




Teknologiasta liiketoimintaa

# VTT Technical Research Centre of Finland Intelligence in Machine Design

**Req. Mgmt, Simulation, Virtual Prototyping,  
HIL-Simulation, Full Scale Testing**

Mikko Siuko, ESO Info event 16-17.10.2012

VTT TECHNICAL RESEARCH CENTRE OF FINLAND 19/10/2012 2 

## VTT Technical Research Centre of Finland

### VTT IS

- a globally networked multitechnological applied research organisation

### VTT HAS

- extensive cross-disciplinary technological and business expertise
- unique research infrastructure
- comprehensive global partnership networks in business, industrial and research communities

### VTT CREATES

- new technology and science-based innovations in co-operation with domestic and foreign partners

#### VTT Group

- Turnover 307 M€ (2011)
- Personnel 3,187 (1.1.2012)
- Established 1942
- VTT has been granted ISO9001:2008 certificate.

#### Focus areas of research

- Applied materials
- Bio- and chemical processes
- Energy
- Information and communication technologies
- Industrial systems management
- Microtechnologies and electronics
- Services and the built environment
- Business research

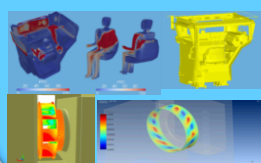
## VTT- SMART MACHINES knowledge centre



## Systematic analysis of machines and vehicles

### Fluid dynamics and heat transfer

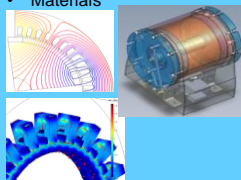
- Air particles and aerosols
- Human response on heat and flow
- Cooling
- Materials



Analysis of operation and maintenance. Concept studies, development, design.  
Parametric multi-disciplinary modelling and optimization.

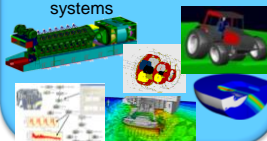
### Electromechanics

- Electro-mechanical forces and phenomena
- Dynamics of control systems
- Machine systems
- Materials



### Structural dynamics

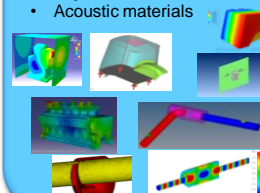
- Structural strength, stress and strain
- Mechanical vibration
- Durability of machines and mechanical systems, wear, fatigue
- Shock and impact
- Dynamics of mechanical systems



Uncertainty or sensitivity evaluation of models and measurements.  
Validation of models and products.

### Acoustics

- Excitations
- Vibro-acoustics
- Aeroacoustics
- Acoustics in ducts
- Psychoacoustics
- Acoustic materials



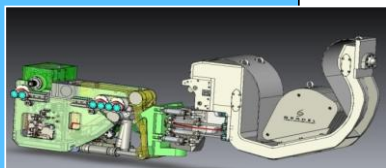
### From Requirements Management to Proven Design

Combination of understanding Customer and Authorities, Physical phenomena, theory, modelling and experiments. Integrating Safety, Reliability, Risk management, Verifying, Validating, Documenting.

## From: Virtual prototyping => To: Full scale tests

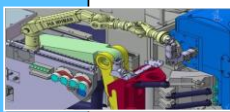
### Integrating real life into virtual model

- Kinematics
- Dynamics
- Flexibility
- Control



#### What:

- Manipulators, tools, methods
- Control, operator training
- Logistics, rescue scenarios
- Maintenance, maint. planning



### Using the model all the lifetime

- Prototyping
- Control development
- Operator training
- Maintenance
- Device control
- ...



#### Tools used:

- Virtual modeling
- Virtual prototyping
- Hardware-in-the-loop
- Testing in practice



## VTT creates business from technology