‘HIDA-8’
3-days Online International Conference

HIGH TEMPERATURE PLANT
CRACKING, DAMAGE & LIFE ASSESSMENT

Venue: Online (from London)
Dates: 20 – 22 April 2021

PROGRAMME & Registration Form

Supported by:
https://www.mdpi.com/journal/crystals
(Details on page 4)
INTRODUCTION

HIDA (High-temperature Defect Assessment) was a European Commission and industry supported research project aimed at unifying European defect assessment procedures with validation on a number of materials of interest to high temperature industry. Assessment of the behaviour of high temperature plant components containing defects and operating under steady and/or cyclic load conditions has become an area of urgent need and interest. The series of HIDA conferences, started in April 1998, have now become a regular event aimed at addressing this need. The first HIDA Conference (HIDA-1) was held in Paris in April 1998 and was considered to be a highly focused event. HIDA-2 Conference was organised in Stuttgart, Germany, at the end of the 4-year duration of the HIDA project. HIDA-3 was held in Lisbon, Portugal, and was aimed at crack growth and other high temperature behaviour of repair welds. HIDA-4 held at the Cambridge University, UK, was aimed at bringing together experts, academics, researchers and industry personnel interested in assessing the behaviour and life of defect containing components using probabilistic assessment. HIDA-5 was held at the University of Surrey, UK, and considered a wider scope including Fitness-for-Service and RBI. HIDA-6 was held in Nagasaki, Japan, in December 2013 and encompassed plant experience including experience with the new steels and creep-fatigue interaction. HIDA-7 was held in March 2017 at the University of Portsmouth, UK, and covered life and crack assessment of industrial components including costs and benefits of life extension of older plants when operating both in base load and flexible modes. HIDA-8 will cover crack assessment, repair and inspection and monitoring of cracks and the development of pre-crack damage.

Due to Covid-19 since the start of 2020 organisation of large face-to-face international conferences has become prohibitive limiting exchange of knowledge, data and discussions on many new and exciting developments over the last few years, hence this innovative idea of organising online Zoom HIDA-8. The organisers have been encouraged by the successful conduction of ETD’s 2-days Zoom online MIMA (Materials, Inspection, Monitoring and Assessment) conference held in October 2020 which was attended by 80 delegates from around the world.

ONLINE CONFERENCE FORMAT

The online conference presentations will each be of 25-minutes duration including questions at the end of each presentation. All attendees will be requested to keep their videos band microphones muted to avoid disturbance from the background noise during a presentation. During the question time at the end of a paper all attendees will be free to turn their videos on but will need to keep their mics muted. The Session Chairperson will invite a questioner to unmute her/his mic. and speak. The session moderator will ensure that only one questioner is able to speak at a time when all other attendees, except the questioner and the presenter, will remain muted. You don’t need to remember all this as before the start of a session all this will be described by the organisers!

WHO SHOULD ATTEND?

Plant owners, designers, fabricators, operators and services providers will be the prime audience in this conference. It is also envisaged that other organisations such as research institutions and inspection companies will equally benefit from this experience and the information exchange.
SUBMISSION OF PAPERS

Arrangements have been made for the publication of a Special Issue of the ‘Journal of Strength, Fracture and Complexity’. As this Conference is aimed at industry, submission of papers is optional but those which are submitted will be considered for publication in this Special Issue.

All Technical Enquiries to:
Dr Ahmed Shibli  ashibli@etd-consulting.com  Tel: +44 788 109 7730

THE ORGANISER – European Technology Development (ETD)

ETD is an independent UK based engineering, consulting and R&D company specialising in high temperature plant inspection and life assessment/extension, maintenance, materials and engineering issues in all type of power generating and petrochemical/ process plant. It also serves oil and gas sectors in general. ETD has also been organising various international workshops/ training courses and conferences in the UK, Europe, USA, Canada, Japan, Korea and other Asian countries mainly on the issues such as: power and process plant inspection and life assessment/extension, high temperature plant materials, plant component safety and durability, performance of in-service welds, power plant cycling, risk based maintenance (RBM), Reliability Centered Maintenance (RCM), probabilistic life and crack assessment, weld repairs etc. The company has been leading and co-ordinating a number of large cutting edge international industry projects (supported by the industry from North America, Japan, Europe and elsewhere or by the UK government and European Commission) on issues related to the assessment and improvement of high temperature plant performance, materials and design, maintenance and inspection strategies, and the development of innovative inspection techniques. The company has carried out/ participated in leading edge projects on P91 weld repairs, crack assessment, integrity issues and has carried out studies of P/T91 performance in plant worldwide. The company also specialises in power plant cyclic operation issues.

Further information about ETD, its projects, life assessment courses offered and other activities can be seen at:  www.etd-consulting.com

CONFERENCE COMMITTEE

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<tr>
<th>Dr Ahmed Shibli, ETD, UK</th>
<th>Prof A T Yokobori, Teikyo University, Japan</th>
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<tr>
<td>Dr David Allen, ETD, UK</td>
<td>Prof Staf Huysmans, ENGIE, Belgium</td>
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<td>Ms Feroza Akther, ETD, UK</td>
<td>Dr Qiang Xu, Huddersfield University, UK</td>
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<td>Dr Andrea Tonti, INAIL, Italy</td>
<td>Dr Stuart Holdsworth, EMPA, Switzerland</td>
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<td>Dr Andreas Klenk, MPA Stuttgart, Germany</td>
<td>Dr S Simandjuntak, University of Portsmouth, UK</td>
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<td>Ms Fiona McHugh, ETD, UK</td>
<td>Mr Damien Charman, IRIS NDT, Australia</td>
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<td>Prof Changyu Zhou, Nanjing Tech. University, China</td>
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Crystals (ISSN 2073-4352, IF 2.404) is a peer-reviewed open access journal, published monthly online by MDPI, that covers all aspects of crystalline material research, including liquid crystals, Mineralogical Crystallography and Biomineralization and biomolecular crystals.

At present, Crystals ranks 10/26 (Q2) in the ‘Crystallography’ category of Web of Science.

https://www.mdpi.com/journal/crystals

Special Issue “Mechanical Degradation of Advanced Energy-Related Alloys: Processing, Microstructure, and Testing”

Edited by: Dr. Yiyu Wang, Dr. Xu Xu, Dr. Zaiqing Que, Prof. Dr. Wei Sun

https://www.mdpi.com/journal/crystals/special_issues/energy_alloys
INTRODUCTION TO THE CONFERENCE  (0800 - 0815h)

SESSION 1: INSPECTION, DAMAGE & CRACKING UNDER CREEP, FATIGUE AND OXIDATION CONDITIONS  (0815 – 1400h)

Chairman: Dr. David Allen, ETD, UK

Paper 1-1 (0815 -0840h)
Assessment of Creep Damage in Welded P91 T-pieces of Main-Steam and Hot Reheat Steam Piping Systems
David Robertson, ETD Consulting, Leatherhead, Surrey, UK

Paper 1-2 (0840 -0905h)
Embrittlement of HP40Nb Heat-Resisting Alloy at Intermediate Operating Temperatures
D B Swanepoel, Metallurgical Engineering Department, Sasol, South Africa
K Eschbach, Research and Development Services, Schmidt and Clemens, Germany

Paper 1-3 (0905 -0930h)
Acceptability Assessment of Casting Weld Defects Under Transient Thermal Loading
Ronnie Scheepers, Corporate Consultant: Structural Integrity, Eskom, South Africa
Marthinus Bezuidenhout, Corporate Consultant: Power Plant Materials, Eskom, South Africa

COFFEE BREAK  0930 – 0945h  (15 mins.)
Chairman: Dr. Andrea Tonti, INAIL, Italy

Paper 1-4 (0945-1010h)
Combined Creep/Fatigue/Oxidation Continuum Damage Modelling Approach in Progressive Failure Analysis at High Temperatures
Kamran Nikbin, Department of Mechanical Engineering, Imperial College London, UK

Paper 1-5 (1010-1035h)
Creep-Fatigue Assessment and Damage Evolution of P92 Steel Including Welds
T Bender, A Klenk, S Weihe, MPA Stuttgart, Germany

Paper 1-6 (1035-1100h)
Comparison of Wrought and Additively Manufactured IN718 Concerning Crack Growth Threshold and Fatigue Crack Growth Behaviour
Timo Brune, Karl Michael Kraemer, Christian Kontermann, Matthias Oechsner Chair and Institute for Materials Technology, Technische Universität Darmstadt Darmstadt, Germany

COFFEE BREAK 1100 – 1115h (15 mins.)

Chairman: Prof. Emeritus Staf Huysmans, ENGIE, Belgium

Paper 1-7 (1115-1140h)
Practical Aspects of Inspecting P91 Piping System
Damien Charman, IRISNDT, Newcastle, Australia

Paper 1-8 (1140-1205h)
The Novosound Belenus: A Truly High Temperature, Flexible Corrosion Monitor
Claire Thring, Belenus Applications Specialist, Novosound, Motherwell, Scotland, UK

LUNCH BREAK 1205 – 1310h (1h 5mins.)

Virtual Guided Tour of Rome: “History of Rome through its Squares and Fountains”
by: Dorte Schmidt & Sergio Ciattaglia (1230 – 1300h)

Paper 1-9 (1310-1335h)
Kurt Boschmans, LABORELEC, ENGIE, Belgium

Paper 1-10 (1335-1400h)
Ahmed Shibli, ETD Consulting, Leatherhead, Surrey, UK
**Introduction to Day-2 & Admin. Matters**

**SESSION 2: DEFECTS / CRACKS & LIFE ASSESSMENT**

**Chairman: Prof. Kamran Nikbin, Imperial College, London, UK**

**Paper 2-1 (0815 -0840h)**
Development of Guidelines for Simplifying Fracture Mechanics Assessment in the High Temperature Regime
Andreas Klenk, Annett Udoh, Magdalena Speicher, MPA Stuttgart, Germany
Falk Müller, ifW Darmstadt, Germany

**Paper 2-2 (0840 -0905h)**
Factors Influencing the Analytical Representation of Creep Crack Development in Alloy 939
Stuart Holdsworth, EMPA, Switzerland

**Paper 2-3 (0905 -0930h)**
‘Crackfit’ - A Defect Assessment Tool for Pressure Vessels, Piping and Turbine Defect/Crack Assessment at Low and High Temperatures
Baginda Affendy, ETD Consulting, Leatherhead, Surrey, UK

**COFFEE BREAK 0930 – 0945h** (15 mins.)

**Chairman: Dr. Andreas Klenk, MPA Stuttgart, Germany**

**Paper 2-4 (0945 -1010h)**
The Correlation of Behaviour of Vacancy Diffusion With Creep Damage Progression Around A Notch Tip for W Added 9Cr Steel
A Toshimitsu Yokobori Jr.* and Haruki Ishikawa**
*Teikyo University, **Graduate School of Tohoku University, Japan

**Paper 2-5 (1010 -1035h)**
Bolt Loading Effects on the Structural Integrity Assessment of Defects in Industrial Components
Ronnie Scheepers, Eskom Corporate Consultant: Structural Integrity, South Africa
Marthinus Bezuidenhout, Eskom Corporate Consultant: Power Plant Materials, South Africa

**Paper 2-6 (1035-1100h)**
A Perspective on the Wilshire Creep Equations *(new title)*
John M Brear, John Brear – Plant Integrity, Llanelli, UK

**COFFEE BREAK 1100 – 1115h** (15 mins.)
Chairman: Dr. David Robertson, ETD, UK

Paper 2-7 (1115 -1140h)
An Overview of the Condition Assessment Approach Followed for an Aged Carbon Steel Pipeline Network in High Pressure Superheated Steam Service to Support Continuous Operation by Means of a Phased Replacement Strategy
Leanne Matthesen, Metallurgical Engineering Lead – Sasol Ltd., South Africa

Paper 2-8 (1140 -1205h)
Further Calibration of Creep Cavitation Model for 316H Steel
Guoling Fu and Qiang Xu, Department of Engineering and Technology, School of Computing and Engineering, University of Huddersfield, UK

LUNCH BREAK  1205 – 1250h  (45 mins.)

Paper 2-9 (1250 -1315h)
Conditional Operation of Boiler Components Working Under Creep Conditions Until Replacement
Jerzy Trzeszczyński and Ewa Trzeszczyńska, Pro Novum sp. z o.o., Poland

Paper 2-10 (1315 -1340h)
A Case Study: Life Assessment of a Superheater Outlet Header Using ETD’s Newly Developed ‘Boiler Life Assessment Software’ (BLAS)
F Akther, ETD Consulting, Leatherhead, Surrey, UK

Paper 2-11 (1340 -1405h)
Adam Wojcik, Mechanical Engineering, University College London, UK
Alberto Santos, Mathew Waitt, Matelect Ltd, Harefield, UK
Ahmed Shibli, ETD Consulting, Leatherhead, Surrey, UK
SESSION 3: MARTENSITIC STEELS – CRACKING, LIFE ASSESSMENT AND MODELLING

Chairman: Dr. Stuart Holdsworth, EMPA, Switzerland, UK

Paper 3-1 (0815 -0840h)
Creep Ductility-based Models for Creep Strength Enhanced Ferritic Steels: A Review
R Ragab\textsuperscript{a}, J. Parker\textsuperscript{b}, M. Li\textsuperscript{a}, T. Liu\textsuperscript{a}, A. Morris\textsuperscript{c}, W. Sun\textsuperscript{a}
\textsuperscript{a} Faculty of Engineering, University of Nottingham, Nottingham NG7 2RD, UK
\textsuperscript{b} Electric Power Research Institute, Charlotte, NC, USA
\textsuperscript{c} EDF Energy (UK), Coal Gas and Renewables, Central Technical Organisation, Gloucester, UK

Paper 3-2 (0840 -0905h)
The Correlation of Creep Deformation with Damage Progression Behaviour Around a Notch Tip for W Added 9Cr Steel
A Toshimitsu Yokobori Jr.\textsuperscript{*}, Haruki Ishikawa\textsuperscript{**} and Ryuji Sugiura\textsuperscript{***}
\textsuperscript{*}Teikyo University, ** Graduate school of Tohoku University, *** Nihon University, Japan

Paper 3-3 (0905 -0930h)
Inspection and Life Assessment of “Aberrant” Mis-Manufactured Martensitic High Temperature Steels
David Allen, David Robertson, Ahmed Shibli, ETD Consulting, Leatherhead, Surrey, UK

COFFEE BREAK 0930 – 0945h

Chairman: Dr Sarinova Simandjuntak, University of Portsmouth, UK

Paper 3-4 (0945 -1010h)
New Italian Standard for the Creep Assessment of Martensitic Steels
Andrea Tonti, Corrado Delle Site, INAIL and Luana Campanile, ex-INAIL, Italy

Paper 3-5 (1010 -1035h)
Lifetime Assessment of Prematurely Cracked P91 Weldments at Intermediate Temperatures and Low Stress Loading
Ludwig Limmer, Kinetica GmbH, Nurnberg, Germany

Paper 3-6 (1035 -1100h)
All-Positional Flux Cored Wire With Lower Trace Element Contents and Improved Ambient Temperature Toughness for Welding P91 Steels
Zhuyao Zhang, Sorin Craciun, Vincent van der Mee, Lincoln Electric, Europe
HIDA PRIZE GIVING CEREMONY + BREAK  
(1100 – 1200h)

HIDA Prize Giving Ceremony: 1115 – 1145h  (30 mins.)
Given to prominent scientists/ engineers for their contribution to research or services to high temp. plant materials, inspection, monitoring and particularly damage and crack assessment.

Please feel free to send your recommendations and the reasons for the recommendations. The Conference Committee will pick up to five prize receivers from the participants.

Chairman: Dr Qiang Xu, University of Huddersfield, UK

Paper 3-7 (1200 -1225h)
Prediction of creep damage
Rolf Sandström, Materials Science and Engineering, KTH Royal Institute of Technology, Stockholm, Sweden

Paper 3-8 (1225 -1250h)
The Development of Creep Damage Constitutive Equations for High Cr Alloys
Xin Yang¹, Zhongyu Lu² and Qiang Xu¹
¹Department of Engineering and Technology, School of Computing and Engineering, University of Huddersfield, UK
²Department of Informatics, School of Computing and Engineering, University of Huddersfield, UK

Paper 3-9 (1250 –1315h)
Investigating the Combined Residual Stresses and Fluid-Structure Interaction FE Analysis for the Integrity Assessment of Induction Bent Pipes
Bing Lin, Sarinova Simandjuntak, School of Mechanical and Design Engineering, University of Portsmouth, UK

Paper 3-10 (1315 -1340h)
Remaining Life Assessment Method of Grade 91 Steel Welded Joint of In-Service Piping Considering Data Scatter
Masatsugu Yaguchi, Materials Science Research Laboratory, Central Research Institute of Electric Power Industry (CRIEPI), Japan

CLOSING DISCUSSION 1340-1400h  (20 mins.)
Chaired by: Dr Ahmed Shibli, ETD, UK
REGISTRATION FORM  (Please email)
International Online Conference

**HIDA-8**

**CRACKING & DAMAGE IN HIGH TEMPERATURE PLANT**

**Dates:** 20 – 22 April 2021

**Registration Fee:** Please put ‘x’ in the relevant box and show the total payment.

<table>
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<tr>
<th>Fee is to be paid in GB Pounds.</th>
<th>Reduced Fee (Until 22 Mar. 21)</th>
<th>x</th>
<th>Full Fee (From 23 Mar. 21)</th>
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<tr>
<td>Conference Delegates</td>
<td>£400</td>
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<td>Conference Presenters</td>
<td>£300</td>
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Please show here (no. of attendees x £ ) : **Total Amount Payable = £**


How to Pay: When paying please quote reference ‘HIDA-8’ and the ETD invoice number (if this was issued):

1) **By bank to bank transfer** to: European Technology Development Ltd.

**(ETD bank account details will be provided on request)**

2) **Credit Cards:** Payment information will be provided on request.

When registering, please state here how you paid or intend to pay:

All Registration & Payment enquiries to: enquiries@etd-consulting.com

**Delegate/ Speaker Details**

Your **title** and **name**:

Company: Job Title (optional):

Address: Phone:

E-mail: **Address for Registration:**

Please email the completed Form to: enquiries@etd-consulting.com