



Thermal effects in mechatronic systems

This training starts on: 19-06-2017

Location: Eindhoven
Price: 2.245,00 euro excl. VAT
Duration: 3 consecutive days
Contact: training@hightechinstitute.nl, +31 85 401 3600

Overview

This course focuses on the various aspects related to thermal effects that impact the performance (accuracy, life time or process quality) of precision modules/systems. Participants will acquire theoretical and practical background on design, simulation, measurement and compensation techniques that are essential in the development of precision modules/systems that are subject to internal or external thermal loads.

Intended for

Mechanical designers, mechatronics system engineers and mechatronic architects who are involved in the multi-disciplinary development of accurate motion modules/systems in which thermal aspects play an important role in the overall system performance.

Prerequisites: Technical education (BSc or higher), with at least two years of experience and preferably completion of the course "Mechatronics system design" (Metron Part 1), the former Philips-CTT course Metron or equivalent basic knowledge. Basic knowledge of matrix calculus is recommended but not essential.

Objective

After completion of the course, the participants understand the basic aspects, risks and concepts related to thermal effects and judge solutions and implications on system level.

Programme

Day 1

Basics: Thermal System Theory

- Common Heat Source in Mechatronic systems
- Heat transfer mechanisms
- Thermally induced deformations
- Transient effects

Basic Modelling

- Lumped mass modelling
- Tooling
- Electrical analogy
- Hands-on exercise

Day 2

Temperature Measuring / Thermal Experiments

- Precies thermal measurement techniques
- Sensors
- Do's & don'ts

Case Cryogenic Application

Partner

Mechatronics Academy B.V.

Certified by

Euspen

Certification

This course is certified by the European society for precision engineering & nanotechnology (euspen) and the Dutch Society for Precision Engineering (DSPE) and leads to the ECP2-certificate.

Course leader

Dr.ir. Adrian Rankers

Teachers

Dr.ir. Theo Ruijl
Ing. Jack van der Sanden
Ir. Marco Koevoets
Dr. Ir. Rob van Gils

Timetable

19-06-2017 | 09:00 - 17:00
20-06-2017 | 09:00 - 17:00
21-06-2017 | 09:00 - 17:00

- Lumped mass modelling
- Simulation

Intro Thermal Control

Day 3

Design for TEMS

- Main objectives and design considerations for precision equipment
- Thermal centre, thermal cancelling & shielding (low-pass, reduction of gradients)
- Case: applying sheelding

Case Thermal Control

Advanced Topics

- Model reduction
- Thermal modes
- Thermal compensation & sensor placement

References

"Most important items I've learned: Lumped mass modelling principle." - Tom Schakenbos (ASML)

"Most important items I've learned: Lumped mass. Sensors." - Tim Meesters (ASML)