SEMAE3168

Overhauling components of aircraft rotor heads, blades and power transmission equipment

Overview

This standard identifies the competences you need to carry out overhauling activities on aircraft rotor heads, blades and power transmission equipment and components, in accordance with approved procedures. The equipment to be overhauled will have been removed from the aircraft and the overhauling activities may take place in a workshop or hangar.

It covers a range of aircraft power transmission equipment, such as drive shafts and drive shaft supports, main, nose, tail and intermediate gearbox assemblies, main and tail rotor head assemblies, accelerometers, vibration monitoring equipment and other aircraft specific equipment. The overhauling activities will include carrying out all necessary safety checks, dismantling the equipment to unit or component level, inspecting and checking all components for damage and wear, replacing all `lifed' items and worn/faulty components or units, reassembling the equipment and carrying out all necessary tests/checks.

Your responsibilities will require you to comply with organisational policy and procedures for the overhauling activities undertaken, and to report any problems with the overhaul 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, 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 own 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 procedures to aircraft power transmission equipment. You will understand the dismantling and reassembly methods and procedures used and their application. You will know how the equipment functions, the common faults encountered, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment meets the required specification.

You will understand the safety precautions required when carrying out the overhauling activities, especially those for handling large and heavy assemblies. 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. carry out the overhauling activities within the limits of your personal authority
4. carry out the overhauling activities in the specified sequence and in an agreed time scale
5. replace/refit components using appropriate methods and techniques
6. carry out checks on the overhauled equipment using correct procedures
7. report any instances where the overhauling activities cannot be fully met or where there are identified defects outside the planned schedule
8. complete the relevant documentation, in accordance with organisational requirements
9. dispose of waste materials in accordance with safe working practices and approved procedures
10. leave the equipment 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 power transmission equipment (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. hazards associated with carrying out overhauling activities on aircraft power transmission equipment (such as using lifting and handling equipment, handling oils and fluids, lifting and moving large and heavy assemblies, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down overhauling procedures) 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 extract and use information from aircraft manuals, history/maintenance reports, aircraft logs, charts, circuit and physical layouts, specifications, symbols used in aircraft power transmission systems, 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 procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul
9. terminology used in aircraft power transmission systems
10. the various types of component that make up the aircraft power transmission equipment (such as drive shafts, bearing housings, bearings, flexible couplings, pumps, control valves, pressure intensifiers, mechanical and electrical control devices)
11. why electrical bonding is critical and why it must be both mechanically and electrically secure
12. the principles of operation of the power transmission equipment being worked

on and the performance characteristics and function of the various sub-assemblies
13. the sequence to be adopted for the dismantling/reassembling of the various types of power transmission assemblies
14. the techniques used for dismantling the equipment to unit or component level, without damage to the components (such as release of pressures/force, draining of fluids, proof marking/labelling removed components, extraction of components and the need to protect the circuit integrity by fitting covers/protection)
15. the various mechanical fasteners to be removed and replaced, and their method of removal and replacement (such as threaded fasteners, circlips, special locking and securing devices)
16. methods of lifting, handling and supporting the components/equipment during the removal and replacement activities
17. recognition of contaminants and the problems they can create, the effects and likely symptoms of contamination in the power transmission system
18. methods of checking that components are fit for purpose and how to identify defects and wear characteristics
19. the uses of inspection/measuring equipment (such as gauges, micrometers, Verniers, dial test indicators, expansion indicators, mirrors, endoprobes, boroscopes, video probes, scales and other measuring devices)
20. how to identify defects and wear characteristics and the need to replace 'lifed' items (such as filters, seals, bearings and gaskets)
21. how to check that replacement components have the correct part/identification markings
22. how to reassemble the components (such as the use of gaskets and seals, jointing/sealing compounds; ensuring correct tightness of fittings and connections; eliminating stress on pipework/connections; carrying out visual checks of all components; checking the security of joints and that the system is safe to test)
23. the identification and application, fitting and removal of different types of bearing (such as roller, ball, thrust)
24. why securing devices need to be tightened to the correct torque, locked and labelled, and the different methods that are used
25. the tools and equipment used in the overhauling activities and their calibration/care and control procedures
26. how to make adjustments to components/assemblies to ensure that they function correctly (such as setting working clearance, setting travel, alignment)
27. the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of

work in relation to the documentation

28. the need to control and account for all tools and equipment used during the overhauling activity
29. the procedure for the safe disposal of waste materials, scrap components and fluids
30. the problems that can occur during the overhauling activity and how they can be overcome
31. 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 overhauling activities:

1.1 obtain and use the appropriate documentation (such as job instructions, aircraft manuals and overhauling documentation, 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 the rotor heads or power transmission assembly is suitably supported and that appropriate lifting and handling equipment is available
1.6 carry out the overhauling activities, using approved techniques and procedures at all times
1.7 ensure that components and surrounding structures are maintained free from damage and foreign objects
1.8 return all tools and equipment to the correct location on completion of the activities

2.

Carry out overhauling activities to unit/component level on three of the following types of aircraft power transmission equipment:

2.1 intermediate gear box
2.2 main gear box
2.3 tail gear box
2.4 nose/forward gear box
2.5 main rotor head assembly
2.6 tail rotor assembly

3.

Carry out all of the following activities, as applicable to the equipment being overhauled:

3.1 cleaning parts prior to dismantling
3.2 checking components for serviceability (such as visual, measurement, NDT, use of probes/scopes)
3.3 pre-disassembly checks and tests
3.4 releasing stored pressure (where applicable)
3.5 fitting blanks to openings to prevent entry of contaminating debris
3.6 replacing all damaged or defective components
3.7 draining/removing any remaining fluids

3.8 reassembling equipment
3.9 dismantling equipment to unit/sub-assembly level
3.10 making mechanical connections
3.11 dismantling units to component level
3.12 setting and adjusting replaced components
3.13 proof-marking/labelling of components
3.14 securing components using mechanical fasteners and threaded devices
3.15 tightening fastenings to the required torque
3.16 replacing all `lifed' items (such as seals, filters, gaskets, bearings, bushes)
3.17 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts)

4.

Replace a range of aircraft power transmission components, to include ten of the following:

4.1 drive shaft
4.2 locks and stops
4.3 tail rotor head
4.4 drive shaft support
4.5 static seals/gaskets
4.6 accelerometers
4.7 bearings (such as ball, roller, tapered)
4.8 dynamic seals
4.9 flexi couplings
4.10 bearing bushes (such as bronze, sintered metal)
4.11 control valves
4.12 rotor brakes
4.13 gears
4.14 sensors
4.15 swash plate
4.16 gear shafts
4.17 main rotor head
4.18 control units
4.19 couplings
4.20 filter units
4.21 levers and linkages
4.22 selector mechanisms
4.23 mechanical controls (plungers, springs, rollers)
4.24 torque converters
4.25 electrical controls (solenoids, motors, switches)
4.26 pumps
4.27 other specific components

5.

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

5.1 visual inspection for completeness and freedom from damage or foreign objects

5.2 main rotor rigging
5.3 tail rotor rigging
5.4 gear box alignment (main, tail, intermediate)
5.5 static or dynamic balancing
5.6 drive shaft/high speed shaft alignment
5.7 freedom and range of movement
5.8 'special-to-type' test rig checks
5.9 leak test
5.10 tension adjuster check
5.11 vibration analysis
5.12 safety interlock test

6.

Overhaul aircraft hydraulic equipment in compliance with one of the following:

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

7.

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

7.1 job cards
7.2 computer records
7.3 aircraft service/flight log
7.4 aircraft log book
7.5 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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