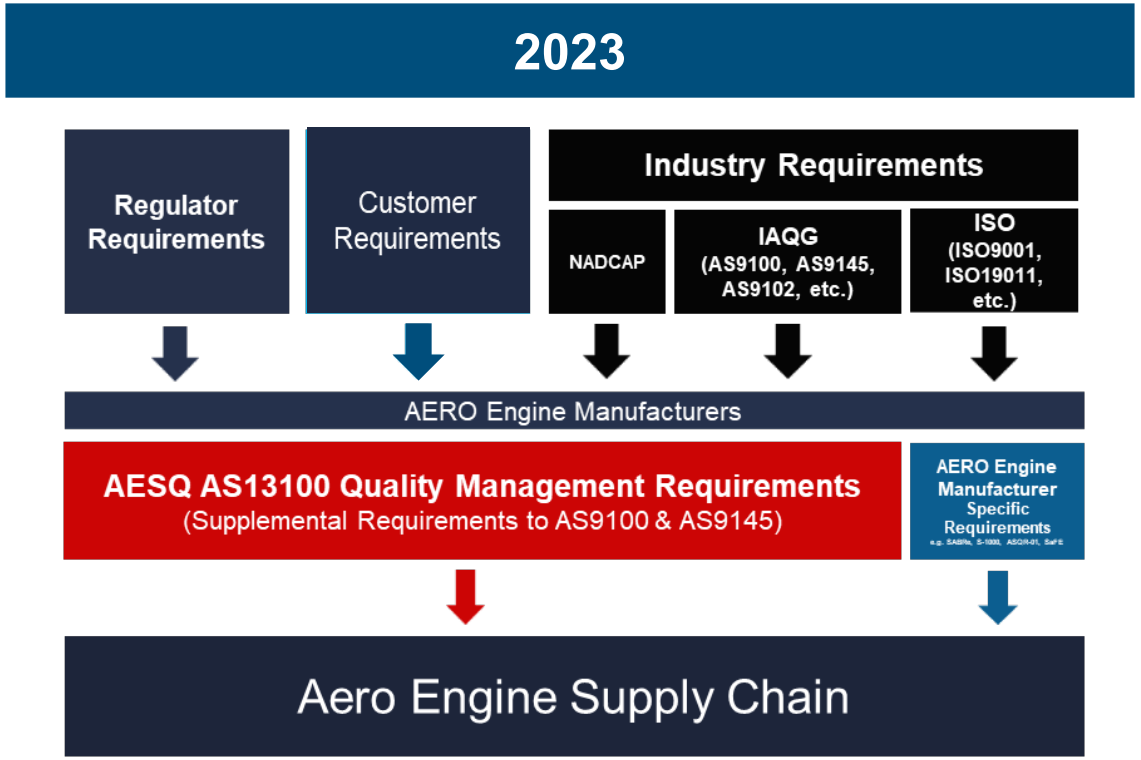
Cincinnati Thermal Spray
Collins Aerospace
Consolidated Precision Products

Parker Meggitt
Rolled Alloys
Solar Atmospheres
Woodward

AS13100 Overview

Aero Engines requirements flowdown





- Differing supplemental requirements to AS9100 [Regulatory, Customer, business] and guidance albeit with largely the same intent

- Creates a common set of supplemental requirements
- Simplifies the compliance for suppliers with multiple customers
- Common reference materials to support understanding, efficiency, and effective deployment of foundational quality tools

AESQ Strategy Group Company Members

AESQ Members

Cincinnati Thermal Spray
Collins Aerospace
Consolidated Precision Products
ITP Aero
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

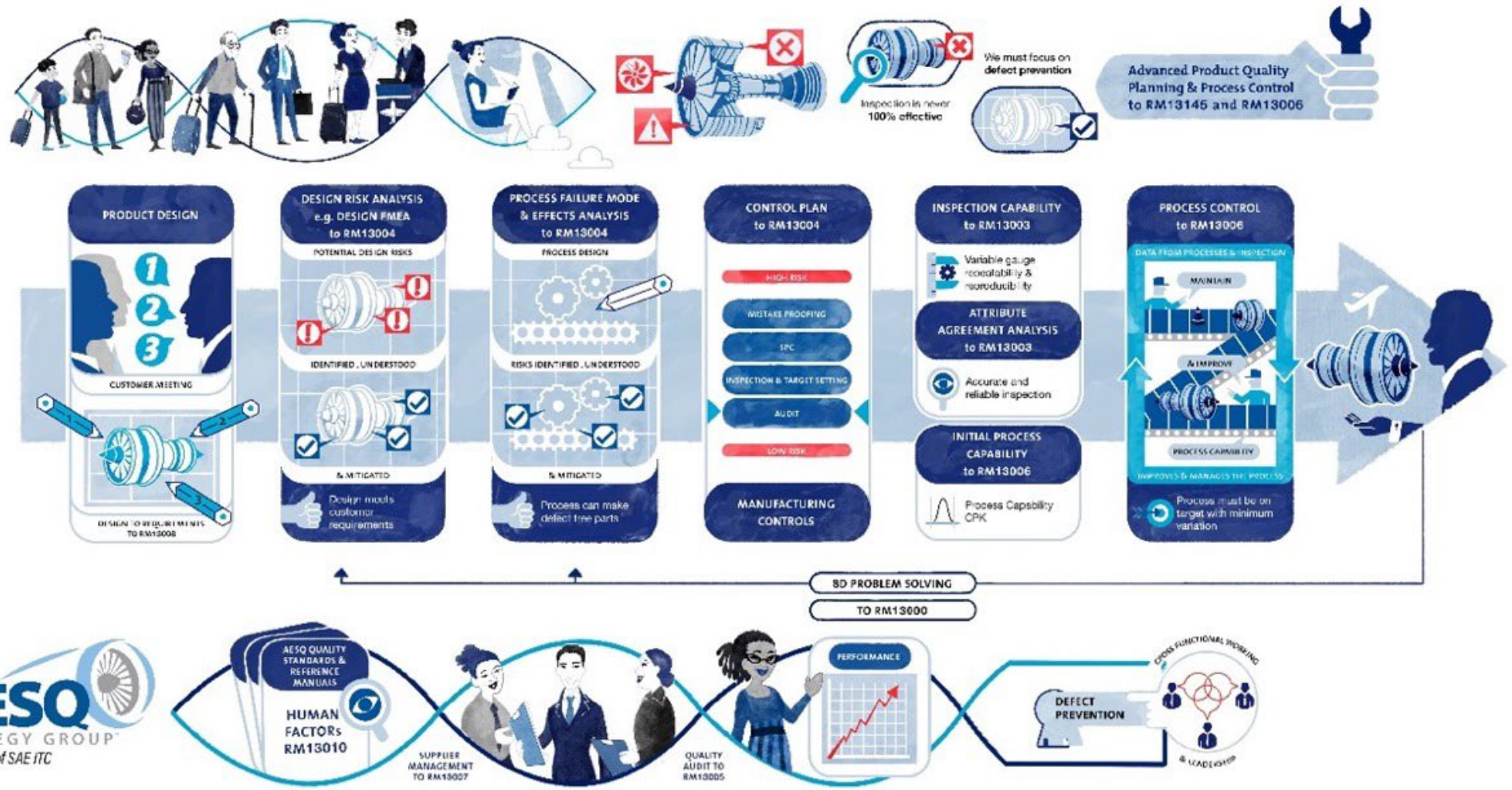
Barrie Hicklin
Sr. Director, Quality Systems
& Regulatory Compliance
Honeywell

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

What Does Success Look Like?

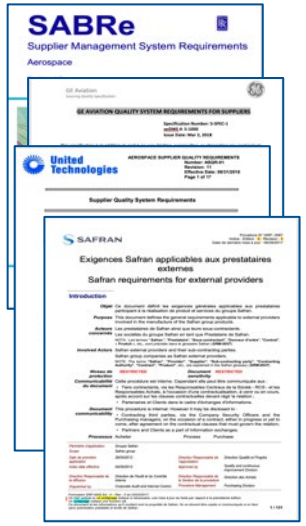
- Leaders advocating for process control- speaking the language
- Common tool usage, processes control is the way we work
- Developing proficiency through common Industry training
- Culture of product safety and quality felt into the tiers of the supply base
- Continuous Improvement of the AS13100 standard- feedback from supply base, OEM's, customers

Mindset shift- Belief that zero defects is achievable

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

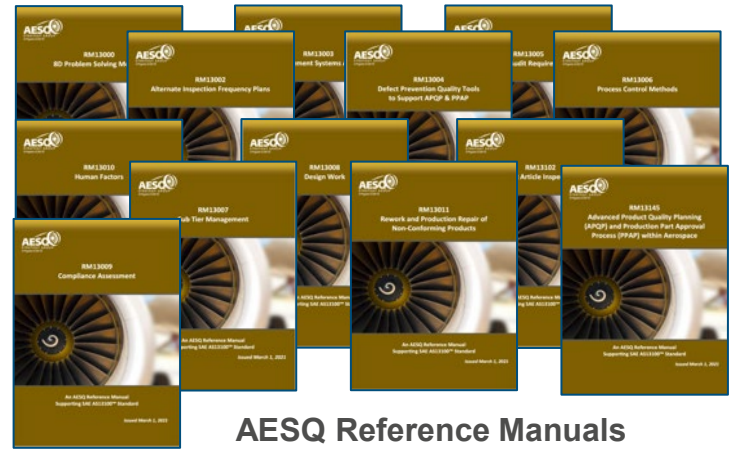
Future Engine Maker Supplier Requirements

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

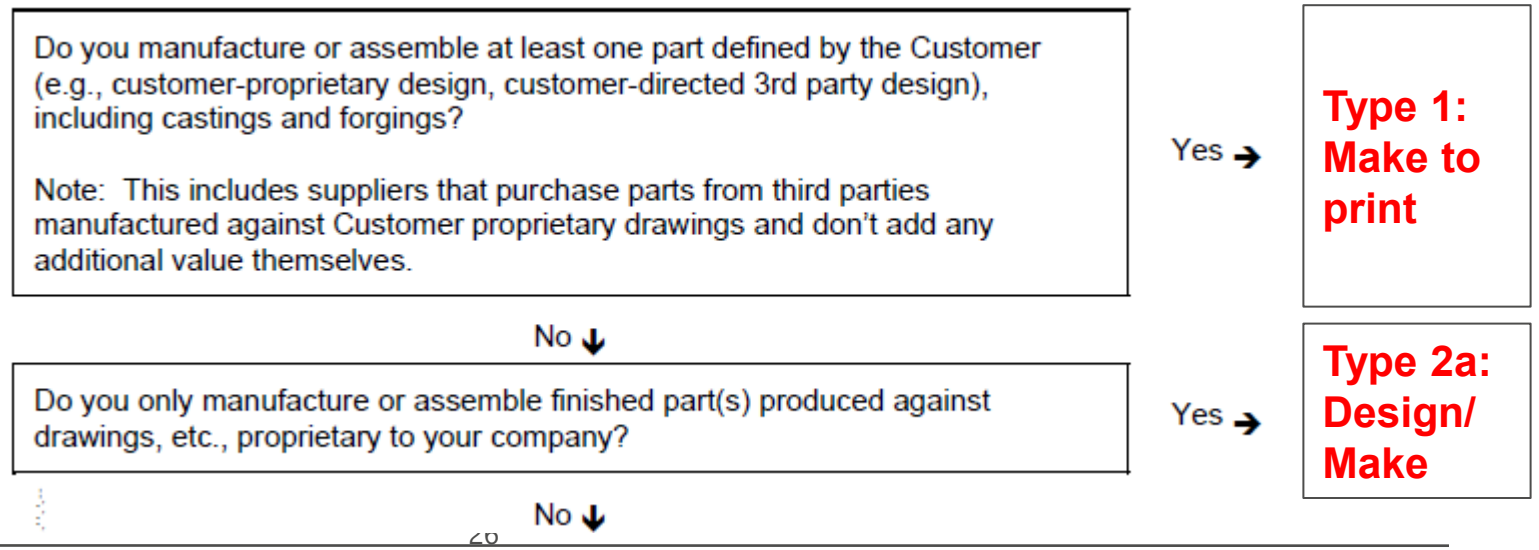
AS13100 Requirement Highlights

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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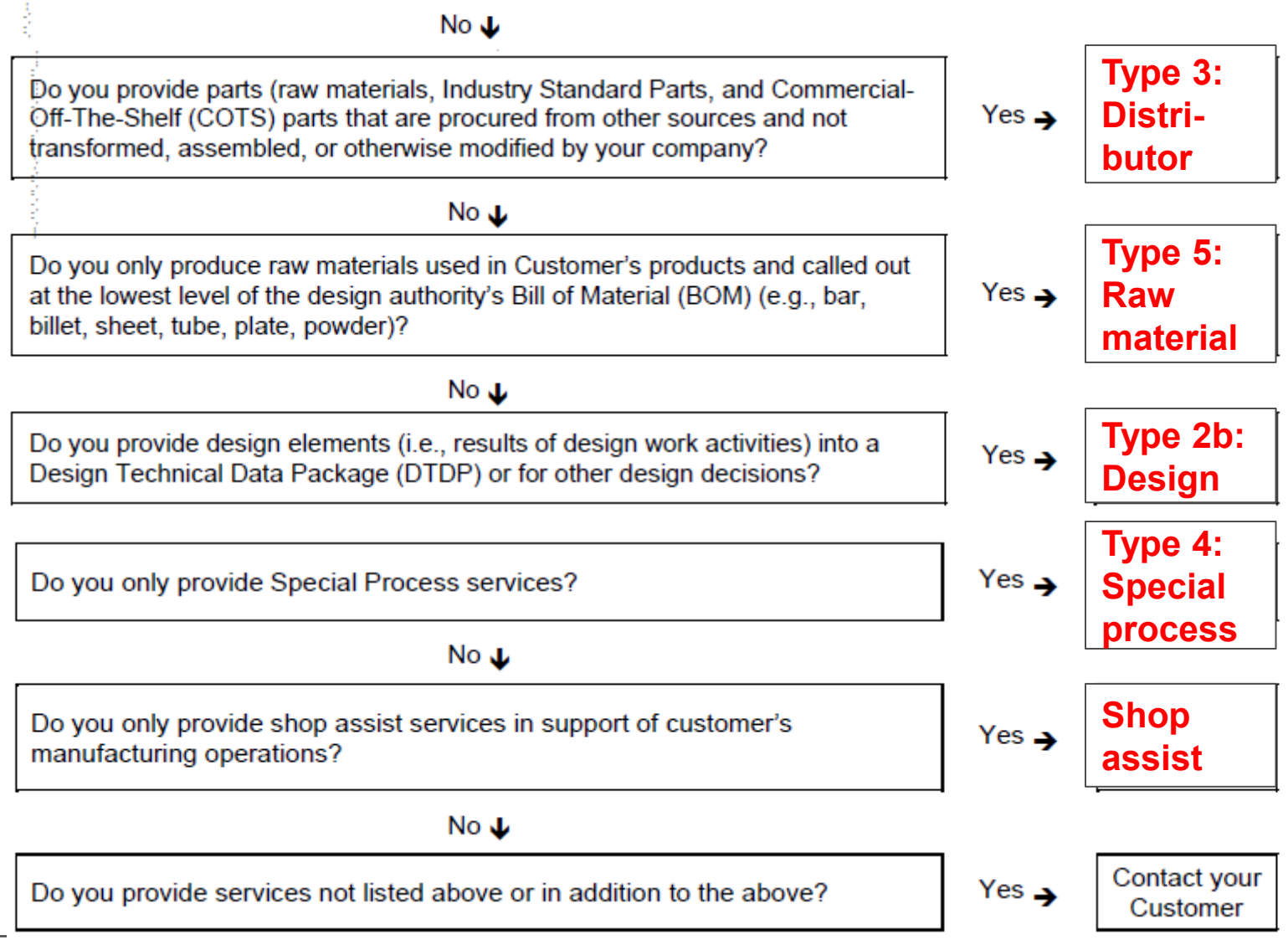
AS13100 Requirement Highlights

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

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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

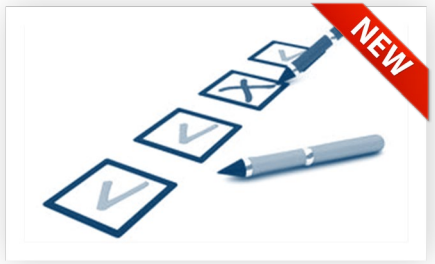
Recognizes NADCAP certification for special processes for both internal and external operations.

(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.

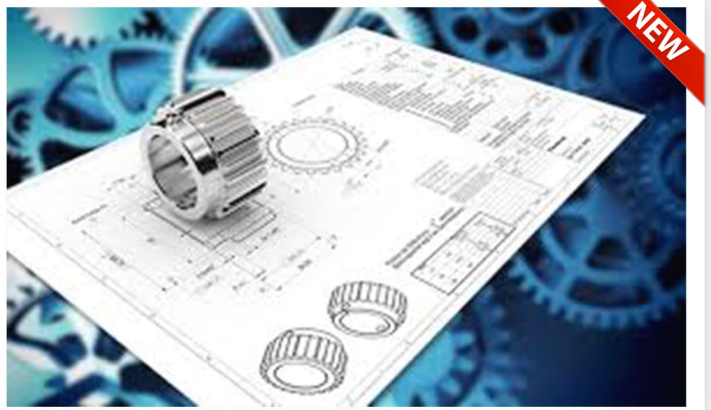
(Section 7.2.1)

AS13100 Requirement Highlights

NEW

Common **Record Retention** policy for OEMs

(Section 7.5.3.5)



NEW

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)

NEW

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)

NEW

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)

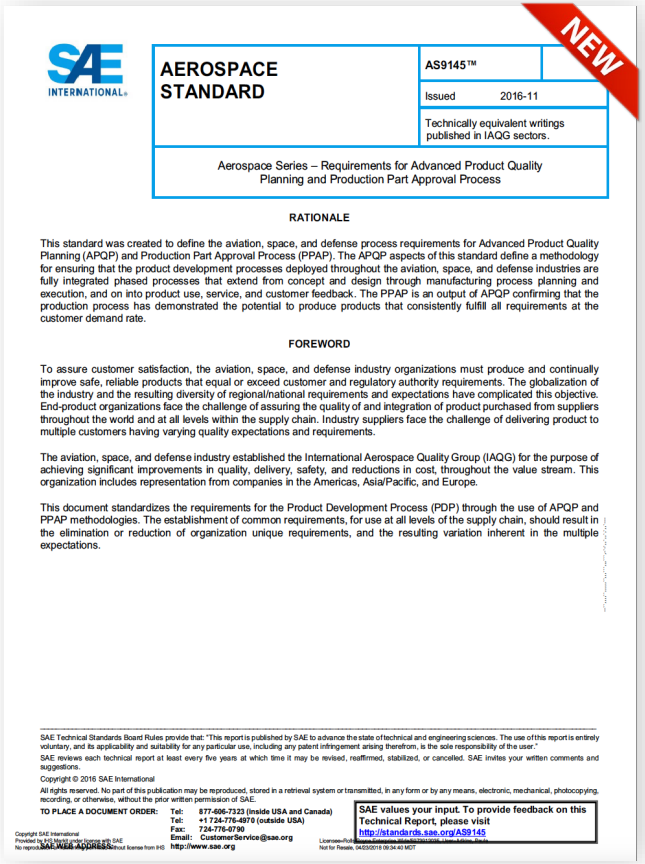
AS13100 Requirement Highlights: Chapter B APQP & PPAP

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.

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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

- **The AS13100 writing team is currently working on an update of the standard**
- **Target date for publication is Year end 2023**

- **108 suggestions under review**
  - Clarifications
  - Grammar & Spelling
  - Suggested Improvements

All ideas for improvement is appreciated.
Send to 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

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SAE WEB ADDRESS:

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

DEPLOYMENT & TRANSITION TO AS13100

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

EARL CAPOZZI
DISCIPLINE CHIEF; QUALITY & PROCESS ENGINEERING / SUPPLIER QUALITY
PRATT WHITNEY

Where are we?

March 2021
AS13100 Publication

Deployment Started

Target: December 31, 2022
- Transition Completed

Ongoing compliance activities 2023

GE Aerospace

Pratt & Whitney – Dependable Engines

Rolls-Royce

Safran Aircraft Engines

Honeywell Aerospace

MTU Aero Engines

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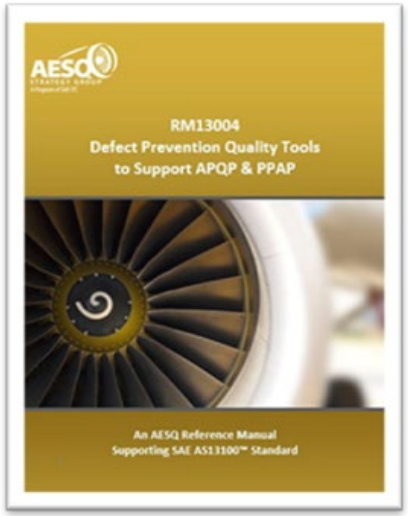
PCC Precision Castparts Corp.

Howmet Aerospace

GKN Aerospace

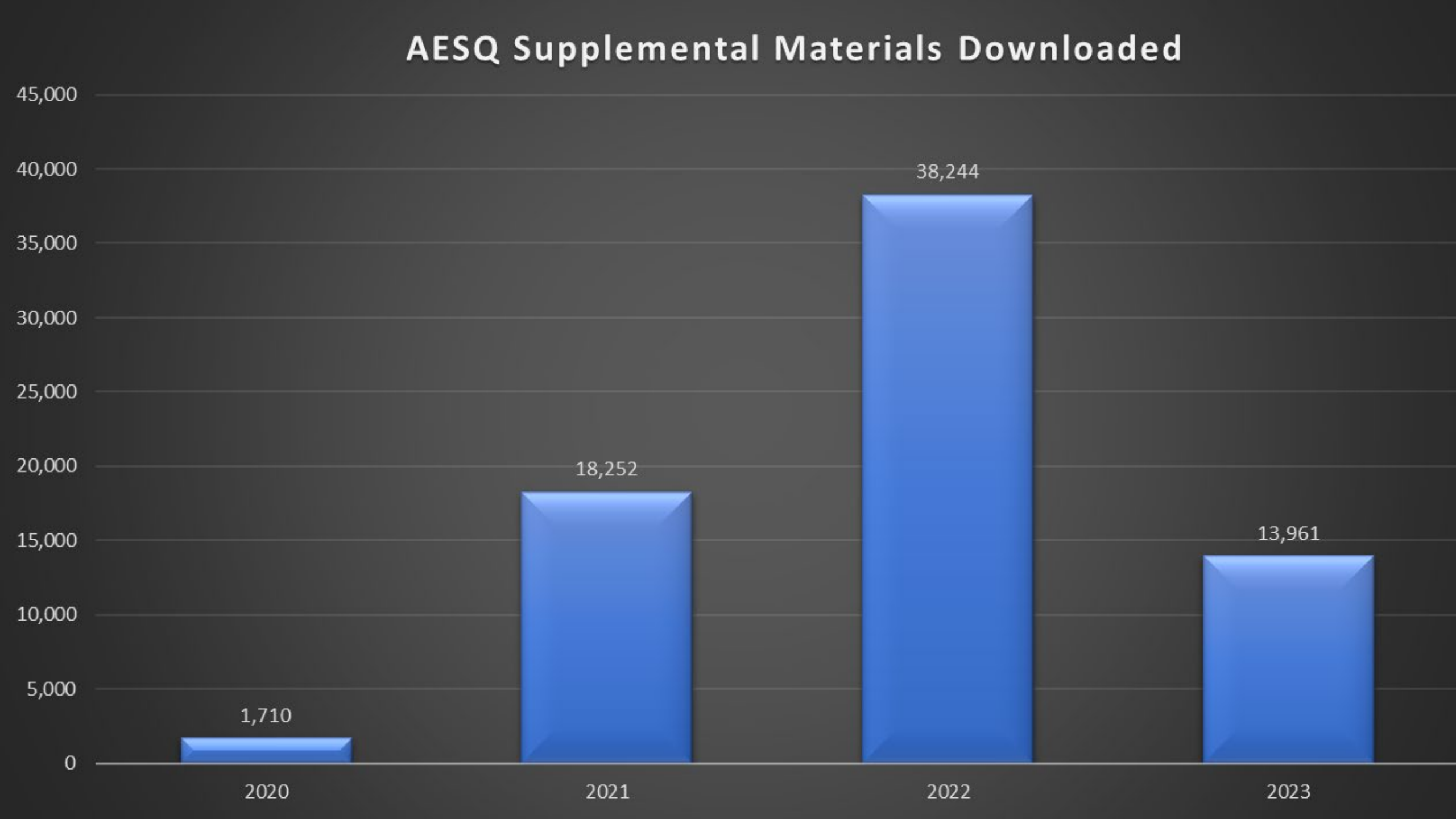
Implementation Resources



AESQ Subject Matter Interest Groups

Advanced Product Quality Planning (APQP) & Production Part Approval Process (PPAP) RM13145	Measurement Systems Analysis (MSA) RM13003
Design Work & Production Repair & Rework RM13008 & RM13011	Process Control Methods RM13006
Sub Tier Management RM13007	Problem Solving Methods RM13000
Human Factors RM13010	Quality Audit Methods RM13005
DPRV Training RM13001	Alternate Inspection Frequency RM13002
First Article Inspection RM13102	Compliance Assessment RM13009
Defect Prevention Tools to Support APQP & PPAP RM13004	

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
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30,000
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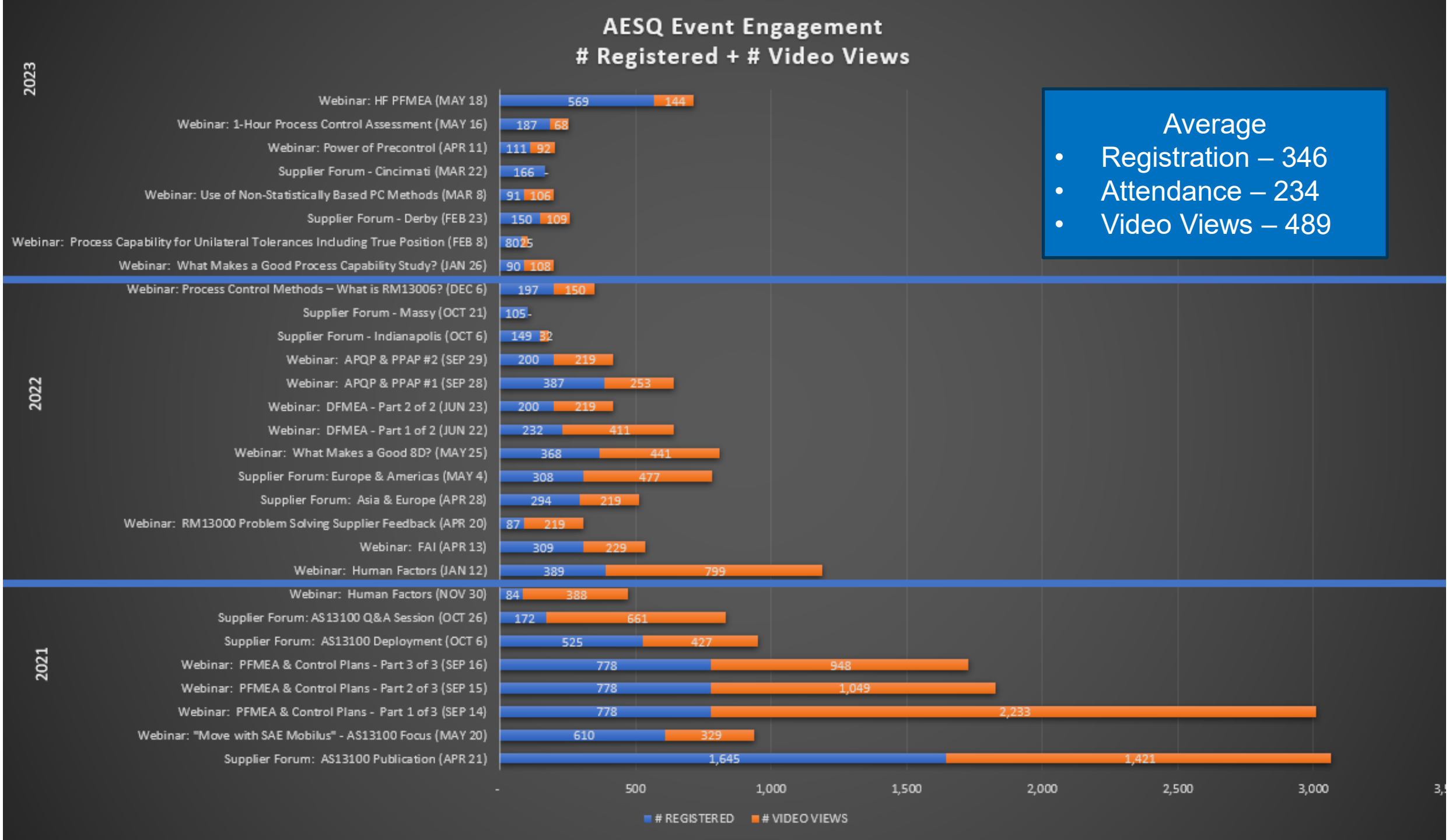
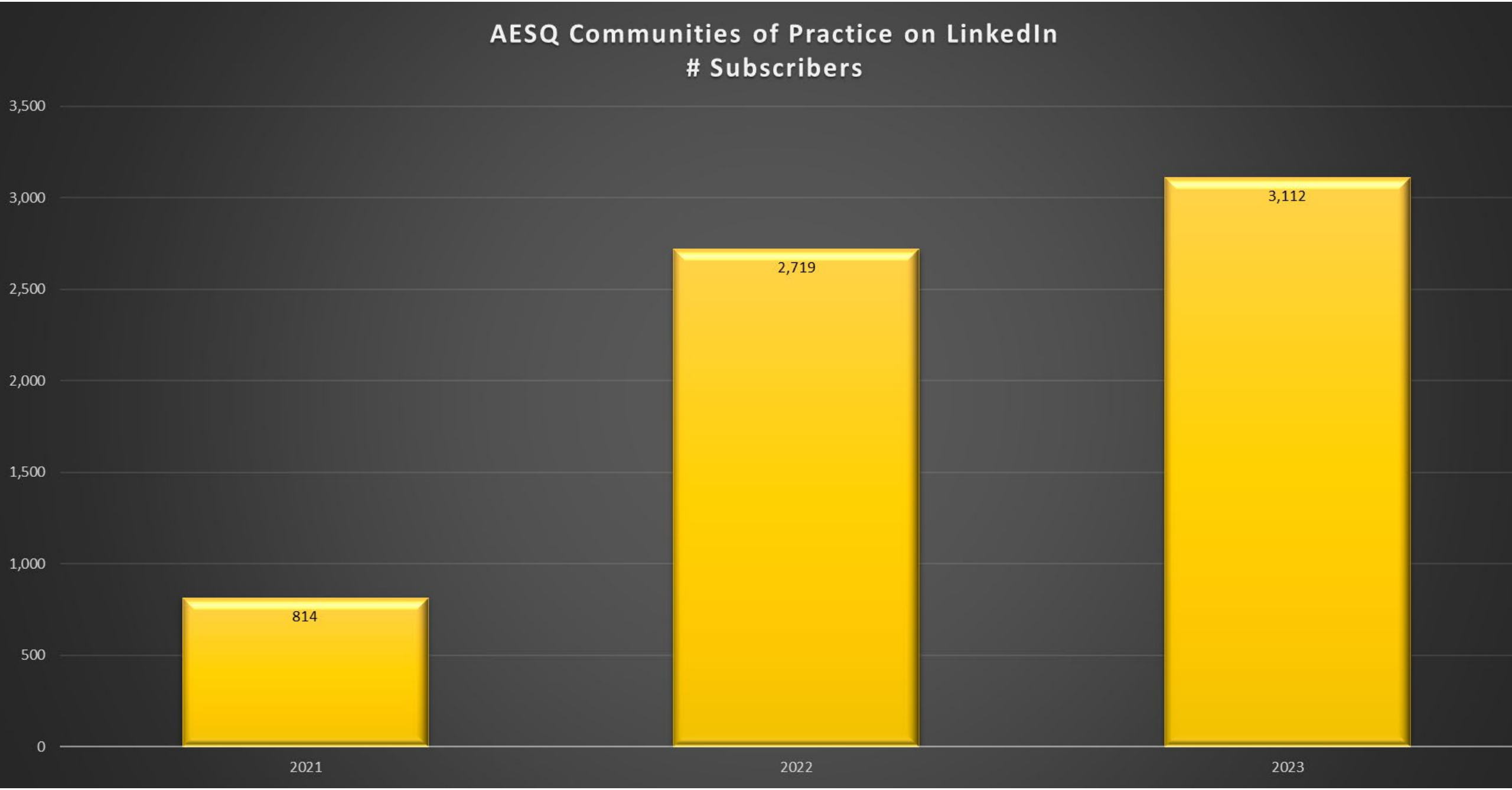
20,000
15,000
10,000
5,000
0
1,710
18,252
38,244
13,961
2020
2021
2022
2023


AESQ Event Engagement
Registered + # Video Views
2023
Webinar: HF PFMEA (MAY 18) 569 144
Webinar: 1-Hour Process Control Assessment (MAY 16) 187 68
Webinar: Power of Precontrol (APR 11) 111 92
Supplier Forum - Cincinnati (MAR 22) 166 -
Webinar: Use of Non-Statistically Based PC Methods (MAR 8) 91 106
Supplier Forum - Derby (FEB 23) 150 109
Webinar: Process Capability for Unilateral Tolerances Including True Position (FEB 8) 80 25
Webinar: What Makes a Good Process Capability Study? (JAN 26) 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
Webinar: Human Factors (JAN 12) 389 799
2021
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 – 346
• Attendance – 234
• Video Views – 489
- 500 1,000 1,500 2,000 2,500 3,000
REGISTERED
VIDEO VIEWS


AESQ Communities of Practice on LinkedIn
Subscribers
3,500
3,000
2,500
2,000
1,500
1,000
500
0
814
2,719
3,112
2021
2022
2023


AESQ Newsletter Subscribers
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
202
1,178
3,403
3,991
2020
2021
2022
2023

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

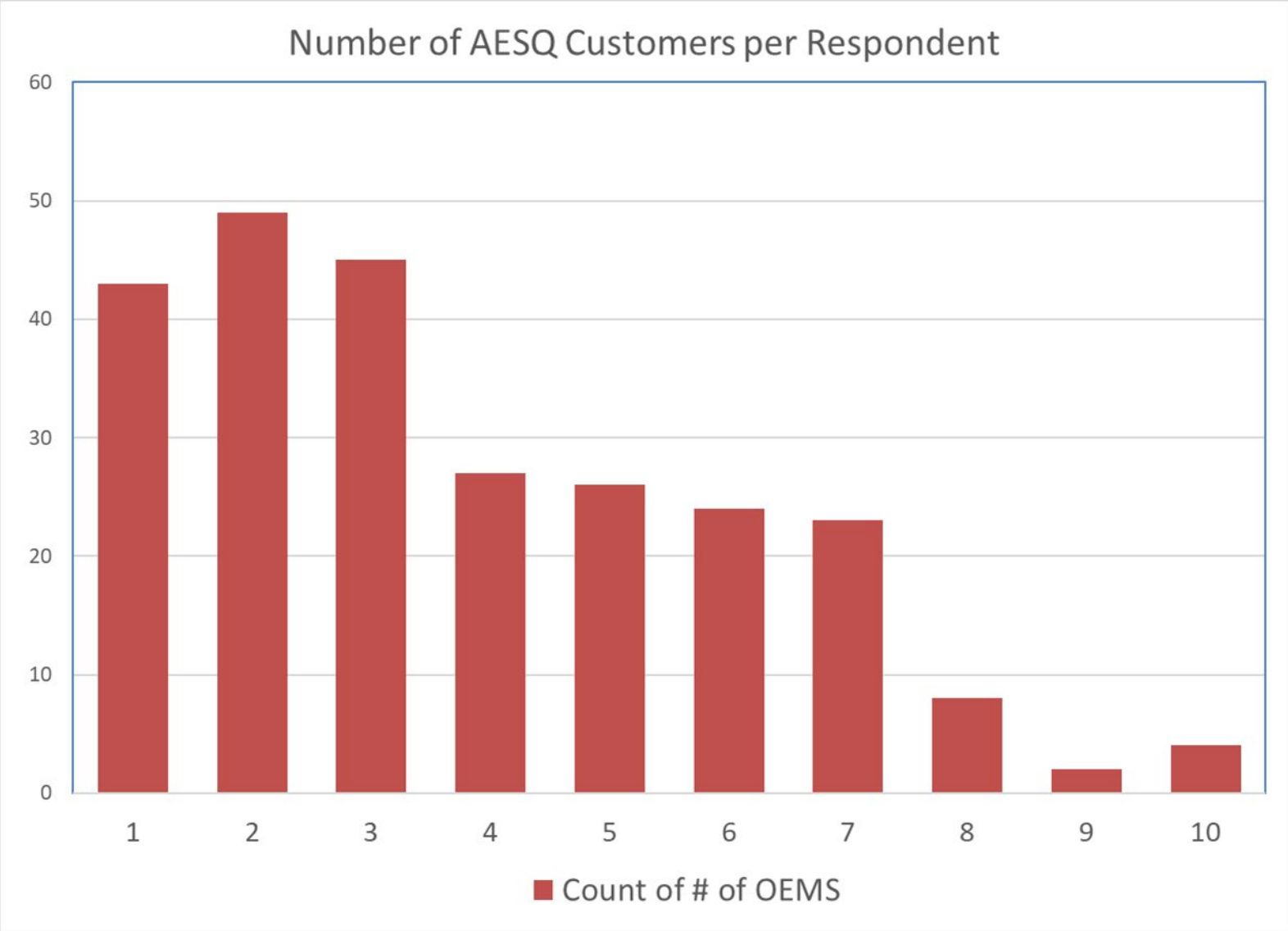
September 2022: Survey targeted to develop plans to help suppliers for Q4

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

February 2023: Post deployment survey to find opportunities

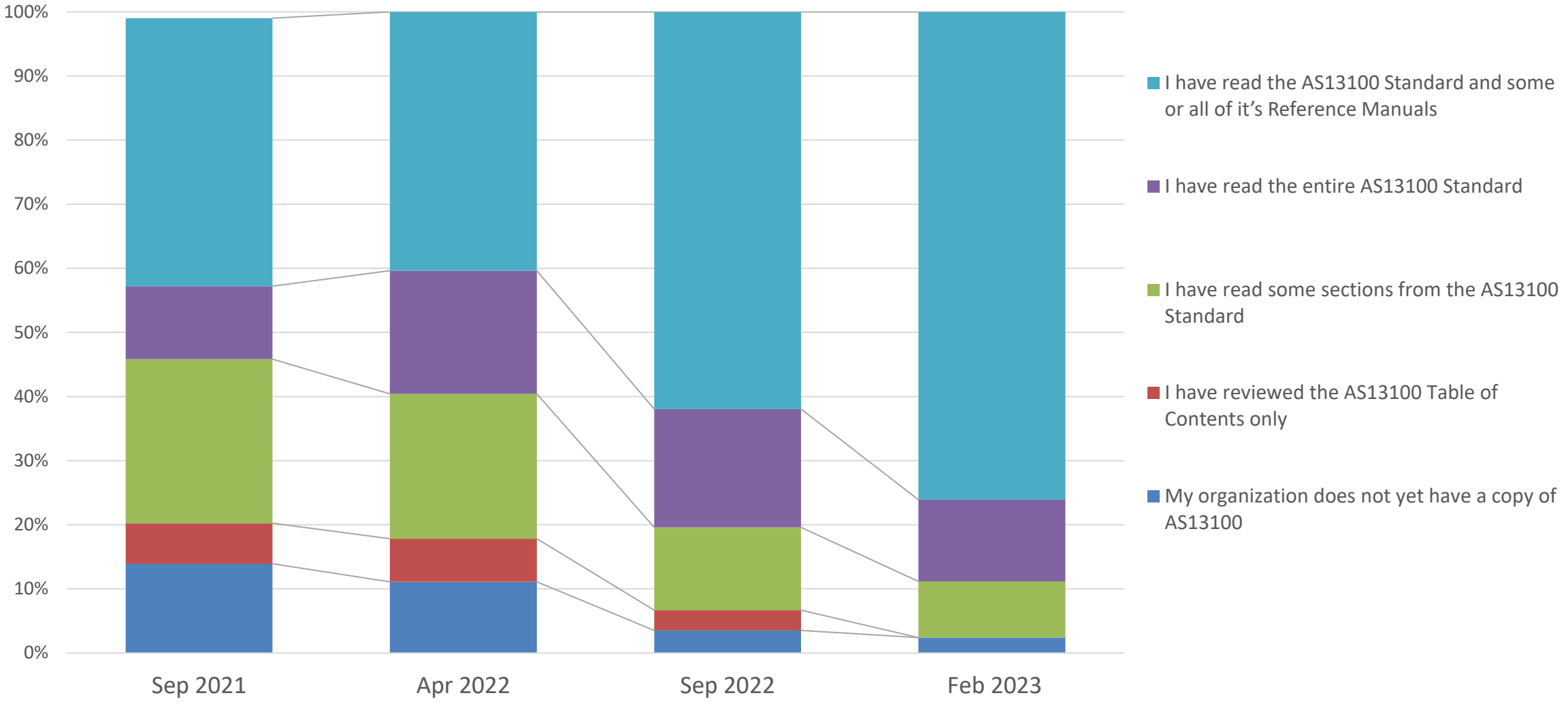
- Continue with similar questions to track evolution
- 251 respondents

Who Responded?

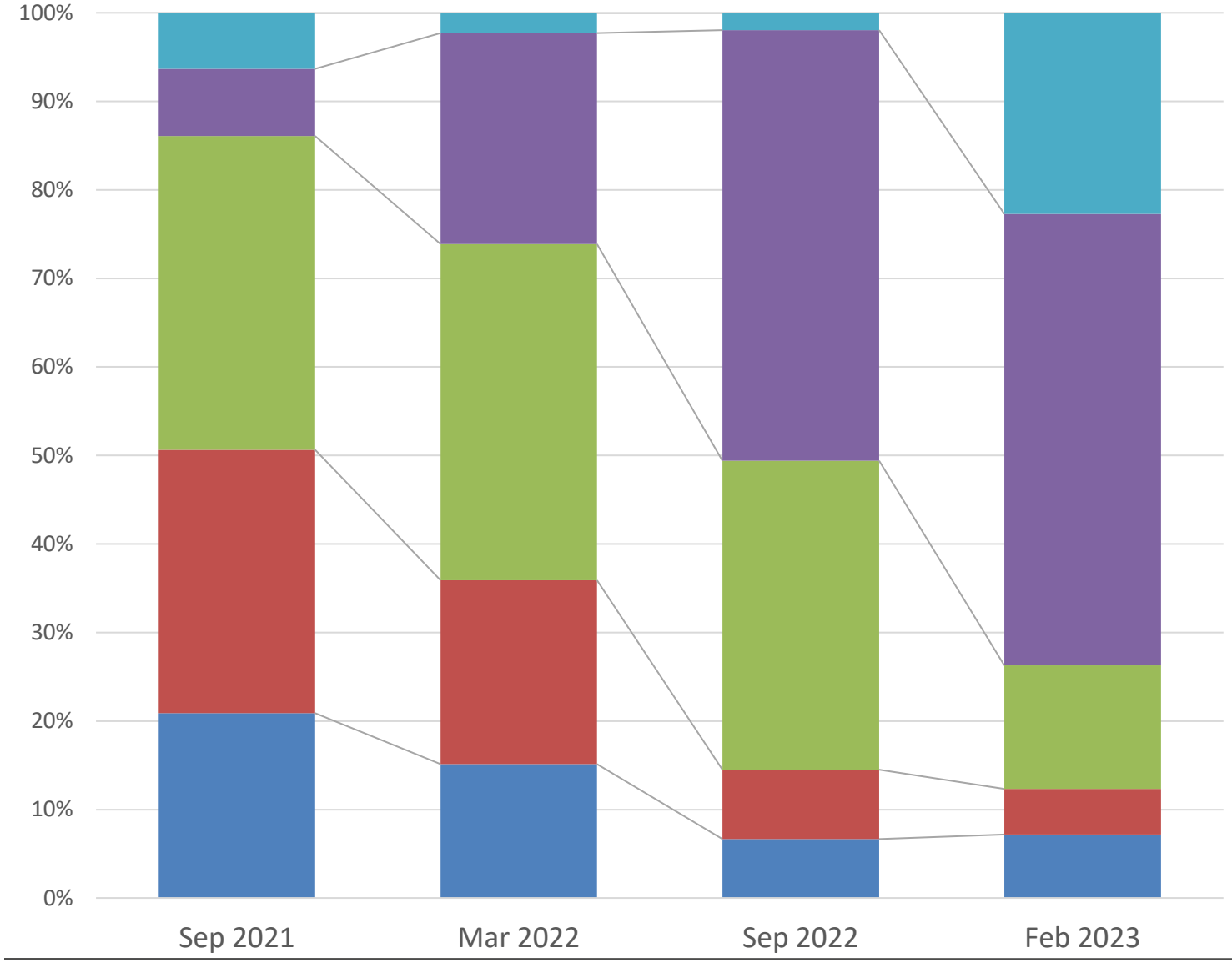


Respondents had an average of 3.75 AESQ customers

Familiarity with the AS13100 standard



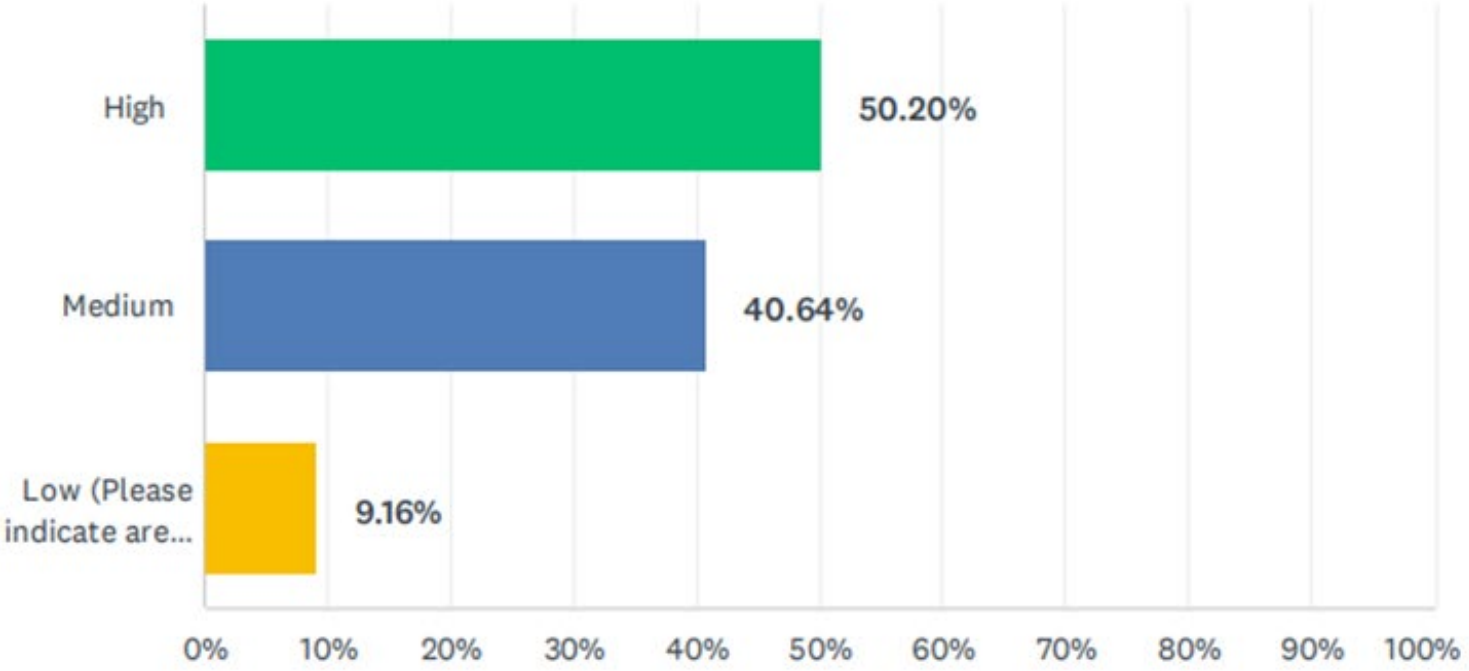
Deployment Status



Deployment Confidence

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

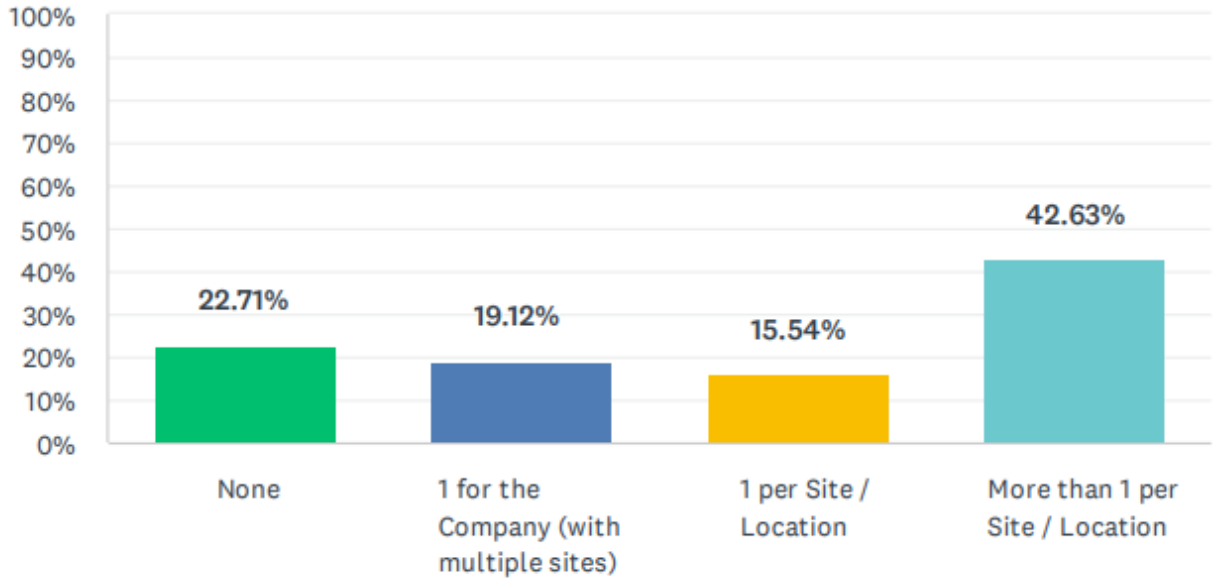
Answered: 251 Skipped: 0



Training

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

Answered: 251 Skipped: 0

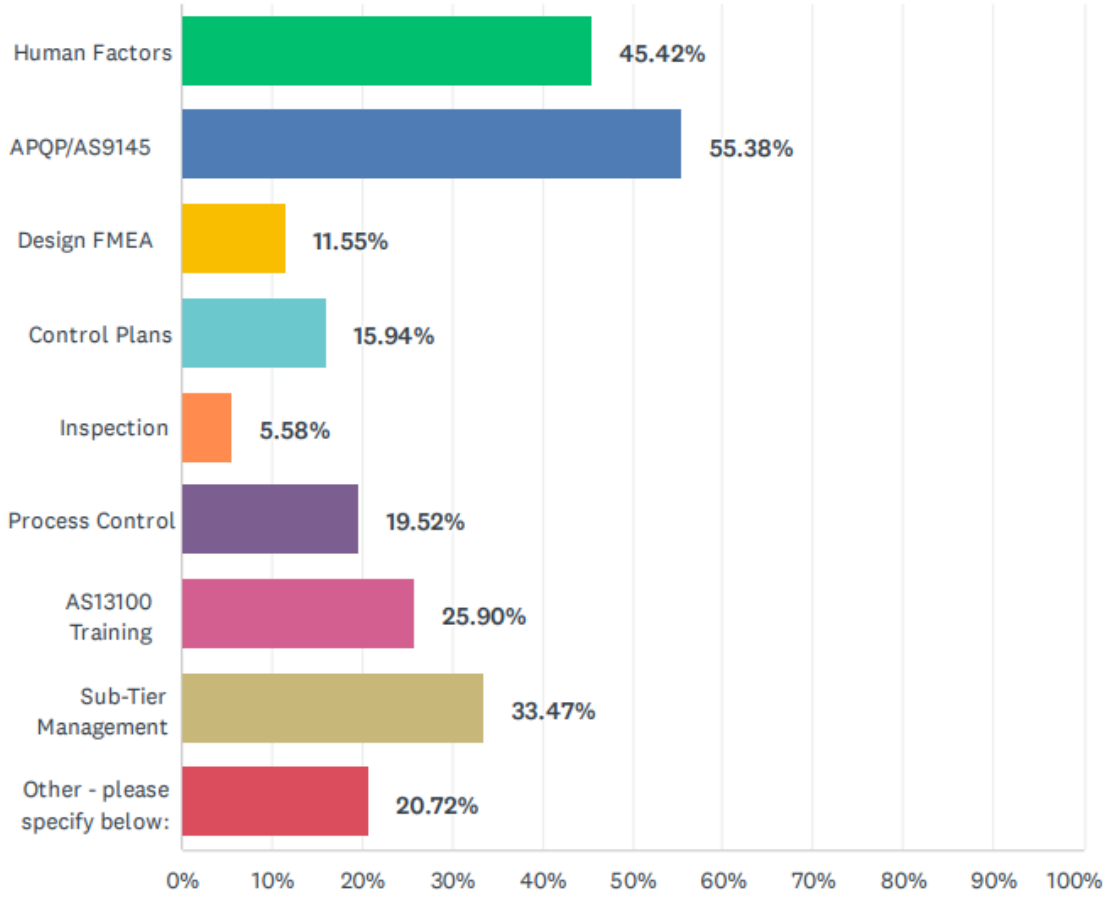


- Requirements training is the online training
- Expectations that it is required to conduct effective gap analysis
- We have set a minimal of 1 per company, but expect more for effective deployment

Biggest Challenges

Q6 What is the biggest challenge to your company being able to comply with AS13100? (check all that apply)

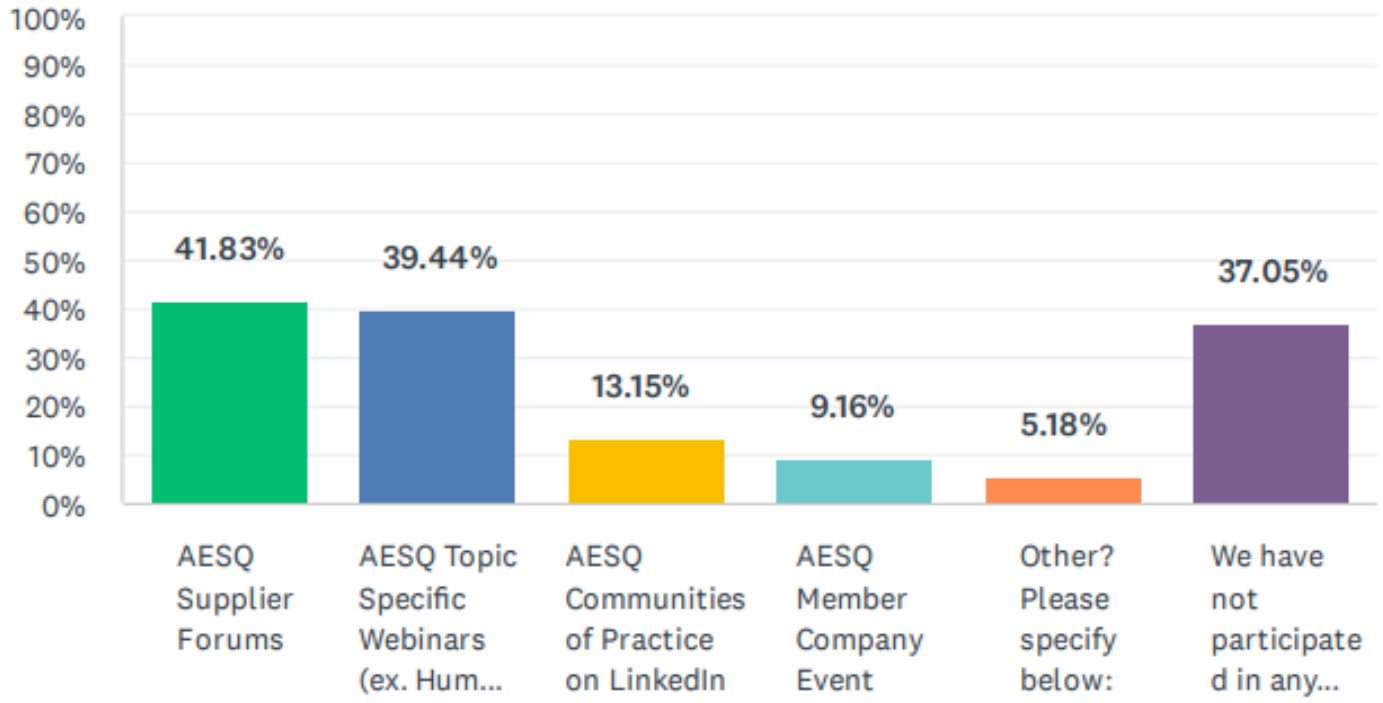
Answered: 251 Skipped: 0



Engagement with AESQ

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

Answered: 251 Skipped: 0



AESQ

HUMAN FACTOR FAILURE MODE & EFFECTS ANALYSIS

Using an FMEA approach to REDUCE HUMAN ERROR

A Rolls-Royce Case Study

Steve Roebuck
Head of Certification & Quality Assurance
Rolls-Royce Civil Aerospace Operations

AESQ STRATEGY GROUP
A Program of SAE ITC

Aero Engine Assembly Operations

AESQ STRATEGY GROUP™
...ogram of SAE ITC

30,000

Components

6,000

Manual Operations

HUMAN FACTORS play a critical part in assuring **PRODUCT QUALITY & SAFETY**

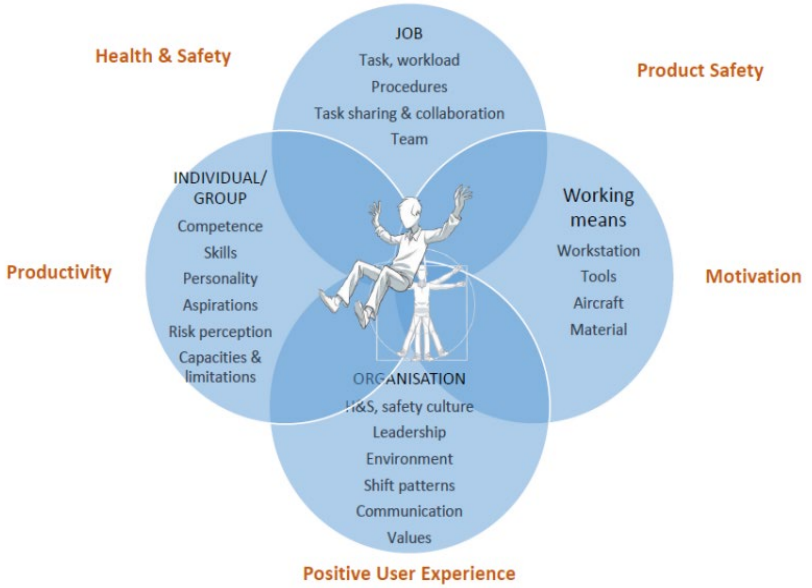
What is/are Human Factors?

Human Factors can influence us at work every day and can negatively impact performance without us knowing it!

Being aware and understanding Human Factors plays an important role in Manufacturing and Assembly Operations

The primary focus of any Human Factors initiative is to improve safety, quality, and efficiency by reducing and managing human errors made by individuals and organizations

There are many disciplines around the study of human factors but today we are going to focus on the Dirty Dozen (12 most common causes of human error).



slido

How many of the Dirty Dozen can you name?

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

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

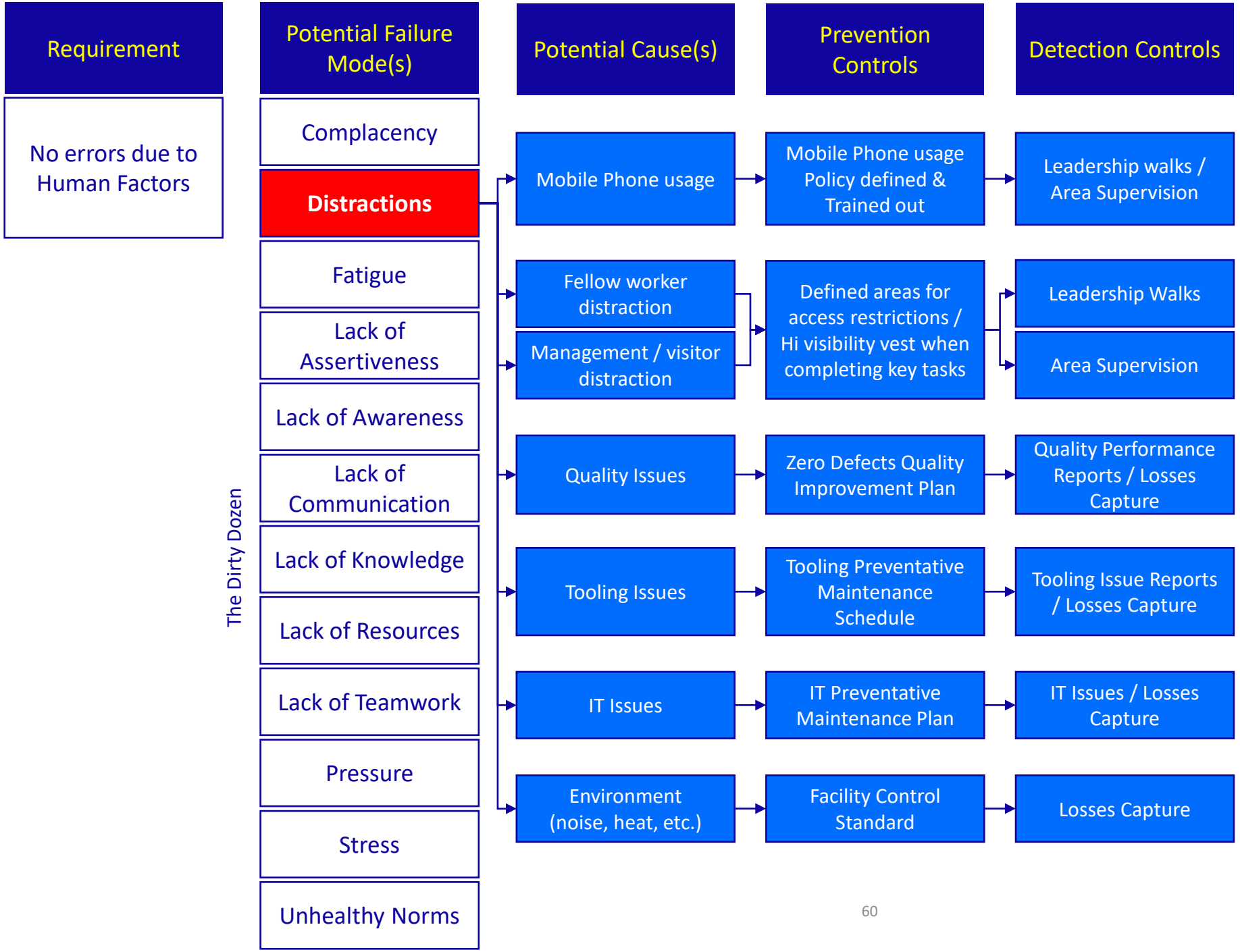
Requirement	Potential Failure Mode(s)	Potential Cause(s)	Prevention Controls	Detection Controls
No errors due to Human Factors	Complacency			
	Distractions			
	Fatigue			
	Lack of Assertiveness			
	Lack of Awareness			
	Lack of Communication			
	Lack of Knowledge			
	Lack of Resources			
	Lack of Teamwork			
	Pressure			
	Stress			
	Unhealthy Norms			

The Dirty Dozen

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

Human Factors

Using the FMEA Approach



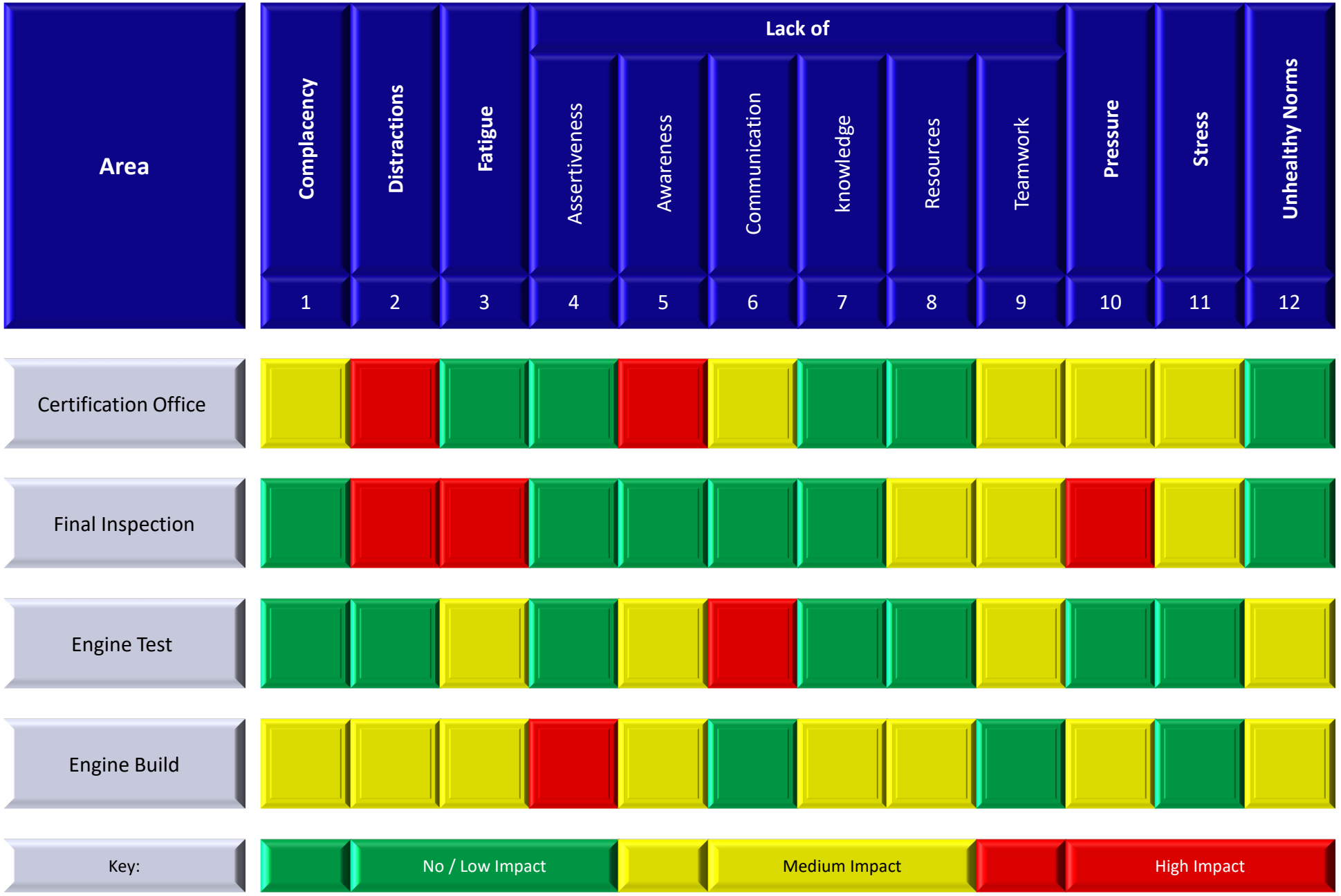
(Simplified FMEA template for illustration purposes only. Some columns are missing e.g. the scoring is not included)

Assembly & Test

Human Factors FMEA

Heat Map

Each area will have its own, unique Human Factor risk profile (and this will change over time)



Human Factors FMEA – Certification Team Extract

Requirement	Failure Mode	Potential Effect	Severity	Class.	Potential Cause(s) of the Failure Mode	Prevention Control(s) for the Potential Causes	Occurrence	Detection Controls of the Failure Mode and/or the Potential Causes	Detection	RPN
No Distraction	Distraction	Delays to despatch of the engine			Paperwork Errors	Gated Process		Individual Observation		
No Pressure	Pressure	Escape to the customer			Delivery Pressure	Team allocation of tasks/daily meeting		Individual Observation		
Good Communication	Lack of Communication	Escape to the customer			Poor handover of engine	Daily engine review		Engine status board		
All Resources	Lack of Resources	Delays to despatch of the engine			Lack of consumables	Consumable champion		Weekly 5S audit		
Full Awareness	Lack of Awareness	Repeat escapes to the customer			Unaware of errors made	Weekly team meeting to feedback errors		None		

Scenario 1 – Final Inspection

Final Inspection includes three main activities;

- Post Test Engine Inspection
- Engine Preparation for Transport
- Final Documentation for Certification

When engines get to Final Inspection they have a specific time window to complete these activities before the transportation is ready to take it off site to be delivered to the customer.

The teams work a 12 hour shift pattern and provide 24 hour cover, seven days per week.

Any delays to this process can cause disruption to the transportation and customer delivery schedule. Delays can be caused by;

- Quality issues found at inspection
- Resource constraints (e.g. Absence to key personnel)
- Paperwork discrepancies

slido

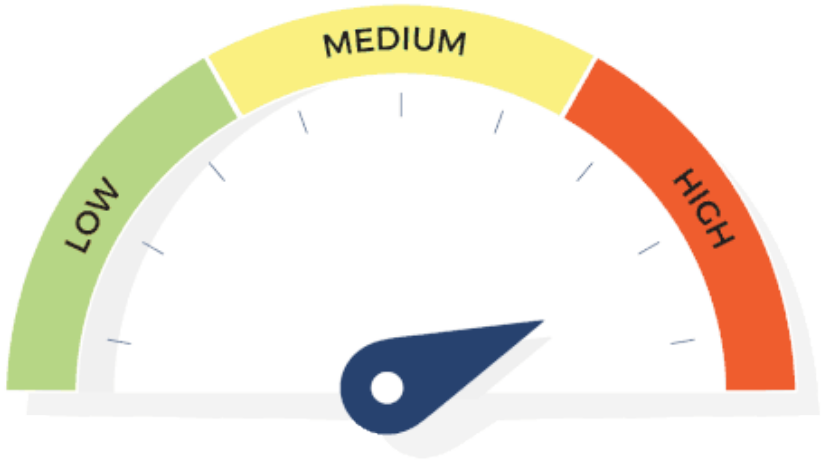
Which of these Dirty Dozen applies to this Scenario?

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

Key Benefits

- Increased Awareness of Human Factors risks across the teams/organisation
- Increased engagement on Human Factors improvements
- Majority of improvements are low cost but high impact
- Increased levels of Human Factors reporting
- Reduction in errors/escapes

Human Factor FMEA : Tips for Success



Human Factors Maturity Score

EFFECTIVE FMEAs WILL HELP TRANSFORM YOUR QUALITY PERFOMANCE!

Tips for Effective Deployment include;

a) Develop FMEA at the team level (Can be done for **Operational** or **Transactional** Processes/Teams)

b) Ensure that the team is **Cross Functional**

c) Use **REFERENCE FMEAs** and adapt them to the local situation

d) Create **Tangible Mitigation Actions** based on Risk

e) Conduct **Regular Reviews** with the team and keep the FMEA updated

f) Keep it **Simple!**

Please use the Chat Function to ask any questions

AESQ AS13100 TRAINING OVERVIEW

EARL CAPOZZI
DISCIPLINE CHIEF; QUALITY & PROCESS
ENGINEERING / SUPPLIER QUALITY
PRATT WHITNEY

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

$1095

SAE AS13100 Quality Requirements Course Overview

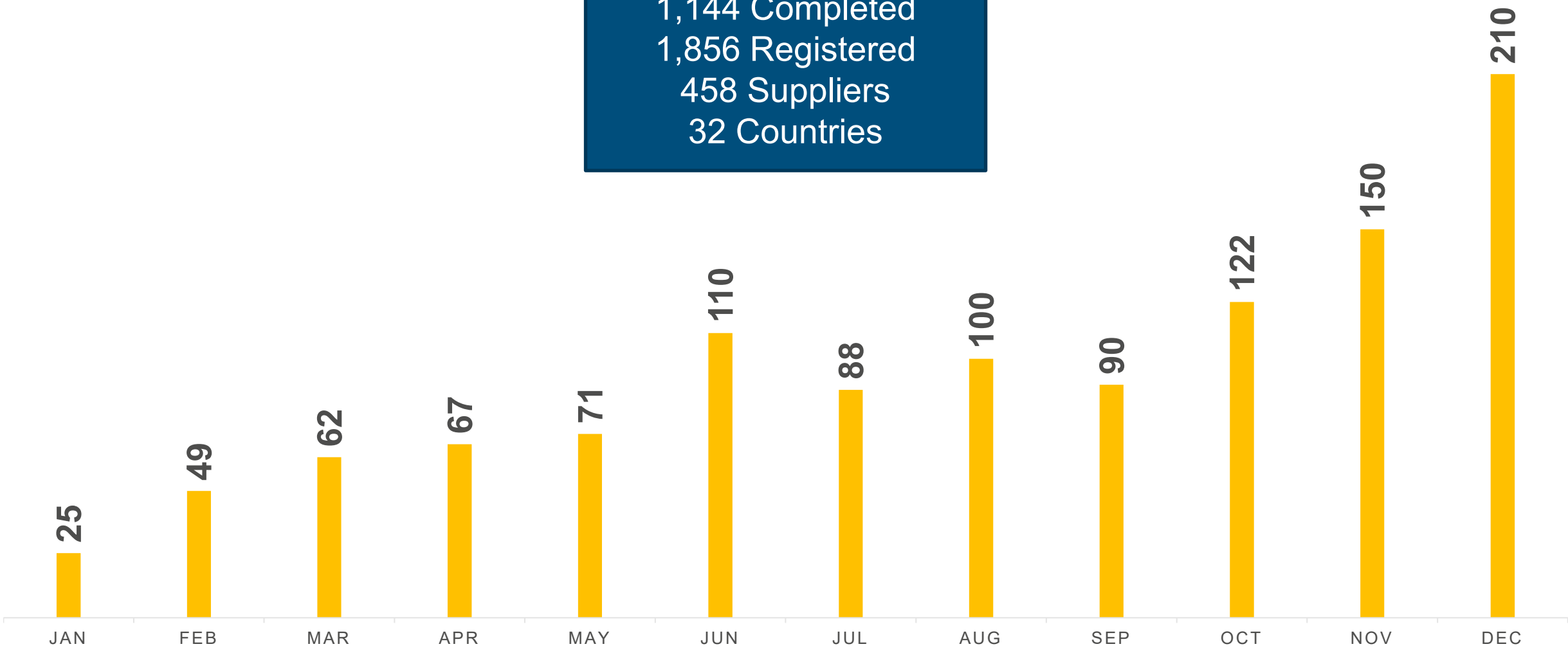
- **Required** for Quality Leaders with responsibility for deploying the requirements of AS13100
- **Recommended** for functional leaders responsible for creating or managing processes that are impacted by AS13100
- Provides knowledge and insight for each of the AESQ supplemental requirements
- Provides 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.

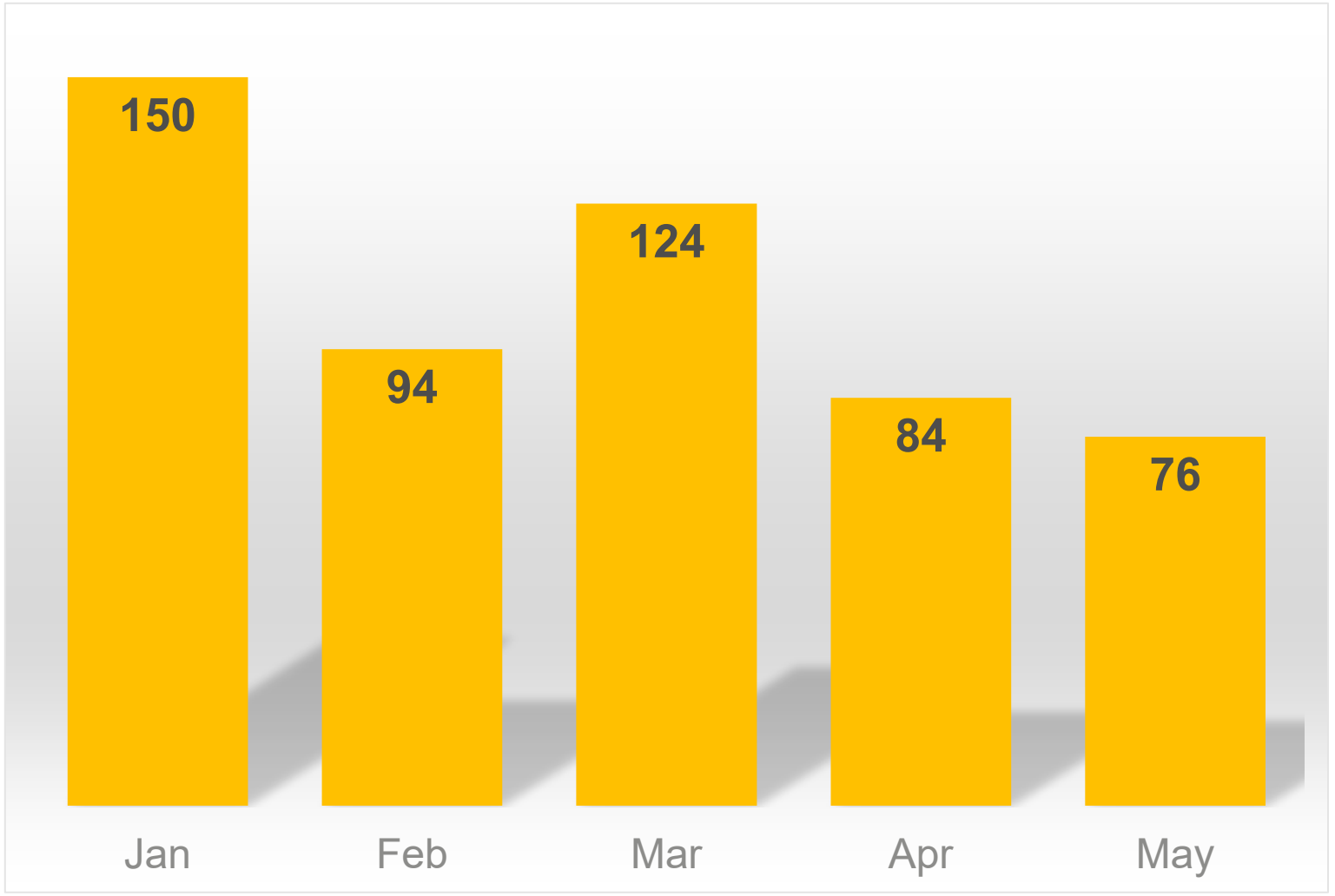
AS13100 Requirements Course Participation 2022

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



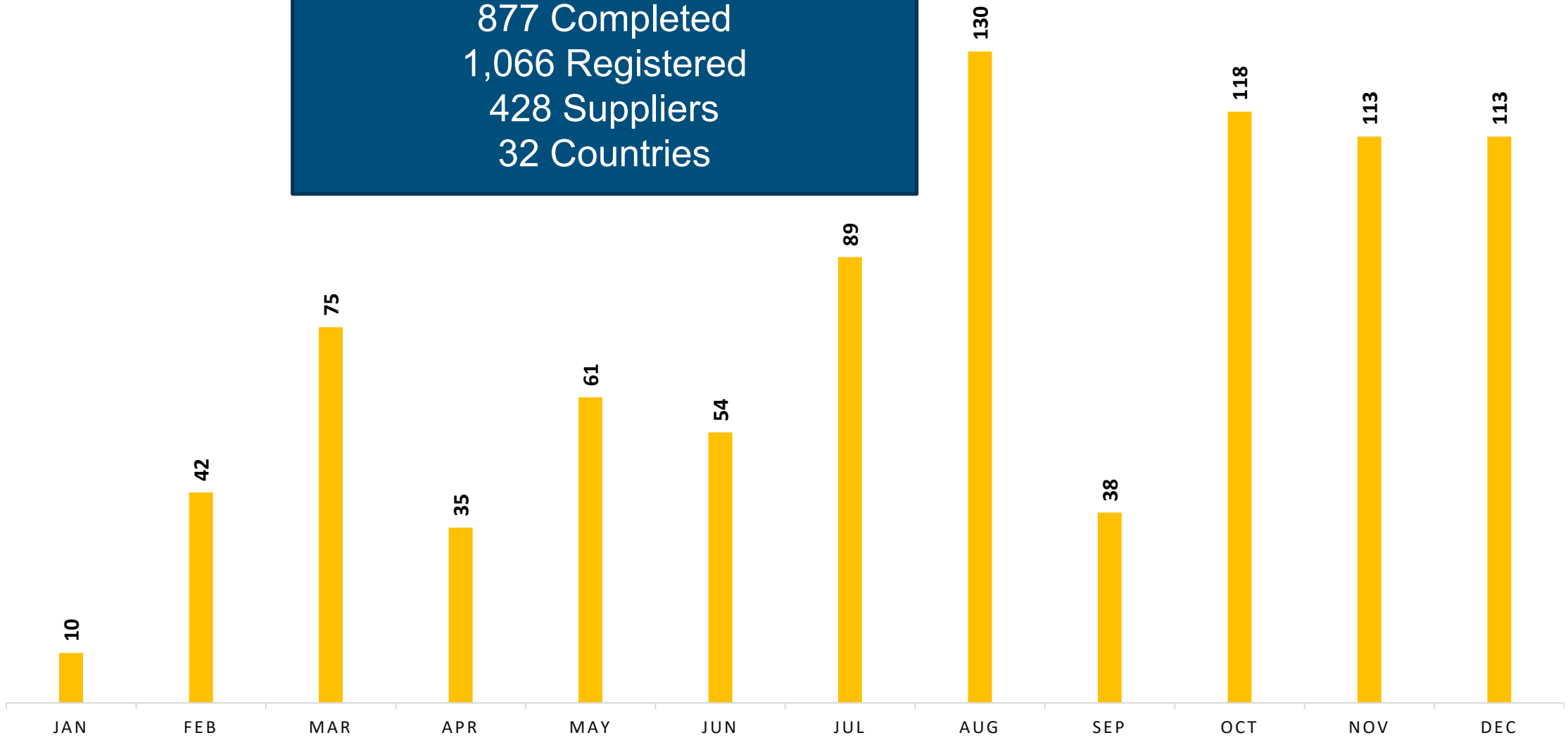
AS13100 Requirements Course Completions 2023

528 Completed
451 Registered
43 Suppliers
70 Countries

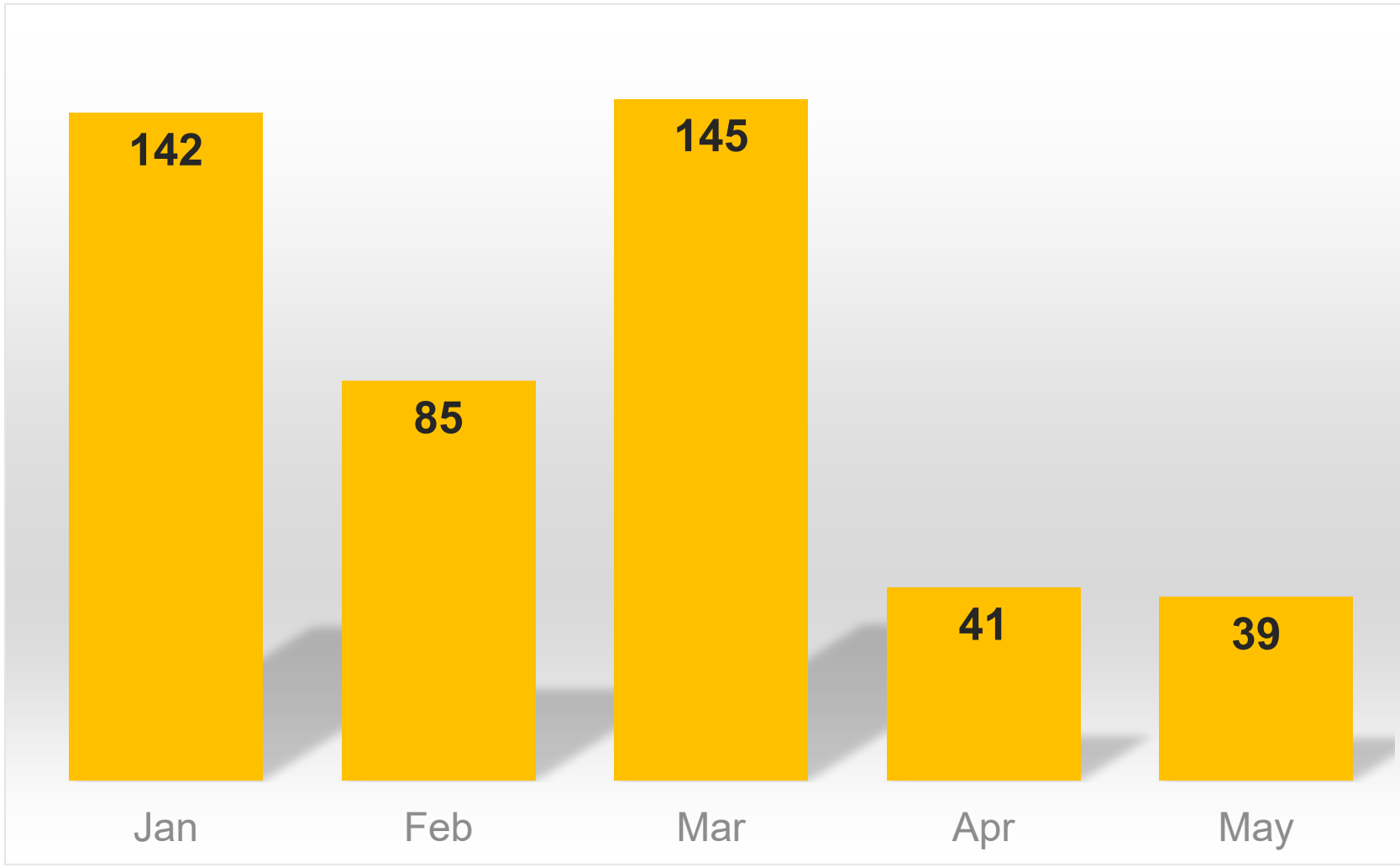


Quality Foundations Course Participation 2022

877 Completed
1,066 Registered
428 Suppliers
32 Countries



Quality Foundations Course Completions 2023



452 Completed
346 Registered
70 Countries

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

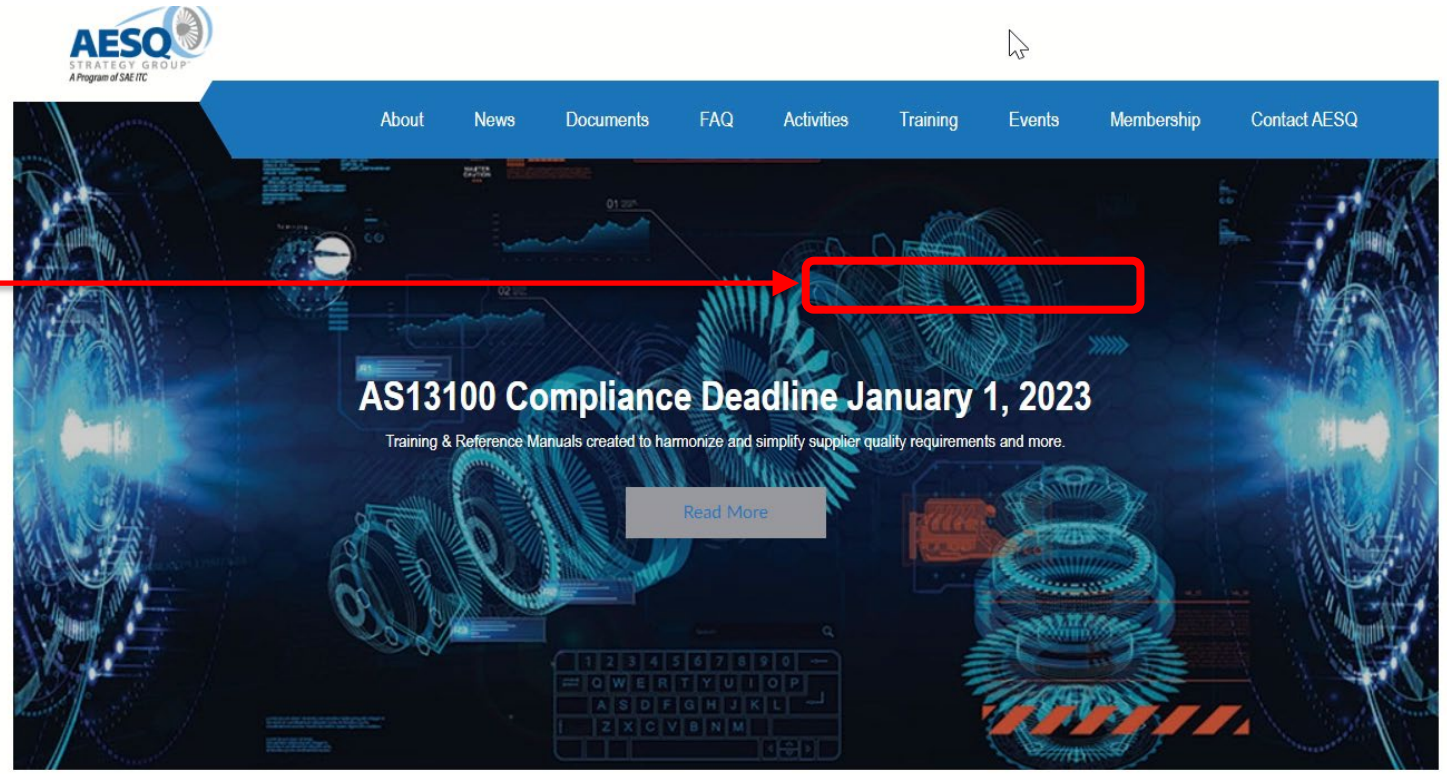
AESQ
HOW TO GET INVOLVED

JUN SAKAI
CHIEF ENGINEER
IHI

“Get Involved” with AESQ

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

- Click “Get Involved”

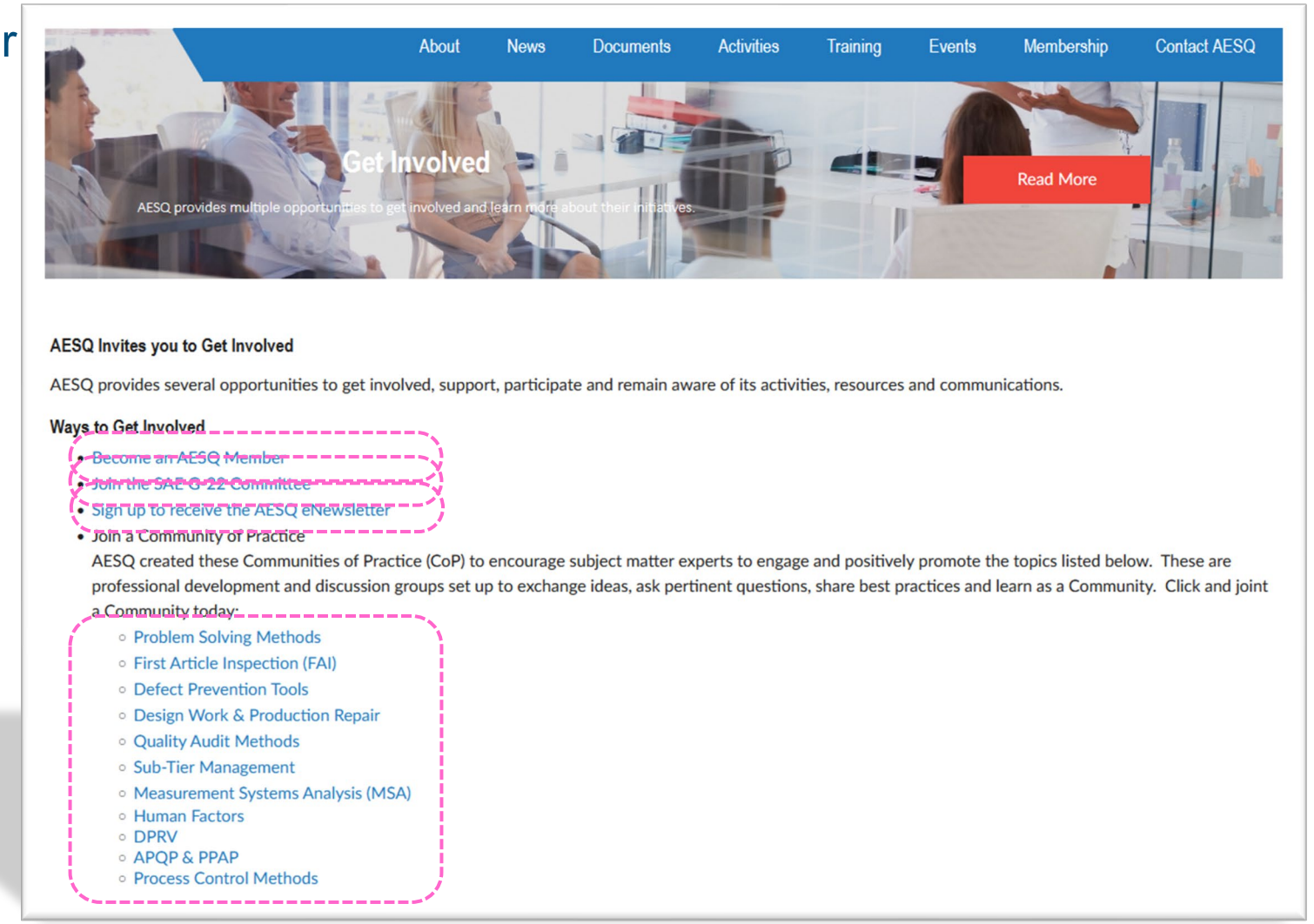


Aerospace Engine Supplier Quality (AESQ) Strategy Group™

“Get Involved” Options

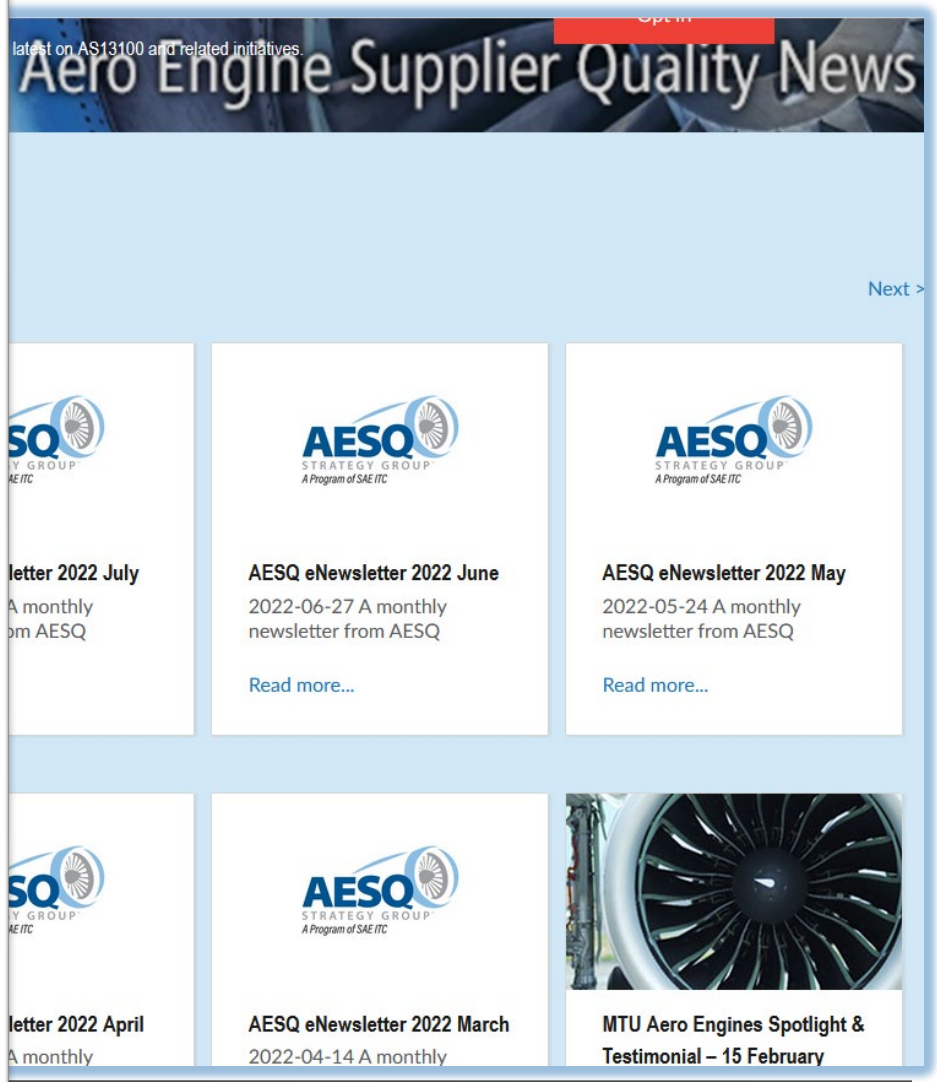
1. Subscribe to AESQ’s Newsletter
2. Become an AESQ Member
3. Join the SAE G-22 Standards Committee
4. Join an AESQ Community of Practice on LinkedIn

Click on the appropriate link for additional information



“Get Involved” – Subscribe 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

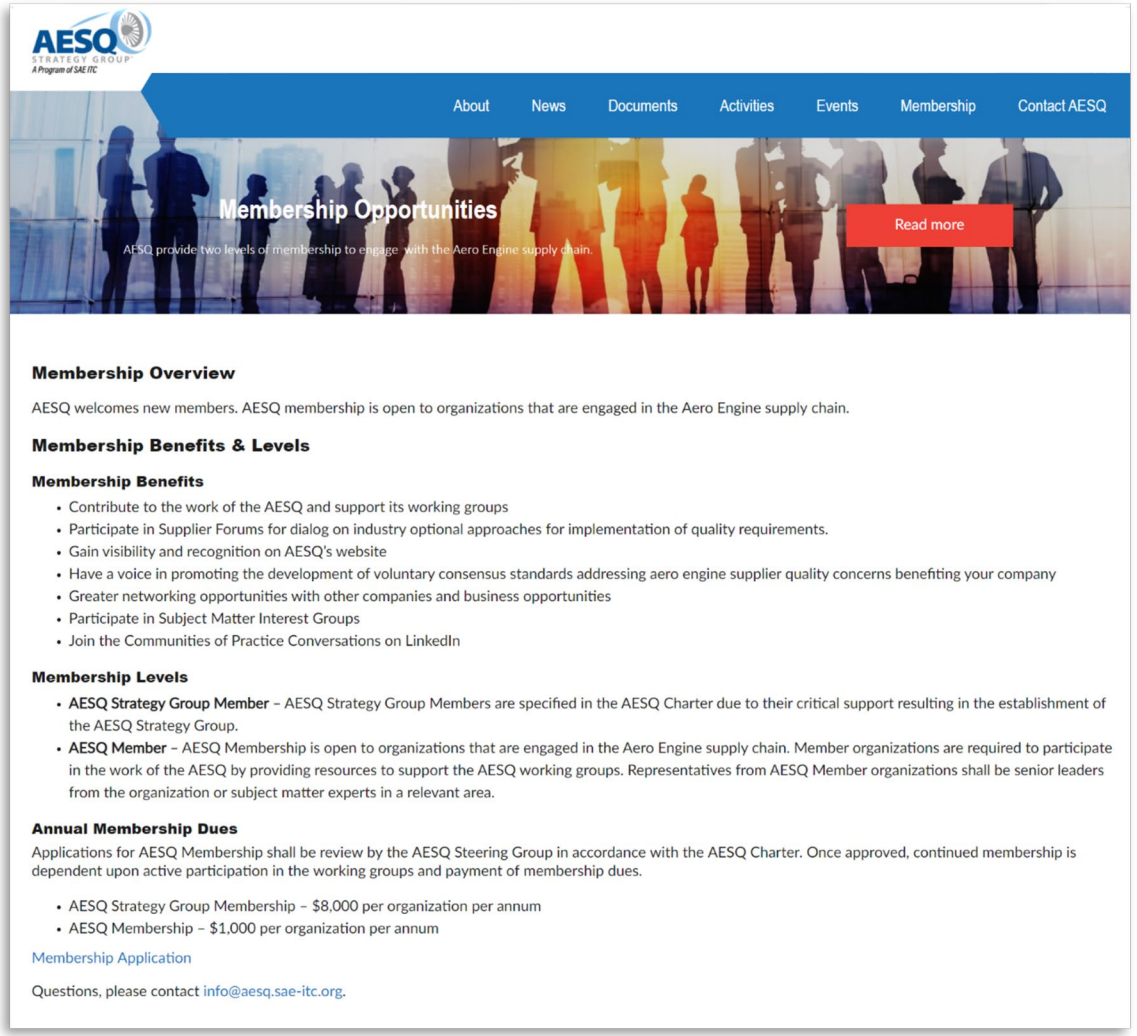
2 Membership Levels:

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.

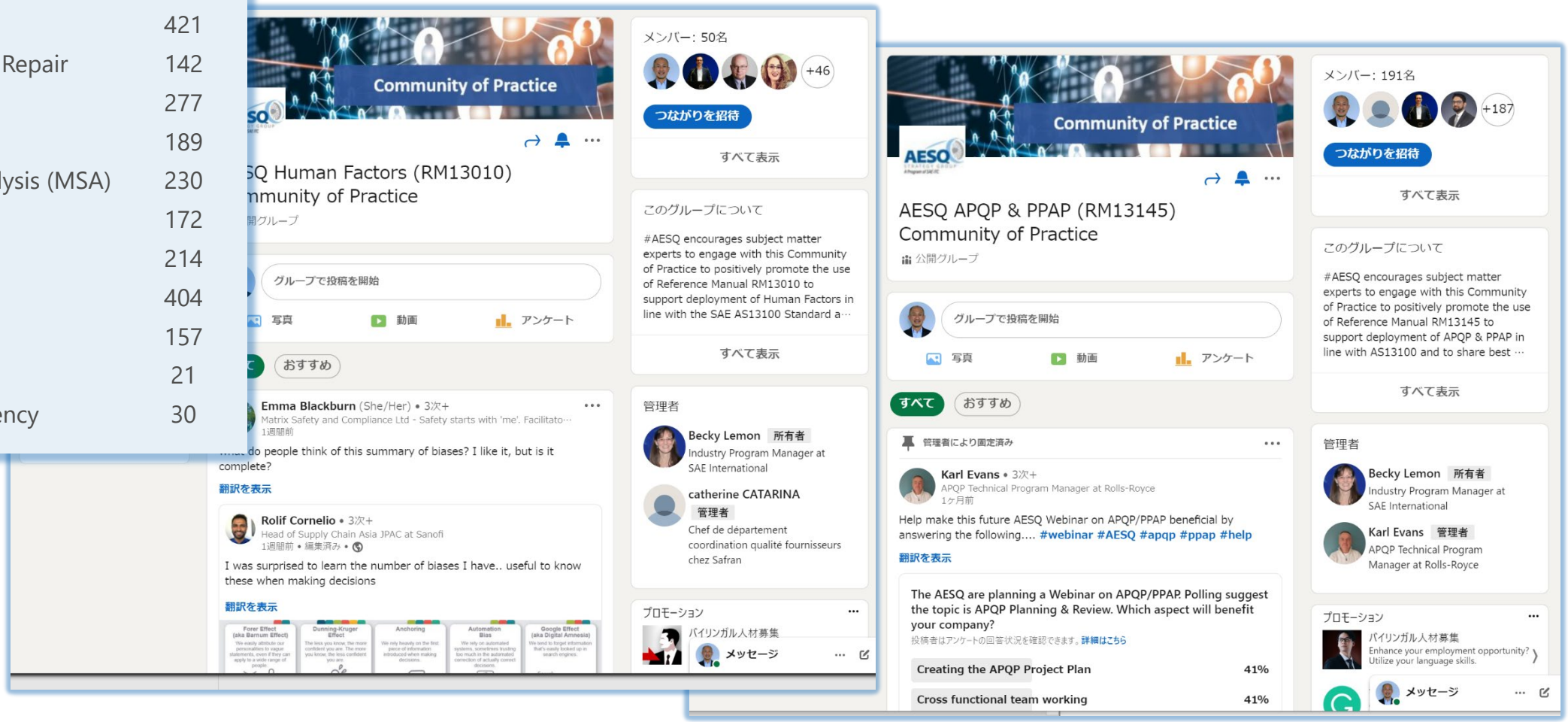
Complete Membership Application at bottom of page



“Get Involved” – Join a Community of Practice

Communities 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

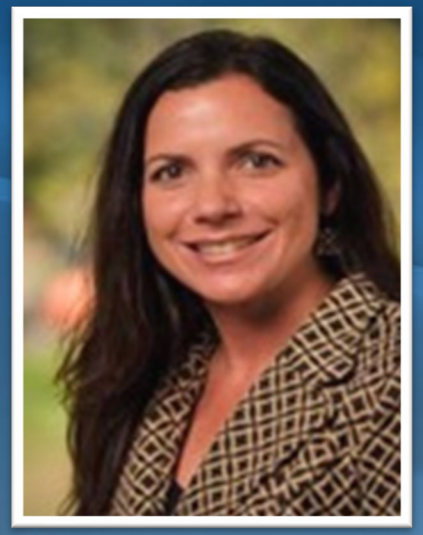
- Attend AESQ Events (Supplier Forums, Webinars) or Watch Videos Online
- Take a AS13100 Training Course
- Download AESQ Reference Manuals (RMs) & Templates
- Watch the “Zero Defects” Video

AS13100 Question & Answer

MARKUS BRAIG
DIRECTOR QUALITY SUPPLY CHAIN AND MRO
MTU AERO ENGINES

Use the “Chat” Function to Ask a Question…

SUMMARY & CLOSE



BARBARA NEGROE
EXECUTIVE SOURCING QUALITY LEADER
GE AEROSPACE

What Does Success Look Like?

- Leaders advocating for process control- speaking the language
- Common tool usage, processes control is the way we work
- Developing proficiency through common Industry training
- Culture of product safety and quality felt into the tiers of the supply base
- Continuous Improvement of the AS13100 standard- feedback from supply base, OEM's, customers

Mindset shift- Belief that zero defects is achievable


AESQ
STRATEGY GROUP
A Program of SAE ITC
ΕΥΧΑΡΙΣΤΩ
TÄNAN
HVALA
GRACIAS
DZIĘKUJĘ
GRAZIE
ありがとう
MERCI
TACK
THANK YOU
DIAKUIU
PALDIES
ACIU
DANKE
DANK U WEL
ДЗЯКУЮ
СПАСИБО
谢谢
OBRIGADO
dioldh
KIITOS
TESEKKUR EDERIM
AESQ Thanks You for Attending!

AESQ
STRATEGY GROUP™
A Program of SAE ITC