Aviation Supply Chain Integrity Coalition

FINAL REPORT AND RECOMMENDATIONS
TO PREVENT UNAPPROVED PARTS IN THE AVIATION SUPPLY CHAIN

Aviation Supply Chain
Integrity Coalition

CONTENTS

Executive Summary

In summer 2023, the aviation industry discovered that a small, London-based aviation parts broker had sold thousands of aircraft engine parts using falsified documentation. The little-known company, AOG Technics ("AOG"), became the focus of regulators and law enforcement on both sides of the Atlantic, as aviation companies across the industry raced to track down the parts. While the number of known engines affected was ultimately a small percentage of the global fleet, the incident demonstrated the need for additional safeguards to prevent unapproved propulsion parts in the global aviation supply chain.

In February 2024, aerospace industry leaders from around the world formed the Aviation Supply Chain Integrity Coalition ("the Coalition") to recommend actions the industry can take to prevent unapproved propulsion parts from entering the supply chain again and to strengthen the overall integrity and safety of the supply chain. Former National Transportation Safety Board (NTSB) Chairman Robert Sumwalt and former U.S. Transportation Deputy Secretary John D. Porcari joined the effort as Coalition co-chairs.

The Coalition organized its work into two phases, beginning with the research phase to investigate gaps and gather insights from experts. The co-chairs, members and Coalition staff interviewed 38 subject matter experts from 24 companies and associations via written questions and oral interviews. These experts represented industry associations, maintenance, repair and overhaul shops (MROs), engine and airframe original equipment manufacturers (OEMs), airlines, parts brokers, engine lessors, audit agencies, and accreditation organizations. Additionally, the Coalition visited one of the world's largest MROs to gather best practices and develop possible solutions.

The recommended actions are performance-based and technology-agnostic, allowing companies in the aerospace industry flexibility in achieving the outcome. While no single recommended action will solve the challenge, taken together, the Coalition firmly believes that these actions are necessary to strengthen the integrity of the system and increase aviation safety.

Although the Coalition's work centered on the propulsion supply chain, these recommended actions could be considered more broadly for other parts of the aviation parts supply chain.

It is also important to note that these recommendations constitute actions that industry members can undertake as voluntary measures, and are intended to supplement any efforts by regulatory bodies such as the U.S. Federal Aviation Administration (FAA), European Union Aviation Safety Agency (EASA), Civil Aviation Authorities (CAAs), and others, as well as enforcement actions by law enforcement agencies worldwide.

The Aviation Supply Chain Integrity Coalition represents one of the best traditions in aviation safety: to prevent repeated incidents and mitigate emerging and future threats. Taking these recommended actions will maintain the high level of aviation safety that the public has come to expect. But this can only occur if additional members of the aviation community also implement the recommendations outlined in this report. Collective action by additional industry stakeholders—airlines, manufacturers, repair and maintenance organizations, regulatory bodies, and law enforcement—is essential to prevent unapproved parts from entering the supply chain. Together, the industry can mitigate current risk and anticipate future challenges, ensuring the continued safety and trust of the global aviation community.

The 13 recommended actions included in this report reflect unanimous consensus from Coalition members to prevent future unapproved propulsion parts and are the result of biweekly Coalition member meetings, weekly Coalition staff meetings, dozens of interviews with experts, and other special emphasis meetings during a nine-month period. The actions are grouped into three different categories: vendor accreditation, document traceability and verification, and non-serialized parts traceability. Each category has actions that should be implemented in the short-term (12-24 months), medium-term (within the next 5 years), and long-term (over 5 years):

RECOMMENDED ACTIONS

VENDOR ACCREDITATION

SHORT TERM	MEDIUM TERM	LONG TERM
Promote Industry Use of Suppliers that Meet FAA and EASA Standards	Establish Industry Oversight Body of Accreditation Organizations	Establish Database of Accredited Vendors to Verify Identities and Quality Management Standards
Establish Feedback Loop Between Parts Installers and Accreditors		

DOCUMENT TRACEABILITY & VERIFICATION

SHORT TERM	MEDIUM TERM	LONG TERM
Expand the Use of Digital Authorized Release Certificates (ARCs) and Increase the Use of Digital Authentication Tools	Establish Industry Standard Documentation Requirements to Ensure Consistency Across the Industry	Establish Voluntary Industry Database of Back-to-Birth Parts Documentation
	Digitize Existing and Past Parts-Related Documents	
	Develop and Adopt Industry-wide Use of Software Database to Verify Key Authorized Release Certificate (ARC) Fields	

NON-SERIALIZED PARTS TRACEABILITY

SHORT TERM	MEDIUM TERM	LONG TERM
Further Strengthen Training Materials, Programs, and Best Practices	Improve Real-Time Data Sharing to Identify Unapproved Parts	Development of New Technological Solutions to Improve Parts Traceability
Verification and Auditing of Scrap Material and Recycling Vendors		

Background

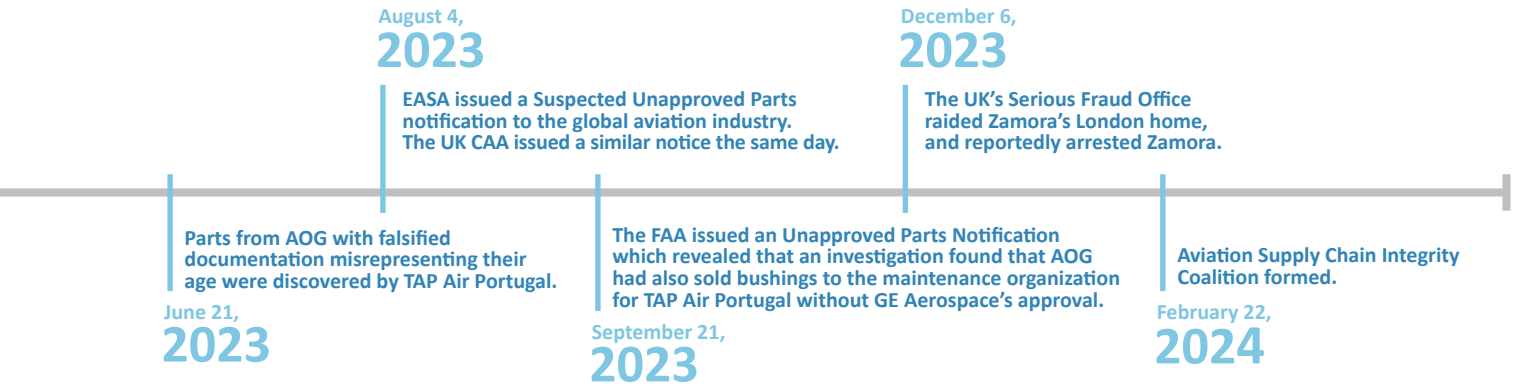
AOG TECHNICS

In June 2023, a keen-eyed operator at TAP Air Portugal contacted Safran Aircraft Engines regarding parts for a CFM56 engine that appeared older than represented in the documentation provided by AOG.[1] Safran quickly determined that the documentation had been falsified and began notifying regulators.

On August 4, 2023, the European Union Aviation Safety Agency issued a suspected unapproved parts (SUP) notification to the global aviation industry about SUPs distributed by United Kingdom (UK)-based aircraft parts broker AOG Technics Ltd. In that notification (ref. OC-EASA-2023004901[2]), the agency stated that occurrence reports submitted to EASA indicated that several parts for CFM56 engines distributed by AOG had been supplied with a falsified Authorized Release Certificate (ARC). The UK Civil Aviation Authority (UK CAA) issued a similar notice the same day. The CFM56 is a family of turbofan aircraft engines manufactured by CFM International, the 50-50 joint-ownership company of Safran Aircraft Engines and GE Aerospace, and powers many commercial narrowbody and widebody aircraft including variants of the Boeing 737, Airbus A320, and Airbus A340.

On September 21, 2023, the U.S. Federal Aviation Administration issued an Unapproved Parts Notification (No.: 2023-AAE-EHL-20230801-713[3]) which revealed that a July 25, 2023 FAA SUP investigation found that AOG had also sold bushings for GE Model CF6 engines to TAP Maintenance & Engineering (the maintenance, repair and operations (MRO) organization for TAP Air Portugal).[4] The investigations subsequently revealed AOG had also sold turbine blades without legitimate documentation.[5]

The FAA and GE Aerospace had determined the ARCs were falsified based on several discrepancies that did not match regulatory standards, including incorrect description references, missing boilerplate language, and incorrect formatting. However, with regulators limited in their ability to determine the full scope of AOG's sales worldwide, GE Aerospace and Safran Aircraft Engines went to court in the UK to access AOG's records. As a result of that effort, the investigation found that parts had been installed on engines for airlines across the globe.[6]



Venezuelan native Jose Alejandro Zamora Yrala founded AOG Technics in 2015. On its website, the London-based company called itself a "leading global aircraft support provider" with warehouses in the UK, Miami, Singapore, and Frankfurt. Transonic Aviation Consultants ("Transonic"), an accreditor of suppliers, certified AOG as meeting voluntary standards for aircraft parts distributors.

Initially established in Hove, in the South of England, Zamora later relocated the company to London. Court documents subsequently revealed that after a slow start to the business, AOG's sales abruptly accelerated in late 2019, shortly after the company is alleged to have begun selling thousands of aircraft parts with falsified documentation. Forged records dated as far back as 2018 from parts sold by AOG bore fake signatures of actual Safran Aircraft Engines employees, while others were supposedly signed off by individuals who no longer worked at the company. The names of other signatories appeared to be wholly fabricated, complete with fake LinkedIn profiles for would-be AOG employees featuring stock photos.[7]

On December 6, 2023, the UK's Serious Fraud Office (SFO) raided[8] Zamora's London home, and reportedly arrested Zamora.[9] The SFO's investigation into AOG Technics is ongoing. In April 2024, the FAA removed Transonic, which inspected AOG's operations,[10] from the list of accreditation organizations under its Voluntary Industry Distributor Accreditation Program.[11] The aviation community, meanwhile, responded to regulators' notices by immediately inspecting aircraft to determine the presence of AOG-sold parts. While less than one percent of CFM engines in service were affected by the issue, the incident showed more needed to be done.

SUSPECTED UNAPPROVED PARTS

In the United States, aircraft parts must meet rigorous standards set by the FAA in order to be installed on an aircraft. To be approved, a part must be produced under a Parts Manufacturer Approval (PMA) or Technical Standard Order (TSO) authorization, in conjunction with type certificate procedures for a product, or in another manner that is approved by the FAA (14 CFR § 21.8.12). Likewise, under 14 CFR § 21.9, a replacement part may only be installed if it is:

1. **Produced under a type certificate;**
2. **Produced under an FAA production approval;**
3. **A standard part (such as a nut or bolt) manufactured in compliance with a government or established industry specification;**
4. **A commercial part (as defined by 14 CFR § 21.1);**
5. **Produced by an owner or operator for maintaining or altering that owner or operator's product;**
6. **Fabricated by an appropriately rated certificate holder with a quality system, and consumed in the repair or alteration of a product or article in accordance with 14 CFR part 43; or**
7. **Produced in any other manner approved by the FAA.**[13]

In addition, 14 CFR § 43.1 through 14 CFR § 43.17 provide the regulatory framework for the process of maintenance, overhaul, and rebuilding, including the standards for which Used Serviceable Material (USM) is to be inspected, tested, and certified for reuse.

SUPs include components, materials, and other aerospace products from unknown or suspect origin, or in unserviceable condition. A part can itself be suspect, or the paperwork that may be required to be included with the part could be suspected to be false. Civil Aviation Authorities (CAA) across the world—including FAA, EASA, and the UK CAA —maintain reporting systems for the aerospace community to report SUPs and distribute notices upon the discovery and confirmation of such parts.

Parts that are manufactured or repaired without the approval of an aviation authority present risk because they may be poor quality, have been used beyond their approved lifetime limit, returned to service without proper documentation, or be stolen.

SUPs have long been a focus of regulators and the law enforcement community. Between 1990 and 1996, the U.S. Department of Transportation (USDOT) Inspector General led investigations that led to about 160 criminal convictions.[14] Efforts between the USDOT Office of the Inspector General, Department of Justice (DOJ), Federal Bureau of Investigation (FBI), Department of Defense (DOD) Criminal Investigative Service, and the U.S. Customs Service led to approximately 500 criminal indictments between 1993 and 2000 for the manufacture, distribution, or installation of unapproved parts.[15] The issue also attracted significant attention from Congress, with the Senate Government Affairs Committee and Senate Commerce, Science, and Transportation Committee holding hearings on unapproved aircraft parts in May 1995[16] and July 1996,[17] respectively.

FORMATION, MEMBERSHIP, AND OBJECTIVES OF THE COALITION

In February 2024, leaders from across the aerospace industry in the U.S. and Europe launched the Aviation Supply Chain Integrity Coalition ("the Coalition") to help prevent unauthorized propulsion parts from entering the aviation supply chain and strengthen the supply chain's overall integrity. Members of the Coalition include senior representatives from:

AIRBUS · American Airlines · BOEING · DELTA

GE Aerospace · SAFRAN · StandardAero · UNITED

> Co-chaired by former NTSB Chairman Robert L. Sumwalt and former USDOT Deputy Secretary John D. Porcari, members of the Coalition met biweekly over nine months. There were dozens of additional meetings by members and Coalition staff to interview subject matter experts, discuss challenges and opportunities to enhance the safety of the supply chain, and deliberate the recommended actions in this report.

SCOPE OF THE COALITION

The Coalition's work focused primarily on preventing SUPs in the aviation propulsion supply chain due to the critical role the engine and its related parts play in flight safety. The vastness and structure of the propulsion supply chain (manufacturers, suppliers, and brokers) and the MRO ecosystem (the large network of independent MROs, airline MROs, OEM MROs) make it a target for bad actors – those individuals or organizations that intentionally perform fraudulent or falsifying actions.

However, the recommended actions in this report could be considered broadly for other parts of the aerospace supply chain. Vendor accreditation, document traceability and verification, and part traceability can all enhance the integrity of other aspects of aviation supply chains.

The Coalition's research process and recommendations are the result of information shared voluntarily by subject matter experts from across the industry. Throughout the research process, the Coalition took significant precautions to prevent the release of proprietary or otherwise competitively sensitive material.

The Coalition, through legal counsel, developed and implemented anti-trust guidelines for participating in the Coalition's activities, including meetings and communications. The goal was to help participants avoid activity that could violate – or even appear to violate – antitrust laws. These guidelines were shared in writing with all participants prior to each meeting, and a verbal anti-trust statement was read at each Coalition meeting.

"Through this coalition, we will work to find lasting solutions that the industry can adopt to improve the overall integrity of the aviation supply chain,"

- JOHN D. PORCARI, CO-CHAIR -

"We were able to stop a rogue actor and quarantine the parts last year thanks to swift action from the aviation industry, but more is needed to stop anyone who tries to take a shortcut in the future,"

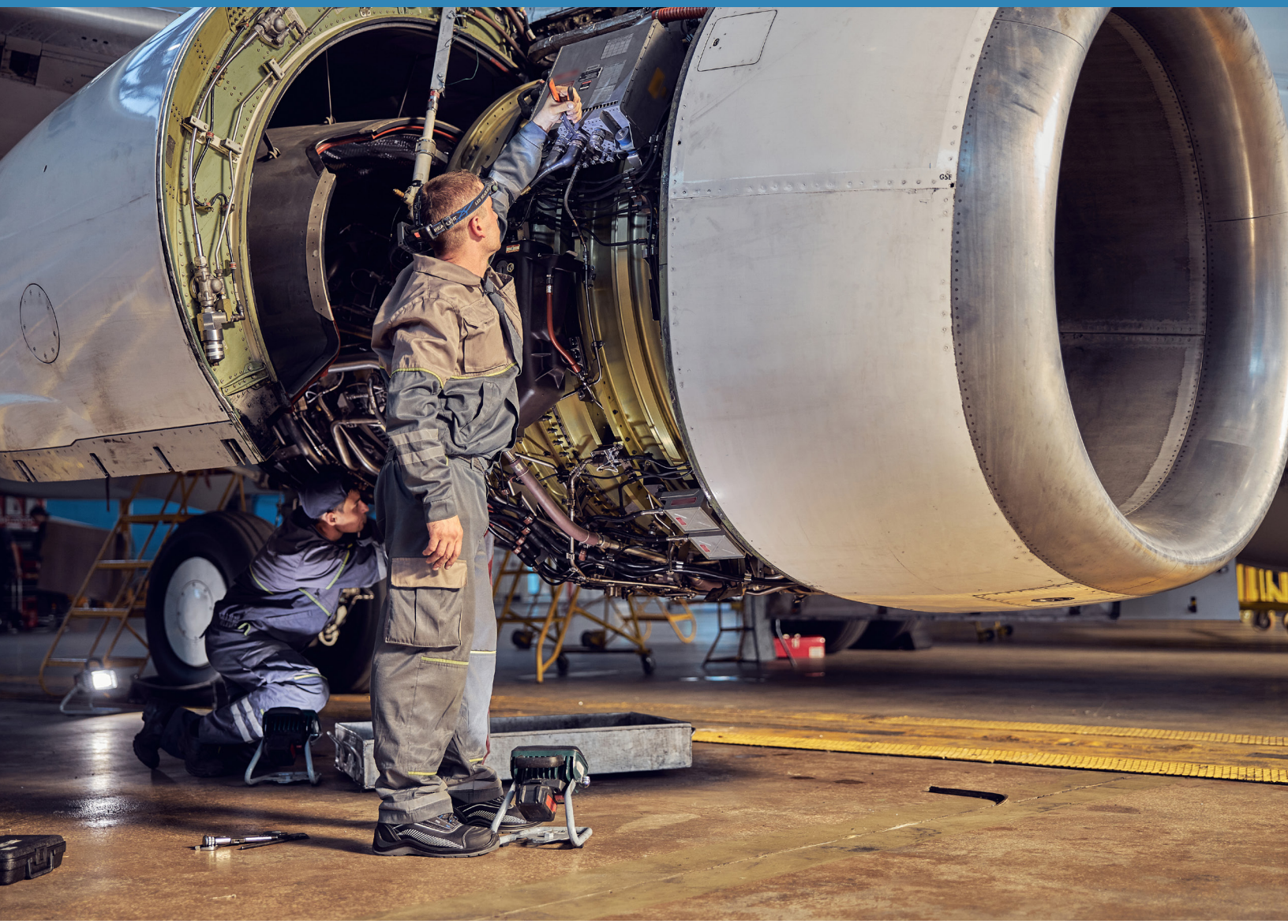
- ROBERT L. SUMWALT, CO-CHAIR -

AEROSPACE PARTS DOCUMENTATION REQUIREMENTS

Proper documentation plays a critical role in validating the provenance of aircraft parts, and both FAA and EASA provide regulatory guidance on using and completing Authorized Release Certificates (ARCs). In the US, this form is designated as FAA Form 8130-3, and in the EU as EASA Form 1. ARCs are used to demonstrate domestic airworthiness approval, approval for the return of service of products and articles, and export airworthiness approval of products and articles. [18]

1. Approving Civil Aviation Authority/Country: FAA/United States	2. **AUTHORIZED RELEASE CERTIFICATE** FAA Form 8130–3, AIRWORTHINESS APPROVAL TAG				3. Form Tracking Number:
4. Organization Name and Address:					5. Work Order/Contract/Invoice Number:
6. Item:	7. Description:	8. Part Number:	9. Quantity:	10. Serial Number:	11. Status/Work:
12. Remarks:					
13a. Certifies the items identified above were manufactured in conformity to: ☐ Approved design data and are in a condition for safe operation. ☐ Non-approved design data specified in Block 12.			14a. ☐ 14 CFR 43.9 Return to Service ☐ Other regulation specified in Block 12 Certifies that unless otherwise specified in Block 12, the work identified in Block 11 and described in Block 12 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.		
13b. Authorized Signature:	13c. Approval/Authorization No.:		14b. Authorized Signature:		14c. Approval/Certificate No.:
13d. Name (Typed or Printed):	13e. Date (dd/mmm/yyyy):		14d. Name (Typed or Printed):		14e. Date (dd/mmm/yyyy):
User/Installer Responsibilities					
It is important to understand that the existence of this document alone does not automatically constitute authority to install the aircraft engine/propeller/article. Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensures that his/her airworthiness authority accepts aircraft engine(s)/propeller(s)/article(s) from the airworthiness authority of the country specified in Block 1. Statements in Blocks 13a and 14a do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.					
FAA Form 8130–3 (02–14)					NSN: 0052-00-012-9005

Sample FAA Form 8130-3 for airworthiness approval when issued at a distributor facility (courtesy FAA[30]).

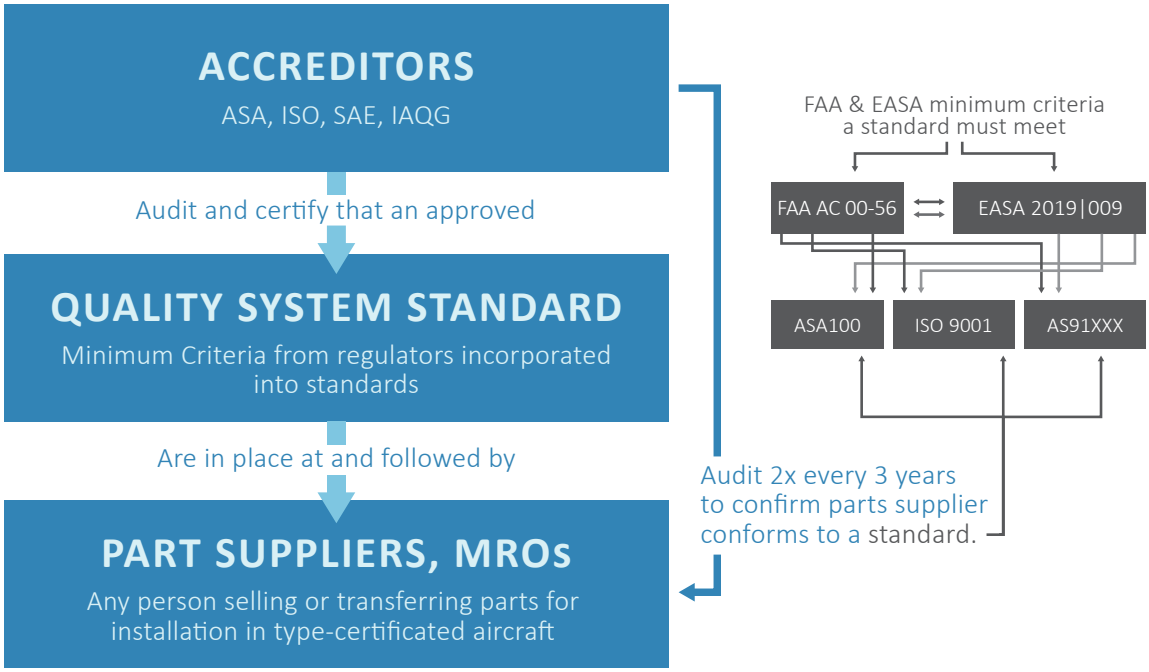


ARCs contain vital information for airlines and maintenance organizations, and matching up information contained on a certificate with the physical part is key in validating the authenticity of a received part. **Certificates for new, used, or repaired parts may only be issued by:**

- A repair station certified under 14 CFR Part 145;
- The holder of a U.S. air carrier certificate under 14 CFR Part 121 or 14 CFR Part 135 with an approved continued airworthiness program; or
- A production approval holder.

The FAA has authorized the use of electronic form 8130-3s since 2009 (Order 8130.21G[19]). However, the adoption of digital ARCs across the industry remains slow, with most ARCs being paper. Increased digitization can provide the ability to detect falsified signatures and other elements of parts documentation, enabling the ability to check the validity of signatures, part number, or other key field required to be filled out in an ARC.

VOLUNTARY INDUSTRY DISTRIBUTOR ACCREDITATION PROGRAM AND INTERNATIONAL EQUIVALENTS



In 1993, the FAA endorsed establishing voluntary oversight of distributors for civil aircraft parts rather than mandatory federal regulation. FAA defines a distributor as "any person selling or transferring parts for installation in appliances or type-certificated aircraft, aircraft engines, or propellers."[20] The FAA in 1995 created a task force of representatives from a wide array of industry organizations[21], which ultimately prepared for the FAA's consideration a draft Advisory Circular (AC) on industry oversight of distributors, among other actions related to addressing SUPs.

In 1996, the FAA published Advisory Circular (AC) 00-56, Voluntary Industry Distributor Accreditation Program ("VIDAP"). This established third-party accreditation of distributors. This program was developed to determine which distributors meet the quality elements of AC 00-56.

The FAA has continued to update AC 00-56 regularly—in 2002, AC 00-56 was updated with Revision A to reflect changes in the accreditation renewal cycle. In 2015, AC 00-56 was updated with Revision B to reflect changes in regulatory requirements.

Most recently, in April 2024, AC 00-56 was updated with Revision B Change 1, to reflect the removal of the Transonic TAC-2000 standard as an acceptable quality system. The Coalition understands the FAA is now examining potential further changes to AC 00-56.

As of the April 2024[22] update to Advisory Circular (AC) 00-56B, the FAA has accepted three Accreditation Organizations and their Quality System Standards under the Voluntary Industry Distributor Accreditation Program:

FAA Accepted Voluntary Industry Distributor Accreditation Program Organizations

Quality System Standards Organization	Acceptable Quality System Standard
Aviation Suppliers Association (ASA)	ASA-100
International Organization for Standardization (ISO)	ISO-9001
International Aerospace Quality Group (IAQG)	AS9100, AS9110 and AS9120 (EN9100, EN9110 and EN9120)

The EU has adopted similar procedures related to quality management system standards. On August 14, 2018, the European Commission (EC) issued Commission Regulation 2018/1142 requiring EASA Part 145 organizations—that is, aircraft maintenance and repair organizations—to "establish procedures for the acceptance of components, standard parts and materials for installation to ensure that components, standard parts and materials are in satisfactory condition and meet the applicable requirements."[23]

Subsequently, on March 28, 2019, EASA issued Decision 2019/009/R, implementing EU 2018/1142 and updating the acceptable means of compliance (AMC) and guidance material (GM) to officially recognize four quality management systems for Part 145 suppliers:

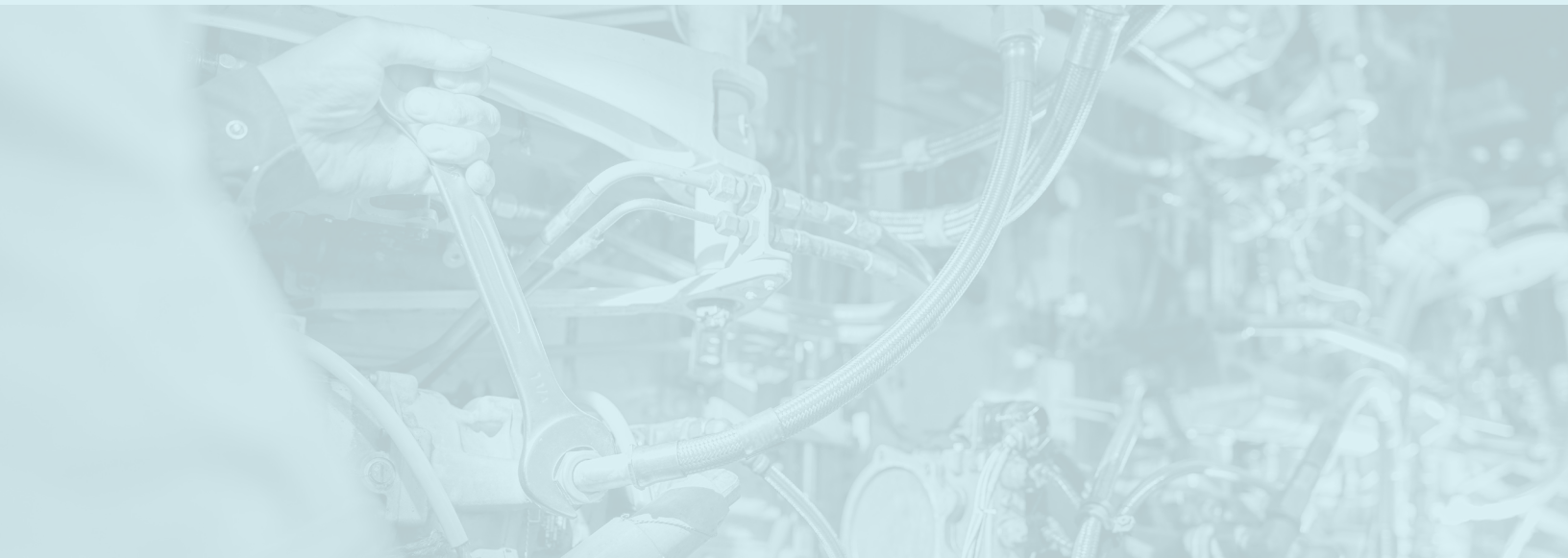
EASA Recognized Quality Management Systems

Quality System Standards Organization	Acceptable Quality System Standard
Aviation Suppliers Association (ASA)	ASA-100
International Aerospace Quality Group (IAQG)	EN/AS9120 and listed in the OASIS[24] database
European Aviation Supplier Organization (EASO)	EASO 2012[25]
U.S. Federal Aviation Administration (FAA)	AC 00-56

The Coalition strongly supports both the FAA's Voluntary Industry Distributor Accreditation Program, and EASA's Quality Management System Standards, which the Coalition firmly believes helps improve aviation safety by ensuring that third-party accreditors provide regular quality auditing of parts distributors.

That said, the Aviation Supply Chain Integrity Coalition has developed several recommendations to drive further improvements to the aviation supplier vendor accreditation systems, which are more fully discussed later in this report.

Research Methodology



RESEARCH DESIGN

From the outset of the Coalition's founding and the research process, the Coalition sought to incorporate feedback from a wide range of industry participants. As detailed below, the Coalition's research phase was structured to primarily encompass two means of feedback and dialogue with industry members to identify gaps and challenges in existing processes to prevent and detect SUPs in the aerospace supply chain, and identify potential recommendations and solutions to help address the problem. The first was a written assessment provided to subject matter experts (SMEs) in order for Coalition members to receive feedback on a consistent set of questions from across organizations and be able to compare answers. The second step included detailed on-the-record interviews with a subset of assessment respondents. In addition to these two measures, the Coalition conducted additional discussions with organizations that received requests for SME assessment responses as well as others.

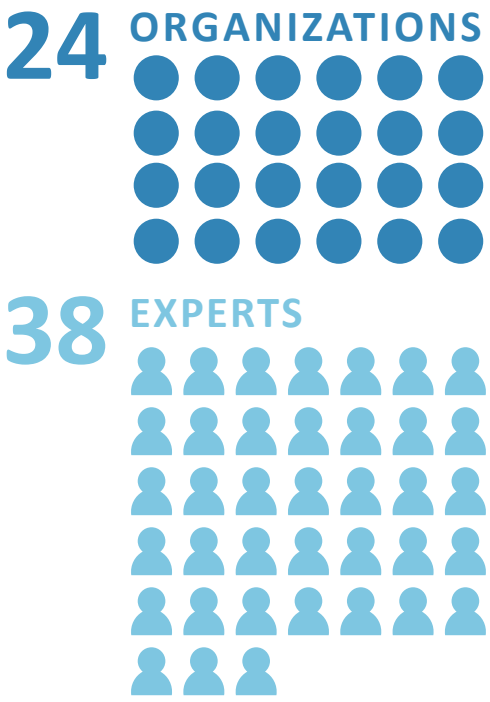
DATA COLLECTION METHODS

Assessments

As the first major step in the research process, the Coalition provided assessments—a list of survey questions—to 58 SMEs from 36 organizations representing a wide cross-section of the aerospace industry, including engine OEMs, engine MROs, parts brokers, industry associations, engine lessors, audit agencies, air carriers, airframe manufacturers, and accreditation organizations.

The SMEs identified to receive assessments were comprised of individuals and organizations suggested by Coalition members, recommended by others in the industry, identified by Coalition staff, and individuals who reached out to Coalition members following its launch. The Coalition also sought feedback from the broader industry, including by issuing open calls to industry experts at events such as the 2024 FAA-EASA International Aviation Safety Conference.

The Coalition ultimately received responses from 38 individuals representing 24 organizations, a response rate of 67 percent. Each of the SME Assessments were provided to Coalition members, while ensuring that any information a company or SME designated as proprietary or sensitive was withheld from distribution.



SMEs were provided questions developed by Coalition members in cooperation with Coalition staff, with the particular set of questions provided to each SME modified depending on the type of organization an SME represented. These included, among others:

- Can you classify/characterize the types of unauthorized parts most likely, in your opinion, to be injected into the parts ecosystem?
- What is your company's process for qualification of a vendor?
- What is your process for receiving parts? How is the documentation reviewed and how do you deem them acceptable for installation?
- How confident are you that your current audit process will lead you to find companies that are providing false certification on parts?
- Do you provide to your customer means of verification of Airworthiness Documents integrity/validity? Or did you get from your OEM supplier means of verification of AW document integrity/validity? If yes, describe it.
- In your view, how can we best improve traceability of parts, including through the use of technology, to prevent suspected unapproved parts from entering the supply chain?

A full list of companies and organizations that provided SME assessment responses is included in Appendix B.

Interviews

After receiving completed assessments from Subject Matter Experts (SMEs), the Coalition's co-chairs and staff carried out a series of structured interviews with a select group of these experts. The selection was made to include a diverse range of industry professionals and those who exhibited substantial expertise concerning Suspected Unapproved Parts (SUPs) issues, which were highlighted during the assessment phase. This approach ensured that the insights gathered were both comprehensive and directly relevant to addressing the identified challenges.

In addition to these formal interviews, the Coalition also engaged in regular, more informal discussions with both the organizations that submitted assessment responses and other entities within the aerospace and technology sectors. These meetings were instrumental in enriching the Coalition's understanding and further informing its research and subsequent recommendations.

A total of six formal interviews were conducted with SMEs. A complete list of the companies and organizations whose representatives were interviewed can be found in Appendix B of this report.

In addition, the Coalition provided updates to regulators at both FAA and EASA on the status of our research and recommendations.

On-the-Ground Research

Throughout the research process, the Coalition reviewed current processes and best practices that help combat SUPs that could be more widely adopted. As part of this effort, the Coalition also visited Delta Air Lines' TechOps' facility at Hartsfield-Jackson Atlanta International Airport. The all-day visit included briefings on the company's process for receiving and inspecting parts. This on-the-ground experience provided additional opportunities for members to deliberate recommendations and receive feedback from those directly responsible for preventing the introduction of SUPs in the course of their daily work.

COALITION MEETINGS

Throughout the Coalition's research and report writing phases, Coalition members held regular biweekly meetings to hear from industry experts, discuss findings from the research phase, and deliberate recommendations. Members also held an in-person Coalition meeting during a visit to Delta TechOps in Atlanta. Additional working-level and weekly staff meetings, along with special-emphasis meetings, occurred during the coalition's nine months of work. The meetings and additional contributions represented a significant amount of time invested by members and others in the Coalition's work.

Findings and Recommendations

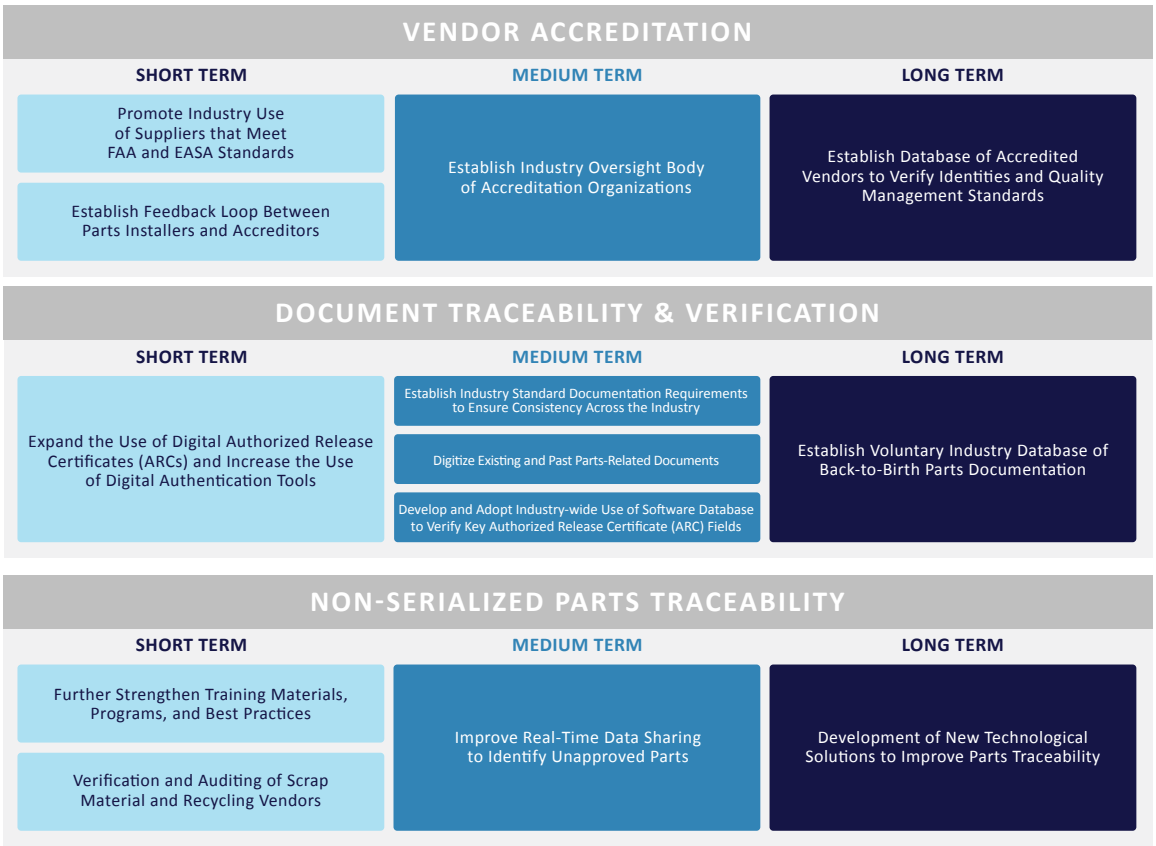
OVERVIEW

The Aviation Supply Chain Integrity Coalition, after robust research and discussion, has developed the following **13 recommended actions** industry can take to prevent the introduction of SUPs into the aviation propulsion supply chain.

The recommended actions are grouped in three categories:
1. Vendor accreditation,
2. Documents traceability and verification, and
3. Non-serialized parts traceability.

Within each of these three categories, the Coalition developed recommendations that industry should strive to implement in both the **short-term (12 – 24 months),** the **medium-term (within the next 5 years),** and the **long-term (over 5 years)** to prevent SUPs entering the aviation propulsion supply chain.

RECOMMENDED ACTIONS



> The recommended actions are performance-based and technology-agnostic, allowing companies in the aerospace industry flexibility in achieving the outcome. There is no single recommended action that can prevent bad actors from committing fraud in the marketplace but, taken together, the Coalition firmly believes that the actions identified in these recommendations will increase aviation safety and reduce the risk of fraud in the aviation parts supply chain. These recommended actions could also be considered broadly for other parts of the aerospace supply chain.

VENDOR ACCREDITATION

Findings

The Coalition strongly supports both the FAA's Voluntary Industry Distributor Accreditation Program and EASA's Quality Management System (QMS) Standards, and believes that the rigorous requirements, audits, and training standards that each of these accreditation programs require reduce the risk of fraud in the marketplace and contribute to the overall improvement of aviation safety.

In large part, the Coalition's recommendations in this area serve to support and expand the use of these accreditation programs, focusing on collectively sharing information and prioritizing companies willing to meet appropriate standards. There are, however, several specific improvements the Coalition believes can improve the vendor accreditation ecosystem and help reduce risk in the aviation supply chain, including:

- Promoting greater industry utilization of accredited parts distributors;
- The establishment of a feedback loop between parts installers and accreditors;
- The creation of an Industry oversight body of accreditation organizations; and
- The creation of a database of accredited vendors in order to verify identities and their use of quality management standards.

Note: The term "vendor" used in this document represents all parts distributor organizations.

Short-Term Actions

RECOMMENDATION #1:

Promote Industry Use of Parts Distributors that Meet FAA and EASA Standards

The Coalition recommends that air carriers, MROs, propulsion OEMs, and other industry participants at all levels of the aerospace supply chain seek to primarily utilize distributors accredited under FAA AC 00-56B or ED2019/009/R when sourcing parts for placement on an aircraft. Utilizing accredited distributors will help ensure that vendors supplying the aviation industry are held to the highest standard when providing parts critical to the safety of our skies.

As discussed throughout this report, both the FAA's Voluntary Industry Distributor Accreditation Program and EASA's QMS Standards serve to increase aviation safety by establishing minimum quality standards for companies which sell parts for installation on engines or aircraft throughout the world. These programs help reduce risk to the aviation ecosystem by requiring parts distributors to ensure proper quality control procedures are in place.

Many of the aerospace QMS systems require distributors to meet and maintain certain requirements—and are subject to regularly scheduled audits to confirm compliance—to retain their accreditation, including (but not limited to):

- Receiving inspection training requirements;
- Supplier approval criteria and the maintenance of supplier quality history;
- Ensuring parts are traceable to a prior source (or if LLP, include back-to-birth (BtB) traceability);
- Material and shelf-life controls; and
- Proper record retention policies.

RECOMMENDATION #2:

Establish Feedback Loop Between Parts Installers and Accreditors

The Coalition recommends that accreditation organizations establish a feedback mechanism to enable the exchange of non-prejudicial supplier information between aerospace parts installers and the accreditation organizations. Such a mechanism would allow parts purchasers to provide non-prejudicial feedback on compliance with the relevant quality process standards and would aid industry in making informed supplier approval decisions. It would also inform future audit activities by the accreditation organizations.

Accreditation organizations currently publish the names of the organizations that maintain accreditation under their standard. For example, the Aviation Suppliers Association (ASA) makes available a searchable database[26] of ASA-100 accredited companies on its website and is designated as the database manager for companies seeking to be accredited to AC 00-56B by the FAA.[27] However, the Coalition found that there is no organized means across accreditation organizations for companies to report concerns or raise questions that may be raised regarding a specific parts distributor.

This feedback mechanism is envisioned to function similar to the process used by the Coordinating Agency for Supplier Evaluation (C.A.S.E.), a nonprofit alliance of air carriers and aviation repair stations dedicated to exchanging information on repair station performance in a manner that provides antitrust protections, and which helps aviation organizations make informed vendor approval decisions.

C.A.S.E. functions as both an information exchange and as an auditing entity for repair stations—namely those

REC. 2 CONT.

facilities which perform maintenance, preventative maintenance, or alteration on aircraft, engines, propellors, or other components. Similar to the accreditation organizations under FAA AC 00-56B and ED2019/009/R, C.A.S.E. has developed and accredits aircraft repair stations to its voluntary C.A.S.E. standards (1-A and 2-A), helping to provide an additional layer of safety to the aviation ecosystem.

A core function of the C.A.S.E. organization and benefit to its members is the exchange of non-prejudicial supplier data, a function that the Coalition believes should be incorporated into the practices and procedures of the FAA AC 00-56B and ED2019/009/R aviation supplier accreditation organizations.

Any feedback mechanism should be implemented in a manner that does not violate antitrust laws and conforms with appropriate EU data privacy laws.

CASE STUDY: AMERICAN AIRLINES

American Airlines envisions an organization comprised of air carriers that provide onsite auditing of parts suppliers that voluntarily elect to be an active members of the organization. This organization would develop a standard for parts suppliers to meet and should also include criteria to evaluate issues discovered during the respective air carrier's receiving inspection process.

Upon successful completion of an audit, the parts supplier would be listed as active in this organization's database, indicating they met the standard. When an air carrier has a need for a new parts supplier, part of the initial consideration would include a review of the data obtained from this organization.

This provides benefits to the members of the oversight organization as we would establish a direct line of communication and interaction with many, if not all the parts suppliers we utilize. This reinforces the "know your supplier" concept. In addition to building this rapport, the end users would have direct access to the parts suppliers' facilities and firsthand knowledge of how each individual part supplier conducts business, building our confidence in the final product and the health of the aviation ecosystem.

Medium-Term Action

RECOMMENDATION #3:

Establish Industry Oversight Body of Accreditation Organizations

The Coalition recommends that the aviation industry work to establish an industry-driven oversight body to conduct regular and appropriate oversight, observation, and audits of each accreditation organization to ensure that accreditation and continuous monitoring audit processes meet the necessary standards.

The Coalition understands that at least one organization, the International Aerospace Quality Group (IAQG), through their Industry Controlled Other Party (ICOP) Scheme, provides for industry oversight of their quality management system to ensure best practices are met by their auditors. This could be an efficient way of providing additional oversight.

The Coalition believes that supplemental industry oversight and more frequent observation and audit of accreditation organizations would increase aviation safety. Given a lack of regulatory authority, such an industry-led oversight body will require the active collaboration and consent of the accreditation organizations.

As noted earlier in this report, on April 23, 2024, the FAA announced the removal of Transonic Aviation Consultants—the accreditor that granted certification to AOG Technics—as an accreditation organization under AC 00-56B after observing two audits conducted by Transonic in January 2024. In an Information for Operators (InFO) notice, the FAA noted that "processes and procedures described in AC 00-56B were not followed in their entirety and determined that Transonic was not in compliance with the program".[28]

Long-Term Action

RECOMMENDATION #4:

Establish Database of Accredited Vendors to Verify Identities and Quality Standards

The Coalition recommends the establishment of an electronic universally accessible database of accredited vendors, through which prospective parts purchasers can verify and review accreditation certifications, recent audits, and the relevant contact information of key supplier personnel. The compilation of this data can form the basis for "know-your-customer" (KYC) requirements—similar to the standard used in the financial services industry to verify customers and discern risk and financial profiles.

Today, many aviation industry organizations have established their own internal vendor screening processes. It is the Coalition's view that a single portal which industry participants can utilize to view a variety of authentication data will reduce the risk of fraudulent actors in the marketplace and increase efficiencies in the vendor verification process globally.

Such a database would build upon the existing FAA AC 00-56 database maintained by ASA, and the Online Aerospace Supplier Information System (OASIS) databases, and provide a single, secure, portal for which aviation parts purchasers can reference to verify and authenticate accredited parts distributors. This database should incorporate key information such as an organization chart of key company individuals, including the managing individual responsible for the organization's safety and quality functions, and the lead responsible for the organization's quality management system.

Recognizing that bad actors, as in the AOG Technics case, utilize publicly available information about vendors and employees to fool buyers and sell parts using fraudulent documentation, such a system must be designed to provide screened, verified information that provides confirmation to buyers rather than exposing proprietary information (order numbers, internal tracking numbers, etc.) that would enable bad actors to produce fraudulent documentation that may more easily be passed off as authentic.

In practice, the Coalition believes that the organization or entity that manages this database would also serve to verify and authenticate vendors entry into the database, while also ensuring compliance with the relevant laws and regulations, especially privacy.

DOCUMENT TRACEABILITY AND VERIFICATION

Findings

Documentation plays a critical role in tracking parts in the aviation supply chain, and maintaining the industry's commitment and focus on safety requires a robust process by companies to correctly track, inventory, and validate paperwork to follow manufacturing and maintenance procedures.

Upon issuance of a certificate of conformance or airworthiness (FAA Form 8130-3 or EASA Form 1), new aircraft and engine parts are deemed genuine, and can be traded freely on the marketplace. Given the inherent importance of these certificates to the authenticity of the parts they accompany, they remain subject to potential fraud and counterfeiting—as we saw with AOG Technics.

Given the significant risks of SUPs to aviation safety, the Coalition spent a significant amount of time discussing recommendations to improve the authentication, verification, and traceability of documents within the industry.

The aviation industry continues to rely on physical paperwork, which can be both easier to counterfeit and more difficult to process in a timely manner. Several of the Coalition's SME assessment respondents noted that the industry's heavy reliance on paper documentation made investigating and responding to the AOG Technics case more difficult and onerous, and that they began to digitize their paper documentation and employ Optical Character Recognition (OCR) to process their paperwork faster in response to the threat realized from the AOG Technics circumstances.

In many instances, the counterfeit ARCs issued by AOG, included what looked to be fairly accurate depictions of an authorized signature, while other falsified features of the document were disparate—a purchase order number that did not conform to the OEM's practice, or a part number that conflicted with the part the document accompanied.

The Coalition's recommendations in this area seek to increase digital documentation and digital authentication tools across the industry and utilize emerging technologies to reduce the risk of fraudulent airworthiness certificates.

In the Coalition's view, there are several methods that can be employed to utilize technology to improve traceability, and ensure authenticity of documentation, as the Coalition heard from SMEs across the industry, including:

- Expanding the use of digital Authorized Release Certificates (ARCs) and increasing the use of other digital tools to enhance document authentication;
- Establishing industry standard documentation requirements to ensure consistency across the industry;
- Promoting the digitization of existing and past parts-related documents;
- Developing and adopting an industry-wide use of a software database to verify key Authorized Release Certificate (ARC) fields; and
- Establishing a voluntary industry database of Back-to-Birth parts documentation with non-competitive data.

Short-Term Action

RECOMMENDATION #5:

Expand the Use of Digital Key Documents and Increase Digital Authentication Tools Use

While digital ARCs, including FAA Form 8130-3 and EASA Form 1, have been authorized by the FAA since 2009, their broader use remains limited. Further, while certain facets of the industry, including many sales offices and brokerage firms, utilize digital ARCs more regularly—primarily in PDF form—their use may not translate to the records retention or receiving inspection department where critical parts and parts documentation operations occur. Additionally, the use of digital verification and authentication tools remains very limited.

In response to these challenges, the Coalition strongly recommends that all stakeholders within the industry, including MROs, repair stations, air carriers, lessors, and brokers, adopt digital ARCs in as many functions as possible. This shift towards digital documentation is crucial for enhancing the security, efficiency, and traceability of the supply chain.

Furthermore, the Coalition recommends the use of sophisticated digital document verification tools to ensure the authenticity of ARCs. These tools include:

- Encryption algorithms and digital certificates to secure document contents.
- Cryptographic hashing to verify the integrity of document data.
- Digital signatures, which are already proven in fields such as legal, financial, and real estate transactions, to authenticate digital documents and transactions effectively.

These technologies not only help safeguard against forgery and fraud but also promote increased operational efficiency and regulatory compliance. Digital signatures, for instance, offer a scalable solution that can be adapted to meet the needs of both large and small entities within the aerospace industry. By digitizing these documents and employing robust authentication tools, the industry can better secure the integrity of its supply chain and streamline compliance and documentation processes, ultimately enhancing overall operational effectiveness and safety standards.

CASE STUDY: **BOEING**

Boeing is partnering with one of our largest commercial airline customers to pilot the creation of a digitally signed and authenticated version of the 8130-3 Authorized Release Certificate that will be exchanged through digital media. This pilot will provide valuable insights into both the efficiencies and challenges this capability will have on Boeing and our trading partners. We are working across all functions within Boeing to understand how this might impact the roles of our quality, safety, shipping and technical operations. Our industry has depended on being able to trust the authenticity of a signature on a piece of paper with remarkable success over time, but times have changed and we are preparing for a future where there will be immutable evidence of the source and authenticity of documents for parts within our supply chain, continuing to enhance the quality and safety of our industry.

Medium-Term Actions

RECOMMENDATION #6:

Establish Standard for Required Information in Documentation

The development and adoption of industry standard documentation requirements would enhance consistency, uniformity, reliability, and quality across the industry. This will not only reduce variability in how documents are completed and processed but also significantly decrease the risk of fraud if implemented properly. This also facilitates easier compliance checks and regulatory approvals.

The Coalition believes standardization protocols are pivotal for digitization efforts, as they enable seamless integration of digital document management systems across various platforms and use cases. This compatibility is crucial for the effective digital transformation of the industry, allowing for electronic data interchange, improved data accessibility, and enhanced data analytics capabilities.

Additionally, such standardization is likely to drive innovation and improve efficiency within the industry by streamlining operations and supporting the development of new technologies and processes that comply with these uniform standards. This approach ensures that all industry players, from large corporations to smaller enterprises, operate on a level playing field, enhancing overall industry integrity and trust.

RECOMMENDATION #7:

Digitize Existing and Past-Parts Documents

The Coalition recommends that industry work to digitize all parts-related documents, including ARCs, using Optical Character Recognition (OCR) to create a fully digital environment. While newly generated documents will be originated in digital format, there remains a need to digitize older physical documentation.

By implementing OCR technology, the industry can transform printed or handwritten documentation into machine-readable text. This shift significantly accelerates processes involving large numbers of documents by making them more manageable, searchable, and accessible in digital form. OCR facilitates better data analytics by converting documents into formats that can be easily analyzed using modern data tools, while allowing for easier audits as digital documentation can be more quickly accessed and reviewed, enhancing compliance practices and reducing the risk of errors.

The importance of such technology has been underscored by the responses from several SME assessment respondents, particularly in light of recent challenges such as the emergence of fraudulent documentation from AOG Technics. The capability of OCR to quickly digitize and verify documents has proven essential in swiftly addressing and mitigating the risks associated with such fraudulent activities, enabling companies, for example, to quickly search documents potentially related to SUP upon receiving a SUP alert. By adopting OCR and moving towards a digital documentation framework, the industry can ensure greater security, compliance, and efficiency, which are crucial for maintaining high standards and trust across global aviation operations.

RECOMMENDATION #8:

Develop and Adopt Industry-Wide Use of Software Database to Verify Key Document Fields

The Coalition recommends developing a software system or algorithm, potentially hosted through a third party, that can query OEMs, air carriers, and PAH databases of ARCs to electronically validate the data listed in each field on the ARC for accuracy, authenticity, and legitimacy. The proposed solution involves creating Application Programming Interfaces (APIs) to facilitate real-time data querying of ARC fields such as part number, form tracking number, and serial number.

These APIs will enable seamless real-time querying of relevant databases, ensuring that each field on the ARC is consistent and valid. For instance, the system will verify that the part number and serial number match authorized data, the issuance date is within valid limits, and the signatory is an authorized individual.

In addition to real-time validation, the software could potentially log each verification query and its results, creating a comprehensive audit trail. This feature would be invaluable for compliance checks and regulatory reporting, providing a clear and traceable record of all validation activities. Enhanced traceability and accountability will strengthen the overall security and trustworthiness of the supply chain, as stakeholders can confidently rely on the verified data.

The development of these tools should prioritize the security and confidentiality of shared data to avoid antitrust issues, and careful measures should be taken to ensure that data sharing is secure and compliant with relevant regulations. Additionally, the Coalition envisions the system to be designed for interoperability and low barriers to entry, promoting widespread adoption across the industry.

CASE STUDY: GE AEROSPACE

In 2023, GE Aerospace began digitizing more than 18 million MRO records going back to 2015. Today, when an engine has maintenance performed at a GE Aerospace MRO, the Authorized Release Certificate and other key paperwork is digitized. However, digitizing records alone is not enough, as the AOG Technics case demonstrated. Today, GE Aerospace is using AI to examine key areas of the certificate to verify that the data fields are valid and match other records. If discrepancies are detected, the documents and parts receive additional scrutiny. Beginning in late 2024, the company plans to pilot digital signatures to further enhance digital security by proving chain of custody.

The company has also created a source-of-truth database to track GE Aerospace and CFM new-make engine material. Before a GE Aerospace MRO shop purchases or installs new-make material from external parties, a shop uses the database to verify the material has legitimate documentation. This prevents used material that does not show signs of use from being sold as new.

Long-Term Action

RECOMMENDATION #9:

Establish Voluntary Industry Database of Back-to-Birth Parts Documentation

During the research phase, many SME respondents highlighted the value of back-to-birth (BtB) traceability for new parts, in which PAHs provide an airworthiness certificate upon an article being produced under their system. While a long-term effort will require significant coordination across the industry, the Coalition believes in the value of establishing BtB traceability for as many parts as reasonably possible, and has established several suggested principles to inform a voluntary base that could be created to track such parts across the supply chain.

Long term, the Coalition recommends the establishment of a voluntary industry database of digitized ARCs with the goal of achieving BtB traceability for all parts, including non-serialized "standard" parts. The database would provide detailed traceability for parts from production to end-of-life, crucial for ensuring authenticity, safety, and compliance.

The Coalition has developed key principles for the establishment of this database:

- **Protection of Proprietary Information** - The database should ensure the protection of proprietary information by using either a centralized database managed by an appropriate third-party custodian with stringent cybersecurity risk management standards or by implementing an OEM-standardized database. This would allow participants to access necessary and appropriate information while safeguarding sensitive data.

- **Voluntary Participation** - Participation in the database should remain voluntary. This principle respects the diverse capabilities and preferences of industry participants, encouraging wider adoption without imposing mandatory requirements. However, to access the database, you must participate in it.

- **International Accessibility** - The database should allow for international accessibility. This ensures that industry participants from different regions can access and contribute to the database, promoting global collaboration and standardization.

- **Low Barriers to Entry** - The database should maintain low barriers to entry, allowing universal access from interested industry participants regardless of their size. This inclusivity ensures that small and medium-sized enterprises can also benefit from and contribute to the database.

These principles are designed to support the creation of a robust, secure, and inclusive database that enhances the traceability of aircraft parts documentation, and thereby improving overall industry standards for safety, compliance, and authenticity.

PARTS TRACEABILITY

Findings

In the aerospace industry, the primary focus on parts traceability for many years has typically been for life-limited parts (LLP), or parts with a hard limitation on their lifespan, normally given in cycles, hours, or calendar days. LLP are found on both aircraft and aircraft engines, and current aviation regulations require aircraft operators to have a documented understanding of the current lifecycle status of any LLP installed on its engines or aircraft. That said, industry practice has generally developed beyond this regulatory requirement, and most LLP transactions today will require documentation of back-to-birth (BtB) traceability for the entirety of the lifespan of the LLP. By its nature, LLP are typically, but not always, serialized parts which raises the question of how to implement traceability features for non-serialized parts, such as those that were involved in the AOG Technics situation.

Although significant challenges remain for ensuring traceability of non-serialized parts–including constraints such as limited physical space of small parts, the need for extensive engineering and design analysis, and the ability to safely integrate in-service parts into any tracing scheme–the Coalition has identified several recommended actions to close this gap, including:

- Strengthening training materials, programs, and best practices;
- Ensuring the verification and auditing of scrap material and recycling vendors;
- Enhancing coordination between industry and aviation regulators to identify SUPs; and
- The long-term development of new technological solutions to improve parts traceability.

Short-Term Actions

RECOMMENDATION #10:

Strengthen Training Materials, Programs, and Promote Best Practices

While enhanced digitization and strengthened processes will provide greater traceability and validation of parts documentation, physical inspection of parts by experienced, well-qualified technicians remains a fundamental backstop to prevent SUPs from being installed on aircraft and engines. SME assessment respondents consistently identified the importance of upfront and continuing education and training on the parts purchasing, receiving, and inspection processes.

The Coalition thus recommends that the industry work collaboratively to develop best practices and principles for training materials to include for all personnel involved in procurement, receiving inspection, shipping inspection, and material control. Receiving inspectors serve as the last line of defense to prevent SUPs and non-airworthy parts from entering the system and must be highly trained and knowledgeable in inspection techniques and methods used to determine part quality.

The Coalition recognizes and commends the personnel at TAP Air Portugal's MRO who initially identified the CFM56 damper that was provided by AOG Technics that appeared to be worn and was accompanied by forged paperwork identifying the part as new. In this case, the expertise, experience, and the skepticism of the TAP personnel ultimately ensured the safety of our skies.

REC. 10 CONT.

The Coalition recommends that all personnel involved in procurement, receiving inspection, shipping inspection, and material control receive regular and recurrent training on unapproved parts and counterfeit parts and materials. Many OEMs and suppliers already provide these materials and require training of their supply chains (in addition to their own employees) and industry associations similarly make available training materials to their members. Still, given the rising number of retirements among industry technicians and size of the new workforce needed in coming years, the Coalition believes a coordinated effort to ensure parts inspectors and technicians at companies of all sizes receive needed training and materials would support a higher level of training across the industry.

The Coalition is aware of several MROs that utilize only high-qualified, experienced, aircraft maintenance technicians holding an Airframe & Powerplant (A&P) certificate as receiving inspectors, ensuring that only individuals with significant training and hands-on experience are entrusted with ensuring the security of the receiving and inspection process. However, as noted above, over the coming years the industry faces a wave of retirements and need for new personnel that will have less experience than those they replace. While some large firms may be able to promote already experienced personnel from within and have established pipelines for parts technicians, smaller companies with fewer resources may face greater challenges maintaining the same level of expertise. Thus, the Coalition believes this coordinated effort to distribute materials and training can bring benefits among industry firms of all sizes.

RECOMMENDATION #11:

Improve Verification and Auditing of Scrap Material and Recycling Vendors

The Coalition is concerned with the potential of scrap material exiting the ecosystem to be, either accidentally or otherwise, reinserted into the supply chain and used in parts installed on an aircraft. Scrap parts that have been removed from an aircraft or engine after reaching the end of their service life, pose a significant threat of being re-sold. Such parts that are not properly destroyed or mutilated may be reworked or camouflaged to appear as used serviceable material (USM) by bad actors looking to re-sell the material at a significant gain by misrepresenting its quality.

The Coalition recommends that any organization that handles aircraft parts—including parts distributors, air carriers, repair stations, aircraft manufacturers, engine manufacturers, and others—ensure that proper procedures and record keeping practices are in place. This verification should extend both to companies' internal operations as well as third-party vendors that a company may contract with to dispose of scrap parts and material, in order to prevent such material (including non-serialized parts) from entering back into the marketplace disguised as USM. Regular auditing is a tool that should be utilized for third-party vendors to ensure compliance.

REC. 11 CONT.

Scrap material can be disposed of properly in several ways, including:

1. Packaged and mutilated locally;
2. Returned to the customer – Some customers ask for scrap to use for localized training;
3. Retained for internal Repair Development purposes;
4. Retained for internal training purposes;
5. Donated to college/university for training purposes;
6. Donated to a museum;
7. Sent to a broker;
8. Scrapped locally at a Repair Vendor during the repair process; or
9. Returned to an OEM.

CASE STUDY: STANDARD AERO

Standard Aero has developed a procedure for Control of Non-Serviceable Material that covers all of the different paths that scrap material may follow, as described in Recommendation # 11.

Throughout the engine repair process a Unserviceable Material List (UML) is maintained and used as a means to physically audit parts that have been tagged as scrap. The scrap material is then segregated into an area, in which only a few approved employees have access. Once the engine repair process is complete, the majority of the scrap material is then packaged, and sent to a Recycling Vendor for final mutilation. Prior to shipment to the recycling vendor, each part (which is tagged or identified with red paint) is validated against the UML. Once the recycling vendor has completion their task, a Certificate of Destruction is requested to confirm the parts have been completed destroyed.

For the other streams that scrap can be disposed of, the practice is to Vibropeen the part and clearly mark it with "SCRAP – NOT FOT AVIATION USE". This ensures that it is very visible to all and the part cannot re-enter the aerospace ecosystem.

This process and control has proven to be beneficial and has greatly reduced the opportunity to lose track of scrap material and potentially finding a way into the wrong scrap disposal stream.

Both the FAA and EASA encourage manufacturers to establish programs that control scrap and salvageable products and articles as an integral part of their quality management systems, and that several of the Quality Management System Standards (including ASA-100) require distributors to establish documented procedures to mutilate and dispose of scrapped parts. These standards also require the ongoing maintenance of records of all serialized and life-limited parts that are scrapped The Coalition remains concerned, however, that the use of documented procedures and practices remains limited industry-wide, and that a lack of proper care and notation for unsalvageable parts can jeopardize safety. Thus, enhanced verification procedures, combined with a robust and regular auditing process, for companies own operations as well as those of their vendors would provide additional confidence in the proper disposal of scrap parts.

Medium-Term Action

RECOMMENDATION #12:

Improve Real-Time Data Sharing to Identify Unapproved Parts

The Coalition believes there is an opportunity to improve real-time data sharing across the industry to enable a quicker alerting of SUPs. The Coalition's research found leveraging public databases that Civil Aviation Authorities maintain, along with other data sources, would help reduce the time between when SUPs are determined and when key individuals across the industry are informed.

The Coalition recommends the industry works to develop a clear process and clarify roles and responsibilities for all actors (operators, MROs, OEMs, suppliers, vendors, and others) for notifying when SUPs are identified in the supply chain.

REC. 12 CONT.

This process should also establish a timeframe for these actions. Such a process should, as appropriate, also include coordination with law enforcement authorities. The International Civil Aviation Organization's (ICAO) Annex 13 could provide a starting framework to determine roles, responsibilities and timeframes for various parties to report and share information about SUPs. This effort would build on previous work from 1995 when the FAA convened a task force to improve the SUP process.

Long-Term Action

RECOMMENDATION #13:

Develop New Technologies to Improve Parts Traceability

In the long term, the Coalition believes that technological solutions may exist to support the traceability of physically small non-serialized parts. That includes using a digital unique identifier, the use of digital twin technology, and blockchain.

The Coalition heard from a wide range of subject matter experts on each of these potential concepts, many of which remain in the exploratory phase. The Coalition also met with companies that are involved in the development and adoption of these technologies, which hold significant potential to enhance digitization efforts across the industry.

- **Digital Unique Identifier** - Digital Unique Identifier (DUI) technology can potentially enhance aircraft parts tracking and authentication by providing a distinct, tamper-proof identity to each aircraft part, enabling precise tracking throughout their lifecycle. DUI's can incorporate cryptographic elements, making it difficult to replicate, and can be incorporated into automated inventory management systems, streamlining supply chain operations and reducing the risk of fraud and counterfeiting. While a potentially interesting technology, it remains nascent in use by the aerospace industry.

- **Digital Twins** - Digital twins are virtual replicas of physical objects, including aviation parts, engines, or entire aircraft, that can be used to improve their safety, efficiency, and reliability. They are created by combining data, machine learning, and software analytics to create digital models that can update and change in real time. Digital twins allow for real-time tracking throughout their lifecycle, including manufacturing, shipping, installation, maintenance, and decommissioning. It then becomes possible for each part's digital twin to contain detailed and cryptographically secure information about its origin, manufacturing process, and any subsequent modifications, ensuring complete traceability. This technology remains promising, and the Coalition is aware of several aviation industry firms that are exploring its use further, including Airbus, Boeing, GE Aerospace, Safran Aircraft Engines, Northrup Grumman, Rolls-Royce, and others.

- **Blockchain** - Utilizing distributed ledger technology, or blockchain, aircraft parts can be given distinct digital blockchain identities by recording their serial number, transactional data, maintenance records, ARCs, and other valuable data. The Coalition believes that blockchain remains particularly well suited to tracking and authenticating aircraft parts registration but remains concerned with the nascent nature of the technology. That said, we are aware of several entities exploring the use of blockchain technology to track aircraft parts, including an effort by PricewaterhouseCoopers and several airlines,[29] and EASA's VIRTUA project.

CONSIDERATIONS FOR REGULATORY AGENCIES

As previously discussed, these recommendations consist of voluntary, industry-driven actions the Coalition believes will help prevent unapproved parts in the supply chain. The Coalition believes Civil Aviation Authorities should study alternatives for additional supplier accreditation standards Any study should aim to build on the work the Coalition has done to ensure the same standard is met to maintain quality.

CONCLUSION

The Aviation Supply Chain Integrity Coalition represents one of the best traditions in aviation safety: to prevent repeated incidents and mitigate emerging and future threats.

Over the last nine months, the Aviation Supply Chain Integrity Coalition worked to identify and address gaps in the propulsion supply chain. The Coalition's membership strongly believes that a focus on vendor accreditation—including a strong audit component—document traceability and verification, and non-serialized parts traceability is necessary. All 13 recommendations are unanimous.

Taking these recommended actions will maintain the high level of aviation safety that the public has come to expect. But this can only occur if additional members of the aviation community also implement the recommendations outlined in this report. Collective action by additional industry stakeholders—airlines, manufacturers, repair and maintenance organizations, regulatory bodies, and law enforcement—is essential to prevent unapproved parts from entering the supply chain. Together, the industry can mitigate current risk and anticipate future challenges, ensuring the continued safety and trust of the global aviation community.

APPENDIX A:

ASCIC Membership and Biographies

COALITION CO-CHAIRS

The Honorable John D. Porcari

John D. Porcari is a nationally recognized public and private sector infrastructure leader. He most recently served as the Port and Supply Chain Envoy to the Biden-Harris Administration Supply Chain Disruptions Task Force to address supply and demand mismatches that emerged during the pandemic.

As Deputy Secretary and Chief Operating Officer of the U.S. Transportation Department in the Obama-Biden administration (2009-2014), Porcari was directly involved in FAA regulatory and operational issues and the development strategy of the national airspace system. He also guided the department during the grounding of the Boeing 787, allowing personal electronics to remain on but in airplane mode and several other aviation safety incidents.

The Honorable Robert L. Sumwalt

Robert L. Sumwalt is the executive director for Embry Riddle's Boeing Center for Aviation and Aerospace Safety. He previously served as the chairman of the National Transportation Safety Board after being on the board for many years and had support of presidents from both parties for his nominations.

Before joining the NTSB, Sumwalt was an airline pilot for 24 years. He accumulated more than 14,000 flight hours, and he has co-authored books on aircraft accidents and Safety Management Systems. He also has published more than 100 articles on transportation safety and aircraft accident investigation. He earned a Master of Aeronautical Science (with Distinction) from Embry-Riddle Aeronautical University.

COALITION MEMBERS

Frank Haselbach, Senior Vice President Propulsion Engineering, Airbus

As Senior Vice President, Head of Propulsion Engineering, Frank is accountable for the end-to-end integration of all propulsive and non-propulsive powerplants in Airbus Commercial Aircrafts, including APUs, pylons and nacelles. His organisation needs to provide the capability of design, development, certification and continuous airworthiness management of the propulsion and power systems in all commercial products. Furthermore, the role is responsible for the definition and leadership of technical propulsion/ powerplant strategy for Airbus Commercial Aircraft with all internal and external partners as well as driving the relevant technology and industrial capability acquisition programmes.

Frank is a dynamic and accomplished leader with a wealth of operational, strategic and product design & technology experience in aeroengine design. He has operated businesses and worked with customers, teams and suppliers in Europe, Asia and America.

He changed in spring 2021 from the position of Chief Engineer of Large Engines (including all design engineering) at Rolls-Royce plc, to the Airbus Toulouse base to look after propulsion engineering for Airbus.

He is a Fellow of the RAeS and a Visiting Professor for the University of Oxford he also holds a doctorate in mechanical engineering.

Stacy Morrissey, Vice President of Engineering & Quality, American Airlines

Stacy Morrissey is Vice President of Engineering and Quality within the Technical Operations organization where she oversees engineering, quality control, quality assurance, reliability, aircraft configuration management, maintenance programs and technical publications. Previously she served as the Managing Director of Fleet Engineering, responsible for aircraft reliability and performance analysis, maintenance programs and systems and avionics engineering.

Stacy began her career at American 25 years ago as a fleet operations engineer, supporting both the line and the base operations for the Boeing 757, 767 and 777 fleets. During her years at American, she has gained a deep knowledge of technical operations, spending time in Engineering, Regulatory Affairs, Safety, Planning, Quality Assurance, Continuing Analysis and Surveillance Systems and Operational Excellence. Along the way, she has picked up a passion and experience in Safety Management Systems (SMS), quality management, FAA regulations, continuous improvement, reliability, avionics and aircraft systems.

Stacy graduated with a Bachelor of Science degree in mechanical engineering from Texas A&M University and an MBA from the University of North Texas. She's a mother of three active teenagers in Flower Mound, Texas, and spends her time enjoying their various competitions, games, rehearsals and practices.

Kathryn Muhich, Vice President of Planning and Supplier Management, Boeing Global Services

Kate Muhich is the Vice President of Planning and Supplier Management for Boeing Global Services. In this role, Kate is responsible for the overall forecasting, material management, strategy, contracting, and general procurement for Boeing Global Services, a $9.5B spend business. BGS maintains over 6,500 supplier relationships in over 51 countries with all 50 U.S. states represented. The Planning organization is responsible for forecasting and material management within BGS. The Supplier Management organization focuses on establishing supplier relationships and improving supplier performance while providing the best value for customers across Boeing's aftermarket business.

Muhich brings a strong background in Supply Chain and government services to this position. Prior to this position, Kate was the senior director of the U.S. Government Commercial Derivative Aircraft Services organization. She was responsible for the profit and loss, program execution, and sales generation of sustainment solutions to The Boeing Company's U.S. government customers. She has also held multiple Supply Chain and Engineering positions within Boeing Defense and Security.

Muhich holds a Bachelor of Science in Aerospace Engineering from the University of Notre Dame.

David Thompson, Vice President of Engineering, Quality, and Safety, Delta Technical Operations

David Thompson is the Vice President of Engineering, Quality and Safety for Delta Technical Operations. His team of ~1,200 is responsible for the overall management of Delta's fleet of 950 mainline aircraft. Areas of responsibility include Engineering, Technical Services, Reliability, Maintenance Programs, Quality Assurance & Control as well as Safety.

Prior to this David served as Managing Director of Line Maintenance and Maintenance Control. In this role he was responsible for overseeing the US domestic Line Maintenance team of over 3,500 employees delivering industry leading operational performance.
David is a native Georgian and a 25-year Delta TechOps veteran with a passion for driving operational excellence and building upon Delta's unique culture.
He has held numerous positions in operations and engineering with increasing responsibility.
He holds an A&P license and bachelor's degree in Aeronautics from Embry Riddle Aeronautics University.

Phil Wickler, Chief Transformation Officer, GE Aerospace

Phil Wickler is Chief Transformation Officer at GE Aerospace where he has enterprise responsibility for EHS, Quality, Lean Operations, Sustainability Scope 1 & 2 and Transformation.

Most recently, he was the Vice President of Supply Chain, where he led global manufacturing and supply chain operations. Prior to that he was General Manager of the Materials Value Stream within GE Aerospace, where he was responsible for forecasting, demand management, planning, fulfillment, and logistics for the global Supply Chain. He was appointed to that role in January 2018.

Phil joined GE in 1995 on the Technical Leadership program within the GE Lighting business. He progressed through several operations roles, including six sigma Black Belt in assembly and component manufacturing, and as a facility manager. In 2001, Phil began his GE Aerospace career in Commercial Engine Services where he led new product introduction for service product offerings.

Phil graduated from the University of Illinois at Urbana-Champaign with a bachelor's degree in industrial engineering. He also holds a master's degree in business administration from Xavier University. He was a member of the board of directors for the SSAMC and XEOS MRO JVs, as well as President of CFM Materials.

Olivier Secheresse, Director of Certification, Safran Aircraft Engines

Olivier Secheresse is the Director of Certification at Safran Aircraft Engines.

He is in charge of Certification and relationships with Safety Agencies in the Technical Directorate.

Previously, Olivier was during five years Director of Critical Parts Design Offices (for all Safran Aircraft Engines civil and military products), and before that he was part of the team which certified the Leap-1A and Leap-1B engines for Airbus and Boeing as Technical Director of Leap Design Offices Plateau.

Olivier has a 28 years' experience in the field of Propulsion Engineering, for space engines and aircraft engines.

Brent Ostermann, Vice President of Product Assurance and Quality, StandardAero

Brent Ostermann is the Vice President of Product Assurance and Quality at StandardAero. In this role, he is responsible for the company's Product Engineering, Flight Safety, Quality, OEM Technical Relationships, New Product Development, and New Technology Introduction divisions globally.

Most recently, he was the Vice President of Engineering, where he led Product Engineering, Test Cell Facilities Engineering, and Process Engineering. Notably, Brent led the $50 million project to start up StandardAero's operations to perform certification testing for GE in Winnipeg, Canada.

Brent joined StandardAero in 1997 as a propulsion engineer for Pratt & Whitney Canada's PT6A.

Brent graduated with a bachelor's degree in mechanical engineering from the University of Manitoba, where he also received a Certificate in Management. He is registered as a P.Eng in Province of Manitoba. Brent is the Chairman of Manitoba Aerospace and a member of the National Board for Canada's Aerospace Industry and the Red River College Technology Access Center for Aerospace and Manufacturing.

John Wiitala, Vice President of Technical Services, United Airlines

John Wiitala is vice president of technical services for United, one of the world's leading airlines. He is responsible for the technical groups that support United's aircraft configurations, operations, and maintenance. These technical support groups include engineering, inspection, quality assurance, reliability, maintenance programs, technical publications, aircraft records, maintenance training, tooling, aircraft interiors, logistics/innovation, project engineering, and methods and standards.

Prior to this role, Wiitala was managing director of product and service engineering. He joined the company in 1992 and held a number of engineering jobs throughout the organization including director of engineering and managing director of project engineering.

Wiitala began his aviation career in 1988 in project engineering at Aircraft Modular Products in Miami, Florida.

Wiitala received his Bachelor of Science degree in Mechanical Engineering from University of Iowa. He is married and has two children.

COALITION STAFF

David Marten, Executive Director

David has spent nearly a decade leading successful legislative and political strategies at the federal level on issues ranging from transportation, technology, and tax to energy, environment, and natural resources. With bipartisan relationships across the Senate and House of Representatives, David has a record of impacting policy and creating win-win solutions for stakeholders.

David most recently served as Legislative Director for Senator Maria Cantwell (D-WA), Chair of the Senate Committee on Commerce, Science, and Transportation, where he oversaw the Senator's legislative agenda and initiatives on the Commerce, Finance, Energy & Natural Resources, Indian Affairs, and Small Business Committees. Working at the nexus of the Senator's personal and committee offices, he helped deliver hundreds of millions of dollars in federal infrastructure funding for Washington state priorities. As a key member of the Senator's aviation policy team, he helped develop the financial support package for the U.S. commercial aviation industry at the outbreak of the Covid-19 pandemic and led the most significant reform of the federal aircraft certification process since the creation of the Federal Aviation Administration.

Prior to his work in the Senate, David served as Deputy Director of Washington Governor Jay Inslee's D.C. office, serving as one of the Governor's primary liaisons with Congress and the executive branch. He began his D.C. career as a policy advisor to former congressman Denny Heck (D-WA).

Tyler Hardy, Deputy Executive Director

Tyler has spent over a decade leading successful legislative strategies at the federal level on a large variety of issues, and has extensive experience in appropriations, transportation, financial services, tax, agriculture, and energy policy.

Tyler most recently served as Deputy Legislative Director for Senator John Hoeven (R-ND), a senior member of the Senate Appropriations Committee where he oversaw the Senator's legislative agenda related to the Appropriations, Banking, Commerce, and Finance Committees. Tyler is passionate about helping people find solutions to complex policy challenges and has successfully led the passage of several notable bills that were signed into law related to agricultural taxation, agribusiness banking, carbon capture and sequestration, airport infrastructure, and air traffic control reform. In addition, he has worked on major legislative initiatives including the annual appropriations legislation, the Ocean Shipping Reform Act, Infrastructure Investment and Jobs Act, FAA Reauthorization Act, Agriculture Improvement Act, and the Tax Cuts and Jobs Act.

Samantha (Sammi) Wells, Senior Associate

Sammi brings expertise in the transportation, aviation, and commercial sectors, helping manage the day-to-day operations of the Coalition's work. She previously worked as an intern in two congressional offices, assisting with constituent correspondence and legislative research. Most recently, Sammi interned for Senator Jon Tester (D-MT) where she developed research memoranda and analyses on energy, environment, and foreign affairs policy issues.

Sammi received her Bachelor of Art degree in International Relations and Public Policy with a minor in Political Science from the University of Redlands. She is originally from Temecula, California.

Kayla Roberson, Senior Associate

Kayla utilizes her knowledge of aviation, infrastructure, and transportation policy to support the Coalition's work. Previously, she worked in the Texas House of Representatives, where she held roles of Communications Director and Legislative Staffer, overseeing social media campaigns and compiling research and analyses on a host of issues, including transportation and economic development. Additionally, Kayla has prior experience in the transportation sector, most recently working as an intern within the Texas Department of Transportation.

APPENDIX B:

ASCIC Stakeholder Engagement

COMPANIES AND ORGANIZATIONS THAT PROVIDED COMPLETED SME RESPONSES

Accreditation Organizations (2 of 3 solicited)
- Aviation Supplier Association (also classified as an industry association)
- SAE Industry Technologies Consortia (ITC)

Airframe Manufacturers (2 of 2 solicited)
- Airbus SE
- The Boeing Company

Airlines (3 of 5 solicited)
- American Airlines
- Delta Air Lines
- United Airlines

Technology Solutions Providers (1 of 2 solicited)
- Aramid Technologies

Electronic Business Exchanges for Airframe and Engine Parts (1 of 1 solicited)
- Aeroxchange

Engine MROs (5 of 6 solicited)
- AAR Corp.
- GA Telesis
- MTU Aero Engines
- StandardAero
- Delta TechOps

Engine Lessors (1 of 3 solicited)
- Shannon Engine Support

Engine OEMs (2 of 5 solicited)
- GE Aerospace
- Safran Group

Industry Associations (6 of 8 solicited)
- Aerospace Industries Association
- Aeronautical Repair Station Association
- Aircraft Fleet Recycling Association
- Aviation Suppliers Association (also classified an accreditation organization)
- General Aviation Manufacturers Association
- International Air Transport Association

Parts Brokers (2 of 2 solicited)
- AerFin
- CFM Materials

COMPANIES AND ORGANIZATIONS WITH WHOM THE COALITION CONDUCTED FORMAL INTERVIEWS OR OTHERWISE MET WITH TO DISCUSS SUPS

- Aeronautical Repair Station Association
- Aeroxchange
- Airlines for America
- Alitheon
- American Airlines
- Aramid Technologies (SmartCert)
- Aviation Industries Association
- Aviation Suppliers Association
- CFM Materials
- GE Aerospace
- International Air Transport Association
- LocatorX
- SAE ITC

APPENDIX C:

Timeline Leading to the Formation of ASCIC

June 2023: TAP Air Portugal contacted Safran regarding parts for a CFM56 engine that appeared older than represented in the documentation provided by the broker, AOG Technics LTD.

July 25, 2023: FAA SUP investigation finds that AOG Technics sold bushings for GE Model CF6 engines to TAP Maintenance & Engineering, the MRO for TAP Air Portugal.

August 4, 2023: EASA issues a SUP notification to the global aviation community regarding SUPs distributed by AOG Technics.

- In that notification, the agency stated that occurrence reports submitted to EASA indicated that several parts for CFM56 engines distributed by AOG had been supplied with falsified ARCs. The UK Civil Aviation Authority (UK CAA) issues a similar notice the same day.

September 21, 2023: FAA issues an Unapproved Parts Notification regarding its July 25, 2023 findings regarding AOG Technics-sold bushings and recommends industry participants inspect and remove these parts from engines.

December 6, 2023: UK SFO raids AOG Technics founder Jose Alejandro Zamora Yrala's home and reportedly arrests Zamora.

February 22, 2024: Aerospace industry leaders launch Aviation Supply Chain Integrity Coalition to strengthen aviation supply chain against SUPs.

APPENDIX D:

Acronyms

AC—Advisory Circular
AMC—Acceptable Means of Compliance
API – Application Programming Interface
ARAC—Aviation Rulemaking Advisory Committee
ARC—Authorized Release Certificate
ASCIC—Aviation Supply Chain Integrity Coalition
ASA—Aviation Suppliers Association
BAA—Bilateral Airworthiness Agreement
BASA—Bilateral Aviation Safety Agreement
BtB – Back-to-Birth
CAA—Civil Aviation Authority
CAAC—Civil Aviation Administration of China
DOD—Department of Defense (United States)
DOJ—Department of Justice (United States)
DUI—Digital Unique Identifier
EASA—European Union Aviation Safety Agency
EC—European Commission
EU—European Union
FAA—Federal Aviation Administration (United States)
FBI—Federal Bureau of Investigation (United States)
FR—Federal Register
GE—General Electric; GE Aerospace
GM—Guidance Material
ICAO—International Civil Aviation Organization
InFO—Information for Operators
KYC—Know-your-customer
LLP—Life-Limited Part
MRO—Maintenance, Repair and Operations
NTSB—National Transportation Safety Board
OEM—Original Equipment Manufacturer
PAH—Production Approval Holder
PC—Production Certificate
PMA—Parts Manufacturer Approval
QMS— Quality Management System
SDR—Service Delivery Process
SFO—Serious Fraud Office (United Kingdom)
SME—Subject Matter Expert
STC—Supplemental Type Certificate
SUP—Suspected Unapproved Part
TC—Type Certificate
TCCA—Transport Canada Civil Aviation
TSO—Technical Standard Order
UK—United Kingdom
UML— Unserviceable Material List
US—United States of America
USM – Used Serviceable Material
USDOT—United States Department of Transportation

APPENDIX E:

References

1 Hepher , T., Insinna , V., & Shepardson, D. (2023, October 5). Hunt for suspect jet engine parts spurs call for regulation. Reuters . https://www.reuters.com/business/aerospace-defense/hunt-suspect-jet-engine-parts-spurs-call-regulation-2023-10-05/

2 Aircraft parts distributed by AOG Technics. European Union Aviation Safety Agency (EASA). (2023, April 8). https://www.easa.europa.eu/en/domains/aircraft-products/suspected-unapproved-parts/aircraft-parts-distributed-aog-technics

3 FAA Unapproved Parts Notifications - No.: 2023- AAE-EHL-20230801-713. Federal Aviation Administration Unapproved Parts Notifications . (2023, September 12).

4 GE Plans to Form Three Public Companies Focused on Growth Sectors of Aviation, Healthcare, and Energy. GE. (2021, November 9). https://www.ge.com/sites/default/files/GE%20Press%20Release_11092021.pdf

5 Siddharth, P. (2023, September 6). Crucial jet-engine blades among bogus parts supplied by UK firm. American Journal of Transportation (AJOT). https://www.ajot.com/news/crucial-jet-engine-blades-among-bogus-parts-supplied-by-uk-firm

6 Terlep, S., & Katz, B. (2023, October 4). Delta, southwest search for jet engine parts sold with Forged Safety Records - WSJ. The Wall Street Journal . https://www.wsj.com/business/airlines/dodgy-jet-parts-ge-boeing-plane-engines-a3fcbcfd

7 Johnsson, J., Beene, R., Philip, S. V., & Meddings, S. (2023, October 11). Fake parts found on Boeing, Airbus Jets Plague Airlines. Bloomberg.com. https://www.bloomberg.com/news/features/2023-10-11/fake-parts-found-on-boeing-airbus-jets-plague-airlines

8 Oke, J. (2023, December 6). SFO launches Criminal Investigation Into Global Aviation Supplier with dawn raid in London. Serious Fraud Office. https://www.sfo.gov.uk/2023/12/06/sfo-launches-criminal-investigation-into-global-aviation-supplier-with-dawn-raid-in-london/

9 Gemmell, K., & Philip, S. V. (2023, December 6). UK fraud cops make arrest in AOG technics fake airplane parts scandal. Bloomberg.com. https://www.bloomberg.com/news/articles/2023-12-06/uk-fraud-cops-make-arrest-in-aog-technics-fake-airplane-parts-scandal?embedded-checkout=true

10 Johnsson, J., Beene, R., Philip, S. V., & Meddings, S. (2023a, October 11). Fake parts found on Boeing, Airbus Jets Plague Airlines. Bloomberg.com. https://www.bloomberg.com/news/features/2023-10-11/fake-parts-found-on-boeing-airbus-jets-plague-airlines

11 Removal of Transonic Aviation Consultants from Advisory Circular (AC) 00-56B, Voluntary Industry Distributor Accreditation Program. Federal Aviation Administration Unapproved Parts Notifications . (2024, April 23). https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/InFO24004.pdf

12 14 CFR 21.8. https://www.ecfr.gov/current/title-14/chapter-I/subchapter-C/part-21/subpart-A/section-21.8

13 14 CFR 21.9. https://www.ecfr.gov/current/title-14/chapter-I/subchapter-C/part-21/subpart-A/section-21.9

14 Johnsson, J., Beene, R., Philip, S. V., & Meddings, S. (2023a, October 11). Fake parts found on Boeing, Airbus Jets Plague Airlines. Bloomberg.com. https://www.bloomberg.com/news/features/2023-10-11/fake-parts-found-on-boeing-airbus-jets-plague-airlines

15 Beverly Jane Sharkey, The Federal Aviation Administration Suspected Unapproved Parts Program: The **Need to Eliminate Safety Risks Posed by Unapproved Aircraft Parts, 65 J. AIR L. & COM. 795** (2000) https://scholar.smu.edu/jalc/vol65/iss4/6

16 Senate Governmental Affairs Subcommittee Hearing on Aviation Safety. C-SPAN. (1994, May 24). https://www.c-span.org/video/?65352-1%2Faviation-safety#!

17 Senate Transportation Committee Hearing on FAA Safety Issues Part 2. C-SPAN. (1996, July 17). https://www.c-span.org/video/?73720-1%2Ffaa-safety-issues-part-2

18 Speipel, J. (2013, August 1). Procedures for Completion and Use of the Authorized Release Certificate, FAA Form 8130-3, Airworthiness Approval Tag. Federal Aviation Administration. https://www.faa.gov/documentlibrary/media/order/faa_order_8130.21h.pdf

19 "Procedures for Completion & Use Authorized Release Certificate, FAA Form 8130-3, Approval Tag." Federal Aviation Administration, March 25, 2024. https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentid/215194.

20 "Procedures for Completion & Use Authorized Release Certificate, FAA Form 8130-3, Approval Tag." Federal Aviation Administration , March 25, 2024. https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentid/215194.

21 FAA Advisory Circular: Detecting and Reporting Suspected Unapproved Parts. Federal Aviation Administration . (2008, July 22). https://www.faa.gov/documentLibrary/media/Advisory_Circular/21-29C_chg_1.pdf

22 FAA Advisory Circular: Voluntary Industry Distributor Accreditation Program. Federal Aviation Administration. (2024a, April 26). https://www.faa.gov/documentlibrary/media/advisory_circular/ac_00-56b.pdf

23 European Aviation Suppliers Organisation. GOV.UK. (n.d.). https://find-and-update.company-information.service.gov.uk/company/04253028

24 Commission Regulation (EU) No 1321/2014 of 26 November 2014 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organizations and personnel involved in these tasks (OJ L 362, 17.12.2014, p. 1), as last amended.

25 European Aviation Suppliers Organisation. GOV.UK. (n.d.). https://find-and-update.company-information.service.gov.uk/company/04253028

26 ASA-100 Companies. Aviation Suppliers Association. (n.d.-a). https://www.aviationsuppliers.org/ASA-100-Accredited-Companies

27 FAA AC 00-56 Database List. Aviation Suppliers Association . (n.d.-b). https://www.aviationsuppliers.org/FAA-AC-00-56B

28 InFo: Removal of Transonic Aviation Consultants from Advisory Circular (AC) 00-56B, Voluntary Industry Distributor Accreditation Program. Federal Aviation Administration. (2024b, April 23). https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/InFO24004.pdf

29 Blockchain: The future of tracking aircraft parts? Aerospace Tech Review - Technology and innovation news for the aerospace tech industry. (2022, April 24). https://aerospacetechreview.com/blockchain-the-future-of-tracking-aircraft-parts/#:~:text=Aircraft%20parts%20can%20be%20given,regulatory%20requirements%2C%E2%80%9D%20said%20Roboff.

30 FAA Order 8130.21h CHG 1: Procedures for Completion and Use of the Authorized Release Certificate, FAA Form 8130-3, Airworthiness Approval Tag. (2016b, January 11). https://www.faa.gov/documentLibrary/media/Order/FAA_Order_8130.21H_with_chg_1.pdf