

RESEARCH AND INNOVATION AT SZÉCHENYI ISTVÁN UNIVERSITY

GYŐR, HUNGARY

CENTROPE_tt

Wiener Neustadt, June 30th, 2010

University in Key Figures

Number of students: 11,500

Full-time teaching staff: 356

Full-time non-teaching staff: 225

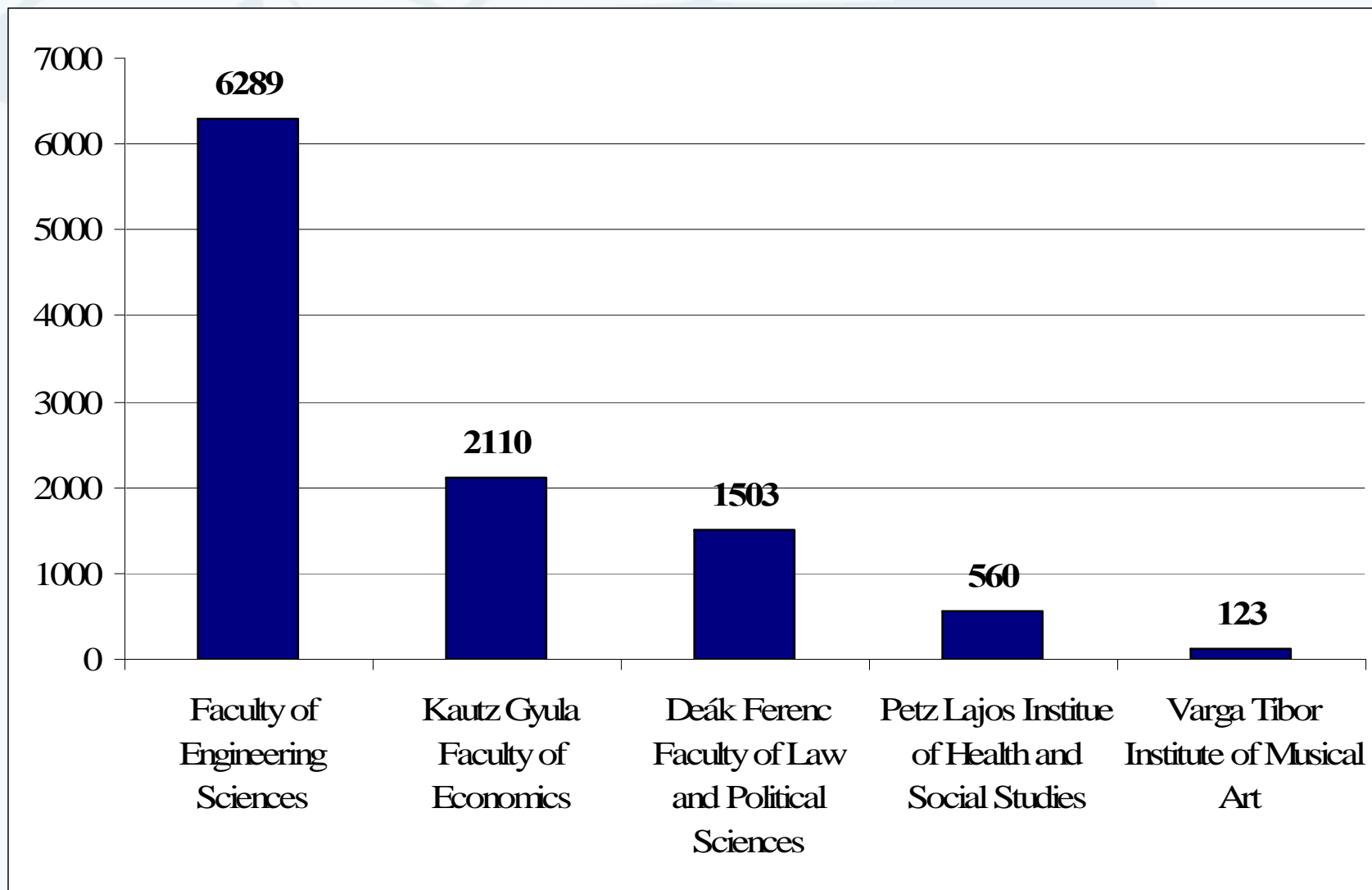
Annual budget: 6.6 billion HUF



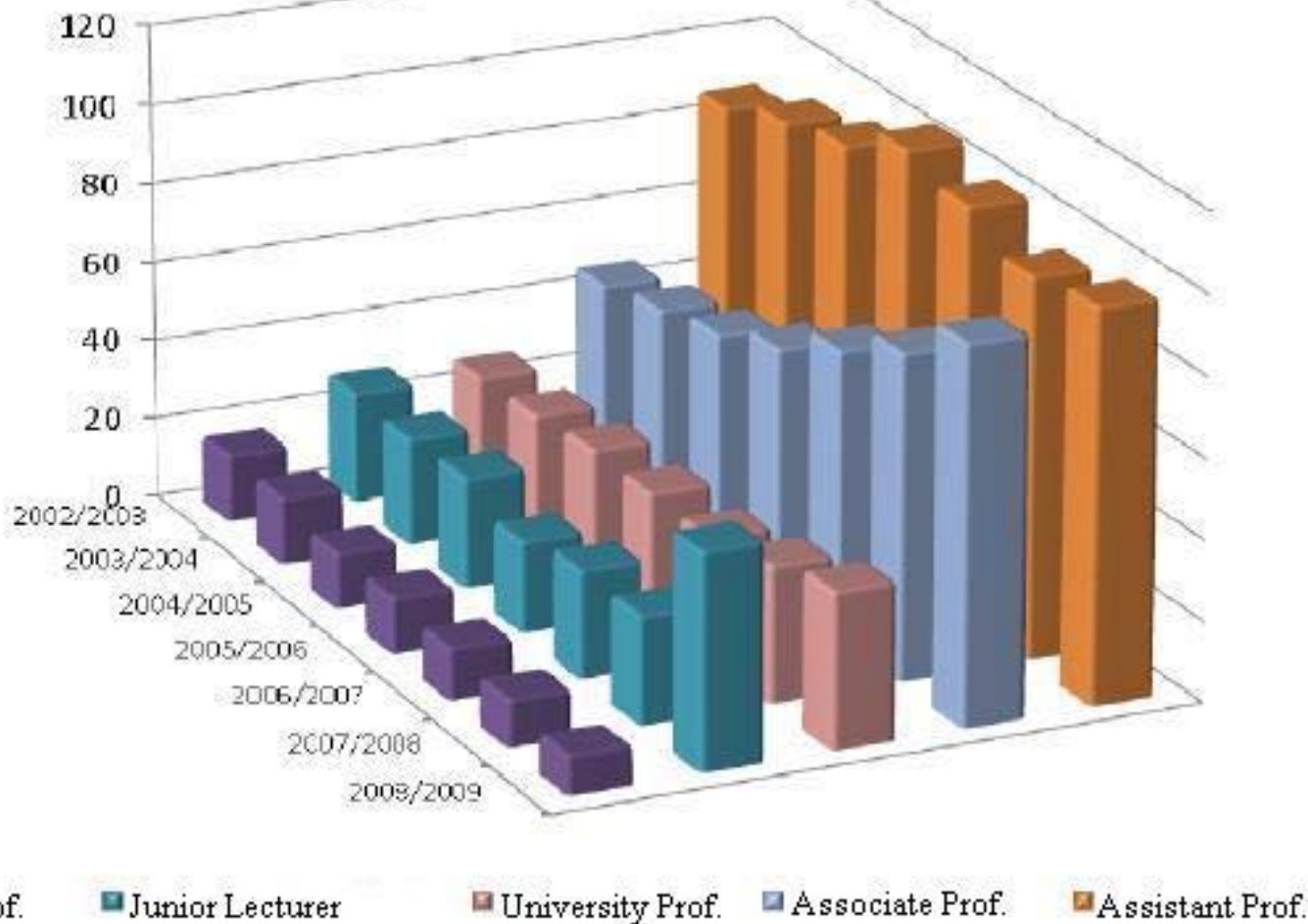
Three faculties and two institutes:

1. Deák Ferenc Faculty of Law and Political Science
2. Kautz Gyula Faculty of Economics
3. Faculty of Engineering Sciences
4. Petz Lajos Institute of Health and Social Studies
5. Varga Tibor Institute of Musical Art

Number of Students per Faculty (2008)



The Number of Teaching Staff and Their Academic Titles (2002-2008)

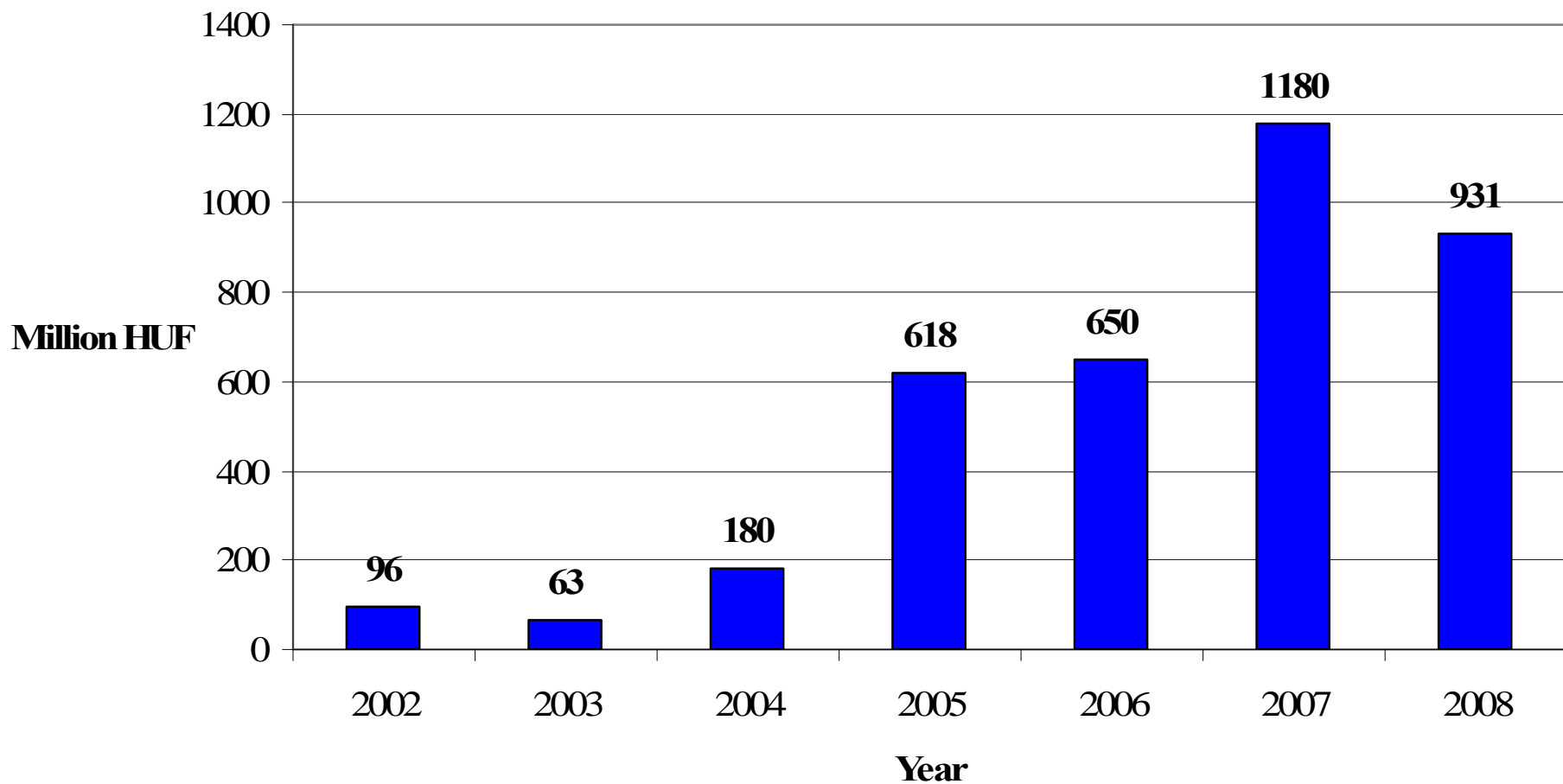


The Amount and Distribution of Subsidies for Scientific Research (million HUF)

<i>Area/Year</i>	<i>2007</i>	<i>2008</i>	<i>2009*</i>
<i>R&D priority areas</i>	14,08	13,6	14,3
<i>Conferences, publication</i>	9,51	8,43	9,85
<i>Postdoctor fellowship</i>	3,84	4,1	2,2
<i>Total</i>	27,43	26,13	26,35

*payments until 2009. October

The University's Income from R&D, 2002-2008



Research Centers

- **Car manufacturing, Electronical and Logistical Cooperative Research Center (KKK)**
 - Between 2005-2007- 400 MFt subsidies, 465 MFt corporate project costs
 - The members of the consortium: three tertiary institutions, one Hungarian Scientific Academy institute and 23 companies
- **Car manufacturing Regional University Knowledge Center (JRET)**
 - Projects done between 2006-2008
 - 1,1 billion Ft from subsidies, 715 million Ft from companies
- **IJTTR – Research of integrated product and technology development system for vehicle industry**
 - 100% Vehicle industry, Research consortium led by RABA, SZE-JRET is acting as partner

Co-operation with Industry (1)

- **„Practing” Consortium**
 - 10 years of joint efforts for practice oriented education of engineers, with over 75 industrial partners
 - Praxis semester: 1...25 students / company in Hungary or abroad (e.g. USA, France)
 - Benefits:
 - No-obligation trial period: company can choose the best students
 - Direct feedback to education: up-to-date training portfolio
- **Thesis work, given and guided by the company**
 - Tutor system from BSc practices
 - Company led and sponsored doctoral themes (e.g.: AUDI)

Co-operation with Industry (2)

- **Courses delivered by companies**
 - Audi: The modern enterprise
 - Magna-Steyr, Visiocorp (Schefenacker): CAD training
- **Company sponsored establishment of new departments**
 - Internal combustion engines department w/ Audi Hungaria Motor Ltd.
- **Practice oriented further education and vocational training**
 - International cooperation projects on demand driven, flexible technical training
 - Regional network of training-advisors: two-way communication on HR needs

R&D Topics

Mechanical and Manufacturing Engineering Vehicle Industry and Sustainable Mobility

- **Construction and development of vehicle components and units**
 - Finite Element Techniques – gas and fluid flow, stress analysis
 - Analysis of vehicle units
 - Noise, vibration measurements, mechanical losses
 - Special focus: internal combustion engines (co-sponsored department by Audi)
 - New field: alternative drive-train systems
- **Manufacturing: process and tool design**
 - Primary shaping processes (casting, bulk and sheet metal forming, polymer processing – computer simulation and experiments)
 - Secondary processes (cutting, heat treatment, surface treatment – computer simulation and modelling)
- **Efficiency and quality**
 - Simulation of production and assembly processes
 - Logistic process planning
- **Road, traffic and transportation systems**
- **Electronics and communication technology**

R&D Topics

Economics and Law

- **Regional and international economy**
 - Development trends of West-Pannon Region
 - Regional differences and their evaluation
 - Competitiveness of regions
 - Development of knowledge economy
 - Knowledge transfer and innovation
- **Financing**
 - Financing of the activity of companies
 - Role of international money markets in the financing of companies
- **Law**
 - International law, harmonisation of the Hungarian and EU regulation

Future Development Plans of University R&D

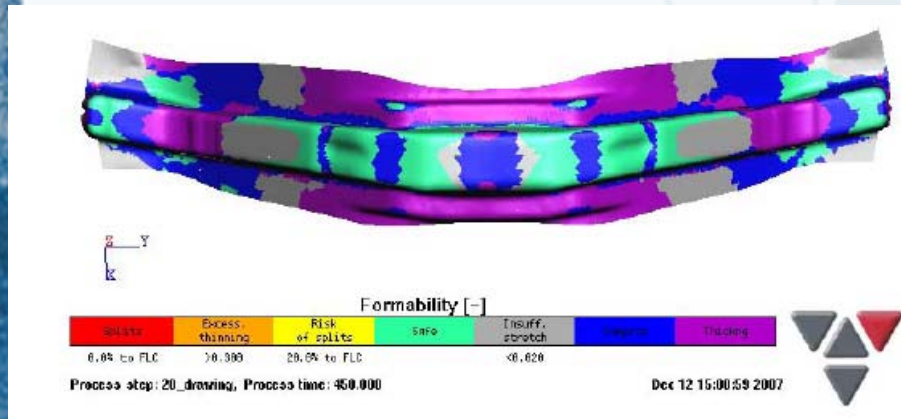
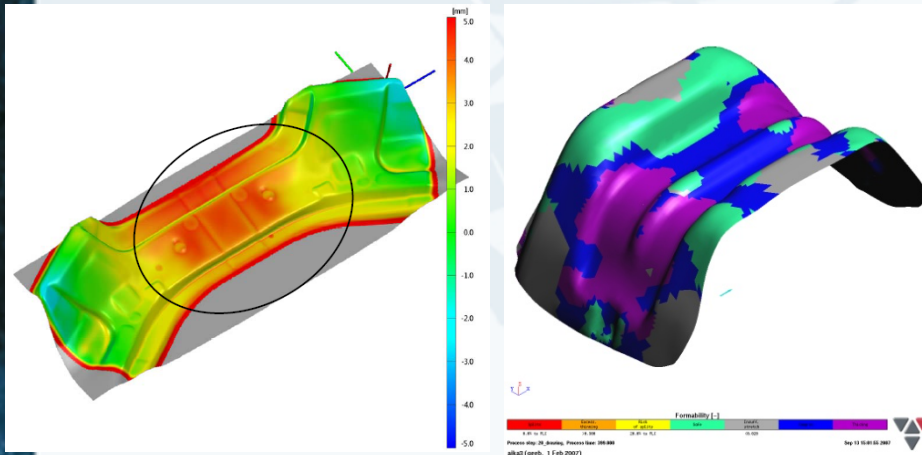
Motto: Intelligent Mobility – Intelligent Vehicles – Intelligent Production

- **Product focus**
 - Car-body, sheet metal components
 - Engines and peripheries
 - Axles and drive-train components
 - Vision and sensing systems (intelligent vehicles)
- **Technology fields in focus**
 - Intelligent production (man-machine interconnection, automated factory)
 - Small volume automotive components (esp. car-body and engine related components) – mass customization
 - New materials and surface treatment technologies with low environmental impact
 - Clean(er) engines, alternative fuels, alternative drive systems
 - Vehicle diagnostics
 - Intelligent traffic and transportation systems
- **Way to go**
 - Carrying out intensive capacity building at Széchenyi István University (SZE)
 - Supporting strong knowledge concentration of private R&D
 - Building up intensive research co-operation between SZE and regional industry

Company Projects: Examples

- **Primary process analysis**
 - Sheet metal forming, forging, moulding of polymers
- **Secondary process analysis**
 - Cutting, cracking process of connecting rods
- **Process Planning and Quality Control**
 - Assembly, Production, Logistics
- **Development of Testing Equipment**
 - Vehicle unit tests, noise and vibration analysis

Analysis of Sheet Metal Forming



Process analysis using AutoForm

Reference: Suzuki, Ajakai Elektronika

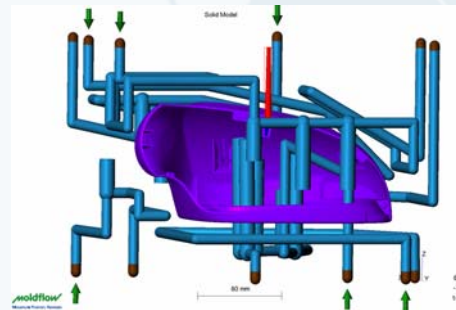
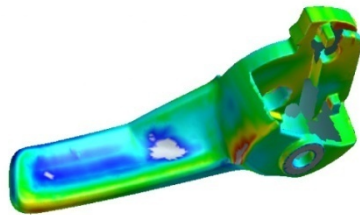
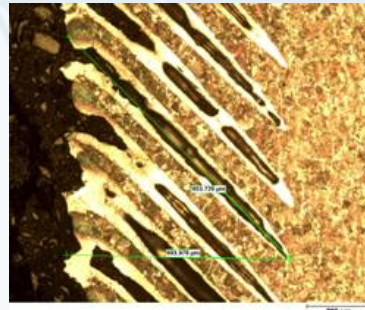
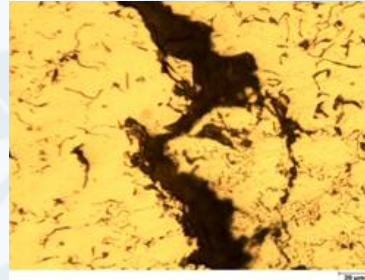
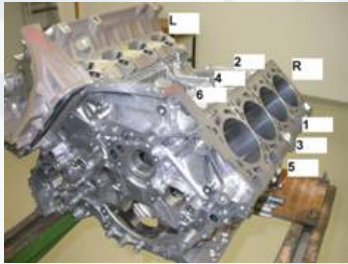
Suggestions:

- Modification of process parameters
- Modification of blank geometry
- Modification of blank holder geometry
- Proposal for new tooling

Results:

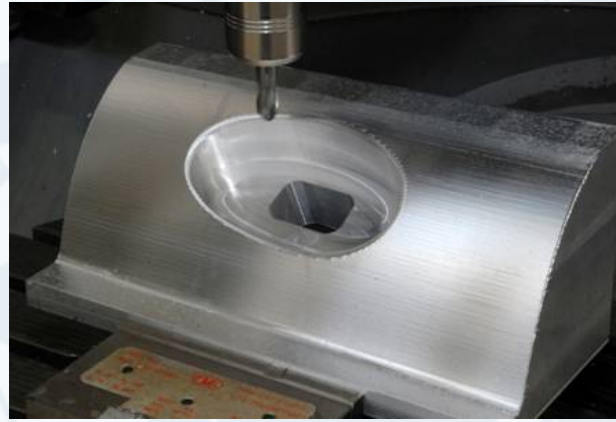
- Decrease of scrap
- Cost saving

Analysis of Casting, Forging, Polymer Molding

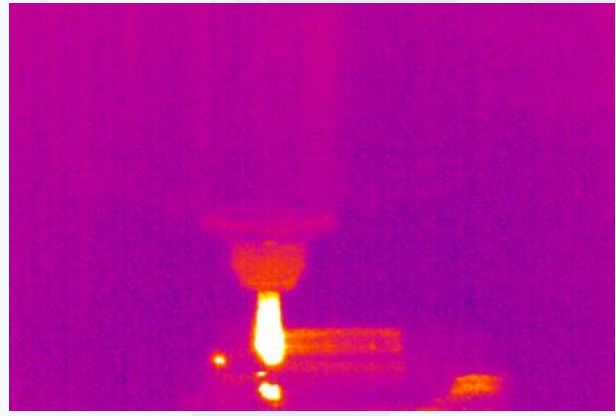


- Engine blocks
 - Audi: Aluminium
 - GM-PTH: Cast iron
- Forged connecting rods
 - Audi: notching parameters
 - GM-PTH: cracking process
- Polymer molding analysis
 - Suzuki: Door-handle
 - Visiocorp: GID process for mirror covers
 - VisiCorp: Subsidising Al components with composites

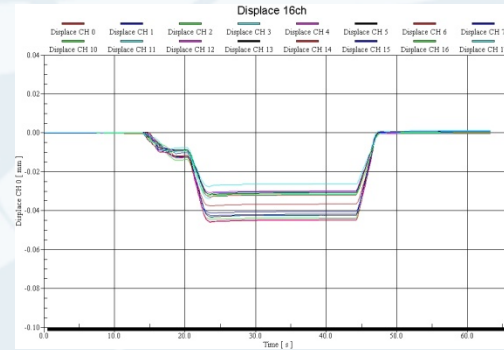
Cutting Processes



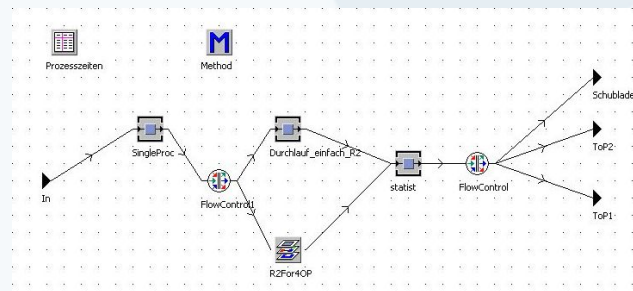
- HSC machining of Al castings (Audi, Nemak)
- 5D machining for SME-s
- Dry and minimum lubrication (GM-PTH)
- Hard machining of tool steels (Borsodi Ltd)



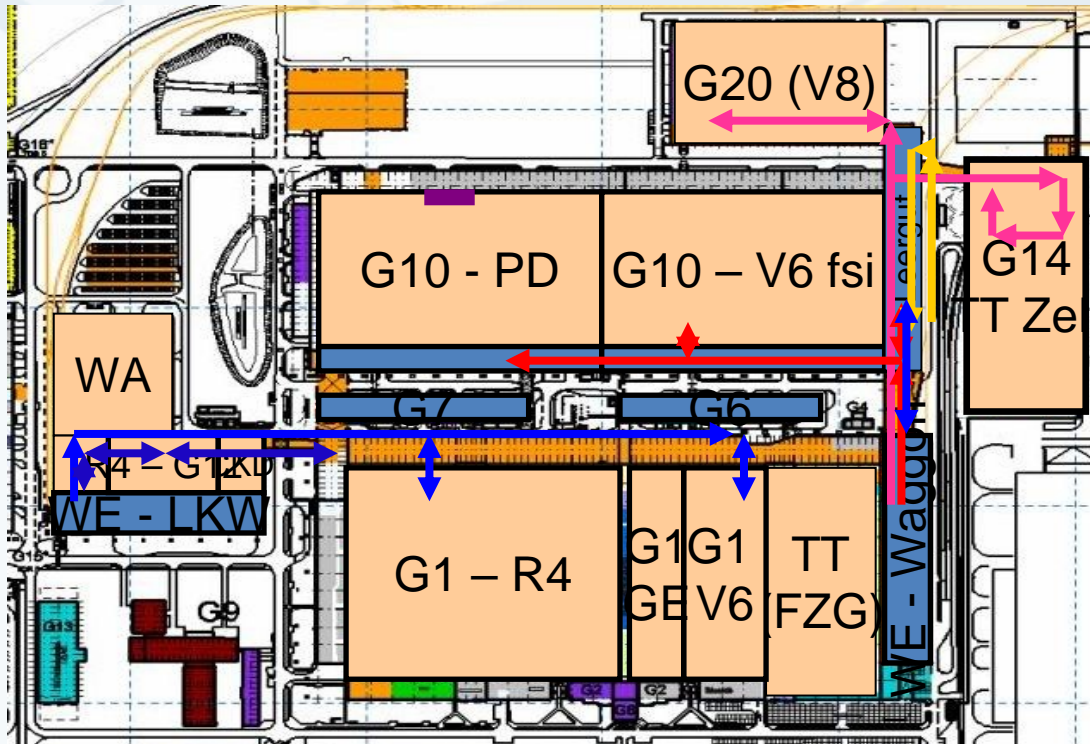
Process Planning and Quality Control



- Deformation and tolerance analysis of cylinder heads (GM-PTH)
- Measurement and tolerance analysis (Audi, GM-PTH)
- Manufacturing process control (Audi)
 - Engine assembly line
 - Sheet metal forming
 - Logistic process of components



Analysis of Material Flow for Audi Hungary Motor Co.



- Road transport

- Lorries
- Distribution of goods
- Storage

- Rail transport

- Distribution of goods
- Continuous transfer in/out
- Quantity of goods

Testing Equipment for Gearboxes



Reference:

GM-Powertrain Hungary Ltd.

- Input power: 37 kW
- Load power: 2 x 18 kW
- Feedback of load energy to main electric motor
- Suitable for testing all standard gearboxes for Opel cars

Summary

- **Institution**
 - Young and medium size university w/ primarily a regional focus
 - Dynamic, quickly adapting to regional needs
 - Service orientation
- **Education**
 - Wide variety of BSc and MSc courses
 - PhD courses for engineers, economists and lawyers
- **Research**
 - All engineering disciplines (centered around mobility)
 - Social science: economics and law
 - High-budget (international) research projects are about to start
- **Services**
 - Laboratory service for SME's and multi-national companies
 - Process analysis and modeling
- **Technology & knowledge transfer**
 - Two-way communication: industry - university & teaching – industrial practice

Thank you for your attention!

Mr Dr Tibor DŐRY

Director, associate professor

Centre for Knowledge Management