

Back to Birth and Life Limited Part Considerations

Presented by Sofema Aviation Services (SAS) www.sassofia.com

Introduction

By 2025, more than half of all the commercial aircraft in airline service globally will be controlled by the multiple aircraft leasing companies.

The lessor's primary business is preserving the value of their asset, means ensuring that the aircraft will retain the maximum possible value whilst generating lease income and maintaining adequate reserves.

Commercial aircraft leases are onerous and provide a number of complications related to legal, technical, and logistical issues. Commercial lessors often require that the aircraft and its technical records be in a condition that exceeds the regulator's airworthiness requirements.

An aircraft with poor technical records (even they may be compliant with regulatory obligations) will have an adverse effect on current value and may also affect the residual value.

Operators often fail to fully consider the technical requirements that are imposed on them when they lease aircraft. The challenge being that the Operators will throughout the lease, remove, repair, and replace parts. (Particularly related to Engines and APUs) means it is unlikely that returns will ensure the same S/N as originally provided.

The vast majority of components which are fitted to aircraft today are considered to be on condition, this means that the component may remain fitted to the aircraft until an imminent failure is detected.

Configuration Control

However even components which are on condition are typically subject to configuration control – which means the component which is fitted must correspond to the aircraft data. Essentially it is only when the dash no (of the part No is incremented is there likely to be a configuration issue.

Component Status

The important thing is to ensure the component status is clearly identified on the incoming documentation – Form 1 or 8130-3 or equivalent

Certain Components which are fitted to the aircraft have a "life limit" which can be described in Flying Hours FH, Cycles CYC or Calendar Time CAL.

Important Note - The technical records for these “life limited components” form part of the Continuing Airworthiness Records and are of critical importance to the integrity of the technical records.

Note also that when these components are removed serviceable they are considered to be “part life” and we should ensure that we track and officially recorded this information.

AD’s Modifications & Service Bulletin Effect on Components

In Addition, Components are subject to various Airworthiness Directives AD’s Modifications and Service Bulletins. It may also be that Part No of the component changes after modification. For example, a component part No 1234-02 changes and becomes a 1234-03.

Alternatively, the modification data plate may be altered to record that mod 1 (for example has been accomplished)

Life Limited Parts – Traceability

To enable the traceability of LLP it is required to have details of the part “Back to Birth” in terms of Fitment & and Certifiable Hrs, Cyc or Landings. Not only from a regulatory compliance point of view but in terms of the obligations under a lease agreement.

There are no industry templates to support Back to Birth evidence so it is up to the organisation Incoming Inspection to satisfy this element – Discuss!

What Do We Mean by Back to Birth?

Some Confusion is evident because EASA does not use the term Back to Birth (BTB) however lessors typically use BTB in the commercial lease terms.

Instead of just tracking the number of flight hours or flight cycles, most lease arrangements require operators to adhere to the principles of back-to-birth and back-to-overhaul traceability.

So to understand that it is industry rather than the regulators who drive the BTB requirements.

The term “back to birth” is not used in European regulations. The requirements that apply to a service life-limited component (see definition in AMC M.A.305) are basically stated in M.A.305 (e) and (h). All detailed maintenance records of a maintenance action (e.g. a restoration) must be kept until another maintenance action equivalent in scope (another restoration) is done, but never less than 36 months. Keep in mind that:

A service life limited component log card must be kept with all the relevant information, so the action should be recorded there, and

The records showing compliance with other requirements stated in M.A.305, e.g. an airworthiness directive, or any other information that could be affecting the configuration of the aircraft, must be retained too.

Delivering full Back to Birth requires the records to include

- a) The original OEM Production Conformance Certificate or 8130-3/EASA Form One
- b) A record of the operators or MROs that the component has passed through
- c) A certified record of the hours that the part has been on the wing.
- d) A statement of non-incident/accident is also required

Retention Period For Component Technical Records (Not LLP)

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So clearly we can see that the EASA regulations do not support an effective component management process as “preferred” by many stakeholders within the industry.

The challenge becomes to accept that Hrs / Cycles & Landings are NOT going to be available for ALL components. (They Must be for LLP of course)

Acceptance of Life Limited Parts

FAA requires the tracking of LLPs reference 14 CFR §43.10, “The part may be controlled using a record keeping system that substantiates the part number, serial number, and current life status of the part. Each time the part is removed from a type certificated product, the record must be updated with the current life status. This system may include electronic, paper, or other means of record keeping.”

The EASA regulations treat LLPs in a somewhat similar fashion. EASA M.A. 305 states that technical records must include “the component life limitation, total number of hours, accumulated cycles or calendar time and the number of hours/cycles/time remaining before the required retirement time of the component is reached.

- a) The total time in service of the LLP part, along with its installation history since new. (a certified log book entry), or a certified component status computer printout from an air operator
- b) Form 1, FAA 8130-3, or an acceptable maintenance release

14 CFR Part 43.10 titled “Disposition of life-limited aircraft parts.”

Life-limited Part means any part for which a mandatory replacement limit is specified in the type design, the Instructions for Continued Airworthiness, or the maintenance manual. A life-limited part is designated as such during the certification process. The key word in the definition is “mandatory.” That is a mandatory replacement limit as opposed to a recommended replacement limit.

Life status means the accumulated cycles, hours, or any other mandatory replacement limit of a life-limited part.

The second term defined in the new rule is “life status.” The “life status” is simply where the part is in its life cycle or timeline or how much of the limit is used up.

The mandatory replacement times for a part come initially from the type certificate. The type certificate for an aircraft, engine, or propeller either calls out the mandatory replacement limit for parts specifically within the content of the type certificate or it may refer to another document that calls out the limitations.

Best Practice

- a) Each time a part is removed from an aircraft the life status must be recorded or updated in the record keeping system. The system may be computer or paper-based and must include the part number, serial number, and current life status of the part.
- b) Life-limited parts can be removed and segregated from all other parts as long as a system is in place to record the part number, serial numbers, and life status of the part and the parts are stored in a physical location unmistakably separate from parts that are eligible for installation on an aircraft, engine, or propeller.
- c) Life-limited parts are generally serialized, but not always. For example, the wing bolts on a Raytheon King Air B200 are limited to 15 years but they are not serialized or marked in any special way.
- d) Part Life LLP should be accepted into the system with addition acceptance by the Engineering Technical Services and or Quality Assurance Dept.

Technical Records System Integrity

Without the technical records to support an aircraft the value of the aircraft is severely compromised. As the leasing community has a vested interest in maintaining the integrity of the value chain there is clearly a strong influence related to the viability of the records.

Hard Time Considerations – Landing Gear are Hard Time & LLP

Additionally, the operator can expect to return the aircraft with a contractually agreed to amount of life remaining on both hard time-limited components and LLPs.

Landing gear assemblies are examples of hard time and LLP with the difference between hard time limited assemblies and LLPs being that components with hard time limits are intended to be overhauled, tested, and reused. LLP on reaching End of Life (EOL) must be permanently removed from the supply chain.

Leasing companies usually require overhauled hard time components to typically provide sufficient documentation, including physical records (dirty fingerprint).

More is not Always Better!

There is a lack of a standard in relation to the acceptance of Life Limited Parts. Conflicts caused by gaps in understanding related to regulatory requirements, the perceived need for more documentation without providing a commensurate Cost /Benefit (Return on Investment).

Due to a lack of such standard, a “more is better” concept has emerged where multiple checks are undertaken include Regulatory, Aircraft Maintenance Organisation, Customer (Lease Obligations).

Return to Lessor Considerations

a) Common records TC /STC Airworthiness, Registration, etc.

b) Status of life-limited components, hard time components, airworthiness directive and service bulletin compliance data, maintenance program data.

Potential Considerations related to variations applicable to LLP components

An engine may operate at different power ratings depending on the airframe installation (life cycle factor applied to one power rating as a limitation).

A landing gear operating on gravel or containing a structural (safe life) component that is subject to a different life limit penalty when it is operated at an increased maximum take-off weight.

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