Steam Turbine Maintenance and Reliability

This practical course is designed for rotating equipment specialists, millwrights, technicians, and engineers who are involved in the maintenance and operation of single and multi-stage, single valve industrial steam turbines. Major topics covered: principles of operation and design, maintenance and operation of major turbine components (including rotors, bearings, governors, lubrication systems, and casing), piping systems strain and supports, turbine alignment and thermal growth, and shop balancing. Particular attention will be paid to machines manufactured by Elliott, Westinghouse, Coppus, and Terry Turbines.

Topics Covered (3 days)

- History of Turbines
- Types of Turbines
  - Single stage, single valve
  - Multi-stage, single valve
  - Multi-stage, multi-valve
- Principles of Operation
  - Impulse, reaction & tangential
  - Governor valve
  - Trip valve
- Design
  - Curtis style
  - Rateau
  - Impulse
  - Reaction
  - Axial flow
  - Tangential flow
  - Radial flow
- Maintenance of Casings
  - Joint surfaces
  - Casing drain lines
  - Leak-off drains
  - Gaskets
  - Raised face flanges
  - Bolting
  - Sealing
- Maintenance of Rotors
  - Determination of balance
  - Rotor details (shaft sleeves, carbon sealing surfaces, bearing journals, probe sensing surfaces, coupling diameters)
- Bearings
  - Liner, sleeve, anti-friction (single row deep groove & angular contact), thrust sleeve, thrust collar, radial tilting pad, tilting thrust pad
- Governors
  - Mechanical, hydraulic, servo, electronic
- Alignment
  - Thermal growth
  - Flexible foot
  - Piping strain, supports, and design
- Leak-off
  - Gland & leak-off drains
- Lubrications
  - Grease
  - Oil ring feed
  - Pressure feed
  - Oil pumps

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