SEMAE3163

Overhauling aircraft gas turbine engine compressor assemblies

Overview

This standard identifies the competences you need to carry out a complete overhaul of aircraft gas turbine engine compressor assemblies, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft engines. The compressor assembly to be overhauled will have been removed from the engine assembly and the overhauling activities may take place in a workshop or hangar.

In carrying out the overhauling operations, you will be required to follow laid-down procedures and use specific dismantling and rebuilding techniques. The overhauling activities will involve removing all ancillary components and sub-assemblies, removing the compressor blades, stators, bearings and seals, and stripping the compressor housing of all its components. You will then be expected to inspect the components for damage and wear and to make decisions on which components can be reused and which will need replacing. You will then rebuild the compressor assembly, which will involve fitting replacement or overhauled sub-assembly units (such as compressor housing, stators, compressor blades) and the replacement of all damaged, worn and `lifed' components. The overhauling activities will include making all necessary checks and adjustments to ensure that components are correctly replaced, positioned, aligned, adjusted, torque loaded, locked and fastened, and that the correct sealants are used.

Your responsibilities will require you to comply with organisational policy and procedures for the overhauling of the aircraft gas turbine engine compressor assembly, and to report any problems with the overhauling activities, or with the tools and equipment used that you cannot personally resolve or that is outside your permitted authority, to the relevant people. You must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area on completion of the activities, and that all necessary job/task documentation is completed accurately and legibly. You will be expected to work with a minimum of supervision, taking personal responsibility for your actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying appropriate overhauling techniques and procedures to aircraft gas turbine engine compressor assemblies. You will understand the dismantling and reassembly methods and procedures used and their application. You will know how the compressor assembly functions, the purpose of the individual

components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities to the required specification. In addition, you will have sufficient knowledge of these components, to ensure that they are fit for purpose and meet the specifications, thus providing a sound basis for carrying out the reassembly.

You will understand the safety precautions required when carrying out the overhauling activities associated with aircraft gas turbine engine compressor assemblies, especially those for lifting, handling and supporting the equipment being removed and replaced. You will be required to demonstrate safe working practices throughout and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. follow the relevant overhauling schedules to carry out the required work
3. establish the components to be removed and where appropriate, mark components to aid re-assembly
4. ensure that any stored energy or substances are released, safely and correctly
5. carry out the overhaul to the agreed level, using the correct tools and techniques
6. ensure that all removed components are correctly identified and stored in the correct location
7. replace/refit components using appropriate methods and techniques
8. carry out checks on the overhauled engine using correct procedures
9. report any instances where the overhauling activities cannot be fully met, or where there are identified defects outside the planned overhaul schedule
10. complete the relevant documentation, in accordance with organisational requirements
11. dispose of unwanted components, waste materials and substances, in accordance with safe working practices and approved procedures
12. deal promptly and effectively with problems within your control and report those that cannot be solved
13. leave the engine in a safe and appropriate condition, free from foreign object debris

Knowledge and understanding

You need to know and understand:

1. the specific safety practices and procedures that you need to observe when overhauling aircraft gas turbine engine compressor assemblies (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
2. the health and safety requirements of the area in which the overhauling activity is to take place and the responsibility these requirements place on you
3. the hazards associated with overhauling aircraft gas turbine engine compressor assemblies (such as handling oils, greases, stored pressure/force, use of power tools, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down overhauling procedures, lifting and moving large and heavy components) and how to minimise them and reduce any risks
4. the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to
5. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the overhaul
6. how to obtain and interpret drawings, specifications, manufacturers' manuals, history/maintenance reports and other documents needed in the overhauling process
7. how to carry out currency/issue checks on the specifications you are working with
8. the quality control procedures to be followed during the overhauling operations
9. the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul
10. company policy on the repair/replacement of components during the overhauling process
11. terminology used in aircraft gas turbine engine compressor assemblies
12. the principles of how the compressor assembly functions, its operating sequence, the working purpose of individual units/components and how they interact
13. the extent to which the equipment is to be dismantled for overhaul
14. the sequence to be adopted for the dismantling/reassembling of the compressor assembly

15. the techniques used to dismantle the aircraft gas turbine engine compressor assembly, without damage to the components or surrounding structure (such as release of energy/pressures/force; making mechanical disconnections; proof marking components to aid reassembly; removing assemblies having interference fits (such as expansion, contraction, and the use of presses and extractors); removing mechanical locking and securing mechanisms/devices)
16. the need to protect the system integrity by ensuring that exposed components are correctly covered/protected
17. how to lift and move large components and assemblies; the methods and equipment used to transport, handle and lift the components during the overhauling activities
18. the need to ensure that lifting and handling equipment is within its current certification dates
19. methods of checking that components are fit for purpose, how to identify defects and wear characteristics, and the need to replace `lifed' items (such as seals and gaskets)
20. the uses of measuring equipment (such as micrometers, verniers, expansion indicators and other measuring devices)
21. methods of reassembling the aircraft gas turbine engine compressor assembly, using new or previously overhauled components (such as replacing assemblies requiring pressure/force, ensuring correct orientation, bedding in bearings and components, replacing mechanical locking and securing mechanisms/devices, torque setting components)
22. how to make adjustments to replaced components/assemblies to ensure that they function correctly (such as checking alignment, balancing of rotating components such as turbines, setting working clearance, setting travel, and pre-loading bearings)
23. the various mechanical fasteners that are used, and their method of removal and replacement (including rivets, threaded fasteners, special securing devices)
24. the various types of electrical connector that are used, methods of unlocking, orientation indicators and locating and locking-in of the connections
25. why electrical bonding is critical and why it must be both mechanically and electrically secure
26. the tools/equipment used in the overhauling activities and how to check that they are in a safe/usable condition
27. the importance of ensuring that all tools are used correctly and within their permitted operating range

28. the importance of ensuring that all tools, equipment and components are accounted for and returned to their correct location on completion of the overhauling activities
29. the procedure for the safe disposal of waste materials
30. the generation of maintenance documentation and/or reports following the overhauling activity
31. the problems that can occur during the overhauling activity and how they can be overcome
32. the extent of your own authority and to whom you should report if you have a problem that you cannot resolve

Scope/range related to performance criteria

1.

Carry out all of the following during the overhaul of the aircraft gas turbine engine compressor assembly:

1.1 obtain and use the appropriate documentation (such as job instructions, engine overhaul manuals, engineering drawings, technical instructions, and other relevant maintenance documentation)
1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.3 provide and maintain safe access and working arrangements for the overhauling area
1.4 obtain the correct tools and equipment for the activity, and check that they are in a safe, tested and usable condition and within current certification/calibration date
1.5 ensure that all oils, fluids and fuel have been drained/removed before breaking into the system
1.6 ensure that the compressor assembly is suitably supported and that appropriate lifting and handling equipment is available
1.7 carry out the overhauling activities, using approved techniques and procedures at all times
1.8 ensure that components and surrounding structures are maintained free from damage and foreign objects
1.9 return all tools and equipment to the correct location on completion of the activities

2.

Dismantle the aircraft gas turbine engine compressor assembly, to include removing all of the following:

2.1 compressor housing
2.2 bearings
2.3 locking devices
2.4 compressor stators
2.5 sub-assemblies
2.6 wire thread inserts
2.7 compressor blades
2.8 seals and gaskets
2.9 pipes and unions
2.10 curvic couplings
2.11 shims and packing

3.

Carry out all of the following activities on the equipment being overhauled:

3.1 cleaning parts prior to dismantling

3.2 replacing all damaged or defective sub-assemblies and components
3.3 pre-disassembly checks and tests
3.4 releasing stored energy (where applicable)
3.5 replacing all 'lifed' items (such as seals, bearings, gaskets)
3.6 draining/removing any remaining fluids
3.7 dismantling equipment to unit/sub-assembly level
3.8 reassembling the compressor
3.9 dismantling units to component level
3.10 balancing components (where applicable)
3.11 removing and replacing components having interference fits (such as by expansion, contraction, pressure)
3.12 'blue bedding' components
3.13 making mechanical connections
3.14 setting and adjusting replaced components
3.15 proof-marking/labelling of components to aid reassembly
3.16 tightening fastenings to the required torque
3.17 electrical bonding of components
3.18 checking components for wear and serviceability (such as visual, measurement, NDT, use of probes/scopes)
3.19 applying gaskets and sealant/adhesives
3.20 securing components using mechanical fasteners and threaded devices
3.21 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts)
3.22 applying protection to openings to prevent entry of contaminating debris

4.

Replace a range of compressor assembly components, to include ten of the following:

4.1 compressor housing
4.2 locking devices
4.3 compressor stators
4.4 wire thread inserts
4.5 compressor blades
4.6 pipes and unions
4.7 curvic couplings
4.8 mechanical controls (such as plungers, springs, rollers)
4.9 bearings
4.10 static seals/gaskets
4.11 electrical controls (such as solenoids, motors, switches)
4.12 dynamic seals
4.13 shims and packing
4.14 mechanical securing devices
4.15 other specific component

5.

Carry out checks and tests on the overhauled equipment, to include six of the following:

5.1 positional accuracy

5.2 operating/working clearance
5.3 orientation
5.4 visual inspection for completeness and freedom from damage or foreign objects
5.5 alignment
5.6 freedom of movement
5.7 'special-to-type' test rig checks
5.8 bearing end float

6.

Overhaul aircraft gas turbine engine compressor assemblies in compliance with one of the following:

6.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
6.2 Federal Aviation Authority (FAA)
6.3 Military Aviation Authority (MAA)
6.4 Aerospace Quality Management Standards (AS)
6.5 BS, ISO or BSEN standards and procedures
6.6 customer standards and requirements
6.7 company standards and procedures
6.8 engine manufacturer's requirements

7.

Complete the relevant paperwork, to include one of the following and pass it to the appropriate people:

7.1 job cards
7.2 computer records
7.3 aircraft log books
7.4 engine overhaul logs or reports
7.5 work authorisation documents
7.6 permit to work/formal risk assessment

Behaviours

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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