European Union Aviation Safety Agency

Continuing Airworthiness domain

Return to service of aircraft from storage: guidelines in relation to the COVID-19 pandemic

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Revision record

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01	20-07-2020	Initial issue

1. Purpose of these guidelines

This document provides guidance that can be used by continuing airworthiness management organisations (CAMOs) and approved maintenance organisations (AMOs) to support the return to service of aircraft that have not flown for several weeks or months due to the special situation resulting from the COVID-19 pandemic. This may also be used by competent authorities while accompanying and performing the oversight of these approved organisations in the return to normal operation activities.

More specifically, it proposes organisations to analyse the foreseeable process and identifies some hazards (list non-exhaustive) and potential mitigating measures when returning to service a large number of aircraft of an operator's fleet, put on storage during the pandemic. While the purpose of the guidelines is to maintain the level of safety of the aircraft, following this guidelines may also avoid undesirable operational constraints or financial implications.

2. Introduction

The aviation world has been heavily impacted by the COVID-19 pandemic. In particular, air operations with passengers have been drastically reduced, if not fully suspended, and an unprecedented number of aircraft have been grounded. This situation has caused severe financial pressure on air operators, as well as on their service providers and the whole supply chain.

Thanks to a gradual lifting of travel restrictions amongst countries, air operators are now starting to resume passenger flights. This requires first of all, to restore to an airworthy condition the aircraft stored for weeks or months.

Considering the unprecedented scenario, it is very likely that affected organisations were not totally prepared for the rapid storage of aircraft and some of the hazards affecting the return to service of aircraft may not be obvious. At this point in time, the organisations management systems play an essential role in identifying these hazards and defining strategies to mitigate the associated risks, and thus ensuring a safe return to normal operations. Different to the traditional management systems that use known past occurrences and experience to identify hazards and build up mitigations, in this case, the current unprecedented situation demands also for the pro-active anticipation of the potential difficulties and their proper consideration and the rapid adaptation of the internal processes based on lessons learnt with the first aircraft returned to operations.

3. Analysis

While several actors are involved (operations departments, AMOs, type certificate holders (TCHs), competent authorities (NAAs), etc), the CAMO should lead this process of hazard identification and risk management, since they know the configuration and status of the aircraft and are responsible for ensuring the airworthiness condition of the aircraft before they fly again.

In this respect and for the particular scenario applicable to each organisation, the CAMO should analyse the process that needs to be followed to return the aircraft to service and that it is handed-over to the operations department/customer. This analysis has to be performed with a close cooperation with the AMO responsible to collect the first data on the condition of the stored aircraft (see chapter 3.2).

The analysis should start already in advance of the operational needs and execution of the tasks, by a pro-active exercise. Thinking ahead permits to gain time since it would allow to discover situations that may not have been foreseen. For this analysis, the CAMO should brainstorm on the process tailored to its particular case and foresee the different undesirable scenarios that could arise. Once hazards are identified, and risks assessed, it is possible to define mitigating strategies to overcome or reduce the likelihood or the severity of the consequence of the hazard.

3.1 Proactive identification of hazards

For this exercise, the CAMO, in consultation with the AMO, should consider, for instance, the following:

Starting point and current status of each individual aircraft: What was the aircraft condition when stored? Were the TCH storage procedures followed? Throughout the full period? By an appropriately rated AMO? Have there been enough protective covers available for the entire fleet or has the AMO used alternate methods? Is there sufficient tooling and ground equipment available? Has the airworthiness review certificate (ARC) expired? What schedule maintenance tasks became overdue during the storage period? Any AD to consider? What typical maintenance tasks will be required after storage? Have parts been robbed from the aircraft? Could the aircraft have sustained damage? What is the situation in regards of items that had been deferred using the MEL or any 'carry forward maintenance task'?

Fuel condition: Has approved biocide been used on the fuel and at the amount set by the aircraft/engine manufacturer?

Supply Chain: Will parts and material be available as needed to avoid disruptions? Will tools and other necessary equipment at AMOs? Are proper supply chain agreements in place to ensure that the work can be performed as agreed? Have lessors and/or other aircraft/component owners been informed?

Human resources: Plan ahead the staff that need to work on the different stages of the process. Are the required staff available, in healthy condition and not quarantined? Can the staff travel to the aircraft? Might the health safety recommendations for people affect the way they work? Are staff able to access the premises? Could the CAMO/AMO staff be distracted, disrupted or preoccupied, and therefore not focused on its tasks because of COVID-19? Are the AMO staff well qualified and competent to follow the storage procedures?

Information access and exchange: Is information of the aircraft accessible remotely to all relevant staff and organisations involved? Can the ICA be accessed? Can staff communicate easily within the organisation and between different organisations? Consider if IT resources could impact your operations if you need to organise virtual meetings and any impact on telephone communications.

Procedures: When was the last time that the CAMO/AMO used the procedure for return to service of aircraft on long term storage? Is this procedure still adequate for the current scenario and complies with the rules? Are the personnel positions referred to in the procedure currently staffed (in particular staff nominated to take decisions) and do they understand their roles?

Combination of above elements: Is there a chance that the combination of multiple elements considered above increase the level of risk for the return to operation?

Inform others about your intentions: Are other organisations involved aware of my intentions and does the CAMO understand its customer's needs? In particular:

- AMOs: need to plan resources, hangar space, procure spare parts and consumables, relocate tooling and ground equipment, potentially acquire special tools and double-check the status of calibrated tools and status of the maintenance data;
- TCHs: clarification of the instructions to be followed, additional support in the form of a non-technical objection or repair designs due to any damage that occurred on the aircraft during the storage, additional instructions in case the storage procedures were not complied with;
- flight department including planning operations: coordination to identify the need of aircraft with a specific configuration (e.g. cargo in cabin) and inputs before the first flight such as if a check flight or an in-depth review of the pre-flight inspection/checks for the first flights is needed, exchange of information recorded in the on-board maintenance computer, discussion on the status of the deferred items and consequences for the flight crew. If a check flight is needed, identification of special attention items that the flight crew should focus on during the flight, such as discrepancies in speed and altitude indications and engine parameters. The coordination should also include special checks before flying RVSM and ETOPS operations;
- lessors and other equipment owners of the aircraft and its parts: assess impact of decisions on existing commercial contractual agreements and if needed discuss possible solutions;
- other service provided by any third party: consider any additional input or need of coordination, for instance in relation with line maintenance support at any destination and in relation to fuel quality at the airports; and
- NAA: contact them in advance for any request such as permit to fly (PtF), exemption, aircraft maintenance programme variations, expired certifying staff licenses or issuance of the ARC.

3.2 Reactive identification of hazards (data collection from the AMO and analysis)

It is essential that information related to particular defects, unexpected findings and conditions found by the AMO on aircraft while preparing it for return to service and which can be reasonably assumed to be linked with storage is collected and linked, where applicable, to a fleet of aircraft being stored in the same or similar condition. As a matter of fact, same aircraft types stored at the same time and same environment are expected to behave in the same way. This data should be collected as soon as possible after the manifestation of the defect or condition on a single aircraft and exchanged with the CAMO without delay. Some findings may also need to be communicated to the TCH and to the competent authority.

The CAMO should have a team of experienced staff ready to analyse this data and capable of developing amendments to maintenance work orders/job cards, or other document such as pre-flight inspection.

4. Non-exhaustive list of hazards and mitigating strategies

The early analysis of the process to be followed to return to service a significant number of aircraft will lead to the identification of hazards and related risks for which mitigating strategies can be defined upfront. The risks entitled by such hazards can only be assessed by each organisation, but a list of non-exhaustive hazards and mitigations are provided below as reference.

4.1 Aircraft storage

4.1.1.

a) Hazard: Aircraft not (or not fully) stored in accordance with storage procedures and ICA.

b) Mitigation:

- Group aircraft from the same type and stored under the same conditions (assumption that similar aircraft types stored at the same time and in the same environment are expected to behave in the same way as the ones sampled) and consider to perform, with the support from the TCH when needed, supplemental physical aircraft inspection and ground test on the first 20% (at least 2) of the aircraft of each group. Ground tests should cover things like engine runs, exercising the flight controls and breaking/steering test.
- Assess the need of performing flight checks on the first 10% of the fleet (at least 1 aircraft) of each group.
- In case of findings, the sampling of each group may be extended to address the issue and confirm the trend (see chapter 3.2).
- Report to TCH and NAA/EASA any unexpected findings found during the additional inspections and tests, to contribute to the improvement of TCH recommended practices.

4.1.2.

a) Hazard: Aircraft stored at airfields where only minimum maintenance services are available.

b) Mitigation:

- Consider that the AMOs and other service providers at the remote storage locations may get overwhelmed with large number of aircraft that need to return to service at the same time.
- Consider, together with the involved AMO, the possibility to send additional maintenance staff at this remote location, including the need of tools, facilities, documentation and replacement parts.
- If not possible, consider if the aircraft can be brought to a safe condition to allow it to be ferried to another location, including the need of a PtF.

4.1.3.

a) Hazard: Robbery of spare parts from one aircraft for use on another aircraft.

b) Mitigation:

- Perform an independent check to verify that these actions are recorded in the aircraft records and match with the results of a physical inspection of the aircraft.
- Plan to conduct ground checks on the affected systems of this aircraft once newly available parts are installed.

4.1.4.

a) Hazard: Effects of the environment during aircraft storage (e.g. humidity, salt, dust, ashes, etc).

b) Mitigation:

- Consider additional protection (e.g. sealant coating of engine inlets and leading edges, and seat cover and cushion removal during storage) as long as not contradicting TCH instructions.
- Contact the TCH for additional support if needed to add inspection items to the return-to-service procedures for structure or parts sensitive to environmental effects. For example, engineering judgment should select opening of some panels located in lower external zones where accumulation of water could occur.

4.2 Personnel

4.2.1.

a) Hazard: Absence of key personnel.

b) Mitigation:

- Nominate as soon as possible adequate deputies for the different activities and record decisions taken, so in case of doubt they can be confirmed at a later moment.

4.2.2.

a)Hazard: Commercial or time pressure while conducting airworthiness review or other inspections.

b) Mitigation:

- Plan ahead availability of airworthiness review staff (ARS) that may be needed to conduct aircraft documental reviews and aircraft physical surveys. Consider if the ARS needs to be accompanied by a certifying staff for the physical survey.

4.2.3.

a) Hazard: Commercial or time pressure affecting human performance.

b) Mitigation:

- Plan realistically, plus add margins.
- Explain mitigating measures put in place to gain staff confidence. Remind them to ask managers when in doubt.
- Remind 'just culture' principles.

4.3 Procedures

4.3.1.

a) Hazard: Aircraft not preserved/protected fully in accordance with storage procedures.

b) Mitigation:

- Consider implementing an audit programme for aircraft in storage to ensure that all required tasks are both called out and actually accomplished.
- Consider the need for additional maintenance, for instance: cleaning and lubricating as needed parts that have not been effectively protected as it was recommended (e.g. lack of available covers and possibility of insect/bird nesting); conducting analysis for fuel contamination; evaluating batteries condition; etc.
- Consider dedicated inspections for potentially affected areas.
- Contact the aircraft/engine TCH to decide if additional maintenance tasks are required before the aircraft is released to service and share any relevant findings during inspections.

4.3.2.

a) Hazard: Inappropriate decision making in unknown situation (the organisations/teams may face situations not addressed in existing organisation approved procedures) and subject to changes.

b) Mitigations:

- Remind all staff to report problems or unknown situations and do not act on their own.
- Create a dedicated team involving knowledgeable, experienced and responsible staff for decision making in a changing scenario. Communicate to affected people the decisions taken and record them.

- Assign to competent people the assessment of the changing circumstances, analysing the impacts on aircraft safety. Task certifying staff for the assessment of aircraft defect, when not addressed by the MEL.
- Review guidelines and published recommendations to cater for the scenario of the Covid-19 pandemic. When needed, discuss with the competent authority the special situations.

4.3.3.

a) Hazard: Staff with limited experience on storage procedures.

b) Mitigation:

- Refresh the procedures through training.
- Prepare leaflets and communicate repeatedly key messages.
- Prepare checklists when needed.
- Apply 'just culture' principles.

4.3.4.

a) Hazard: Covid-19 health recommendation poses restrictions on group activities.

b) Mitigation:

- Consider in advance what tasks/activities may be affected due to health recommendations and plan based on them (e.g. establish isolated teams working on shifts or remotely (if this does not affect job effectiveness), while ensuring adequate and timely flow of information).

4.3.5.

a) Hazard: Aircraft returning to operation with overdue maintenance.

b) Mitigation:

- Follow the principles expressed in EASA FAQ n. 116314 or FAQ n. 116316.
- Review ADs, including ADs which may have been issued since the aircraft was stored. Consider if a PtF is needed.

4.4 Services from suppliers

4.4.1.

a) Hazard: Suppliers not delivering on time or the required quantity or with the expected quality.

b) Mitigation:

- Ask for their operational status before entrusting them with activities and plan ahead with them.
- Remind them to review also their own risks to mitigate them, providing you with feedback.
- In case of doubt, ensure your concerns are addressed properly.

4.4.2.

a) Hazard: AMO tools and equipment not serviceable (e.g. AMO tools calibrations expired or tools corroded due to lack of use without adequate protection).

b) Mitigation:

- Before the tools/equipment are needed, request verification of their condition.

4.4.3.

a) Hazard: Need to complement workforce with external personnel, that are not used to our working methods.

b) Mitigation:

- Identify the internal procedures that these staff need to know before they start to work and trained them on the application of these procedures.
- Assess fully their competence before they start to work and assign them all-time-available supervisors.

5. Conclusions

This paper raises awareness of possible hazards and suggest possible mitigations following the potential risks of aircraft returning to service after storage. However, a more detailed risk assessment needs to be conducted by the relevant organisation taking into account their particular activities and must be performed by competent staff. Once the analysis is conducted, internal and external communication with the relevant organisations and the competent authority allow the third parties to also plan ahead in order to support the process.