1st Successful Run in Asia!

STEAM TURBINE COMPONENTS, ROTORS AND CASINGS

15 – 16 MARCH 2016, KUALA LUMPUR, MALAYSIA

TOPICS COVERED

Overview of Steam Turbines Types and Operating Principles.

Steam Turbine Components What Are They Made From and Why?

Coating Technologies

Steam turbine component damage, degradation and factors which limit component life

Common Repair Techniques for Turbine Components

What is failure analysis?

Failure Investigation

How Steam Turbine Components Fail

Expert Course Faculty Leader

Dr. Maxine Watson
Director Power Resources, Quest Integrity Group LLC

IN COLLABORATION WITH

energy institute  CPD MEMBER  SEAS

Sustainable Energy Association of Singapore  Quest Integrity

Another Quality Training By powerEDGE®
Empower your future
Training Course Objectives

- Develop a detailed knowledge of the materials used in steam turbine components, how they degrade and how they fail
- Gain an understanding of how operation affects component degradation failure modes and life span
- Discover the methods used in determining failure causes
- Understand the knowledge that can be gained from on-site and laboratory investigations
- Learn how materials, manufacturing and in-service created defects can promote failure
- Become familiar with common causes of steam turbine component failures using real life examples
- Participate in interactive technical discussions

Your Expert Faculty

DR. MAXINE WATSON

SPECIALISED PROFESSIONAL COMPETENCE

Maxine has a first class BSc (Hons) in Metallurgy and Microstructural Engineering for which she was awarded the Institute of Metallurgists Royal Charter Prize for outstanding achievement, and a PhD in Engineering undertaken for the UK Atomic Energy Authority. She has over 33 years’ experience in metallurgy and materials engineering, specialising in the life assessment and prevention of failures in rotating machinery. Maxine has leads root cause failure analysis investigations and provides independent advice and expert witness reports for legal (criminal and civil) and insurance cases and for other investigatory bodies e.g. government safety and defence agencies and in power generation, industrial plant and equipment, aero and rail accident investigations.

PROFESSIONAL BACKGROUND

Maxine was appointed Director, Power Resources for Quest Integrity Group LLC in 2009 and has responsibility for the Power Industry projects performed globally. Previously she was Global Group Head of Materials Engineering for Quest Reliability Ltd and General Manager Materials Engineering for MPT Solutions Ltd, IRL Crown Research Institute, New Zealand.

Before moving to New Zealand she held several senior positions in the UK including Head of Power and Utilities, for ESR Technology, Head of Metallurgy and Materials Engineering with the Engineering, Safety and Risk Division and the Rail Division (ex British Rail Research) of AEA Technology in the UK. The ESR division incorporated three UK National Centres of Excellence – The National Centre of Tribology, The National Non-Destructive Testing Centre and the Pump Centre (UK centre of excellence in pumps and pumping system technology) and one European Centre of Excellence, the European Space Tribology laboratory. She began her career in the Nuclear Industry with the United Kingdom Atomic Energy Authority (UKAEA), Harwell Research Laboratories where she worked on Advanced Cooled Gas Reactor and Fast Reactor power programmes. She worked on design, build, commissioning and de-commissioning issues for UK nuclear power stations and conventional power plant and performed many failure investigations and life assessment programmes including gas and steam turbines, valves, bearings, gearboxes, pumps and conveyor plant.

Maxine is the Chair of the Australia and New Zealand Gas Turbine Users Forum and also regularly Chairs industry events such as Asia Powertech, Singapore Gas Turbines and the Australia Gas Turbines Conference. Maxine also devises and presents training courses for GTUF, IIR Australia and ibc Asia in root cause failure analysis, metallurgy for engineers, gas and steam turbine failure investigation, surface engineering and gas turbine life assessment and for the American Society for Mechanical Engineers (ASME) in gas and steam turbine failure investigation and in gas turbine rotor life management.
2 Day Course Outline

Day 1: Steam Turbine Components

Overview of Steam Turbines Types and Operating Principles.

Steam Turbine Components What Are They Made From and Why?
- Design and operating concepts controlling material selection
- Steam Turbine Metallurgy
- Properties generated by heat treatment
- Manufacturing techniques and defects produced

Coating Technologies
- Metallic coatings
- Non-metallic coatings

Steam turbine component damage, degradation and factors which limit component life
- Turbine section, HP, IP, LP and expansion
- Rotating Components
  - Blade materials – specific properties required for turbine blades
  - Rotors, shafts materials
- Turbine stationary components
  - Casings/Cylinders,
  - Diaphragms/Nozzles
  - Blades
- Ancillary’s
  - Valves
  - Seals
  - Bearings

Common Repair Techniques for Turbine Components
- Factory repairs and site repair techniques
- Methods of repair
- Qualifying repairs

DAY 2: Steam Turbine Component Failure Investigation and Common Failure Mechanisms

What is failure analysis?
- Failure investigation techniques
- Failure analysis methods and techniques
- Root cause failure analysis
- Discuss operational failures and what can be learned from carrying out failure analyses

Failure Investigation
- How to undertake a failure investigation
- On-site evidence collection
- Laboratory failure investigation techniques
- Learning from performing certain examinations
- Essentials of a good report and understanding reports

How Steam Turbine Components Fail
- Common modes of failure illustrated with case study
- How operation affects failure modes
- Materials defects which lead to failure
- Common causes steam turbine component failure focusing on:
  - Steam Turbine Blading
  - Discs, Rotors, Shafts, Hollow Rotor Forgings
  - Blade Rings, Shells, and Diaphragms
  - Bearings and Lubrication Systems
  - Sealing For Steam and Oil
  - Main and Auxiliary Steam Valves Stop, Throttle, Governor, Control, Non-Return, Admission, Extraction etc.
OTHER AVAILABLE COURSES

4 Pillars of Transformer Condition
Advanced Project Finance for Power
Advanced Technical Report Writing & Presentation Skills
Advanced Turnaround Shutdown & Outage Management
Ancillary Services in Competitive Electricity
Asset Management for the Power Industry
Best Practice Renewable Energy Capital & Project Management
Biomass Power Generation
CFB Combustion for Boiler Operations
Clean Development Mechanism and Carbon Markets
Coal Contracts
Combined Cycle Power Plants Operation
Combined Heat & Power (CHP) and Co-Generation Plant Operations
Competency Management System for the Power Industry
Design & Operations of Circulating Fluidized Bed Boiler
Developing & Structuring Public-Private Partnership (PPP) for Infrastructure
Effective Tender Process Management for Power & Utilities
Electrical Hazop (eHazop) Studies for the Power Industry
Electricity Demand-Side Management
Electricity Industry Design
Electricity Network Planning
Electricity Retail Contracts
Electricity Theft
Electricity Trading Essentials
Energy Efficiency
EPC Contract Management for Power & Utilities
Essentials of Coal Markets and Trading
Essentials of Power Trading
Excitation Systems
Feed-In Tariffs for PV Systems
Finance for Non-Finance Professionals in Power & Utilities
Financial Modelling for Project Finance in Power & Utilities
Fitness-For-Service AP1 579 & High Energy Piping Life Management
Fundamentals of Geothermal Energy
Fundamentals of Power Generation
Gas & LNG Contract Negotiation
Gas Turbine Generator Selection, Operation & Maintenance
Gas Turbine Hot Gas Paths, Rotors & Failure Analysis
Gas Turbine Major Inspection & Overhaul
GE Gas Turbine Operations Simulation Based
HRSG Design, Operations & Understanding, Controlling of HRSG Damage
HV Substation Design & Construction
IEC for Utilities
Integration of Distributed Generation
Introduction to Carbon Capture & Storage
Introduction to Clean Coal Technology
Introduction to Power Systems
Keeping Electrical Switchgear Safe
Leadership & Team Dynamics for Power & Utilities
LNG Fundamentals
LNG Markets & SPOT Trading
Maintenance Planning & Scheduling
Making IPP & Renewable Energy Projects Contract Frameworks Bankable
Managing Complex Projects for Power and Utilities Professionals
Medium Voltage & High Voltage Switchgear
Metallurgy for Engineers
Mechanical Engineering for Non-Mechanical Engineers
Mini Hydro Project Analysis
MKV Speedtronic Control System
MK VI Speedtronic Control System
Nuclear Energy Project Planning & Economics
Nuclear Power
Offshore Platforms Electrical Systems Design & Illustrations
Operations of Coal Fired Power Plants
Power Generation Commissioning, Operations & Maintenance
Power Generation Operation, Protection & Excitation Control
Power Plant Chemistry for Chemist & Chemical Engineers
Power Purchase Agreements
Process Control Methods
Programmatic CDM
Project Management for Power and Utilities
Relay Protection in Power Systems
Reliability Centered Maintenance Masterclass
Reliability Engineering
Renewable Energy Development & Investment
Renewable Energy Integration
Risk Based Inspection
Risk Management in Power Markets
Root Cause Analysis
Rotating Equipment Maintenance & Reliability Excellence
SCADA & Power Systems
Smart Grid
Solar Energy & Photovoltaic Power
Spare Parts Optimisation
Supercritical and Ultra-Supercritical Coal-Fired Power Plant
Technical Report Writing & Presentation Skills for Power & Utilities Professionals
Ultra Low NOx Gas Turbine Combustion
Uninterruptible Power Supply
Vibration Analysis & Condition Monitoring
Waste to Energy Plant Operations
Water Treatment and Corrosion Control for Steam Generation and Power Production
Writing Effective Standard Operating Procedures (SOP) for Power & Utilities Professionals & Engineers
1. Does PowerEdge have other programmes than those listed?  
We have more than 200 programmes that we are capable of running. All we need is for you to contact us and request for the preferred programme and we will be able to develop it.

2. Where is PowerEdge based?  
PowerEDGE is headquartered in Singapore but we run our training programmes in different venues around Asia.

3. What does PowerEdge do?  
We are a Power & Utilities Training Specialist.

4. Can this course be done in our city?  
It absolutely can. Get in touch with us to request for a training programme to be carried out in your city.

5. Can you reduce the price of our preferred course?  
While our price has been reduced before it is even launched, we are always happy to help you with further discounts.

6. Can you change the dates of the course?  
If you have a special requested date, let us know and we will arrange another session for you.

7. Who are the companies that will be participating?  
This varies from a diversity of Power Operators, Regulators, Financiers, to Vendors in the Power & Utilities Industry.

8. Where is the venue for the course?  
We usually engage a 4 to 5 star hotel meeting room to ensure the comfort of our participants.

9. How many delegates should we expect for each course?  
This varies from 15 to 20 participants. Class sizes are kept small to allow trainers to focus better on each participant.

10. What are the different payment modes?  
We accept Visa/MasterCard, cheques, bank transfers and cash on site.

11. Is accommodation included when I sign up for a course?  
Accommodation is not included in the course fee but we are always happy to advise on available accommodations.

12. Can I get a cheaper accommodation through PowerEdge?  
We will be pleased to help you negotiate a better rate with hotels.

13. Is lunch provided during the course?  
We provide lunch and 2 tea breaks every day during our training programmes.

14. Are the training materials included once I have signed up for a course?  
Yes, training and course materials are included in the course fee.

15. Will there be a certificate for the course?  
Yes, there will be a certificate of participation upon completion of a course.

16. Who are PowerEdge trainers?  
They are expert consultants and practitioners with many years of experience in the subject matter that they deliver on.

17. Are PowerEdge trainers competent?  
We have received numerous favourable feedbacks on our trainers from past participants.

18. Can PowerEdge assist with Visa travel applications?  
We can assist in advising you on the relevant procedure[s] and embassies/consulates that provide Visa for travel purposes.

19. Can we purchase training materials without attending a course?  
Unfortunately this option is not available as training materials are specially developed for courses.

20. Can course content be tweaked to cater to our needs?  
Of course! Just let us know your request and we will get the trainer to assist in carrying it out.
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<th>NORMAL PRICE</th>
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<td>SGD 3,499</td>
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<td>Per Participant</td>
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CANCELLATIONS & SUBSTITUTIONS

You may substitute delegates at any time. POWEREDGE PTE LTD does not provide refunds for cancellations. For cancellations received in writing more than seven (7) days prior to the training course you will receive a 100% credit to be used at another POWEREDGE PTE LTD training course for up to one year from the date of issuance. For cancellations received seven (7) days or less prior to an event (including day 7), no credits will be issued. In the event that POWEREDGE PTE LTD cancels an event, delegate payments at the date of cancellation will be credited to a future POWEREDGE PTE LTD event. This credit will be available for up to one year from the date of issuance. In the event that POWEREDGE PTE LTD postpones an event, delegate payments at the postponement date will be credited towards the rescheduled date. If the delegate is unable to attend the rescheduled event, the delegate will receive a 100% credit.

PAYMENT POLICY

All bank charges and payment in Singapore dollars (SGD) to be borne by payer. Please ensure that PowerEdge Pte Ltd receive the full invoiced amount.

PAYMENT METHODS

- By Telegraphic Transfer: Please quote AE1 with the remittance advise
- By Cheque/ Bank Draft: Make Payable to PowerEdge Pte Ltd.

Payment is due in full at the time of registration. Full payment is mandatory for event attendance. I agree to PowerEdge Pte Ltd. payment terms

GST

* GST: Exclusive price is only applicable for overseas corporate customers subject to qualifying conditions.

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