

2-Day Training Course aimed at Industry & Research



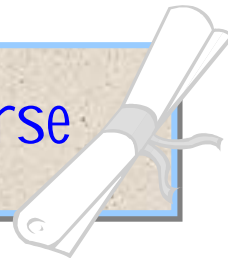
**T23/P23 + T24/P24 - PLANT EXPERIENCE +
FABRICATION, WELDING, HEAT TREATMENT,
OXIDATION, & DAMAGE MECHANISMS**



Venue: INSTITUTE OF MATERIALS (IOM3), LONDON
www.iom3.org

Date: **28 – 29 April 2008**

2-Day Training Course



European Technology Development (UK) are pleased to announce the organisation of this *2-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 and T24 were originally developed as superheater and reheater tubing steels 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. Similarly T24 is also being now used in some European and other plants. Furthermore, thicker sections of these steels are now being studied for use as thick wall components and the welding and heat treatment issues are being resolved. One of the benefits of these steels is that unlike the P91 type martensitic steels, T/P23 and T/P24 are easy to weld, the accuracy and control of the heat treatment (tempering, PWHT) is less critical than that for 9-12Cr martensitic steels and the thin sections, unlike T91, for example, do not always require PWHT thus saving time and cost. These low alloy steels are also being investigated for use as replacement materials in many parts of the boilers.

It is, therefore, pertinent that the plant users or those involved in life assessment of these low alloy steels understand the underlying principles of the development of these steels, their microstructure and the changes that may occur during service. This obviously has the implications for life assessment and this aspect will be further discussed during this course. Welding and weld consumables is an important aspect of any new steel and this aspect will also 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. He is now involved in its life assessment as a part of the Japanese industry effort. The second speaker is Dr Heuser of Bohler Thyssen, Germany, who has successfully presented this course in many countries. Bohler Thyssen are well known for their welding expertise in this area and indeed many companies benefit from their work and expertise. The third and fourth speakers are Drs David Robertson and Ahmed Shibli of European Technology Development who have been involved in the study of welding consumables and welding related issues of T23/T24 as a part of ETD's Group Sponsored Projects for international industry.

Technical Enquiries to:

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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 and T/P24 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

DAY --- 1**REGISTRATION & WELCOME 0900 - 0930****Module 1: T/P23 Material Properties and Heat Treatment**

0930 – 1530 h (with coffee and lunch breaks)

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: P23/ P24 Weld Consumables and Welding Issues

1530 – 1700 h

Presenter

Dr Herbert Heuser, Bohler Thyssen, Germany

Objective

To develop a better understanding and knowledge of the state of the P23, P24 weld consumable development, weld characterisation, short term material properties and effect of heat treatment.

Specific topics will include:

- Characterization of the matching filler metals
- Welding without PWHT
- Welding with PWHT
- Problems regarding stress relief cracking at P23
- Reasons for low CVN – values
- Optimised welding parameter
- Examples
- Conclusions

DAY --- 2

Module 3: P24 Material Properties, Heat Treatment and Some P24/P23 Weld Behaviour Issues

0900 – 1130 h

Presenters

Dr David Robertson, Dr Ahmed Shibli, European Technology Development, UK

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/P24 development, its properties, the effect of heat treatment, chemical composition, data sources etc. and the industrial experience to date.

Specific topics will include:

- T24/P24 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.
- Comments on the worldwide supply/ use of T24.
- Potential sources of materials data.
- Strength/ life reduction factors.
- Potential effect of plant cycling on cracking type, especially Type IV cracking.
- Weld repair issues.
- Dissimilar metal weld issues (T23/T24 to P91 or T23/T24 to low CrMoV steel welding, T23/T24 to austenitic stainless steel welding) and the effect of cycling.

LUNCH

1230 – 1330 HOURS

Module 4: Steam Side Oxidation, Component Integrity/Life Assessment

1200 – 1630 hrs (with 60 minute lunch 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 and T/P24 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 and T/P24 Training Course' 28 – 29 April 2008, IOM3, London

REGISTRATION FEE

Amount payable is that shown in the 'Fee+VAT' column (All figures are in *UK Pounds*)

	Until 27 March 08		From 28 March 08
Fee *	Fee +VAT @ 17.5% *	Fee *	Fee +VAT @ 17.5% *
	(To Pay)		(To Pay)
£700	822.50	£750	£881.25

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+T/P24 Course 08' with the payment and state here how you paid / intend to pay:

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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: Institute of Materials (IOM3), London. www.iom3.org

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 7ND, 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: Institute of Materials (IOM3), London. www.iom3.org		