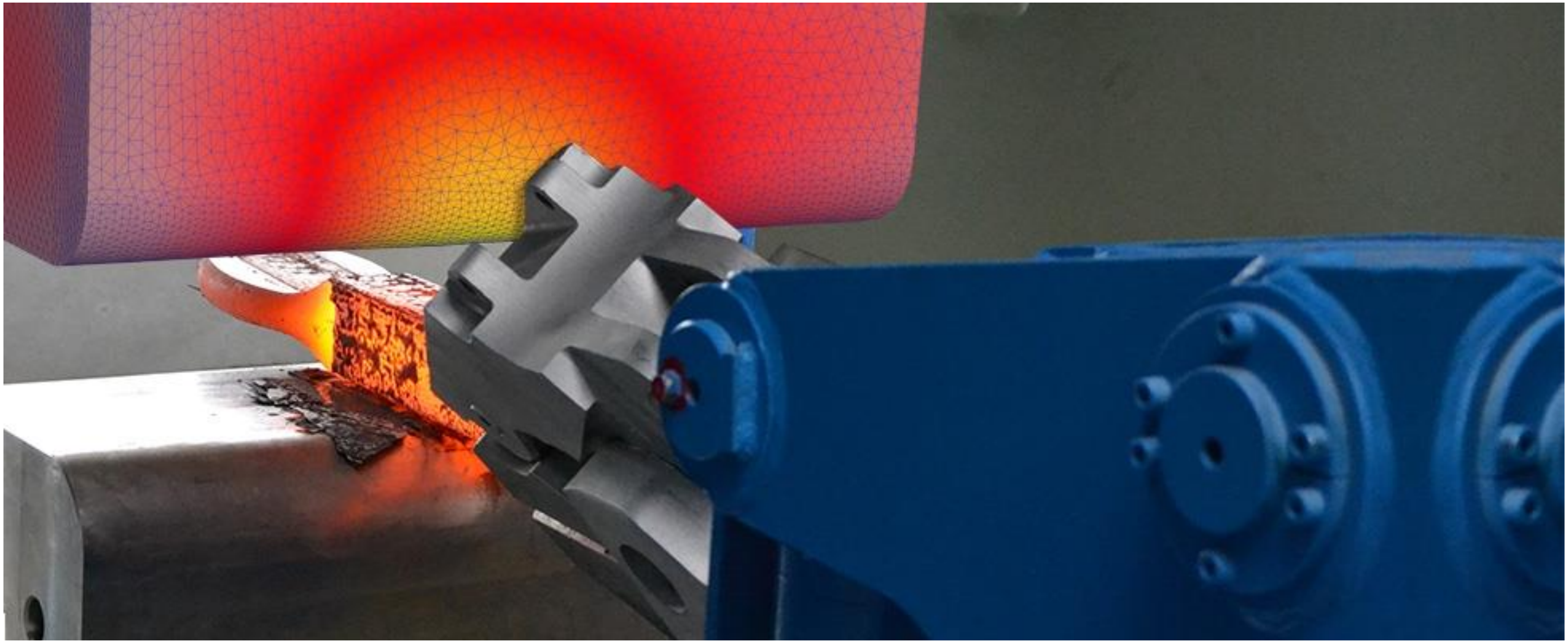
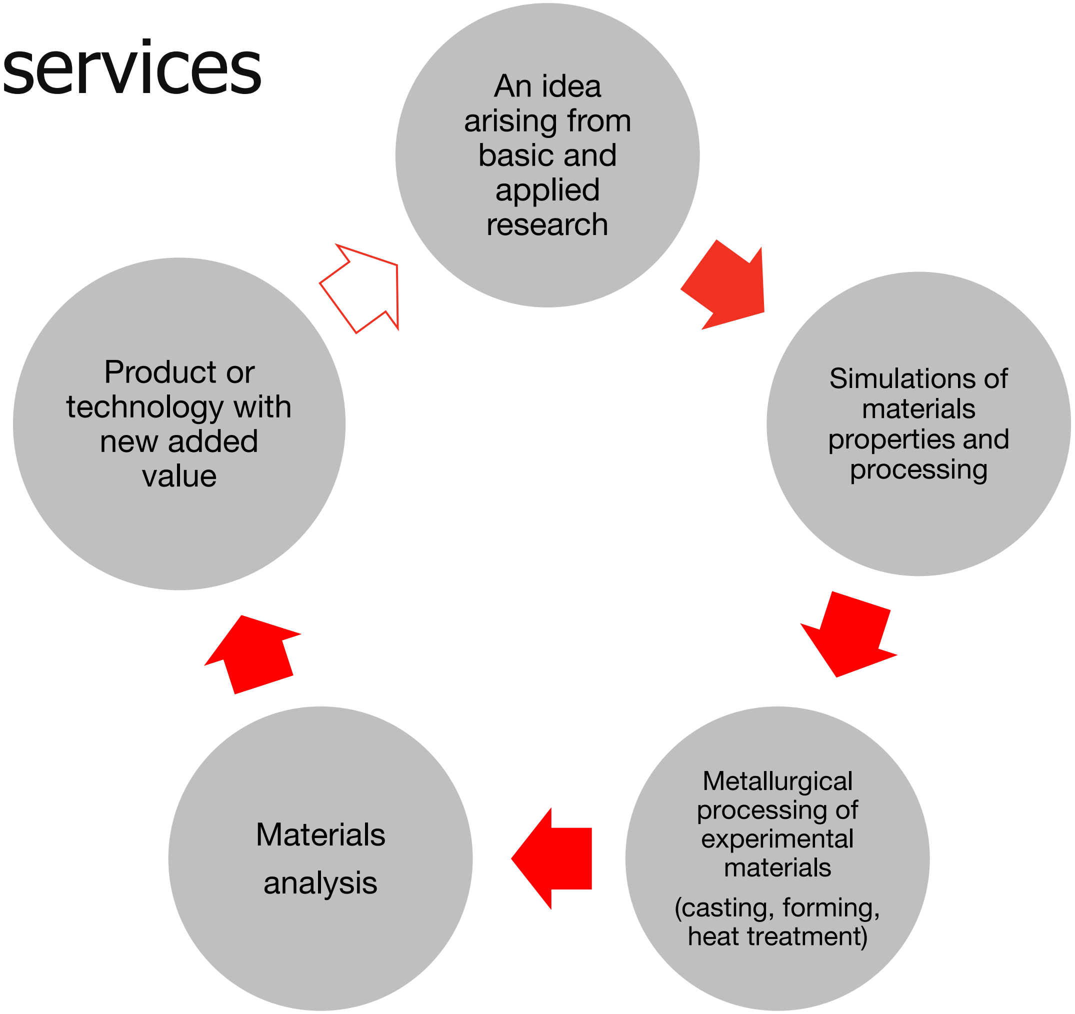
www.comtesfht.cz

COMTES FHT a.s.

R&D in metals



Comprehensive services



Activities

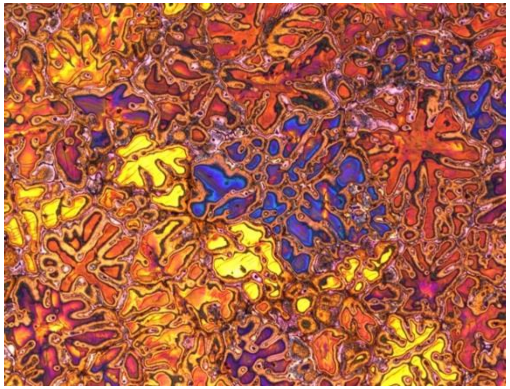
- Development of technologies
- Materials research
- Measurement and testing
- Consultancy and training

Development of technologies

- Development and optimisation of forming and heat treatment technologies
- Computer and physical modelling of metallurgical processes
- Development and construction of prototypes
- Design of forming tools and jigs

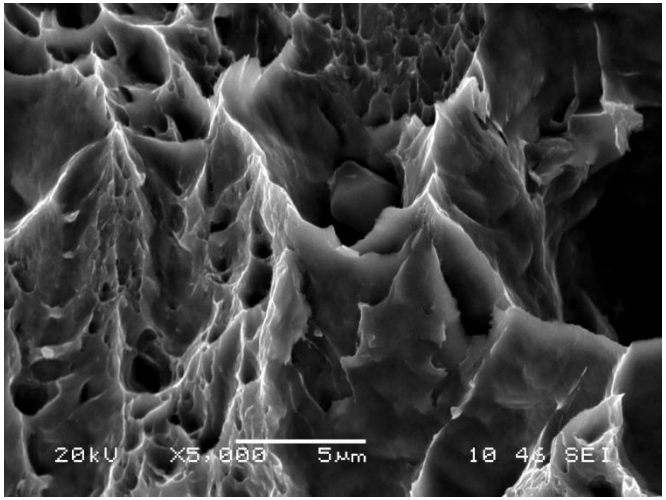
Materials Research

- Ultrafine structures in metallic materials
- Multi-phase steels with very good cold formability and high strength upon final deformation
- Use of transformation-induced plasticity in steel-forming processes
- Microalloyed steels for thin-walled castings with improved mechanical properties
- Production of components from high-purity steels for power industry equipment
- Development of high-strength low-alloyed steels
- Rapid carbide spheroidisation
- Accelerated annealing processes for steels



Measurement and testing

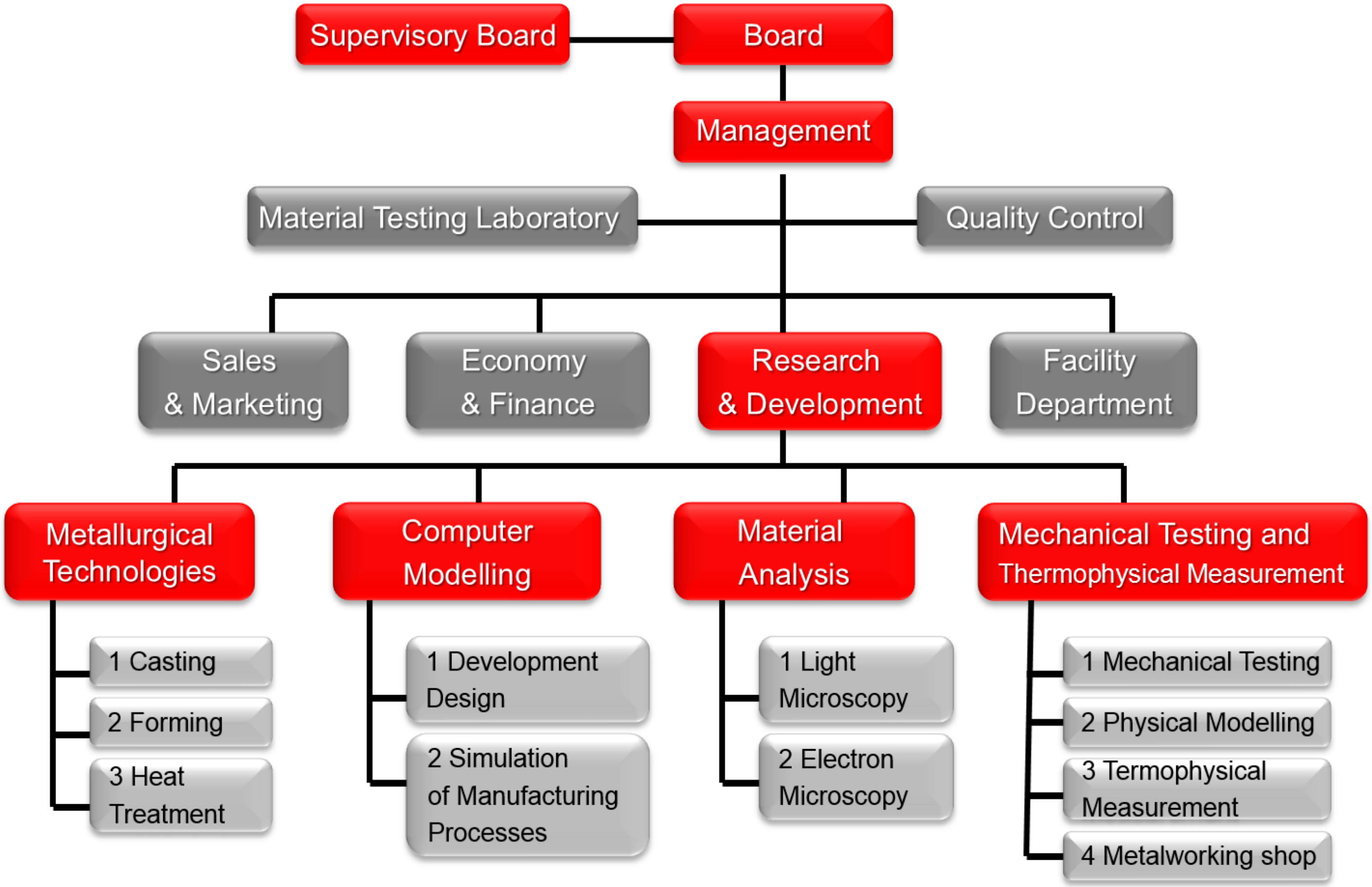
- Mechanical testing including accredited tests
- Metallographic analysis including accredited tests
- Development of materials models for numerical simulations
- Hardenability and hardness testing
- Construction of CCT and TTT diagrams
- Thermophysical measurement
- Tribological measurement
- Spectrometric analysis
- Materials investigation reports
- Magnetic measurement



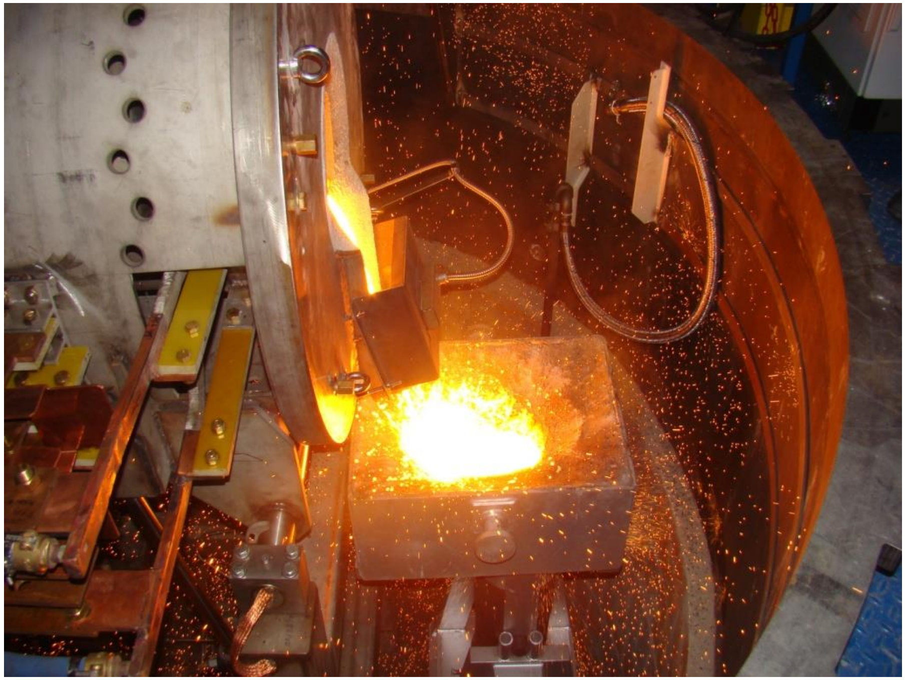
Consultancy and training

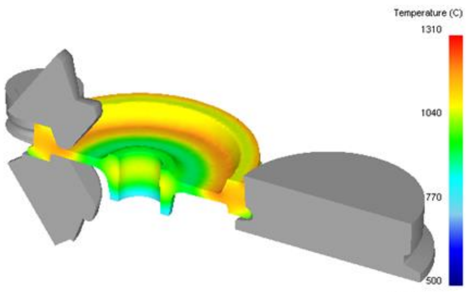
- Metallic materials and their processing technologies
- Preparation of R&D projects

Organigram


Supervisory Board
Board
Management
Material Testing Laboratory
Quality Control
Sales & Marketing
Economy & Finance
Research & Development
Facility Department
Metallurgical Technologies
Computer Modelling
Material Analysis
Mechanical Testing and Thermophysical Measurement
1 Casting
2 Forming
3 Heat Treatment
1 Development Design
2 Simulation of Manufacturing Processes
1 Light Microscopy
2 Electron Microscopy
1 Mechanical Testing
2 Physical Modelling
3 Termophysical Measurement
4 Metalworking shop

Overview of departments





R&D efforts

Metal mould sizes:

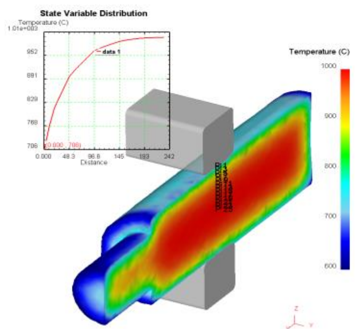
Ø 210 × 1230 mm
for 450 kg

Ø 110 × 720 mm
for 50 kg

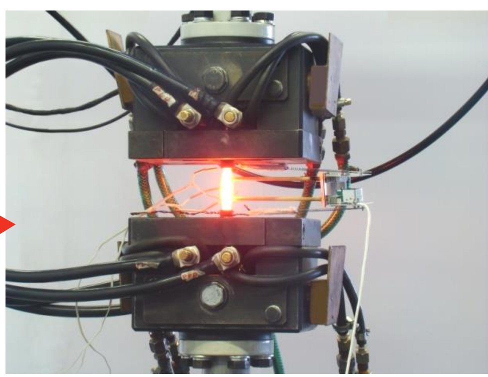
Ø 300 × 1400 mm
for 500 kg

- Materials are made and cast in a vacuum melting furnace to customer specifications

R&D efforts

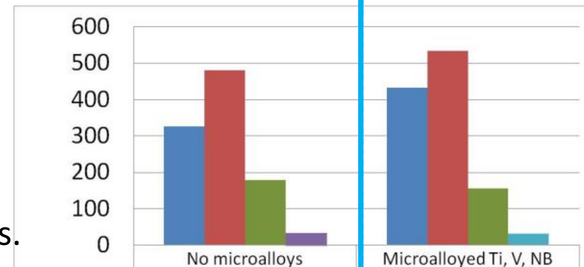


Computer simulation of forming



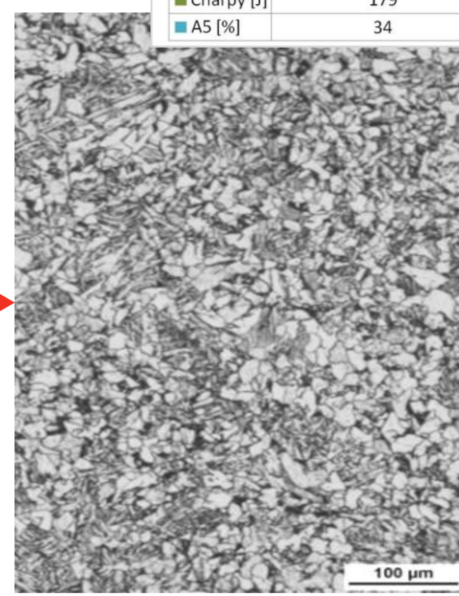
Physical simulation of forming

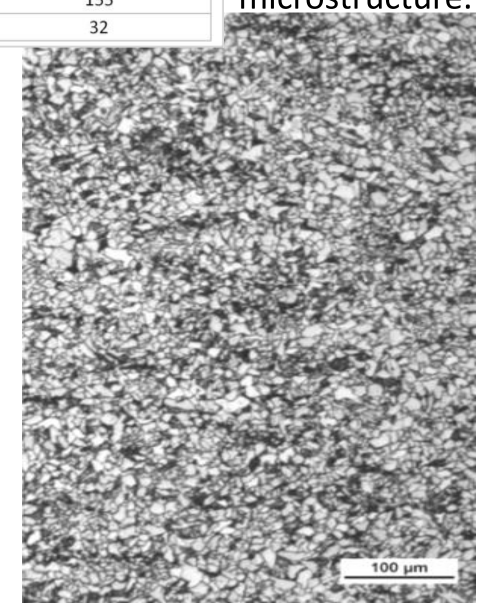
Before process optimisation and without micro-alloying elements.



	No microalloys	Microalloyed Ti, V, NB
YS [MPa]	326	433
TS [MPa]	480	534
Charpy [J]	179	155
A5 [%]	34	32

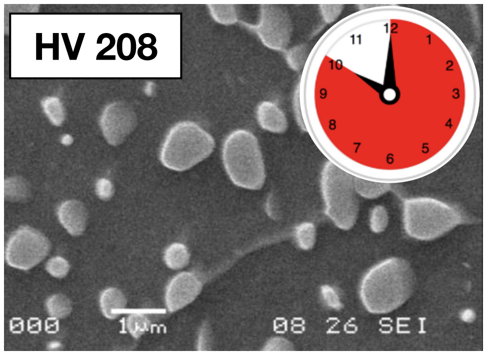
After process optimisation and with added microalloying elements: better strength and fine microstructure.



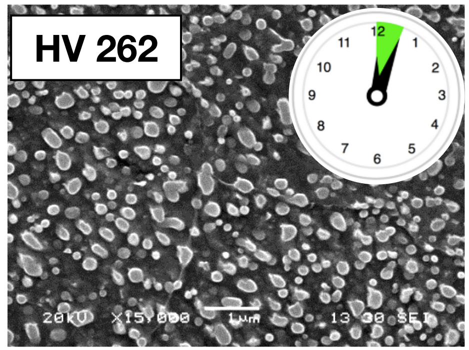


- Development of microalloyed steels: forming and heat treating

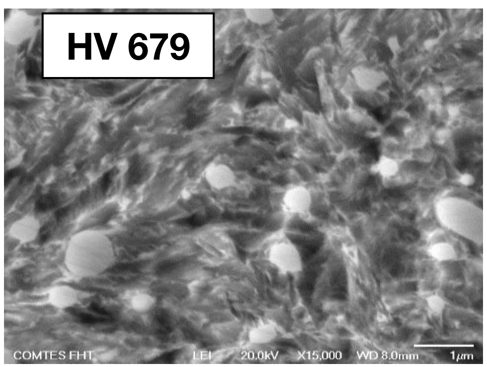
R&D efforts



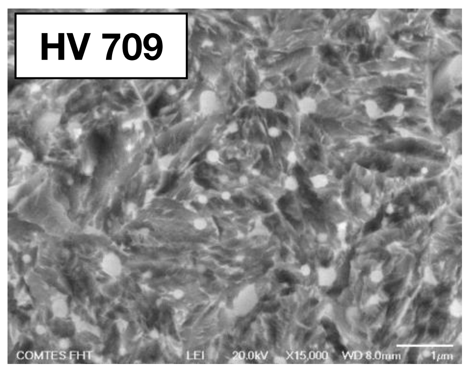
Conventional annealing



ASR annealing



Conventional hardening



Hardening after ASR

The ASR process provides:

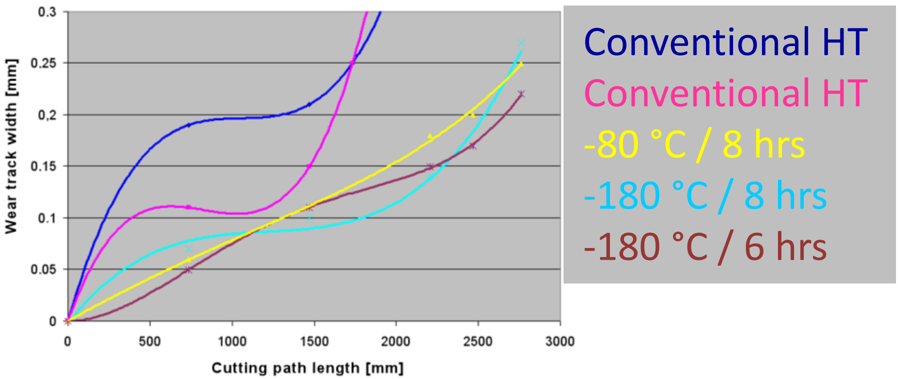
- Time and energy savings
- Finer carbides
- Finer austenite grain
- Finer martensite after quenching and tempering
- Improved mechanical properties

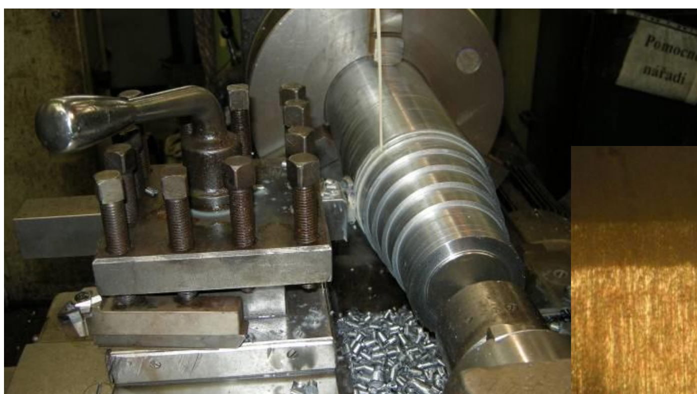
Implementation:

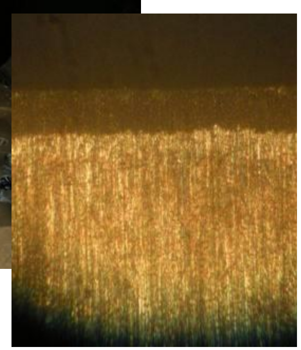
- Thermomechanical treatment (carried out in rolling mills and other equipment)
- Induction heat treatment

- ASR (Accelerated Spheroidisation and Refinement) – accelerated soft annealing and recrystallization annealing

R&D efforts





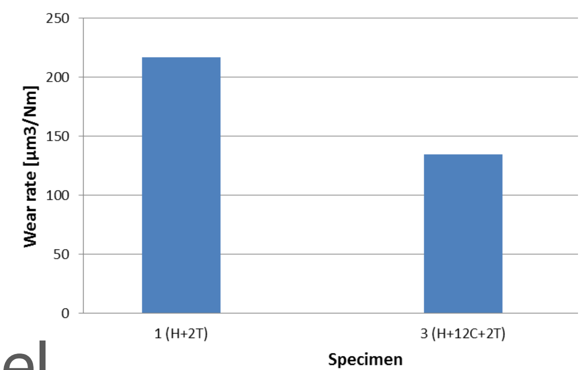


Implementation:

- Quenching + deep freezing below -100 °C
- Holding at the deep cryogenic temperature of approx. 2 – 15 hours, depending on the size of the part and the chemical composition of steel
- Conventional tempering

Effects:

- Elimination of retained austenite
- Refinement of martensite and carbides
- Improved wear resistance



- Deep cryogenic treatment of steel

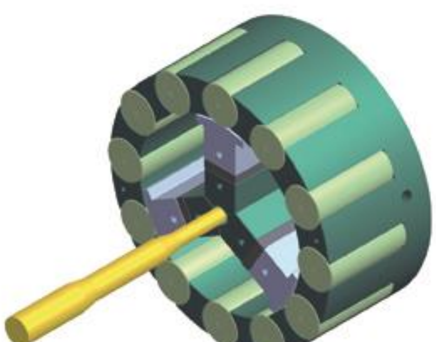
R&D efforts

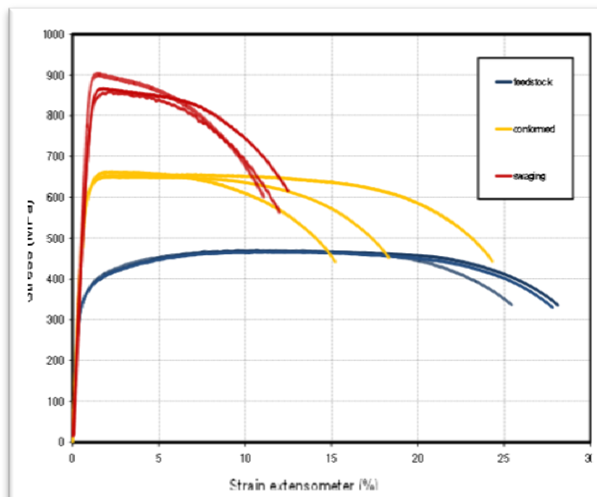
- Diffusion bonding of various types of steels by means of hot rolling
- Potential for combining various mechanical properties
- Capability to create highly attractive visual patterns
- Plain carbon as well as stainless steels
- Knife making, jewellery making and other fields
- Max. size: 380 × 4000 mm; thickness: 3-8 mm

- Industrially-produced rolled Damascus steel

R&D efforts

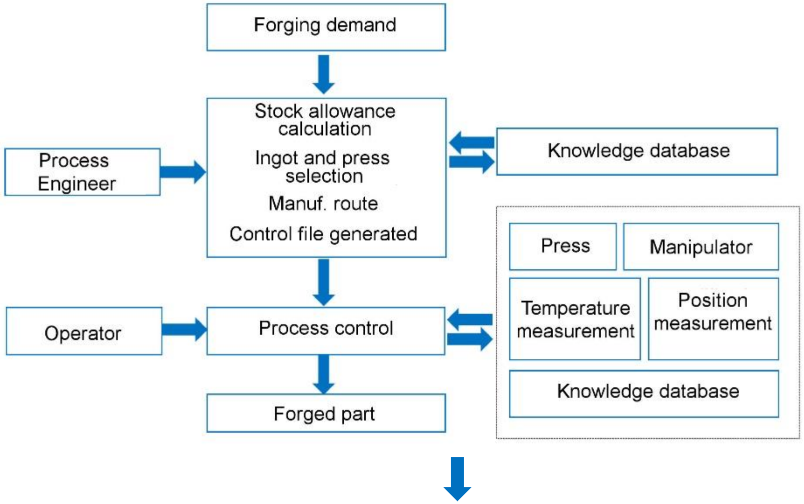
- Grain refinement, most notable in titanium alloys to less than 1 µm
- 60 – 80 % increase in strength
- For medical applications (implants), precision engineering (shafts for mechanical watches) and others





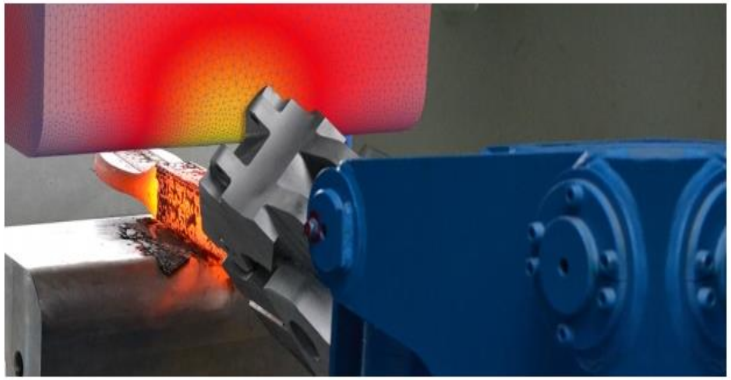
- Creating ultrafine structures in metallic materials

R&D efforts



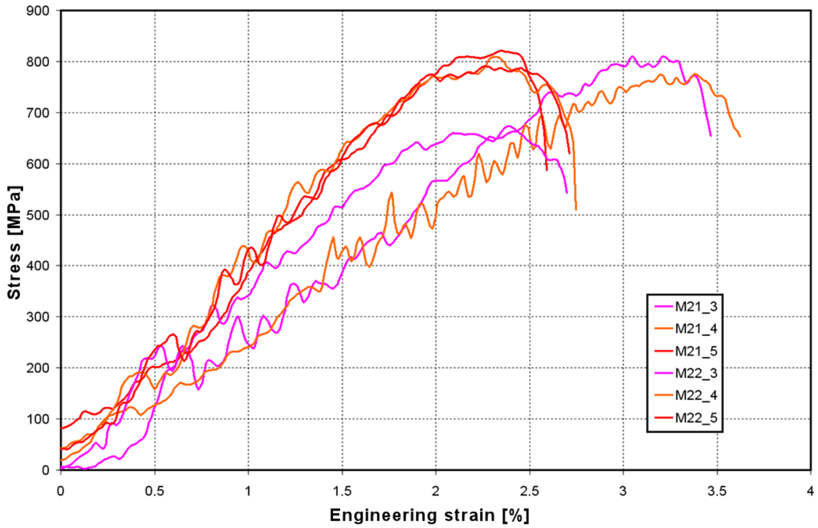
Benefits of Software-Controlled Forging

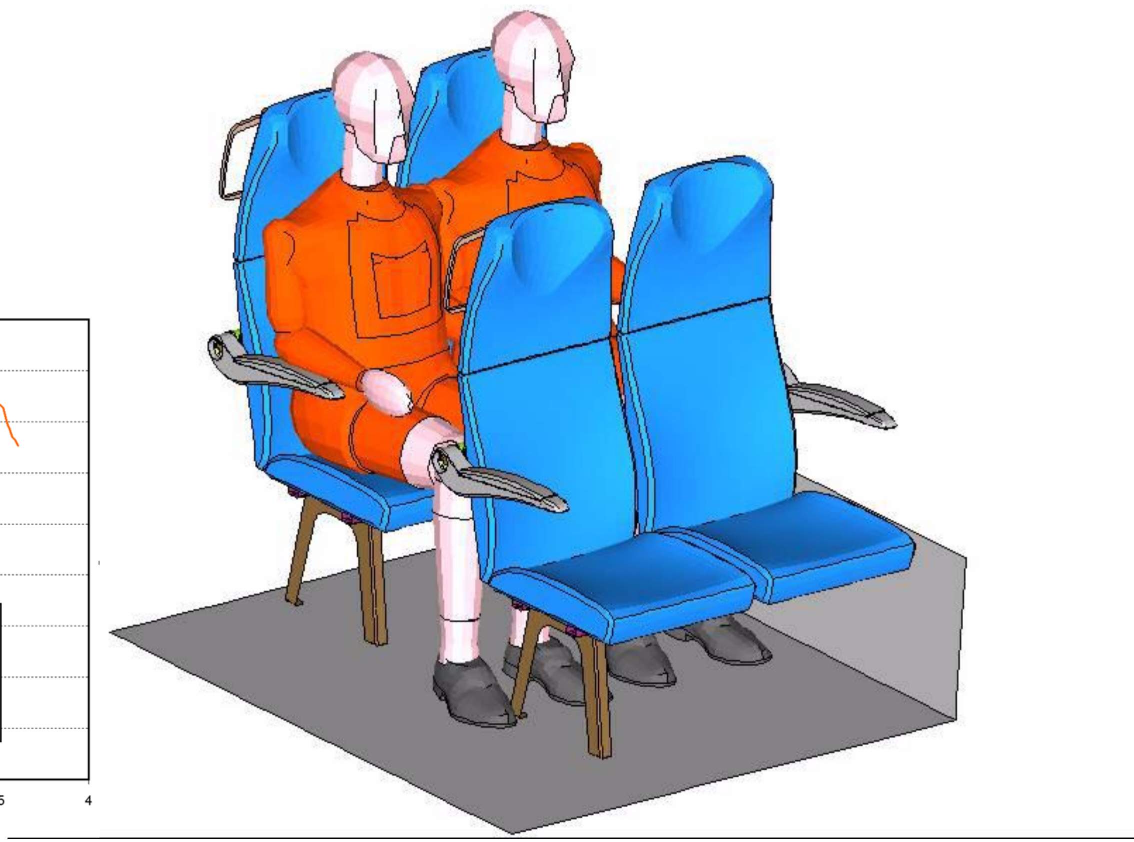
- Rapid and accurate design of new manufacturing processes
- Prediction of strains, forces and temperatures during the process
- Repeatability of production
  and consistent quality
- Correct production documentation
- Development of process know-how



- Automatic generation of open-die forging sequences

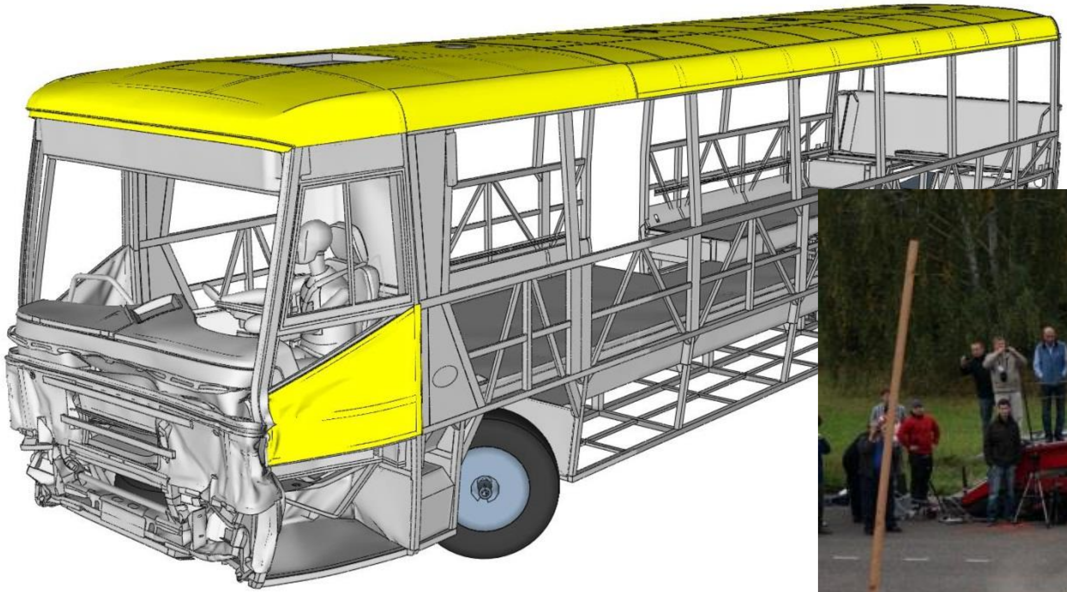
R&D efforts





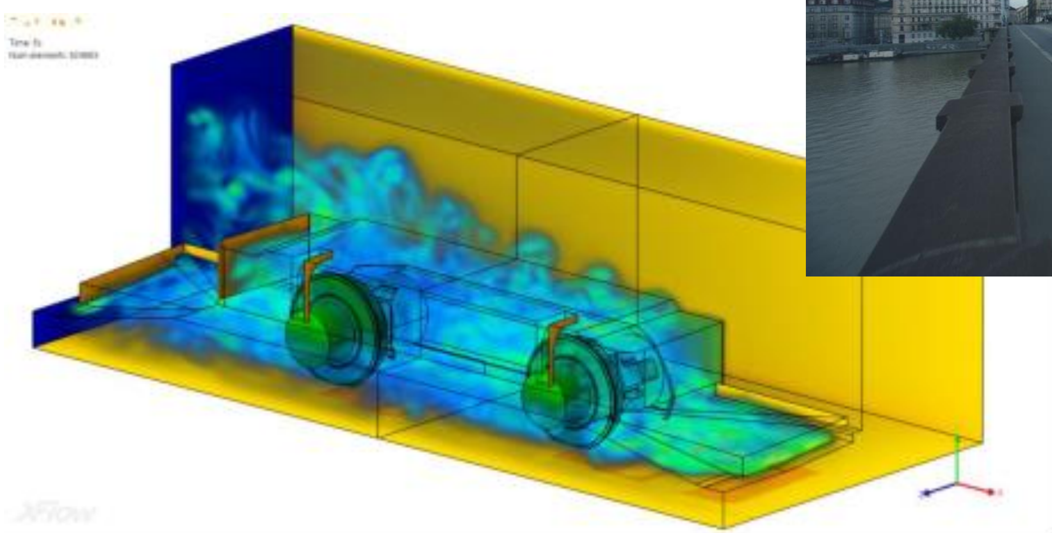
- Measurement of data for simulating aircraft seat crash tests

R&D efforts



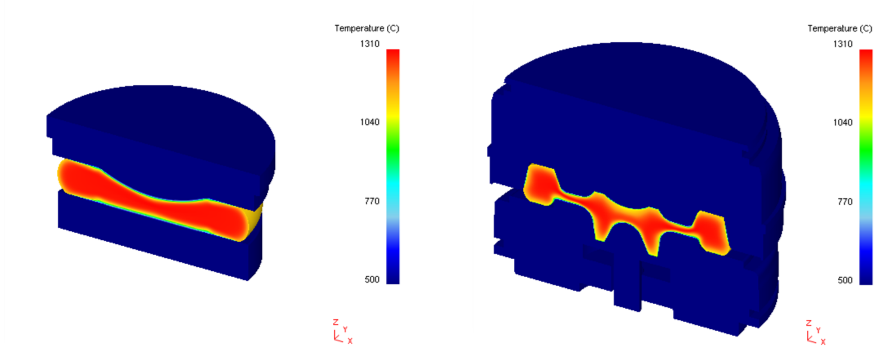
- Enhancing the passive safety of buses

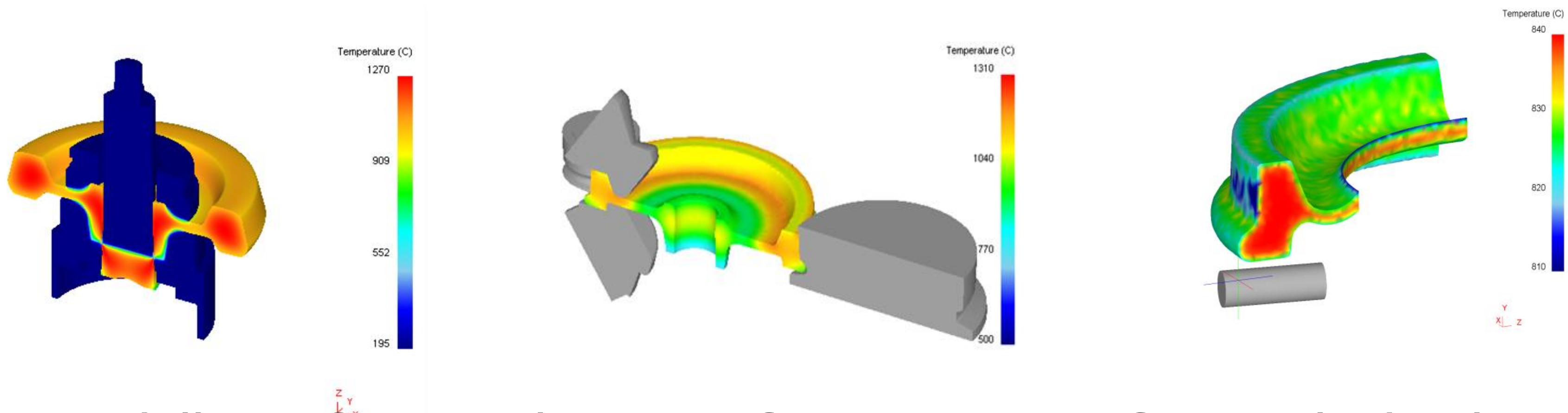
R&D efforts



- Eddy simulation in an FEM model of a tramway wheelset at 16 m/s.

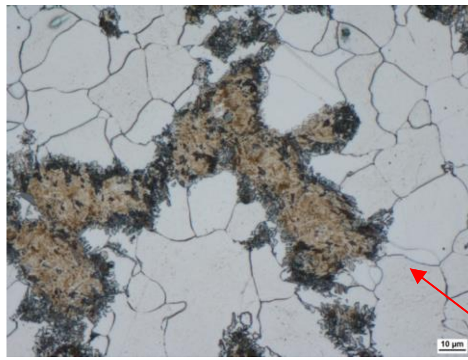
R&D efforts

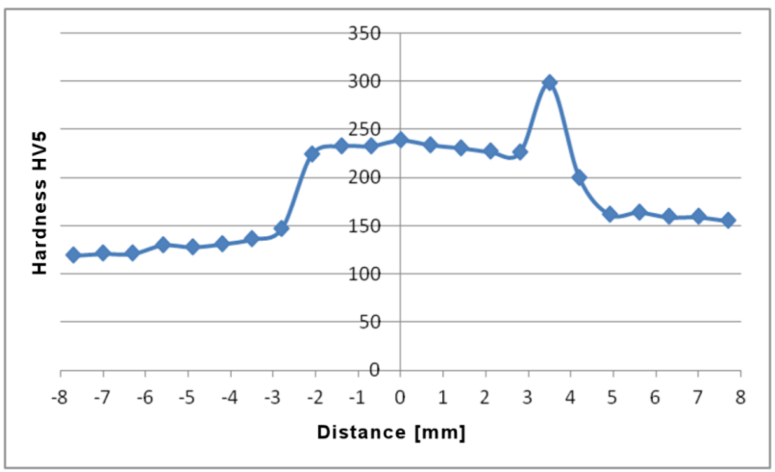


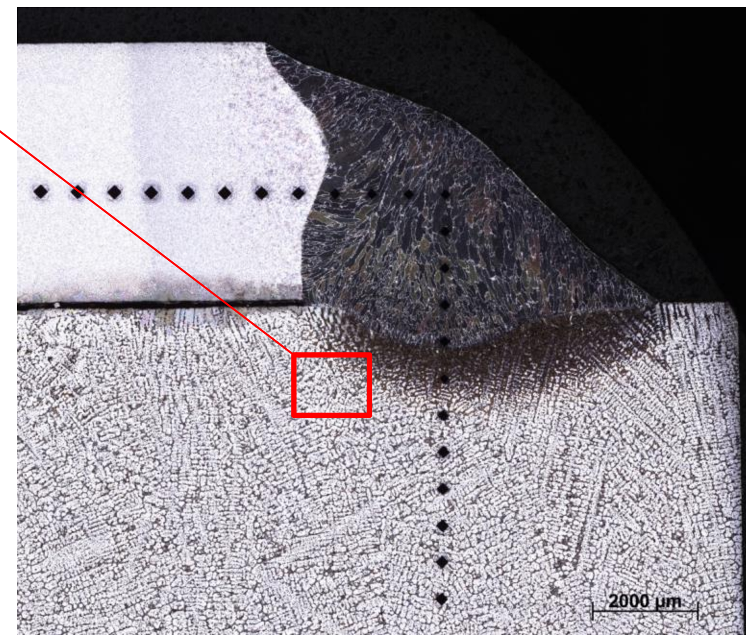


- Modelling of a complex manufacturing route for a rail wheel

R&D efforts

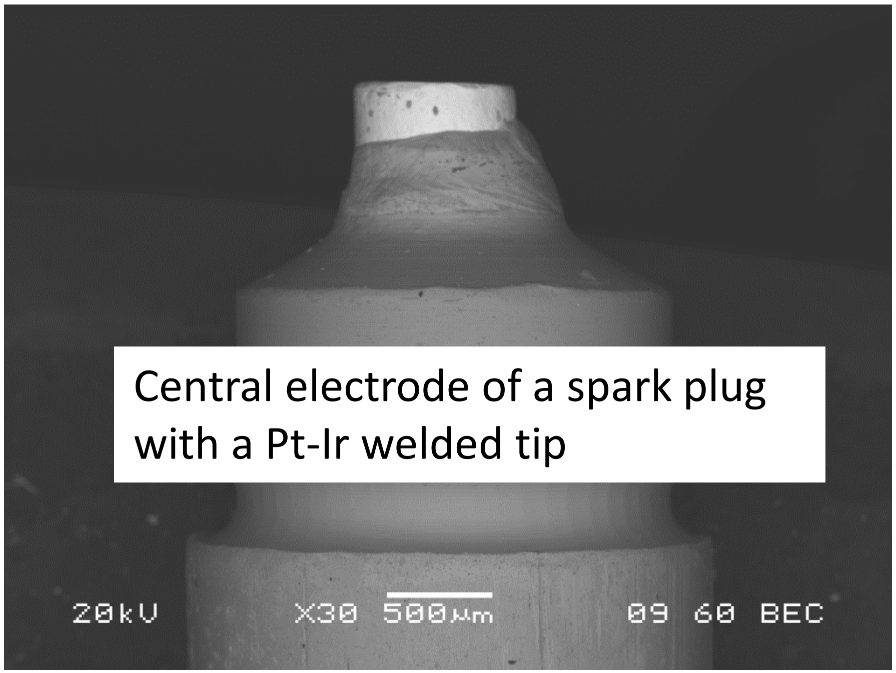




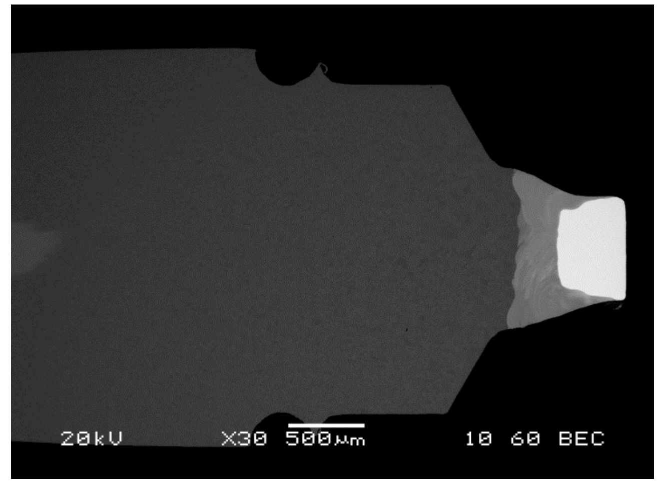


- WPQR – weld assessment

R&D efforts



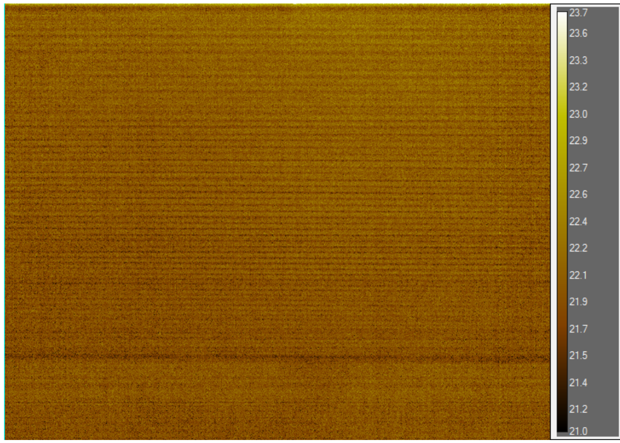
Central electrode of a spark plug with a Pt-Ir welded tip

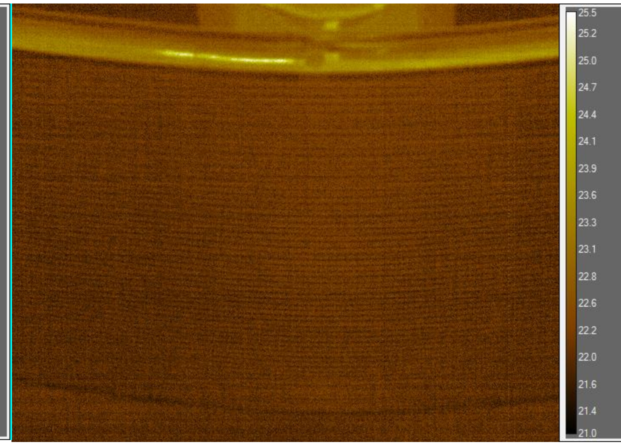


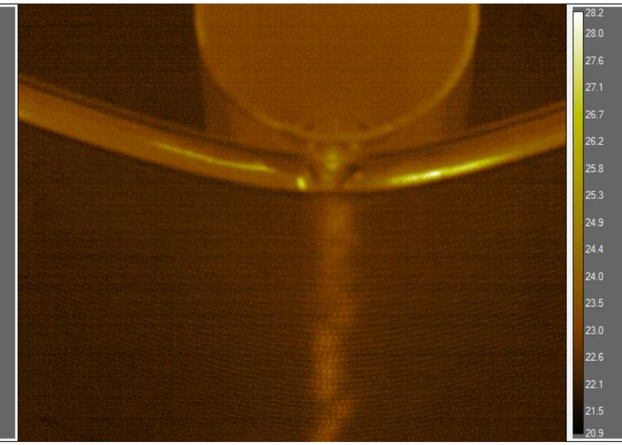
Longitudinal metallographic section through the central electrode. In the weld, partial dilution between the Pt-Ir tip and nickel wire is visible.

- Analysis and development of spark plugs

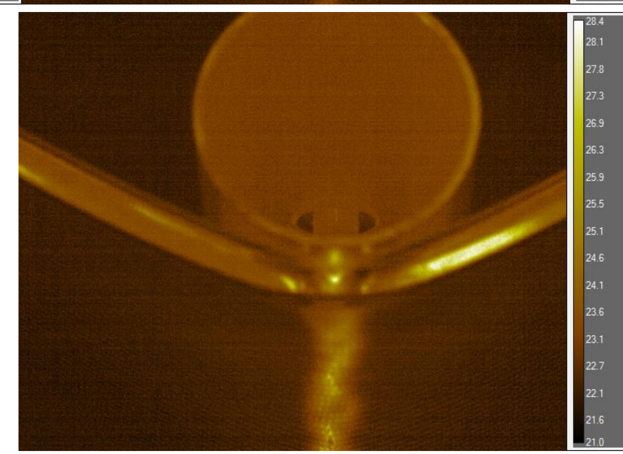
R&D efforts



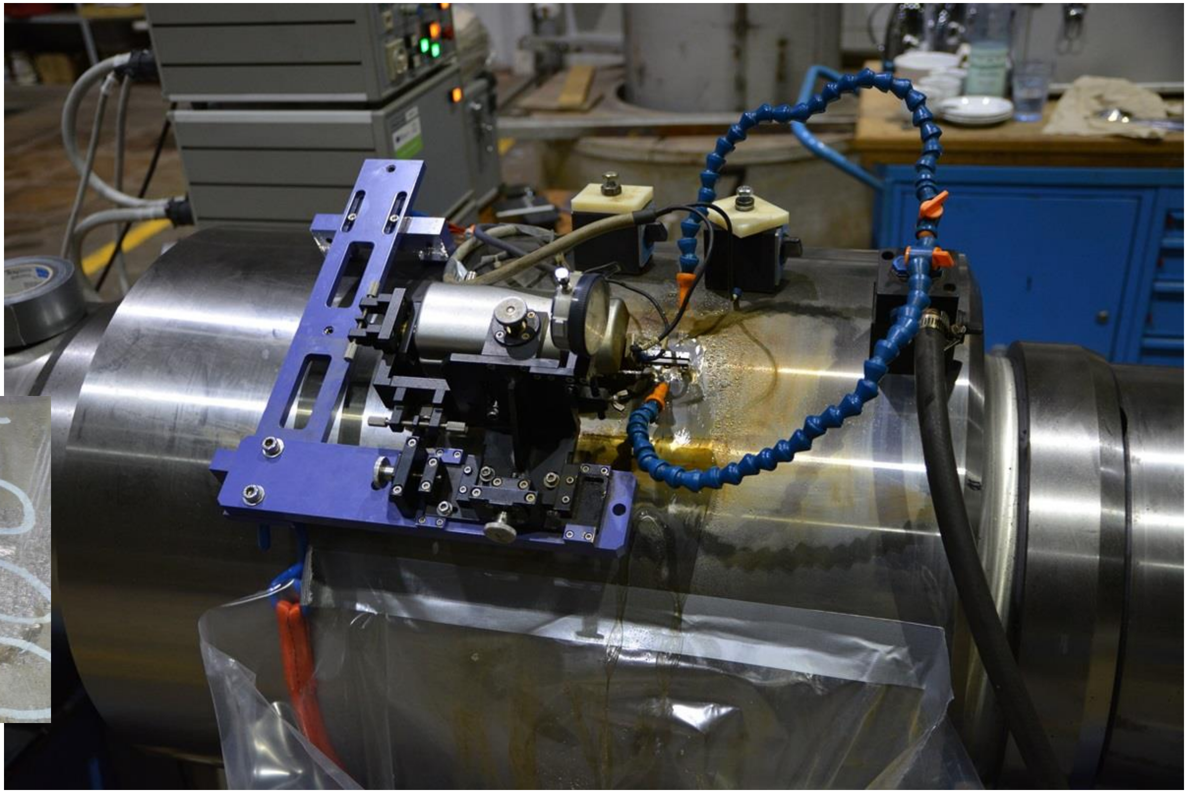




- Dynamic bending test of a cooler
  FLIR X 6580sc high-speed thermal imaging camera footage

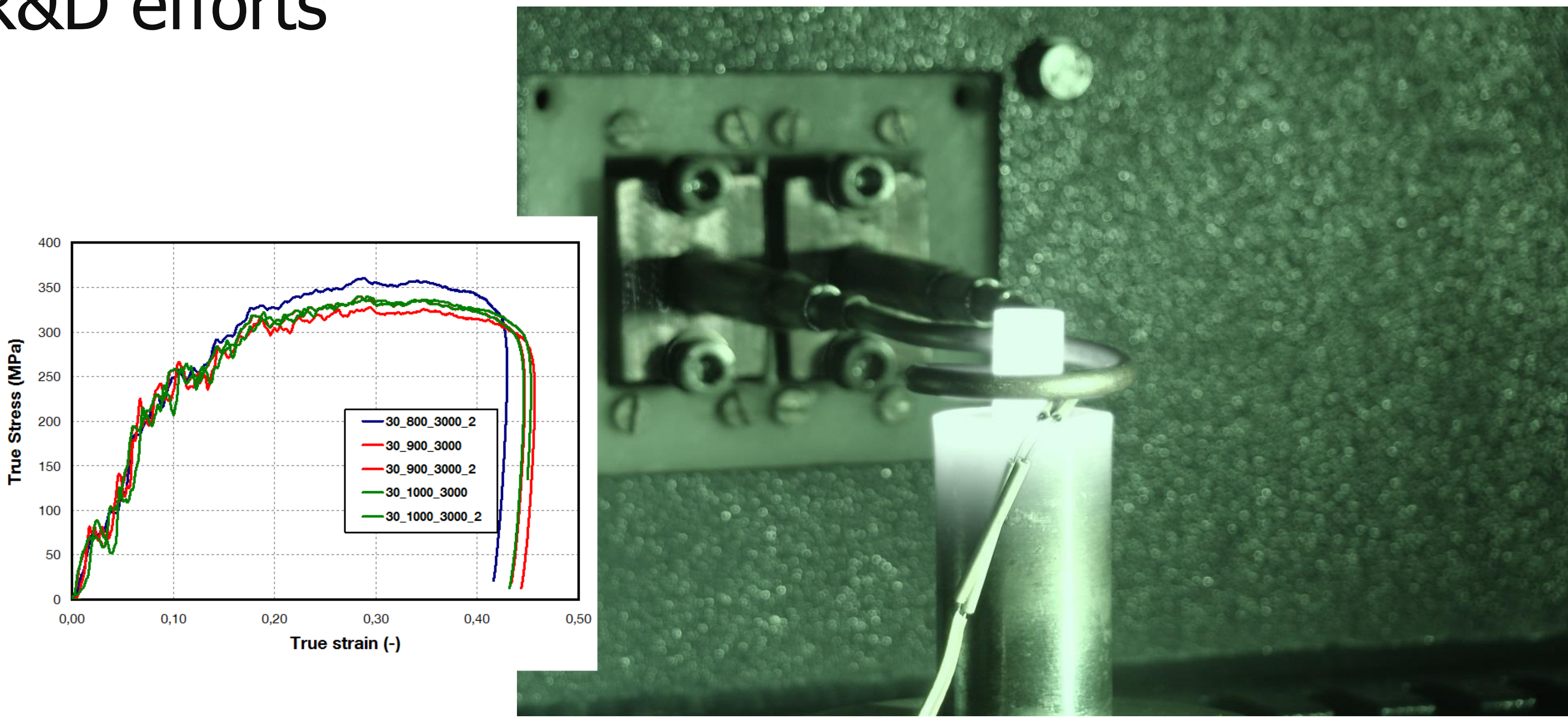


R&D efforts



- Taking miniature samples on site

R&D efforts

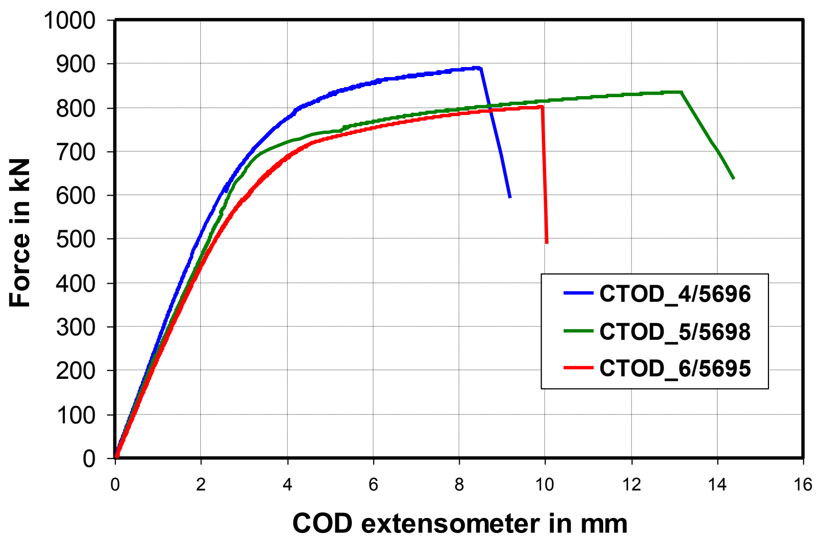


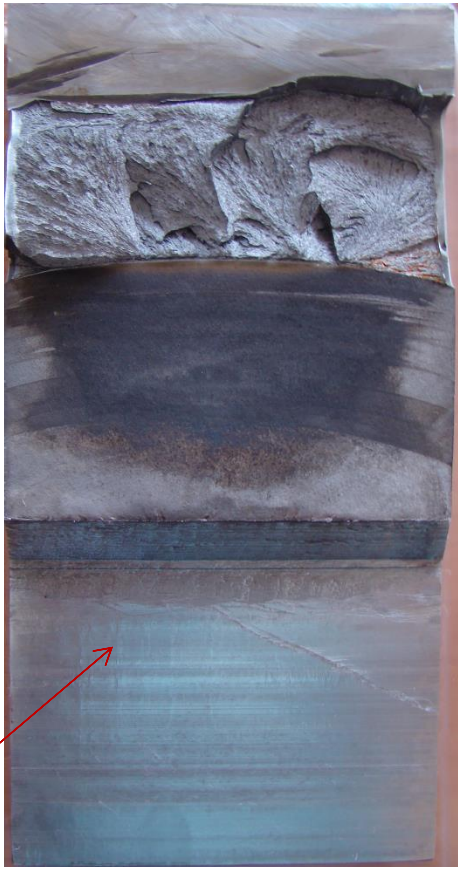
- Dynamic compression test in a drop weight tower with induction heating (900 °C, $\dot{\varepsilon} > 300\ s^{-1}$)

R&D efforts

RUMUL magnetic resonance testing machine
Preparation of a fatigue crack in specimens

Results of measurement: CTOD





Fracture surface upon testing

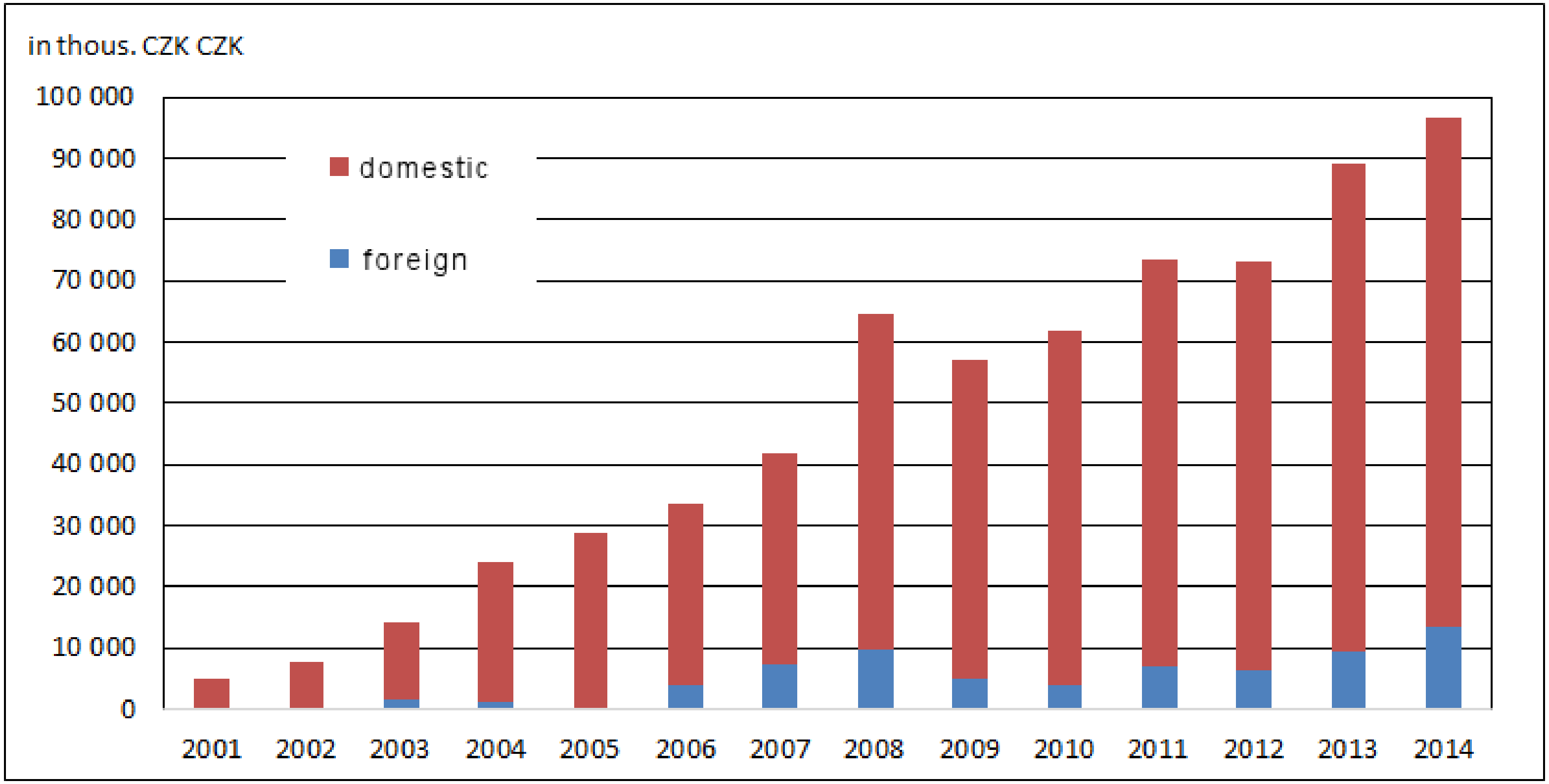
- CTOD testing – 300 kg specimen, 1170 × 200 × 260 mm

Awards for research and development activities

- First prizes awarded in the Czech Republic

Our people

Results



- Financial turnover of the company

Client references

SCHAEFFLER
LUK INA FAG

BILSTEIN
Ein Name für Kaltband

DOOSAN
Doosan Škoda Power

ANDRITZ

ŠKODA

voestalpine
EINEN SCHRITT VORAUS.

Buderus Edelstahl

Mubea
light.efficient.global.

BENTELER

metatech

VÍTKOVICE
MACHINERY GROUP

BONATRANS

ŠKODA

ŠKODA
ŠKODA JS a.s.

Honeywell

ZDAS

PILSEN STEEL

CPF
CZECH PRECISION FORGE

MECAS ESI s.r.o.