

1-Day Training Course aimed at Industry & Research



T23/P23 - FABRICATION, WELDING, HEAT TREATMENT, OXIDATION, LIFE ASSESSMENT & PLANT EXPERIENCE



Venue: EMPA, Dubendorf, Switzerland

Date: **20 April 2009**

(Will precede the Creep Conference being organised by European Creep Collaborative Committee and being held at the same venue on 21-23 April 2009)

1-Day Training Course



European Technology Development (UK) are pleased to announce the organisation of this *1-day Training Course* covering: *a)* the effect of welding/ heat treatment/ tube & pipe manufacture and bending on the material microstructure and its short/ long term properties, and, *b)* the experience so far with the use of these materials as tubing in power plant. It will further cover *life assessment* issues faced by the plant operators, weld repairs, sources of materials data and other related topics.

WHY THIS COURSE ?

T23 was originally developed as superheater and reheater tubing steel to substitute conventional low alloy and T91 steel tubes not only for the new higher temperature and higher pressure ultra supercritical power plant boilers but also for the heat recovery steam generators (HRSG) and the conventional power plant boilers. These steels are also suitable for use as the furnace wall tubing for the new higher temperature and higher pressure ultra supercritical power plant boilers.

Indeed a recently concluded study by ETD of the worldwide practices has shown that T23 is now used in many a plant around the world especially in HRSG units. Furthermore, thicker sections of this steel are now being studied for use as thick wall components and welding and heat treatment issues are being resolved. One of the benefits of this steels is that unlike the P91 type martensitic steels, T/P23 is easy to weld, the accuracy and control of the heat treatment (tempering, PWHT) is less critical than that for 9-12Cr martensitic steels and that thin section components, unlike T91, for example, do not always require PWHT thus saving time and money. This low alloy steel is also now being investigated for use as a replacement material.

It is, therefore, pertinent that the plant users or those involved in life assessment of this low alloy steel understand the underlying principles of the development of this steel, its microstructure and the changes that may occur during service. This obviously has implications for life assessment and this aspect will also be discussed during this course. Welding and weld consumables is an important aspect of any new steel and this aspect will be covered in this course.

Course Presenters

The first course presenter is Prof F Masuyama who, as the ex-head of research in Mitsubishi Heavy Industries (MHI), Nagasaki, invented T23 and has been involved in its development ever since. Prof Masuyama is now involved in its life assessment as a part of the Japanese industry effort. The second speaker is Dr David Robertson of European Technology Development, UK. He has been successfully presenting this course in London over the last few years to attendees from various countries. Dr Robertson has a specialist knowledge and consulting experience in this field.

Technical Enquiries to:

Dr David Robertson Tel: + 44 (0)1372 363 112 or + 44 (0) 1372 363 111
drobotson@etd1.co.uk

Who Should Attend?

If you have responsibility for, or you are involved with, any of the following functions in Power Generation or Petrochemical industries.

- | | |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| § Engineering | § Planning |
| § Maintenance | § Component monitoring |
| § Inspection - assessment of defect significance | § T23/P23 similar and dissimilar metal welding and the weld assessment |
| § Insurance | § Research and Development |
| § Service provision | § Material procurement and quality assurance |
| § All those involved in integrity / life assessment of T/P23 components | |

Who Are We ?

European Technology Development Ltd. (ETD) is a UK based engineering advisory, consulting and R&D company specialising in high temperature plant life assessment/extension, maintenance, materials and engineering issues in all types of power generating and process plant. ETD has, in the recent past, organised various international workshops/ courses/ conferences in the UK, a number of other European countries (Germany, France, Portugal etc.) and Asia, mainly on the issues such as: plant life assessment/ extension, high temperature plant materials, plant component safety and durability, performance of in-service welds, power plant cycling and plant risk based maintenance (RBM). The company is leading and co-ordinating a number of large leading edge international industry initiatives (supported by industry from North America, Japan, Europe and elsewhere or by funding agencies such as the European Commission) on issues related to the assessment and improvement of high temperature plant performance, materials and design, and maintenance and inspection strategies. The company has carried out/ participated in some leading edge projects on P91 weld repairs, crack assessment, integrity issues and has only recently carried out and concluded reviews of T/P23, T/P24 and P/T91 performance in plant worldwide.

Further information about ETD, its projects [e.g. *Review of Experience with New Steels (P91/T91, T23, T24, P122) and Preparation of Guidelines for Assessment*], consultancy services, plant integrity/ life assessment services offered and other activities can be seen at: www.etc1.co.uk www.ommi.co.uk
Or obtained by writing to: enquiries@etc1.co.uk



REGISTRATION & WELCOME 0845 - 0900 h

Module 1: T/P23 Material Properties and Heat Treatment

0900 – 1230 h (with coffee break)

Presenter

Prof Dr Fujimitsu Masuyama

Ex-Mitsubishi Heavy Industries

Now with: Kyushu Institute of Technology

Dept. Applied Science for Integrated System Engineering, Kitakyushu, Japan

Objective

To develop a better understanding of the underlying concepts and basis of T/P23 development, its properties, the effect of heat treatment, chemical composition, data sources etc.

Specific topics will include:

- T23/P23 specifications, inspections and control required during manufacturing and erection processes.
- The effect of heat treatment (austenitising/normalising and tempering) on microstructure and hardness and best practices.
- The effect of heat treatment on material strength, creep strength, hardness and ductility etc. and the damage mechanisms.
- The effect of chemical composition variation.
- ASME, European and other codes, practices, recommendations, standards and their differences.
- Comments on the worldwide supply/ use of T23.
- Potential sources of materials data.

LUNCH	1230 – 1330 HOURS
-------	-------------------

Module 2: T/P23 Weld Consumables and Welding Issues

1330 – 1500 h

Presenter

Dr David Robertson, ETD, UK

Objective

To develop a better understanding and knowledge of the state of the P23 weld consumable development, weld characterisation, short term material properties and effect of heat treatment.

Specific topics will include:

- Development of weld consumables
- Characterization of the matching filler metals
- Welding without PWHT
- Welding with PWHT
- Problems regarding stress relief cracking
- Dissimilar metal welds

Module 3: Steam Side Oxidation, Component Integrity/Life Assessment

1500 – 1730 h (with coffee break)

Presenter

Prof Dr Fujimitsu Masuyama

Ex-Mitsubishi Heavy Industries

Now with: Kyushu Institute of Technology

*Dept. Applied Science for Integrated System Engineering, Kitakyushu, **Japan***

Objectives

To understand how T/P23 component integrity can be assessed. What are the available techniques and the advantages that they may offer. This includes a better understanding of the basic principles of oxidation in steam and its effect on tube overheating and cracking/ failure.

Specific topics will include:

- Cavitation development due to creep.
- Ductility and hardness issues.
- Type IV failures and their early detection.
- NDE techniques and their use for life assessment.
- Potential of the use of new NDE type techniques.
- Current developments for life assessment of T/P23 component integrity/ life assessment.
- Repair and replacement of failed tubes and issues involved.



The END



REGISTRATION FORM

(Please copy and e-mail / fax / post)

'T/P23 Training Course' 20th April 2009, Empa, Dubendorf, Switzerland

REGISTRATION FEE

All figures are in *pound sterling (GBP)*

Until 15 th February 09	From 16 th February 09
400 (GBP)	450 (GBP)

PAYMENT

By UK bank cheque, bankers draft, bank to bank transfer to:

European Technology Development Ltd. *Bank account details to be provided on request.*

Please quote reference 'T/P23 Course 09' with the payment and state here how you paid or intend to pay:

.....

By Credit Card: Major cards such as Visa / Master Card / American Express/ JCB / Switch are accepted with the exception of Dinners Club. For security reasons please *fax or post* this information.

Name of Account Holder

Card Type and No.

Expiry date

Amount being paid

Authorisation signature

Refund policy: 5% administration fee for cancellations more than 60 days in advance. For less than 60 and more than or equal to 10 days, refund of 50% of fees. For less than 10 days no refund is possible. Substitution of another person is welcome at any time.

Course Venue: EMPA, Dubendorf (Zurich) Switzerland.

Accommodation: Information on local hotels can be supplied by ETD on request.

Delegate Details: (Required for your badge)

Your **title and name:**

Company:

Position (optional):

Address:

Phone:

Fax:

E-mail:

REGISTRATION ADDRESS: Please copy and post/ fax/ e-mail to address below:

Registration Section, T&C, European Technology Development, 6 Axis Centre, Cleeve Road, Leatherhead, Surrey KT22 7RD, UK

Enquires: registration@etd1.co.uk

Tel: + 44 (0)1372 363 111 or + 44 (0)1372 363 112 Fax: + 44 (0)1372 363 222

Course Venue: Empa, Dubendorf (Zurich), Switzerland.