

## Seminar 4 Monday June 18, 2001

### DESIGN WITH POWER SEMICONDUCTORS - Part II - POWER SEMICONDUCTORS IN THE FIELD 9:00am – 6:00pm

Instructors: Pierre Aloisi, Jean-Marie Peter, France

ABOUT THE INSTRUCTORS: SEE SEMINAR 3

#### CONTENTS

##### **2.1 COMPONENT COMPARISON**

Choice - Data Sheets - Typical and maximum values - second source - Reliability and safety margin

##### **2.2 DRIVE**

MOSFETs and IGBTs, GTO and IGCT

##### **2.3 THE FAST RECOVERY RECTIFIER IN THE FIELD**

Turn-off behavior - Consequences, losses, overvoltages, noise current spikes. The circuit has an influence. The designer's job.

##### **2.4 OVERVOLTAGE PROTECTION**

Analysis of overvoltages - Passive components -  
Active protection  
Snubbers: Switch aid networks and clamping circuits

##### **2.5 OVERCURRENT PROTECTION**

Active short circuit protection MOSFETs and IGBTs.  
GTOs and IGCTs

##### **2.6 SIMULATION**

##### **2.7 HOW TO MINIMIZE THE LOSSES**

Switching losses: Hard and soft switching component behavior in zero-voltage switch and in zero current switch. Conduction losses

##### **3.1 THE POWER ELECTRONICS WORLD CHANGES**

Power electronics evolution and main requirements.  
From "high tech" to "heavy industry" - Progresses and improvements

##### **3.2 POWER SEMICONDUCTORS EVOLUTIONS AND TRENDS**

Discrete and integrated devices - New devices? Or new control methods? MOSFET and IGBT trends - The competition: MOSFET vs IGBT - IGBT vs IGCT - What could be the successor of the IGBT? The fast rectifier always the weak point?

##### **3.3 CONSEQUENCES FOR THE DESIGN**

The challenge of power integration - Consequences for the design

#### WHO SHOULD ATTEND

Engineers involved in power electronics and interested in:

- Converter design
- Choice of components and component policy
- Component reliability

For this part II course it is not necessary to have followed the first part of the course. Some background about basics of power component is desirable.

This course is focused on:

The concrete aspects of the components in the field, from low to high power. The components evolution and the major future trends.