

CHROMALLOY

FAA-PMA Parts and DER Repairs



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Director of Airworthiness



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Long live your engine.

PMA Basics

What is Parts Manufacturer Approval (PMA)?

- A two-part approval issued by the FAA.
 - Aircraft Certification Offices (ACO) find **design** compliance
 - Manufacturing Inspection District Offices (MIDO) approve the **production**
- PMA allows companies to produce and sell FAA-approved aircraft articles¹ that are eligible for installation on FAA type certificated products.
 - A PMA is valid until surrendered, withdrawn or terminated.
 - PMA is not transferable. One may sell PMA data to another, but the buyer must get a separate PMA.

¹ Article means a material, part, component, process, or appliance



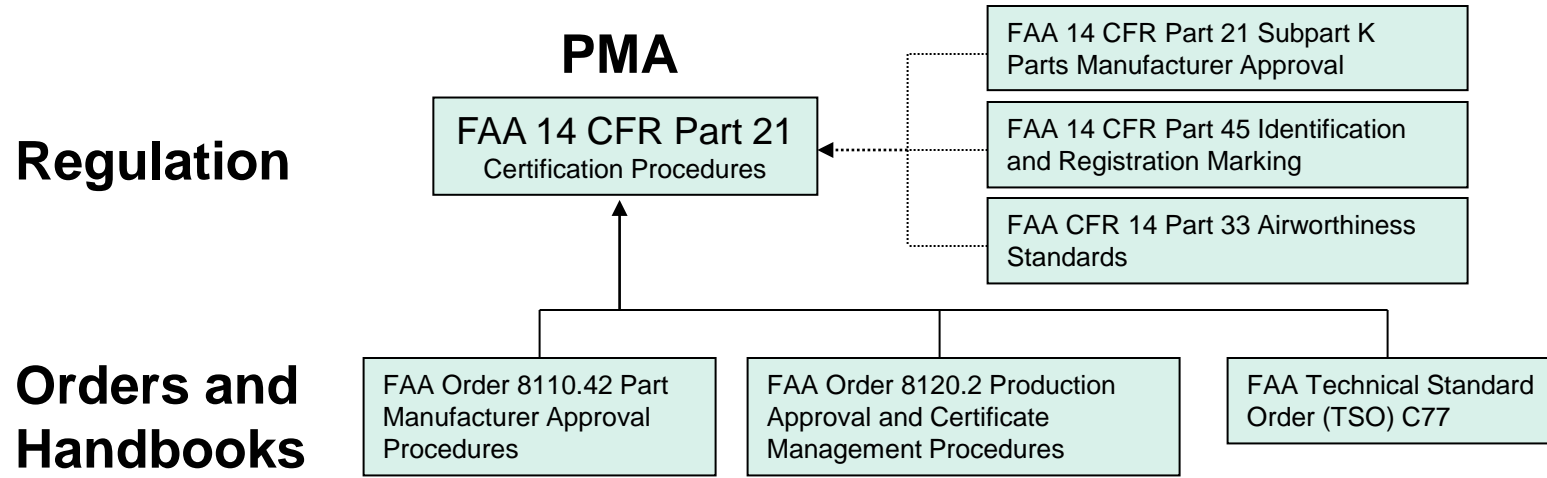
PMA Basics

How are PMAs regulated and approved?

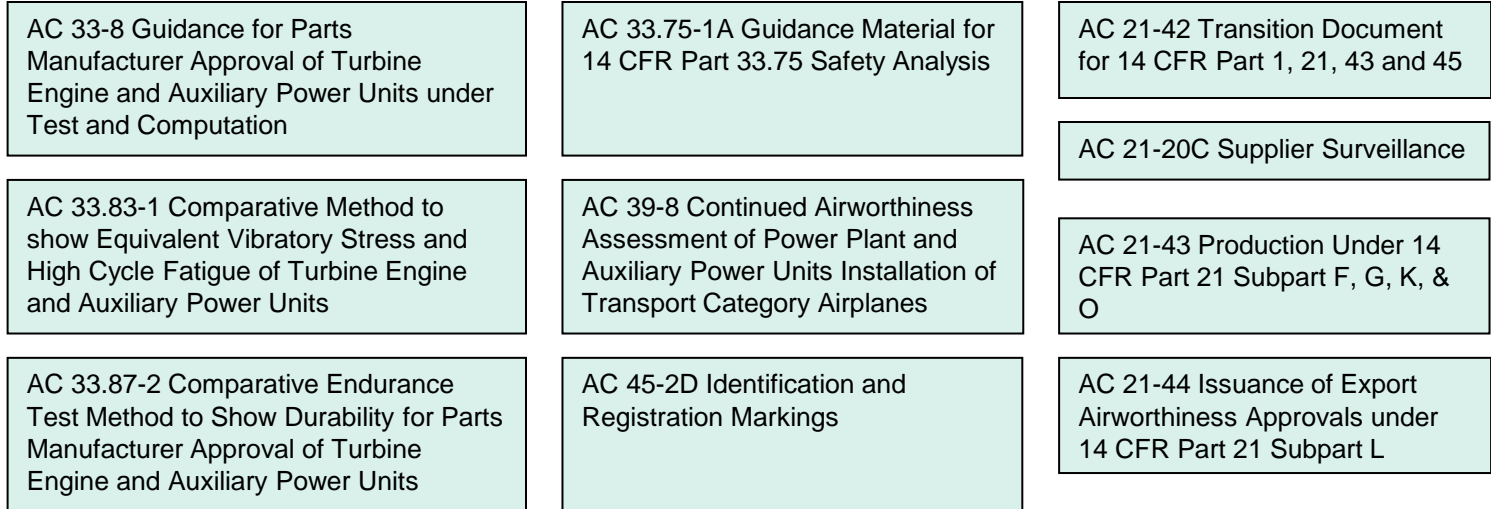
- Long history of successful and safe approvals dating to the 1950s
- PMAs must be produced under an approved Quality System
- PMAs have the same production requirements as Production Certificate holders who produce engines and aircraft
- PMA includes installation eligibility on specific make/model products
- Four PMA Approval Methods
 - Identity with a Licensing Agreement
 - Supplemental Type Certificate (STC)
 - Identity without a Licensing Agreement
 - Test Reports and Computations (T&C)



PMA Development Regulations Chart – Part 33



Advisory Circulars



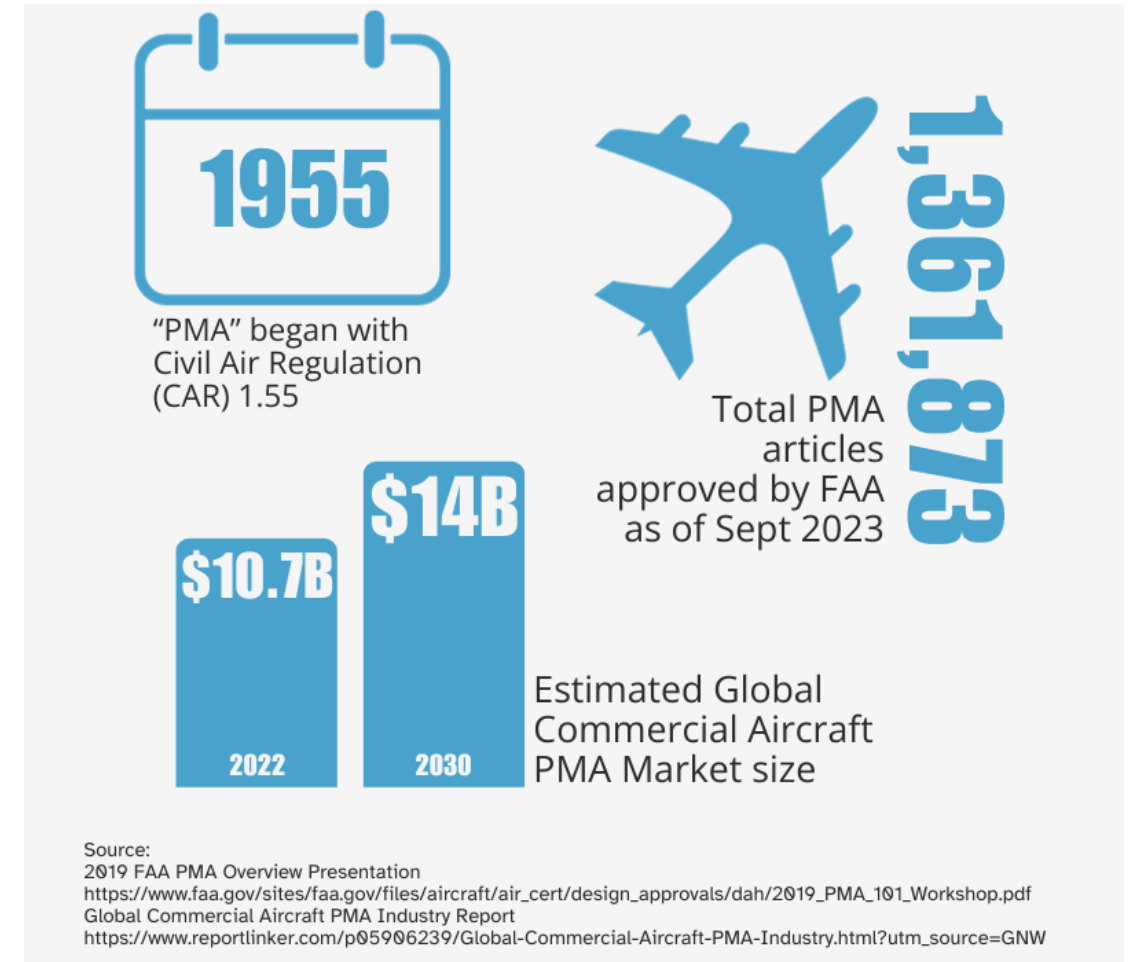
NOTE: Depending on type of part, not all Advisory Circular guidance material may be applicable



PMA for Airlines

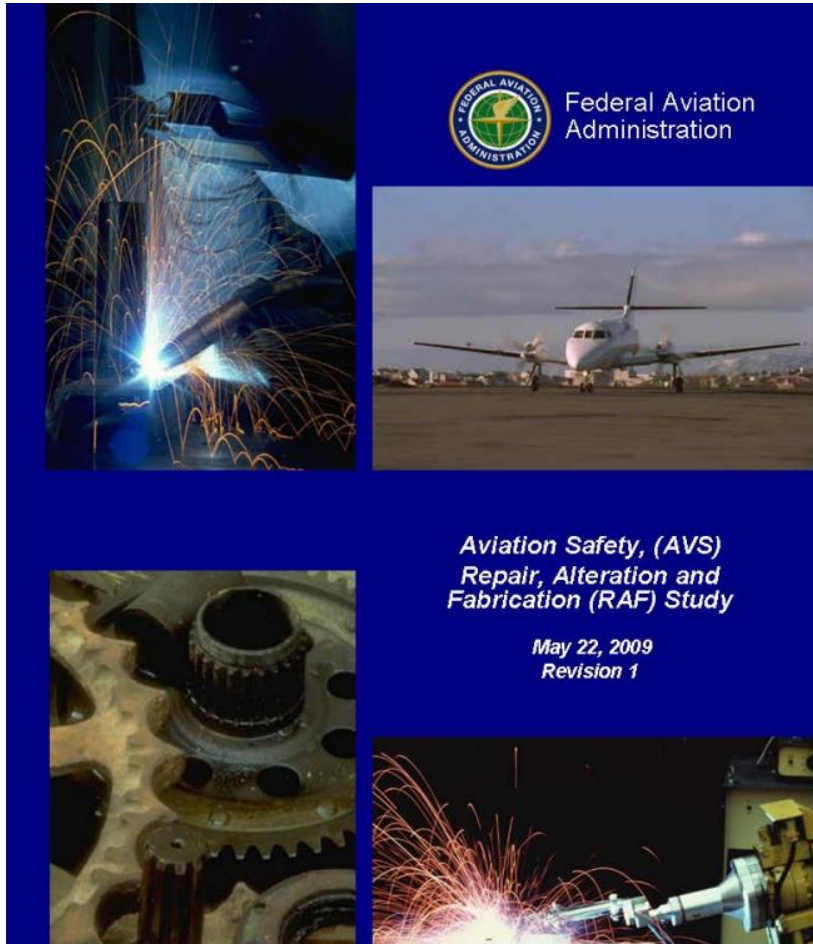
Why airlines utilize PMA parts?

- **Safe** as proven by operational history
- Certified **equivalent**
- **Complementary** to TCH supply chain
- Robust, **mature** suppliers and processes
- **Bilateral** agreements between the FAA and counterpart civil aviation authorities (CAA)



The RAF Report

Aviation Safety (AVS) Repair, Alteration, Fabrication (RAF) Team Study



CONCLUSION 10:

A major driver of the debate between TC/PC holders and non-TC/PC holders over the integrity of repairs and replacement parts is **the economic business competition between them**. That is not likely to change despite any actions taken by the FAA. Regardless, the FAA will take the necessary steps to ensure safety, compliance, and standardization shortfalls are corrected.

<https://www.pmaparts.org/gvt/raftreport.pdf>



IATA Obtains Commitments from OEMs

Agreement/statements focused on enhanced competition and non-discrimination

CFMI Agreement

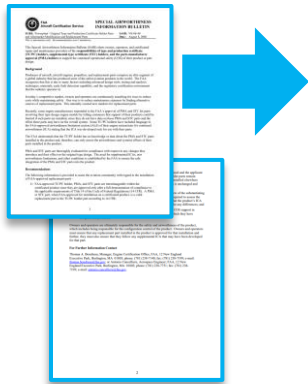
- Will license Engine Shop Manual to MRO facilities using PMA (non-CFM) parts.
- Permits the use of non-CFM parts or repairs by any licensee of the CFM Engine Shop Manual.
- Honors warranty coverage of the CFM components and repairs on a CFM engine even when the engine contains non-CFM parts or repairs.
- Grants airlines and third-party overhaul facilities the right to use the CFM Engine Shop Manual without a fee.
- Sells CFM parts and perform all parts repairs even when non-CFM parts or repairs are present in the engine.

Rolls-Royce and IATA Joint Statement

- RR does not prevent the development of legitimate non-OEM parts or non-OEM repairs by MRO providers and independent parts manufacturers, as long as they are approved by the appropriate airworthiness regulator;
- RR policy is to grant airlines, lessors and MRO providers non-discriminatory access to OEM parts, repairs and support (including access to Rolls-Royce Care);
- RR does not discriminate against airlines, lessors or MRO providers that use non-OEM parts or repairs;
- RR will not insist that airlines or lessors subscribe to Rolls-Royce services.



SPECIAL AIRWORTHINESS INFORMATION BULLETIN



1. FAA-approved TC/PC holder, PMA, and STC parts are interchangeable within the certificated product since they are approved only after a full demonstration of compliance to the applicable requirements of Title 14 of the Code of Federal Regulations
2. Unless stated otherwise as a limitation to an STC, the FAA has determined and the applicant has shown that FAA-approved life limits established for the TC/PC holder parts remain unchanged for those TC/PC holder parts when PMA or STC parts are installed elsewhere within the product.
3. A PMA or STC applicant either shows and states that the product's ICA are still valid with their part installed or provides a supplemental ICA for any differences;
4. TC/PC holders, PMA holders, and STC holders are responsible for the COS support in accordance with the applicable standards for their parts and products which they have designed and produced.

<https://drs.faa.gov/browse/excelExternalWindow/AF4CD7D303D7BA628625749F006AFBC7.0001>

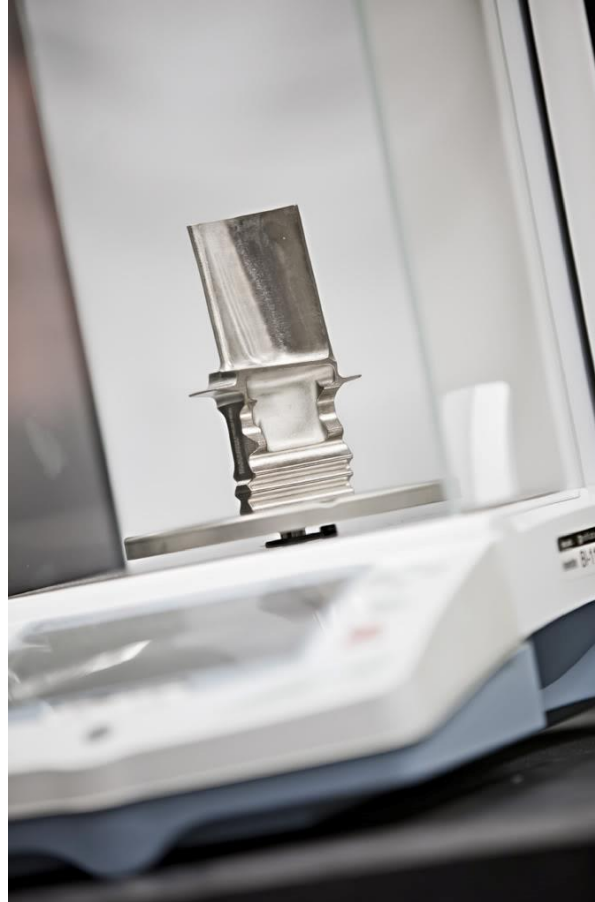


FAA DER Repair Basics

FAA delegation has a long history starting in 1927 with Aviation Medical Examiners. In 1940, the first Designated Engineering representative was appointed.

Types of DERs

- **Company DERs** can act as DER for their employer and may only approve, or recommend approval, of technical data to the FAA for the company.
- **Consultant DERs** are individuals appointed to act as an independent DER to approve or recommend approval of technical data to the FAA.



DER Technical Disciplines

- Acoustical Engineering
- Engine Engineering
- Flight Analyst
- Flight Test Pilot
- Power Plant Engineering
- Propeller Engineering
- Radio Engineering
- Structural Engineering
- Systems and Equipment Engineering



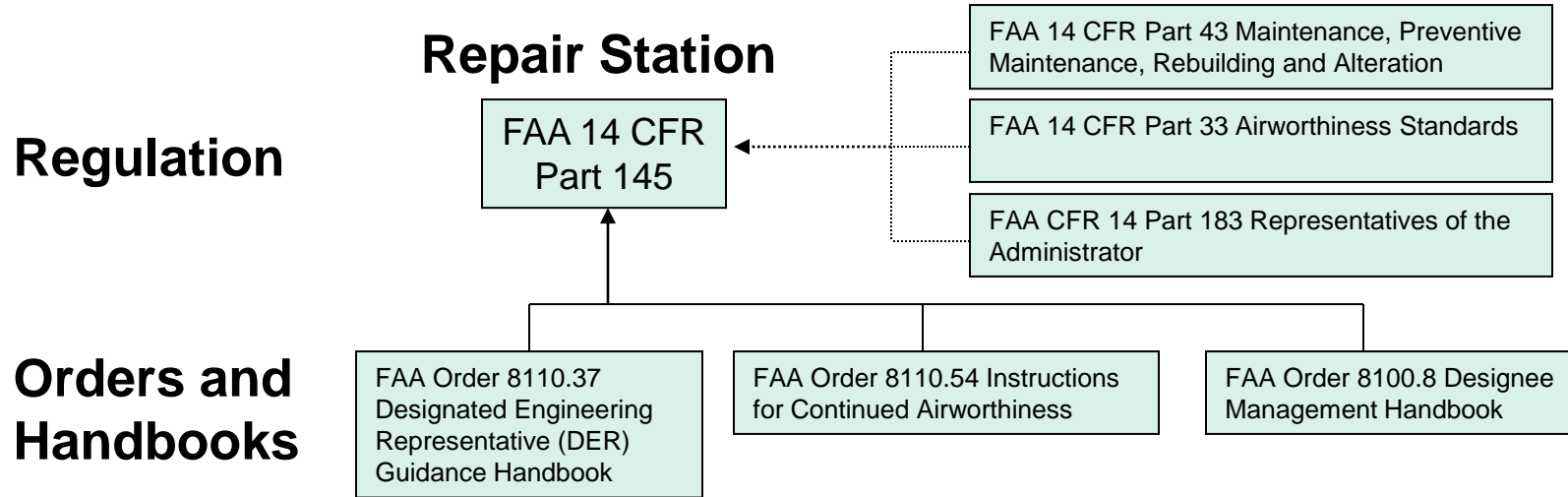
FAA DER Repair Basics

DER Compliance Findings, Multiple Use Repairs, and Performance Rules

- FAA DERs document findings of compliance to airworthiness requirements using FAA Form 8110-3.
- FAA Form 8110-3 may be used for one-time repairs, serial number specific repairs, or multiple use repairs in support of a Repair Specification (RS) approval.
- RS (Repair Specification) DER: Approval as an RS is required for multiple-use major repairs that do not come from the DAH, and do not specifically identify serial numbers of all the products or parts currently in need of the repair. RSs include step-by-step “how to” instructions for performing the repair.
- Repairs preserve the certification basis: Each person maintaining or altering, or performing preventive maintenance, shall do that work in such a manner and use materials of such a quality, that the condition of the aircraft, airframe, aircraft engine, propeller, or appliance worked on will be at least equal to its original or properly altered condition (with regard to aerodynamic function, structural strength, resistance to vibration and deterioration, and other qualities affecting airworthiness).



DER Repair Development Regulations



Advisory Circulars

- AC 33-9 Developing Data for Major Repairs of Turbine Engine Parts
- AC 33.75-1A Guidance Material for 14 CFR Part 33.75 Safety Analysis
- AC 21-47 Submittal of Data to an ACO, a DER or an ODA for a Major Repair or Major Alteration
- AC 33.83-1 Comparative Method to show Equivalent Vibratory Stress and High Cycle Fatigue of Turbine Engine and Auxiliary Power Units
- AC 120-77 Maintenance and Alteration Data
- AC 43-18 Fabrication of Aircraft Parts by Maintenance Personnel
- AC 33.87-2 Comparative Endurance Test Method to Show Durability for Parts Manufacturer Approval of Turbine Engine and Auxiliary Power Units
- AC 21-51 Applicant's Showing of Compliance and Certifying Statement of Compliance
- AC 21.93-1 Determining the Classification of a Change to Type Design

NOTE: Depending on type of part, not all Advisory Circular guidance material may be applicable



Continued Operational Safety (COS) Overview

FAA requires PMA Holders and major repair holders to have COS system

- **COS Issue**
 - an unsafe condition, or a potential unsafe condition
- **COS Systems**
 - Provide information for product support
 - Collect service experience data
 - Provide data for solutions to problems
- **Fundamental COS Elements**
 - Problem Prevention
 - Part Monitoring
 - Problem Response



Chromalloy's Corporate-level COS

- Standardized COS at all facilities
- Collects service information from all customers and all products
- Full engineering resources for design review, safety analysis, problem response



Chromalloy FAA DER Repair and PMA Experience

FAA DER Repair Experience

- More than 4000 FAA DER approved repairs
- Cases, frames, combustors, vanes, blades, shrouds
- Customer savings through innovative repair concepts
- Thirty (30)+ years experience developing FAA DER repairs

FAA PMA Experience

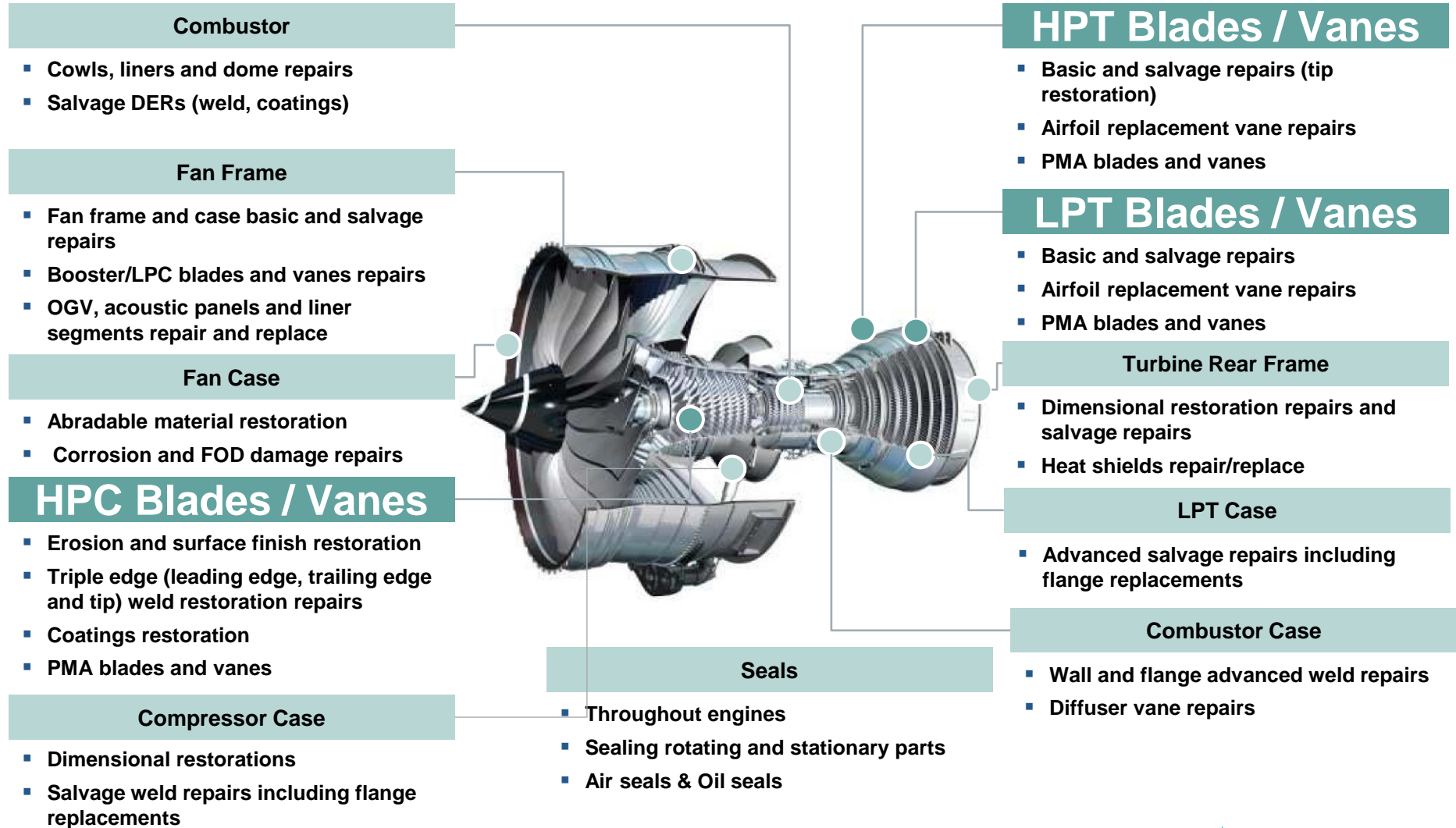
- More than 425 FAA PMA approvals
- Majority are gaspath parts – vanes, blades, and shrouds
- Specialize in complex HPT blade PMAs
- Unique, vertically integrated manufacturing – alloy manufacture, casting (SX/DX), machining, and coating all within Chromalloy
- Twenty-five (25) + years experience developing and manufacturing FAA PMA aero engine parts

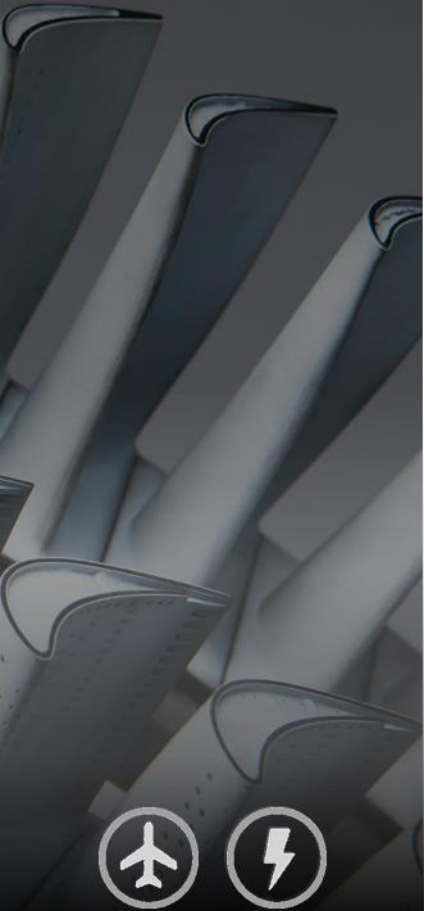
Note: Chromalloy is also a trusted supplier (new parts and repairs) and partner to multiple commercial engine and APU OEMs



Comprehensive Aftermarket Component Offerings

Chromalloy designs, manufactures and/or repairs high value, flight-critical components.





Questions?