

Creep Data Assessment *Procedures* and *Methodologies* for
Industry and Research Engineers

2-Day Training Course and Workshop

**Innovative Approaches to Creep
Data Assessment for Industrial
Structures**

Date: 10 - 11 May 2006

**Venue: Associazione Italiana di Metallurgia*
Milan, Italy**



* Venue: Italian Metallurgical Association - details and directions at:
www.aimnet.it

Presented by:

EUROPEAN CREEP COLLABORATIVE COMMITTEE (ECCC)



Organisation and Secretariat at:
European Technology Development, UK

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ECCC is the leading voice of European creep experts from Industry and associated Research Institutes, and since 1991 has been engaged in co-ordinating Europe-wide creep data generation, collation and assessment activities and developing accompanying guidelines and procedures. Principal aims of ECCC are to pool national creep data resources, to provide agreed creep-rupture strength values for European Product and Design Standards, and to ensure that new creep data meets the high standards required by modern industry needs. ECCC is an industry led grouping at present comprising 44 organisations from 16 countries of Europe. The interests of alloy producers, plant manufacturers and end users are represented within the ECCC grouping.

During the period 1992-1996, ECCC concentrated its efforts on the consideration of creep-rupture properties of non-welded materials through European Commission (EC) funding support. Focus switched to the consideration of properties for welded materials between 1997 and 2001. During 2002-2005 ECCC work was conducted on the development of guidelines for the generation, exchange and treatment of 'advanced creep' data (creep ductility, creep strain, multi-axiality, crack initiation, component testing and modelling) for plant design and life assessment. Work undertaken in these projects resulted in the development and publication of (i) extensive ECCC guidelines on data generation, exchange and assessment methods and (ii) approved Data Sheets on a scale that had not been possible before. Current ECCC activity is focused on the generation of data (i.e. testing) where gaps were found during the collation of data for the above programmes and where a particular need has been identified by the European high temperature industry. ECCC work is also continuing on the treatment of the large scale industrial data and expansion and refinement of the guidelines already produced by ECCC in the form of 9 Volumes already published for use by the European industry, consultants and research organisations. Further information on ECCC and its work/publications can be seen at: www.etc1.co.uk/eccc/advancedcreep

Currently ECCC activities are focusing on: the generation of creep-rupture data for materials for which the required knowledge base has been identified as being incomplete, the assessment of creep ductility, multi-axial creep properties and weld strength reduction factors (including those for the relatively new martensitic steels), creep data extrapolation, and support of CEN Standards Committees.

INTRODUCTION TO THE TRAINING COURSE & WORKSHOP

ECCC's early activity resulted in the development of agreed European Procedures for creep-rupture and creep strain/ductility data generation, data collation/exchange and data assessment. In particular, a range of established and state-of-the-art assessment methods were evaluated and compared, including the German graphical method, the ISO procedure, DESA and PD6605. The outcome was new guidelines for the assessment of creep-rupture datasets involving new and original concepts relating to pre-assessment and post assessment. For example, the ECCC post assessment tests (PATs) provide an independent check on the credibility of strength values determined by any creep-rupture data assessment procedure.

Having developed guidelines for the determination and assessment of creep data for base metals and weldments, the time is right for the European and wider international community to benefit from the newly established procedures, hence this course / workshop to train engineers/ scientists not directly involved in the use of the new ECCC concepts and procedures. The course will provide delegates with the knowledge to ensure that the creep-rupture data produced by their organisation is of the acceptable quality and accuracy. The course will also provide guidance on how to derive reliable long term material strength values from this data. These will provide the basis for the design and life assessment of high temperature components conforming to the highest standards.

This is the second course. The first one was successfully presented in London in Oct. 2004 and was attended by delegates from Central, Eastern and Western Europe & Japan.

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COURSE PRESENTERS

The course presenters are: Dr Stuart Holdsworth, EMPA, Switzerland; Dr Gunther Merckling, Instituto Scientifico Breda, Italy; Dr Stefan Holmstrom, VTT, Finland and Dr Michael Schwienheer, Technische Universitadt Darmstadt, Germany. These are the experts involved in the development of ECCC data generation and analysis procedures. They are experts of international repute drawn from a number of European high temperature industry and research institutes.

WHO SHOULD ATTEND

- The Training Workshop will be particularly useful for new engineers who want to become familiar with state-of-the-art data generation and analysis practices and to improve the quality of their skills in these disciplines.
- Those involved in creep testing and the management of creep laboratories in industry or research organisations, who want to become aware of the new procedures and underlying principles.
- Those involved in assessment of the creep-rupture strength of industrial alloys.
- Design engineers who want to become aware of the origin of datasheet creep strength values.

BENEFITS

Full notes will be provided for use during the course and to ensure easy revision of the course at any future time. Certificates will be awarded for attendance.

Hands-on experience of data assessment is included in the workshop sessions. Emphasis will be placed on understanding not only the underlying principles but also their practical application to high temperature plant design and life assessment.

Participants will need to bring their own lap top computers / notebooks for this work.

Day - 1



REGISTRATION:

(0830 – 0930 hrs)

Morning (0930 – 1230 hrs – *with break*)

Module 1: Introduction to Rupture and Creep Data Generation

- Introduction to workshop, objectives and structure
- Creep-rupture mechanism overview
- Creep / rupture testing overview and ECCC recommendations (includes the significance of temperature, load and strain measurement accuracies; specimen design, axiality, test machines and loading, required accuracies etc.)

1230 – 1400 hrs – LUNCH BREAK

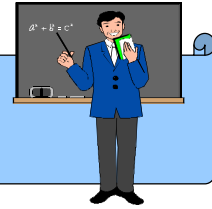
Afternoon (1400 – 1700 hrs - *with break*)

Module 2: Creep / Rupture Data Assessment (*with Worked Example*)

(Focus in this module will be on the determination of rupture strength and creep strength but reference will also be made to creep strain, stress relaxation etc.)

- Data assessment objectives
- Associated data requirements
- Data assessment methods
 - Overview of model equations, their physical significance and what do they represent in practice.
 - Overview of assessment methods (ISO, German-Graphical, PD6605, DESA).
 - Importance of pre-assessment.
- Post Assessment Tests (PATs), overview.
- **Worked Example 1:** Simple datasets showing sigmoidal behaviour. One objective is to demonstrate susceptibility of determined 100kh strength values to subjectivity without user experience of alloy characteristics.

Day - 2



Morning (0900 – 1200 hrs – *with break*)

Module 3: Procedures for Stress Rupture Data Assessment (*with Worked Example*)

- Review of previous day, questions, clarifications etc.
- Associated data requirements, pre-assessment (material pedigree, testing practice requirements).
- Demonstration of automated procedures, PD6605 and/or DESA.
- **Worked Example 2:** PD6605 and/or DESA assessments of dataset of previous day.

1200 – 1300 hrs – LUNCH BREAK

Afternoon (1300 – 1500 hrs)

Module 4: ECCC PAT Test Procedures for Post Analysis Data Qualification (*with Worked Example*)

- Post assessment tests – 1: Background, overview, description.
- Post assessment tests – 2: Demonstration of automated PATs with a worked example.
- Workshop Review.



REGISTRATION FORM

ECCC Training Course - CREEP / RUPTURE
Date: 10 – 11 May 2006, Milan, Italy

Please copy and post/ fax/ e-mail completed Form to the address shown at the bottom.

REGISTRATION FEE

The Registration Fee for this course is **625 Euros** and covers the Course Notes, coffee and lunches.

PAYMENT

For payment in Euros: Registration Fee is to be paid into the following UK Euro bank account:

Account Name: European Technology Development
Bank: National Westminster Bank
A/C No: 01/08061181
Sort Code: 60-12-36.

For payment in pound sterling: For the UK or other registrants wishing to pay in pound sterling the fee is **£425** (four hundred and twenty five pounds). This should be paid either by credit card or by a UK bank cheque or bank-to-bank transfer in the following *pound sterling account*: A/C Name: European Technology Development, Bank: Nat West Bank, A/C No: 26096625, Sort Code: 60-12-36.

With your payment please quote reference 'ECCC Course 2006' & name of the delegate.
(Please state below 'how and when was the Fee paid or will be paid')

Credit Card Payment: Payment can be made using Visa, Mastercard, Switch, JCB, American Express etc. (except the Diners Club). For security reasons please provide only *by fax or post* the following information:

Name of account holder:
Credit card number: Card expiry date:
Authorisation signature:
(All payments by credit card will be charged in pound sterling).

ACCOMMODATION

Information on accommodation in the vicinity of the Course venue will be provided on registration.

INFORMATION REQUIRED FOR YOUR BADGE

Delegate Name and Title:
Company: Position:
Address:
Phone: Fax: E-mail:



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