

# ***Competences and outlook Faculty of Mechanical Engineering***

Imre Norbert ORBULOV, DSc

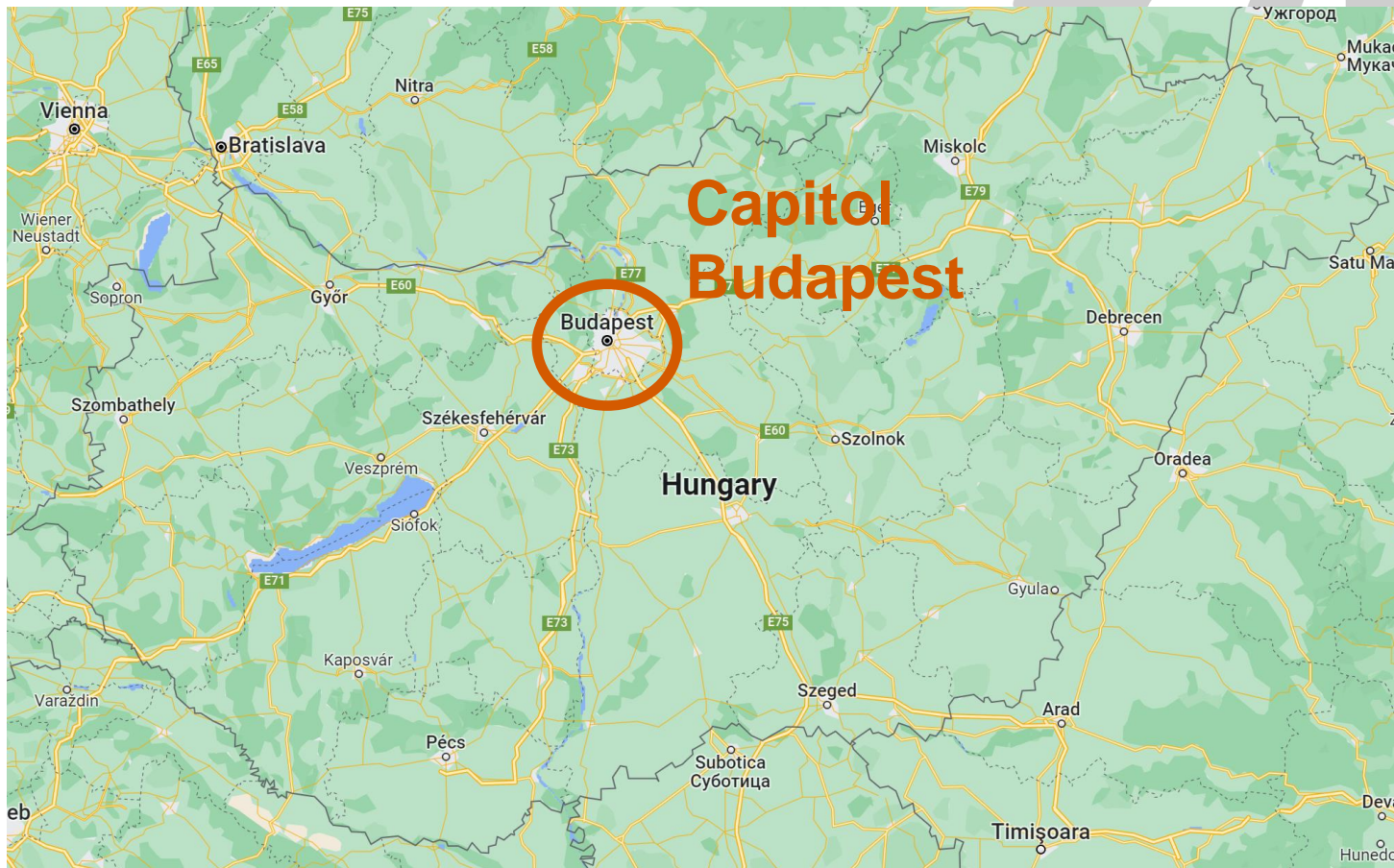
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[orbulov.imre.norbert@gpk.bme.hu](mailto:orbulov.imre.norbert@gpk.bme.hu)

# Geographical location

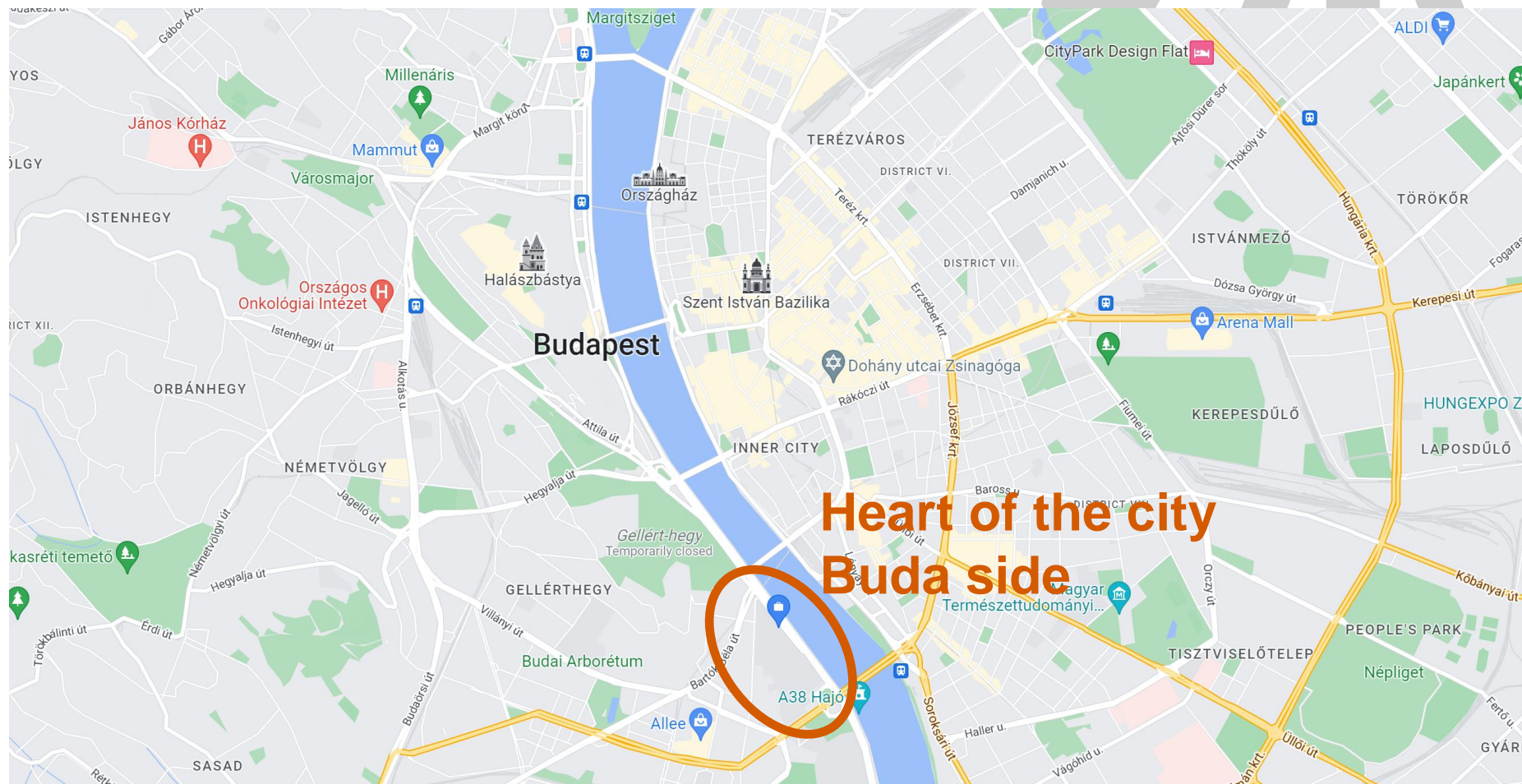


# Geographical location





# Geographical location



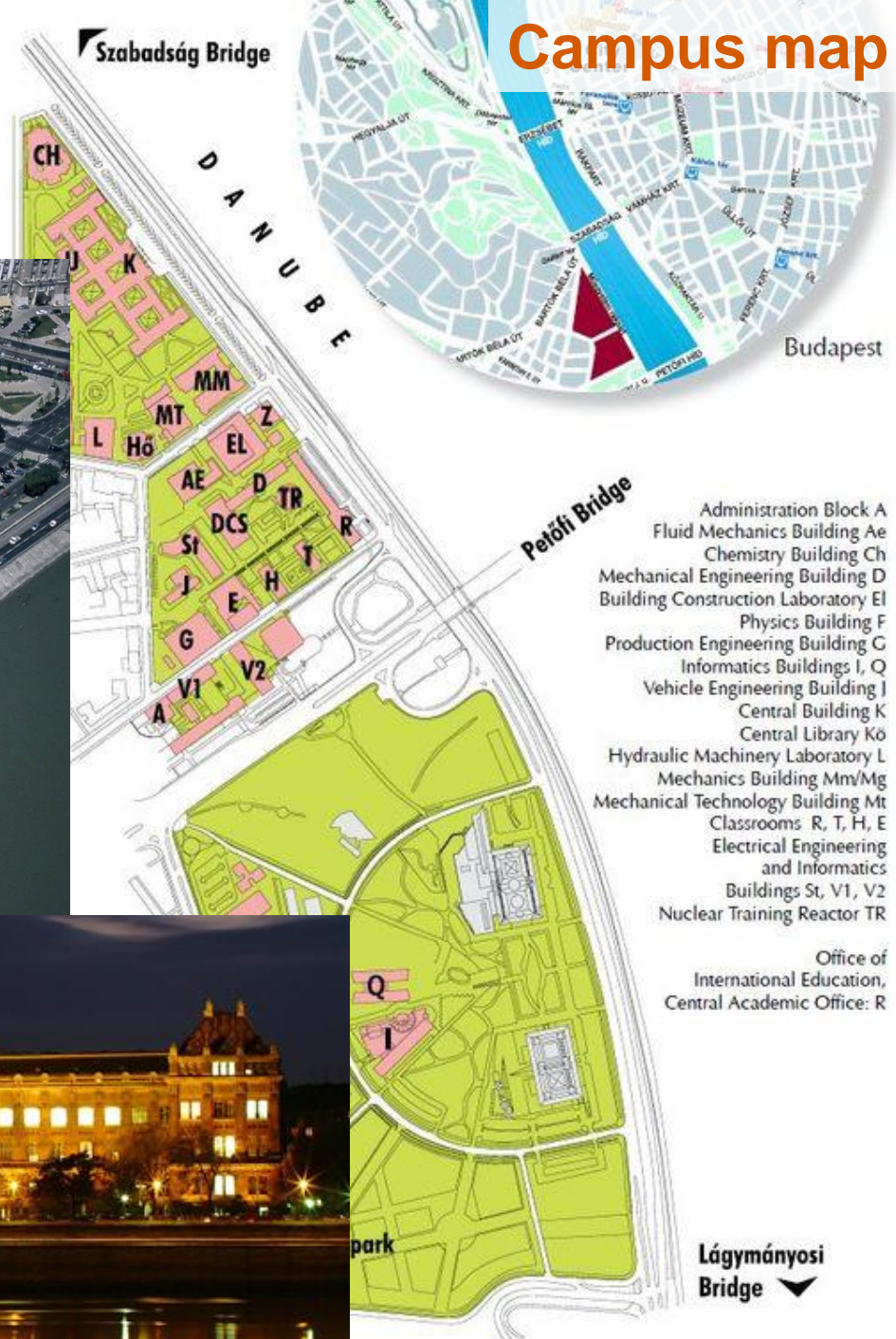


# Campus

Main building at day...



... and at night



# ***Facts and figures***

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- Founded in 1871
- Leading Faculty in its educational portfolio
  - Highest enrollment criteria
  - Number one Faculty in the surveys of firms and corporates
  - BSc, MSc and PhD levels
- Annual budget
  - ~1.2 billion HUF (~2.5 million GBP) - government
  - ~2.0 billion HUF (~4.2 million USD) – industry
  - ~2.0 billion HUF (~4.2 million USD) – research funds

# Rankings

- Budapest University of Technology and Economics is situated in the following main ranking lists
  - QS (2022) – #801-1000.
  - ARWU (2021) – #801-900.
  - THE (2022) – #1201+.
- Faculty of Mechanical Engineering is listed in the following subject based ranking lists
  - QS (2022) – #211.
  - ARWU (2021) – #201-300.
  - THE (2022) – #601-800.



# ***Facts and figures***

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- Organization
  - 10 Departments
  - 2 + 3 research groups supported by the Hungarian Academy of Sciences
  - 2 Cooperative Research Centers
- Staff
  - 250 persons
  - 190 academic positions
  - 75% with at least PhD degree



# ***Facts and figures***

- Departments – Department of...
  - Materials Science and Engineering
  - Fluid Mechanics
  - Energy Engineering
  - Building Service Engineering and Process Engineering
  - Machine- and Product Design
  - Manufacturing Science and Engineering
  - Hydrodynamic Systems
  - Mechatronics, Optics and Mechanical Engineering Informatics
  - Applied Mechanics
  - Polymer Engineering



# ***Facts and figures***

- Research Groups
  - Dynamics of Machines and Vehicles Research Group
  - Research Group for Composite Science and Technology
- „Lendület” (Momentum) Research Groups
  - Composite Metal Foams Research Group
  - Machine Tool Vibration Research Group
  - Analysis of dynamic integrity of real engineering systems
  - MTA-BME Lendület Lightweight Polymer Composites Research Group
- Research Centers
  - Cooperation Research Center for Biomechanics
  - BME – AUDI Hungaria K3 Cooperative Research Center

# ***Facts and figures***

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- **Students**
  - 3800 students currently in the system
  - Enrolling numbers (BSc 2022)
    - Mechanical engineer – ~290 students
    - Mechatronic engineer – ~230 students
    - Energy engineer – ~70 students
    - Industrial product design engineer – ~70 students
  - Enrolling numbers (MSc 2022)
    - ~150 students in sum (~70 mechanical engineer, ~40 mechatronical engineer and ~40 modelling engineer)
  - More than 90 PhD students in all fields





# Department of Materials Science and Engineering

Budapest University of  
Technology and Economics  
Faculty of Mechanical Engineering  
Department of  
Materials Science and Engineering

Head of Department  
Prof. Dr. Péter J. Szabó

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Bertalan Lajos u. 7.  
H-1111 Budapest  
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+36 1 463 1234 / +36 1 463 1366  
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[matsci@eik.bme.hu](mailto:matsci@eik.bme.hu)  
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<http://www.att.bme.hu>



- Materials testing (structure and mechanical properties)
- Failure analysis and prevention
- Welding (UHSS and Duplex as well)
- Forming technology
- Technology modelling

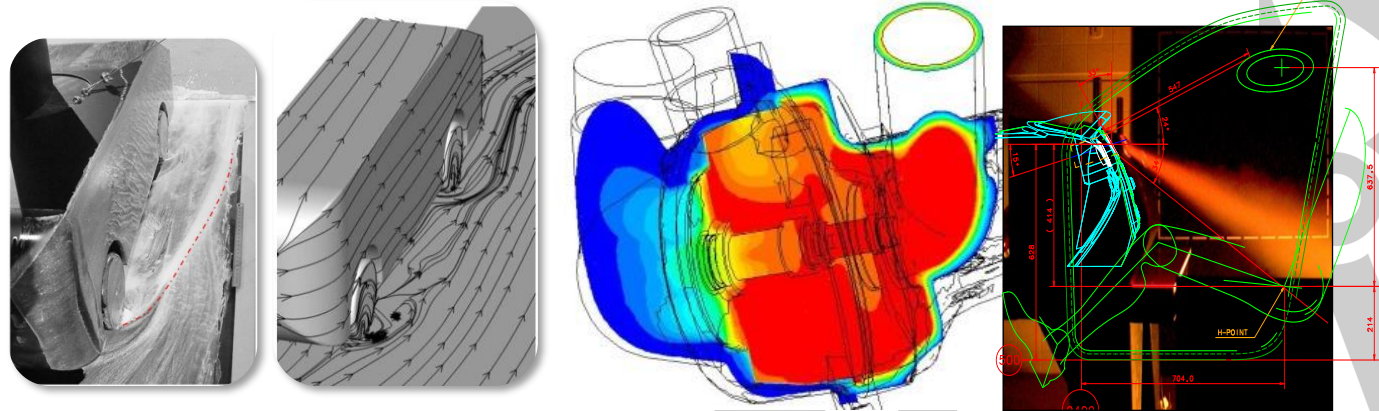
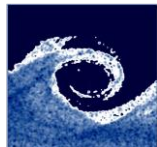


# Department of Fluid Mechanics

Budapest University of  
Technology and Economics  
Faculty of Mechanical Engineering  
Department of Fluid Mechanics

Head of Department  
Prof. Dr. János Vad

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vad@ara.bme.hu  
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- Experimental & Numerical Modelling of Fluid Flows
- External & Internal Vehicle Aerodynamics
  - Physical Modelling / Wind Tunnel Experiments
  - Computational Fluid Dynamics / CFD modelling
- Wind Tunnel Testing of Aerodynamic Parameters
- Aerodynamic Design & Optimization
- Flow Visualization, Model Testing & Calibration
- Design & Instrumentation (Unique Test Facilities)
- Commercial & Open Source CFD Softwares & Codes

# Department of Energy Engineering

Budapest University of  
Technology and Economics  
Faculty of Mechanical Engineering  
Department of Energy Engineering

Head of Department  
Dr. Péter BIHARI

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- Energy Engineering
  - Power generation, renewable energy systems, LCA
- Thermodynamics
  - Heat transfer, cycle optimization
- Heat Engines
  - Gas turbines, ORC, ICE, Cooling, Combustion
- Theoretical study of the utilization of Organic Rankine Cycle in low temp. heat recovery





# Department of Building Service Engineering and Process Engineering

Budapest University of  
Technology and Economics  
Faculty of Mechanical Engineering  
Department of Building Service and  
Process Engineering

Head of Department  
Dr. Tamás CSOKNYAI

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- Thermal comfort and indoor air quality
- Energy optimisation of buildings and technical building systems
- Energy monitoring and data analysis
- Dynamic simulation of building energy performance
- HVAC (heating, ventilation and air conditioning) systems and water supply
- Renewable energy systems

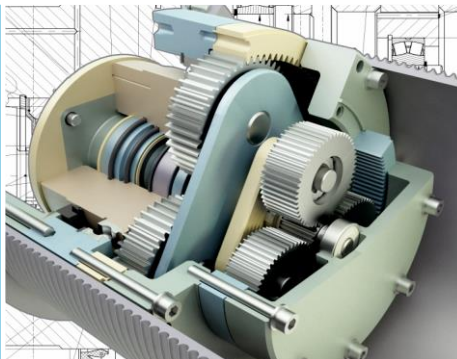


# Department of Machine- and Product Design

Budapest University of  
Technology and Economics  
Faculty of Mechanical Engineering  
Department of  
Machine and Product Design

Head of Department  
Dr. Péter Horváth

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- Industrial product design
- Machine design
- Numerical simulations of machine structures
- Virtual product design
- Modell/prototype manufacturing

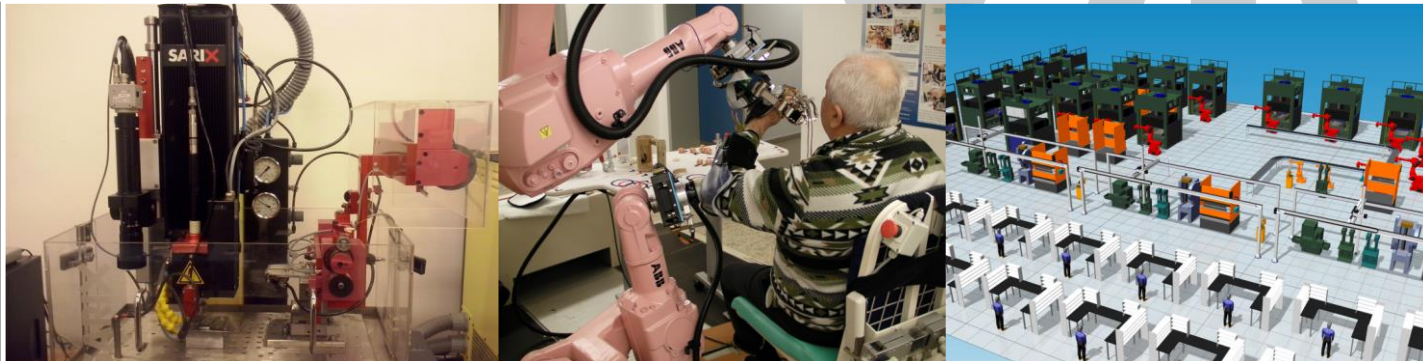


# Department of Manufacturing Science and Engineering

Budapest University of  
Technology and Economics  
Faculty of Mechanical Engineering  
Department of Manufacturing Science  
and Engineering

Head of Department  
Dr. Tibor Szalay

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- Design of machine tools and manufacturing systems
- Experimental and theoretical investigation of mechanical micro and hard machining
- Development of robotized processes
- Industry 4.0 applications and smart factories





# Department of Hydrodynamic Systems

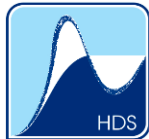
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- 1D in-house and 3D commercial CFD simulations (steady & transient)
- A wide range of fluid mechanical measurement techniques
- Aeroacoustics simulation competences
- Valve stability competences



# Department of Mechatronics, Optics and Mechanical Engineering Informatics

Budapest University of  
Technology and Economics  
Faculty of Mechanical Engineering  
Department of Mechatronics, Optics  
and Mechanical Engineering  
Informatics

Acting Head of Department  
Prof. Dr. Rita KISS

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www.mogi.bme.hu



- Mechatronics: robotics, sensors, actuators
- Informatics: Artificial Intelligent
- Optomechatronics: applied optics, optical transfer fusion, image compose technology
- Biomechatronics: motion capture, 3D augmented reality, intelligent space

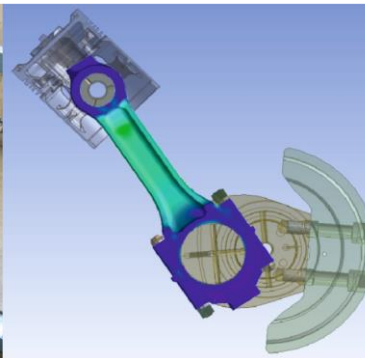


# Department of Applied Mechanics

Budapest University of  
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Department of Applied Mechanics

Head of Department  
Prof. Dr. Tamás Insperger

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mechanics@mm.bme.hu  
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- Material modelling: hyperelasticity, viscoelasticity, viscoplasticity, damage mechanics, advanced models
- Static and transient FE analyses involving geometric and material nonlinearities
- High-speed camera recordings and video analyses
- Advanced material tests
- FE modal analysis / Experimental modal tests (contact damping)
- Dynamic tests (centrifuge, vibration and drop tests)
- Rotordynamics (Campbell, experimental test)





# Department of Polymer Engineering

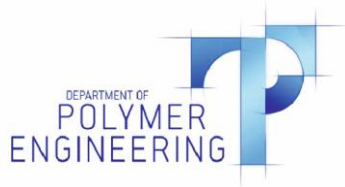
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- Polymers: thermosets, thermoplastics and rubbers
- Lightweight structures, polymer composites
- Injection molding and simulation
- Additive manufacturing, rapid tooling
- Joining technology development
- Materials testing, accredited laboratory





***Thank you for your kind  
attention!***

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