

## Registration (Fax Reply)

To: ECPE e.V.  
Att.: Ingrid Bollens

Fax: +49 (0)911 / 81 02 88 – 28

Registration before **11 March 2008**

### Participation fee:

.. €480,- for industry

.. €380,- for universities

The fee includes the tutorial, dinner, lunch,  
coffee/soft drinks and handouts.

With the confirmation of seminar registration you will receive the invoice. A discount of 50 % is given to ECPE Member Companies.

The number of participants is limited to 35 attendees.

Sender:

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title, given name, name

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company, department

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full address

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phone, fax

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e-mail

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date, signature

## Organisational information

Organiser: ECPE e.V.  
90443 Nuremberg, Germany  
[www.ecpe.org](http://www.ecpe.org)

Course instructor: Prof. Dr. E. Wolfgang

Organisation: Ingrid Bollens, ECPE e.V.  
+49 (0)911 / 81 02 88 – 10  
[ingrid.bollens@ecpe.org](mailto:ingrid.bollens@ecpe.org)

Place of seminar: Warwick University  
Room 104, Building 26  
IMRC (International Manufacturing  
Research Centre)  
Gilbert Hill Road  
Coventry CV4 7AL  
United Kingdom



Further information (hotel list and maps) will be provided after registration.



**ECPE European Center for  
Power Electronics e.V.**

## ECPE Tutorial

# Reliability of Power Electronic Systems

**18 – 19 March 2008  
at Warwick University  
Coventry, United Kingdom**

## Introduction

# ECPE Tutorial “Reliability of Power Electronic Systems”

18 – 19 March 2008  
Coventry, United Kingdom

The aim of the tutorial is to teach the basics of modern reliability engineering. This is based on physics-of-failure-concept and the intended mission profile of the electronic system and its components. The mission profile considers the combination of stresses versus time to which the electronic system is subjected during its application time. Especially application oriented end-of-life testing is under strong consideration today. This requires the design of appropriate accelerating stress tests. To secure reliability of power electronics systems the building-in reliability philosophy will be explained by examples.

Beside the very successful seminar series, ECPE is starting a tutorial programme focussing more on education of young engineers and engineers from neighbouring disciplines.

The course instructor of the reliability tutorial is  
Prof. Dr. Eckhard Wolfgang

Co-instructors are  
Dr. Wolfgang Gerling, Consultant  
Dr. Eckart Hoene, Fraunhofer Institute IZM.

All presentations and discussions will be in English.

## Programme

Tuesday, 18 March 2008

9:30 am Start of registration

10:30 Welcome, Opening

10:45 Introduction

- scope of tutorial
  - content
- E. Wolfgang

11:15 Definitions and Characteristics

- quality, reliability
  - degrading / failure mechanisms, models
  - reliability phases
- W. Gerling

12:15 Mission Profiles

E. Wolfgang

1:00 pm Lunch

2:00 Virtual Performance Assessment:

i) Power Electronics Circuit Design

- switching and on-state losses
- over-voltages

E. Hoene

3:00 Coffee break

3:30 ii) Power Electronics Thermal Design

- simulation
- measurements

E. Hoene

4:30 iii) Advanced Cooling Technologies

E. Wolfgang

5:15 Wrap up 1<sup>st</sup> day

5:45 End

7:30 pm Dinner at **Restaurant “Radcliffe House”**,  
Building 46, Gilbert Hill Road,  
Coventry CV4 7AL, United Kingdom

## Programme

Wednesday, 19 March 2008

9:00 am Open questions from 1<sup>st</sup> day

9:30 Virtual Reliability Assessment

i) Physics-of Failure Concept  
W. Gerling

ii) Examples for Failures in  
Power Electronics

E. Wolfgang

10:30 Coffee

11:00 iii) Reliability Risk Analysis

E. Wolfgang

iv) Life Time Prognosis: solder cracking

E. Wolfgang

12:30 Reliability Evaluation Programme

early, random, end-of-life phase

**Robustness Validation**

- change of test paradigm
- test samples size
- robustness margins

W. Gerling

1:15 pm Lunch

2:15 Zero Defect Strategy

- first time right in design
- zero defect in processes

W. Gerling

3:00 Wrap up tutorial

3:30 pm End