Course 214
7FA Gas Turbine Major Inspections
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Disclaimer:

The intent of this course is to familiarize the trainee with the steps necessary to perform a Hot Gas Path inspection on a 7FA Gas Turbine. It is not intended to be used as a field procedure for performing a hot gas path inspection. Please refer to proper and specific plant procedures.
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Learning Objectives, Chapter:

1.0 Overview
This chapter provides an overview of the hot gas path and major inspections. At the completion of this topic the trainee will be able to identify the different types of maintenance performed on the gas turbine.

2.0 HGP Clearance Measurements
Provides a description of the steps required to measure and record component clearances as part of the Hot Gas Path inspection.

3.0 Turbine Casing Removal
Provides a description of the steps required to remove the turbine casing to conduct a Hot Gas Path inspection.

4.0 HGP Concentricity, Rotor Float, & Clearance Checks
Provides a description of the steps required to measure the concentricity of the first stage nozzle assembly and take rotor float measurements and internal turbine clearances.

5.0 HGP Component Removal
This chapter provides a step by step description of the disassembly of the gas turbine combustion system for inspection.

6.0 Hot Gas Path Inspection
This chapter provides a description of the steps necessary to inspect the hot gas path components.

7.0 HGP Turbine Section Assembly
Provides a description of the reassembly process following a Gas Turbine Hot Gas Path inspection.

8.0 HGP Assembly Clearances
Provides a description of the required clearance measurements taken during the Gas Turbine Hot Gas Path inspection reassembly.

9.0 HGP Combustion Section Assembly
This chapter provides a description of the steps necessary to reassemble the combustion section following a Gas Turbine Hot Gas Path inspection.

10.0 HGP External Equipment Assembly and Testing
This chapter provides a step by step description of the reassembly of the gas turbine combustion system following the combustion inspection, including machine retest.
214_B5_Ch1 Overview

1. Inspection Scope

a. The purpose of hot gas path and major inspection is to examine those parts that are exposed to high temperatures from the combustion process and parts that have been in-service for a long period of time, such as compressor blades and bearings.
b. The hot gas path inspection includes the full scope inspection of the combustion system components and a detailed inspection of the turbine nozzles, shrouds, and buckets.
c. The major inspection includes the full scope inspection of the combustion system components, the full scope of the hot gas path inspection and a detailed inspection of the compressor blades, turbine buckets, bearings, rotor, and casing conditions.
d. Good preparation for these outages will include having all of the spare parts and tools on site prior to the start of the inspection.
2. Hot Gas Path Inspection

(a) A hot gas path inspection is estimated to take 176 hours or 22 eight hour shifts to perform.

(b) The hot gas path inspection includes the combustion inspection and a detailed inspection of the turbine nozzles and shrouds.

(c) In order to perform this inspection, the top half of the turbine shell is removed.

(d) The nozzles, diaphragms, and shrouds are removed.

(e) The turbine buckets will be inspected visually while in place.
3. Major Inspection

a. A major inspection is estimated to take 368 hours or 46 eight hour shifts to perform.
b. The major inspection is a flange-to-flange inspection of gas turbine components which are subject to wear during normal turbine operation.
c. This inspection includes elements of the combustion system inspection and the hot gas path inspections, plus:
   - The upper inlet case, mid, and discharge cases are removed.
   - The compressor and inlet cases are inspected for fouling, erosion, corrosion, and leakage.
   - The rotor and stator compressor blades are checked for tip clearances, rubs, bowing, cracking, and warping.
   - The turbine nozzles and shrouds are checked for clearance, foreign object damage, cracking, erosion and corrosion.
   - The seals and hook fits of the nozzles and diaphragms are inspected for rubs, erosion, fretting or thermal deterioration.
   - Turbine buckets are removed and the bucket, bucket grooves and dovetails are inspected foreign object damage, cracking, erosion and corrosion.
   - Bearings and seals are inspected for clearance and wear.
   - All clearances are checked against their original values.
1) Scope

Besides the combustion system parts, what additional parts are inspected during a hot gas path inspection?

A. Nozzles
B. Shrouds
C. Buckets
D. All of the above

2) Buckets

The buckets must be removed to in order to inspect them.

A. True
B. False
3) Cases

Which of the following cases are removed for a hot gas path inspection?

A. The upper turbine case
B. The upper compressor discharge case
C. The exhaust frame
D. The upper and lower turbine case

4) Equipment

The major inspection includes bearings and seals.

A. True
B. False
What are the compressor blades inspected for during the major inspection?

A. Rubs  
B. Bows  
C. Cracks  
D. All of the above
Test Answers

1) D
2) False
3) A
4) True
5) D