



DAMASK & ETD Seminar

Date: Monday 15th May 2023, 0830 - 1300h

Venue: TNBR, Selangor, Malaysia

=====

Introduction

In this Seminar we will briefly talk about problems faced by the modern power plant boilers and HRSGs, especially in view of the increasing intervention of the renewables resulting in enhanced **cycling of fossil power plants**. There are problems faced by the materials especially the new generation of materials such as P91, P92 and P23. Similarly, design issues in the existing boilers and HRSGs need to be considered and suitably modified to make them compatible with plant cycling as renewables' penetration in the energy market increases. Other issues such as water chemistry, staff training, increased inspection and monitoring etc. need to be considered when increasing plant cycling or load following.

Many new developments have taken place in the **inspection, monitoring and life assessment** of power plants. Recent developments in some of the new inspection techniques such as LFET and BFET have resulted in the reduction of the boiler tubes inspection time and increase in the coverage thus making plants not only safer but also reducing inspection cost and time, thus reducing plant downtime and increasing the income stream.

Similarly, **recent developments in high temperature fracture mechanics** means that cracks in components can now be safely dealt with, the repair and replacement tasks only undertaken when necessary thus postponing capital and O&M costs to sometime in the future. Cracks in plant components are no longer always considered a risk as was once the case. Indeed, even in nuclear reactors crack safety can be assessed with confidence and cracked components can be left in service with an appropriate inspection and monitoring regime.

Plant efficiency is much talked about but **plant availability and reliability** is equally important these days. If a back-up fossil plant cannot be quickly made available during the sudden outage of the renewables such as solar or wind then such a plant can be penalised heavily. This means that the back-up plants need to be available on a very short notice. Various **maintenance strategies** such as risk-based and reliability-centred have been developed to reduce un-necessary maintenance and keeping the cost to affordable levels. Similarly, methodologies such as predictive and knowledge-based maintenance have been developed where the knowledge of materials, design, plant inspection history and past experience with similar plants is benefitted from to predict in advance maintenance



ETD Consulting, 5 Axis Centre, Cleeve Road, Leatherhead, Surrey, KT22 7RD, UK

Tel: + 44 (0)1372 363 111 enquiries@etd-consulting.com

www.etd-consulting.com BS EN ISO 9001: 2015 Certified VAT No: 733600853

ETD Consulting is a trading name of European Technology Development Ltd, Registered in England No: 3553836



required for a particular plant so that unexpected failures do not result in plant forced outages and planned outages can be reduced without increasing risk.

Plant maintenance can also call for the component **weld repair**. This particular field has been further developed such that even temporary cold-weld repairs can now be trusted with long term safe performance thus reducing the outage time when PWHT may not be vital. Various weld repair geometries have been studied in detail some of which are less vulnerable to cracking than others. It is important to be aware of these to make the correct decision when asking for weld repairs.

More realistic plant **Remaining Life Assessment (RLA)** is required especially for the ageing plant. This can be enhanced by determining the actual materials properties (not just by using the minimum code material strength) for the most critical components (pressure vessels, rotors etc.) to avoid replacing components too early. To determine real material strength reliable **'boat sampling'** is important as long as this does not involve damage to the component, which means more advanced boat sampling equipment. More sophisticated **probabilistic life assessment** (in the presence of simple creep cavitation damage or even growing cracks) can enhance a component life prediction compared with the traditional deterministic life assessment and thus needs to be carried out where necessary.

Issues such those noted above will be discussed in this seminar.

Specific Topics

ETD experts with many decades of plant experience and development of new technologies and methodologies for power and process plant asset management, who have also written a number of Guidelines for industry in Europe and North America, will discuss in detail some of the specific topics shown below:

- RBI/RBM (Risk-based Inspection/ Management),
- RCM (Reliability Centred Maintenance),
- Power Plant Cycling/ Flexibility Issues,
- Plant Benchmarking and Cost Analysis (both for the base-load and cycling plant),
- Issue of crack initiation and growth in high temp. plant under creep and /or fatigue conditions, Assessment of cracks and ETD's Crackfit software,
- ETD's EDSE (a portable spark erosion machine) for safer 'boat' sampling,
- SFM (Scanning Force Microscope) for early-stage damage detection – especially in P91 and P92 components,
- Aberrant P91 and P92 found in high temp. plant components, its detection and how to deal with it,
- Full and partial Weld Repair,
- High temp. strain gauging,
- 'Smart Sleeve', ETD's portable precision hardness tester,
- Developments in NDE techniques (LFET, BFET, Potential drop, Electromagnetic–EM etc.) reducing time of inspection and increasing the inspection area coverage.

SEMINAR PROGRAMME

Power Plant Inspection and Condition/ Life Assessment *Conventional and Innovative inspection and assessment methodologies*

0830-0910h

1. **Flexible operation of conventional power and CCGT plants with increasing renewables – technical & cost issues**

Dr Ahmed Shibli, ETD, UK

0910-0940h

2. **Boiler tube inspection and life management**

Dr David Robertson, ETD, UK

0940-1010h

3. **P91 & P92 in Power Plants - quality control, in-service inspection and safe operating life**

Dr Ahmed Shibli, ETD, UK

Break: 1010-1030h

1030-1050h

4. **P91 & P92 in Power Plants – Case Studies**

Dr David Robertson, ETD, UK

1050-1150h

5. **Innovations and recent developments in inspection and life/ crack assessment, including new software systems**

Dr Ahmed Shibli, ETD, UK

1150-1235h

6. **RBI and RCM for power plants**

Mr Syed Nadeem Ahmed, ETD Consultant.

7. 1235-1250h

Integrity assessment for P91 steam piping

Ir. Dr. Ng Guat Peng, TNB Research, Malaysia

Discussion and Q&A Session: 1250-1300h

SPEAKERS

Dr Ahmed Shibli, Director, ETD Consulting, UK



Dr Shibli is the Managing Director of European Technology Development and is a practising metallurgist. He has led and co-ordinated a number of European and International Industry projects. Dr Shibli has been working on P91 and P92 for the past 25 years and has written a number of Reviews/ Guideline Reports and conducted training courses on these steels.

Dr Shibli has been successfully coordinating and running two other large P91 and P92 related Group Sponsored Projects (GSPs) – one on inspection, lifing and integrity of in-service P91 and P92 steels and the other on P91 subjected to ‘aberrant’ or ‘abnormal’ heat treatment. Thus he has a well recognised expertise in P91 research, industry experience with the use of P91 and new developments in this area.

Dr Shibli has run European Creep Collaborative Committee (ECCC) – a grouping of some 47 industry and research organisations from about 15 countries - for over a decade and has been leading many of its creep related research projects. He has also initiated and run a number of research projects for the European Commission and European industry in general. Dr Shibli has also run and coordinated the activities of European Pressure Equipment Research Council (EPERC) for a number of years.

Dr David Robertson, Lead Metallurgist, ETD Consulting, UK



Dr Robertson has over thirty years of experience of materials used in the power, petrochemical and other industries. Since 2004, Dr Robertson has been working for ETD Consulting on projects related to high-temperature plant integrity and life assessment, materials and welding issues, and root cause failure analysis. Through his work, Dr Robertson has gained extensive experience of the materials used and damage/ failure mechanisms in high-temperature plant. He also has led a number of European and international industry projects dealing with power and process plant issues.

Dr Robertson is internationally known in his field. He has specialist experience with ASME P91 steels components used in modern higher performance supercritical power plants. He is also very familiar with the issue of various alloys used for boiler and HRSG components and their repair and replacement with different materials. Dr Robertson gained his qualifications in metallurgy at Imperial College, London.



Syed Nadeem Ahmed, Senior Consultant, ETD Consulting, UK

Asset Performance Management System
RAM/RCM-III/ MSG-3 Applications Specialist
M.Sc. Engg Th.PE / Six Sigma MBB

Mr Ahmed has diverse professional engineering experience of more than 30 Years with demonstrated ability to Develop and Implement an Asset Performance Management System in Power Generation, Process & Petrochemical and Aviation Industry. Plant Performance Benchmarking and Improvement studies. He has a Masters degree in Thermal Power Plants Engineering with Six Sigma MBB Analyst qualification. Qualified Reliability Program Development MSG3 Certified. Mr Ahmed has facilitated more than 200 Events on Maintenance and Reliability Programs, RCM-III, Plant Performance and APMS across the globe in Power Generation, Process /Petrochemical and Aviation Industry.

Key Specialities include:

- APMS – Asset Performance Management System development and implementation for power, process and petrochemical plants
- Leading RAM/RCM/MSG3 based Studies for Plant and its Equipment, Maintenance Strategy deployment, Failure Elimination strategies and Reliability Analytics
- Performance optimizations studies for Power, Process and Petrochemical Plants
- Asset Integrity Assessment/ Remaining Life Assessment (RLA) study of Petrochemical and Power Generation Plants
- Process & Petrochemical Plant Debottlenecking and Performance Optimization study
- Maintenance and Reliability Program Development and Implementation in Industrial Plants
- RMF - Reliability Management Framework development and implementation in Industrial Plants
- MSG -3 Maintenance Steering Group Program Implementation in Industrial Plants
- Work-Processes development, Procedures and Guidelines development, Criticality and GAP Analysis for plant and its equipment.
- Technical Training Development and Facilitations- Plant and Equipment Specific
- Generation – 3 RCM Integrator with MSG3 program for Aircraft & its Systems.



Ir. Dr. Ng Guat Peng

Head, Material Engineering & Testing Group,
TNB Research, Malaysia.

Ir. Dr. Ng Guat Peng started her career in managing material testing laboratory at TNB Research from 2000 to 2004 and was assigned as approved signatory & technical assessor for ISO/IEC 17025 laboratory accreditation scheme. She was appointed as a technical expert in forensic engineering work from 2005 to 2015 and actively involved in diagnosis of various material failure modes in power industries. From 2015 onwards, she has been leading material & metallurgical research work, as the head of research unit and her research interest/topics cover boilers, pressure vessels, steam piping and rotary machineries in power plants.

ABOUT THE ORGANISERS

Damask Materials Solutions Sdn Bhd, Malaysia

Damask Materials Solutions is a technical service provider incorporated in Malaysia in 2016. It offers a range of services that includes failure analysis and condition assessment of plant equipment in power, petro chemical and oil and gas industries. Besides it conducts and organises technical courses in areas related to performance of structural components of plants and their ability to meet service requirements.

For further information,

Please visit: www.damask.my Or, write to: contact@damask.my

European Technology Development Ltd. (ETD), UK

ETD is a UK based engineering and consulting company specialising in life assessment/ extension, maintenance, materials and engineering issues in all types of power generating and process plant. In addition to its *main business of technical consulting, plant inspection and their condition and life assessment*, ETD regularly organises training courses in power, petrochemical, oil, gas and other industrial sectors as a part of its programme on *technology transfer to industry worldwide*. In the recent past ETD has organised various international workshops/ courses/ conferences in the UK, a number of other European countries (Germany, France, Portugal), Middle East, Far East, South East Asia, Canada and the USA. The issues involved in these courses covered lifing and failure analysis; HRSG design, maintenance and inspection; plant life assessment/ extension; high temperature plant materials behaviour; plant component safety and durability; performance of in-service welds and weld repairs; power plant cycling - technical and cost issues; boiler and turbine maintenance; petrochemical and refining plant issues; and, power plant benchmarking for performance, and risk based maintenance and inspection (RBMI).

For further information,

Please visit: www.etd-consulting.com Or, write to: enquiries@etd-consulting.com