SEMMME3109

Overhauling industrial power turbine combustion assemblies

Overview

This standard identifies the competences you need to carry out a complete overhaul of an industrial power turbine combustion assembly, in accordance with approved procedures. The combustion assembly to be overhauled will have been removed from the power turbine, and the overhauling activities will take place in a maintenance environment or manufacturer's workshop.

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 subassemblies, removing the combustion cans/chambers, nozzle guide vanes, outer guide vanes, bearings and seals, and stripping the combustion housing of all its components. You will be required 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 combustion assembly, which will involve fitting replacement or overhauled sub-assembly units 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 overhaul of the power turbine combustion assembly, and to report any problems with the overhauling activities, or with the tools and equipment used that you cannot personally resolve, or that are 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 power turbine combustion assemblies. You will understand the dismantling and reassembly methods and procedures used, and their application. You

will know how the combustion 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 power turbine combustion 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. report any instances where the overhauling activities cannot be fully met or where there are identified defects outside the planned overhauling schedule
8. complete the relevant documentation, in accordance with organisational requirements
9. dispose of unwanted components, waste materials and substances, in accordance with safe working practices and approved procedures
10. deal promptly and effectively with problems within your control and report those that cannot be solved

Knowledge and understanding

You need to know and understand:

| --- | |

1. how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. the hazards associated with overhauling power turbine combustion assemblies and how to minimise them and reduce any risks
3. the importance of wearing protective clothing (PPE) and other appropriate safety equipment during the overhaul
4. how to obtain and interpret drawings, specifications, manufacturers' manuals, history/maintenance reports, and other documents needed in the overhauling process
5. how to carry out currency/issue checks on the specifications you are working with
6. the quality control procedures to be followed during the overhauling operations
7. the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul
8. company policy on the repair/replacement of components during the overhauling process
9. terminology used in power turbine combustion assemblies
10. the basic principles of how the combustion assembly functions, its operating sequence, the working purpose of individual units/components and how they interact
11. the extent to which the equipment is to be dismantled for overhaul
12. the sequence to be adopted for the dismantling/reassembling of the combustion assembly
13. the techniques used to dismantle the power turbine combustion assembly, without damage to the components or surrounding structure
14. the need to protect the system integrity by ensuring that exposed components are correctly covered/protected
15. 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
16. the need to ensure that lifting and handling equipment is within its current certification dates
17. methods of checking that components are fit for purpose, how to identify defects and wear characteristics, and the need to replace `lifed' and consumable items
18. the uses of measuring equipment
19. methods of reassembling the power turbine combustion assembly, using new or previously overhauled components
20. how to make adjustments to replaced components/assemblies to ensure that they function correctly
21. the various mechanical fasteners that are used and their method of removal and replacement
22. the various types of electrical connectors that are used, methods of unlocking, orientation indicators, and locating and locking in of the connections
23. the tools and equipment used in the overhauling activities, and how to check that they are in a safe/usable condition
24. the importance of ensuring that all tools are used correctly and within their permitted operating range
25. 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
26. the procedure for the safe disposal of waste materials
27. the need to complete overhaul documentation and/or reports following the overhauling activity
28. the problems that can occur during the overhauling activity, and how they can be overcome
29. 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 power turbine combustion assembly:
    1.1 obtain and use the appropriate documentation for the overhaul activities
    1.2 adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations
    1.3 provide and maintain safe access and working arrangements for the work area
    1.4 ensure that the combustion assembly is suitably supported, and that appropriate lifting and handling equipment is available
    1.5 carry out the overhauling activities, following good practice/approved procedures
    1.6 ensure that components and surrounding structures are maintained free from damage and foreign objects
    1.7 return all tools and equipment to the correct location on completion of the activities
    1.8 leave the work area in a clean and safe condition on completion of the activities
2. Dismantle the power turbine combustion assembly, to include removing all of the following:
    2.1 combustion case
    2.2 outer guide vanes
    2.3 locking devices
    2.4 combustion cans/chambers
    2.5 seals and gaskets
    2.6 wire thread inserts
    2.7 annular combustion chambers
    2.8 shims and packing
    2.9 pipes and unions
    2.10 nozzle guide vanes
3. Carry out all of the following activities on the equipment being overhauled:
    3.1 cleaning parts prior to dismantling
    3.2 pre-disassembly checks and tests
    3.3 releasing stored energy (where applicable)
    3.4 draining/removing any remaining fluids
    3.5 proof-marking/labelling of components to aid reassembly
    3.6 dismantling equipment to unit/sub-assembly level
    3.7 dismantling units to component level
    3.8 applying protection to openings to prevent entry of contaminating debris

3.9 removing and replacing components having interference fits (such as by expansion, contraction, pressure)
3.10 replacing all damaged or defective sub-assemblies and components
3.11 replacing all `lifed' and consumable items (such as seals, bearings, gaskets)
3.12 checking components for wear and serviceability (such as visual, measurement, NDT, use of probes/scopes)
3.13 drilling, reaming and riveting (where applicable)
3.14 reassembling the combustion unit
3.15 `blue bedding' components
3.16 making mechanical connections
3.17 setting and adjusting replaced components
3.18 electrical bonding of components
3.19 applying correct lubrication during assembly
3.20 applying gaskets and sealant/adhesives
3.21 tightening fastenings to the required torque
3.22 securing components using mechanical fasteners and threaded devices (such as nuts, bolts, circlips, pins)
3.23 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts)

4. Replace/refit a range of combustion assembly components, to include ten of the following:

4.1 combustion case
4.2 locking devices
4.3 combustion cans/chambers
4.4 wire thread inserts
4.5 annular combustion chambers
4.6 pipes and unions
4.7 nozzle guide vanes
4.8 mechanical controls (such as plungers, springs, rollers)
4.9 outer guide vanes
4.10 locks and stops
4.11 electrical controls (such as solenoids, motors, switches)
4.12 static seals/gaskets
4.13 dynamic seals
4.14 shims and packing
4.15 other specific components

5. Carry out checks and tests on the overhauled equipment, to include all of the following:

5.1 visual inspection for completeness of all operations
5.2 visual inspection for freedom from damage or foreign objects
5.3 applying protection to openings to prevent entry of contaminating debris
5.4 carrying out any `special-to-type' test rig checks

6. Overhaul industrial power turbine combustion assemblies, in compliance with one of the following:

6.1 BS, ISO or BSEN standards and procedures

6.2 customer standards and requirements
6.3 company standards and procedures
6.4 turbine manufacturer's requirements

SEMMME3109

Overhauling industrial power turbine combustion assemblies

Developed by	Enginuity
Version Number	3
Date Approved	30 Mar 2023
Indicative Review Date	31 Mar 2028
Validity	Current
Status	Original
Originating Organisation	Enginuity
Original URN	SEMMME3109
Relevant Occupations	Engineering, Engineering and Manufacturing Technologies, Engineering Technicians
Suite	Mechanical Manufacturing Engineering Suite 3
Keywords	Mechanical engineering; overhaul; industrial power turbine; combustion; assemblies; case; cans; combustion chambers; guide vanes; seals; gaskets; shims; packing; locking; inserts; pipes; unions