

*Training Course aimed at **Gas Turbine** Issues*



Training Course in GT Component Materials,  
Coatings, Failure, Repair and Integrity/ Life  
Assessment

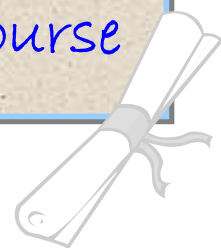


Venue: INSTITUTE OF MATERIALS ( IOM3 ), LONDON  
[www.iom3.org](http://www.iom3.org)

Dates: 6 – 10 July 2009

*(With an option to attend for any number of days at proportionally reduced  
registration fee)*

1-week (or shorter) Training Course





**REGISTRATION & WELCOME 0900 - 0930h**

*Prof Dr U Gampe*

(6-7 July)

**Design, Operation, Materials and Integrity/ Lifting Issues**

- Overview of design of hot gas path components: materials, coatings, cooling, damage mechanisms, lifing and deformation models.
- Power augmentation by high fogging (wet compression) and evaporative cooling: technology, effects vs. ambient conditions, background considerations.
- Compressor operation issues: Deterioration in compressor performance and prevention.
- NO<sub>x</sub> emissions of gas turbines: mechanism of nitrogen oxides production, influencing factors, combustion technology.
- Influence of air inlet parameters on gas turbine performance (gas turbine performance map, background in detail).
- Effects of non-uniform gas temperatures at turbine inlet on component lifetime and performance.
- Modification of fast loading mode of GT and its impact on service life (40MW class peak load GT as worked example).
- **Workshop:** 10 case studies on damage and service life taken from GT operation.
- **Discussion of examples, case studies and problems contributed by the participants.** (*Participants are requested for their feedback what and how many contributions can be expected*).

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*Dr Eng C Sampietri*

(8 July)

**Component Degradation and Failure**

- Compressor blades failure.
- Turbine stator and rotor blades degradation with metallographic examination.
- Failure due to lack of air cleaning for compressor and turbine.
- Rotor blades failure due to thermo-mechanical fatigue cracking.

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**Dr Y Yoshioka**

*(9-10 July)*

### **Materials Selection and Related**

- Typical materials for current GTs, metallurgical background, and recent developments.
- Hot section components in gas turbines, combustion can and blade temperature profiles.
- Blade designs.
- Can and blade cooling techniques.
- Basic principles of superalloy design.
- Solution treatment, precipitation and overageing.
- Coarse grain, directionally solidified, and single crystal types.
- Temperature and strength relationships for typical alloys.

### **Lifing of Hot-gas path components**

- Analytical and condition based life assessment of GT blades and metallurgical evaluation methods.
  - Material degradation due to creep, fatigue and oxidation.
  - Materials and principles of life assessment.
  - Life consumption for a GT Trip.
  - Coatings. Effect of thermal barrier coatings (TBC) on material temperature and creep life. Coating life aspects.
  - Aspects of repair of hot gas path components.
  - Life extension of GT blades
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The End



## Course Presenters

**Prof Dr Uwe Gampe** of the University of Technology Dresden, Germany, who has over 10 years of experience of working at the university on R&D and consulting projects for gas turbine industry and who joined the university after many years of experience of working in the German industry on plant life assessment issues.

**Dr Claudio Sampietri** works now as an independent consultant but is closely associated with Italian and international GT industry and is a recognised specialist in this area with many years of industry experience.

**Dr Yomei Yoshioka** is Chief Researcher at the Power Systems Co., Toshiba Corporation, Yokohama, Japan, and has many years of experience of working in the gas turbine area. He is a well recognised authority in this field.

### Technical Enquiries to:

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

## 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), Guidelines for HRSG Operation, Inspection, Monitoring and Assessment etc.*], consultancy services, plant integrity/ life assessment services offered and other activities can be seen at: [www.etd1.co.uk](http://www.etd1.co.uk)  
 Or, obtained by writing to: [enquiries@etd1.co.uk](mailto:enquiries@etd1.co.uk)

# REGISTRATION FORM

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

## ‘Gas Turbine’ Training Course, 6- 10 July 09, IOM3, London

*Can be attended for any number of days for the proportionally reduced registration fee as shown below.*

### REGISTRATION FEE

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

	Until 12 June 09	From 13 June 09	
Fee *	<b>Fee +VAT @ 15% * (To Pay)</b>	Fee *	<b>Fee +VAT @ 15% * (To Pay)</b>
Full Course- 5-days (£2,000 + VAT)	<b>£2,300</b>	£2,200 + VAT	<b>£2,530</b>
Any number of days (£400 / day + VAT)	<b>£460 / day</b>	£440 + VAT	<b>£506 / day</b>

\* All attendees pay the UK government VAT for events held in the UK.

### 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 ‘Gas Turbine Course 09’ with the payment and state here how you paid / intend to pay: .....*  
.....  
.....

**By Credit Card:** Major cards such as Visa / Master Card / American Express/ JCB / Switch are accepted with the exception of Diners 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](http://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, Cleve Road, Leatherhead, Surrey KT22 7RD, UK      Enquires: [registration@etd1.co.uk](mailto: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](http://www.iom3.org)