Fundamentals
M7
MAINTENANCE PRACTICES

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M7.20
Maintenance Procedures

EASA Part-66
CAT B1

Training Manual

Lufthansa Technical Training

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M7 MAINTENANCE PRACTICES

M7.20 MAINTENANCE PROCEDURES

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MAINTENANCE PLANNING

Maintenance Planning

Responsibility of the Operator

To be allowed to operate commercial aircrafts, the particular aviation authority of the operator demands, that the operator assures the airworthiness of its aircrafts and aircraft components. This includes a planning framework for the maintenance.

Overview

Catchwords for the planning are:

Considering the personnel:

- Qualification of the personnel,
- Number of the personnel,
- Hangar and parking space,

Considering the documentation:

- Maintenance instructions (AMM, SRM, etc.)

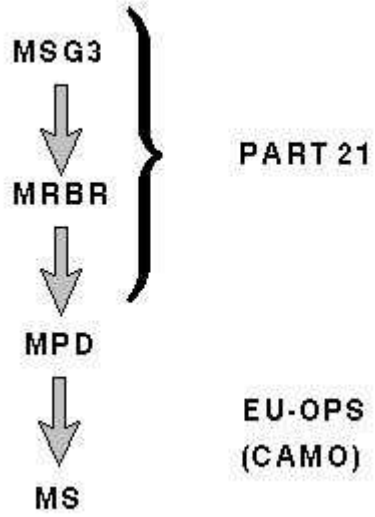
And:

- Materials and operating materials,
- Operation equipment,
- Preparation of the aircraft,
- Possibly flight test.

Within the Part-145 organization, the event has to be planned in such a way, that working papers suited for the procedure and provided with adequate qualification specifications for accomplishment, quality inspection and approval are at hand.

This is also applies to unscheduled complementary maintenance actions. The working papers must base on the maintenance program of the operator; differences are only allowed with a procedure defined by the operator. The preparation of the working documents must only be conducted by qualified personnel.

Furthermore the EU-OPS prescribe a reliability monitoring to be carried out and that the maintenance program is optimized according to this. In this program the recommendation of the design organization may be incorporated by means of a MPD recommendation (Maintenance Planning Document) and further recommendations of the aircraft and the aircraft component design organisations. If the aircraft type is part of a MRBR (Maintenance Review Board Report; usually for new aircraft types) the primary maintenance program must base on the MRBR.



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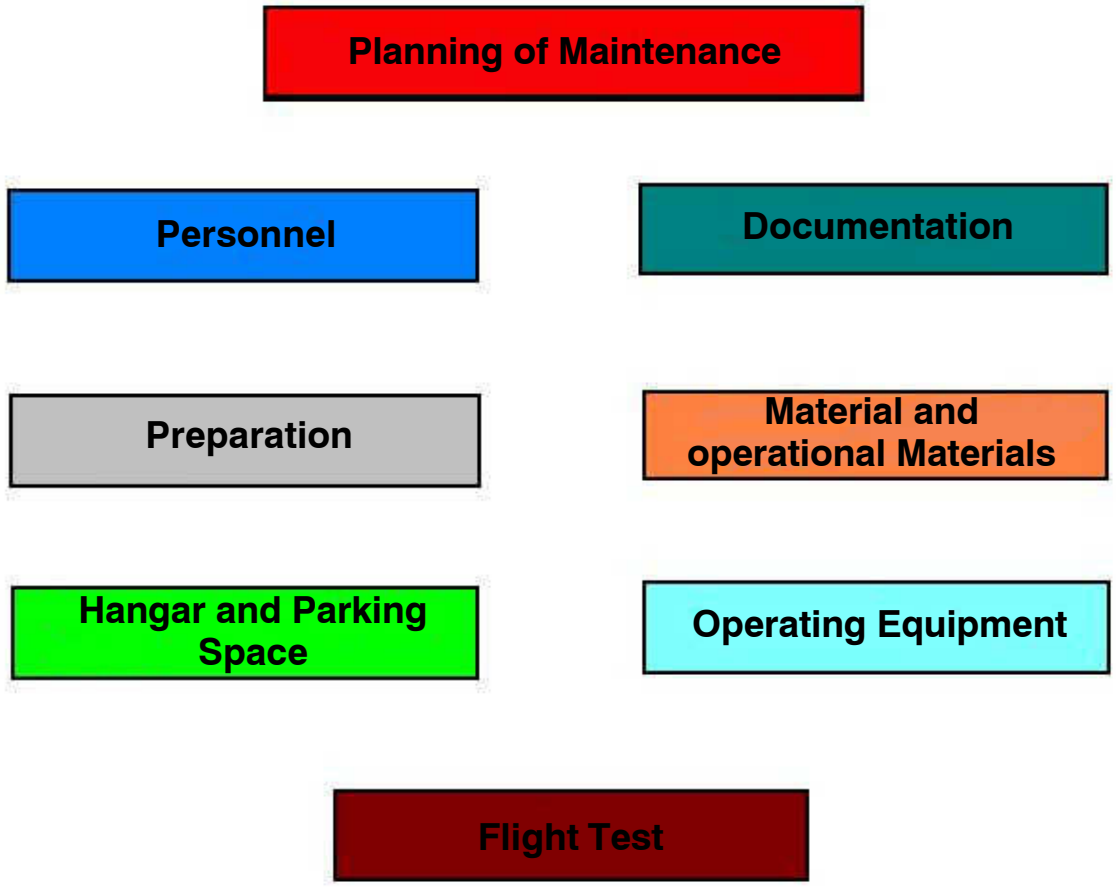


Figure 1 Catchwords for the planning

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EVENT PLANNING

During planning, individual maintenance actions can be united into packages to maintenance events, which are structured into line and base maintenance.

Additionally the intervals are described with letter codes, like A, B, C, IL etc.

The intervals must be dimensioned; e. g. in flight cycles, flight hours or calendar times.

The type and intensity of the work should be described in task codes, which certainly, like all other codes, must be specified in the introduction of the maintenance program.

The working documents must only be created or changed by authorized personnel.

They must be trackable on the based specifications, such as the Maintenance Manual or the authorized Maintenance Program (MS, MPD, MRBR).

The qualifications which are necessary for the work task must be stated in the working documents.

The processed working plans or job cards are used for the documentation of the carried out work and are the basis for the following release for service.

REQUIREMENTS FROM THE REGULATIONS

Since the responsibility for maintenance planning is in the hands of the operator, Part-145 only refers to this topic in a few sub items. Detailed requirements can be found in the EU-OPS.

But the maintenance organization can be authorized by the operator to plan and carry out the maintenance for the operator.

Generally a Part-145 organization is only allowed to perform the maintenance tasks, for which it has been authorized according to the license agreement.

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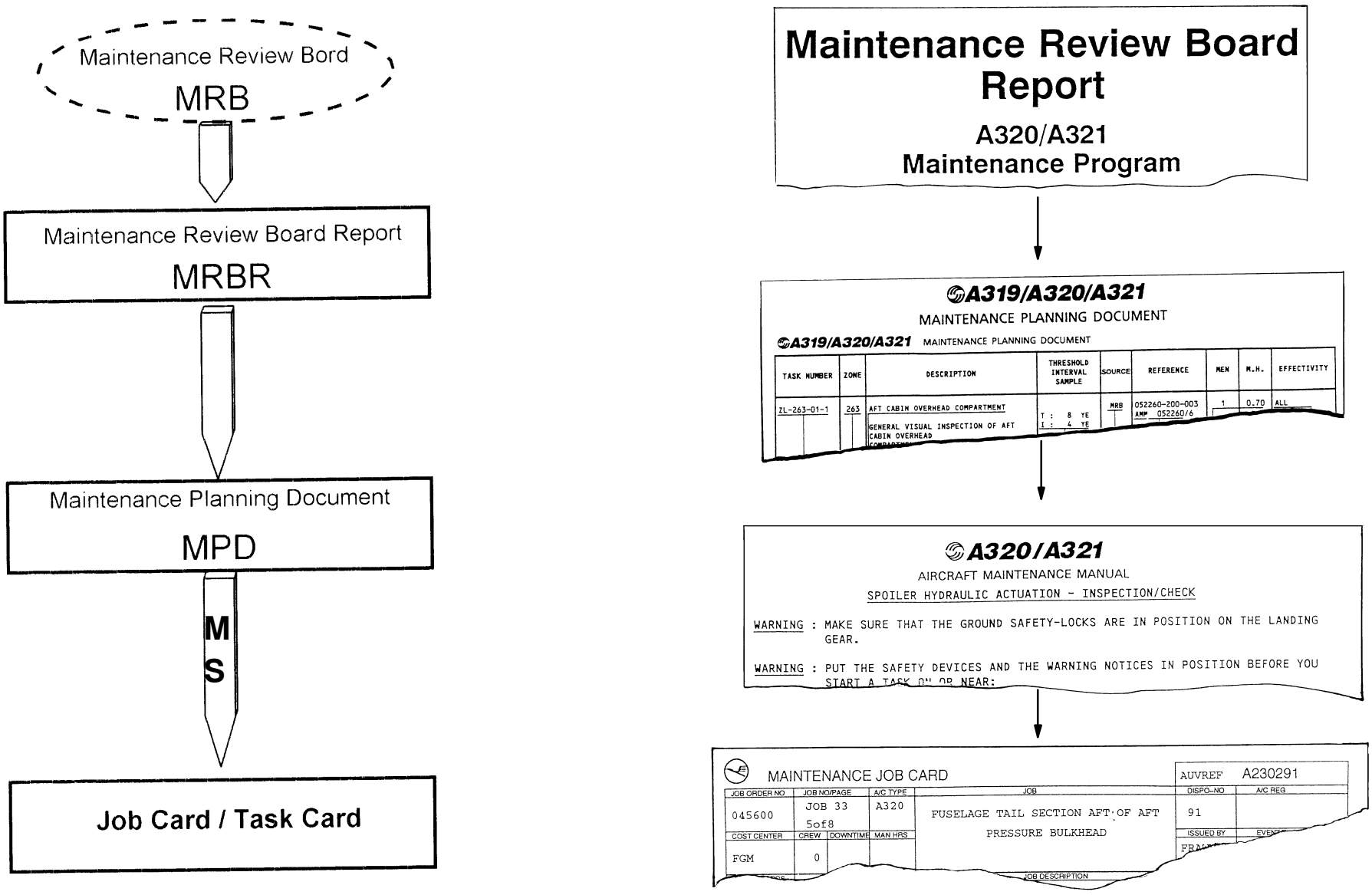


Figure 2 From the MRB to the Job Card

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Maintenance – Checks

General

A lot of of the scheduled maintenance tasks listed in the MPD manual also serve the purpose of identifying the frequency of maintenance intervals. This is accomplished with alphanumeric codes (1A, 2A, 1C, etc.). These so-called letter checks and the other checks are defined as follows.

Transit Check

The Transit Check (TC) is intended to assure continuous serviceability of a transiting aircraft. This check is planned to be carried out at an en-route stop and is basically a ”walk–around” inspection which requires a check of both the aircraft interior and exterior for obvious damage, leaks, the functionality of equipment and the safety of attachments as well as carrying out required maintenance.

A–Check

There are two different A–Check intervals specified for the Boeing 757 maintenance. These are listed in the interval column of the Systems, Structural and Zonal maintenance programs. The A-Check interval for Systems (including lubrication) and the Zonal A–Check interval is 500 flight hours. The Systems/Zonal A–Check is designated as ”1A”. The Structural A–Check interval is 300 flight cycles and designated as ”S 1A”.

C–Check

For Boeing 757, there are also two different C-Check intervals. These are listed in the interval column of the Systems, Structural and Zonal maintenance programs. The Systems (including lubrication) and Zonal C–Check interval is 6,000 flight hours or 18 months. The Systems/Zonal C–Check is designated as ”1C”. The number of C–Check intervals should not further increase at least until one aircraft inspection has been carried out at 12,000 flight hours for 2C components, 18,000 flight hours for 3C components and 24,000 flight hours for 4C components.

The Structures C–Check interval is 3,000 flight cycles or 18 months. The Structures C–Check is designated as ”S 1C”.

Some tasks of the Structures check have a calendar limit instead of the normal letter check interval described above. The following provides an explanation for the interval difference.

- **C–Check (additional information) :**

The original S 1C interval of the Maintenance Review Board Report (MRBR) was 3,000 flight cycles or 15 months and the S 2C, S 3C and S 4C intervals were multiples thereof.

A revision of the MRBR (issued 11/90), was based on current accumulated service experience. The MRBR calendar time limit for S 1C, S 2C, and S 3C was increased to 18, 36 and 54 months respectively, with the S 4C remaining at 60 months.

However, based on fleet–wide corrosion findings, the initial (starting point) interval for a selected number of structural inspection tasks was kept at 15, 30, and 45 months. Consequently, the MRBR interval for these tasks was changed from S 1C, S 2C and S 3C to 3,000 cycles/15 months, 6,000 cycles/30 months and 9,000 cycles/45 months, respectively.

The interval for any of these calendar-based tasks (15, 30, 45 or 60 months) can be adjusted, as with any other structural inspection task, by an operator, based on their service experience as noted in the Maintenance Program Rules and Operating Rules of the MRBR.

The Systems Maintenance and Zonal Inspection Programs are flight-hour sensitive; whereas, the Structural Inspection Program depends on the flight cycle or calendar time. Separation of these A and C check definitions provides an operator with maximum flexibility in scheduling and packaging the Systems/Structural/Zonal tasks based on aircraft utilization.
Task intervals are expressed in hours, cycles, calendar time or a letter check.

Individual operators may convert intervals (based on aircraft utilization) to their desired units provided such conversion does not result in exceeding the frequencies identified herein.

An operator may package any or all of the tasks not specified at one of the basic check intervals into one of the basic checks, provided such packaging does not exceed the interval shown for the task.

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MAINTENANCE CHECKS	I	NTERVALS
1 TRANSIT CHECK (TR)		PRIOR TO FLIGHT
1 A–CHECK (SYSTEMS/ZONAL)		500 FLIGHT HOURS
1 A–CHECK (STRUCTURES)		300 FLIGHT CYCLES
1 C–CHECK (SYSTEMS/ZONAL)		6,000 FLIGHT HOURS OR 18 MONTHS *
1 C–CHECK (STRUCTURES)		3,000 FLIGHT CYCLES OR 18 MONTHS *
1 4C–CHECK (STRUCTURES)		12,000 FLIGHT CYCLES OR 72 MONTHS *

*whichever comes first

Figure 3 Maintenance Checks

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Coverage of the Certification

An Organisation is only allowed to accomplish work task in its certified coverage. This coverage is shown on the certification document.

Here the aircraft type and the engines, APU's and the components are listed. Possible special procedures are also listed.

APPROVAL BY THE AVIATION AUTHORITY

Approvals of LHT

Lufthansa Technik AG is holder of an **Maintenance Organization** approval certificate in accordance with **EASA Part-145**, as well as an **Production Organization** approval certificate in accordance with **EASA Part-21G** and an **Design Organization** approval certificate in accordance with **EASA Part -21J**.

These approvals are bound to the setting up and compliance of the so-called **TOP** requirements (**T**echnical, **O**rganizational and **P**ersonnel).

These official approvals are documented in the LH Info-System.

The official approvals are issued by the Federal Republic of Germany (represented by the so-called „Luftfahrtbundesamt" (LBA), the German Civil Aviation Administration) on behalf of the European Aviation Safety Agency (EASA) and by EASA itself (development).

The approval is issued with an approval reference number which has to be stated with every type of certificate.

The reference number for the LHT maintenance organization is:

DE.145.0001

Lufthansa Technik was thus the first aeronautical organization in Germany to receive this license.

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BUNDESREPUBLIK DEUTSCHLAND

LUFTFAHRT-BUNDESAMT

Mitgliedstaat der Europäischen Union
A Member of the European Union

BESCHEINIGUNG DER GENEHMIGUNG ALS INSTANDHALTUNGSBETRIEB
MAINTENANCE ORGANISATION APPROVAL CERTIFICATE

Aktenzeichen: DE.145.0001
Reference:

Gemäß der geltenden Verordnung (EG) Nr. 216/2008 des Europäischen Parlaments und des Rates und vorbehaltlich der im Folgenden angegeben Bedingungen erteilt das Luftfahrt-Bundesamt hiermit
Pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council and to Commission Regulation (EC) No 2042/2003 for the time being in force and subject to the conditions specified below, the Luftfahrt-Bundesamt hereby certifies

Lufthansa Technik Aktiengesellschaft
Weg beim Jäger 193
22335 Hamburg

die Genehmigung als Instandhaltungsbetrieb entsprechend Abschnitt A von Anhang II (Teil-145) der Verordnung (EG) Nr. 2042/2003, dem die Instandhaltung von Erzeugnissen, Teilen und Ausrüstungen, die im beigefügten Genehmigungsverzeichnis aufgeführt sind, sowie die Erteilung entsprechender Freigabebescheinigungen unter Verwendung der obigen Bezugsdokumente genehmigt ist.
as a maintenance organisation in compliance with Section A of Annex II (Part-145) of Regulation (EC) No 2042/2003, approved to maintain products, parts and appliances listed in the attached approval schedule and issue related certificates of release to service using the above references.

BEDINGUNGEN:
CONDITIONS:

1. Die Genehmigung unterliegt den im Abschnitt „Genehmigungsumfang" des gemäß Abschnitt A von Anhang II (Teil-145) genehmigten Handbuchs des Instandhaltungsbetriebs aufgeführten Einschränkungen.
This approval is limited to that specified in the scope of work section of the approved maintenance organisation exposition as referred to in Section A of Annex II (Part-145), and
2. Diese Genehmigung erfordert die Einhaltung der im Instandhaltungsbetriebshandbuch spezifizierten Verfahrensvorschriften.
This approval requires compliance with the procedures specified in the approved maintenance organisation exposition, and
3. Diese Genehmigung behält solange ihre Gültigkeit, wie der Instandhaltungsbetrieb die Bestimmungen von Anhang II (Teil-145) der Verordnung (EG) Nr. 2042/2003 einhält.
This approval is valid whilst the approved maintenance organisation remains in compliance with Annex II (Part-145) of Regulation (EC) No 2042/2003.
4. Vorbehaltlich der Erfüllung der vorstehenden Bedingungen behält die Genehmigung ihre Gültigkeit für eine unbegrenzte Dauer, sofern sie nicht zurückgegeben, ersetzt, ausgesetzt oder widerrufen worden ist.
Subject to compliance with the foregoing conditions, this approval shall remain valid for an unlimited duration unless the approval has previously been surrendered, superseded, suspended or revoked.

Datum der Erstausstellung: 25.08.2004
Date of original issue:

Datum dieser Revision: 01.05.2013
Date of this revision:

Revisions-Nr.: 26
Revision No:

LUFTFAHRT-BUNDESAMT
Im Auftrag
p.p.
Unterschrift: (Schmaljohann)
Signed:

EASA-Formblatt 3-145 Ausgabe 2, 04-10
EASA Form 3-145 Issue 2, 04-10
Aktenzeichen: DE.145.0001
Revisions-Nr : 26
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GENEHMIGUNG ALS INSTANDHALTUNGSBETRIEB
GENEHMIGUNGSVERZEICHNIS
MAINTENANCE ORGANISATION APPROVAL SCHEDULE

Aktenzeichen: DE.145.0001
Reference:

Lufthansa Technik Aktiengesellschaft

Betrieb:
Organisation:

Weg beim Jäger 193
22335 Hamburg

Flughafen Mailand/ Malpensa, Fabricato No. 181, Terminal 1
21019 Somma Lombardo
Italien

Lufthansa Basis
60546 Frankfurt/Main

Rudolf-Diesel-Straße 10
55232 Alzey

Wartungsallee 1
85325 München

Naas Road
Co. Dublin Rathcoole
Irland

Flughafen Berlin Brandenburg
13361 Berlin

World Aviation Park
County Clare Shannon
Irland

Airport Complex-Terminal 1, Block3
1540 Sofia
Bulgarien

Unit 3, Dawley Park, Kestrel Way
UB3 1HP Hayes
Vereinigtes Königreich

Oude Haachtsesteenweg, Bldg. 117d
1820 Steenokkerzeel-Melsbroek
Belgien

Shannon Airport
County Clare Shannon
Irland

Budapest Liszt Airport
1675 Budapest
Ungarn

Dubai Airport Freezone, LIUC02 +C03
DAFZA Dubai
Vereinigte Arabische Emirate

Luqa Airport
LQA 05 Luqa
Malta

Gerhard-Höltje Str. 1
99310 Arnstadt

KLASSE CLASS	KATEGORIE RATING	EINSCHRÄNKUNGEN LIMITATION	‚BASE' BASE	‚LINE' LINE
LUFTFAHRZEUGE AIRCRAFT	A1 FLUGZEUGE ÜBER 5700 KG AEROPLANES ABOVE 5700 KG	AIRBUS A300-600 AIRBUS A300-600	JA/YES	JA/YES
		AIRBUS A300 BASIC MODEL AIRBUS A300 BASIC MODEL	JA/YES	JA/YES
		AIRBUS A310 AIRBUS A310	JA/YES	JA/YES
		AIRBUS A318/A319/A320/A321 AIRBUS A318/A319/A320/A321	JA/YES	JA/YES
		AIRBUS A330 AIRBUS A330	JA/YES	JA/YES
		AIRBUS A340 AIRBUS A340	JA/YES	JA/YES
		AIRBUS A380 AIRBUS A380	JA/YES	JA/YES
		BOEING 737-100/200 BOEING 737-100/200	NEIN/NO	JA/YES
		BOEING 737-300/400/500 BOEING 737-300/400/500	JA/YES	JA/YES
		BOEING 737-600/700/800/900 BOEING 737-600/700/800/900	JA/YES	JA/YES
		BOEING 747-200/300 BOEING 747-200/300	JA/YES	JA/YES
		BOEING 747-400 BOEING 747-400	JA/YES	JA/YES
		BOEING 747-8 BOEING 747-8	JA/YES	JA/YES
		BOEING 747SP BOEING 747SP	JA/YES	JA/YES

EASA-Formblatt 3-145 Ausgabe 2, 04-10
EASA Form 3-145 Issue 2, 04-10
Aktenzeichen: DE.145.0001
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Figure 4 Certification of the LHT as a Part -145 Organisation

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Maintenance Schedule

If an aircraft operator is not approved as maintenance organization, the operator needs to own a maintenance contract with an EASA Part-145 approved maintenance organization.

Maintenance planning can be described in the maintenance schedule for instance:

Standards

An important part of the product field **Maintenance Management Services (MMS)** is maintaining and creating aircraft maintenance programs.

The regular maintenance carried out is based on the documents issued by the aircraft and equipment manufacturers:

- Maintenance Review Board Report (MRBR)
- Maintenance Planning Data (MPD)
- Regulatory Requirements, such as:
  - Corrosion Prevention and Control Program (CPCP)
  - Airworthiness Limitation Items (ALI)
  - Airworthiness Directives (AD's)
  - Life Limits etc.
- Requirements of the aircraft systems engineers.

The requirements of the aircraft systems engineers are made up of the aircraft and component reliability, the state of the aircraft construction and the operating experiences.

Implementation

Merged and documented these requirements in a maintenance only for this purpose developed computer database application.

The reports created with this program are the so-called **Maintenance Schedules (MS)** which are also called Maintenance Inspection Program or Maintenance Program at other organizations.

The maintenance schedule specifies the maintenance requirements for the aircraft as well as the maximum operating hours for aircraft components as required by regulatory authorities.

Requirements

Setting up as well as developing the maintenance schedule is required for the operating license of an aircraft operator.

The aircraft operator must ensure the effectivity of the maintenance procedures by continuously checking the maintenance schedule.

The changes to the regular maintenance resulting from the check are issued in MS Revisions. Urgent changes are issued in the temporary revisions.

At Lufthansa Technik AG, 45 maintenance schedules are currently maintained in the course of the support of aircraft owners.

Implementation in the Organization

From the requirements of the maintenance schedules, the work documents (job cards) necessary for production are created by the planning units of the respective production divisions.

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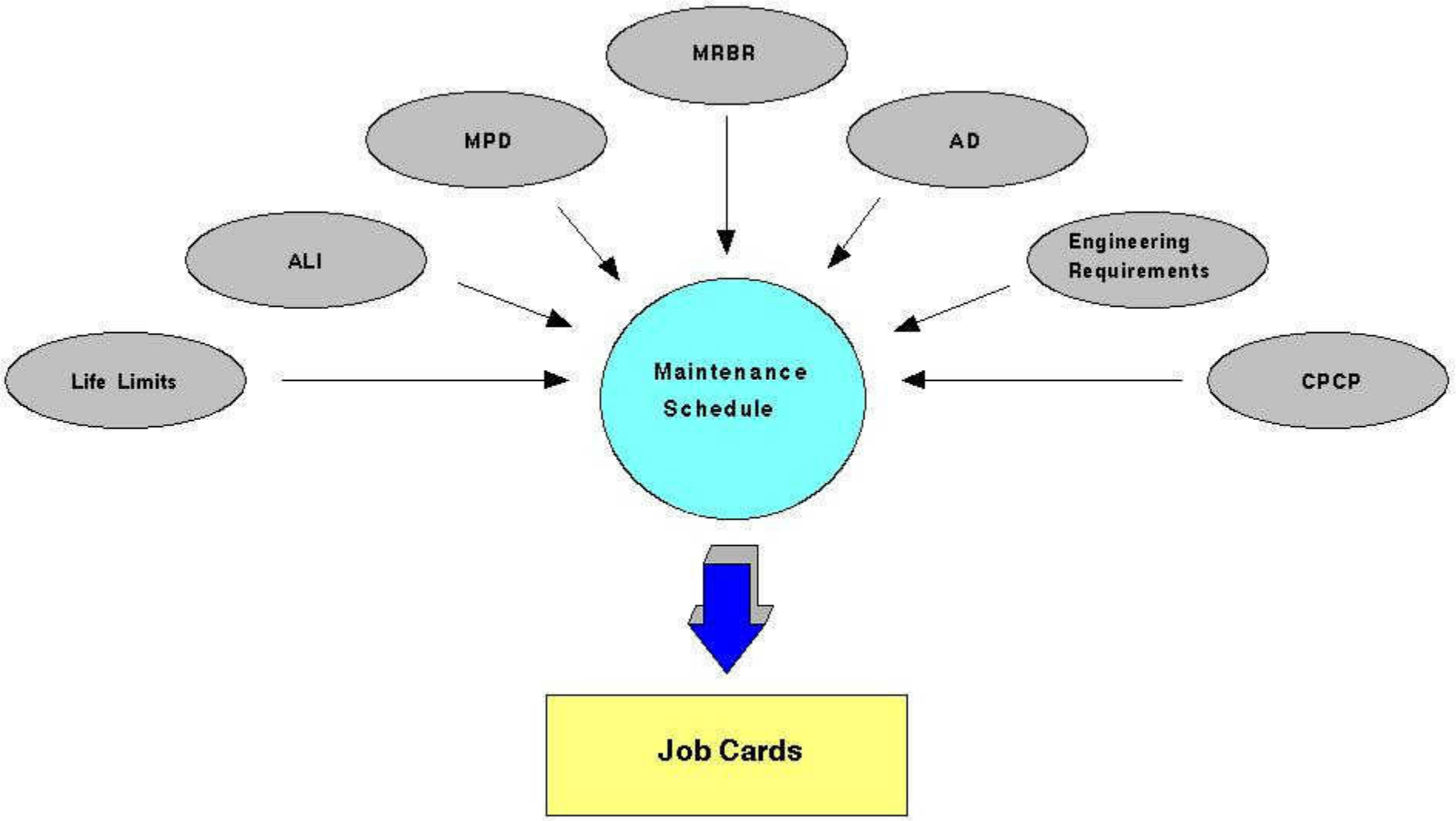


Figure 5 Maintenance Schedule - Preparation

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Coverage of the Lufthansa Technik AG Approvals

Approval Certificate

The attachment of the LHT approval certificate contains information on the sites and the scope of maintenance work the LHT is authorized to carry out.

Additionally, all ratings are listed.

There are A1, B1, B3, C & D ratings.

A-Rating: Aircraft Type

Authorizes to carry out maintenance work on aircraft and aircraft components (including engines / APU), provided those aircraft components are built in the aircraft.

If the Aircraft Maintenance Manual explicitly authorizes the temporary removal of aircraft parts due to better access for maintenance work, it is allowed to carry out maintenance on removed aircraft components provided a maintenance procedure exists.

B-1 / 3 -Rating: Engine / APU Types

Authorizes to carry out maintenance work on:

- Engines / APUs as well as engine / APU components removed from the aircraft, provided those components are built in the engine / APU. If the Engine / APU Manual explicitly authorizes the temporary removal of aircraft components due to better access for maintenance work, it is allowed to carry out maintenance on removed aircraft components.
- Engines built in the aircraft (during line / base maintenance) provided a maintenance procedure exists.

C-Rating:

Authorizes to carry out maintenance work on:

- Removed aircraft components, excluding engines and APUs.
- Built-in aircraft components (during line / base maintenance or in the engine/APU shop) provided a maintenance procedure exists.

D-Rating:

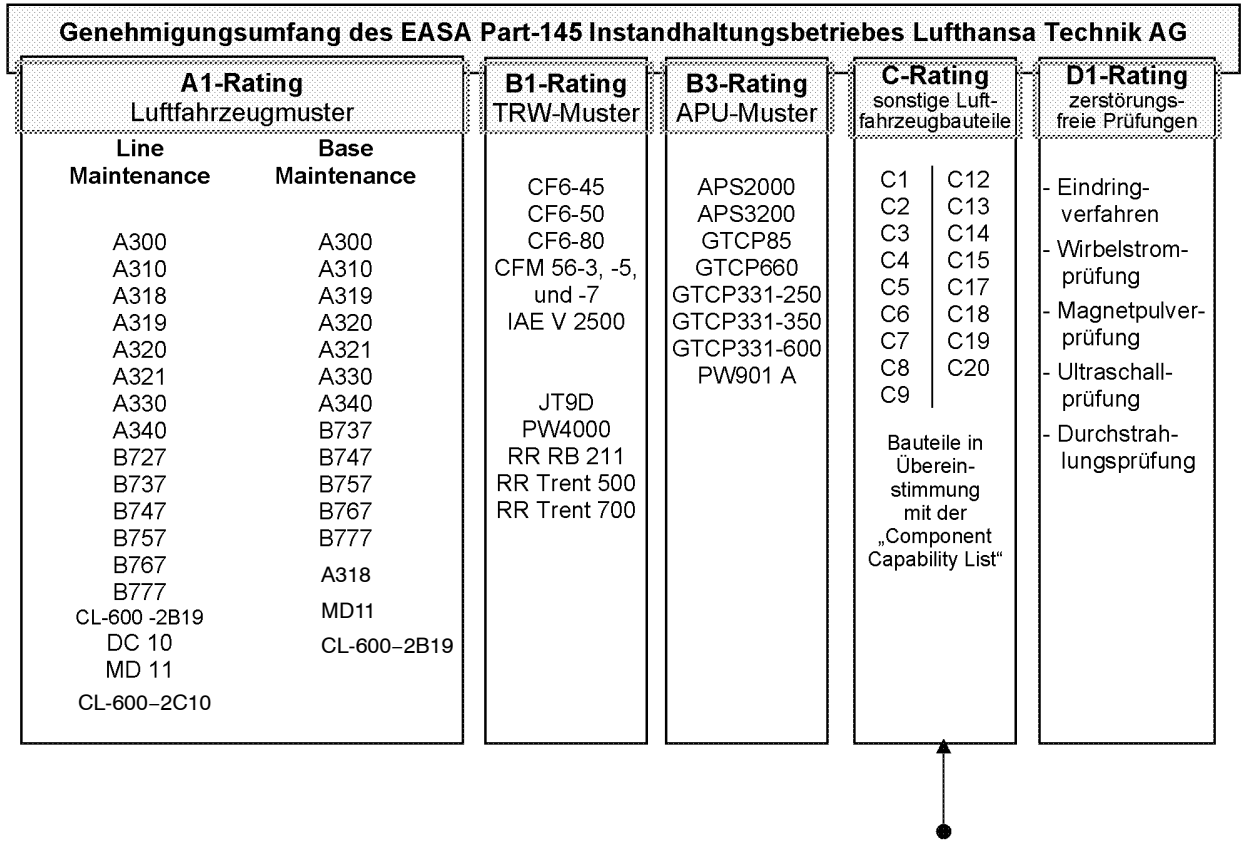
Authorizes to carry out non-destructive testing (NDT).

This authorization is not related to specific aircraft / engines or other aircraft components. A D rating is only required, if NDT is to be carried out for another organization as individual job.

A D rating is not required, if NDT is performed in the course of the maintenance of an aircraft / aircraft components under the approved A, B, or C rating in accordance with the requirements for NDT.

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Das C-Rating ist in folgende Gruppen von Luftfahrzeugbauteilen gegliedert:

C1	„Air Condition and Pressurisation“ (21)	C7	„Engines and APUs“ (49, 71 bis 83)	C15	„Oxygen“ (35)
C2	„Auto Flight“ (22)	C8	„Flight Controls“ (27, 55, 57.40 bis 57.70)	C17	„Pneumatic“ (36, 37)
C3	„Communication and Navigation“ (23, 34)	C9	„Fuel-Airframe“ (28)	C18	„Protection ice/rain/fire“ (26, 30)
C4	„Doors and Hatches“ (52)	C12	„Hydraulic“ (29)	C19	„Windows“ (56)
C5	„Electrical Power“ (24, 33)	C13	„Instruments“ (31)	C20	„Structural“ (53, 54, 57.10 bis 57.30)
C6	„Equipment“ (25, 38, 45)	C14	„Landing Gear“ (32)	Hinweis: Angabe der ATA-Kapitel in Klammern	

Figure 6 Coverage of the LHT Part-145 Maintenance Organization

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Component Capability List (CCL)

Scope of Component Maintenance

The CCL contains information on the component maintenance capability for the aviation authorities FAA and EASA at the date of issue.

The data from the central system maintained by the responsible employees is the basis of the publication of this Lufthansa Technik CCL.

What kind of information does the CCL provide?

For every LHT shop, the CCL lists the part numbers (P/Ns) of parts that have to be maintained in the respective shop.

The list is structured alphabetically/numerically according to the part numbers. The included information are shown.

How can a part number information be found?

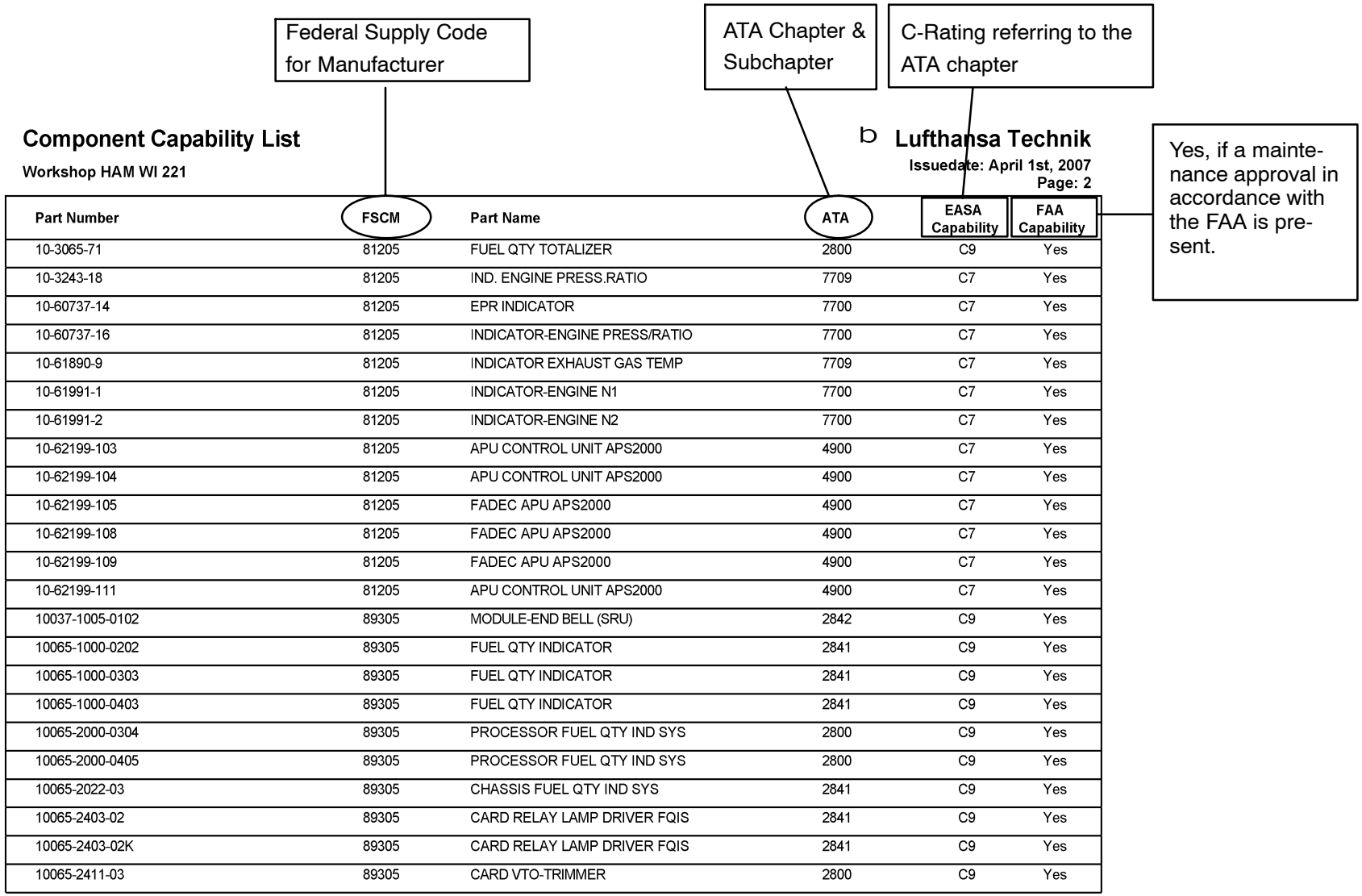
1. Go to the table of contents (TOC)
   In the TOC, choose the responsible shop division. Scroll to the required part number.
2. Use the Find option in the PDF file, enter the required text or part number and let the search function do the work for you.

Where does the information contained in the CLL come from?

The employees of PEP (Product Engineering & Planning) enter the lists of „their“ components in the information system.

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Component Capability List

Workshop HAM WI 221

Lufthansa Technik

Issuedate: April 1st, 2007
Page: 2

Part Number	FSCM	Part Name	ATA	EASA Capability	FAA Capability
10-3065-71	81205	FUEL QTY TOTALIZER	2800	C9	Yes
10-3243-18	81205	IND. ENGINE PRESS.RATIO	7709	C7	Yes
10-60737-14	81205	EPR INDICATOR	7700	C7	Yes
10-60737-16	81205	INDICATOR-ENGINE PRESS/RATIO	7700	C7	Yes
10-61890-9	81205	INDICATOR EXHAUST GAS TEMP	7709	C7	Yes
10-61991-1	81205	INDICATOR-ENGINE N1	7700	C7	Yes
10-61991-2	81205	INDICATOR-ENGINE N2	7700	C7	Yes
10-62199-103	81205	APU CONTROL UNIT APS2000	4900	C7	Yes
10-62199-104	81205	APU CONTROL UNIT APS2000	4900	C7	Yes
10-62199-105	81205	FADEC APU APS2000	4900	C7	Yes
10-62199-108	81205	FADEC APU APS2000	4900	C7	Yes
10-62199-109	81205	FADEC APU APS2000	4900	C7	Yes
10-62199-111	81205	APU CONTROL UNIT APS2000	4900	C7	Yes
10037-1005-0102	89305	MODULE-END BELL (SRU)	2842	C9	Yes
10065-1000-0202	89305	FUEL QTY INDICATOR	2841	C9	Yes
10065-1000-0303	89305	FUEL QTY INDICATOR	2841	C9	Yes
10065-1000-0403	89305	FUEL QTY INDICATOR	2841	C9	Yes
10065-2000-0304	89305	PROCESSOR FUEL QTY IND SYS	2800	C9	Yes
10065-2000-0405	89305	PROCESSOR FUEL QTY IND SYS	2800	C9	Yes
10065-2022-03	89305	CHASSIS FUEL QTY IND SYS	2841	C9	Yes
10065-2403-02	89305	CARD RELAY LAMP DRIVER FQIS	2841	C9	Yes
10065-2403-02K	89305	CARD RELAY LAMP DRIVER FQIS	2841	C9	Yes
10065-2411-03	89305	CARD VTO-TRIMMER	2800	C9	Yes

Figure 7 LHT Component Capability List (Example)

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MODIFICATION PROCEDURES

GENERAL

Modifications of aircrafts / aircraft components have to be accomplished in an approved maintenance organization.

Complementary maintenance measures can result from:

- Requirements from authorities (AD, LTA, etc.)
- Recommendations from the design / production organizations

These could be: modifications, inspections, tests and repairs.

Relating to this, procedures need to be developed, such as:

- The acquisition and distribution of the documents;
- The publication of the measures to be carried in the organization;
- The documentation and approval procedure.

One possibility is the engineering order procedure for instance.

SERVICE BULLETIN (SB)

General

The manufacturer of aircrafts and aircraft components constantly work on the modification of their parts and procedures.

The aircraft owner and maintenance organizations receive information about those improvements via service letters and service bulletins.

Service Letter

Serves for the provision of general information.

Service Bulletin

Describe technical modifications / tests / procedures / ... and their accomplishment.

Service bulletins contain the following parts:

- Planning Information
  - Effectivity
  - Requirements
  - Description
  - Approval
  - Manpower
- Material Information
  - Material
  - Tooling
- Accomplishment Information
  - Preparation
  - Procedures

The decision on the accomplishment usually resides in the aircraft / aircraft component owner, unless the SB accomplishment is explicitly prescribed by an authority.

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A380

SERVICE BULLETIN
SUMMARY

AIRBUS
CUSTOMER SERVICES DIRECTORATE
1 Rond Point Maurice Bellonte
31707 BLAGNAC CEDEX
FRANCE
Tel : (33) 5 61 93 33 33
Telex : AIRBU 530526F
Fax : (33) 5 61 93 42 51

This summary is for information only and is not approved for modification of the aircraft.

ATA SYSTEM: 24

TITLE: ELECTRICAL POWER-AC VARIABLE FREQUENCY GENERATION (VFG) - DEFINE AND INSTALL STANDARD QS2-06 FOR VFG.

****CONF ALL**

MODIFICATIONS

MODIFICATION CLASSIFICATION					
MAJOR	None				
MINOR	73149T83475				

NOTE: As per EASA IR 21, a minor change is one that has no appreciable effect on the mass, balance, structural strength, reliability, operational characteristics affecting the airworthiness of the product. All other changes are major changes.

REASON/DESCRIPTION/OPERATIONAL CONSEQUENCES

The Variable Frequency Generator (VFG) power feeders are routed around the fan case, from a bracket located towards the aircraft pylon side of the interface, circumferentially down the fan-case through a series of clamp block assemblies to termination posts on the VFG assembly.

Airbus has received several in-service reports of terminal lugs fracture at the VFG terminal block on RR engines. Fracture of the VFG terminal lugs can cause the loss of the related bus bar an lead to an in-flight turn back.

This Service Bulletin is published to advise all operators of A380 aircraft of the issue of AEROLEC Service Bulletin No. BA14600-24-09.

A double stud has been introduced to make the metric VFG boss compatible with the imperial standard so that standard bolts can be used to attach the feeder clamp to the VFG boss and thus improve the support of the power cables at the terminal block.

Accomplishment of this Service Bulletin ensures the compatibility of the VFG boss with the imperial standard and introduces improved support to the power cables. The improved power cable support will reduce risk of power cable fracture at the VFG terminal block on RR engines.

This Service Bulletin is included in the Fleet Improvement Program (FIP).

A380

SERVICE BULLETIN

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TITLE: ELECTRICAL POWER-AC VARIABLE FREQUENCY GENERATION (VFG) - DEFINE AND INSTALL STANDARD QS2-06 FOR VFG.

MODIFICATION No.: 73149T83475

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1. PLANNING INFORMATION

****CONF ALL**

A. EFFECTIVITY

(1) Models

380-841 380-842

(2) Effectivity by MSN

0003 0005-0006 0008 0010 0012 0014-0015 0019 0021-0022 0026-0027 0029 0031 0034 0036 0038 0041 0044-0045 0047-0048 0050-0051 0054-0055 0058 0061-0063 0065-0066 0069-0074 0076 0078-0079 0081-0082 0084-0085 0087-0089 0092-0093 0100

(3) Effectivity by Operator

The Operator/MSN relationship is provided for information only and is correct at the time of issue in accordance with the information available to AIRBUS. Any future changes resulting from transfer of an aircraft from one operator to another will not be reflected in this list unless the Service Bulletin is revised for another reason.

OPERATOR	MSN
CSN	0031 0036 0054 0088
DLH	0038 0041 0044 0048 0061 0066 0069 0070 0072 0073
MAS	0078 0081 0084 0089
QFA	0014 0015 0022 0026 0027 0029 0047 0050 0055 0062 0063 0074

0 DATE: Nov 19/12 SERVICE BULLETIN No.: A380-24-8055
REVISION No.: 00 - Nov 19/12 Page: 1

Figure 8 SB A 380

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MODIFICATION PROCEDURES (CONTINUED)

Modifications of aircrafts and aircraft components have to be developed in an approved design organization and accomplished in an approved maintenance organization.

The base for a modification can for example be:

- Service Bulletin of a design organization
- Airworthiness directives of the authority (LTA, AD-Note)
- Economical reasons
- The request of an aircraft operator.

The design organization describes which actions should be conducted and develops a type inspection program, which has to be approved by the authorities. If the modification has to be approved, the development closes with a type inspection.

This procedure should assure, that after the modification is accomplished, the aircraft or aircraft component is:

- designed in accordance with the specification regarding the modification,
- airworthy,
- has no feature or attribute, which affects a safe operation.

Not until these aspects are ensures, the approval for executing the modification by the Part-145 maintenance organization can be issued.

One alternative is an engineering order procedure for instance.

Modification procedures are part of the maintenance scope of a maintenance organization like also other complementing maintenance procedures. Working procedures and **working cards (Job Cards)** have to be edited, which show the work that has to be accomplished and the necessary qualification for this work.

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STORES PROCEDURES

Requirements from Part-145

The Part-145 requires, that the personnel is qualified for the right handling of the material.

Materials like e. g. components, standard parts or also lubricants and Raw materials:

Have generally to be marked at all time, according to the identity and the application.

- The identification is normally marked on the parts themselves by the manufacturer. If the type and the size does not allow such a identification, a adequate medium like e. g. a sticker, a tag or a package has to be used for that.

Have to be stored and transported in such a way that they are protected against damages and changes.

- The storing has to be done in a way, that materials are not affected negatively in their characteristics, e. g. humidity, light, radiation, static electric loads, temperature and so on.
- Manufacturer directives have to be observed and possible expiring dates have to be considered.
- During storage and handling (e. g. transportation) relevant working and environmental guidelines have to be observed.

Have to be defended from unauthorized access.

- The ”unauthorized access” is primarily regarded for materials, which are definitely not reusable. It has been occurred that unusable parts have been ”dolled up” and appeared at the surplus market.

Are stored in the categories ”useable” und ”unusable”.

- The division between useable and unusable material has to be assured organizational. This has particularly to be minded in shops. In these locations a regulation has to be declared definitely.

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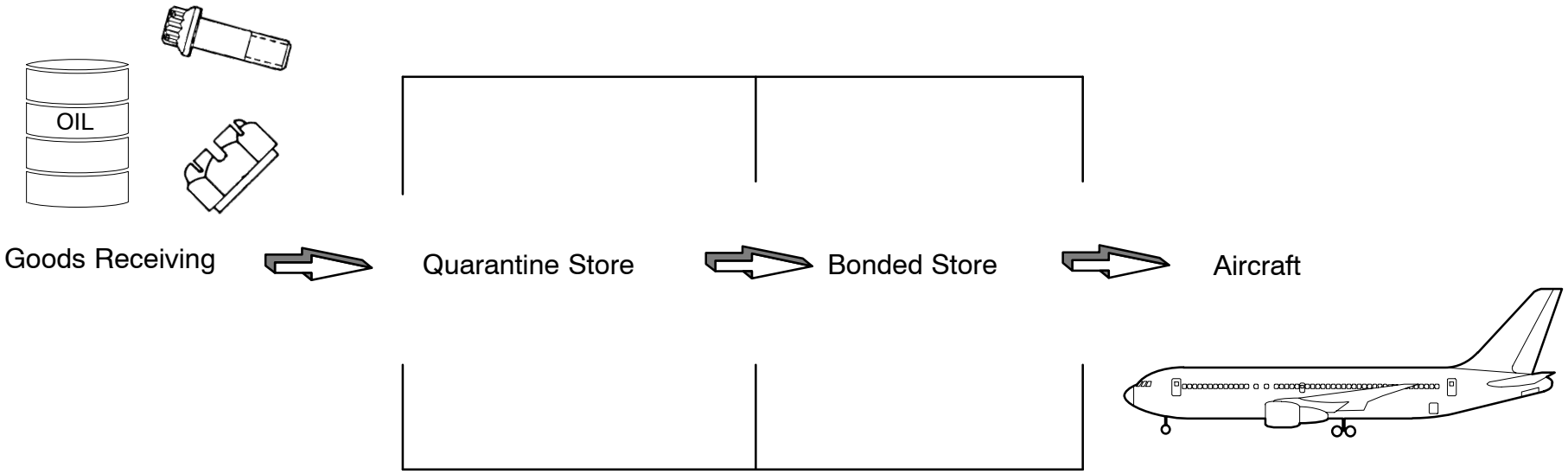


Figure 9 Handling of Materials

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STORE PROCEDURES (CONTD.)

When storing material, the following points have to be taken into consideration:

- The material used must conform to the relevant requirements / specifications.
- The material acquisition has to take place at a qualified / approved supplier.
- The material must undergo an incoming inspection before storage / usage.
- Defect material must be marked und excluded from further usage.
- The state of usage / identity of the material must be clearly recognizable at any time through appropriate marking (tags, certificates, ...).

According to its characteristics, the material must be suitably:

- packaged,
- stored (single batch) and
- transported.

Aircraft components removed from the aircraft for maintenance purposes are to be labeled with the aircraft registration number and the original assembly location (traceability).

Serviceable material must be stored separately from unserviceable material.

Material not to be used anymore, should:

- clearly be labeled as unserviceable,
- be permanently made unusable and
- be disposed of properly.

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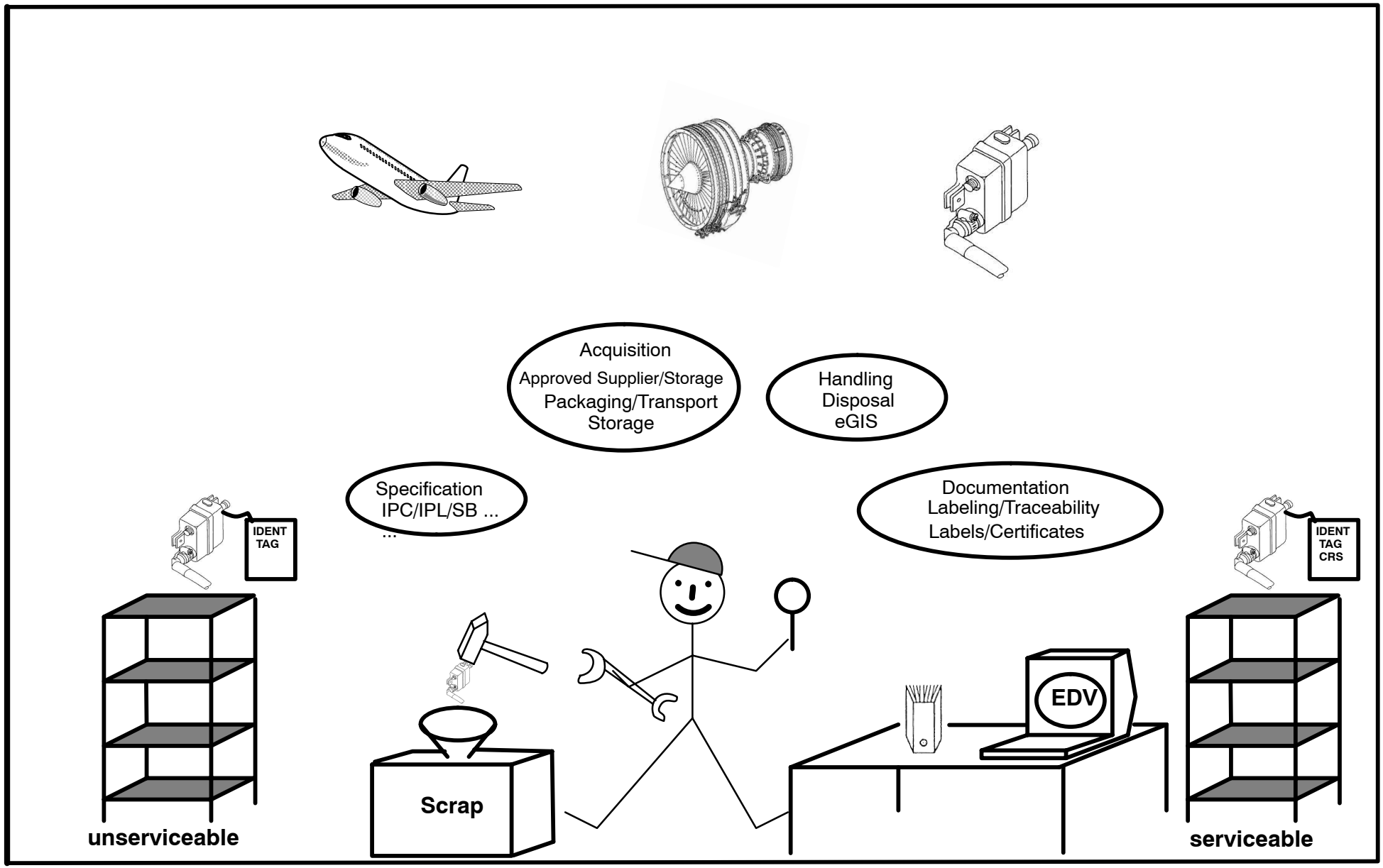


Figure 10 Store Procedures

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Material Differentiation

The materials can be differentiated into:

Standard Parts

- Parts in accordance with a national / international norm (DIN / MS / NAS ...)
- Parts specified in an Standards Part Manual approved by the respective national aviation authority of the type certificate holder.

Raw Material

- Semi-finished products which are not used until processed (sheets, profiles, ...).

Consumables

- Cleaning agents, pickling solutions, primers, lacquers, adhesives, lubricants, etc.

Aircraft Components

- Rotable components: Components for which maintenance documents are released.
- Expendables: Non-repairable aircraft components with part number, which have to be disposed of depending on the usage.

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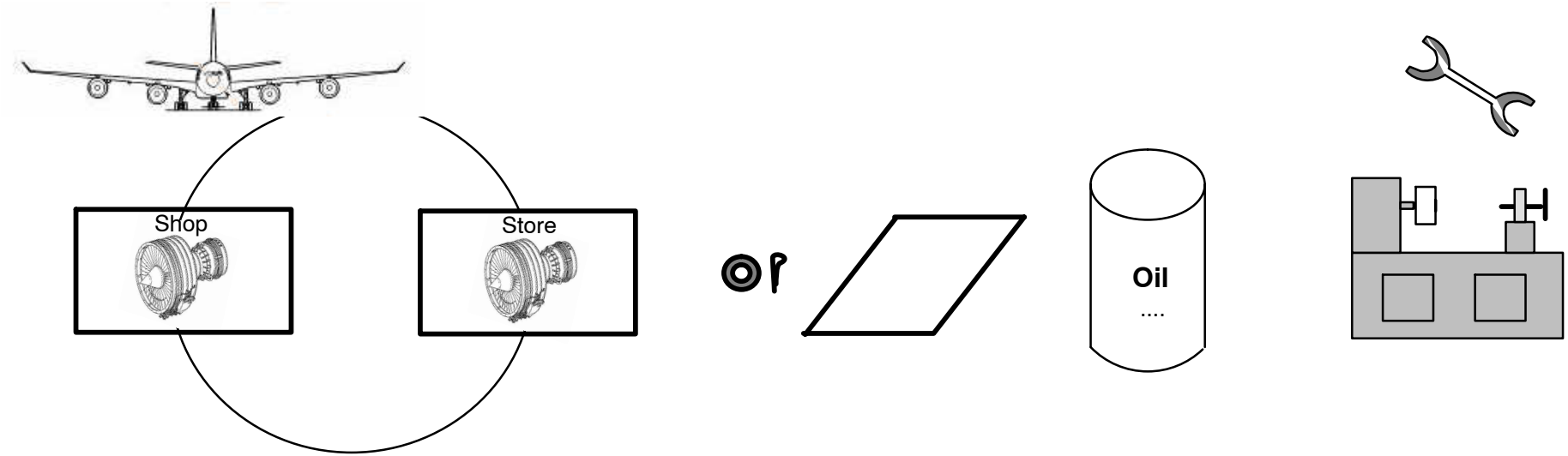


Figure 11 Material Differentiation / Material Types

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Material Classification

For the correct usage and the possible traceability of the material, it must be possible to classify the material correctly.

The following numbers serve this purpose.

Part Number (P/N)

The part number describes a specific type of device. It is located on the identification plate of the device.

Serial Number (S/N)

The serial number registers the individual device of a device type.

Every device of a specific type is equipped with one serial number only allocated to that single device.

With the serial number, the state of construction and the current location of a device can be followed.

Vendor / Manufacturer Number

A vendor / manufacturer number is allocated to every supplier / manufacturer.

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- Outer appearance
- Weight / material
- Surface finish



Figure 12 Identification Plate

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Traceability

Material stored and issued from the storage areas as well as new material received decentralized must be traceable back to its origin (manufacturer). On the other hand, used aircraft components must be traceable back to the last maintenance organization.

This is realized with the aid of the required documentation of release certificates and batch release certificates and their possibility to allocate them to a specific delivery.

The origin of consumables may be traced with the material reference data of the free stores.

Definitions

Traceability:

The possibility to trace back aircraft components and material with respect to the origin or the last maintenance organization.

Batch-wise storage:

Aircraft components and materials are separately stored according to their delivery, batch number etc. to allow for an accurate allocation to the respective release certificates / batch release certificates.

Cert. Ref. No. (reference number, batch number) :

It allows for the accurate allocation of the material to the respective release certificate / batch release certificate.

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1. Approving Competent Authority/Country Zuständige Genehmigungsbehörde / Staat **Luftfahrt-Bundesamt / Germany**	2. **AUTHORISED RELEASE CERTIFICATE** **EASA FORM 1** **Freigabebescheinigung EASA-Formblatt 1**				3. Form Tracking Number Lfd. Nummer
4. Organisation Name and Address: Name und Anschrift des Unternehmens					5. Work Order/Contract/Invoice Arbeitsauftrag/Bestellung/Rechnung
6. Item Pos.	7. Description Beschreibung	8. Part No. Teile-Nr.	9. Qty. Menge	10. Serial No. Werk-/Los-Nr.	11. Status/Work Status/Arbeiten
12. Remarks Bemerkungen					
13a. Certifies that the items identified above were manufactured in conformity to: Bescheinigt, dass die oben angegebenen Artikel hergestellt wurden in Übereinstimmung mit: ☐ approved design data and are in a condition for safe operation genehmigten Konstruktionsdaten und sich in einem betriebssicheren Zustand befinden ☐ non-approved design data specified in block 12 nicht genehmigten Konstruktionsdaten gemäß Angabe in Feld 12			14a. ☐ Part-145.A.50 Release to Service Teil-145.A.50 Freigabe ☐ Other Regulation specified in block 12 Andere in Feld 12 angegebene Vorschrift Certifies that unless otherwise specified in block 12, the work identified in block 11 and described in block 12, was accomplished in accordance with Part 145 and in respect to that work the items are considered ready for release to service. Bescheinigt hiermit, dass, wenn in Feld 12 nichts anderes festgelegt ist, die in Feld 11 aufgeführte und in Feld 12 beschriebene Arbeit in Übereinstimmung mit Teil-145 durchgeführt wurde und dass der Artikel im Hinblick auf diese Arbeit für die Erteilung einer Freigabe geeignet ist.		
13b. Authorised Signature Rechtsgültige Unterschrift	13c. Approval/Authorisation Number Nr. der Genehmigung		14b. Authorised Signature Rechtsgültige Unterschrift	14c. Certificate/Approval Ref. No. Nr. der Genehmigung / Zulassung	
13d. Name Name	13e. Date (dd mmm yyyy) Datum (TT MMM JJJJ)		14d. Name Name	14e. Date (dd mmm yyyy) Datum (TT MMM JJJJ)	

USER/INSTALLER RESPONSIBILITIES

This certificate does not automatically constitute authority to install the item(s). Where the user/installer performs work in accordance with regulations of an airworthiness authority different than the airworthiness authority specified in block 1, it is essential that the user/installer ensures that his/her airworthiness authority accepts items from the airworthiness authority specified in block 1. Statements in block 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.

VERANTWORTLICHKEITEN DES BENUTZERS/AUSRÜSTERS

Diese Bescheinigung verleiht nicht automatisch die Befugnis zum Einbau der Artikel. Führt der Benutzer/Ausrüster Arbeiten in Übereinstimmung mit den Vorschriften einer anderen Luftfahrtbehörde als der in Feld 1 angegebenen Luftfahrtbehörde durch, muss der Benutzer/Ausrüster sicherstellen, dass seine Luftfahrtbehörde Artikel der in Feld 1 angegebenen Luftfahrtbehörde akzeptiert. Angaben in den Feldern 13a und 14a stellen keine Einbaubescheinigung dar. In jedem Fall müssen die Instandhaltungsunterlagen des Luftfahrzeugs eine Einbaubescheinigung enthalten, die in Übereinstimmung mit den nationalen Vorschriften vom Benutzer/Ausrüster ausgestellt wurde, bevor ein Flug mit dem Luftfahrzeug durchgeführt werden darf.

Figure 13 EASA Form One

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Unapproved Parts

- The airworthiness of an aircraft / component can only be guaranteed if all components are manufactured and maintained in accordance with the applicable requirements and regulations.
- Unapproved aircraft components shall not be used since those parts are not airworthy.

Locating unapproved aircraft components

- Abnormality on components
  - Changed or unusual surface finish
  - Changed color of the component
  - Missing identification plate or unusual set-up, in particular changes in the part and/or serial number
  - Engraved part or serial number at an unusual location
  - A generally conspicuous, unusual appearance of the component
- Abnormality on documents and packaging
  - Missing, wrong or incomplete filled out documents
  - Changed, smeared, overwritten or overstamped entries, especially with date, part or serial numbers
  - Packaging material looks different, e. g. is not the original cardboard;
  - Usage of a simple packaging, such as missing protective cover
  - Slight changes in the company logo
- Unusual occurrences with suppliers
  - The required costs are significantly lower as with other suppliers.
  - The delivery time for a specific component, that is currently out of stock, is significantly shorter as with other suppliers.
  - The supplier gives the impression that he is able to deliver an unlimited amount of components.
  - The supplier is not capable of delivering the required accompanying documents instantly, especially the release document.
  - Unusual or suspicious financial transaction.

Blocking unapproved aircraft components

Aircraft components that might be unapproved are to be blocked until their usability has been clarified, i. e. they shall not be used until that time.

Feedback to the employees

After completing the investigations or the report for the responsible authority, the employee, who has started the initial report, must receive feedback on the process.

Documentation

All internal and external reports as well as other documents mentioned in this context must be stored for 5 years and used for the clarification of questionable cases of unapproved components.

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Interne Meldung nicht anerkannter Luftfahrzeugbauteile

Lufthansa Technik

Bezeichnung des Bauteils	Verwendung, LFZ-Muster	Laufende Nummer
Hersteller	Teil-Nummer	Zuständiger Bereich (TQ 31, TQ 2)
Serien-Nummer	Chargen Nummer	
Lieferant	Zeitpunkt der Lieferung	Tag der Feststellung
Vorhandene Dokumentation (Freigabebescheinigung, Workshop Report, Lieferschein etc.)		
Beschreibung, warum es sich um ein nicht anerkanntes Bauteil handelt bzw. handeln könnte.		
Woran wurde das Teil erkannt?		
Wo wurde das Teil entdeckt? (z.B. Luftfahrzeug, Lager, Werkstatt, Handlager, Next Higher Assembly)		
Weitere Angaben		
Kann das Teil bei Bedarf untersucht werden? (Kontaktperson, Abteilung mit Telefon-Nr.)		
Ist zu vermuten, dass weitere solche Teile im Umlauf sind?		
Name, Abteilung und Telefon Nr. des Meldenden		Datum

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CERTIFICATION AND RELEASE PROCEDURES

With the release certificate the release authorized person approves in the name of the approved maintenance organization that he has made sure that all instructed maintenance actions an objection removals are conducted and certified respectively deferred entirely and in accordance with the relevant determinations.

This is independent from the fact, that the release approved person has conducted the maintenance action, that has to be released and certified, by himself or not. For the certification of the release to operation is therefore only one approved person necessary.

For aircraft the CRS has to be done in the log book; Components are released with the FORM ONE.

Who is allowed to certify a CRS and when it is allowed to be certified emerges from the organizational regulations.

It has to be denoted in process instructions, how the release is done in detail. prior to the certification of an release the releasing as the responsible person has to clarify the following questions:

- Has the ordered maintenance action been conducted entirely?
- Has the aircraft owner been informed about not conducted orders/actions?
- Is for all changed / newly installed parts a release certificate present?
- Have necessary following working steps been conducted (e. g. Run-Up, test flight) respectively has the owner been informed?
- Have all objections been fixed? If not, has a approved procedure been used and have possible interactions been checked according to other already existing objection removal deferments? has the owner been informed, prior to the certification of the CRS?
- Are there any effects on the operation (ETOPS, CAT II/III)?
- Has the maintenance program of the aircraft owner been complied to?
- Does the identity of the component match with the papers?
- Are there any details about the status of use denoted in the CRS?
- Are all maintenance records complete and revisable?

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1. Approving Competent Authority/Country Zuständige Genehmigungsbehörde / Staat **Luftfahrt-Bundesamt / Germany**	2. **AUTHORISED RELEASE CERTIFICATE** **EASA FORM 1** **Freigabebescheinigung EASA-Formblatt 1**				3. Form Tracking Number Lfd. Nummer
4. Organisation Name and Address: Name und Anschrift des Unternehmens					5. Work Order/Contract/Invoice Arbeitsauftrag/Bestellung/Rechnung
6. Item Pos.	7. Description Beschreibung	8. Part No. Teile-Nr.	9. Qty. Menge	10. Serial No. Werk-/Los-Nr.	11. Status/Work Status/Arbeiten
12. Remarks Bemerkungen					
13a. Certifies that the items identified above were manufactured in conformity to: Bescheinigt, dass die oben angegebenen Artikel hergestellt wurden in Übereinstimmung mit: ☐ approved design data and are in a condition for safe operation genehmigten Konstruktionsdaten und sich in einem betriebssicheren Zustand befinden ☐ non-approved design data specified in block 12 nicht genehmigten Konstruktionsdaten gemäß Angabe in Feld 12			14a. ☐ Part-145.A.50 Release to Service Teil-145.A.50 Freigabe ☐ Other Regulation specified in block 12 Andere in Feld 12 angegebene Vorschrift Certifies that unless otherwise specified in block 12, the work identified in block 11 and described in block 12, was accomplished in accordance with Part 145 and in respect to that work the items are considered ready for release to service. Bescheinigt hiermit, dass, wenn in Feld 12 nichts anderes festgelegt ist, die in Feld 11 aufgeführte und in Feld 12 beschriebene Arbeit in Übereinstimmung mit Teil-145 durchgeführt wurde und dass der Artikel im Hinblick auf diese Arbeit für die Erteilung einer Freigabe geeignet ist.		
13b. Authorised Signature Rechtsgültige Unterschrift	13c. Approval/Authorisation Number Nr. der Genehmigung		14b. Authorised Signature Rechtsgültige Unterschrift	14c. Certificate/Approval Ref. No. Nr. der Genehmigung / Zulassung	
13d. Name Name	13e. Date (dd mmm yyyy) Datum (TT MMM JJJJ)		14d. Name Name	14e. Date (dd mmm yyyy) Datum (TT MMM JJJJ)	
USER/INSTALLER RESPONSIBILITIES This certificate does not automatically constitute authority to install the item(s). Where the user/installer performs work in accordance with regulations of an airworthiness authority different than the airworthiness authority specified in block 1, it is essential that the user/installer ensures that his/her airworthiness authority accepts items from the airworthiness authority specified in block 1. Statements in block 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. **VERANTWORTLICHKEITEN DES BENUTZERS/AUSRÜSTERS** Diese Bescheinigung verleiht nicht automatisch die Befugnis zum Einbau der Artikel. Führt der Benutzer/Ausrüster Arbeiten in Übereinstimmung mit den Vorschriften einer anderen Luftfahrtbehörde als der in Feld 1 angegebenen Luftfahrtbehörde durch, muss der Benutzer/Ausrüster sicherstellen, dass seine Luftfahrtbehörde Artikel der in Feld 1 angegebenen Luftfahrtbehörde akzeptiert. Angaben in den Feldern 13a und 14a stellen keine Einbaubescheinigung dar. In jedem Fall müssen die Instandhaltungsunterlagen des Luftfahrzeugs eine Einbaubescheinigung enthalten, die in Übereinstimmung mit den nationalen Vorschriften vom Benutzer/Ausrüster ausgestellt wurde, bevor ein Flug mit dem Luftfahrzeug durchgeführt werden darf.					

EASA Form 1 – 145 Issue 2
EASA Formblatt 1 – 145 Ausgabe 2

Vorlagenversion 2

Figure 14 EASA Form 1

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CERTIFICATION AND RELEASE PROCEDURES (CONTD.)

The owner is responsible for the airworthiness of his aircraft. That means that:

- Maintenance and production work on aircraft and aircraft components must be released after their completion of certifying staff on behalf of the Part-145 organization.

A release certificate is required:

- prior to every flight of an aircraft which underwent maintenance,
- principally after completed maintenance of an removed aircraft part,
- after the production of an aircraft component.

A release certificate shall only be issued for work tasks on those aircraft types and aircraft components which are part of the officially approved scope of the LHT maintenance or production organization and for which the specific requirements for the maintenance / production are met.

The certifying staff confirms that the maintenance or production work task to be released were carried out

- in accordance with the applicable maintenance or production requirements for the aircraft or aircraft component,
- in accordance with the applicable definition in the management manual and
- in the stated scope.

The release certificates are to be issued in accordance with the EASA requirements (Form 1, contents, approval number, etc.).

A copy of the release certificate must be given to the customer or enclosed to the aircraft component.

- For states other than EASA states, the release of maintenance is carried out based on the EASA Part-145 approval of the LHT, provided no other official approval exists for this state or this maintenance scope.
- Should working procedures be approved for customers whose aircraft or aircraft components are registered in another country, the release (provided the scope of approval is present) is carried out in accordance with the procedures set in this state (approval, form sheet, etc.).
- The release of the working procedures only does not authorize the serviceability of components. The serviceablity must be determined with suitable measures prior to use / every installation.
- For aircraft components maintained or produced by organizations approved by a non-aviation authority in accordance with the QM system in the course of the approval as maintenance or production organization, the release is carried out by certifying staff of the responsible production unit.
- With components instantly installed in an aircraft after maintenance without intermediate storage, a release certificate is not required.
- For aircraft or aircraft components not mentioned in the respective approval, maintenance or production measures may be carried out in accordance with the specifications of the customer. Nevertheless those measures cannot be released for service by an aviation authority. The release may only be issued by a maintenance or production organization approved for this purpose.

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1. Approving Competent Authority / Country	2.	3. Form Tracking Number
LBA / Germany	**AUTHORISED RELEASE CERTIFICATE** **EASA FORM 1**	

4. Approved Organisation Name and Address:	5. Work Order/Contract/Invoice
Lufthansa Technik	**Lufthansa Technik AG** Weg beim Jäger 193 P.O. Box 63 03 00 D-22313 Hamburg Federal Republic of Germany

6. Item	7. Description	8. Part No.	9. Eligibility (*)	10. Qty	11. Serial / Batch No.	12. Status / Work

13. Remarks

FSCM ATA TP MK-No. Pack Code Resp. Workshop Workshop Station

DUAL RELEASE EASA / FAA

Return to Service in Accordance with U.S. Federal Aviation Regulations
This civil aeronautical product has been maintained altered, or modified (as appropriate) in accordance with U.S. Federal Aviation Regulations

For Lufthansa Technik AG,

FAA Certificate No.

Note: If the above statement is completed with a location designation and certificate number, the statement in block 19 indicating "Other regulation specified in block 13" is checked, and block 20 of this EASA Form 1 is signed, this signature constitutes approval for return to service according to FAR 43.9 with respect to the work performed (see FAA Advisory Circular AC 145-7 as revised).

For storage conditions see CMM or operator's maintenance program.
Limited life parts must be accompanied by maintenance history including total time

14. Certifies that the items identified above were manufactured in conformity to:	19 ☐ Part-145.A.50 Release to Service ☐ Other Regulation specified in block 13
☐ approved design data and are in condition for safe operation ☐ non-approved design data specified in block 13	Certifies that unless otherwise specified in block 13, the work identified in block 12 and described in block 13, was accomplished in accordance with Part- 145 and in respect to that work the items are considered ready for release to service.

15. Authorised Signature	16. Approval / Authorisation Number	20. Authorised Signature	21. Certificate / Approval Ref. Number
	DE.21G.0047		**DE.145.0001**
17. Name	18.Date (d/m/y)	22. Name	23. Date (d/m/y)

EASA FORM 1 - Issue 1
USER/INSTALLER RESPONSIBILITIES

Note:
1. It is important to understand that the existence of the document alone does not automatically constitute authority to install the part/component/assembly.
2. Where the user/installer works in accordance with the national regulations of the Airworthiness Authority different from the Airworthiness Authority specified in block 1 it is essential that the user/installer ensures that his/her Airworthiness Authority accepts parts/components/assemblies from the Airworthiness Authority specified in block 1.
3. Statements 14 and 19 do not constitute installation certification. In all cases the aircraft maintenance record must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

LHT Form 30800 K-04 (HAM WG) Printed in the Federal Republic of Germany

(*) Installer must cross-check eligibility with applicable technical data

Figure 15 LHT - EASA Form One with Dual Release

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Release Certificate after Maintenance and Production

With the release certificate, the certifying staff confirms on behalf of the approved maintenance or production organization, that he has convinced himself that all performed maintenance or production procedures are complete and carried out (or not carried out in exceptional cases) and certified in accordance with the relevant requirements (AMM, CMM, specifications, etc.). Additionally he certifies that he is not aware of any conditions that may pose a serious threat to the flight safety.

This applies independently from the fact whether the certifying staff carried out and certified the maintenance or production measures to be released themselves. The certificate of release to service may only be issued by certifying staff (single signature principle) with the highest required authorization.

It might be the case that, within one work package, a different release certificate might be required than for the overall release. This individual task / defect removal must then be released by the respective certifying person in the documents (Example: avionic tasks / defects within an A Check to be released by an Part-66 Cat B2 certified person, still the overall release is performed by an Part-66 Cat B1 certifying person).

Authorization for the Release to Service of Aircraft Components

A release to service may be issued for procedures carried out in accordance with the maintenance release certificates.

Responsibility of the Certifying Staff

The certifying staff can rely on the system for the division of labor used by the organization and thus on the related work confirmations of other personnel or systems in support processes, i. e.:

The certifying staff usually does not need to check such work steps or data from the support systems again (e. g. flight hours / flight cycle acquisition, component lifecycle acquisition, order tracking systems, defect acquisition systems), unless obvious visible defects are present.

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Folgen Sie zum Aufrufen der jeweiligen Freigabebescheinigung bzw. Ausfüllanleitung dem hinterlegten Link:

|	1. EASA Form1 (Feld 13 + Freigabe)
|	2. EASA Form1 (Feld 3 – 23)
|	3. EASA Form1 (Feld 12 + 13)
|	4. EASA Form1 Herstellung, Freigabe
	5. Freigabebescheinigung für CAAC (China)
	6. Freigabebescheinigung für JCAB (Japan)
|	7. Freigabebescheinigung PCA (Saudi Arabien)
|	8. Freigabebescheinigung FAA (USA)
	9. Unserviceable Tag (LHT- Freigabe Formularsatz)
	10. Unservicable Tag (Kundengerät)
	11. Workshop Report (Kundengerät)

Figure 16 LHT Types of Certificates

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INTERFACE TO THE AIRCRAFT OPERATOR

The fact that the operator is responsible for the airworthiness of his aircrafts alone results in a stringent necessity of a tight relationship between the operator and the maintenance organization.

Especially if the operator has no own Part-145 approval, all aspects that are relevant for the operational safety have to be endured. The EASA stipulates here explicitly a written contract design.

Mainly the EU-OPS1 remarks to this topic, because the responsibility is there.

The Part 145 organization is in this context the contractor, which has to fulfil the asked and ensured services.

Like it has been denoted at the beginning, a tight relationship between the operator and the maintenance organization is required. this contains all sections from the work planning to the release to flight.

Even if the operator is not a Part 145 organization, he is responsible for the airworthiness and so for the maintenance of his components. Therefore he has to demonstrate the aeronautical authority, how he is going to comply with this responsibility. This means he must show a contract with a part 145 organization, which treats very detailed all aspects beginning at the maintenance schedule, over the allocation of maintenance, up to the operational release.

- Scope of work

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Maintenance Contract

about:

Aircraft Maintenance
Engine Maintenance
Aircraft Line Maintenance

regarding:

- **Scope of work**
- **Locations**
- **Subcontracting**
- **Maintenance programme**
- **Quality monitoring**
- **EASA - NAA involvement**
- **Airworthiness data**
- **Incoming conditions**
- **Airworthiness directives**
- **Service Bulletins / Modifications**
- **Hours & cycle control**
- **Component removal**
- **Life limited parts**
- **Supply of parts**
- **Pooled parts**
- **Scheduled maintenance**
- **Unscheduled maintenance / Defect rectification**
- **Deviation from service documentation**
- **Test flight**
- **Release to service documenttation**
- **Maintenance recording**
- **Reliability report**
- **Exchange of information**
- **Meetings**

Figure 17 Maintenance Contract

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INTERFACE TO THE AIRCRAFT OPERATOR (CONTD.)

Due to requirements by authorities, an interface to an Part-145 organization must exist. That interface can be realized with the m-techlog for instance.

M-techlog is an IT system which is mainly used of technical organizations worldwide for the processing of aircraft defects.

All aircraft system defects, defect removals, defect resets and changes of material are recorded in the “m-techlog“ computer system for aircraft in route service.

This can be realized with the direct acquisition of entries from the recording media (TLB, CLB, GLB, ...) or via special form sheets into the m-techlog system.

The m-techlog allows for an allocation of the recorded data with regard to different criteria (e. g. aircraft registration number, ATA chapter, aircraft type, ...).

Based on the different criteria, specified lists can be generated for the respective requirements of the user (IW 06 - history / aircraft registration number or IW 09 - history / reference number - TLB, CLB, GLB ...).

The main functions of this system consist of:

- Digital documentation of the aircraft defects and their removal measures,
- Collection of routine and non-routine aircraft component changes,
- Classification of ad hoc maintenance action orders,
- Acquisition of performed maintenance checks,
- Possibility to communicate with the flight crew of the operator,
- Provision of data for:
  - the aircraft weak-point analysis,
  - the fault localization,
  - the material planning,
  - deferred defect removals,
  - information on the technical state of the aircraft and
  - the technical aircraft history.

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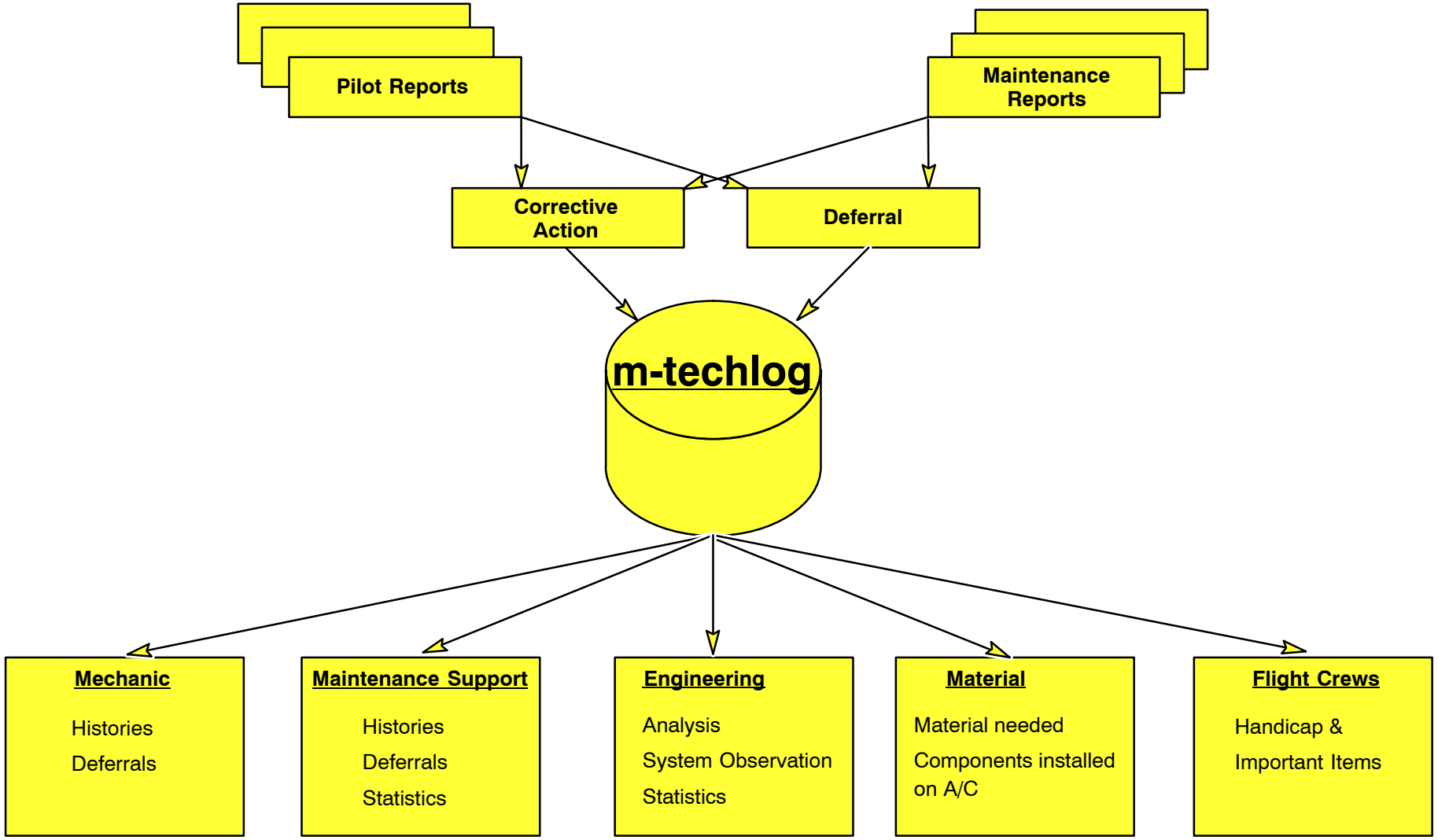


Figure 18 The LHT m-techlog System

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INTERFACE TO THE AIRCRAFT OPERATOR (CONTINUED)

The fact that the operator is responsible for the airworthiness of his aircrafts alone results in a stringent necessity of a tight relationship between the operator and the maintenance organization.

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Maintenance Contract

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- **Quality monitoring**
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- **Pooled parts**
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- **Deviation from service documentation**
- **Test flight**
- **Release to service documenttation**
- **Maintenance recording**
- **Reliability report**
- **Exchange of information**
- **Meetings**

Figure 19 Maintenance Contract

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MAINTENANCE INSPECTION/QUALITY CONTROL/QUALITY ASSURANCE

Quality inspections to protect the product quality have to be planned and conducted for all maintenance work tasks on aircraft and aircraft components.

Every conductor of a work is also committed to check his work. This is approved by a ”check-off” (stamp, signature, electronically) of this work step.

Furthermore it has to be determined in the maintenance documents and working papers, which steps have to be checked in a secondary inspection and which require a special qualification.

So it has to be determined, which workings require an additional inspection (e. g. authority directives) and procedures have to be developed, how the review of the determination is done.

To achieve an optimization and an increase in safety and economy, both the maintenance organization and the operator should install an improvement program. This bases on experience consideration of the MRBD, ADs, MPD, reliability tracing etc.

The QM System

The quality management system should achieve three things:

- At one hand the product quality has to be assured.
- At the other hand the described systematics and the described procedures have to be checked for their meaningfulness and their application. As third, the system is used to inform the accountable manager about the status of his organization and to give him a basis for the optimization.
- By audits, it can be tested if the quality management system is working. The system has to be organized in such a way that a certifying staff has the opportunity to attest that all work steps have been conducted in accordance with the Part-145 directives, before the aircraft is released to operation.

The Audit

To audit means to check, if:

- a process is adequately defined and is adequately described;
- the described process is appropriate;
- the process is applied;
- in the case of differences, what the reasons for them are.
- how the process can be improved.

The staff, who conducts the audits, has to be independent in accordance with Part-145. This means that not one person is allowed to be responsible for the process or work execution and for the audit about this particular process or this particular work at the same time. The personnel, who conducts the audits, is under the supervision of the quality manager.

The Part-145 organization must conduct the audits according to an approved audit plan. Generally all approved class ratings, like they are listed in the approval, should be audited once a year.

Special Defects

Defects on aircrafts as well as aircraft components detected during maintenance, which might endanger the airworthiness of the aircraft, must be reported to the Luftfahrt-Bundesamt (LBA), the Civil Aviation Authority of Germany.

Who reports and what?

Reports can come from all areas, such as production and administration.

This system includes the report of defects and faults relating to the maintenance and production of aircrafts and aircraft components. The following types of defects are differentiated:

Technical Defects

- Technical faults
- Defects with equipment and operating material
- Defects caused during the performance of work
- Mistakes with the customer support
- Localization of foreign objects

Other Defects

- Mistakes in work procedures
- Mistakes in the documentation
- Mistakes in the communication
- Unfulfilled authority requirements

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Quality Assurance

The quality management documentation can consist of several parts. It describes the structure and organizational framework as well as the means to realize quality goals and quality politics set by the executive board of the company.

The management and all employees are obligated to work in accordance with the specifications of this QM documentation.

The prescribed documentation must be used for the modification or maintenance of aircrafts as well as for the production, maintenance and modification of aircraft components and equipment.

The editor / author of a document is responsible for the respective contents.

Editors of documents can be:

- Aircraft and aircraft component design organizations,
- Aircraft owners,
- Aviation authorities,
- Equipment design organizations,
- National and international organizations,
- Head of the division and department of LHT.

The maintenance organization is responsible for the procurement, release, acquisition, distribution and revision of documents for the organization itself as well as for customers, provided it was contractually agreed on.

It needs to be ensured that the current documentation is available to all users (sites, shops) in paper format, on microfilm/microfiche or via electronic data medium/online availability (DMS - document management system).

The documentation must be managed in a way so it is possible for the user to check the revision state of the documents.

The users must ensure to use the valid documentation for the respective work tasks.

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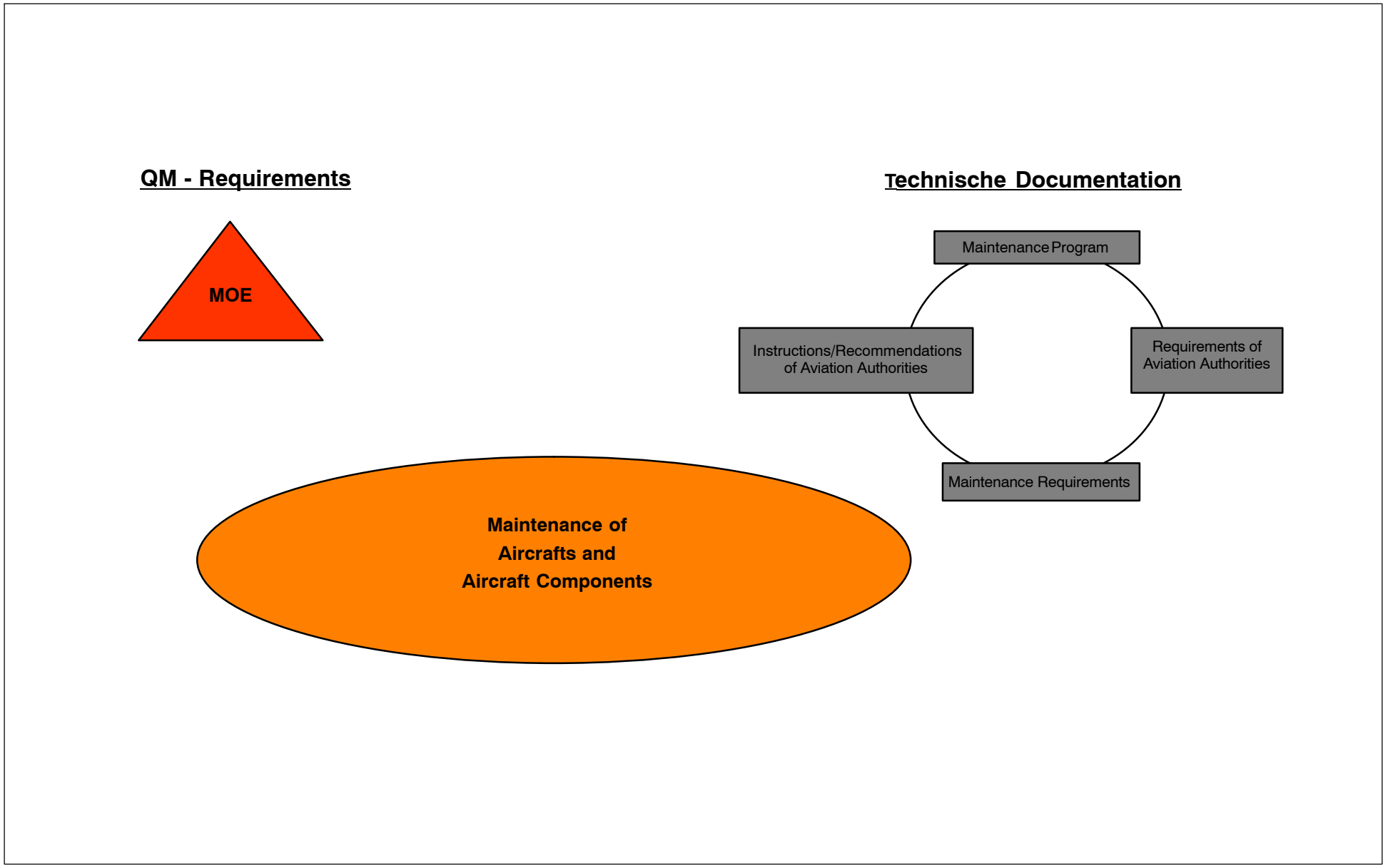


Figure 20 Basics of Quality Assurance

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ADDITIONAL MAINTENANCE PROCEDURES

Additional maintenance procedures can be emerging from:

- Authority directives (AD, LTA, etc.)
- Recommendations of the design/production organization

These can be: modifications, inspections, testings and repairs.

For this, a procedure has to be developed, how

- the documents are obtained and distributed;
- the actions to be conducted are published in the organization;
- the documentation and the release is realized.

One possibility is for example an engineering order procedure.

Authority directives (LTA, AD-Note, etc.)

If there are serious faults on an aircraft or an aircraft component of one aircraft type, the aircraft operator, the manufacturer and the maintenance organization are directed to inform the responsible aviation authority about the fault.

If necessary, the aviation authority then prescribes authority directives for the particular aircraft type and respectively similar models and direct hereby compulsory:

- Operational restrictions
- Checks/Inspections
- Modifications

For the execution of the action, a obligatory time frame is directed by the particular authority.

After exceeding this deadline, the affected aircraft or aircraft component is not allowed to be used in normal operation anymore.

For the work procedure this means:

- Authority directives have to be conducted paramountly.
- Authority directives should especially be marked in the documentation.
- Authority directives underlie special inspections.

"Authority directives" of the individual aviation authorities

German Civil Aviation Authority (LBA - Luftfahrt Bundesamt)

- LTA ➧ Lufttüchtigkeitsanweisung, i. e. Airworthiness Directive

American aviation authority (FAA - Federal Aviation Authorities)

- AD-Note ➧ Airworthiness Directive

Service Letter/Service Bulletin

The aircraft and aircraft component manufacturers constantly work on the improvement of their components and procedures. The aircraft operator and maintenance organizations are informed about this via service letters and service bulletins.

Service Letter

Provide general information.

Service Bulletin

Describes technical modifications/inspections/procedures, their implementation and provides:

- Planning information
- Effectivity reason
- Description
- Approval
- Manpower
- Material information
- Tooling
- Accomplishment information
- Preparation, procedures
- The decision if the SB is conducted is usually in the hands of the operator, unless the SB is instructed to be mandatory by authority directives.

Non-routine Events

These are for example work tasks which result from entries in the log book (TLB, CLB) or also from ground findings. Here a procedure has to be developed as well, i. e. on how these workings are accomplished and released or respectively deferred and who is responsible.

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Luftfahrt-Bundesamt

Lufttüchtigkeitsanweisung
LTA-Nr.: 2003-139

Datum der Bekanntgabe: 01.05.2003

Muster: General Electric CF6 CF6-80	**AD der ausländischen Behörde:** FAA AD 2003-02-07 Amdt. 39-13024
Geräte-Nr.: 6307, 6318	**Technische Mitteilungen des Herstellers:** -keine-

Betroffenes Luftfahrtgerät:

General Electric
CF6, CF6-80

- Baureihen: CF6-50 und CF6-80C2

- Werk-Nrn.: Alle

Hinweis:
Triebwerke der Baureihe CF6-80C2, ausgerüstet mit Niederdruck-Turbinengehäusen (LPT, Low Pressure Turbine Case), Hersteller-Teilenummer (P/N) 1647M68G15, mit den Gehäuseverstärkungsringen (Shrouds)
Stufe 2
P/N 1862M62G01 oder 1862M62G03 und
Stufe 3
P/N 1862M63G01 oder 1862M63G03 und
Stufe 4
P/N 1862M64G01 oder 1862M64G03
sind von dieser Lufttüchtigkeitsanweisung nicht betroffen.

Betrifft:
Niederdruckturbine, Verstärkungsringe am Turbinengehäuse (low pressure turbine, turbine case shrouds, ATA-Code 72-50-00) - Verstärkung des Turbinengehäuses für den Fall von Schaufelbrüchen - ggf. können ohne diese Gehäuseverstärkungen Bruchstücke von Turbinenschaufeln aus dem Triebwerksgehäuse austreten und schwere Schäden am Luftfahrzeug verursachen.

Maßnahmen:
Im Rahmen dieser Lufttüchtigkeitsanweisung sind folgende Maßnahmen vorgesehen:

1. An Triebwerken CF6-80C2 sind die vorhandenen Gehäuseverstärkungen der Niederdruck-Turbinenstufen 2 bis 4 gegen folgende Gehäuseverstärkungen auszutauschen:
   Stufe 2:
   - P/N 2083M12G01, PCT2083M12G01, KT2083M12G01 oder H042*
   Stufe 3:
   - P/N 2083M13G01, PCT2083M13G01, KT2083M13G01 oder H042*
   Stufe 4:
   - P/N 2083M14G01, PCT2083M14G01, KT2083M14G01 oder H042*
2. An Triebwerken CF6-50 sind die vorhandenen Gehäuseverstärkungen der Niederdruck-Turbinenstufen 1 bis 4 gegen folgende Gehäuseverstärkungen auszutauschen:
   Stufe 1:
   - P/N 1822M35G01, PCT1822M35G01, KT1822M35G01 oder H036*
   Stufe 2:
   - P/N 1822M36G01, PCT1822M36G01, KT1822M36G01 oder H037*
   Stufe 3:
   - P/N 1822M36G02, PCT1822M36G02, KT1822M36G02 oder H037*

Aktenzeichen: (10)M121-502.1/2003-139 Seite 1 von 2

EASA AD No : 2011-0088

EASA | **AIRWORTHINESS DIRECTIVE**

AD No.: 2011-0088

Date: 13 May 2011

Note: This Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EC) No 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation.

This AD is issued in accordance with EC 1702/2003, Part 21A.3B. In accordance with EC 2042/2003 Annex I, Part M.A.301, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD unless otherwise specified by the Agency [EC 2042/2003 Annex I, Part M.A.303] or agreed with the Authority of the State of Registry [EC 216/2008, Article 14(4) exemption].

Type Approval Holder's Name :	**Type/Model designation(s) :**
AIRBUS	A340-500/-600 aeroplanes

TCDS Number :	EASA.A.015
Foreign AD :	Not applicable
Supersedure :	None

ATA 52	**Doors – Nose Landing Gear (NLG) Aft Doors – Hinge Attachment Fittings and Swan Neck – Inspection/Replacement**
Manufacturer(s):	Airbus (formerly Airbus Industrie)
Applicability:	Airbus A340 model -541, -542, -642 and -643 aeroplanes, all manufacturer serial numbers.
Reason:	An operator has reported cracks on the aft hinge forward (FWD) fittings (hinge #5) of the NLG aft doors (Right Hand (RH) side or Left Hand (LH) side). The cracks extended by approximately 15 millimetres from the upper hole to the edge of the fittings. Investigation has revealed that these cracks have initiated due to fatigue loads and propagated under bending load. Cracks on the NLG aft door fittings, if not corrected, could lead to the in-flight detachment of the door, possibly resulting in injury to persons on the ground or damage to the aeroplane. In order to maintain the structural integrity of the NLG aft door aft hinge attachment fittings, EASA issued EASA AD 2010-0028, which requires repetitive inspections at hinge #5. Additional investigations have shown that inspections are also necessary for the hinge #4. For the reasons described above, this AD requires repetitive inspections of the FWD and AFT attachment fittings and of the swan neck at the forward hinge #4 and their replacement, as necessary.

EASA Form 110 Page 1/3

Figure 21 German (LTA) & EASA Airworthiness Directive (AD)

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CONTROL OF LIFE-LIMITED COMPONENTS

This section gives general information on the concepts and practices of aircraft maintenance control by the use of Condition Monitored Maintenance.

Confidence in continued airworthiness has long been based on the traditional method of maintaining safety margins by the prescription of fixed component lives and by aircraft 'strip-down' policies.

However, there has been a need for change to this basic philosophy of aircraft maintenance, influenced by

- the economic state of the industry
- changes in aircraft design philosophy, and
- progress in engineering technology.

Primary Maintenance

There are three types of primary maintenance processes practised today.

3. **Hard Time**. This is a preventative process in which known deterioration of an item is limited to an acceptable level by the maintenance actions which are carried out at periods related to time in service (e. g. calendar time, number of cycles, number of landings).

These actions normally include

- servicing
- overhaul
- partial overhaul and
- replacement.

This process is applied to an item when

- the failure of the item has a direct adverse effect on airworthiness and where evidence indicates that it is subject to wear or deterioration
- there is a hidden function which cannot be checked with the item in-situ
- wear or deterioration exists to such an extent that a time limit is economically desirable
- component condition or 'life' progression sampling is practised, and
- limitations are prescribed in a Manufacturer's Warranty.

4. **On-Condition**. This is also a preventative process but one in which the item is inspected or tested, at specified periods, to determine whether it can continue in service. On-Condition philosophy is to remove an item before it fails, **not** 'fit until failure' or 'fit and forget it'.
5. **Condition Monitoring**. This process is one in which information on items gained from operational experience is collected, analyzed and interpreted on a continuing basis as a means of implementing corrective procedures.

It is applied to items whose failure does not have a direct adverse effect on operating safety and no adverse age reliability relationship has been identified.

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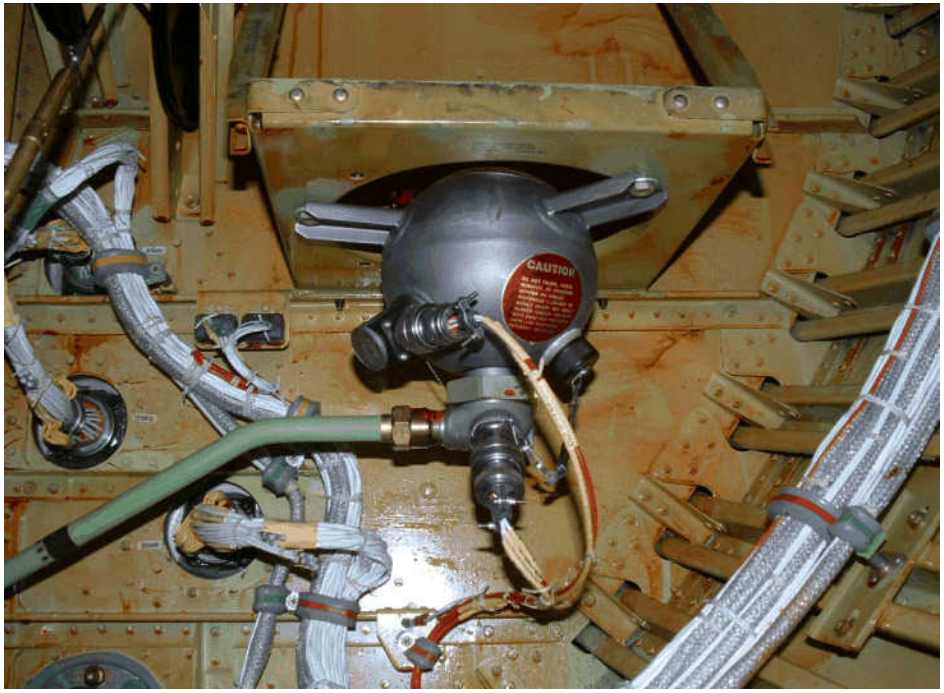








Figure 22 Limited Life Time

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COMPONENTS OPERATING & STORAGE LIMITS (COSL)

This application is responsible for the organization of maintenance regulations for devices operated in aircrafts.

The maintenance regulations specified by employees are customer-specific operating and storage limits for devices with the respective maintenance measures.

For every customer/aircraft type combination, such a regulation with the name COSL (Components Operating and Storage Limits) is set up. That regulation must be approved by the relevant aviation authority.

Contents

COSL includes:

- all components on which maintenance tasks must be carried out (after removal) to ensure their airworthiness,
- the time interval or the time limitation after which a maintenance task must be carried out (installation and/or storage period) and
- the tasks to be carried out to be able to issue a release to service after complete maintenance.

Requirements

The maintenance intervals stated in COSL are **minimal requirements** and must **not** be exceeded.

With components that are subject to the operating **and** storage limits, time tracking must take place **continuously**, regardless of whether the components are installed or stockpiled in the storage.

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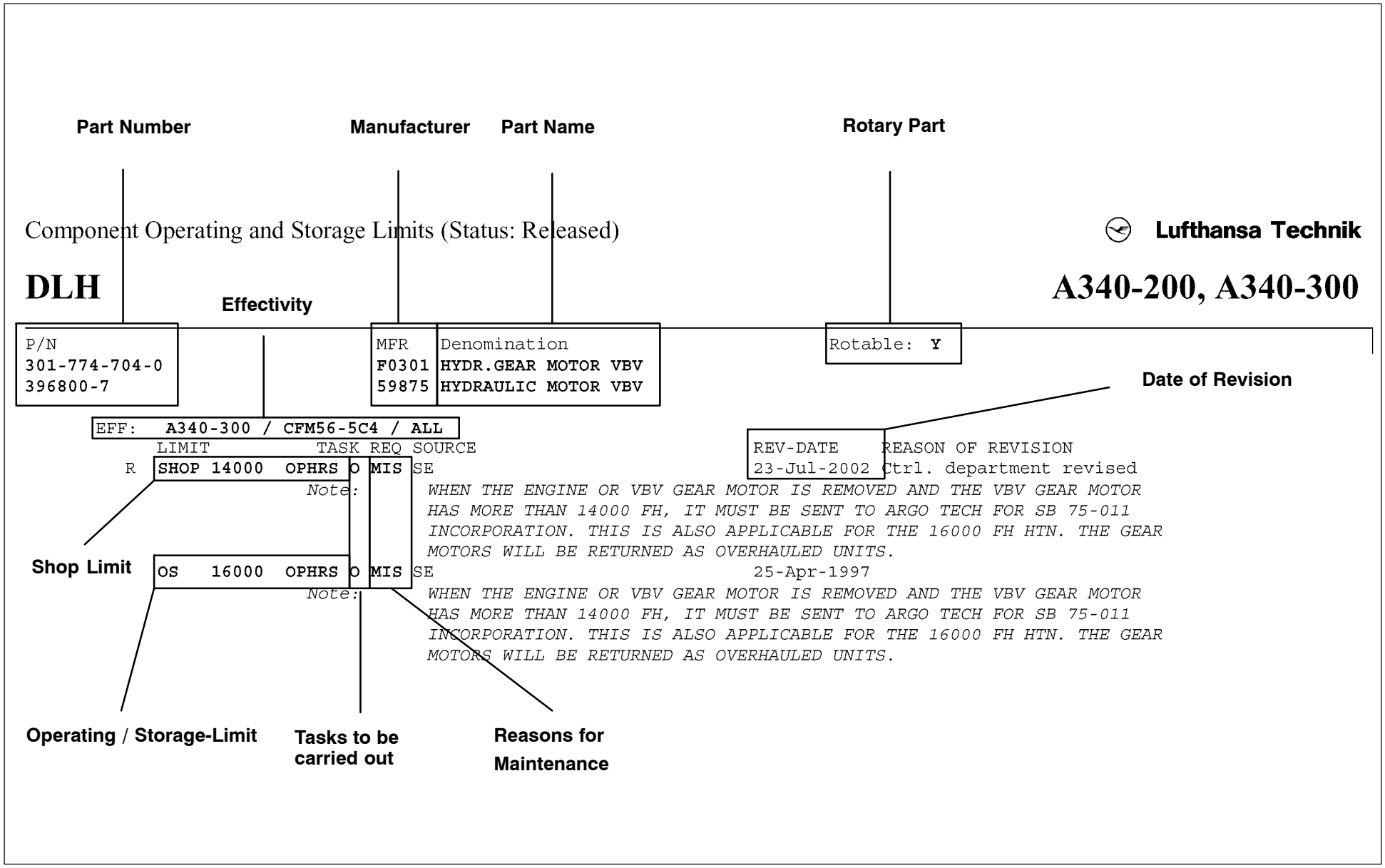


Figure 23 LHT - COSL (Example)

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