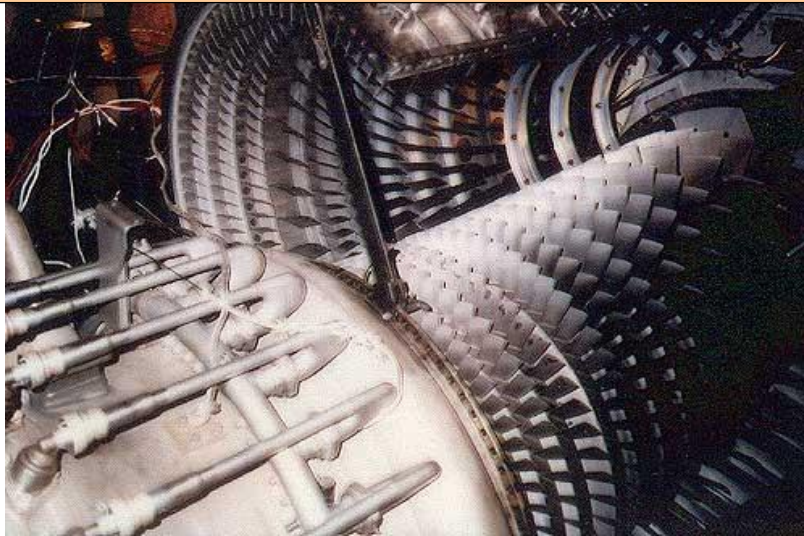


## Training Course aimed at Gas Turbine Issues



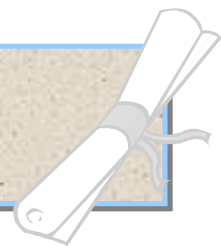
Training Course in GT Component Design,  
Materials, Coatings, Operation, Maintenance,  
Failure, Repair and Integrity/ Life Assessment



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

Dates: 19 – 22 October 2010

4-days Training Course



Note: This is ETD's Second Training Course in the Gas Turbine series.



**REGISTRATION & WELCOME 0900 - 0930h**

*Prof Dr U Gampe & Dipl.-Ing. M Freimark*

*(19-20 October)*

**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).

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**Workshop:** 10 case studies on damage and service life taken from GT operation.  
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Ø **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 Y Yoshioka**

*(21-22 October)*

**Materials Selection, Design, Material Degradation, Coatings, Repair and Life Extension**

- 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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## Course Presenters

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

**Dipl.-Ing. Manfred Freimark** is Senior Expert Engineer for gas turbines in the European Association for Electricity and Heat Generation VGB PowerTech. He has been working in the gas turbine sector for 46 years and thereof 37 years in power generation as engineer and many years as Power Plant Manager. Because of his substantial contributions in re-engineering for gas turbines, in rules and standards, his work as Chairman of the permanent working group for gas turbines of VGB and as scientific organizer and chairman of the VGB conference on gas turbines and gas turbine operation and finally his consulting for gas turbine operators, Manfred Freimark is a recognized specialist in the international gas turbine community.

**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 an internationally recognised authority in this field.

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## Who Are We ?

**European Technology Development Ltd. (ETD)** is a UK based engineering advisory, consulting and R&D company specialising in life assessment/ extension, maintenance, materials and engineering issues in all types of power generating and process plant.

In addition to its *main business of technical consulting*, ETD regularly organises training courses in power, petrochemical, oil, gas and other industrial sectors as a part of its programme on *technology transfer to industry*. In the recent past ETD has organised various international workshops/ courses/ conferences in the UK, a number of other European countries (Germany, France, Portugal), Middle East, Far East, Canada and USA. The issues involved in these courses covered GT hot gas path component lifing; HRSG design, maintenance and inspection; plant life assessment/ extension; high temperature plant materials behaviour; plant component safety and durability; performance of in-service welds and weld repairs; power plant cycling - technical and cost issues; boiler and turbine maintenance; petrochemical plant issues; and, power plant risk based maintenance and inspection (RBMI).

ETD's *consulting services* are backed-up by its *technology development and R&D programmes* in which ETD has been 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). These have covered issues related to the assessment and improvement of high temperature plant

performance, materials, plant design, and, plant maintenance, repair and inspection strategies. The company has also carried out or participated in leading edge projects on P91 weld repairs, crack assessment, plant integrity issues and has only recently carried out and concluded reviews of T/P23, T/P24 and P/T91 performance in plants worldwide.

**Technical Enquiries to:**

Dr David Robertson      Tel: + 44 (0)1372 363 112 or + 44 (0) 1372 363 111

[drobertson@etd1.co.uk](mailto:drobotson@etd1.co.uk)

**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., CCGT Cyclic Operation, consultancy services, plant integrity/ life assessment services 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, 19- 22 October 2010, IOM3, London**

## REGISTRATION FEE

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

GT Training Course	
Fee *	Fee +VAT @ 17.5% * <b>(To Pay)</b>
£1700 + VAT	<b>£1955</b>

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

## PAYMENT

<p><b>By UK bank cheque, bankers draft, bank to bank transfer to:</b>          European Technology Development. <i>Bank account details will be provided on request.</i></p> <p><i>Please quote reference 'Gas Turbine Course 10' with the payment and state here how you paid / intend to pay: .....</i></p>			
<p><b>By Credit Card:</b> Major cards such as Visa / Master Card / American Express/ JCB / Switch are accepted with the exception of Diners Club. For <i>security</i> reasons please <b>fax or post</b> this information.</p>			
Name of Account Holder			
Card Type and No.		Expiry date	
Amount being paid		Card security no.	
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, Cleeve Road, Leatherhead, Surrey KT22 7RD, UK

Enquires: [registration@etd1.co.uk](mailto:registration@etd1.co.uk)

Tel: + 44 1372 363 111 or + 44 1372 363 112 Fax: + 44 1372 363 222

**Course Venue:** Institute of Materials (IOM3), London. [www.iom3.org](http://www.iom3.org)