Unit 304 – Starting Equipment

Topic ‘D’:

4.1 – Types of Starting Devices.

4.3 – Starting sequence of Gas Turbine.
Aim:
To demonstrate knowledge of the function of Starting Device for Industrial Gas Turbine.
Aim & Objective

Objective:
At the end of this lesson, you should be able to:

• Describe the different types of starting device of a Gas Turbine.
• Explain the sequence from initial starting until turbine reaches self sustaining speed.
4.1 – Type of Starting Devices

Purpose of Starting Devices?
- To crank the turbine engine for start-up.

Function of Starting Devices:
1. Supply high torque at zero speed.
2. Drive the unfired gas turbine to an acceptable firing speed.
3. To assist the fired turbine to a self-sustaining speed.
4.1 – Type of Starting Devices

The devices used to start Gas Turbine are:

1. AC Electric Motor. (operation)
2. Diesel Engine. (operation)
3. Steam or Expansion turbine. (operation)
4. Pneumatic starter. (operation)
Starting Sequence of Gas Turbine from Initial Starting until Engine ready to take Load
Check during Operation:

- Check for unusual condition.
- Check for vibration & Noise.
- Check for any changes in accelerating time.
- Check exhaust temperature.
- Check oil level for leak.
- Check battery charger.
Recap

• Describe the different types of starting device of a Gas Turbine.

• Explain the sequence from initial starting until turbine reaches self sustaining speed.
Overview of next week lesson:
Topic 4.2 – Torque Converter
Topic 4.3 – Hydraulic Ratchet System

Thank you for your Attention
4.1 – Type of Starting Devices

AC Electric Motor

- Main Starter.
- Utilizes electric current to run the motor.
- Turn the turbine through gear box arrangement.
- Self-releasing mechanism engage once turbine run on self-sustaining speed.
- Required special insulation. (Intrinsically safe)
4.1 – Type of Starting Devices

Alternating Current Electric Motor
4.1 – Type of Starting Devices

Diesel Engine

• Secondary starter.
• Started by Hydraulic pressure.
• Release hydraulic fluid to the starter motor to crank the engine.
• Engage clutch mechanism to run Gas Turbine.
• Generate power supply for its own control panel.
4.1 – Type of Starting Devices

Lister Type Diesel Engine
4.1 – Type of Starting Devices

Expansion turbine

• Utilized high pressure and temperature steam.
• High velocity steam directed to the rotor blade.
• Connected to Gas Turbine shaft.
• Required separate boiler.
4.1 – Type of Starting Devices

Expansion Turbine
4.1 – Type of Starting Devices

**Pneumatic starter**

- Utilize Compressed air/High pressure gas.
- Use Vane type starter motor fitted on the Forward side Accessory gear.
- Starting torque transmitted through running gear arrangement via clutch and shaft.
- Required pneumatic power supply. (At pressure of 1138kPa – 1379kPa for 60Sec – 90Sec at a rate of 67m³/min)
4.1 – Type of Starting Devices

Gas Turbine Air Starter
Intrinsic Safe (IS)

Term

• A special insulation protection technique for safe operation of electronic equipment in explosive atmospheres.

• To ensure that the available electrical and thermal energy in the system is always low enough so prevent ignition on the hazardous area.