U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Fabrication of Aircraft Parts by Maintenance Personnel

Date: DRAFT **AC No:** 43-18A
Initiated by: AFS-300 **Change:**

1 **PURPOSE OF THIS ADVISORY CIRCULAR (AC).** This AC ensures that parts fabricated during maintenance and alteration have an equivalent level of safety as those parts produced under an original design holder's production certificate. This AC provides one means of complying with the requirements of Title 14 of the Code of Federal Regulations (14 CFR) parts 21 and 43 for the design and fabrication of parts by persons performing maintenance and alterations using methods, techniques, and practices acceptable to the Administrator. As required by regulations, such parts fabrication and their implementation must be accomplished "in such a manner...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." This AC is not mandatory and does not constitute a regulation. It outlines one method, but not the only method, of compliance with the rules. A person may elect to follow an alternative method, provided the Federal Aviation Administration (FAA) finds the alternative method to be an acceptable means of complying with the applicable requirements of 14 CFR. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way, and the document is intended only to provide information to the public regarding existing requirements under the law or agency policies.

2 **AUDIENCE.** The primary audience for this AC is persons responsible for the fabrication of parts consumed in aircraft maintenance practices related to alterations and repairs.

3 **WHERE YOU CAN FIND THIS AC.** You can find this AC on the FAA's website at https://www.faa.gov/regulations_policies/advisory_circulars and the Dynamic Regulatory System (DRS) at https://drs.faa.gov.

4 **WHAT THIS AC CANCELS.** AC 43-18, Fabrication of Aircraft Parts by Maintenance Personnel, dated March 24, 2006, is canceled.

5 **RELATED REGULATIONS.** The following 14 CFR parts are related to this AC:

1. Part 1, Definitions and Abbreviations.
2. Part 21, Certification Procedures for Products and Articles.
3. Part 23, Airworthiness Standards: Normal Category Airplanes.
4. Part 25, Airworthiness Standards: Transport Category Airplanes.
5. Part 27, Airworthiness Standards: Normal Category Rotorcraft.

6. Part 29, Airworthiness Standards: Transport Category Rotorcraft.
7. Part 31, Airworthiness Standards: Manned Free Balloons.
8. Part 33, Airworthiness Standards: Aircraft Engines.
9. Part 35, Airworthiness Standards: Propellers.
10. Part 39, Airworthiness Directives.
11. Part 43, Maintenance, Preventive Maintenance, Rebuilding, and Alteration.
12. Part 45, Identification and Registration Marking.
13. Part 65, Certification: Airmen Other Than Flight Crewmembers.
14. Part 91, General Operating and Flight Rules.
15. Part 145, Repair Stations.
16. Part 183, Representatives of the Administrator.

6 DISCUSSION. This AC describes the quality and conformance requirements relevant to the fabrication of parts consumed in the maintenance and repair of aircraft. Part 43, § 43.13(b) states: "Each person maintaining or altering, or performing preventive maintenance, shall do that work in such a manner and use materials of such 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)."

7 DEFINITIONS. The following definitions apply to this AC:

7.1 Acceptable Data. Data is acceptable to the Administrator when used within the context of maintenance, a minor repair, or an alteration if the data substantiates that the product has been returned to its original or properly altered condition. Acceptable data may establish that the fabricated part complies with applicable airworthiness regulations. When acceptable data is used to substantiate that the article meets the regulatory requirements and will be returned to its original or properly altered condition, it can be considered acceptable to the Administrator.

7.2 Airworthy. The term "airworthy" is defined in 14 CFR part 3, § 3.5(a); a clear understanding of its meaning is essential in making an airworthiness determination. Furthermore, the definition of airworthy applies to type-certificated products such as an aircraft, aircraft engine, or propeller, and parts thereof. Title 49 of the United States Code (49 U.S.C.) § 44704(c) and part 21, § 21.183(a), (b), and (c) state that the two conditions to meet for issuance of an Airworthiness Certificate are:

1. The product must conform to its type certificate (TC). A product conforms to its TC when its configuration and the components installed are as described in drawings, specifications, and other data that are part of the TC, which includes any Supplemental Type Certificates (STC), Airworthiness Directives (AD), and field-approved alterations incorporated into the product; and

2. The aircraft (product) must be in a condition for safe operation.

Note: If one or more of these conditions are not satisfied, the product will not be considered airworthy.

7.3 Approved Data. Data that has been approved by the FAA and used to perform maintenance and alterations on products under part 43. Approved data must be used when performing major repairs and alterations. The FAA approves the data in conjunction with the issuance of a TC, STC, Technical Standard Order Authorization (TSOA), or Parts Manufacturer Approval (PMA). Other forms of approved data include ADs, letters of engineering design approval issued by an FAA Aircraft Certification Service office, maintenance instructions approved by an FAA Designated Engineering Representative (DER), and FAA-approved Structural Repair Manuals (SRM).

Note: While technical and other forms of data are approved under the field-approval process as declared on FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance), such approved data may not be sufficiently detailed to enable the fabrication of parts intended for multiple applications.

7.4 Certificate Holder (CH). Any person certificated by the FAA and authorized to perform maintenance, preventive maintenance, rebuilding, and alterations as provided in § 43.3. Within the context of this AC, if a CH intends to fabricate a part for maintaining a product, they may do so only under the provisions (privileges) of their certificate.

7.5 Certificate Management. The Aircraft Certification Service office is responsible for issuing and overseeing the original design or technical approval under TC, STC, TSOA, or PMA of the product or article on which the fabricated part will be installed. The certificate management Aircraft Certification Service office is responsible for managing the continued airworthiness of a product for as long as it is in service.

7.6 Critical. A term of significance applied to a part or to a function performed by a part. A critical part performs a critical function or a function of such significance to the aircraft on which it is installed that, if it failed, the airworthiness of the aircraft would be degraded to an extent that would preclude continued safe flight or landing.

7.7 Consumed. A fabricated part is considered consumed in a repair when it is installed into the next higher assembly component part, or within a product by the fabricator while undergoing maintenance or an alteration.

7.8 Design. Consists of all drawings and specifications, which may be summarized on a master drawing list. These are necessary to show the configuration of the part(s) and all information on dimensions, tolerances, materials, processes, and procedures that define the characteristics of a part(s), as well as the Airworthiness Limitations Section (ALS) of the instructions for continued airworthiness (ICA).

7.9 Fabrication. An act in which a part/subpart is made (fabricated) and consumed by the fabricator on the product, or part thereof, while performing maintenance or alterations per

approved or acceptable data, depending on the category (CAT) classification of the part being fabricated and the applicable regulations. In addition, a maintenance record entry must be made with a description of the work performed, date of completion, name of the person who performed the work, and a satisfactory signature and FAA certificate number.

7.10 Responsible Flight Standards Office. The FAA Flight Standards (FS) office that has the responsibility for certificate management over the CH that is undertaking the fabrication of the part or part thereof.

7.11 Part. An article that could be produced under part 21 and which is eligible for installation on a certificated aircraft without further manufacturing processes.

Note: The definition of a part for the purposes of this AC would *not* include raw materials or repair segments being utilized for the repair or alteration of a part. Examples of raw materials include sheet metal stock, sealants, lubricants, raw forgings, castings, or billet material.

7.12 Parts CATs. Parts are classified into one of two CATs, depending on their potential effect on safety, and are listed on a Category Parts List (CPL). Criteria exists for establishing and identifying part CATs, as discussed in paragraphs 10.4.1, 11.2.1, and 11.2.2. The criteria detail the level of FAA involvement necessary to approve the fabrication of such parts. The criteria also specify the level of technical data, quality control system (QCS), procedures development, and processes necessary to substantiate fabrication of such parts within each CAT.

7.13 Project Aircraft Certification Service Office. The Aircraft Certification Service office is responsible for a project that results in approving data submitted by a fabricator to the FAA for fabricating a part. The project Aircraft Certification Service office may be required to coordinate with the certificate management Aircraft Certification Service office, depending upon the criticality classification and complexity of the part to be fabricated.

7.14 Production. An act in which a part is manufactured under part 21 to an approved design or an established industry standard or specification recognized by the United States.

7.15 Subcontractor. A person providing parts, materials, or related services (such as welding, plating, or machining) to the CH responsible for the fabrication of the part. The subcontractor must be subject to control and surveillance by the CH who is ultimately responsible for the airworthiness of the part and its fabrication processes.

8 RELATED READING MATERIAL (current editions).

8.1 FAA Orders. You may obtain copies of these orders from the FAA website at https://www.faa.gov or DRS at https://drs.faa.gov.

1. Order 8110.42, Parts Manufacturer Approval Procedures.

2. Order 8120.22, Production Approval Procedures.
3. Order 8130.2, Airworthiness Certification of Aircraft.

8.2 ACs. You may obtain copies of these ACs from the FAA website at https://www.faa.gov or DRS at https://drs.faa.gov.

1. AC 20-62, Eligibility, Quality, and Identification of Aeronautical Replacement Parts.
2. AC 21-29, Detecting and Reporting Suspected Unapproved Parts.
3. AC 43-9, Maintenance Records.
4. AC 43.9-1, Instructions for Completion of FAA Form 337.
5. AC 43.13-1, Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair.
6. AC 43.13-2, Acceptable Methods, Techniques, and Practices – Aircraft Alterations.
7. AC 43-210, Standardized Procedures for Obtaining Approval of Data Used in the Performance of Major Repairs and Major Alterations.
8. AC 43-213, Parts Marking Identification.
9. AC 91-82, Fatigue Management Programs for Programs for In-Service Issues.
10. AC 120-77, Performance Rules: Provisions Contained in an Operators Manual Under § 43.13(c).

9 BACKGROUND.

9.1 Authority to Fabricate Parts. Maintenance personnel have raised questions and concerns regarding their authority to fabricate aircraft parts during the course of performing maintenance and alterations on a product or part thereof. Typically, such questions center around whether a person needs approval under part 21 to produce parts for installation on type-certificated products or whether it is permissible to use maintenance rules in part 43 to fabricate parts for consumption during maintenance or alteration.

9.2 Difference in Rules. It is important to emphasize that design and production rules differ from maintenance and alteration rules. The FAA organization responsible for each of these different activities must be appropriately involved when acquiring approvals. For example, FS inspectors have the necessary knowledge and requirements for maintaining a product, whereas Aircraft Certification Service (AIR) Certificate Management Section inspectors possess the expertise and familiarity with the requirements for manufacturing parts and their use of specific materials and processes. Compliance with both the maintenance and manufacturing requirements is the only way a CH can ensure that a fabricated part is airworthy. This AC provides guidance to establish a system that ensures the same level of safety for parts fabricated under part 43, for maintenance or repair purposes, as those produced under the production rules under part 21.

9.3 Conformance to Approved Design. Persons who design, produce, operate, maintain, or alter a civil aviation product must ensure that the part/product conforms to its approved design and is in a condition for safe operation. An appropriately rated CH that fabricates a part in the course of performing maintenance or alterations must possess:

1. Approved design data or data acceptable to the Administrator that is determined by the CAT classification for the part being fabricated; and
2. A fabrication quality control system (FQCS) to ensure fabricated parts conform to its design data and is in a condition for safe operation.

10 FABRICATION UNDER PARTS 21 AND 43.

10.1 Important Considerations. Many elements affect the nature of processes and the extent of requirements needed to fabricate parts during the course of performing maintenance and/or an alteration. Such elements may include (1) the criticality (application) of the part being fabricated, (2) processes required for fabrication, (3) the sufficiency of design data, (4) equipment necessary for fabrication of the part, and (5) the extent of FAA involvement in data approval to ensure pertinent airworthiness requirements of the product are satisfied. Parts design data may be approved under § 21.8(d) and fabricated under § 43.13(a) and (b), providing the fabricator installs the part onto or within the product or part thereof while it is undergoing repair or alteration.

Note: A CH that desires to sell fabricated parts separately outside the course of performing maintenance or an alteration must obtain a PMA (refer to § 21.301).

10.2 Limitations. Parts fabrication must be performed within the privileges and limitations of the CH's FAA authorization and ratings and per their established QCS.

10.3 Subcontractor Limitations. When a subcontractor is used in the fabrication process, the CH under whose surveillance the fabrication occurs must control the design, manufacture, and quality of the part. The work performed by the subcontractor must be documented to support a determination of conformance to the purchase order requirements and substantiated by a maintenance record. The documentation must describe any special processes. Subcontractors must be subject to control and be audited by the CH fabricating the part for return to service.

10.4 Required Documentation. Procedures for addressing criteria recommended in paragraph 10.4.1, items 1 through 7 below must be documented and recorded in a manual or similar type of document, easily understood, and readily available to the person(s) fabricating the part(s).

10.4.1 Required Data. This data must include the following, dependent on the CAT of the part as defined in paragraph 11:

1. Drawings and specifications necessary to show the configuration of the fabricated part.

2. Information on materials, dimensions, and processes (including special manufacturing processes) necessary to define the structural strength or other critical characteristics of the fabricated part.
3. Inspection and test procedures.
4. Substantiating data (test reports, analysis, computations, and assessments) necessary to show that the design data used to fabricate the part for a repair or alteration meets the applicable airworthiness standards and that no detrimental consequences will result in degradation to the next higher-level subassembly or assembly, or to the product.
5. Airworthiness limitations (AL), as applicable.
6. ICA/maintenance instructions if the application for design approval is sought for a product or article in which the fabricated part is eligible for installation and was filed on or after January 28, 1981.
7. Fabricated part marking.

Note: All fabrication repairs of parts must be accomplished in accordance with methods, techniques, and practices acceptable to the Administrator in accordance with § 43.13(a).

10.4.2 FQCS. To substantiate and demonstrate that a part being fabricated during the performance of maintenance conforms to the approved design data and is in condition for safe operation, QCS procedures should be established to ensure all processes and requirements necessary to fabricate the part are identified and adhered to. The depth and detail of the FQCS depend on the complexity and CAT classification of the part being fabricated. The following are recommended elements that could be addressed in the FQCS:

10.4.2.1 Design Data Control. Procedures for controlling design data and subsequent changes to ensure that only current, correct, and approved or acceptable data is used.

10.4.2.2 Fabricated Parts List. A list of the parts fabricated by nomenclature and part number.

10.4.2.3 Document Control. Procedures for controlling quality system documents and data and subsequent changes to ensure that only current, correct, and approved or acceptable documents and data are used.

10.4.2.4 Subcontractor Control. Procedures that:

1. Ensure that each subcontractor-furnished part conforms to its approved design; and
2. Require each subcontractor to report to the fabricator if a part has been released from that subcontractor and subsequently found not to conform to the applicable design data.

10.4.2.5 Inspecting and Testing. Procedures for inspections and tests are used to ensure that each part conforms to its approved design.

10.4.2.6 Inspection, Measuring, and Test Equipment Control. Procedures to ensure calibration and control of all inspection, measuring, and test equipment used in determining conformity of each part to its approved or acceptable design. Each calibration standard must be traceable to a standard acceptable to the FAA.

10.4.2.7 Inspection and Test Status. Procedures for documenting the inspection and test status of parts supplied to the approved design.

10.4.2.8 Nonconforming Part Control.

1. Procedures to ensure that only parts that conform to their approved or acceptable design are installed on a type-certificated product. These procedures must provide for the identification, documentation, evaluation, segregation, and disposition of nonconforming articles. Only authorized individuals may make disposition determinations.
2. Procedures to ensure that discarded articles are rendered unusable.
3. Corrective and preventive actions. Procedures for implementing corrective and preventive actions to eliminate the causes of an actual or potential nonconformity to the approved design or noncompliance with the FQCS.

10.4.2.9 Handling and Storage. Procedures to prevent damage and deterioration of each part.

10.4.2.10 Control of Quality Records. Procedures for identifying, storing, protecting, retrieving, and retaining fabrication quality records associated with the part must be retained in accordance with regulatory requirements.

10.4.2.11 Internal Audits. Procedures for planning, conducting, and documenting internal audits to ensure compliance with the FQCS. The procedures must include reporting the results of internal audits to the person responsible for implementing corrective and preventive actions.

10.4.2.12 In-Service Feedback. Procedures for receiving and processing feedback on in-service failures, malfunctions, and defects. These procedures must include a process to:

1. Address any in-service problem involving design changes; and
2. Determine if any changes to the ICAs are necessary.

10.4.2.13 Quality Escapes. Procedures for identifying, analyzing, and initiating appropriate corrective action for products or articles that have been released

from the quality system and that do not conform to the applicable design data or quality system requirements.

10.4.3 Part Marking. Except as noted below, fabricated parts must be clearly identified with an additional permanent and legible marking.

10.4.3.1 The marking must include the following:

1. The name, trademark, or symbol of the FAA CH (fabricator) under whose control the fabrication occurred;
2. A unique part number that clearly distinguishes the fabricated part; and
3. The original manufacturer's part number if removed as a result of the fabrication.

10.4.3.2 Critical parts must be marked in accordance with 14 CFR part 45, § 45.15. This part marking provides traceability for subsequent operators and maintenance providers to the source of the fabricated part.

Note: In cases where it is impractical to mark the fabricated part without compromising the airworthiness (integrity) of the part, the marking information should be included in the maintenance records for the part or part thereof.

10.4.4 ICA. Under § 21.50, design approval holders are required to develop and distribute information essential to the continued airworthiness of their parts and/or products. Typically, these instructions are included in maintenance and overhaul manuals to describe the methods, techniques, and practices for performing inspections, maintenance, preventive maintenance, and alterations to ensure that the affected products are maintained in an airworthy condition. Certain sections of the ICA, and any changes to those sections (e.g., ALs, wiring diagrams, or SRM revisions), require FAA approval. When parts are fabricated during the course of performing maintenance, the fabricator must address the following ICA requirements that may apply to the fabricated part(s).

10.4.4.1 Determine whether the existing ICA for the original part is sufficient to ensure the fabricated part continues to meet all airworthiness requirements.

10.4.4.2 In cases where the original part manufacturer's ICA has been determined to be inadequate, the fabricator must develop its own ICA to ensure the continued airworthiness of the fabricated or affected part.

10.4.4.3 When it is necessary to develop a new ICA, current inspection criteria essential to the airworthiness of the part(s) must be maintained and kept current.

10.4.4.4 When the CH develops its own ICA, it must be provided with the part and made available to any other person requesting the ICA for maintaining the fabricated parts.

10.4.4.5 Revision control for the ICA must be maintained to ensure it remains applicable. This is particularly important when changes are made to the original product and the ICAs were changed to accommodate the installation of a fabricated part.

Note: Each Aircraft Certification Service office has an established Aircraft Evaluation Division (AED) branch that is part of FS and is responsible for the operational and maintenance aspects of the certification process.

10.4.5 Fabrication of Multiple Parts. A quantity of identical parts bearing the same part number may be fabricated at the same time, provided they will be consumed in later repairs by the CH that fabricated those parts. Controls should be in place to prevent separate sales of these specific parts (i.e., sales to other persons independent of the repair). If a CH desires to sell its fabricated part(s) separately, it must obtain a PMA. The fabrication of multiple parts is not to be used as a means to circumvent the requirements of § 21.9(a).

10.4.6 Recordkeeping. Fabrication of a part in accordance with this AC is subject to the maintenance recordkeeping provisions of § 43.9. A recordkeeping system should be established for documenting fabricated parts containing sufficient information to determine the airworthiness status of the part. Information contained in the maintenance record entry could include a description of work performed, date of work completion, person approving return to service, current status of any AD, current inspection status, and current status of life-limited parts. These maintenance records should be retained with the aircraft records.

10.4.7 Destruction of Replaced Material. Material replaced by the fabricated part should be mutilated/destroyed beyond any possibility of repair or reassembly and should not be retained for future use.

11 DETERMINING PART CAT.

11.1 Criticality Level—CPL.

11.1.1 For the purposes of this AC, the FAA recommends the use of the CPL (a copy can be found at https://www.faa.gov/aircraft/air_cert/production_approvals/mfg_best_practice), in combination with other factors, to determine a part's criticality level. The CPL classifies parts into one of two CATs depending on their effect on safety. The CPL should be used as a guide in determining a part's criticality. It is important to understand that not all component parts have been addressed on this list, and therefore, specific questions concerning parts not addressed can be evaluated by contacting the certificate-holding Aircraft Certification Service office.

11.1.2 When used in the context of this AC, this CPL is a means to determine the criticality category of the part and the level of AIR involvement needed in the design data approval process for CHs fabricating parts.

Note: No part, or fabricated part thereof, that is the subject of an AD can be installed on an aircraft without complying with the AD or obtaining an alternative method of compliance (AMOC) approval from the responsible Aircraft Certification Service office.

11.2 Part Categories.

11.2.1 CAT 1 Part. An assembly or part must be one whose failure could prevent continued safe flight and landing, and resulting consequences could reduce safety margins, degrade performance, or cause loss of capability to conduct certain flight operations.

11.2.1.1 Design Issues. A CAT 1 part is a part intended to be consumed within a major repair or major alteration. The certificating Aircraft Certification Service office, through the responsible Aircraft Certification Service office, must approve the design data. The list of data to be submitted to the Aircraft Certification Service office can be found in paragraph 10.4.1. The Aircraft Certification Service office will make the determination of necessary data for development and submittal based on each circumstance. In the case of a CAT 1 part, a DER may only "recommend approval" of the design data.

11.2.1.2 Fabrication Issues. The CH is responsible for ensuring all aspects of the FQCS are addressed and satisfied. The guidelines provided in paragraph 10.4.2 should be used to develop the FQCS for compliance.

11.2.2 CAT 2 Part. An assembly or part must be one whose failure would not prevent continued safe flight and landing, but whose resulting consequences may reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions or subsequent failures.

11.2.2.1 Design Issues. A CAT 2 part is a part intended to be consumed within a major repair or major alteration. Design data is required to be approved by the responsible Aircraft Certification Service office or appropriately authorized DER. The list of required data to be submitted to the Aircraft Certification Service office or the DER for approval can be found in paragraph 10.4.1.

11.2.2.2 Fabrication Issues. The CH is responsible for ensuring all aspects of the FQCS are addressed and satisfied. The guidelines provided in paragraph 10.4.2 should be used to develop the FQCS for compliance.

12 AC FEEDBACK FORM. For your convenience, the AC Feedback Form is the last page of this AC. Note any deficiencies found, clarifications needed, or suggested improvements regarding the contents of this AC on the Feedback Form.

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