UK Civil Aviation Authority

Guidance on the fabrication of parts under UK Part 145

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Revision history

Issue 1 July 2024

Initial issue.

Definitions and abbreviations

AMC	Acceptable Means of Compliance
AMM	Aircraft Maintenance Manual
AMO	Aircraft Maintenance Organisation
CAA	UK Civil Aviation Authority
CAP	Civil Aviation Publication
CMM	Component Maintenance Manual
ESM	Engine Servicing Manual
GM	Guidance Material
MOA	Maintenance Organisation Approval
MOE	Maintenance Organisation Exposition
OEM	Original Equipment Manufacturer
POA	Production Organisation Approval
SB	Service Bulletin
SRM	Structural Repair Manual
STCH	Supplemental Type Certificate Holder
TCH	Type Certificate Holder

Scope and applicability

The CAA is the Competent Authority for UK approved Part-145 organisations having their principal place of business located within the UK or in a third country. The CAA is responsible for the approval of these maintenance organisations and for establishing procedures detailing how Part-145 applications and approvals are managed.

The provisions of this guidance document are complementary to the requirements of UK Regulation (EU) No 1321/2014, Annex II (Part-145), as amended, and does not supersede or replace the associated regulatory requirements.

Purpose

This guidance is designed to be used by organisations applying for, or holding a UK Part 145 approval, to assist them with the production or amendment of their Maintenance Organisation Exposition (MOE) procedures with respect to the fabrication of parts under 145.A.42.

It will also be used by the CAA as guidance when approving the MOE and conducting routine oversight of CAA approved Part 145 organisations.

Further information may be published on the CAA's Guidance for Part 145 approval holders webpage.

Associated Instructions

The CAA has developed associated instructions including Forms and Templates, that detail specific matters which have to be considered as an integral part of this guidance.

A complete listing of these documents, together with their applicability to the maintenance organisations, can be found on the CAA's Guidance for Part 145 approval holders webpage.

Communication

All documents and correspondences between the maintenance organisation and the CAA shall be in the English language.

General guidance

Fabrication of parts under 145.A.42

1.1 UK Part 145.A.42(b)(iii) and the associated Acceptable Means of Compliance (AMC) material, provides the possibility for the CAA to agree for a maintenance organisation to fabricate a restricted range of parts to be used during maintenance, within its own facilities, in accordance with a procedure approved in the Maintenance Organisation Exposition (MOE). In this guidance, the term 'maintenance organisation' shall be replaced by 'fabricating organisation,' for clarity. However, it is not the intent of the Part-145 regulation to provide an alternative means to manufacture parts outside an approved Part-21 production organisation (POA) and to clearly distinguish those activities, the following definitions are adopted:

Definitions used within this Guidance

Fabrication of parts

1.2 The term "fabrication" is to be used in the Part 145 environment to identify a restricted production under the limitations of AMC to Part 145.A.42(b)(iii).

Manufacture of parts

1.3 The term "manufacture" is to be used in UK Part-21 Subpart G and Subpart F (POA) for mass production of parts.

1.4 This guidance is only intended to cover the fabrication of parts by a Part 145 maintenance organisation, and it cannot be used in any way to support manufacturing of parts under the UK Part-21 regulations.

General principles of fabrication of parts

1.5 The permission to fabricate parts is to be agreed by the CAA through a detailed MOE procedure. When considering fabrication of parts under the Part-145 approval, the following general principles apply:

1.6 Each time there is a requirement to fabricate a part or batch of parts, the fabricating organisation must state the justification for not acquiring original parts. The fabricating organisation shall provide evidence of:

- sufficient data to fabricate the part. This should already exist in the current issue of the approved maintenance data. In other words the CMM or AMM refers or describes the fabrication process and/or drawings to be used.

Typically, this is the case described under ‘Fabrication file’, paragraph 1.18, points a and b:,or

- direct authorisation (or no objection) received from the design approval holder to fabricate those specific parts, which shall also include the identification of the fabrication data (drawing.) to be used. Typically, this is the case described under ‘Fabrication file’, paragraph 1.18, point c.

1.7 The fabrication is to be performed during maintenance. This implies that:

- fabricated items may only be installed on products and/or components, undergoing maintenance in the fabricating organisation’s scope of approval and at its own facilities.
- the item is fabricated under an approved rating (e.g., as part of the maintenance conducted on aircraft under an A rating, engines under a B rating, or components under a C rating).
- the fabrication of parts shall be done within the fabricating organisation`s facilities.
- the fabricating organisation may subcontract special processes but may not subcontract the overall fabrication process *.
- Note: * Subcontracting the entire fabrication of parts as per 145.A.75(c) may be accepted on the additional condition that the fabricating organisation routinely performs several fabrications, in house, within the scope intended to be conducted. This shall ensure the fabricating organisation maintains the necessary experience.

1.8 The fabricated parts do not qualify for certification with a CAA Form 1. A permission to fabricate does not constitute approval for manufacture, or to supply externally.

1.9 The fabrication of the following type of parts is <u>not</u> permitted:

- critical parts (as defined by the design approval holder).
- complete primary structure.
- prototype parts (conformity only to non-approved data).

Scope of fabrication of parts

1.10 To allow the fabrication of parts, under the Part-145 approval, the related fabrication, inspection, assembly, and test should fall clearly within the technical and procedural capability of the fabricating organisation.

1.11 The capability to fabricate parts shall be defined through the MOE chapter 1.9 “Scope of work,” and shall specify if the permission for fabrication of parts is included or is not applicable.

1.12 When the permission is included, the MOE chapter 2.30. “Fabrication of parts” shall further describe the parts fabrication procedure in compliance with this guidance.

Identification of fabrication groups

1.13 According to the examples given in the AMC1 145.A.42(b)(iii), fabrication under the Part-145 approval can include, but is not limited to, the following **"fabrication groups":**

- Fabrication of bushes, sleeves and shims.
- Fabrication of secondary structural elements.
- Fabrication of control cables.
- Fabrication of flexible and rigid pipes.
- Fabrication of electrical cable looms and assemblies.
- Formed or machined sheet metal panels for repairs.
- Additional cases as agreed by the CAA*(see 1.12 below).

1.14 The "fabrication groups" shall be identified in the MOE 2.30 and is limited to those for which the fabricating organisation is able to demonstrate effective technical capability.

1.15 The CAA may agree for additional "fabrication groups" to be identified. Elements of a primary structural part (such as skin panels or a bracket for a circumferential frame) could also be considered, but this may depend on how such elements are being considered by the design approval holder in terms of criticality.

1.16 Any such additional fabrication groups shall be carefully assessed by the fabricating organisation with the involvement, when necessary, of the design approval holder to support the agreement with the CAA to allow fabrication. The CAA shall be informed via the assigned surveyor when use is made of this option.

Fabrication file

Fabrication Data

1.17 All necessary data to fabricate the part, shall be approved by either the CAA or the type certificate holder (TCH) or the Part-21 design organisation approval holder, or supplemental type certificate holder (STCH).

1.18 For this guidance, any of the following may be considered acceptable data for fabrication of parts by the fabricating organisation.

a) Instructions for continuing airworthiness issued by the TCH, STCH or any other organisation required to publish such data under Part 21 (such as ETSO holder). This case typically includes fabrication procedures directly provided in maintenance data such as AMM, SRM, CMM, Overhaul or Repair Manuals, ESM, or SB.

b) Modification and/or repair data, involving the fabrication of parts, approved under Part-21 regulation or under the terms of a bilateral agreement. This case typically refers to data in support to repairs or modifications, which are not

already included in available approved data (such as structural damages outside the limits of the SRM).

c) Manufacturing drawings (see notes below) for items specified in aircraft, engines, component parts lists, directly provided or made available by a TCH, STCH or an approved production organisation, which is not referred to in other maintenance data (such as AMM or SB). As already specified under 'General principles of fabrication of parts', in this case a direct authorisation (or no objection) received from the design approval holder to fabricate those specific parts is necessary, shall also include the identification of the fabrication data (drawing) to be used.

Note 1: A particular case may be un-dimensioned drawings such as "loft drawing." These are full size drawings of the part to be fabricated (e.g., some older technology aircraft did not have original dimensional drawings. In these cases, where often multiple compound curves are involved, a "loft drawing" of the item was prepared and was the only means to produce parts).

Note 2: Such fabrication of parts to pattern may be acceptable provided that an engineering drawing of the item is produced, which includes any necessary fabrication processes. However, considering the peculiarity of such cases, the production organisation is expected to support fabrication. The CAA shall review these on a case-by-case basis.

1.19 The maintenance organisation shall ensure that the data to fabricate parts:

- Falls within one of the cases identified above (see note below).
- Is applicable to the part to be fabricated.
- Is up to date, legally obtained and respects the proprietary data protection; the intent of the regulation is specifically to prevent the maintenance organisations from reverse engineering parts when they do not have legitimate access to the approved design data.
- Includes all necessary information of part numbering, dimensions with tolerances, materials, processes, and any special manufacturing techniques, special raw material specification and/or incoming inspection requirement.

Note: TCH communications, such as a Non-Technical Objection cannot be considered maintenance data for the purpose of parts fabrication.

Fabrication process – work card/worksheet system

1.20 The fabrication process shall be included in the work card/worksheet system (including worksheets, process sheets and engineering instructions). For any given fabrication process, the relevant Part-145 work card/worksheet shall contain:

- References to the fabrication maintenance data, required tooling, part numbering, dimensions with tolerances, incoming inspection requirement, raw material specification, detailed fabrication processes, any special manufacturing techniques, marking instructions, intermediate and final inspections or testing.

- Identification of the processes which are subcontracted and related specific inspections by the maintenance organisation.

1.21 Work cards/worksheets will be used to split the data into clear stages of work instructions for maintenance personnel and shall be subject to a control procedure, which shall:

- Define the responsibilities within the fabricating organisation, for the development of instructions, in compliance with the acceptable data for fabrication described in section 1 above.
- Define the traceability of such instructions to each individual fabricated part.
- Ensure that each fabricated part is unambiguously linked to a specific product or component undergoing maintenance. The receiving assembly shall be clearly identified in the worksheet/work card (for example, fabricated for a/c MSN, for Landing Gear s/n ZZZZ).

Composition of the fabrication file

1.22 To support and record the fabrication process, a standard “fabrication file” is to be used for each part and will comprise the following:

- The Fabrication Data described above.
- The Fabrication process -work card/worksheet system described above.
- The Final inspection and conformity statement described below.

1.23 The fabrication file will constitute the maintenance records specified under ‘Fabrication records’ in this guidance.

Final inspection and conformity statement.

1.24 The work card/worksheet shall include the final inspection and associated conformity statement.

1.25 The final inspection stage is required at the completion of the fabrication and shall be conducted independently from the fabrication itself. In addition, the final inspection shall be conducted prior to the installation of the fabricated part.

1.26 The final inspection shall consist of the following elements:

- Check for compliance to the MOE 2.9 procedure related to the fabrication of parts.
- Check completion of the fabrication file (refer to the following section).
- Physical inspection of the part to confirm the conformance to the approved fabrication data (see note below).
  Note: Applicable dimensions or data (critical or relevant for fit, form and function) must be measured and recorded during the final inspection stage, confirming that the part complies with the approved fabrication data. A check box document declaring conformity is not considered acceptable.

1.27 The results of the final inspection shall be recorded and formalised through a dedicated form (which cannot be a Form 1), or directly inside the work card/worksheet system, provided it is clearly distinguished from the fabrication stages; The final inspection records shall contain reference to the following statement **“part(s) fabricated as per MOE 2.30”.**

Fabrication Inspection System

1.28 The fabricating organisation shall establish a Fabrication Inspection System to ensure that all fabrication processes, whether performed by the fabricating organisation or by subcontractors under its control, are conducted strictly in accordance with the specifications required by the fabricating data, ensuring as a minimum:

a) The availability of personnel, with defined qualifications, including suitable experience and training, who are formally authorised by the fabricating organisation to:

- undertake the necessary engineering functions to fabricate the part, such as but not limited to, developing the data described under ‘Fabrication file’, ‘Fabrication Data’.
- sign-off the accomplishment of the fabrication process, including the final inspection stage. Special attention should be paid to tasks requiring specialised knowledge and skill (such as NDT/NDI or welding).

b) A system for the control and authorised amendment of all data provided for the fabrication, inspection, and test to ensure that:

- it is complete and up to date at the point of use, readily available to fabrication and inspection personnel.
- during execution, all works are accompanied by documentation giving either directly or by means of appropriate references, the description of the works as well as the identification of the personnel in charge of inspection and execution tasks for each of the different work phases.
- each part is inspected in such a way which identifies the nature of all inspections required and the fabrication stages at which they occur (fabrication work cards with clear inspection stages, such as dimensional checks and NDT).

c) A system to control the subcontracted fabrication steps, where appropriate.

d) Procedures to deal with non-conforming parts, identified during the fabrication process. Such parts shall be treated as “unsalvageable” and identified, segregated, and disposed of in such a way as to preclude any further use (such as mutilation by grinding or burning).

e) The means to achieve adequate configuration control of fabricated parts, to enable the maintenance organisation to make the final determination and identification for conformity and eligibility status.

f) Incoming materials used in the finished product are properly identified as specified in the fabrication data.

g) Parts in process are dully identified and segregated as being fabricated parts.

Part Marking

General

1.29 Any fabricated part shall be marked according to the instructions provided in the approved data for fabrication, including:

- A part number
- The maintenance organisation`s identity

1.30 The main criteria to establish how and by which means the part shall be marked shall be based on the information available in the approved data marking field, possible depth and/or means, actual text or symbols to be used).

1.31 By derogation from the above, in cases where it is impractical to mark the fabricated part without compromising the airworthiness (integrity) of the part or not enough space for the marking information is available due to the size/shape issues, the documentation accompanying the part shall include the information that could not be marked on the part. In this case the use of a label is recommended.

Fabrication part number identification

1.32 For standardisation and traceability purposes of parts fabricated by maintenance organisations, the following standard is recommended be used to identify the **“fabrication P/N”:**

A) Original Part Number (mandatory): part number provided in the approved fabrication data.
B) Maintenance organisation identification (mandatory): UK.145.XXXX*(see note below).
C) Additional maintenance organisation identification codes (optional): additional digits (number and/or letters) may be added according to criteria specified in the MOE to facilitate the part traceability year of manufacture, workshop, location, batch number).

1.33 Therefore, the “**fabrication P/N**” is identified by the digits: A+B+C.

1.34 The following is an explanatory example of the Fabrication Part Number:

[Original P/N] UK.145.XXXXX 2024JAN

Note: “XXXX” to be replaced by the Part-145 approval number of the maintenance organisation fabricating the parts.

1.35 Special attention should be given to the fact that any symbol or digit included in a part number identification (point, comma or dash.) is to be considered integral part

of the P/N and difference shall be made between lowercase and capital letters. Therefore, the P/N identification marked on the part shall exactly reflect the P/N stated in the documentation accompanying the part.

Fabrication Records

General

1.36 The fabrication records constitute objective evidence that:

- All the prescribed stages of the fabrication process have been satisfactorily completed.
- Compliance with the approved data for fabrication has been achieved.
- Traceability from the part to the approved data is ensured.

1.37 Therefore, the maintenance organisation shall implement a system for the completion and retention of records during all stages of fabrication appropriate to the nature of the part and its fabrication processes.

1.38 The record retention procedure shall:

- Describe the organisation of the archiving system (location, paper/electronic format, responsibility).
- Clarify conditions for access to the information (e.g. by P/N-batch of the fabricated parts, or by identification of the component/engine/aircraft on which the fabricated part is installed).
- Ensure that, when a subcontractor is used according to 145.A.75(c), the records retention function is not subcontracted, and the records are duly retained by the maintenance organisation.

1.39 The fabrication records are composed by the documents described in paragraphs below.

Fabrication file record

1.40 The “**fabrication file”** referred to above, shall be kept for each part or batch in compliance with records retention time provided in Part 145.A.55(c). Particular attention shall be made to the fact that the time retention period is not counted from the date of fabrication but the date of release to service of the product or component on which the fabricated part is installed.

List of parts fabricated

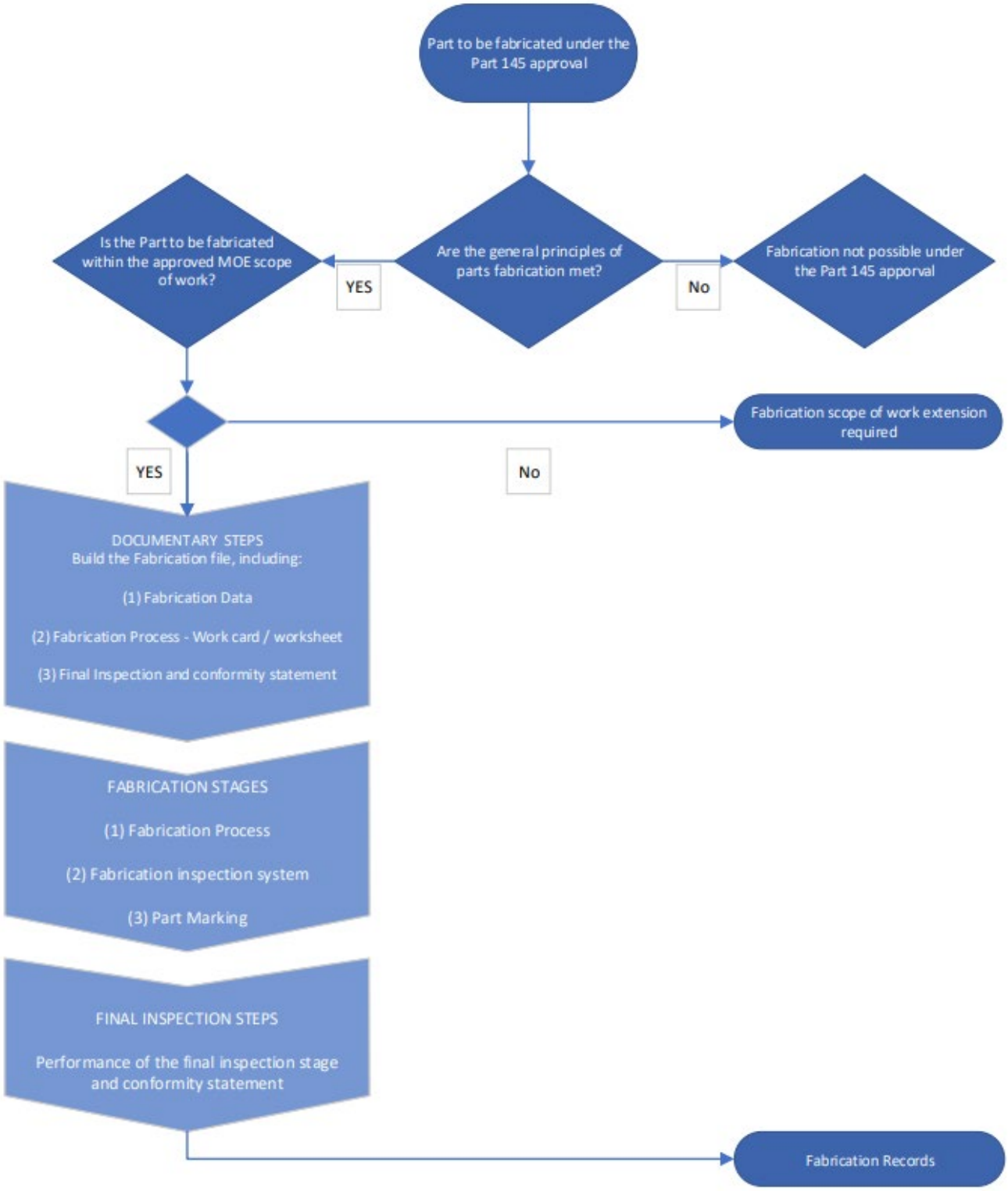
1.41 The maintenance organisation shall have a system (such as a paper register or database) allowing a listing of all the parts/batches which have been fabricated by the maintenance organisation together with the information of the product/component on which those parts have been installed. The following minimum information needs to be recorded:

- Fabrication group
- Part description

- Original Part Number (P/N)
- Fabrication P/N (For the identification of the Fabrication P/N refer to ‘Part marking” section above)
- Approved data for fabrication (refer to the Fabrication Data section above)

Appendix I – Fabrication process

Fabrication process flowchart



Parts to be fabricated under the Part 145 approval:

Are the general principles of parts fabrication met? If not, the organisation cannot fabricate the parts.

Is the part to be fabricated within the approved MOE Scope of Work? If not, the AMO will need to revise their MOE 1.9 and possibly the 2.30 procedures and submit an MOE amendment to the CAA for approval.

If the parts to be fabricated are within the MOE Scope of Work, the organisation will need to build the ‘Fabrication File’, containing the following information:

- The fabrication data
- The fabrication process work card/worksheets
- The final inspection and conformity statement

Following creation of the ‘Fabrication File’ the organisation may fabricate the part using the following fabrication steps:

- The fabrication process
- The fabrication inspection system
- Part marking

After the part has been fabricated, an authorised person from the AMO shall perform the final inspection and if satisfactory, complete the conformity statement.

All records associated with the fabrication of the part shall be retailed by the organisation in accordance with 145.A.55.