



OAI / SAE Counterfeit Webinar

October 29, 2021
9:00 am – 12pm



Kim Holizna

Director Global Development & Member
Programs
Ohio Aerospace Institute (OAI)

Becky Lemon

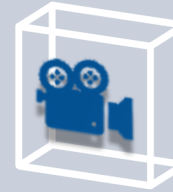
Industry Program Manager
Aerospace Standards
SAE International



We will be **recording** today's webinar and will distribute the video link following the close of the webinar.

We will take **questions** at the end of today's webinar using the **Chat** feature.

Please remain on Mute during the presentation to prevent background noise.



Record



Q&A



Mute

Presentation	Speaker	Time
Welcome & Introduction	Kim Holizna , OAI & Becky Lemon , SAE	9:30 am – 9:35 am
Overview of SAE International's Aerospace Standards Program	Jonathan Archer , Director, Aerospace Standards, Strategy & Innovation, SAE International	9:35 am – 9:55 am
Overview of SAE International's Counterfeit Standards Activities	Judith Ritchie , Director, Government and Industry Affairs – Aerospace, SAE International	9:55 am – 10:05 am
SAE G-19 Counterfeit Electronic Parts Committee & SAE G-21 Counterfeit Materiel Committee	Jim Creiman , Quality and Mission Excellence Operations Compliance, Northrop Grumman Corporation	10:05 am – 10:35 am
Q&A	Becky Lemon , Industry Program Manager, Aerospace Standards, SAE International	10:35 am – 10:45 am
BREAK	BREAK	10:45 am – 10:55 am

Presentation	Speaker	Time
G-19A Test Laboratory Standards for Counterfeit Detection	Michael Azarian Ph.D, Center for Advanced Life Cycle Engineering (CALCE), University of Maryland	10:55 am – 11:25 am
PRI CAAP – Counterfeit Avoidance Accreditation Program	Jim Lewis , Sr. Program Manager, Performance Review Institute (PRI)	11:25 am – 11:45 am
SAE Mobilus & OnQue Digital Standards System	Tim Davison , Corporate Sales, SAE International	11:45 am – 11:50 am
How to Get Involved in SAE Aerospace Standards Development	Becky Lemon , Industry Program Manager, SAE International	11:50 am – 11:55 am
Q&A & Wrap Up	Becky Lemon , Industry Program Manager, SAE International	11:55 am – 12:00 pm

SAE Aerospace Standards Program Overview



Jonathan Archer
Director, Aerospace Standards, Strategy & Innovation
SAE International

About SAE International

Mission

To advance mobility knowledge and solutions for the benefit of humanity.

Vision

SAE is the leader in connecting and educating mobility professionals to enable safe, clean and accessible mobility solutions.

Ends

SAE International provides society and the global mobility engineering community with:

- *Neutral forums* that convene to address society's mobility needs
- The most reliable and comprehensive collection of *engineering resources* that advance mobility
- STEM education and professional development programs that inspire and *build mobility's current and future workforce*
- *Consensus-based standards* to advance quality, safety and innovation
- A *global community* whose collective wisdom makes mobility safe, clean and accessible

Advanced
manufacturing



Advanced
materials

Advanced
propulsion



Automated
& unmanned

Blockchain



Cybersecurity

Connectivity



Quantum
computing

Electrification



Workforce
development

SAE Aerospace Heritage: Aviation Pioneers



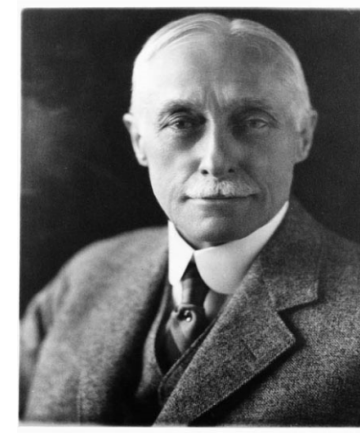
Orville Wright



Glenn Curtiss



Glenn Martin



Elmer Sperry



Chance Vought



Jimmy Doolittle



Charles Lindbergh



Amelia Earhart

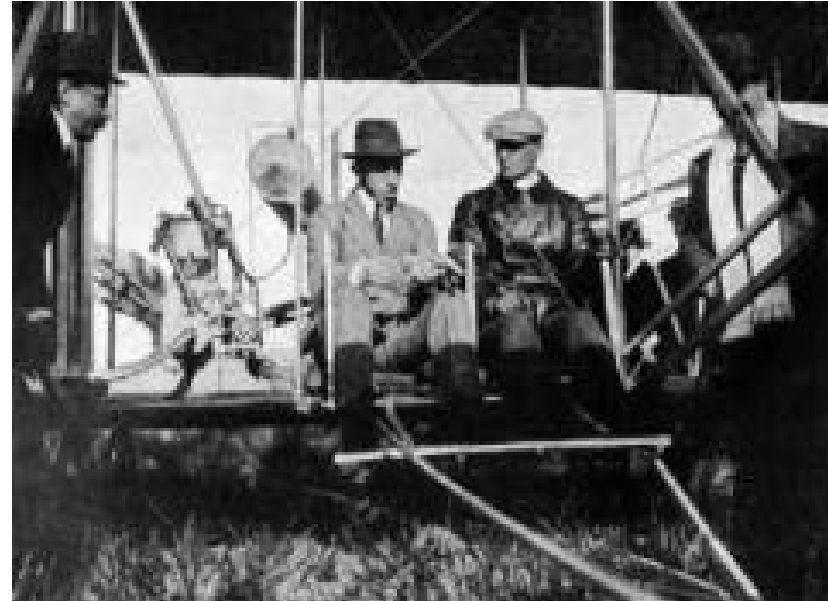
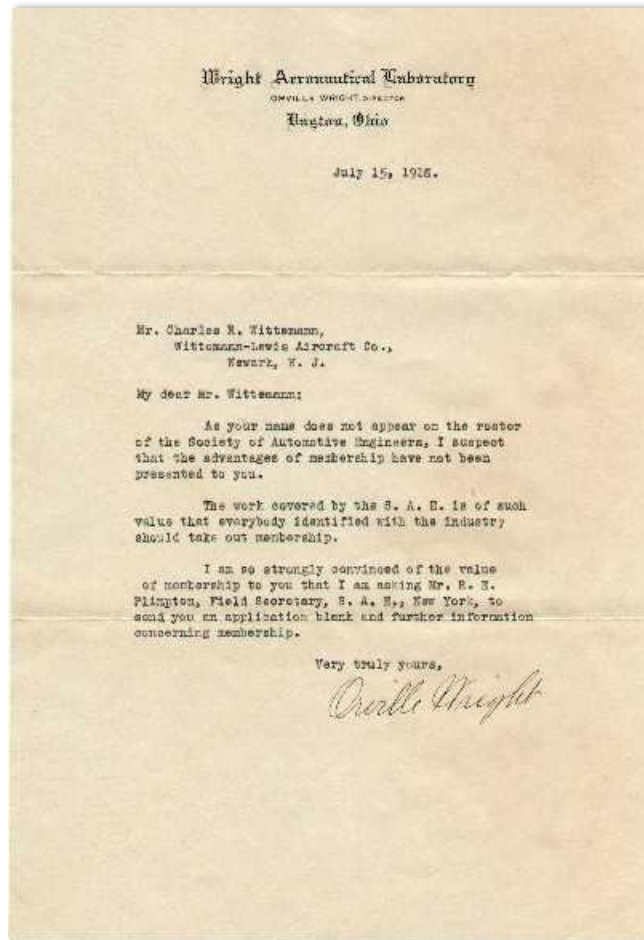


Kelly Johnson



Igor Sikorsky

The Value of SAE – Wright Brothers



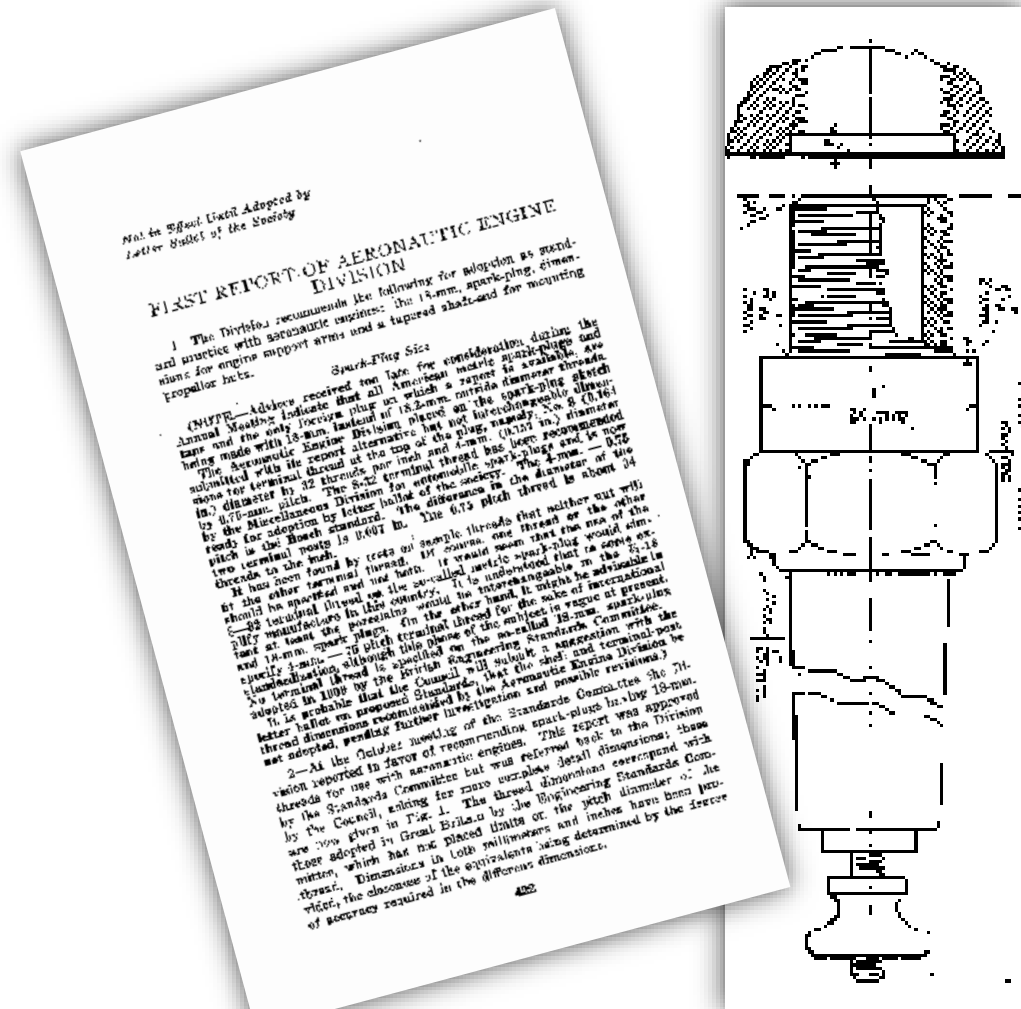
“The work covered by the SAE is of such value that everybody identified with the industry should take out membership.”

Orville Wright, 1918

A Legacy That Spans Over 100 Years

SAE published the first international aerospace standard in January 1917.

It was for an aeronautical spark plug formulated through cooperation between aviation practitioners in the USA, Great Britain and France. Standardization was and continues to be SAE's DNA.



Aerospace Council Organisational Chart



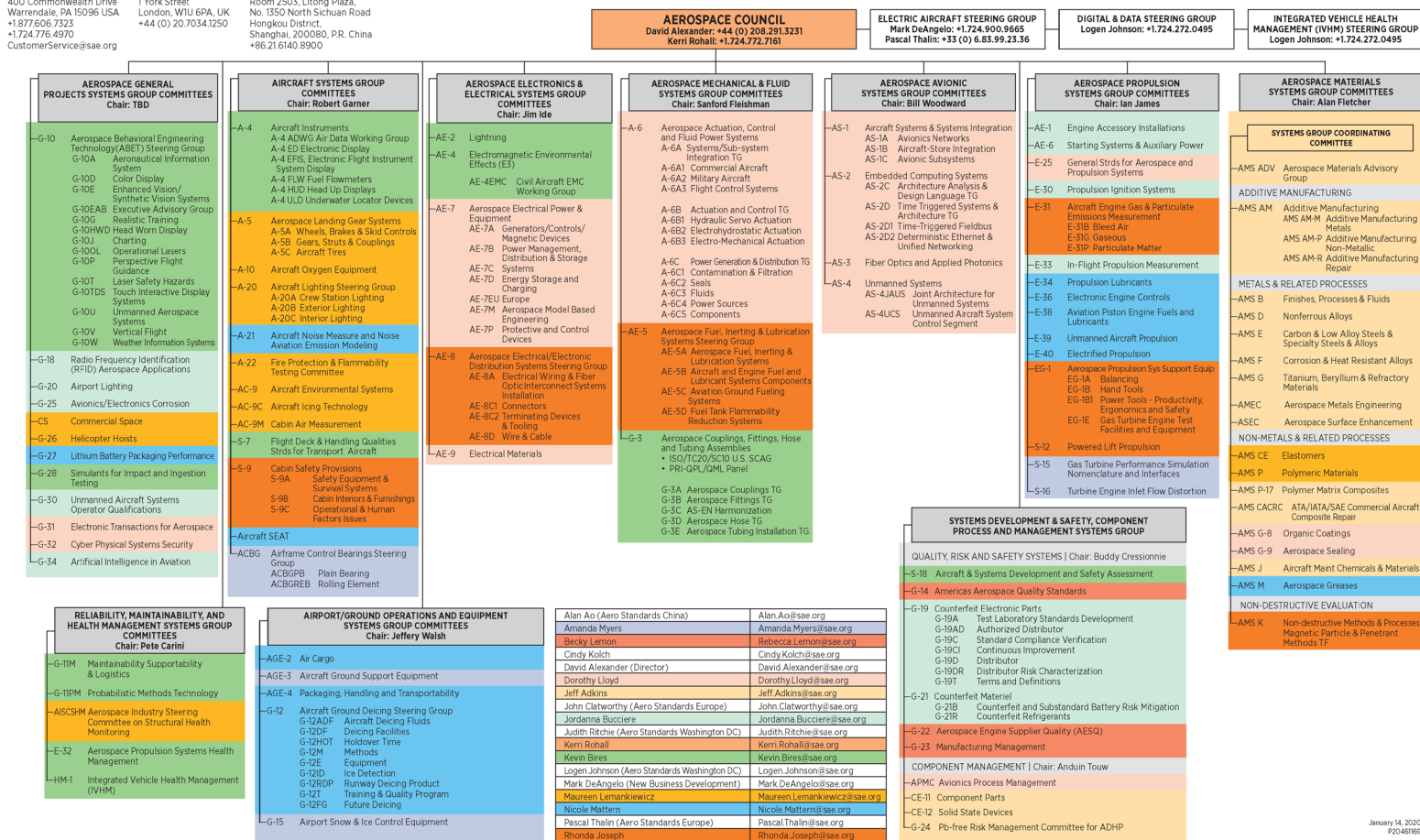
Americas
400 Commonwealth Drive
Warrendale, PA 15096 USA
+1 877.656.7323
+1 724.776.4970
CustomerService@sae.org

Europe
1 York Street
London, W1U 6PA, UK
+44 (0) 20 7034 1250

Asia
Room 2503, Litong Plaza,
No. 1350 North Sichuan Road
Hongkou District,
Shanghai, 200080, P.R. China
+86 21 6404 8900

SAE Aerospace Council Organization Chart

sae.org/standards



Technical Committees

180+

Systems Groups

10

Types

AS, AMS, ARP, AIR

Additional Value

Community Technology Learning Networking

January 14, 2020
P20-481619

SAE Aerospace & Systems Management Standards by the Numbers

125 Meetings worldwide

7,700+ SAE Aerospace
Standards in marketplace

2,620 virtual meetings in 2020

657 standards published in 2020

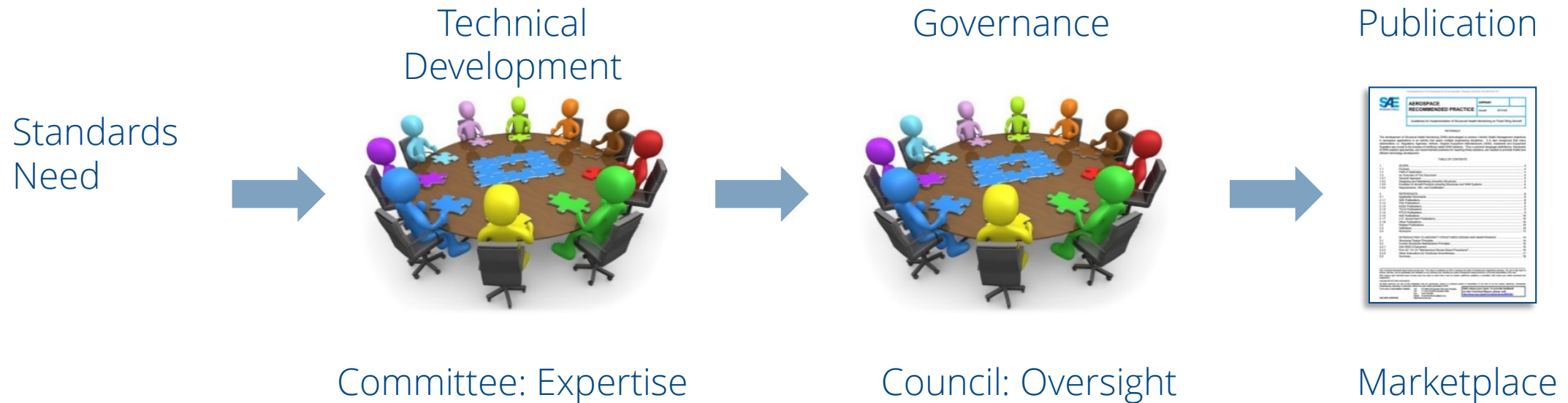
8,300+ individuals on committees

1300+ current Works in Progress

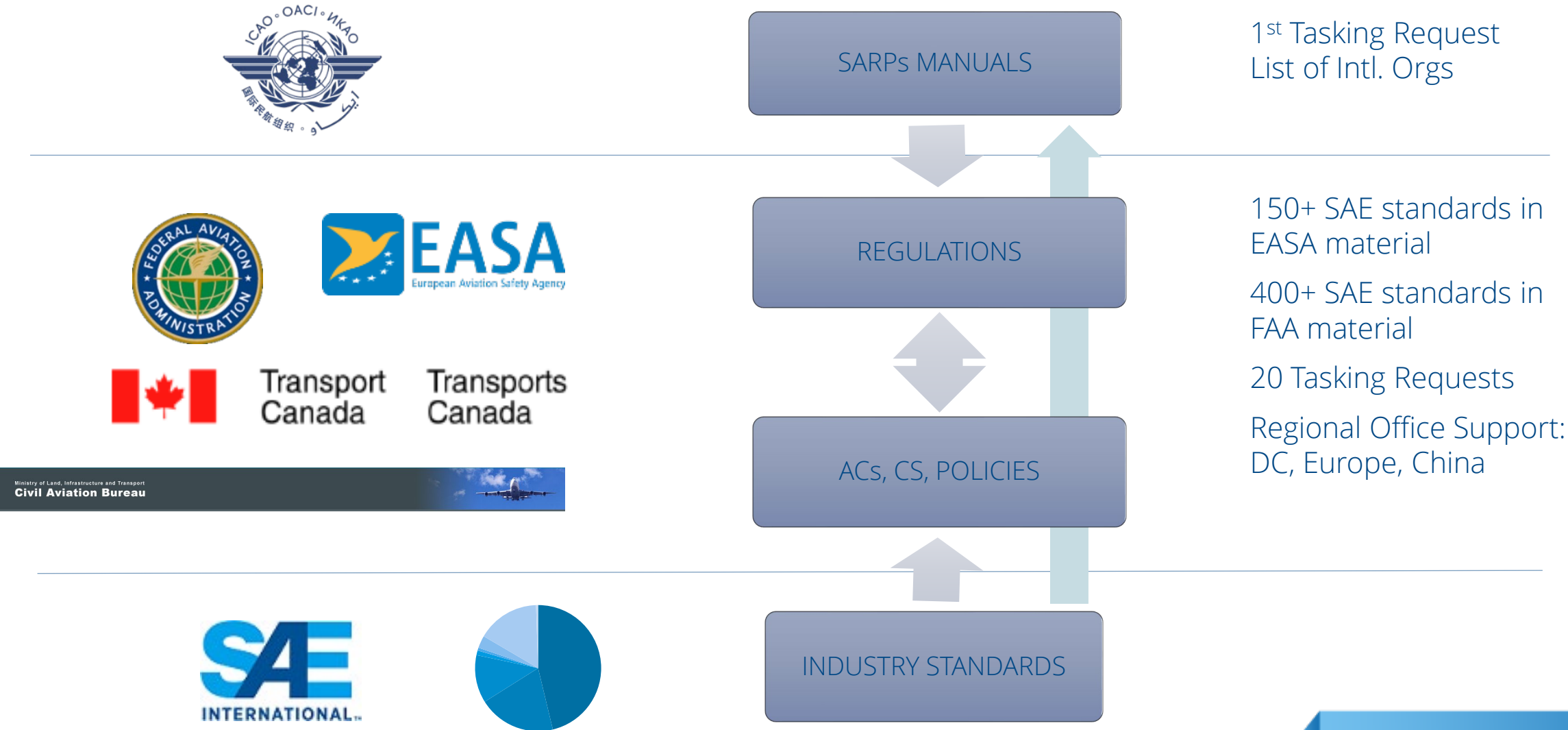
180+ technical committees

Average **18 months**
to publication

Bringing Stakeholders Together



The Public-Private Partnership: Civil Aviation



Long-Standing DoD/SAE Partnership

- U.S. Standard B Liberty trucks built to SAE standards in World War I
- DoD has adopted over 3400 SAE standards
 - Largest number adopted of one standards developing organization
- SAE is key player in DoD efforts to revitalize standardization in systems engineering
 - Developed SAE EIA 649, Configuration Management (DoD adopted Mar 2015)
 - Developed SAE AS6500, Manufacturing Management Program (DoD adopted Jan 2015)
- SAE is key player in DoD efforts to prevent and detect counterfeit parts
 - AS5553B Counterfeit Electrical, Electronic, and Electromechanical Parts Avoidance, Detection, Mitigation, and Disposition
 - ARP6328 Guideline for Development of Counterfeit Electronic Parts Avoidance, Detection, Mitigation, and Disposition Systems
 - DoD adopted

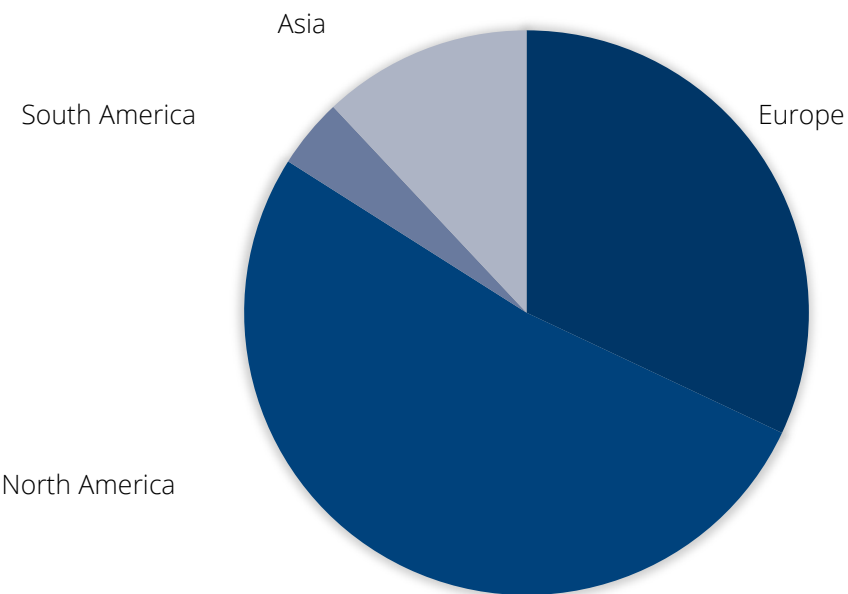
SAE Aerospace Council, Global Custodians: Oversight and Governance

Airbus	Gulfstream Aerospace (Chair)
A4A	Honeywell Aerospace
American Airlines	Lockheed Martin
AVIC	Lufthansa Technik
BAE Systems	Meggitt
Boeing	Northrop Grumman
Bell	Pratt & Whitney / UTC
CAPE	Rolls-Royce
CIRA	Safran
COMAC	Sikorsky
EASA	Textron Aviation
Embraer	U.S. Department of Defense
FAA	UPS
Leonardo	Wichita State University
GE Aviation	

2019 Meetings at COMAC, Shanghai and SAE AeroTech, Bordeaux

Stakeholders:
Industry, Operators, Government, Research
ICAO Observer Role

Global Stakeholders: Matching the Industry



New SAE Committees 2014-21

G-22 Engine Supply Chain Quality

G-25 Electronics & Avionics Corrosion Protection*

G-26 Helicopter Hoists*

Electric Aircraft Steering Group (EASG)

AMS-AM Additive Manufacturing*

A-4 HWD – Head Worn Displays*

A-4 EFIS – Electronic Flight Information Displays*

G-27 Lithium Battery Packaging Performance*

G-28 Simulants for Engine Ingestion & Impact Testing

E-39 Unmanned Vehicle Propulsion Systems

SMC-PNT Position, Navigation, Timing

AC-9M Cabin Air Quality Measurement*

AE-9 Electrical Materials

G-30 UAS Operator Approvals

Digital & Data Steering Group

A-22 Fire Protection and Flammability Testing*

G-31 Electronic Transactions (Blockchain)

G-21B Counterfeit Batteries

E-40 Electrified Propulsion

AE-7D Aviation Battery Technology & Charging

G-32 Cyber-physical Systems Security

G-34 Artificial Intelligence

E-41 Engine Corrosion – Runway Deicing Products

E-33A Engine Hazard Zones

AE-10 High Voltage

AE-11 Aging Models for Electrical Insulation

G-35 Modelling, Simulation & Training

* Authority/Agency/Association Request

Ohio Aerospace Involvement on SAE Technical Committees

Ohio's aerospace community provides leadership and contributes expertise on SAE standards.

Total Participation	1332 (+42)
Unique Participation	598 (+22)
Voting Membership	289 (+5)
Committees Chaired	12 (-1)
Vice Chair	5 (-1)
Secretary	4 (-1)

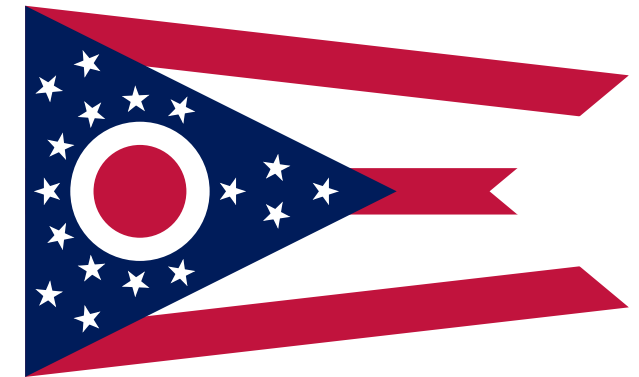
SAE Aerospace Council membership from GE
Aviation



Leadership

Ohio-based Committee Leadership in:

- Additive Manufacturing (AMS-AM)
- Aerospace Sealing (AMS-G9)
- Engine Corrosion – RDF (E-41)
- Deicing Aerodynamics (G-12)
- Polymeric Materials (AMS-P)
- Manufacturing Management (G-23)
- Wheels, Brakes & Skid Controls (A-5A)
- Aircraft Tires (A-5C)
- Interior Lighting (A-20C)
- In-Flight Propulsion Measurement (E-33)
- Turbine Engine Inlet Flow Distortion (S-16)
- Power Management, Distribution and Storage (AE-7B)
- Aerospace Engine Supplier Quality (G-22)



OAI Members Participating on SAE Committees

AFRL

America Makes

Battelle

UTAS / Collins Aerospace / Raytheon
Technologies

Crane Aerospace

GE Aviation

Honeywell

L3 Technologies

Meggitt

NASA

NetJets Aviation

Ohio State University

Parker Aerospace

Timken

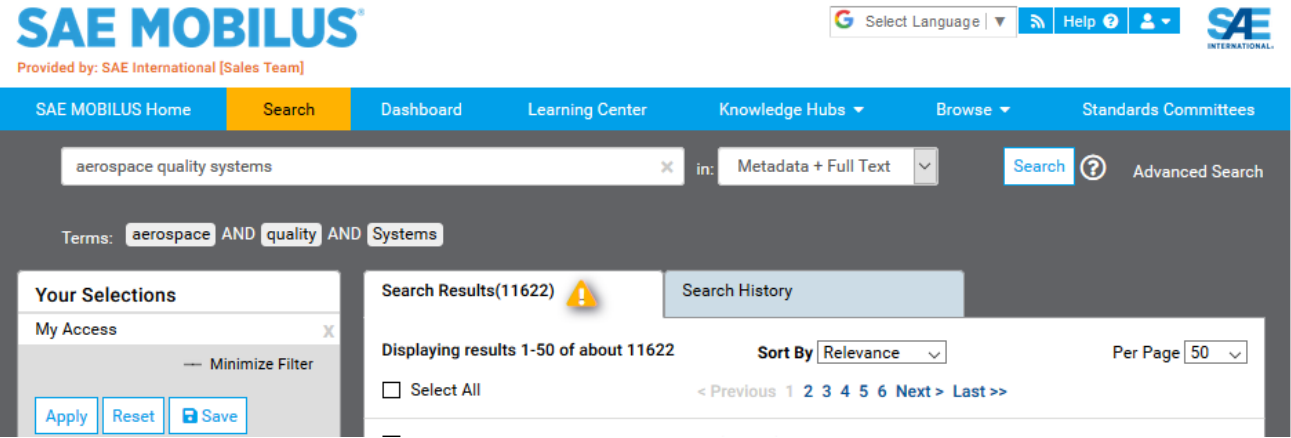
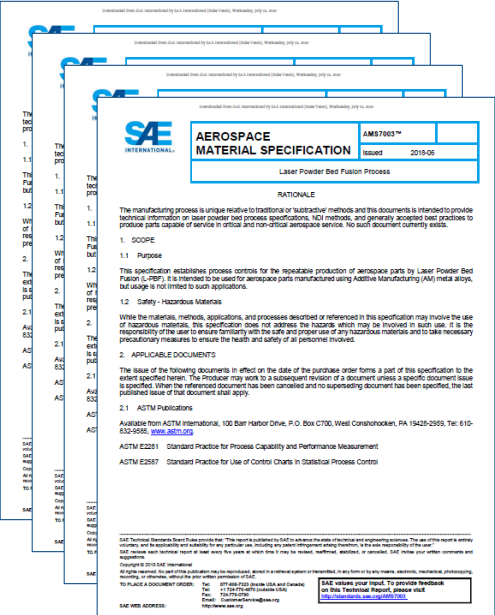
UDRI

Vantage Partners

University of Cincinnati



SAE Aerospace Portfolio



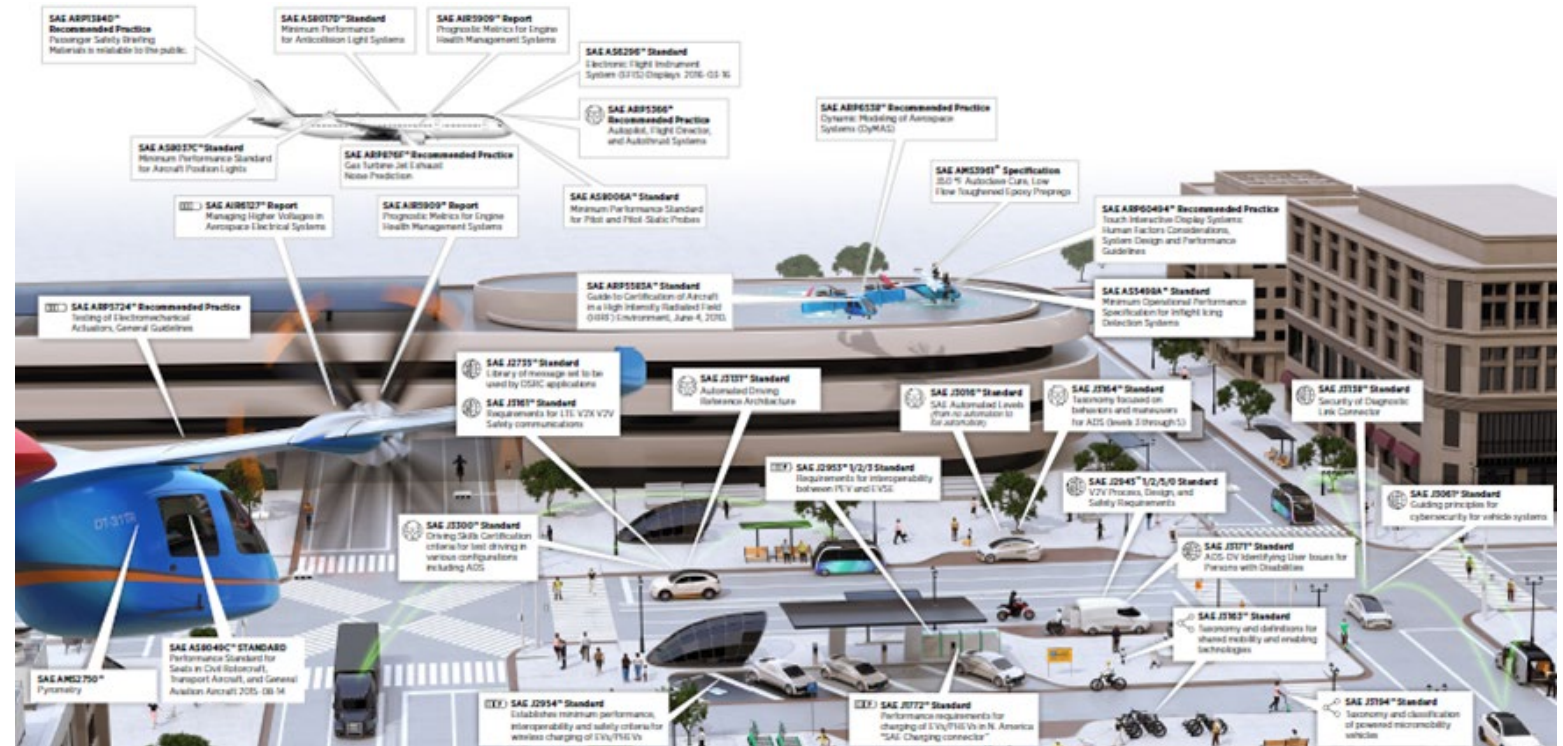
AS13003 Measurement System Analysis (MSA) Requirements for Aerospace Engine Supplier Quality

April 11-12, 2019
Dallas, Texas
Duration: 2 Days

[View Details](#)

Cross-sector Synergies & Multi Modality

- Batteries
- Electrical Systems
- Hybrid & Electric propulsion
- Crashworthiness
- Autonomy
- Micromobility & Data
- Cybersecurity
- Production, Manufacturing, Materials & Parts



Founded in 2015, SAE AMS AM has published 25 documents with 35 under development, spanning metals, non-metals, and repairs



TOTAL: 25 published standards
2 data guidelines & 2 general agreements



23 Metals published
2 Non-metallic published



35 work-in-process*
5 in revision



550+ members across the AM ecosystem



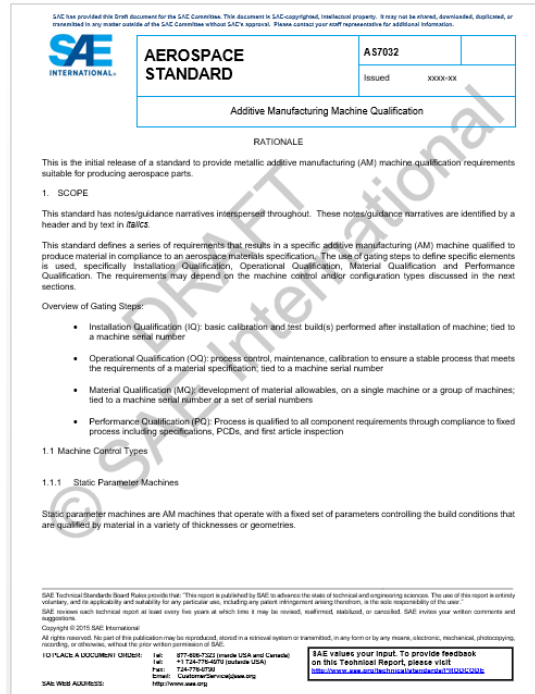
24 Countries



* currently 9 under ballot

Many AMS AM documents cover materials and process (M&P), yet increasingly are focusing on other areas within the value stream

Sample AMS AM Documents



Metals*

- AMS7000 L-PBF Produced Nickel Alloy (IN 625) Parts
- AMS7001 Nickel Alloy (IN 625) Powder for AM
- AMS7003 L-PBF Process

Polymers**

- AMS7100 Process Spec Fused Filament Fabrication (FFF)
- AMS7101 Material for FFF

Non-M&P (WIP)

- AMS7032 AM Machine Qualification
- AMS7041 Distributor Requirements for AM-built Parts
- ARP for AM repairs

Documents accommodate public and proprietary Process Control Documents (PCD)

* pub 2018
** pub 2019

From here...

- Discover what's relevant
- Get engaged
- Opportunities for partnership



SAE AEROSPACE STANDARDS

Jonathan Archer

Director, Aerospace Standards, Strategy & Innovation

SAE International

jonathan.archer@sae.org

Overview of SAE International's Counterfeit Standards Activities



Judith Ritchie

Director, Government and Industry Affairs – Aerospace
SAE International

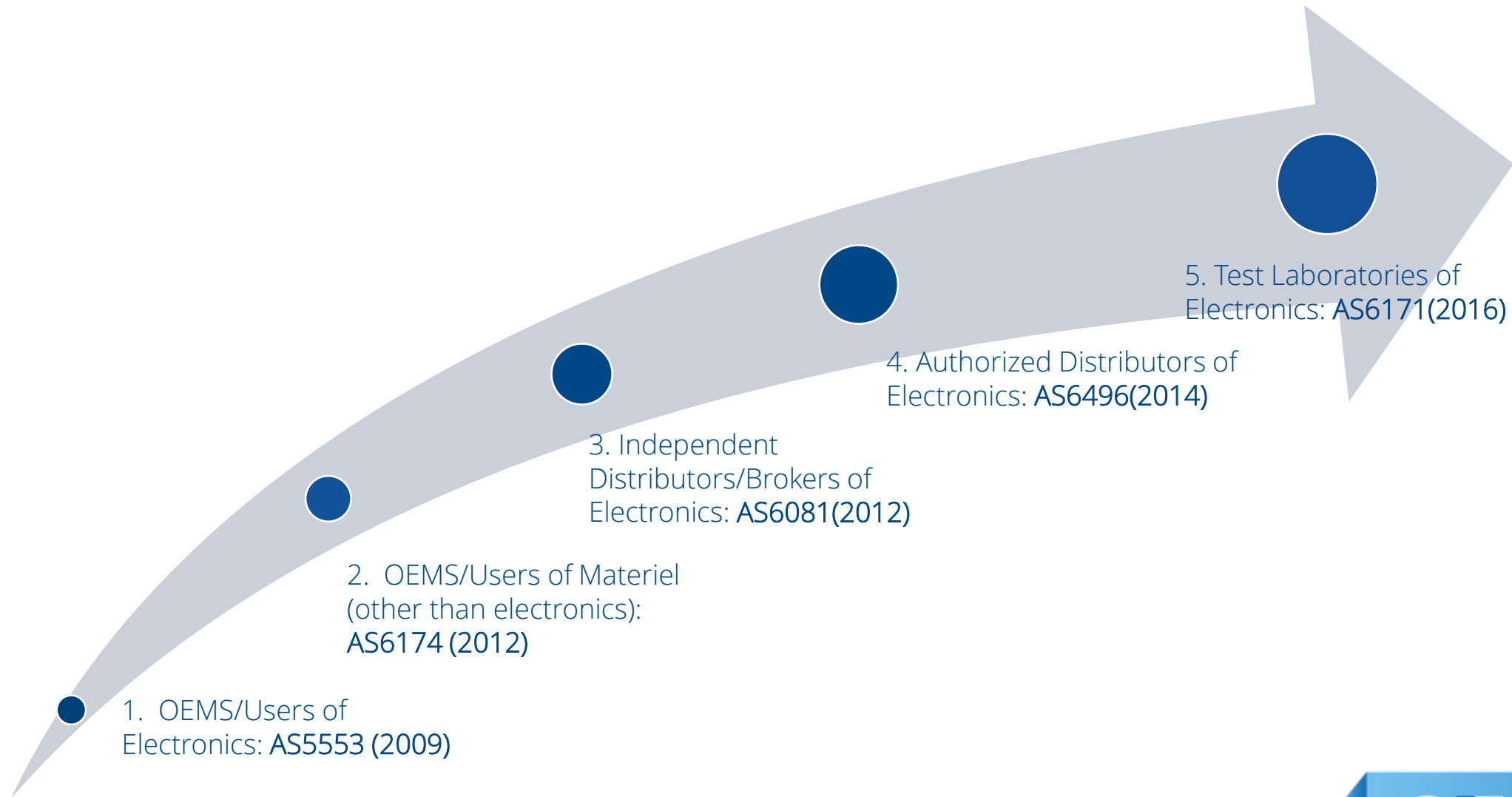
BACKGROUND

- In response to an increasing volume of counterfeit electronic parts entering the aerospace and defense supply chain SAE established G-19 Counterfeit Electronic Parts Committee to address aspects of preventing, detecting, responding to and counteracting the threat of counterfeit electronic components.
- G-19 established in 2007. Participants included: Government, Defense/Aerospace manufacturers, Industry Groups, Testing Laboratories
- April 2009 - SAE International released aerospace standard AS5553, Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition. AS5553 first of a suite of counterfeit avoidance standards developed by SAE.
- August 2009 – United States DoD adopted AS5553

Background

- April 20, 2010 – DoD PSMC (Part Standardization and Management Committee) requested SAE to address counterfeit NON-electronic parts
- G-21 Counterfeit Materiel Committee established to develop AS6174 which is based on major rewrite of AS5553 to address all materiel
- Published AS6174 May 2012

Chronology



SAE AEROSPACE STANDARDS

Judith Ritchie

Director, Government and Industry Affairs – Aerospace

SAE International

judith.ritchie@sae.org

SAE G-19 Counterfeit Electronic Parts Committee & SAE G-21 Counterfeit Materiel Committee



Jim Creiman

Quality and Mission Excellence Operations Compliance

Northrop Grumman Corporation

SAE International Co-Chair G-19 and G-21 Committees

Standards to Mitigate Counterfeit Risk in the Supply Chain

Jim Creiman

Northrop Grumman Corporation

Co-Chair, SAE G-19 & G-21 Committees

Tel: 412-521-3797

Email: james.creiman@ngc.com

Originally published in the proceedings of the SMTA & CALCE Symposium on Counterfeit Parts and Materials on August 3-5, 2021

Approved for Public Release; Distribution is Unlimited; #21-1247; Dated 07/21/21

© 2021, Northrop Grumman

Purpose

- Identify SAE International's counterfeit mitigation standards
- Summarize content of existing standards
- Discuss planned refinement of standards



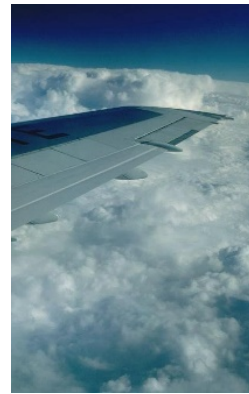
Outline

- Introduction
- SAE International Counterfeit Mitigation Committees
- G-19 EEE Counterfeit Mitigation
- G-19A Test Laboratory Standards
- G-21 Materiel Counterfeit Mitigation
- Current & Future Activities
- Conclusions



Introduction

- Use standards for consistent and effective processes
- Counterfeit mitigation helps detect & avoid counterfeits
- SAE International technical committees published or are developing 30+ counterfeit mitigation documents
 - For use in aerospace, defense, and other important applications



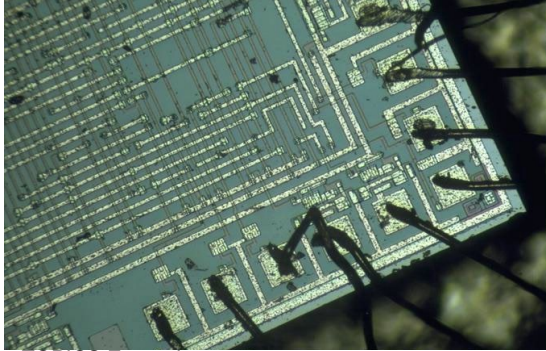
TOPICS Entertainment

SAE Counterfeit Mitigation Committees

- Three main counterfeit mitigation technical committees
 - G-19, Counterfeit Electronic Parts Committee
 - G-19A Test Laboratory Standards Development Committee
 - G-21, Counterfeit Materiel Committee
- Active committees manage multiple documents
- Voluntary committee membership
 - Topical expertise from government, academia and industry
- Output consensus standards and related publications
 - Exchange of information about counterfeit threat and mitigation

Existing G-19 Portfolio

Focus on EEE Parts



TOPICS Entertainment

	For Authorized/ Franchised Distributors	For Independent Distributors	For Procurers/ Integrators
Standards	AS6496	AS6081	AS5553C
Verifications		AS6301	AS6462C
Guidelines			ARP6178, ARP6328
Definitions	← AIR6273 →		

AS5553C

- Counterfeit EEE Parts: Avoidance, Detection, Mitigation and Disposition
- Most popular SAE counterfeit mitigation standard
- Published March 2019
- 9 pages

Topics:

AS5553C
Control Plan
Training
Life Cycle Availability
Sourcing
Supplier Requirements
Verification of Purchases
Investigation
Traceability & Control
Material Control
Reporting
Auditing

AS6496

- Fraudulent/Counterfeit Electronic Parts: Avoidance , Detection, Mitigation and Disposition – Authorized/Franchised Distribution
- For authorized/franchised distributors
- Published August 2014
- 12 pages

Topics:

AS5553C	AS6496
	Policy
Control Plan	✓
	Distribution Agreements
Training	✓
Life Cycle Availability	
Sourcing	✓
Supplier Requirements	✓
Verification of Purchases	
Investigation	
Traceability	✓
Material Control	✓
	Customer Returns

AS6081

- Fraudulent/Counterfeit Electronic Parts: Avoidance , Detection, Mitigation and Disposition – Distributors
- For distributors of electronic parts from the open market
- Published November 2012
- 47 pages

Topics:

AS5553C	AS6496	AS6081
	Policy	
Control Plan	✓	✓
	Distribution Agreements	Customer Contract
Training	✓	✓
Life Cycle Availability		
Sourcing	✓	✓
Supplier Requirements	✓	PO Requirements
Verification of Purchases		✓
Investigation		
Traceability	✓	✓
		Preservation of Product
Material Control	✓	✓
	Customer Returns	✓
Reporting	✓	✓
		Inspect/Test Reports
Auditing	✓	✓

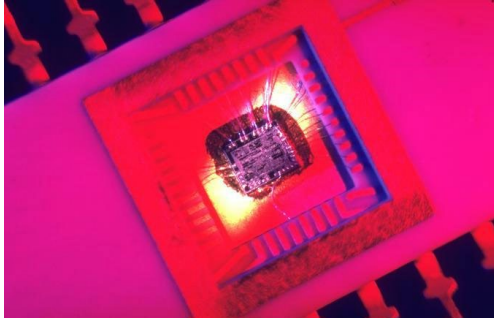
ARP6178, ARP6328, & AIR6273

- ARP6178 – Guidance for assessing a supplier's ability to protect customer from counterfeit risk, especially for open market purchases
- ARP6328 – Guideline for an AS5553 system
- AIR6273 – Defines terms shared by G-19, G-19A, & G-21

Guidance and Terms

Existing G-19A Portfolio

Focus on Test Laboratory Methods



TOPICS Entertainment

Test Evaluation Methods

AS6171/1

External Inspection & SEM

AS6171/2A

X-ray Fluorescence

AS6171/3

Delid/Decap Analysis

AS6171/4

Radiological Methods

AS6171/5

Acoustic Microscopy

AS6171/6

AS6171A

Suspect/Counterfeit EEE Part Test Methods Standard

AS6171/7

Electrical Test

AS6171/8

Raman Spectroscopy

AS6171/9

Fourier Transform Infrared Spectroscopy

AS6171/10

Thermogravimetric Analysis

AS6171/11

Design Recovery Test Methods

AS6810

Test Lab Accreditation Body Requirements

Approved for Public Release; Distribution is Unlimited; #21-1247; Dated 07/21/21

G-19A AS6171 Work In Progress

Under Revision

AS6171A
General Requirements

AS6171/2A
External Visual Inspection

AS6171/4
Delid/Decapsulation Physical Analysis

AS6171/6
Acoustic Microscopy

AS6171/11A
Design Recovery

New Test Methods in Development

AS6171/13 Secondary Ion Mass Spectrometry

AS6171/15 Part Packaging Detection by Various Methods

AS6171/16 Netlist Assurance

AS6171/17 Laser Scanning Microscopy

AS6171/20 X-Ray Photoelectron Spectroscopy

AS6171/22 Scanning Electron Microscopy, including
Energy Dispersive X-Ray Spectroscopy

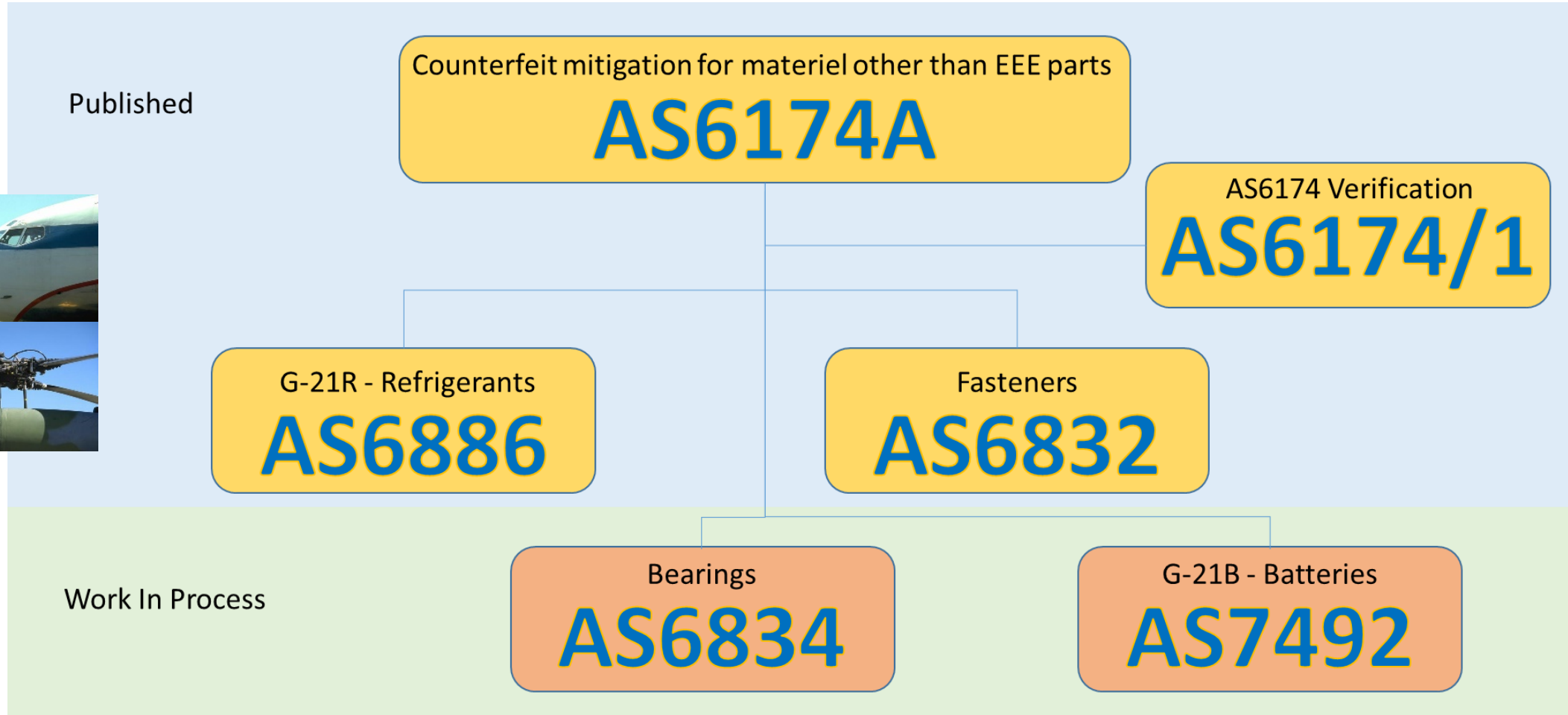
AS6171/23 Suspect/Counterfeit EEE Assembly Detection

Existing G-21 Portfolio

Focus on
Counterfeit
Materiel



TOPICS Entertainment



AS6174A

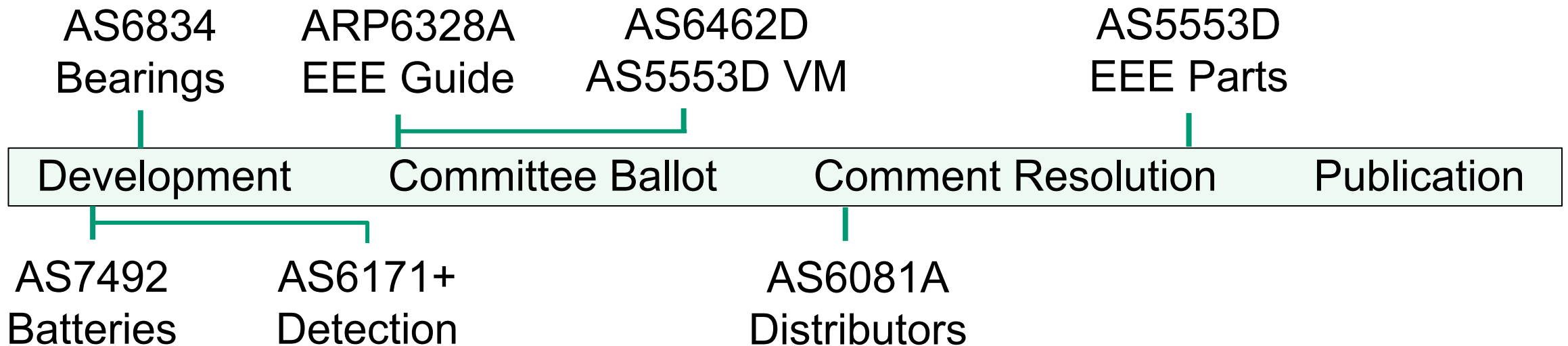
- Counterfeit Materiel; Assuring Acquisition of Authentic and Conforming Materiel
- For materiel other than EEE parts
- Published July 2014
- 38 pages, including 26 pages of guidance in appendices

Comparing Standards Topics

AS5553C	AS6496	AS6081	AS6174A
	Policy		
Control Plan	✓	✓	Assurance Plan
	Distribution Agreements	Customer Contract	
Training	✓	✓	
Life Cycle Availability			✓
Sourcing	✓	✓	✓
Supplier Requirements	✓	PO Requirements	✓
Verification of Purchases		✓	✓
Investigation			✓
Traceability	✓	✓	✓
		Preservation of Product	
Material Control	✓	✓	✓
	Customer Returns	✓	
Reporting	✓	✓	✓
		Inspect/Test Reports	
Auditing	✓	✓	

Current G-19 & G-21 Activities

- G-19 Committee consolidation
 - Improve consistency between documents
 - Balance member representation
 - G-19A and G-21 not impacted
- Work in Progress



(Near) Future G-19 & G-21 Activities

- G-19 – After AS5553D comment resolution
 - ARP6328 update to align with AS5553D
 - AS6462 update from C to D
 - Proposed ARP bridging AS91XX series & G-19/G-21 documents
- G-21 - AS6174 stabilization ballot

Conclusions

- SAE standards committees' counterfeit mitigation focus
- Participation from industry, government, & academia
- Target EEE parts, materiel, & inspection/testing
- 25 published documents, 9 more in development
- Many opportunities to contribute



TOPICS Entertainment

Jim Creiman

Quality and Mission Excellence Operations Compliance

Northrop Grumman Corporation

james.creiman@ngc.com

Question & Answer



Return in 10
Minutes



Return in 9
Minutes



Return in 8
Minutes



Return in 7
Minutes



Return in 6
Minutes



Return in 5
Minutes



Return in 4
Minutes



Return in 3
Minutes



Return in 2
Minutes



Return in 1
Minute



SAE Counterfeit Avoidance Testing: AS6171 Overview



Michael H. Azarian, Ph.D.

CALCE, University of Maryland College Park
SAE International G-19A Committee Chair

Counterfeit Detection: DFARS

Risk-based policies and procedures for counterfeit part detection and avoidance are required by the DFARS¹ and provide a balance between test cost/time and benefits.

The basis for the selection of tests and inspections is the combined risk associated with three elements:

- The probability that the part received is counterfeit (“supplier risk”);
- The probability of detecting a counterfeit part with an inspection or test (“component risk”); and
- The potential negative impact of installing a counterfeit part (“product risk”).

¹Defense Federal Acquisition Regulation Supplement, Clause 48 CFR 252.246-7007

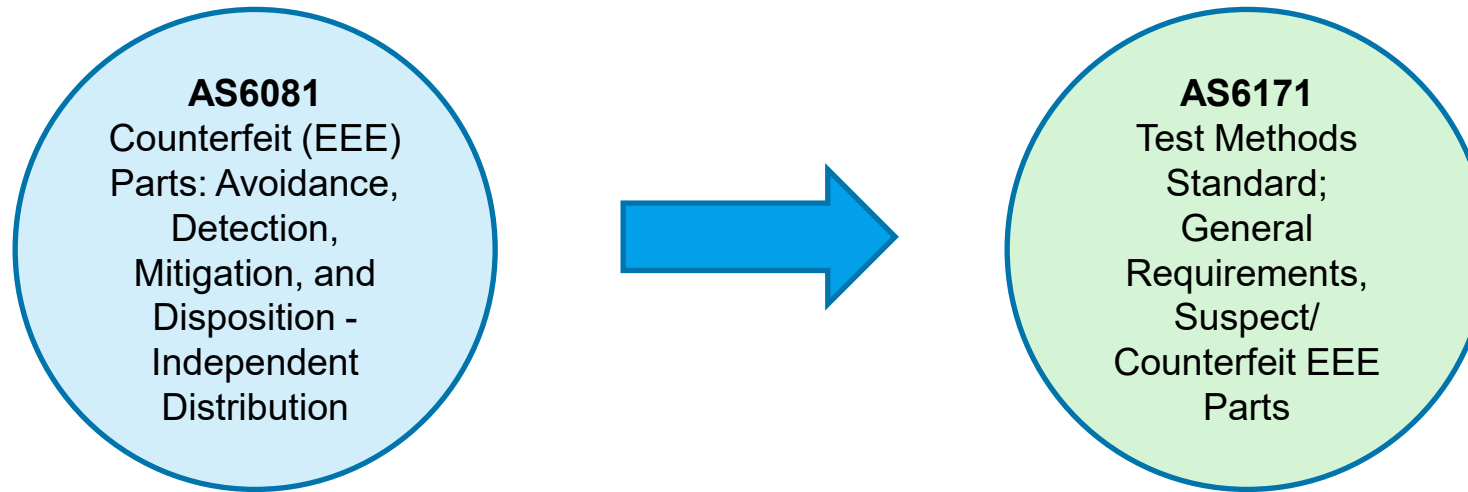
AS6171 – Test Methods Standard

Test Methods Standard; General Requirements, Suspect/Counterfeit Electrical, Electronic, and Electromechanical Parts

Purpose	<ul style="list-style-type: none">• Standardize practices to detect suspect counterfeit EEE parts and to ensure consistency of test techniques and requirements across the supply chain
Target Audience	<ul style="list-style-type: none">• Independent Testing Facilities• Distributors & OEMs (in-house testing capability)• OEMs, Integrators, and End-Users flowing down test requirements
Uses	<ul style="list-style-type: none">• Test Methods for risk-based counterfeit detection• Proficiency for counterfeit test & evaluation• Intended to be used for accreditation of Independent Test Laboratories or Distributors
Status	<ul style="list-style-type: none">• Originally Published by SAE (October 2016); Undergoing Revision and Further Development

AS6171 and AS6081 Relationship

Testing requirements used by the QTSL will likely be removed from the next revision of AS6081.



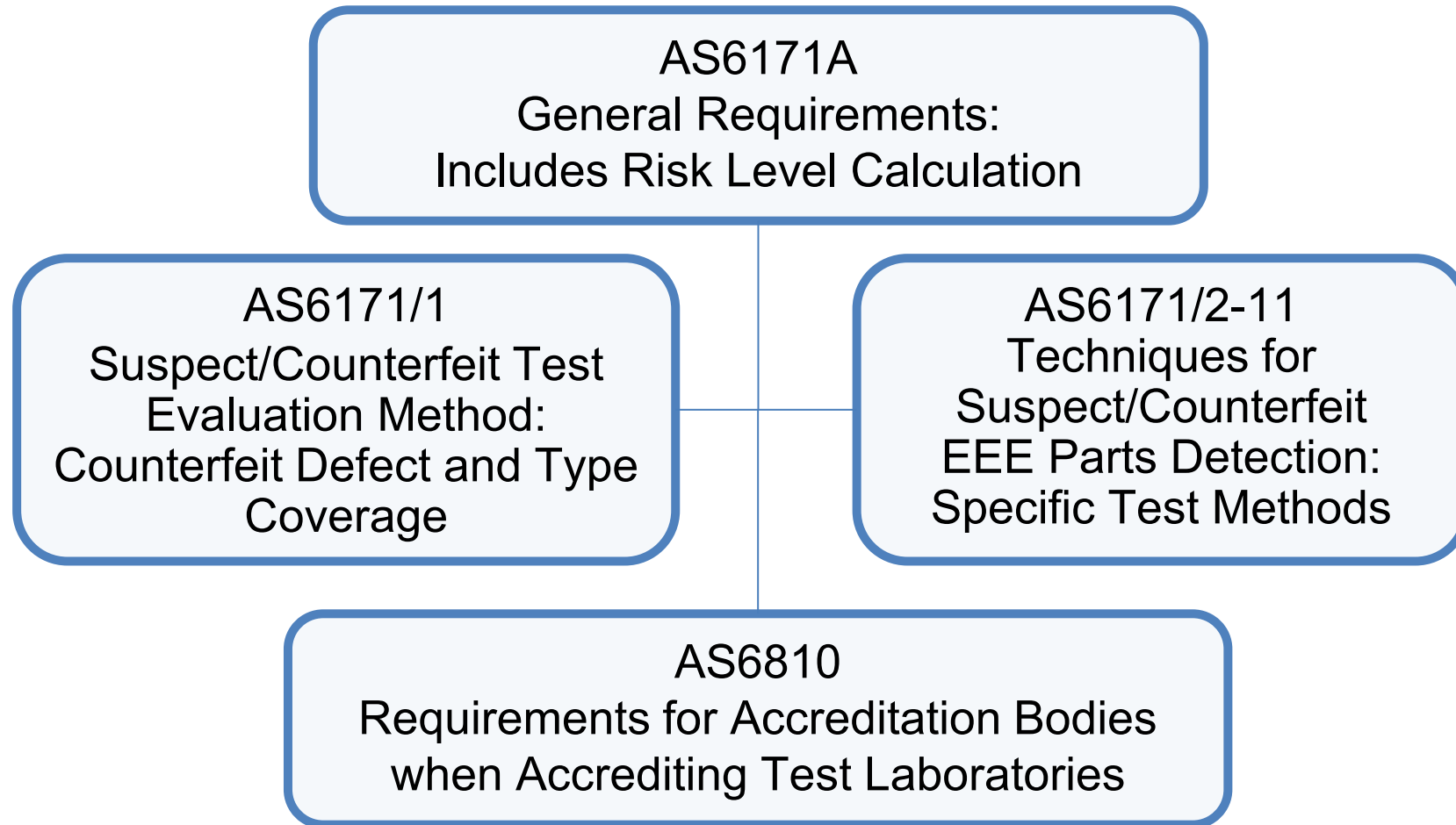
- **AS6081 does not call out electrical testing or a sampling plan.**
- AS6081 specifies **what** to do but **not how** to do it; AS6171 contains test procedures on **how to perform and interpret testing**.
- AS6171 sampling plan is based on a military standard.
- AS6171 is a workmanship standard for risk-based testing to detect suspect/counterfeit EEE parts. The lab certifies the parts.
- AS6081 is a quality management system supplement (process standard).

Counterfeit EEE Part Types

- Counterfeit Electrical, Electronic, or Electromechanical (EEE) parts may be reclaimed from e-waste, product overruns, modified authentic parts, or copies.
- Note: Tampered is not addressed in the current release of AS6171, but will be included in future releases

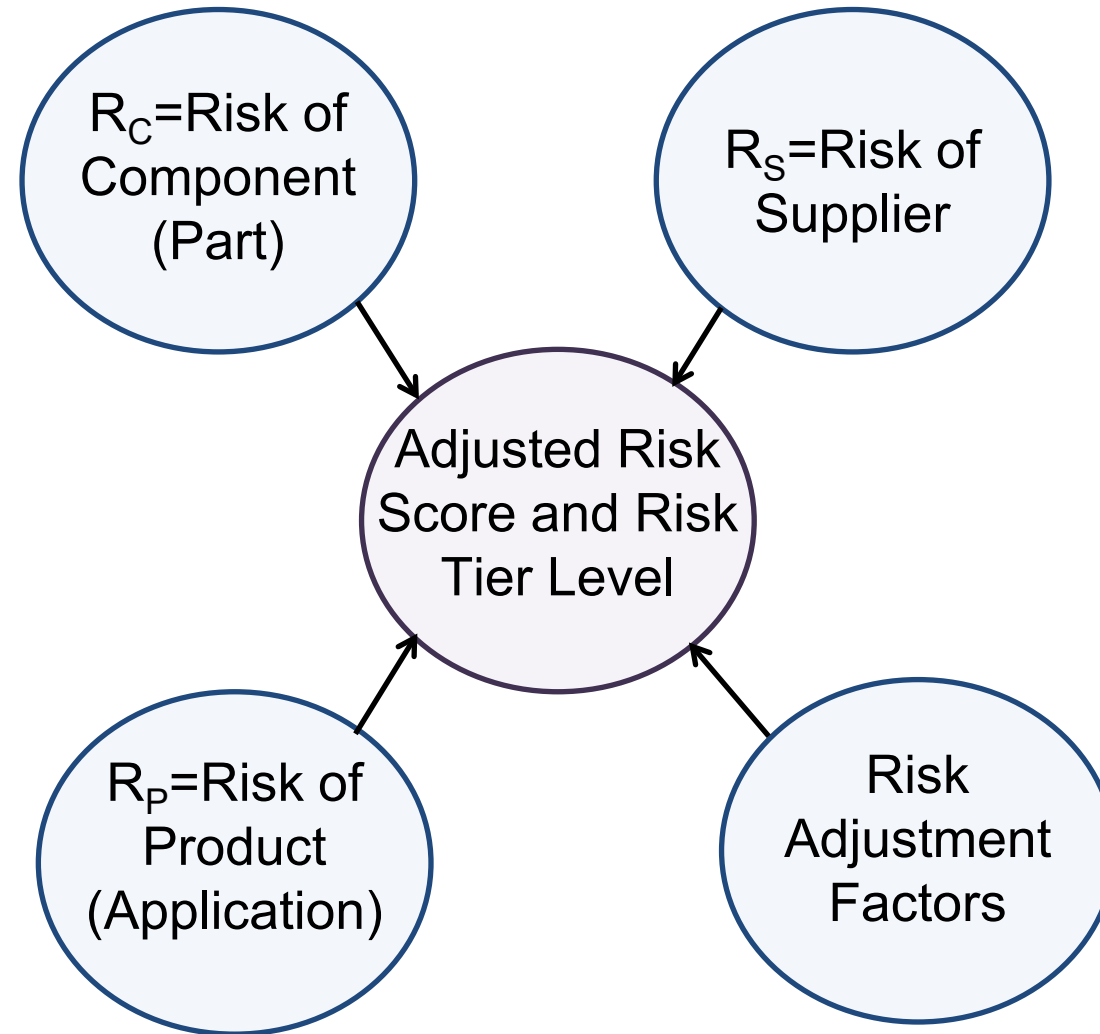
Recycled
Remarked
Overproduced
Out-of-spec/Defective
Forged Documentation
Cloned
Tampered

Organization of SAE AS6171



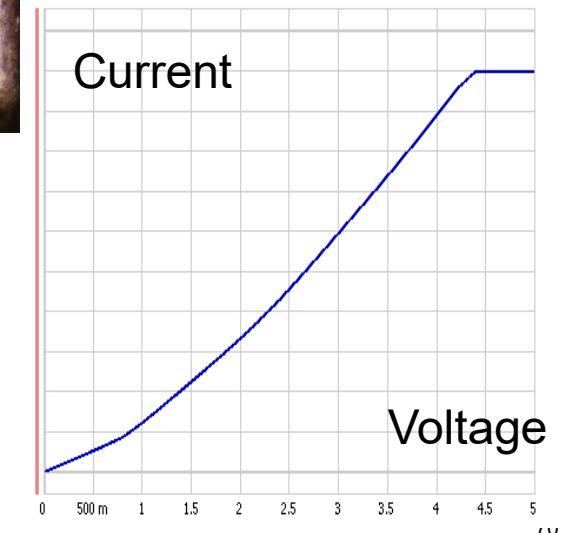
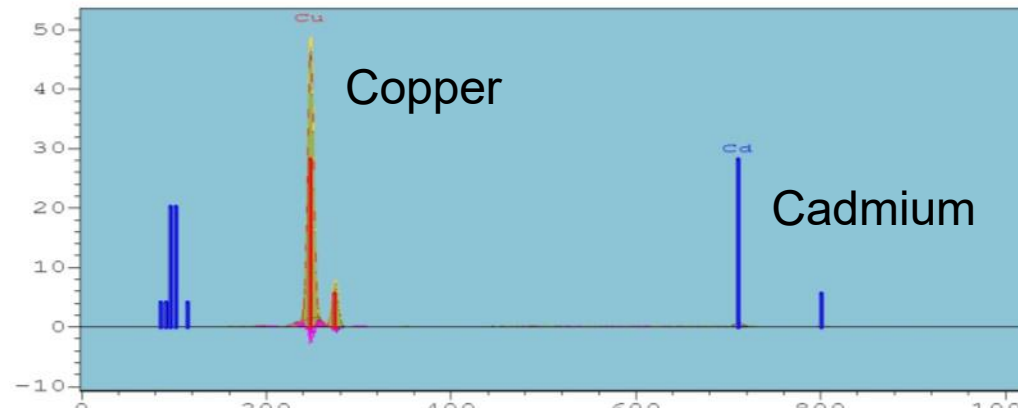
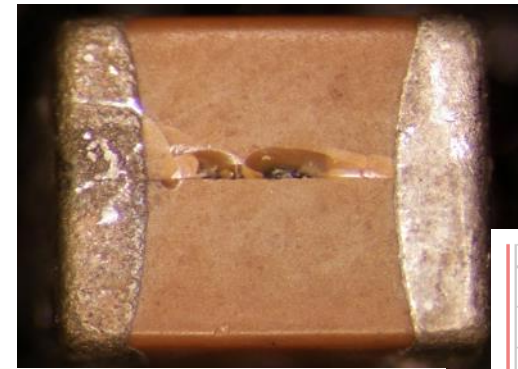
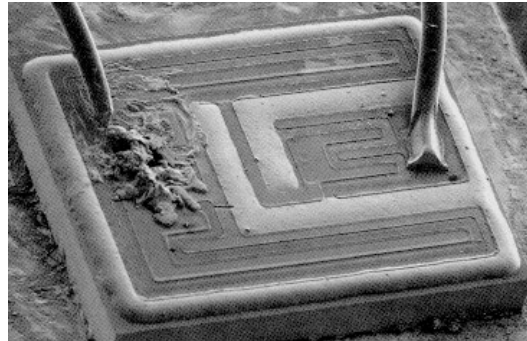
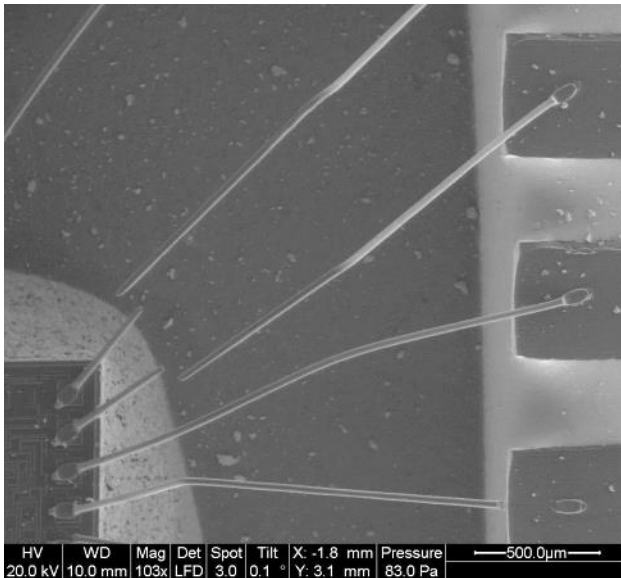
AS6171 is a workmanship standard for risk-based testing to detect suspect/counterfeit EEE parts, produced by the G-19A committee within SAE's Aerospace Standards program.

Factors Used to Calculate Risk



Counterfeit Defects

- Counterfeit Defects are indicators of potential counterfeiting.
- They include such features as damaged terminations, ghost markings, missing or broken bond wires, incorrect materials, and out-of-specification electrical parameters.



Test Methods Covered in the Slash Sheets

- **AS6171/2: External Visual Inspection (EVI)** (incl. remarking, resurfacing, weight, dimensions, SEM)
- **AS6171/3: X-Ray Fluorescence (XRF)** (incl. lead finish, thickness)
- **AS6171/4: Delid/Decapsulation Physical Analysis (DDPA)**
- **AS6171/5: Radiological Inspection (RI):** X-ray imaging
- **AS6171/6: Acoustic Microscopy (AM):** external and internal
- **AS6171/7: Electrical Test:** Curve Trace, Full DC, Key Electrical Parameters for AC, Switching, and Functional Tests; ambient or over temperature (incl. environmental, burn-in, seal)
- **AS6171/8: Raman Spectroscopy:** materials identification
- **AS6171/9: Fourier Transform Infrared Spectroscopy (FTIR):** materials identification
- **AS6171/10: Thermogravimetric Analysis (TGA):** material analysis
- **AS6171/11: Design Recovery (DR):** device layout and function

Each Test Method Slash Sheet Includes:

- Processes and a description of procedures
- Apparatus needed for the test technique
- Required qualification and certification of processes and personnel
- Guidelines and requirements for reporting

Counterfeit Defect Coverage

- **Counterfeit Defect Coverage (CDC)**: average confidence of detection across all defects relevant to a particular type of EEE part.
- **Not-Covered Defects (NCD)**: defects that are not detected by the test sequence
- **Under-Covered Defects (UCD)**: defects whose confidence of detection is below the target.

Risk Tier Level	Target Confidence (TC)
Critical	0.90
High	0.8
Moderate	0.65
Low	0.5
Very Low	0.35

Sample Test Sequence for Moderate Risk

Active Parts, Complex, Model 2

Moderate Risk Target Confidence: 65%

Test #	Test Method
1	EVI, General (Full Lot)
2	EVI, Detailed (Sample)
3	EVI, Remarking
4	EVI, Resurfacing
5	EVI, Part Dimensions
7	XRF, Lead Finish Analysis
9	XRF, Material Composition
10	DDPA, Internal Inspection
13	Radiological, 2D
19	Electrical, DC Test at ambient temp.

Moderate Risk, Complex Active Part - Model 2 Results

Counterfeit Defect Coverage (CDC)

	Test Method
1	General EVI
2	Detailed EVI
3	Testing for Remarking (EVI)
4	Testing for Resurfacing (EVI)
5	Part Dimensions
6	Lead Finish Analysis (XRF)
7	Material Composition (XRF)
8	Internal Inspection (DDPA)
9	2D Radiological Inspection (RI)
10	DC Test at ambient temperature
	Final CDC 66.8%

Not-Covered Defects (NCDs)

1	Bond Pull Strength
2	Semiconductor Impurities
3	Out of Specification-AC Parameters
4	Out of Specification-Switching Parameters
5	Programming State
6	Incorrect Temperature Profile

Under-Covered Defects (UCDs)

1	Missing or Non-functional Condition Indicator (37.5)
2	Missing or Non-functional Part Protector (15.0)
3	Incorrect Part Weight (37.5)
4	Modified Surface Texture (40.6)
5	Die Surface Contamination (39.1)
6	Delamination (7.3)
7	Misaligned or Missing Contact Windows (15.0)
8	Passivation Damage (15.0)
9	Dielectric Impurities (2.5)
10	Interconnect Contamination (4.9)
11	Not Hermetic (2.5)
12	Improper Material (Internal) (48.2)
13	Out of Specification-Functional Parameters (15.0)
14	Out of Specification-Curve Trace Parameters (37.5)
15	Intermittency (2.5)

New AS6171 Test Method Standards Under Development

AS6171/13	Secondary Ion Mass Spectroscopy (SIMS) Test Method	AS6171/20	X-Ray Photoelectron Spectroscopy (XPS) Test Method
AS6171/15	Packaging Test Methods	AS6171/22	Technique for Suspect/Counterfeit EEE Parts Detection by Scanning Electron Microscopy (SEM) including Energy Dispersive X-Ray Spectroscopy Test Methods
AS6171/16	Netlist Assurance Test Methods		
AS6171/17	Laser Scanning Microscopy (LSM) Test Methods	AS6171/23	Techniques for Suspect/Counterfeit EEE Assembly Detection by Various Test Methods

AS6171 Standards Undergoing Revision

- **AS6171A: General Requirements**
- **AS6171/1: Test Evaluation Method**
- **AS6171/2A: External Visual Inspection (EVI)** (incl. remarking, resurfacing, weight, dimensions, SEM)
- **AS6171/4: Delid/Decapsulation Physical Analysis (DDPA)**
- **AS6171/6: Acoustic Microscopy (AM):** external and internal
- **AS6171/11: Design Recovery (DR):** device layout and function

Future Directions and Needs for Risk-Based Counterfeit Detection

- Increased adoption and use of AS6171 by government and industry
- Accreditation of more test laboratories
- Additional test methods (e.g., compositional analysis, imaging, topography, characterization of material properties, and evaluation of part packaging)
- Inclusion of tampered parts
- Improved methods for quantifying risk
- Improved, unbiased data on effectiveness of tests

Michael Azarian, Ph.D.
Center for Advanced Life Cycle Engineering (CALCE)
University of Maryland
mazarian@umd.edu

PRI Industry Managed Counterfeit Avoidance Accreditation Program (CAAP)



Jim Lewis

Sr. Program Manager, CAAP

Performance Review Institute (PRI)

Industry Managed Counterfeit Avoidance Accreditation Program (CAAP)

“WITH THE INCREASED FOCUS
ON COUNTERFEIT PARTS IN THE
AEROSPACE INDUSTRY, OUR WORK
ESTABLISHING A SYSTEM OF ENSURING
COMPLIANCE TO GOVERNMENTAL
AND INDUSTRY REQUIREMENTS IS OF
CRITICAL IMPORTANCE.”

BOB BODEMULLER, SUPPLY CHAIN
QUALITY PRINCIPLE ENGINEER,
LOCKHEED MARTIN

Current Situation - Aerospace

Rising number of counterfeit/defective electronics entering aerospace and defense supply chain

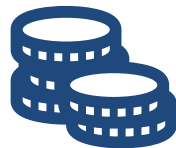
RISKS:



Product Failure



Exfiltration of Electronic Data



Revenue Loss



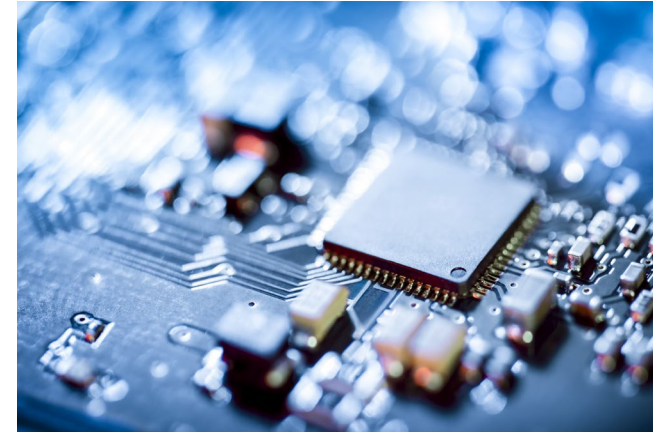
Loss of Intellectual Property



Increased costs relating to warranty, inspections, testing and restocking

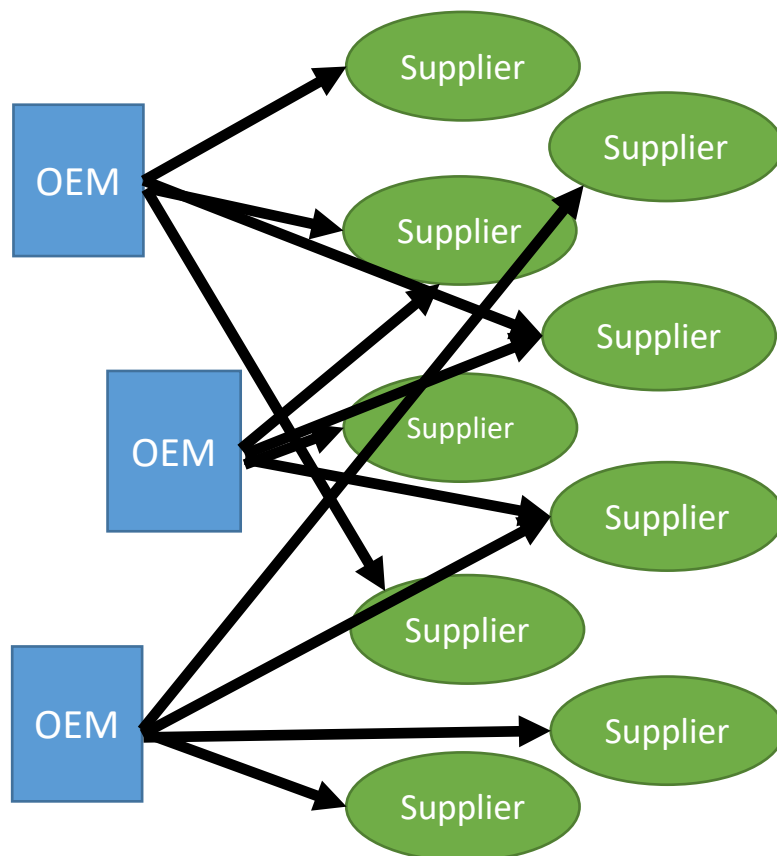
Current Situation

- Counterfeit parts compromise:
 - Safety
 - Industry profitability
 - Security
- Regulatory bodies such as US DOD, FAA, and EASA are requiring an approach to address this issue
 - Need a method to verify organizations are compliant to recognized counterfeit avoidance requirements

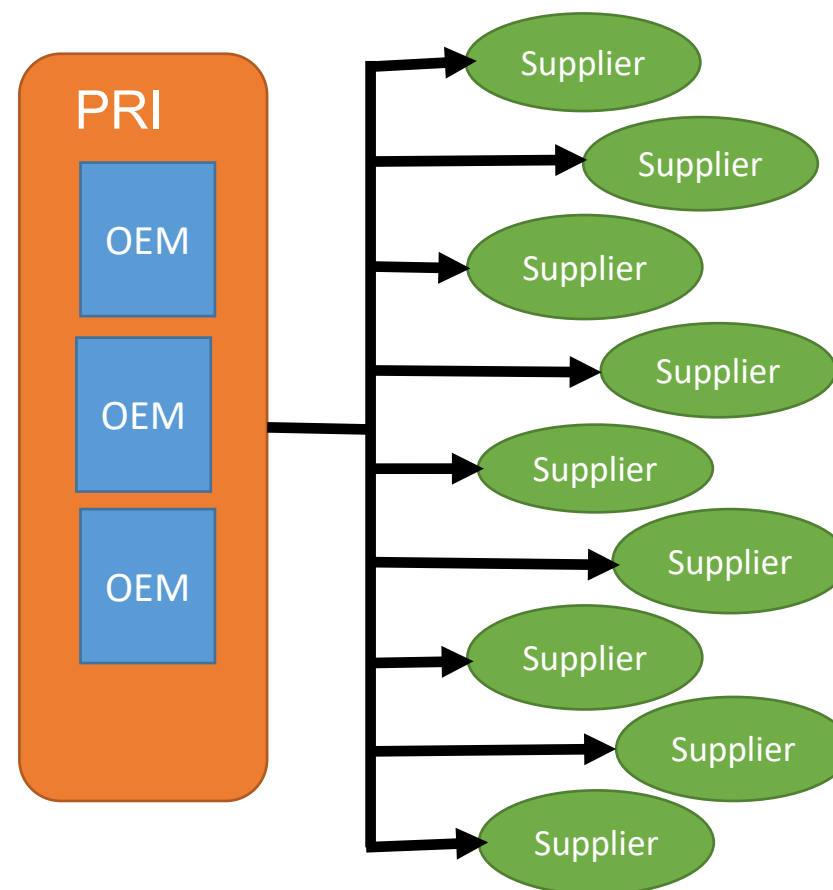


Supplier Oversight

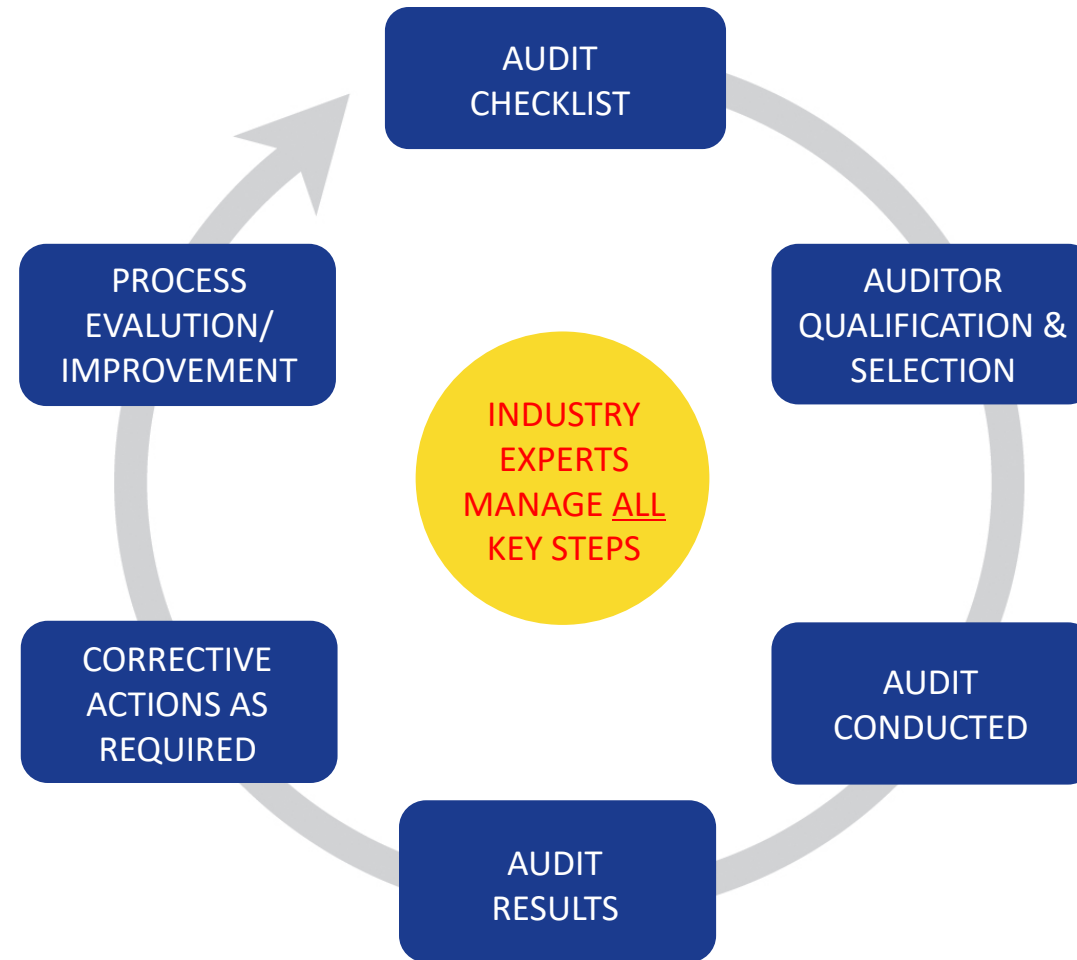
Current Situation



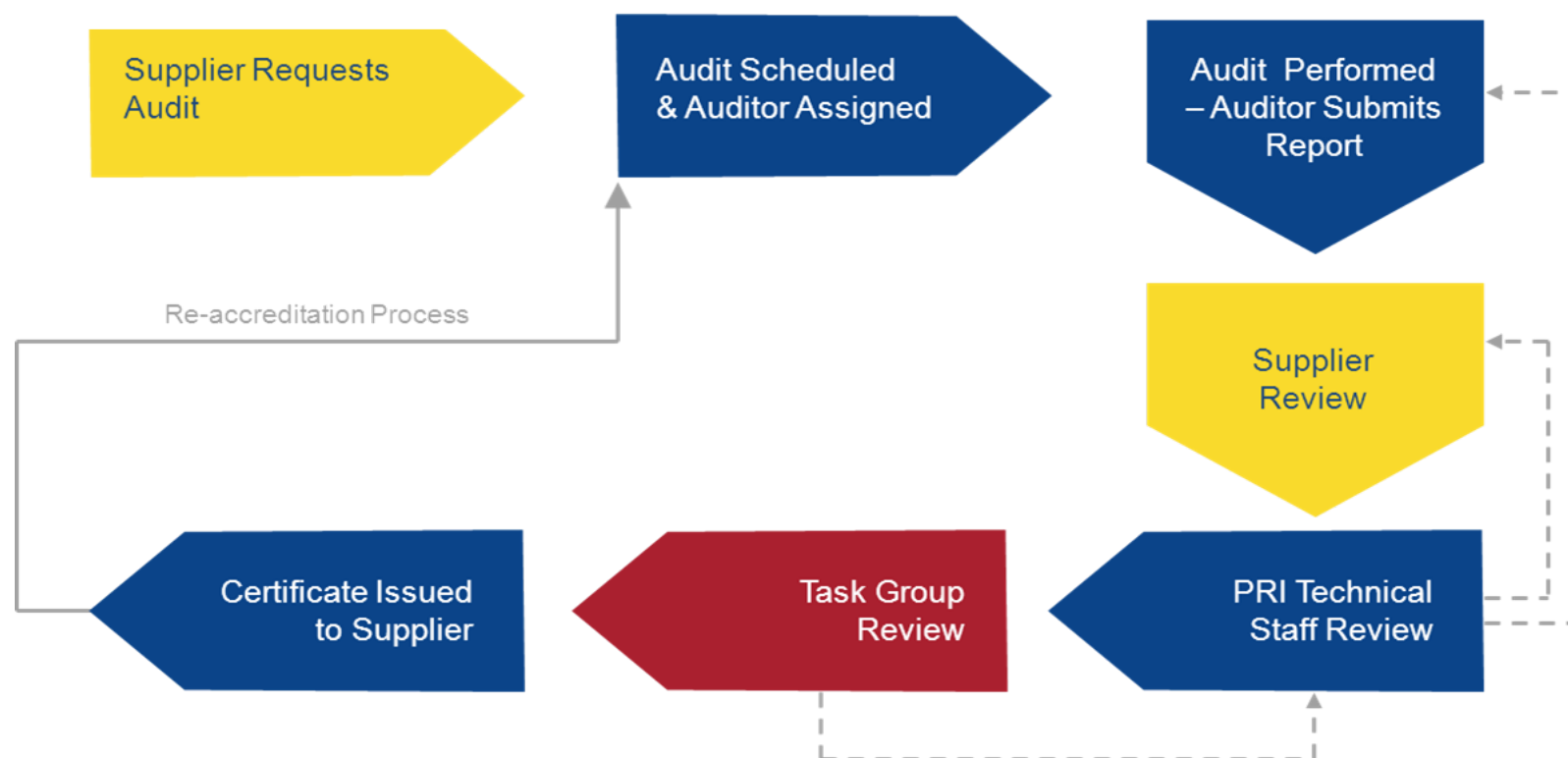
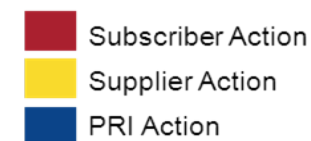
Using CAAP



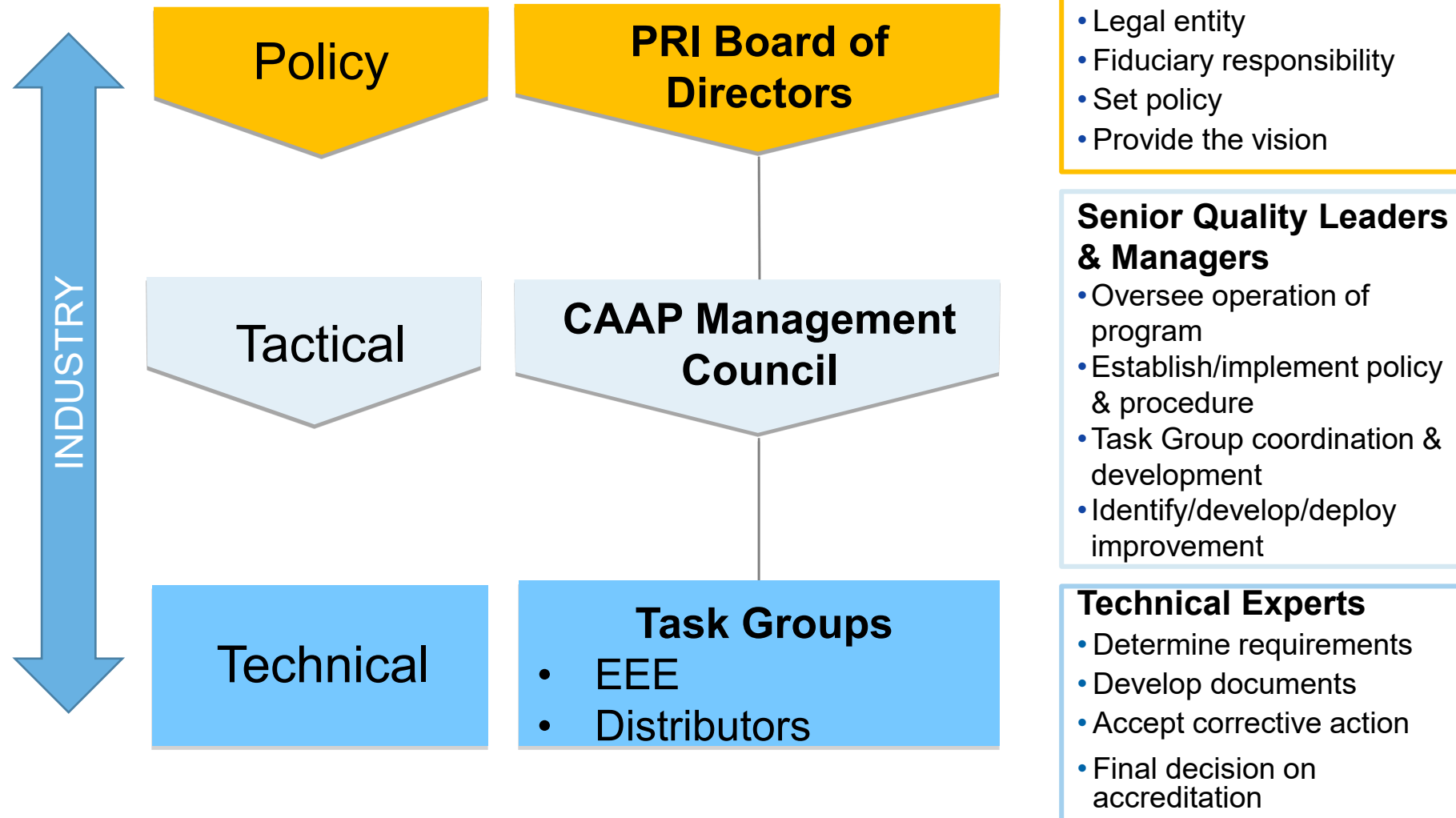
Industry Managed Accreditation Process



Path to Accreditation



Industry Managed Model

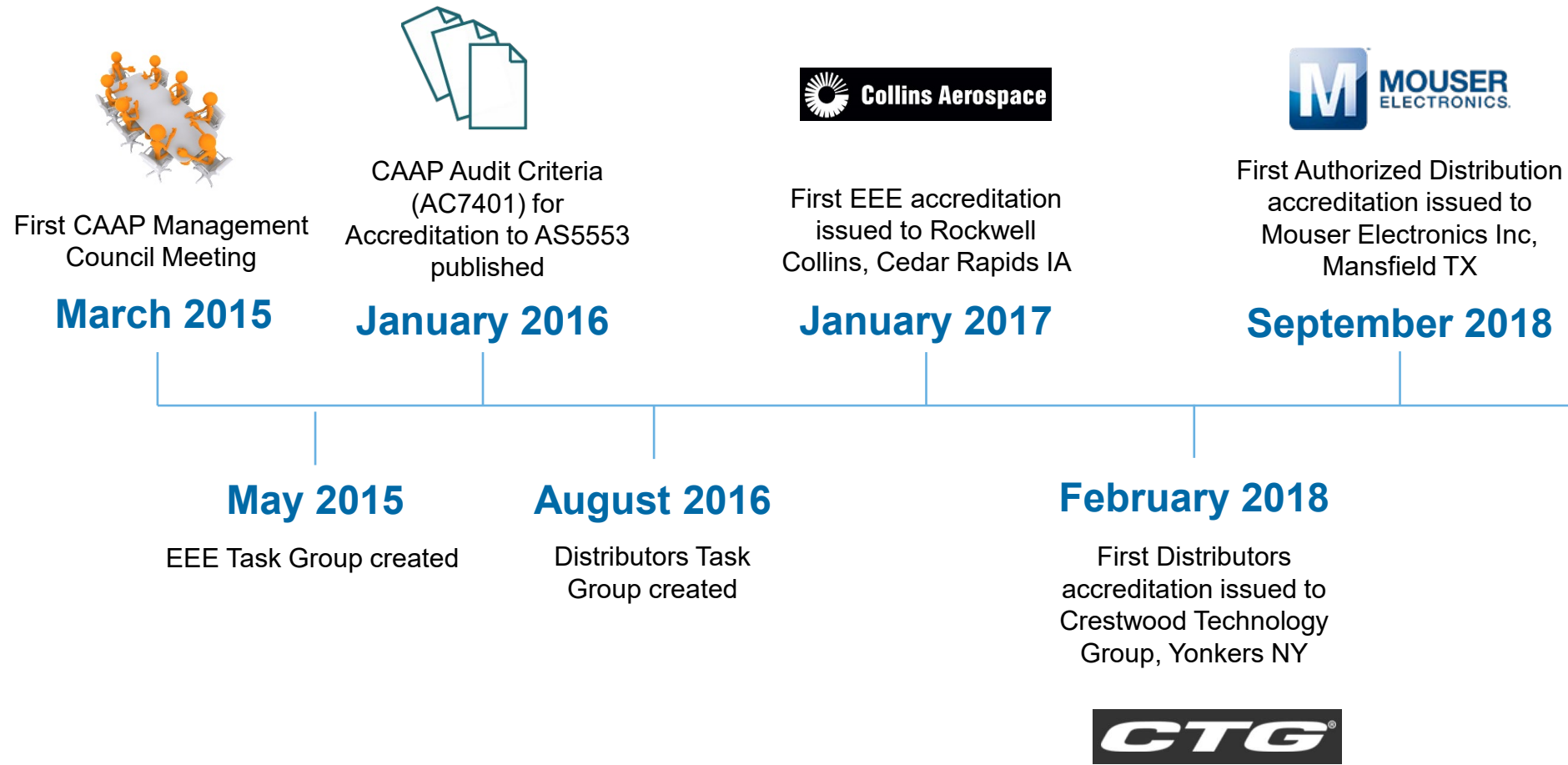


Participating Companies

- Boeing*
- Defense Contract Management Agency (DCMA)*
- General Electric*
- Honeywell*
- Lockheed Martin*
- Northrop Grumman*
- Rockwell Collins*
- United Technologies (UTC)*
- Ball Aerospace
- Electronic Components Industry Association (ECIA)
- Mouser Electronics, Inc
- Raytheon
- Rolls-Royce
- SAFRAN
- TTI, Inc.

* CAAP Subscriber

Development Milestones



Audit Criteria for EEE Parts

AC7401: Accreditation to SAE AS5553

- Controlled by the EEE Task Group
 - AS5553 – Counterfeit Electrical, Electronic, and Electromechanical (EEE) Parts; Avoidance, Detection, Mitigation, and Disposition
-
- | | |
|--------------------------------------|-------------------------------------|
| ✓ Counterfeit EEE Parts Control Plan | ✓ Verification of Purchased Parts |
| ✓ Personnel Training | ✓ Investigation |
| ✓ Parts Availability | ✓ Material Traceability and Control |
| ✓ Purchasing Process and Information | ✓ Reporting |

Audit Criteria for DFARS

AC7401/1: Compliance to DFARS* 252.246-7007 and 7008

- Must be used in conjunction with AC7401
- Controlled by EEE TG
- ✓ Gaps between SAE AS5553 and DFARS 252.246-7007 and 7008
 - 7007 addresses systems requirements
 - 7008 addresses purchasing requirements
- ✓ Full compliance to DFARS requires both AC7401 and AC7401/1 to be audited

Audit Criteria for Independent Distributors

AC7402: Accreditation to SAE AS6081

- Controlled by Distributors Task Group
 - AS6081 – Fraudulent/Counterfeit Electronic Parts: Avoidance, Detection, Mitigation, and Disposition - Distributors
-
- | | |
|---|-------------------------------------|
| ✓ Policies | ✓ Returned Product |
| ✓ Control Plan | ✓ Control of Non Conforming Product |
| ✓ Contract Review | ✓ Material Control |
| ✓ Supplier Approval Processes | ✓ Reporting |
| ✓ Supply Chain Traceability | ✓ Personnel Training |
| ✓ Verification of Purchased Product <ul style="list-style-type: none">• Testing• Visual Inspection | ✓ Internal Audit |

Audit Criteria for Authorized Distributors

AC7403: Accreditation to SAE AS6496

- Controlled by Distributors Task Group
 - AS6496 – Fraudulent/Counterfeit Electronic Parts: Avoidance, Detection, Mitigation, and Disposition - Authorized/Franchised Distribution
-
- | | |
|---|--|
| ✓ Mitigation Policy | ✓ Control of Suspect, Fraudulent and Confirmed Counterfeit Parts |
| ✓ Control Plan | ✓ Training |
| ✓ Customer Processes | ✓ Scrap Control |
| ✓ Supplier Control | ✓ Inventory Control |
| ✓ Traceability, Records Retention, Retrievability | ✓ Reporting |
| | ✓ Certification Review |

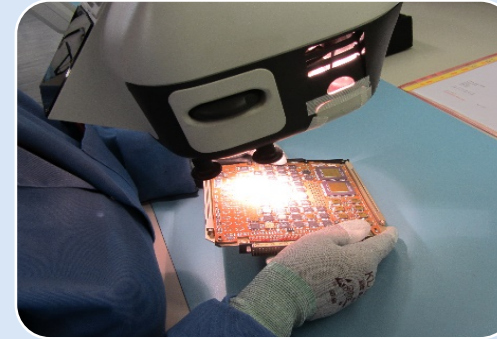
Recent/Future Activities



Worked with International Aerospace Quality Group (IAQG) to revise Counterfeit Parts Prevention section of their aerospace Supply Chain Management Handbook



Investigating development of Materiel Audit Criteria based on SAE AS6174 – Counterfeit Materiel; Assuring Acquisition of Authentic and Conforming Materiel



Investigating development of suspect counterfeit parts testing audit criteria

Questions?

Jim Lewis

Senior Program Manager, CAAP

O: +1 724 772 8688

C: +1 724 991 5815

jlewis@p-r-i.org

"BY ENSURING COMPLIANCE TO THE DEMANDING CAAP AUDIT CRITERIA, ROCKWELL COLLINS IS SENDING A CLEAR MESSAGE TO OUR CUSTOMERS THAT WE HAVE THE SYSTEMS IN PLACE TO ENSURE HIGH-QUALITY MANUFACTURING OF OUR PRODUCTS. OUR TEAMS ACROSS THE BUSINESS HAVE WORKED EXTREMELY HARD TO EARN THIS ACCREDITATION, WHICH POSITIONS OUR COMPANY AS AN INDUSTRY LEADER IN COUNTERFEIT AVOIDANCE."

BRUCE KING, SENIOR VICE PRESIDENT
OF OPERATIONS, ROCKWELL COLLINS

SAE INTERNATIONAL

SAE MOBILUS & SAE ONQUE DIGITAL STANDARDS SYSTEM



Tim Davison
Corporate Sales
SAE International



SAE MOBILUS HOME

Your Destination for Mobility Engineering Resources

141,900+
Technical Papers

6,100+
Journal Articles

12,600+
Aerospace Standards

16,600+
Aerospace Material
Specifications

8,600+
Ground Vehicle
Standards

3,400+
SAE ITC E&A
Standards

Browse our Product Portfolio

SAE subscriptions provide customers with the perfect solution. Access over 200,000 industry leading technical papers, standards, books, and more.

[LEARN MORE >](#)

SAE MOBILUS Transition Information

Transitioning from the Digital Library to SAE MOBILUS requires little technical support and results in a wealth of benefits.

[LEARN MORE >](#)

Featured Article

NASA pursues coatings that reduce bug debris to improve aerodynamics

[LEARN MORE >](#)

Recently Published Technical Papers
and Journal Articles

Recently Published Standards

Most Popular Downloads

SAE STANDARDS

SAE Aerospace Material Specifications (AMS)..... 3,300+
SAE Aerospace Standards (AS).....5,800+
SAE Ground Vehicle Standards (J Reports).....2,400+
SAE ITC – Engine & Airframe Standards3,400+
SAE Historical Standards29,000+

SAE BOOKS

SAE eBooks.....300+

SAE TECHNICAL PAPERS

SAE Technical Papers 100,000+

SAE MAGAZINES

SAE eMagazines9,000+

SAE Journals

- Aerospace
- Alternative Powertrains
- Commercial Vehicles
- Connected and Automated Vehicles
- Engines
- Fuels and Lubricants
- Materials and Manufacturing
- Passenger Cars – Mechanical Systems
- Transportation Safety
- Transportation Cybersecurity and Privacy

SAE Edge Reports:

35 Titles:

- Unsettled Topics Concerning Airworthiness Cyber-Security Regulation
- Unsettled Technology Domains in Aerospace Additive Manufacturing Concerning Safety, Airworthiness, and Certification
- Unsettled Topics Concerning Adopting Blockchain Technology in Aerospace

Partner Content:

Composite Material Handbook - Polymer Matrix, Metal Matrix, and Structural Sandwich Composites 6-Volume Set

MMPDS - *The Metallic Materials Properties Development and Standardization MMPDS-14*

To find out if you are subscriber please contact Tim Davison:

Timothy.Davison@sae.org or 724-772-8551

SAE OnQue™ Digital Standards System

Patented system to automatically extract and convert standards retrospectively into digital formats for greater standards usability and integration into third-party tools. Proactively provides for the next generation of standards development decreasing publication time and improving adoption and circulation of standards data.

RIGHT DATA—RIGHT TIME—RIGHT PERSON



**Use Case:
Aggregation of
Standard Parts**



**Use Case: Systems
Integration**



**Use Case: Change
Management**



**Use Case: Inclusion
of Materials Data in
Engineering
Designs**



**Use Case: Inclusion
of Requirements
within Requirement
Management Tools
and PLM Systems**

<https://www.sae.org/onque-digital-standards>

customersales@sae.org

SAE CORPORATE SALES

Tim Davison

Corporate Sales

SAE International

timothy.davison@sae.org

SAE INTERNATIONAL

SAE AEROSPACE STANDARDS HOW TO GET INVOLVED

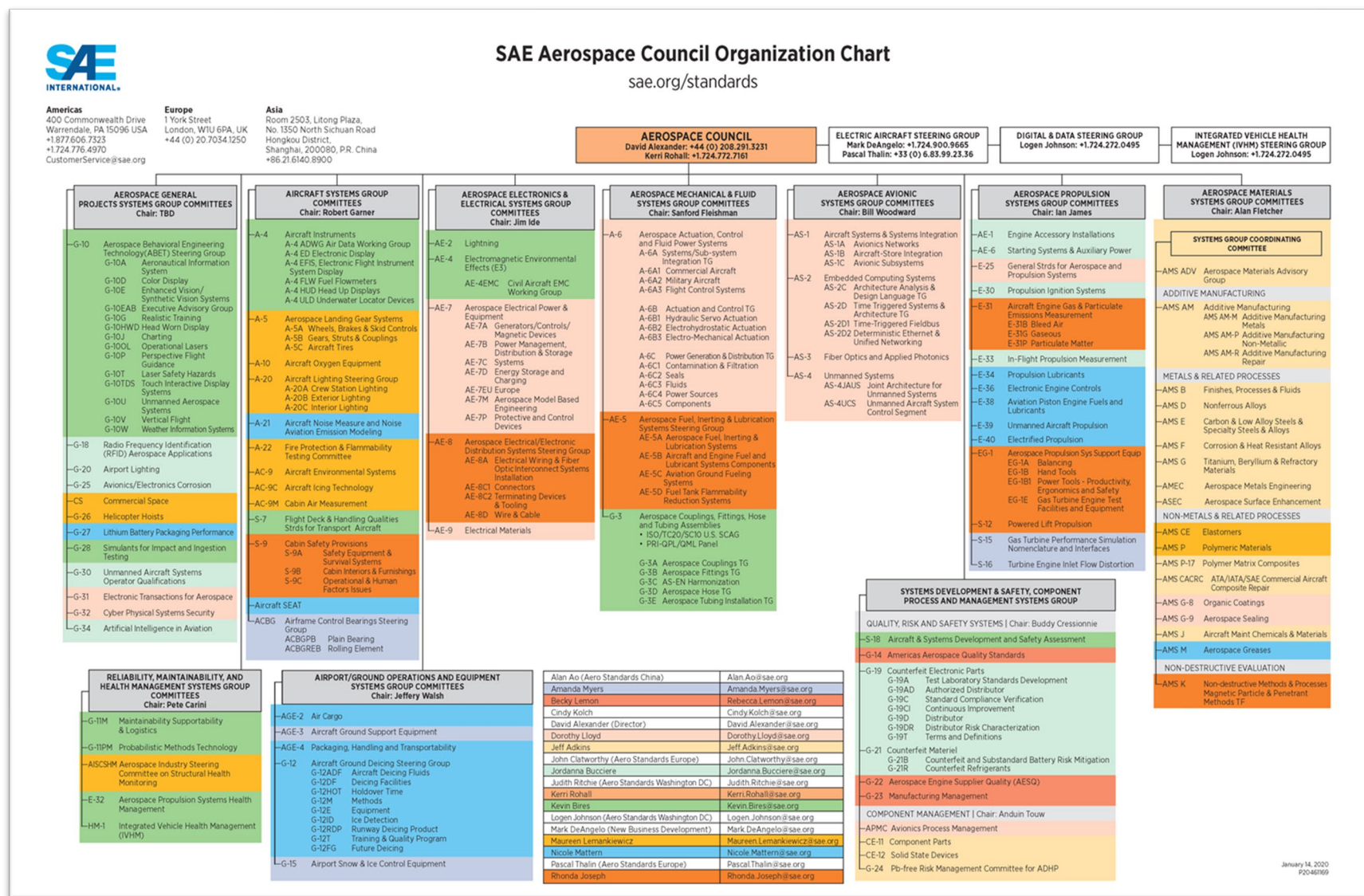


Becky Lemon
Industry Program Manager
SAE International



SAE Aerospace Technical Committees

LINK: <https://www.sae.org/standards/development>

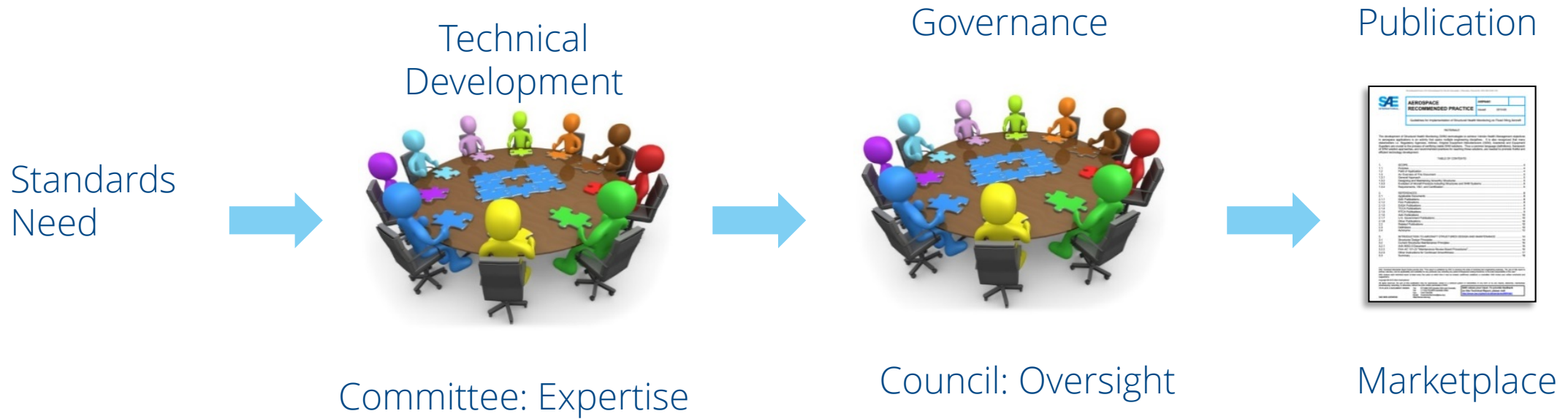


Benefits of Participating with SAE Standards Committees

- Influence the global aerospace market by contributing to SAE standards development
- Network with customers, partners, peers, suppliers and regulators
- Gain an overview of the industry
- Learn about state-of-the-art technology
- Keep informed of the technical standardization landscape and progression

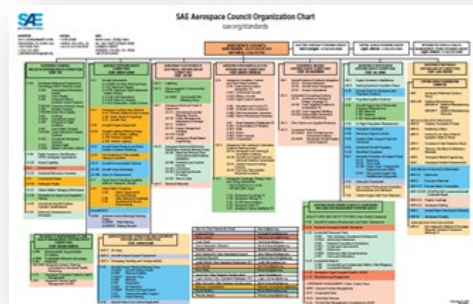


Standards Development Process



Process for Getting Involved in SAE Standards

- The SAE standards process is open to everyone!
- We welcome your involvement and participation on SAE committees.
- **Join a Counterfeit Committee:**
 - SAE G-19 Counterfeit Electronic Parts Committee
 - SAE G-21 Counterfeit Materiel Committee
 - SAE G-19A Test Laboratory Standards for Counterfeit Detection
- Contact Kerri Rohall (kerri.rohall@sae.org) for additional details.



Q&A AND WRAP UP





**Questions will be accepted
via the “Chat” function.**

We will provide these Resources in a follow-up email to all registrants:





Website:

<https://oai.org/>

LinkedIn:

<https://www.linkedin.com/company/ohio-aerospace-institute/>



Website:

<https://www.sae.org/>

LinkedIn:

<https://www.linkedin.com/company/25098/>



OAI & SAE *Thank You* **for participating in today's** **Counterfeit Standards Webinar!**