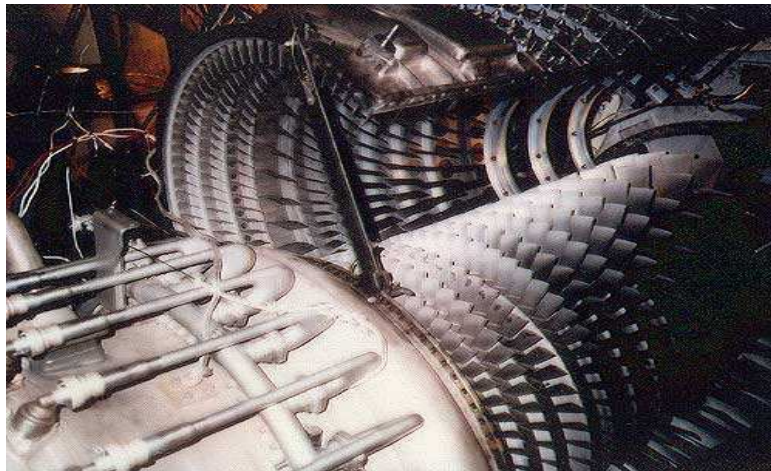


Training Course in Gas Turbine Issues



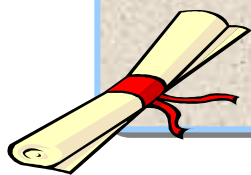
Training Course in GT Component Design, Materials, Coatings, Operation, Maintenance, Failure, Repair and Integrity/Life Assessment



Venue: Charlotte, North Carolina, USA

(Venue details will be announced later)

Dates: 26 – 29 November 2012



4-days Training Course

Notes:

- 1) This is the 4th ETD Training Course in the Gas Turbine Series – the previous three courses were all held in London.
- 2) This course is being held in parallel with the ‘Damage and Crack Assessment’ Course being held on 26-27 Nov. and ‘Power Plant Cyclic Operation’ Conference being held on 28-30 Nov (Conventional Plant on 28-29 Nov, CCGT/ HRSG on 30 Nov) – all at the same venue. *Details at:* www.etd1.co.uk
- 3) Those attending this course will have the opportunity to attend CCGT/ HRSG Cycling part of the Conf. being held on 30th Nov.

Every Morning - Light & Hearty Breakfast 0815 - 0900h

REGISTRATION & WELCOME 0900 - 0930h

Prof Dr U Gampe

26-27 Nov
(26 Nov = 0930-1730h)
(27 Nov = 0900-1730h)

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.
- NOx 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*).

Dr Y Yoshioka

28-29 Nov
(28 Nov = 0900-1730h)

(29 Nov = 0900-1700h)

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

FINISH = 1700 hours

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.

Dr Yomei Yoshioka is Chief Engineer 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.

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:

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shampson@etd1.co.uk

Further information about ETD, its projects [e.g. CCGT/ HRSG plant Cyclic Operation, 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, Failure Analysis, On-Site Plant Services and other activities can be seen at: www.etd1.co.uk

Or, obtained by writing to: enquiries@etd1.co.uk

‘GAS TURBINE’ Training Course

Registration Form

 (Please fax/ email)

Registration Fee: This is being charged in **US dollars for the USA and Canada payees** and in **GB Pounds for all others.**

* Please put a cross in front of the box applicable to you and show the total at the bottom.

++ <i>Note:</i> Those attending GT course have the opportunity to attend CCGT/HRSG Cycling part of conf. on 30 th Nov.	Until 18 Sep 12		*	From 19 Sep 12		*
	UK£	US\$		UK£	US\$	
Conf: Conv. Power Plant Cycling (28-29 Nov) - Delegates	£300	\$500		£350	\$580	
Conf: Conv. Power Plant Cycling (28-29 Nov)- Presenters	£250	\$420		£300	\$500	
Conf: CCGT/ HRSG Cycling (30 Nov) - Delegates	£150	\$250		£175	\$300	
Conf: CCGT/ HRSG Cycling (30 Nov) - Presenters	£125	\$210		£150	\$250	
Course: Damage/ Crack Assessment (26-27 Nov)	£800	\$1330		£900	\$1500	
GT Course – (26-29 Nov) ++ See note above	£2000	\$3350		£2200	\$3650	
Please show here the Total Amount Payable = £				or, \$		

Conference Registration Fee covers Proceedings on a CD provided, at the conference or soon afterwards, hearty breakfast every morning, coffee, lunches, and Reception on the evening day 2.

The Course Fees cover printed course notes supplied at the start of the Courses, electronic (pdf) copies of the slides, hearty breakfast every morning and coffee/ tea and lunches.

Payment Options

1) By bankers draft or bank to bank transfer to: European Technology Development (For payment by bank to bank transfer, account details will be supplied on request).			
2) By UK bank cheque made payable to ‘ETD Ltd.’ Please quote reference ‘ Course +Conf. Charlotte ’ with the payment and state how you paid or intend to pay:.....			
3) By Credit Card: Major cards such as Visa/ Master Card/ JCB/ American Express/ Switch are accepted with the exception of Dinners Club. For security please <i>fax or post</i> this information.			
Name of Account Holder		Amount to pay	£/\$
Card Type and No.		Expiry date	
Authorisation signature		Security code	

Venue + Accommodation: This information will be provided later.

Delegate Details: (Required for your badge)

Your **title and name:**

Company:

Position (optional):

Address:

Phone:

Fax:

E-mail:



Address for Registration: Please post/ fax/ e-mail this Form to:

Registration, European Technology Development, 6 Axis Centre, Cleeve Road, Leatherhead,
 Surrey KT22 7RD, UK Tel: + 44 1372 363 111 or + 44 1372 363 112 Fax: + 44 1372 363 222
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