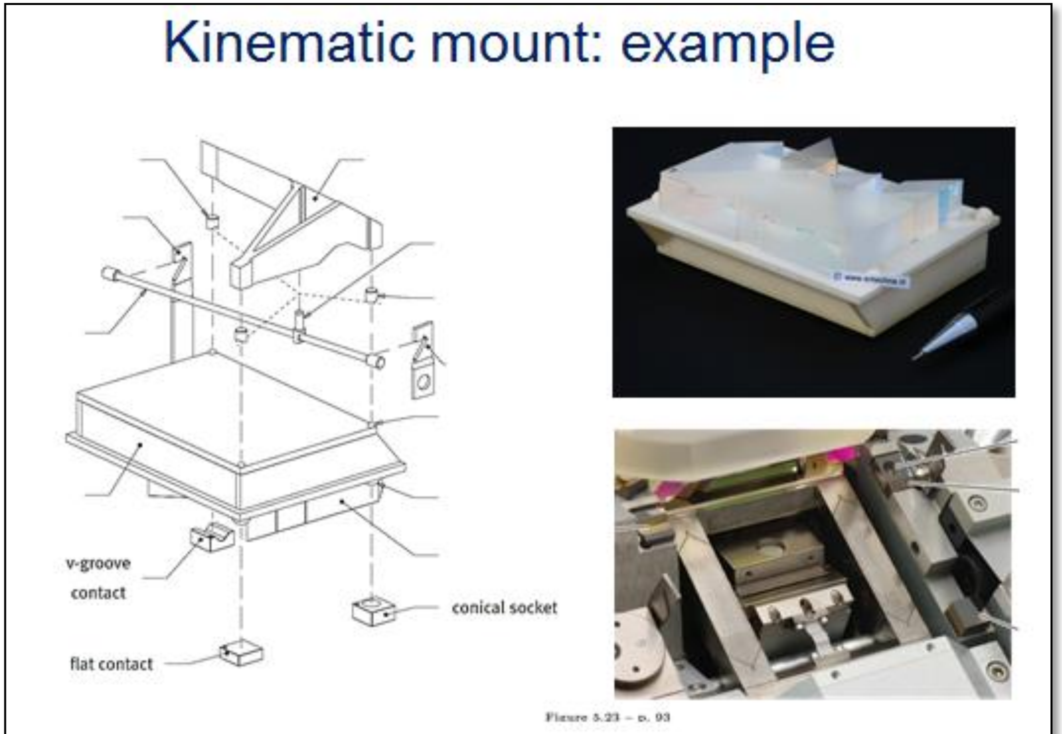
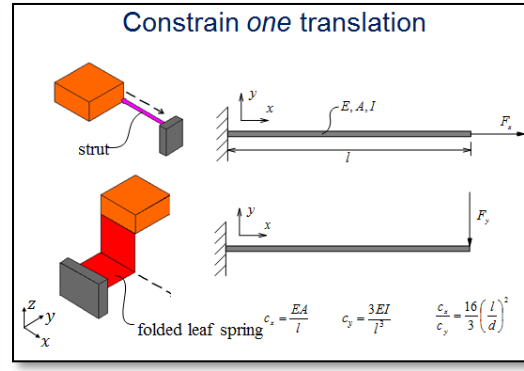
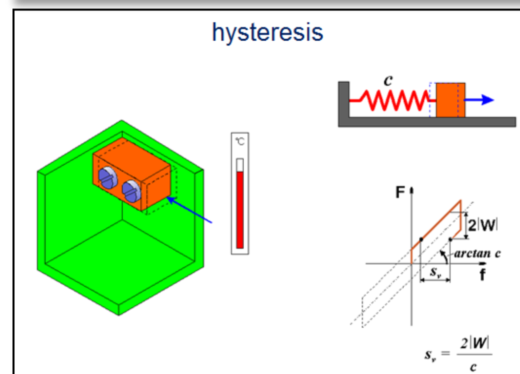
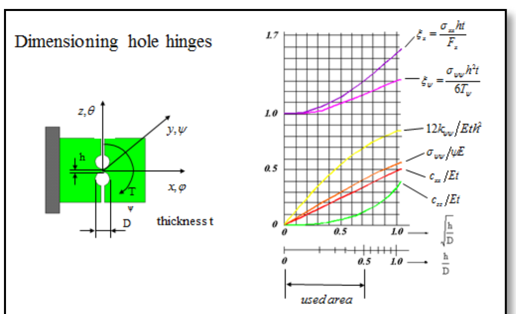
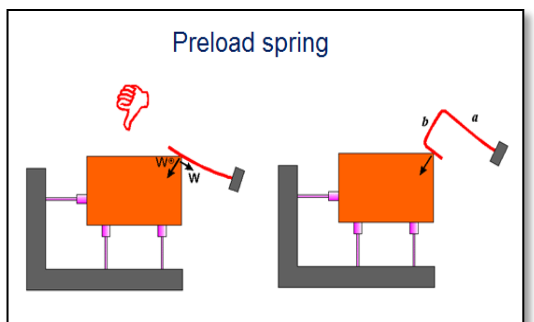
Design Principles for Precision Engineering

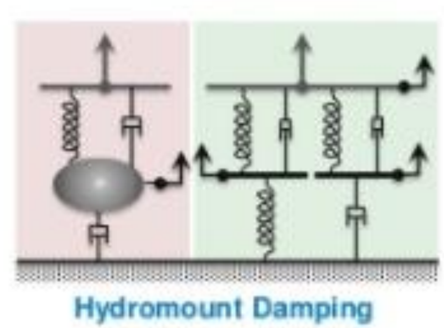












Contents

- Mechatronics Academy & Mechatronics Curriculum
- Details *Design Principles for Precision Engineering*

Mechatronics Training Curriculum

Premium	Advanced Motion Control – **5 days** (Premium/Advanced); Advanced Feedforward & Learning Control – **3 days** (Premium/Advanced); Passive Damping for High Tech Systems – **3 days** (Premium/Advanced); Masterclass Design Principles – **On request** (Premium/Advanced); Workshop Mechatronics System Design – **On request**
Advanced	Advanced Mechatronic System Design – **6 days**
Standard	Motion Control Tuning – **5 days**; Dynamics and Modelling – **3 days**; Design Principles for Precision Eng. – **5 days**; Basics and Design for Ultra Clean Vacuum – **4 days**; Experimental Techniques in Mechatronics – **3 days**; Metrology & Calibration of Mechatronic Systems – **3 days**; Actuation and Power Electronics – **3 days**; Machine Vision for Mechatronic Systems – **2 days**; Thermal Effects in Mechatronic Systems – **3 days**
Basic	Mechatronics System Design – part 2 – **5 days**; Mechatronics System Design – part 1 – **5 days**

Start

Relevant partner trainings:
Applied Optics, Electronics for non-electrical engineers, System Architecture, Soft skills for technology professionals, …

www.mechatronics-academy.nl

Mechatronics Academy

- In the past, many trainings were developed within Philips to train own staff, but the training center CTT stopped.
- **Mechatronics Academy B.V.** has been setup to provide continuity of the existing trainings and develop new trainings in the field of precision mechatronics. It is founded and run by:
    - Prof. Maarten Steinbuch
    - Prof. Jan van Eijk
    - Dr. Adrian Rankers
- We cooperate in the **High Tech Institute** consortium that provides sales, marketing and back office functions.

Design Principles for Precision Engineering

Trainers / Course Director(s)

Teachers

- ir. Huub Janssen (Janssen Precision Engineering)
- Dr.ir. Roger Hamelinck & Dr.ir. Chris Werner (Entechna)
- Prof.Dr.ir. Dannis Brouwer (University Twente)
- Dr.ir. Kees Verbaan (NTS Group)

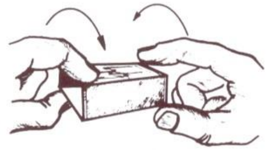
Course Director(s)

- Ir. Huub Janssen (Janssen Precision Engineering)
- Dr.ir. Adrian Rankers (Mechatronics Academy)

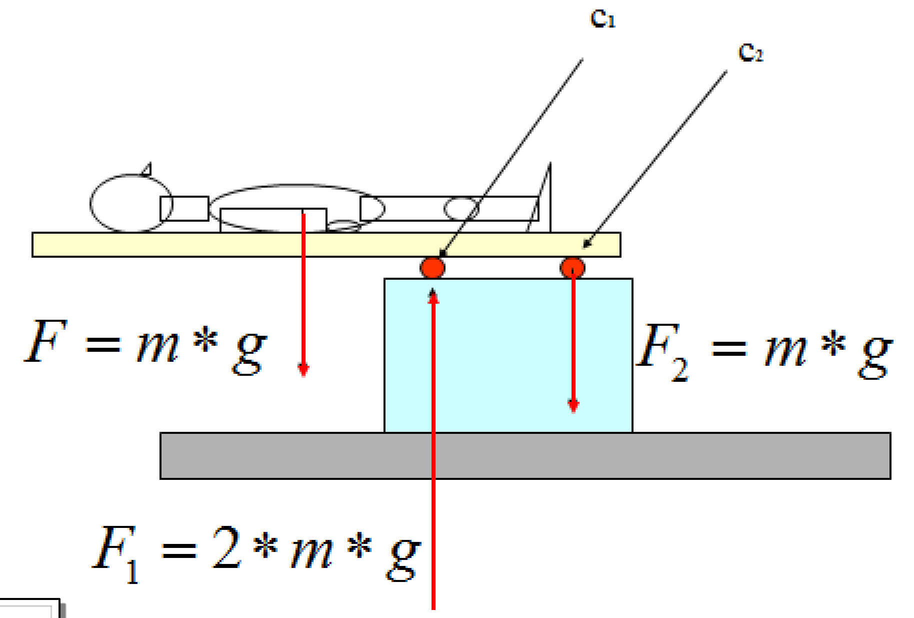
Program

Day	Topic	Presenter
Mon	Mechatronic Context Design for Stiffness	Huub Janssen
Tue	Controlling Degrees of Freedom	Chris Werner and Roger Hamelinck
Wed	Elastic Elements Advanced Flexures	Dannis Brouwer
Thu	Friction, Hysteresis, Stick-Slip, ... Damping (Viscoelasticity, Constraint Layers, ...)	Huub Janssen Kees Verbaan
Fri	Case Capita Selecta (guestspeakers)	Huub Janssen

Day 1



- Mechatronic Context
- Design for Stiffness

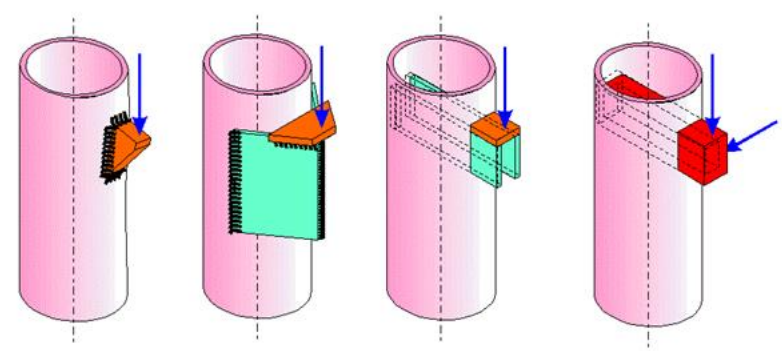


Comparison torsional stiffness of tubes
with different cross sections
and equal perimeter O = 4b and wall thickness t

Cross section	square b × b	triangle 1.3b	rectangle 0.5b × 1.5b	strip 0.1b × 1.9b	circle 1.3b
I*	1	0.59	0.56	0.04	1.6

Torsional stiffness $k = \frac{G \cdot I^*}{l}$ Polar moment of inertia: $I^* = \frac{4 A_{om}^2 t}{O}$

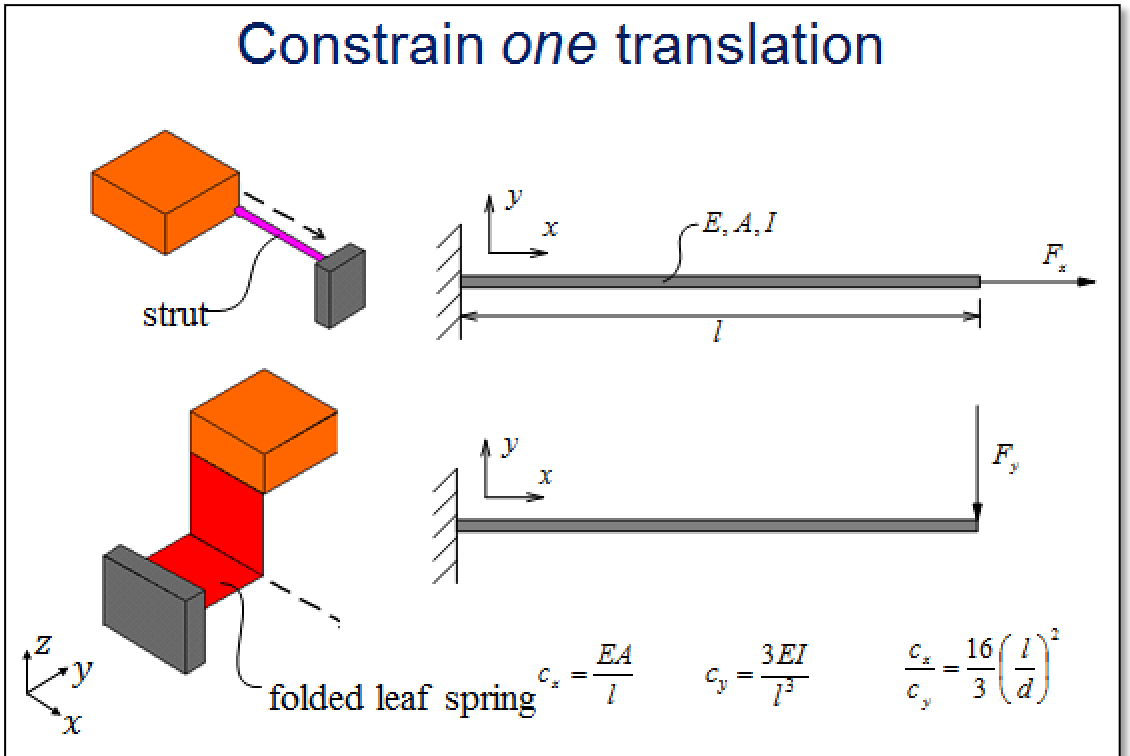
Applying forces to a tube-like column

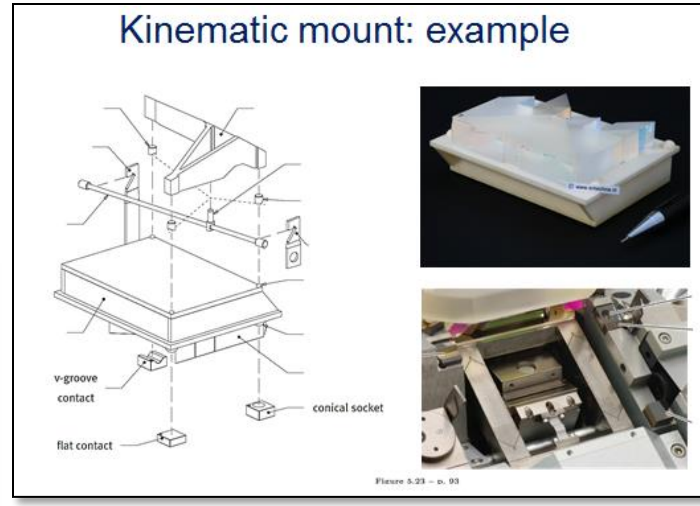


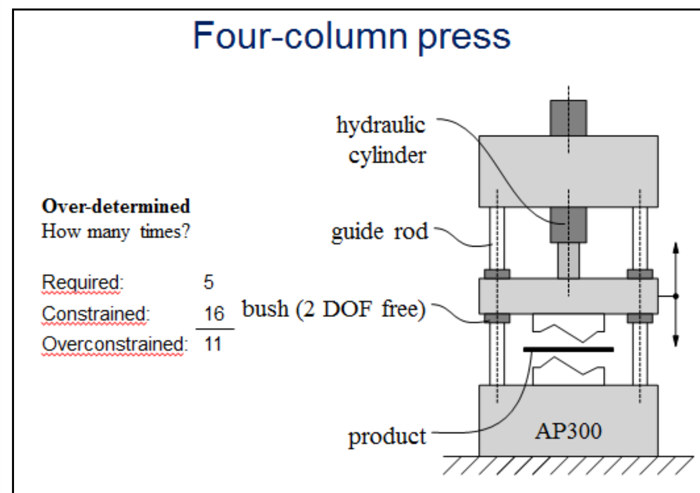
$k \sim t^3$

Day 2

- Controlling Degrees of Freedom

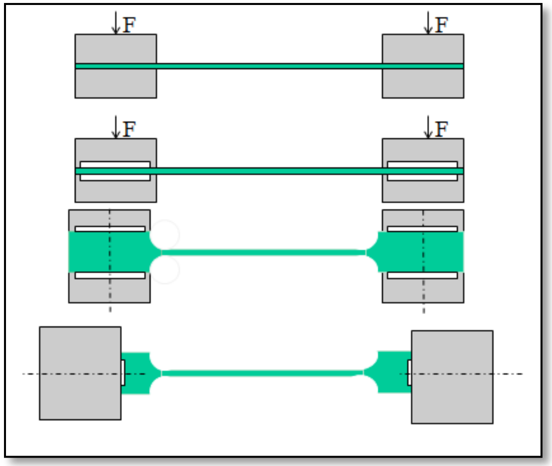


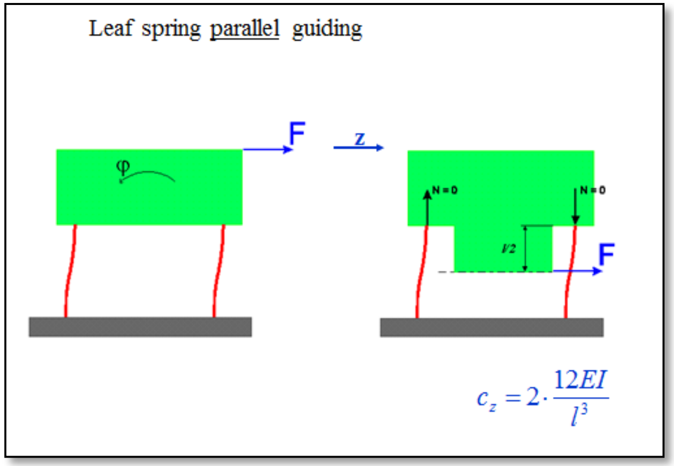


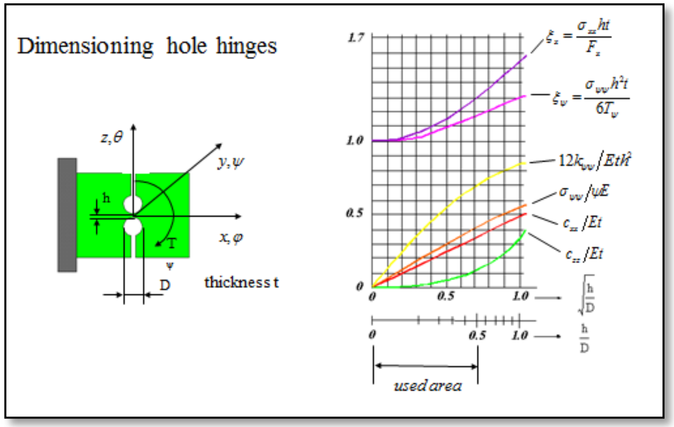


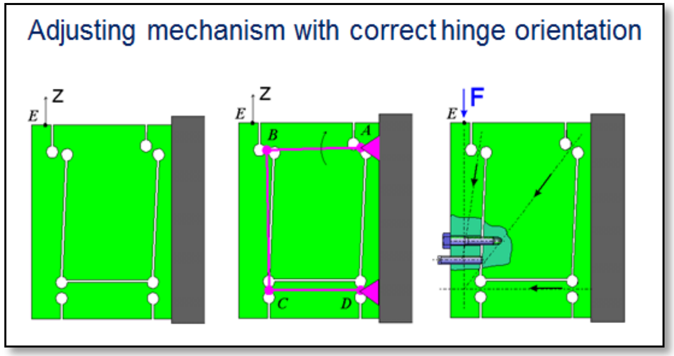
Day 3

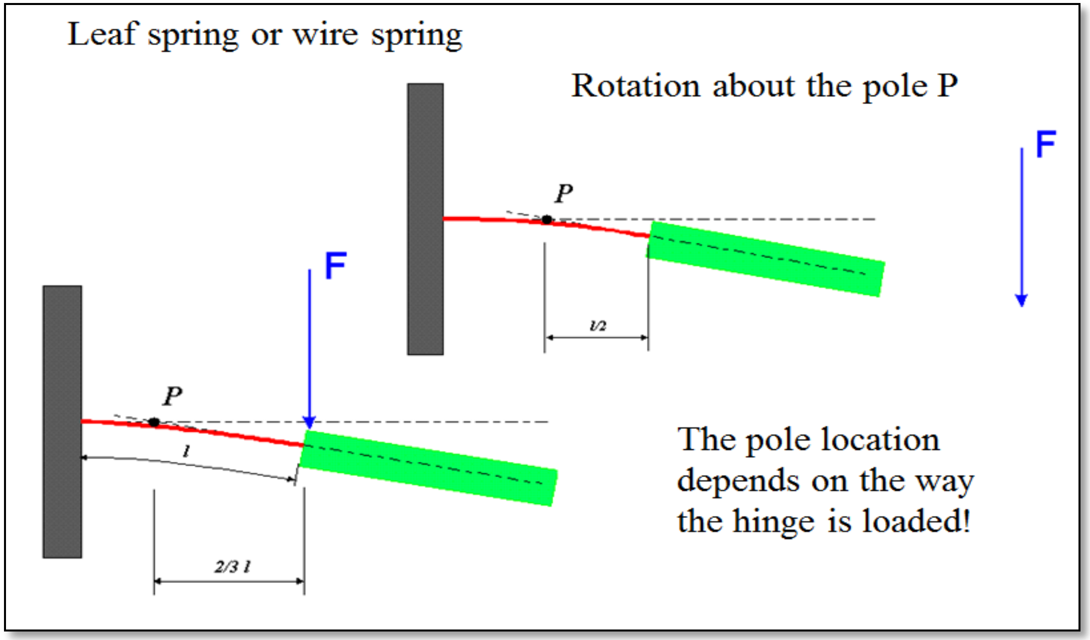
- Elastic Elements
- Advanced Flexures
- Energy Compensation Techniques



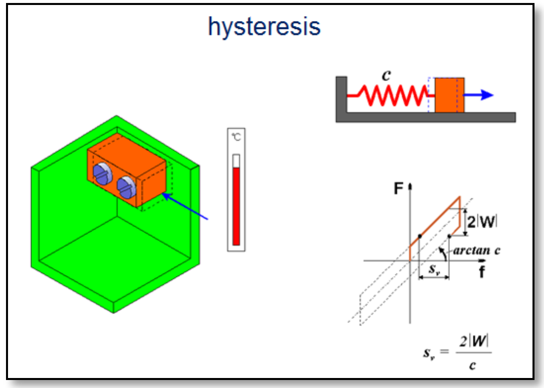


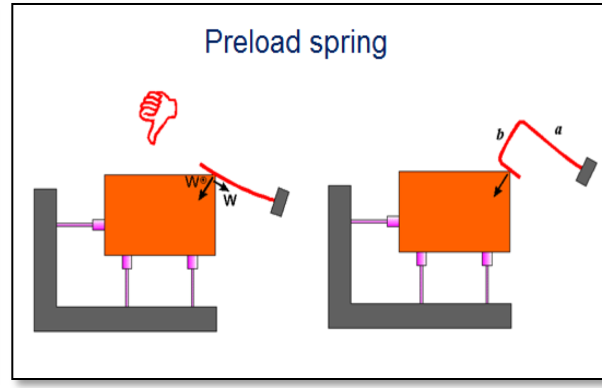




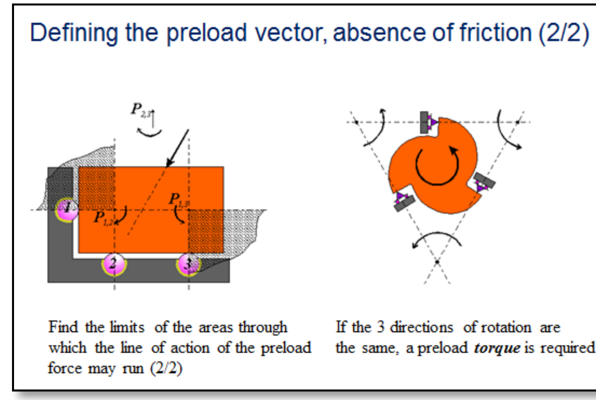


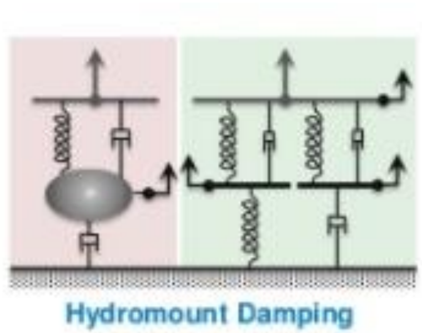
Day 4

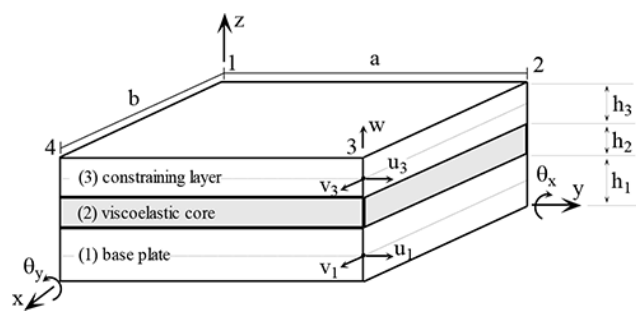


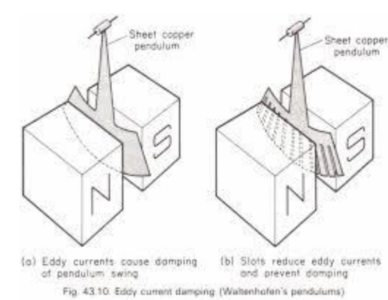


- Friction & Hysteresis
- Damping
  - Viscoelasticity
  - Tuned Mass Dampers
  - Constrained Layer Damping
  - Eddy Current Damping









Day 5

- Case Study
- Capita Selecta
- Guest Speakers academia/industry

Sign-up for this training

Via the website of our partner

High Tech Institute