



Mechanical Engineering Faculty in Slavonski Brod, Croatia

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- Croatia
- Josip Juraj Strossmayer University of Osijek
- Mechanical Engineering Faculty in Slavonski Brod
- Department for Mechanical Design

Some facts about Croatia

Population (2011) 4 284 889

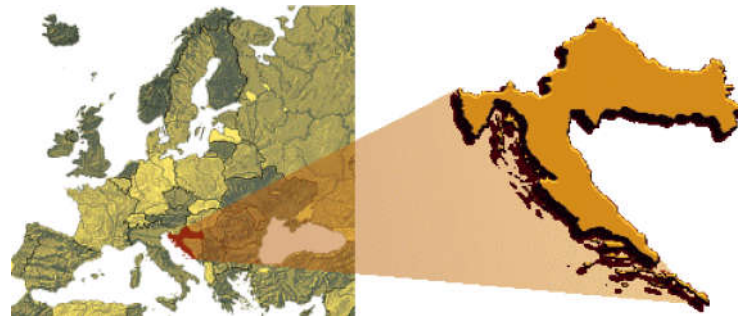
Croatia is country of islands - 1.244 (66 inhabited)

Total state area 89,810 km²

Land area (territory) is 56,610 km²

CROATIA IS

On the cross roads
between
Central Europe
and the
Mediterranean



PUBLIC UNIVERSITIES IN CROATIA (8)

- University of Zagreb
- University of Rijeka
- University of Split
- **J. J. Strossmayer University of Osijek (UNIOS)**
- University of Dubrovnik
- University of Zadar
- University of Pula
- University North (Koprivnica)

OLDEST UNIVERSITIES

ZADAR 1396 and ZAGREB 1669



Bologna 1219
Padova 1220
Paris 1220
Oxford 1249
Lisabon 1290
Rome 1303
Cambridge 1318
Florence 1321
Praha 1348
Krakow 1364
Vienna 1365
Heidelberg 1385

ZADAR 1396

Rostock 1419
Glasgow 1453
Copenhagen 1479
Mainz 1494
Edinburgh 1582
Graz 1585
Dublin 1591
Lwow 1661

ZAGREB 1669

Göttingen 1736
Erlangen 1743,
Moscow 1775
Berlin 1809
Saint Petersburg 1819
London 1825
Helsinki 1826
Kiev 1834
Athens 1834
Tokyo 1881
Constantinople 1900
...



Josip Juraj Strossmayer University of Osijek

Faculty of Economics

Faculty of Electrical Engineering

Faculty of Philosophy

Faculty of Civil Engineering

Faculty of Mechanical Engineering

Faculty of Medicine

Faculty of Agriculture

Faculty of Law

Faculty of Food Technology

Catholic Faculty of Theology

Faculty of Education

Academy of Arts

Department of Mathematics

Department of Physics

Department of Biology

Department of Chemistry

Department of Cultorology



- Mechanical engineering study in SlavonSKI Brod is performing **since 1962.**
- Josip Juraj Strossmayer University of Osijek – approx. 18000 students
- **Mechanical Engineering Faculty in SlavonSKI Brod**
 - **approx. 1000 students and 56 teachers**
- Department for Industrial Engineering
- Department for Production Engineering
- Department for Materials Engineering
- **Department for Mechanical Design**
- Department for Energetics



SCIENTIFIC & RESEARCH ACTIVITIES

- 11 national projects financed by Croatian Ministry of Science, Education and Sports,
- International bilateral projects, such as CEEPUS, ERASMUS, TEMPUS, etc.
- Publishing in Journals
- Organisation and participation in the Conferences
- International collaboration
- ...



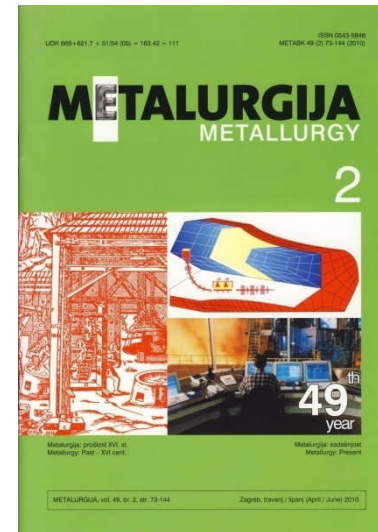
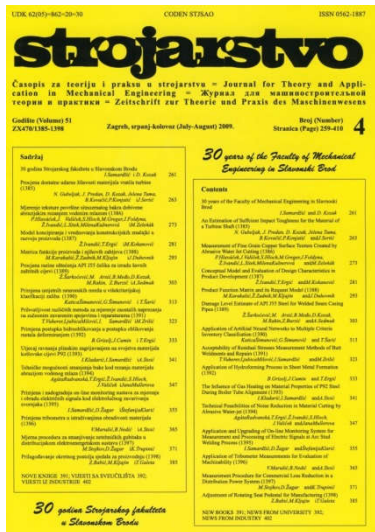
International collaboration

- Hochschule Bremen - since 1982, sponsored by DAAD, Germany
 - exchange of visits of teachers, Colloquiums in Bremen and Slavonki Brod, short time study visits of the teachers, teachers habitu  and lessons performing, study visits of the best students
- University of Manchester, UK
 - interchange of researchers from maintenance branche
- University of Strathclyde, Department of DMEM, Glasgow, Scotland
 - ALIS Project
- University of Maribor, Mechanical engineering faculty, Slovenia
 - projects in the field of fracture mechanics, finite element analysis, welding
- University of Ljubljana, Mechanical engineering faculty, Slovenia
 - teachers visits, projects in the field of tool monitoring, design of flexible manufacturing systems, PDM System etc.
- Institute of materials and technology (IMT) Ljubljana, Slovenia
 - structural integrity assessment of thermo-energetic parts
- Faculty of Machine Building, Technical University of Cluj-Napoca and
- Faculty of Engineering, North University of Baia Mare, Romania
 - CEEPUS program co-operation
- Kecskem t College, GAMF, Hungary
 - advanced cutting and cooling techniques in metal cutting
- Pollack Mih ly Faculty of Engineering, University of P cs, Hungary
 - PhD Symposiums, Gas conferences collaboration, staff exchange, students visit

International collaboration

- Bay Zoltán Institute for Logistics and Production Systems, Miskolc, Hungary
 - new design of welded components
- Montanuniversität in Leoben, Austria
 - influence of surface treatment processes on the fatigue behaviour under multiaxial loading
- University of Udine, Dept. of Electrical, Management and Mechanical Eng., Italy
 - research in the fields eco-design and rapid prototyping
- TU Berlin, Institut für Maschinenkonstruktion, sponsored by DAAD, Germany
 - teachers visits, product design and development
- University of Tuzla, University of Mostar, University of Zenica, University of Sarajevo, B&H
 - teachers exchange, visits, projects, literature exchange
- Faculty of Machine Technology, TU Sofia, Bulgaria
 - Collaboration within CEEPUS program, staff and students exchange
- NIST - Boulder Colorado, USA
 - project in the field of welding
- Tomas Bata University in Zlin and Faculty of Production Technology and Management, the Jan Evangelista Purkyně University in Ústí nad Labem, Czech Republic
 - agreement of bilateral co-operation in the field of polymers processing and machining
- Bilfinger Berger Power Services GmbH, Germany
 - agreement of bilateral co-operation in the field of energetics
- Brandenburg University of Technology Cottbus, Germany
 - agreement of bilateral co-operation in the field of energetics
- Faculty of Manufacturing Technologies, Prešov, TU Košice, Slovakia
 - agreement of bilateral co-operation in the field of mechanical technologies

Croatian journals in field of Mechanical Engineering



Technical gazette is referred in databases: SCI Expanded, SCOPUS, INSPEC, COMPENDEX, CSA, Engineering Materials Abstracts, Ceramic Abstracts etc.

Courses at the MEFSB for CAD/FEM

Students who have chosen *Product design and development* study orientation (master study program) should attend next courses:

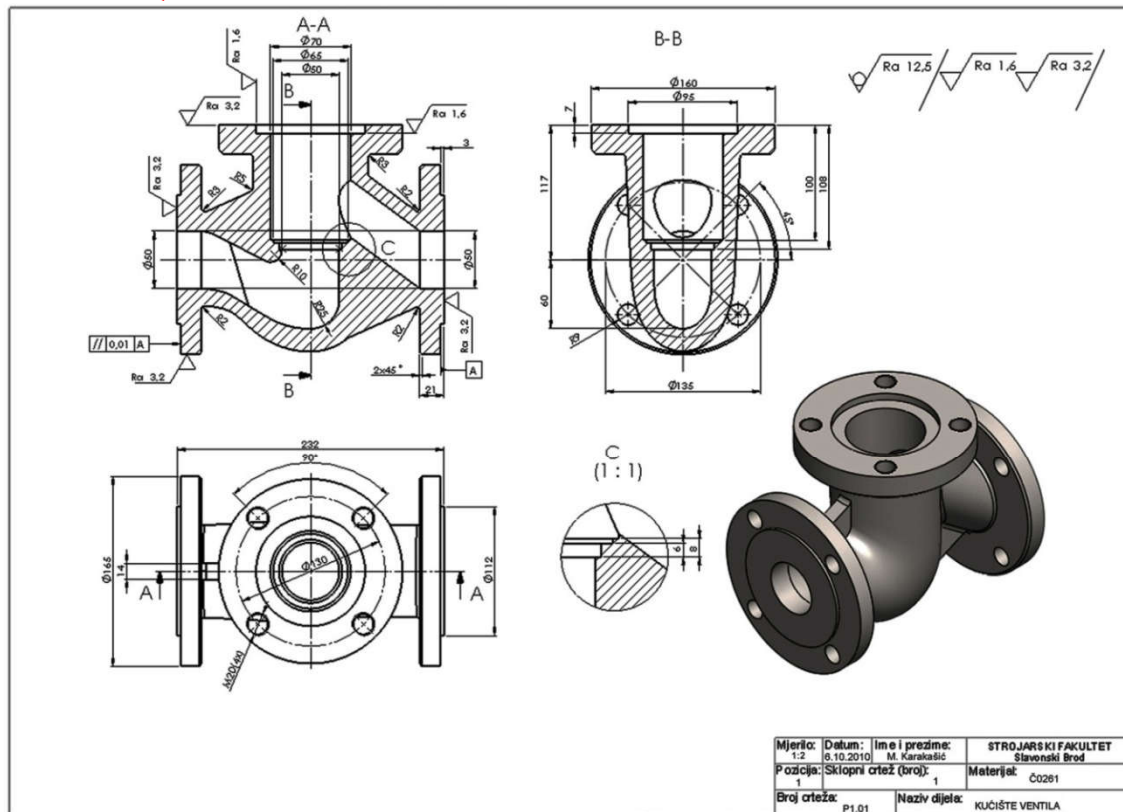
- Computer Aided Design (CAD)
- Design theory
- Eco design
- Theory of elasticity
- Theory of plasticity
- Advanced strength of materials
- Numerical methods
- Experimental mechanics
- Finite element method
- Numerical modeling and simulation
- Industrial design
- Computational fluid mechanics
- Optimization of structures, etc.



Some student projects in CAD

In the frame of the course *Product design and development* students are divided into groups creating new engineering solutions for some products.

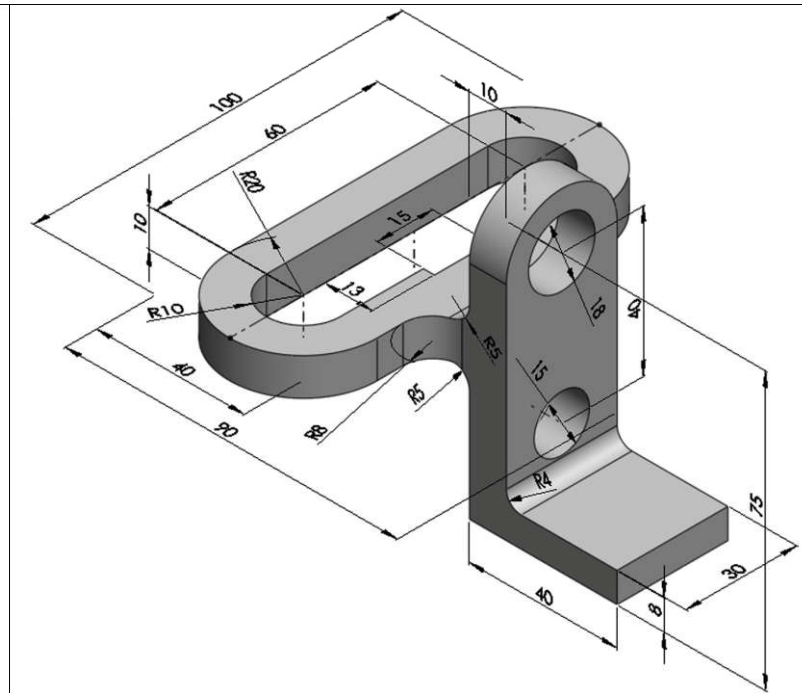
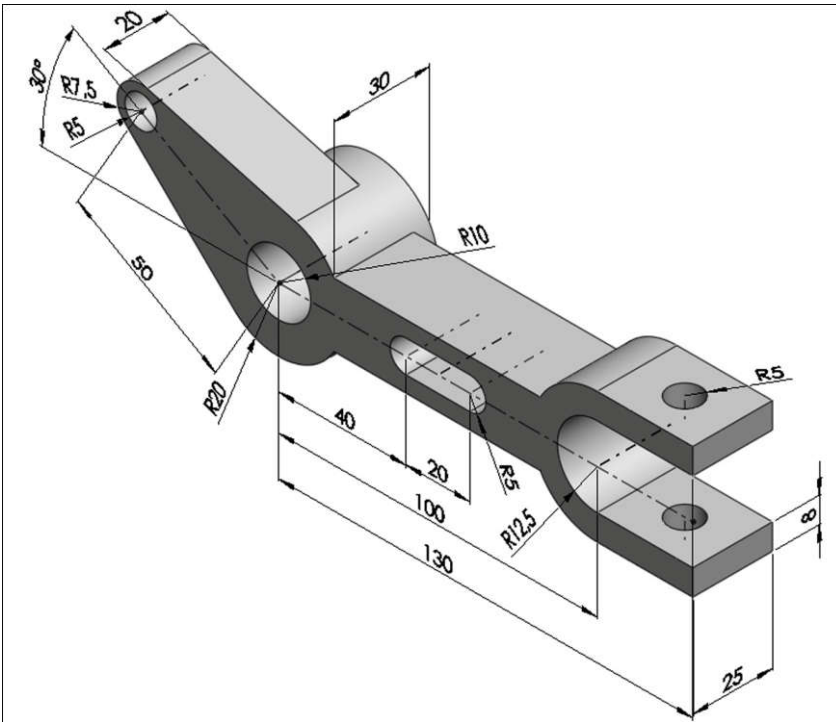
The figure shows an example of the application of CAD software in the design of valves



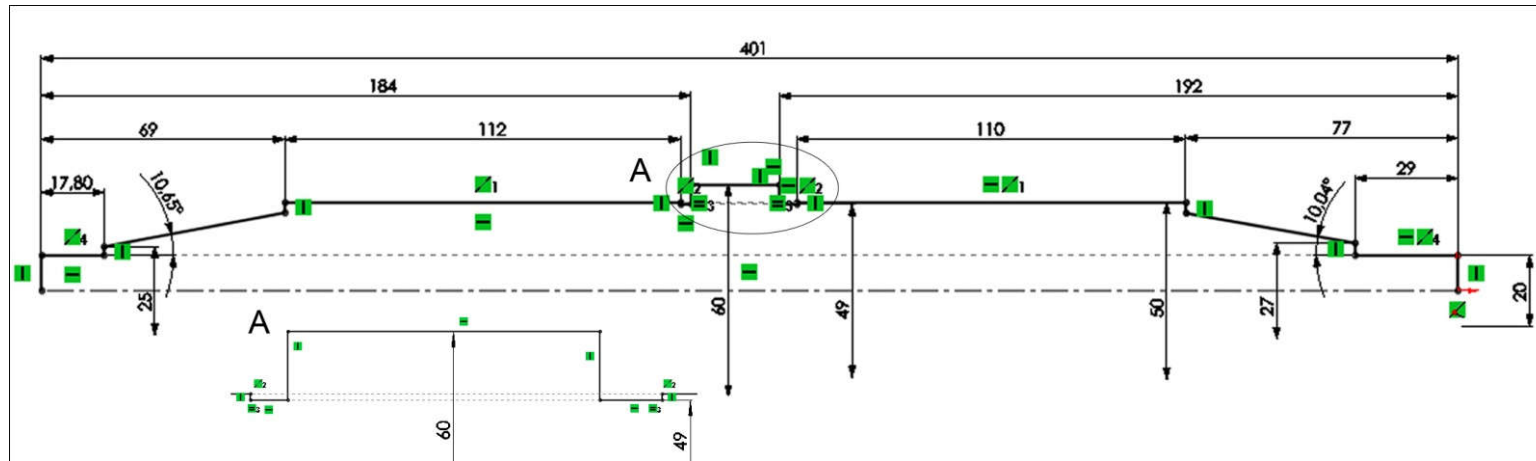


Solid models

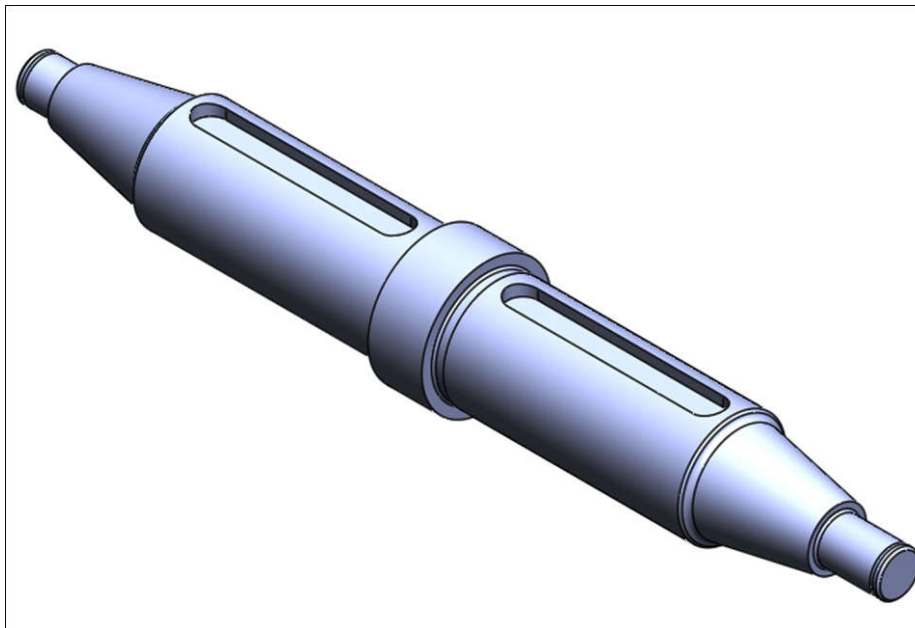
In the course "Computer aided design 1" at the graduate level of our faculty, our students have learning outcomes and competences in modeling design parameters of machine details.



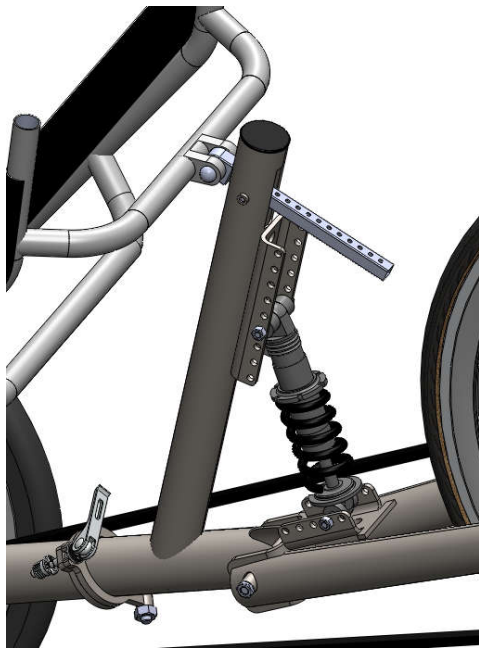
Axysymmetric models



Specifically implemented on symmetric learning problems (here in the technical sense, refers to the symmetry around one or more planes).



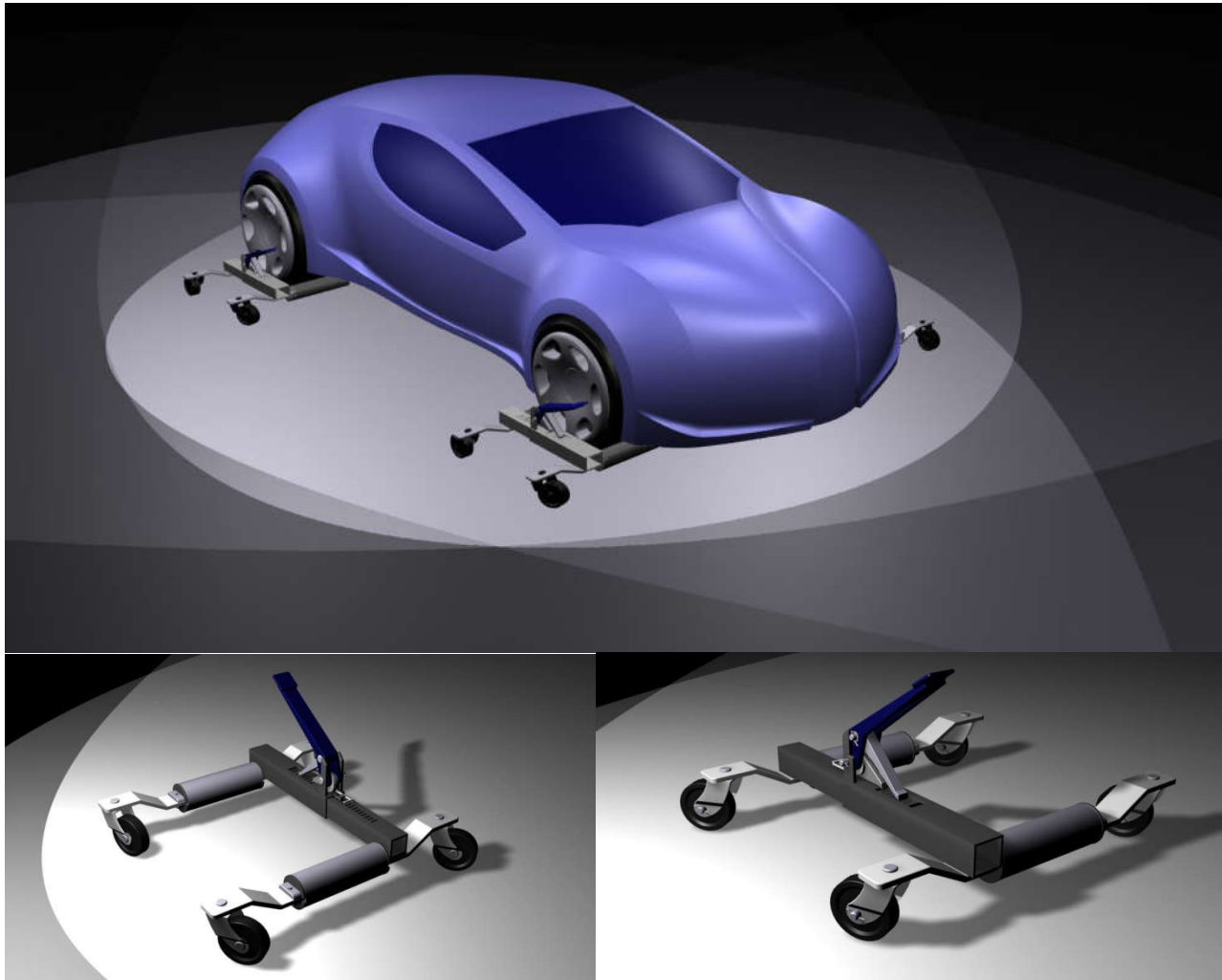
New model of tricycle – developed by students



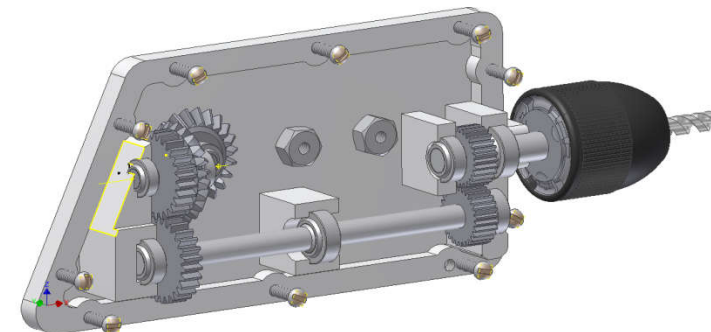
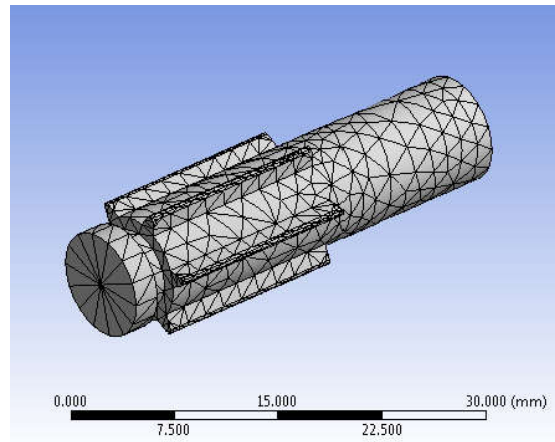
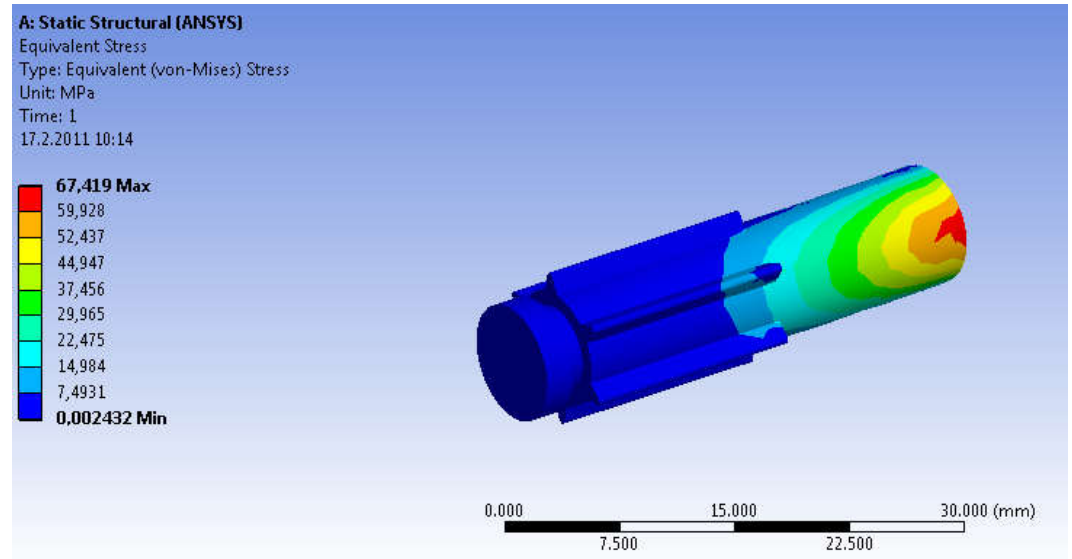
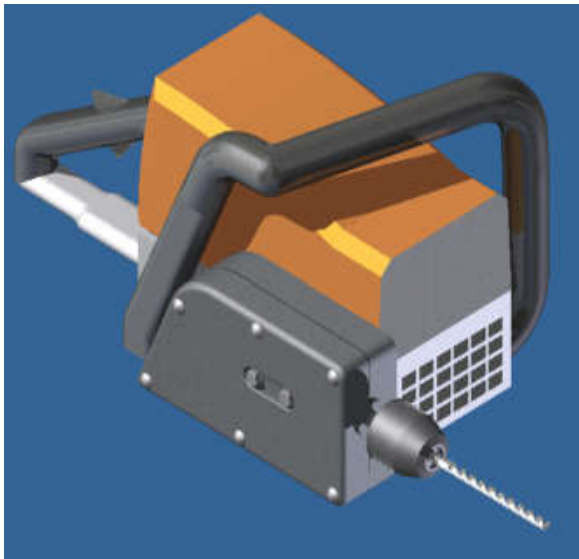
Shown is a representation of the student project for the course "Design Theory". In this process, the process performed conceptual design and application of systems theory approach axiomatic design.



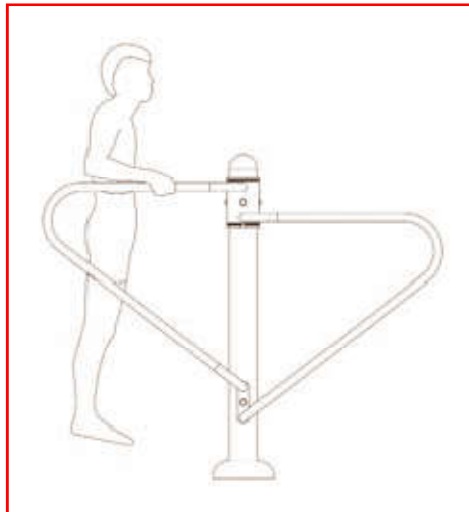
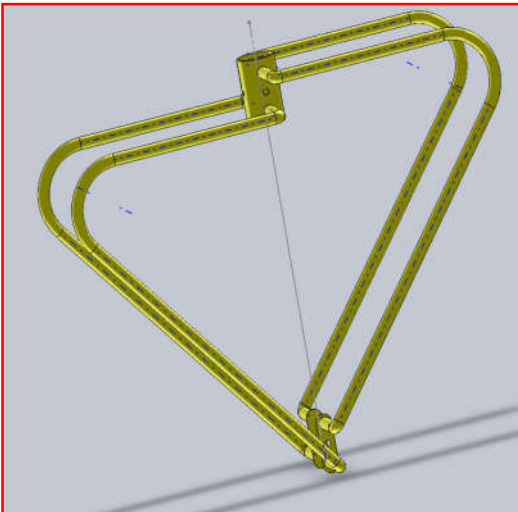
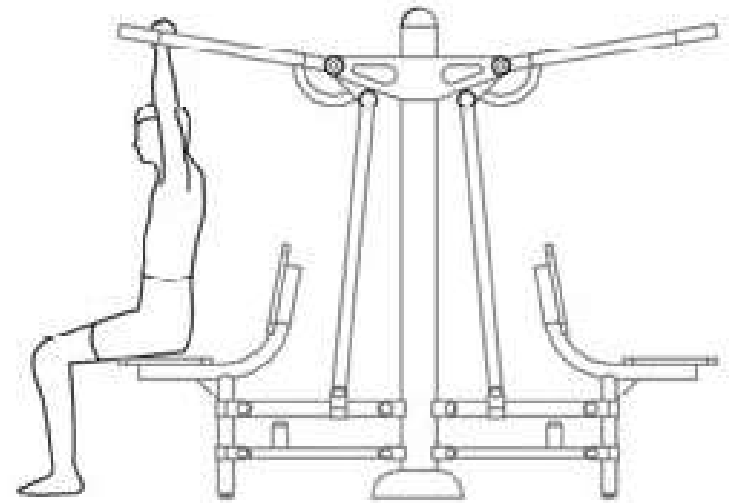
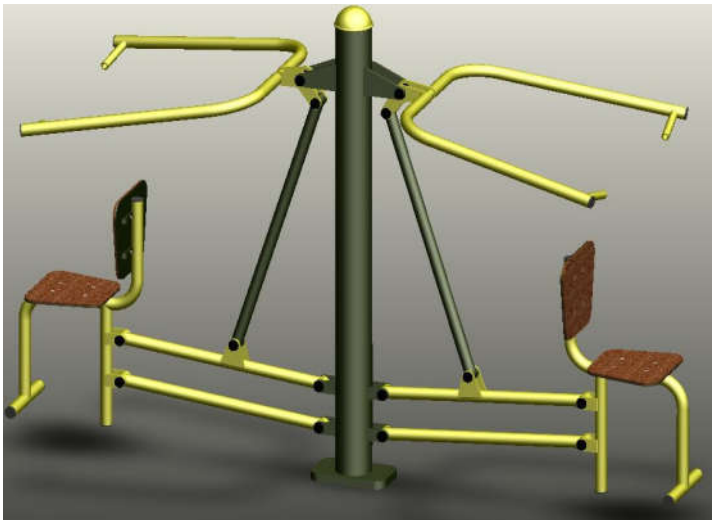
Mechanism for car shifting – developed by students



Shown is a representation of a 3D model of the connector for drilling as student learning outcomes – *developed by students*



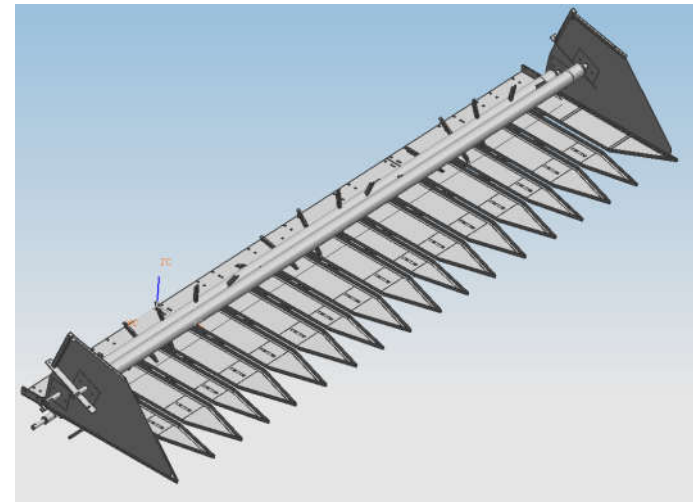
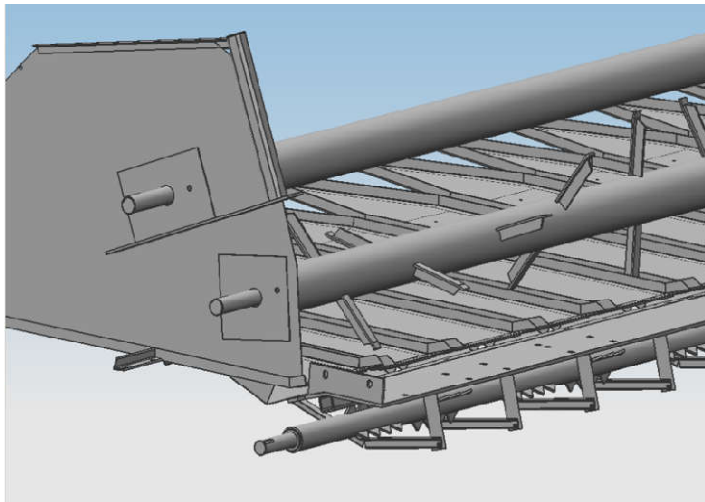
A representation of a 3D model of the device for physical exercise as a student learning outcomes



Sunflower head for SDF Company

A representation of our department collaboration with industry.

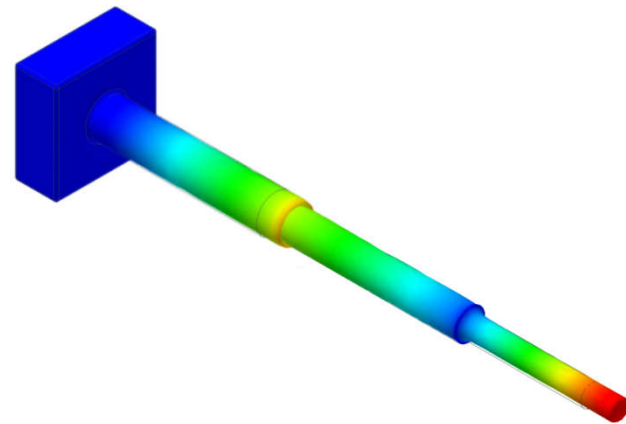
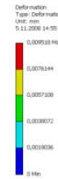
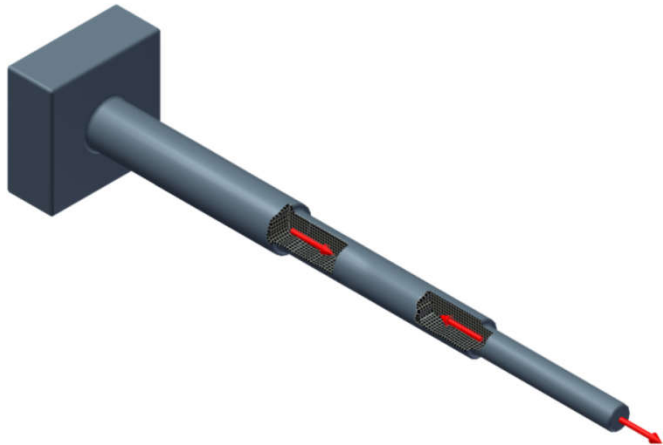
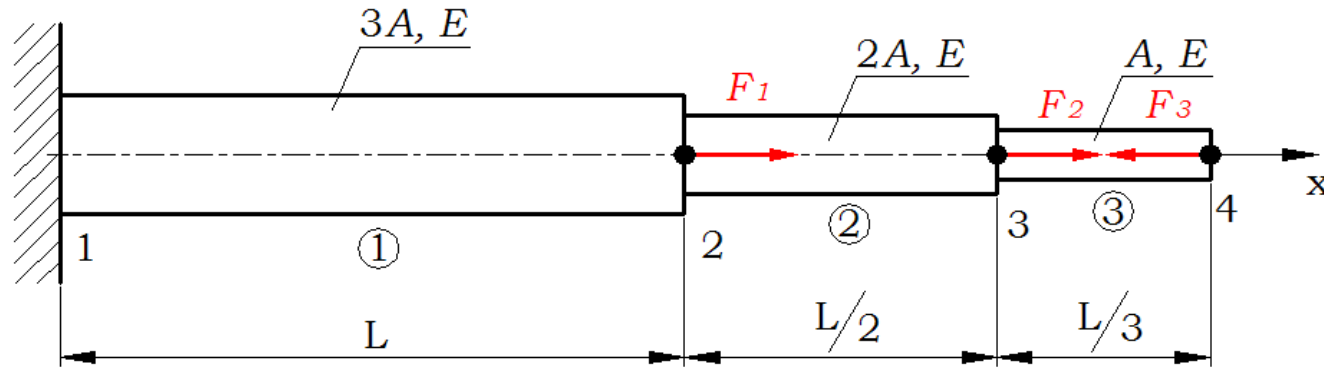
Featured is a 3D structural model of detailed solutions combine as improving previous solutions.



Some student projects in FEM

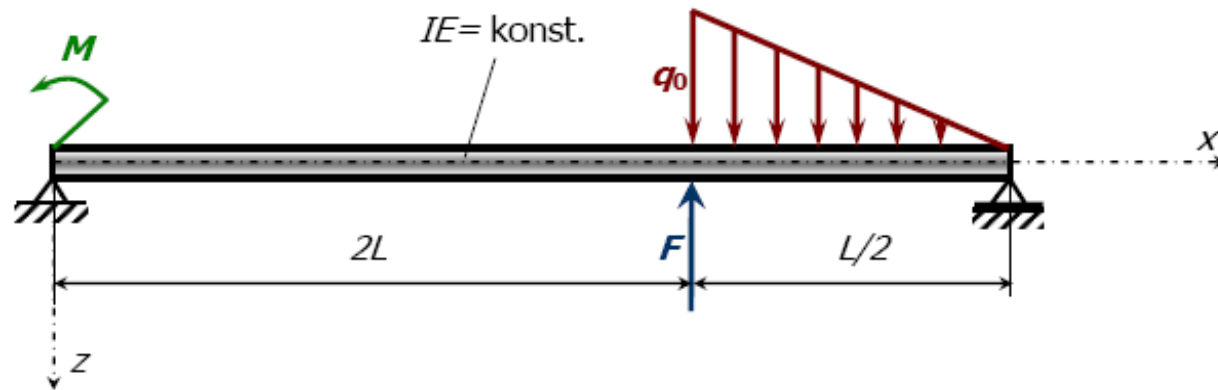
During the course *Finite element method* attending students have to solve 5 seminar works (truss element, beam element, 2D element, 3D element and shell element).

Truss element



Some student projects in FEM

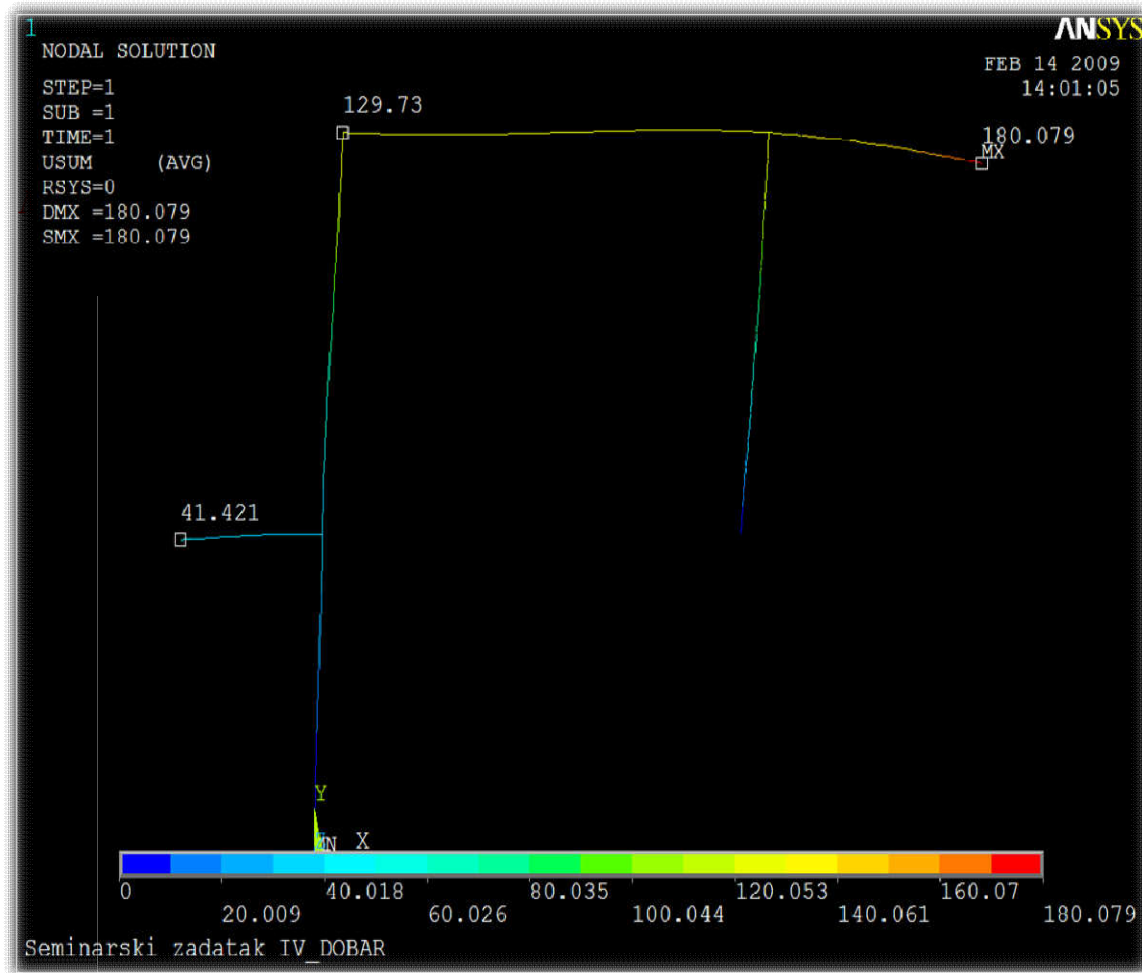
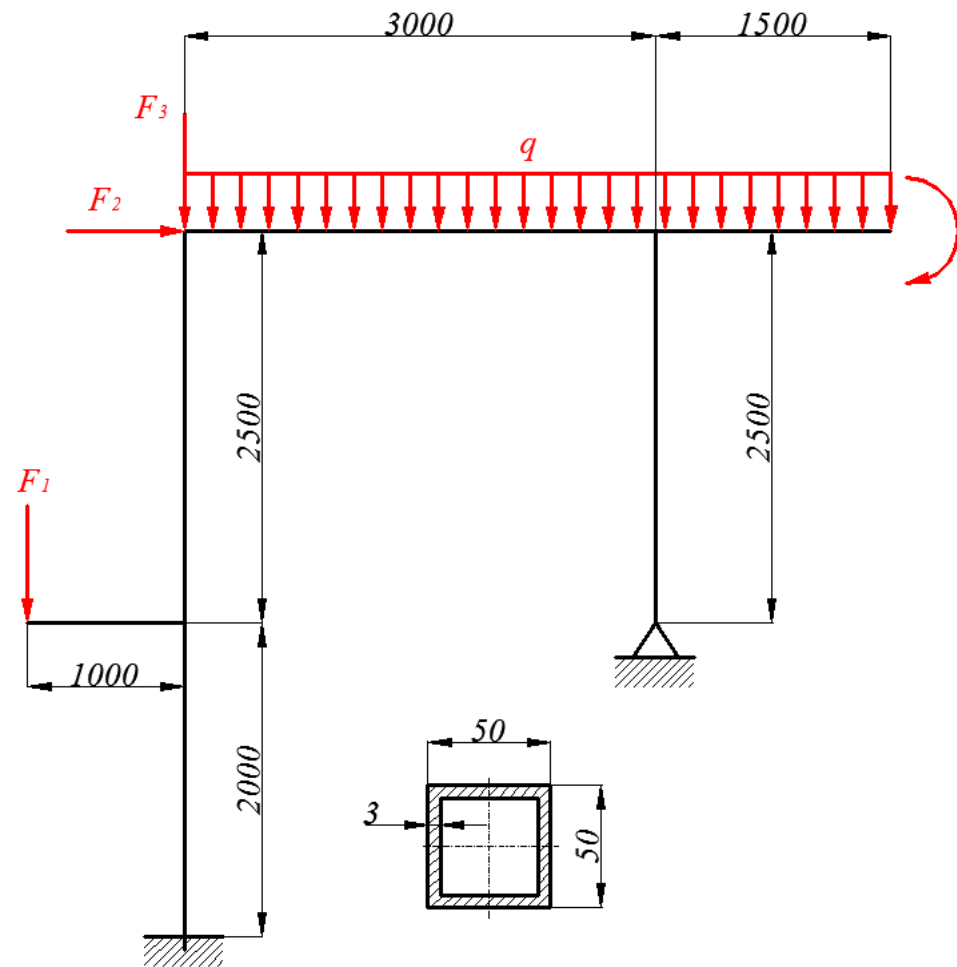
Beam element



$$L = 1 \text{ m}, I = 210 \cdot 106 \text{ mm}^4, E = 210 \text{ GPa}, F = 100 \text{ kN}, q_0 = 600 \text{ kN/m}, M = 30 \text{ kNm}$$

Some student projects in FEM

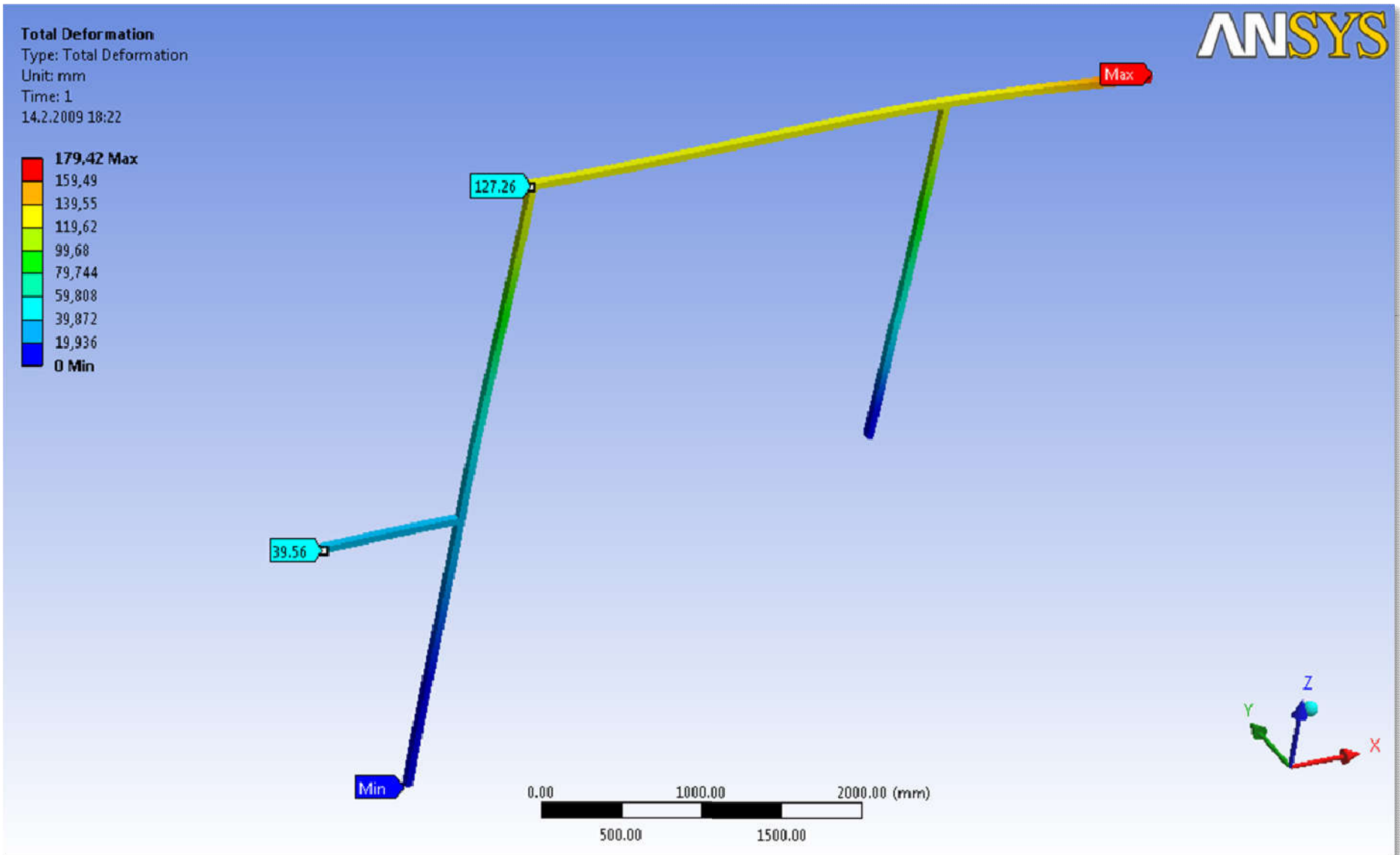
2D element





Some student projects in FEM

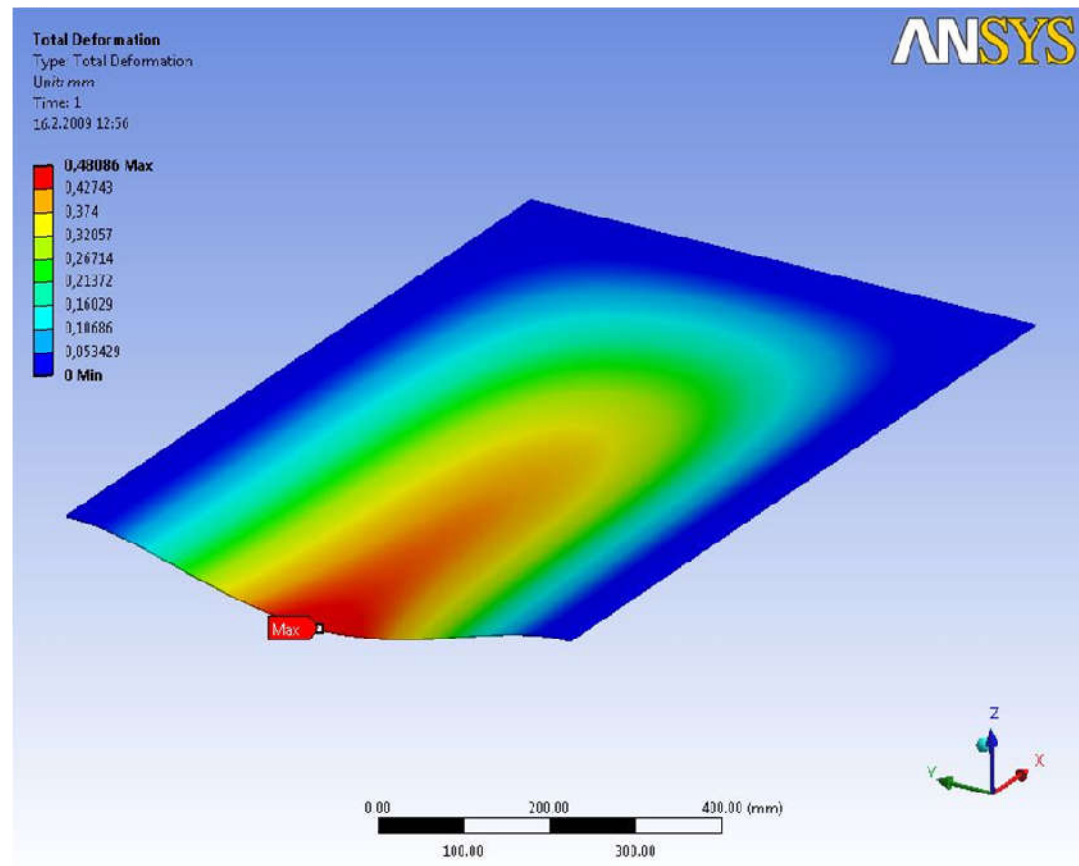
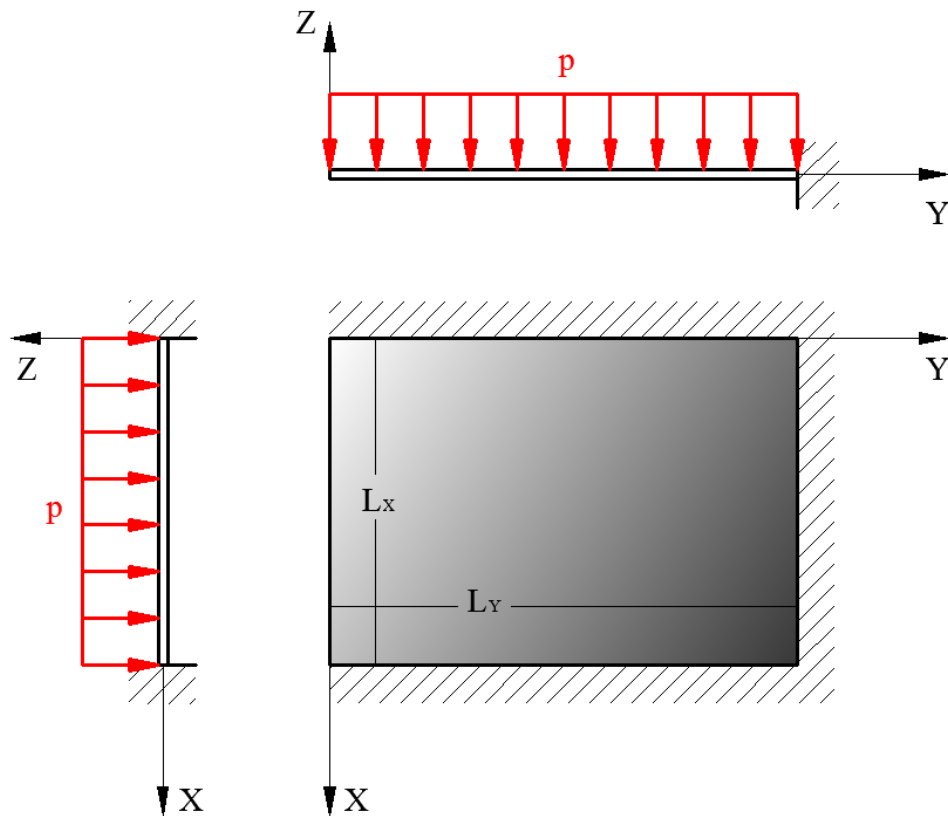
3D element





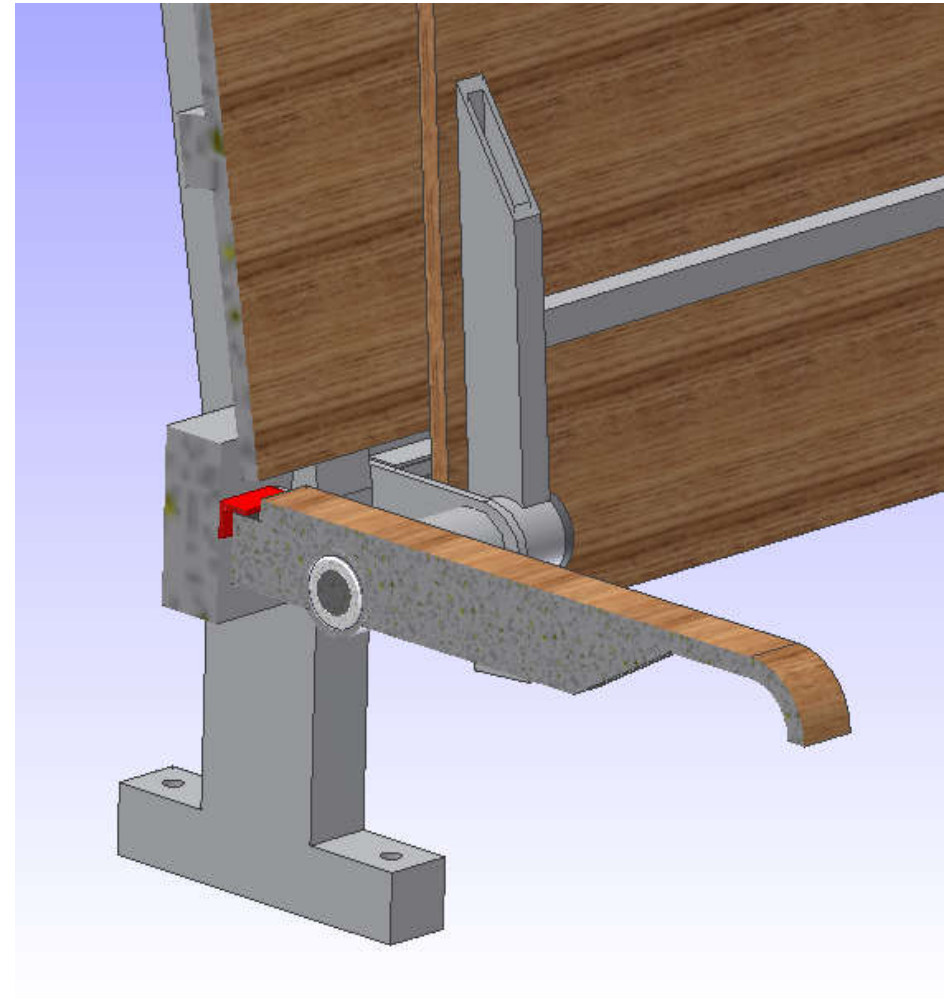
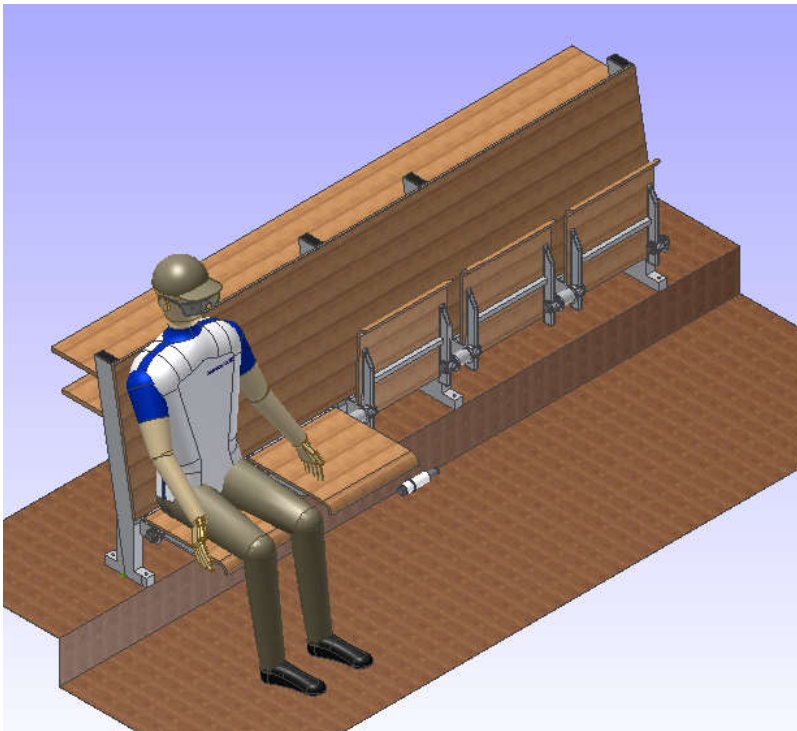
Some student projects in FEM

Shell element



Some student projects in FEM

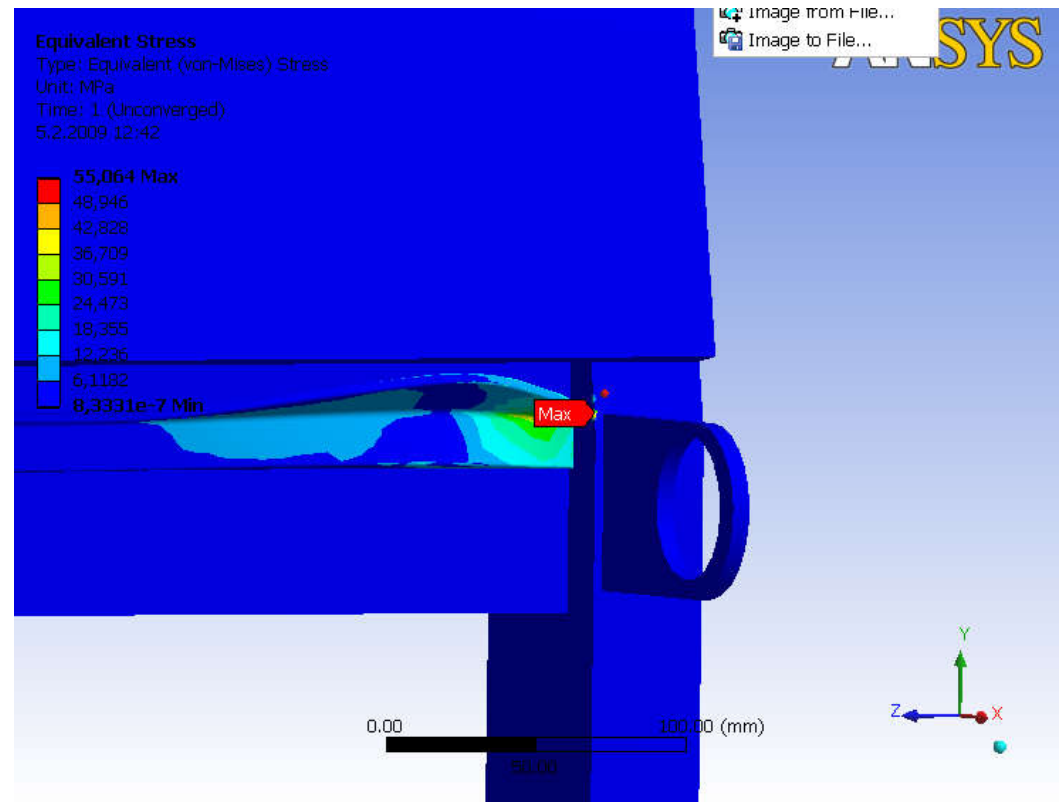
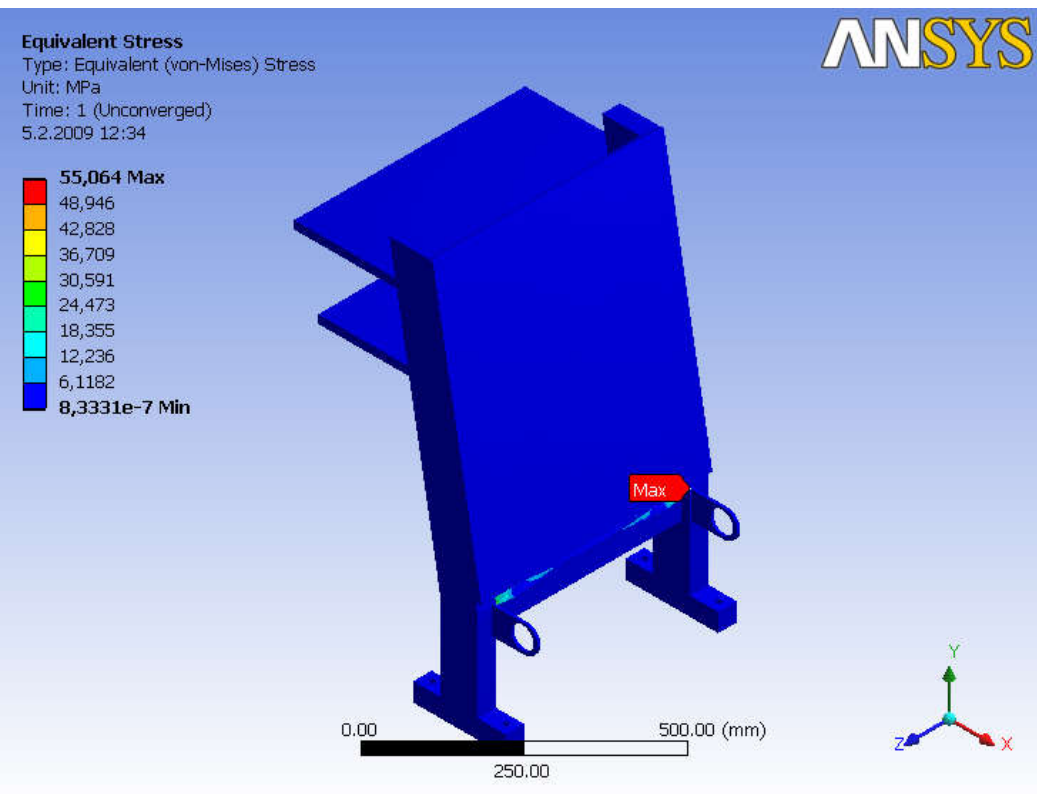
Project documentation of new classroom



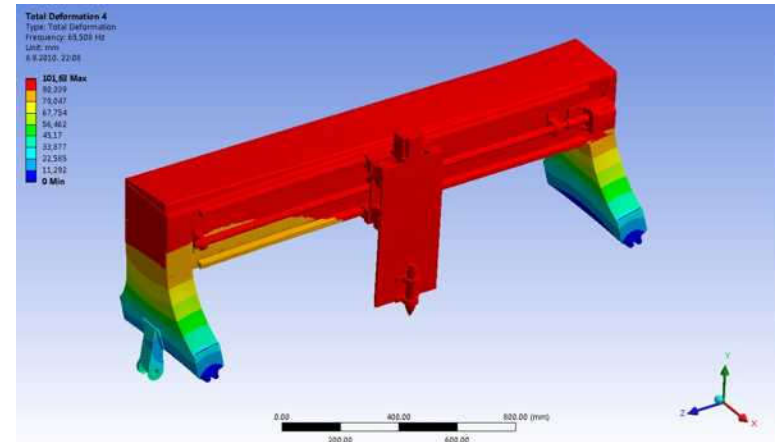
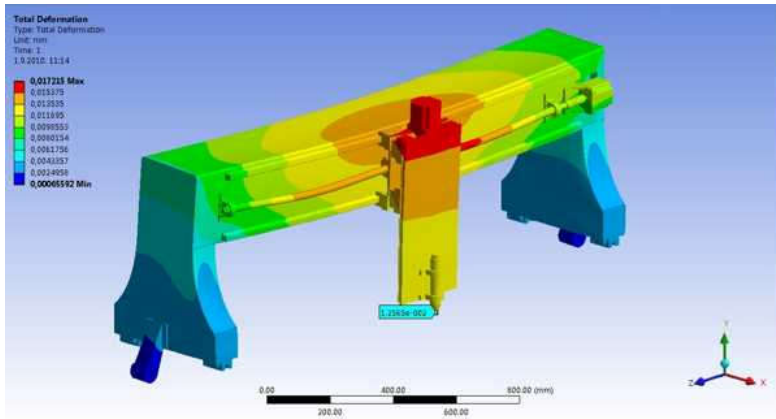


Some student projects in FEM

Project documentation of new classroom



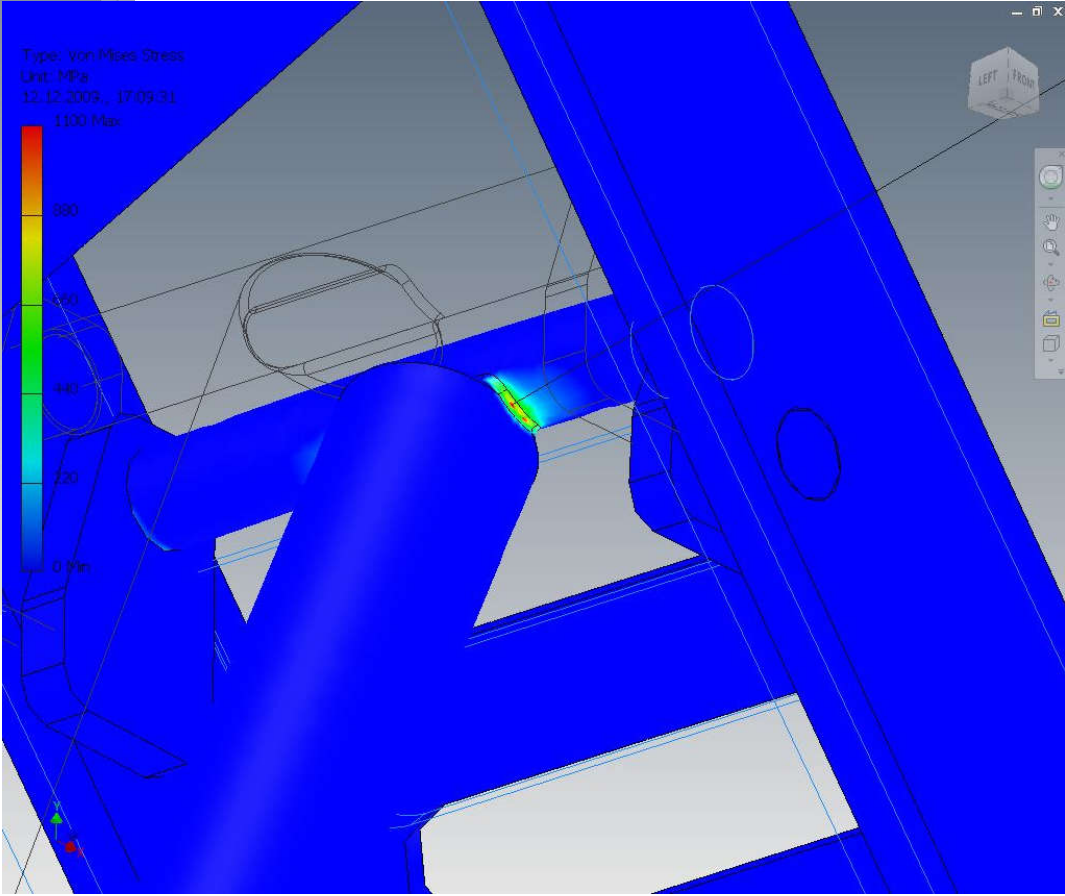
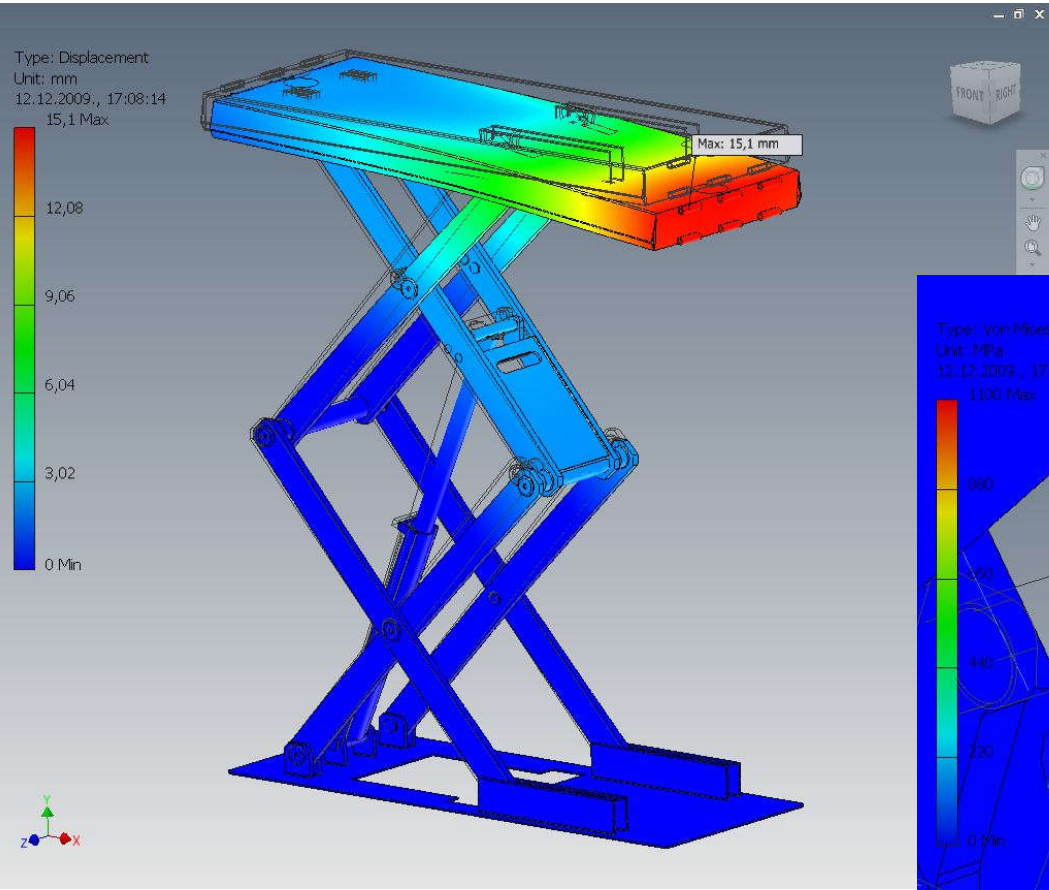
Some diploma works of our students

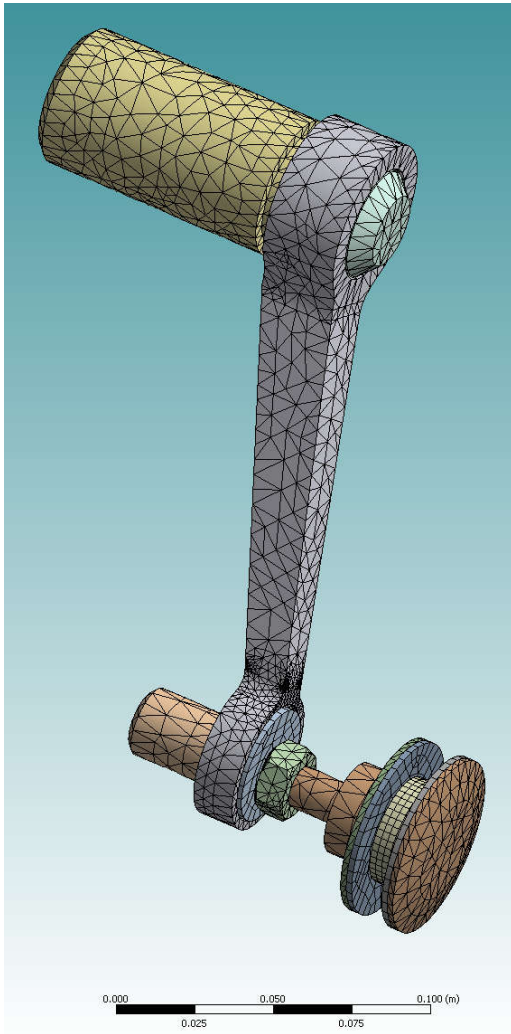


Laser cutting machine

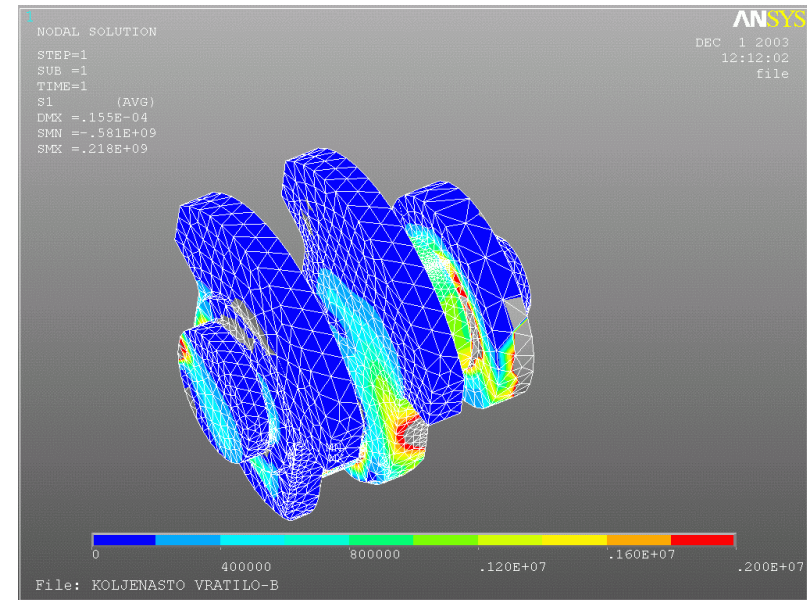
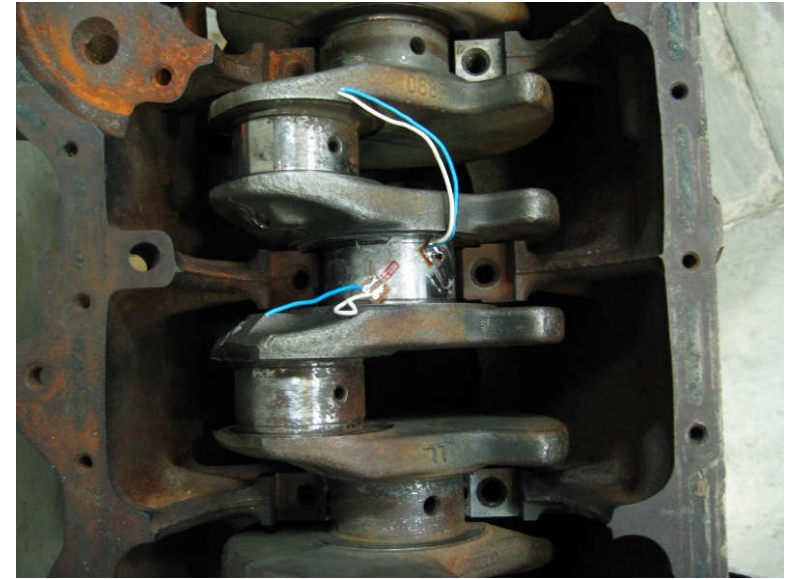
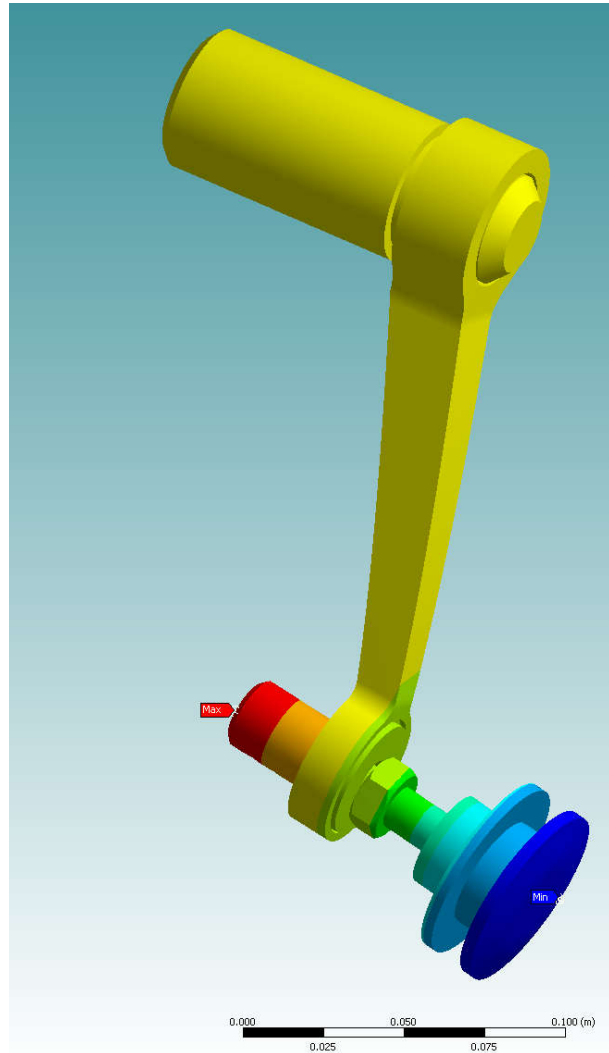


Car lift



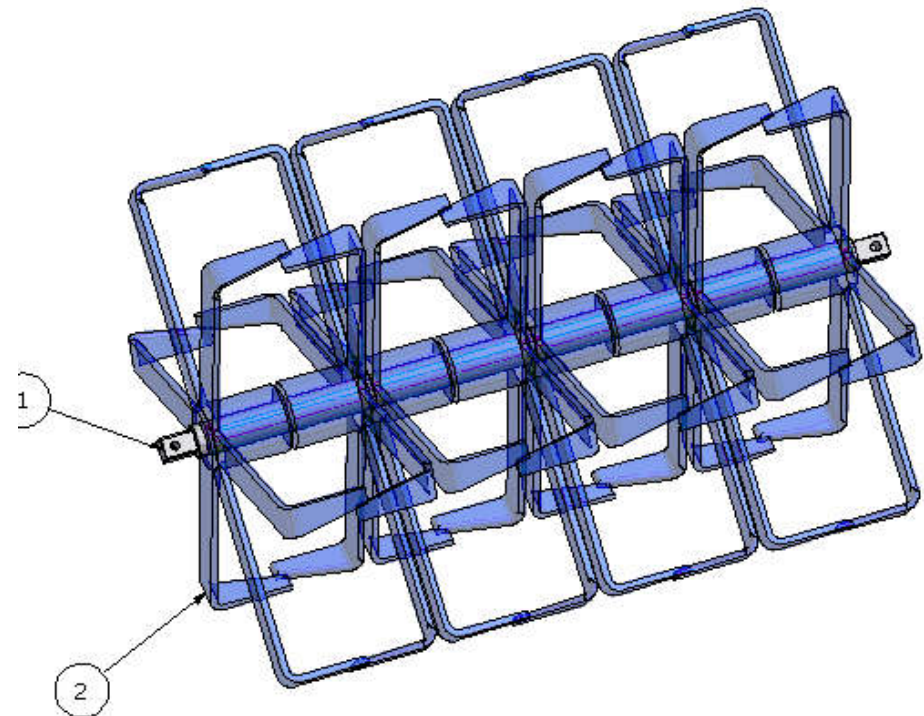
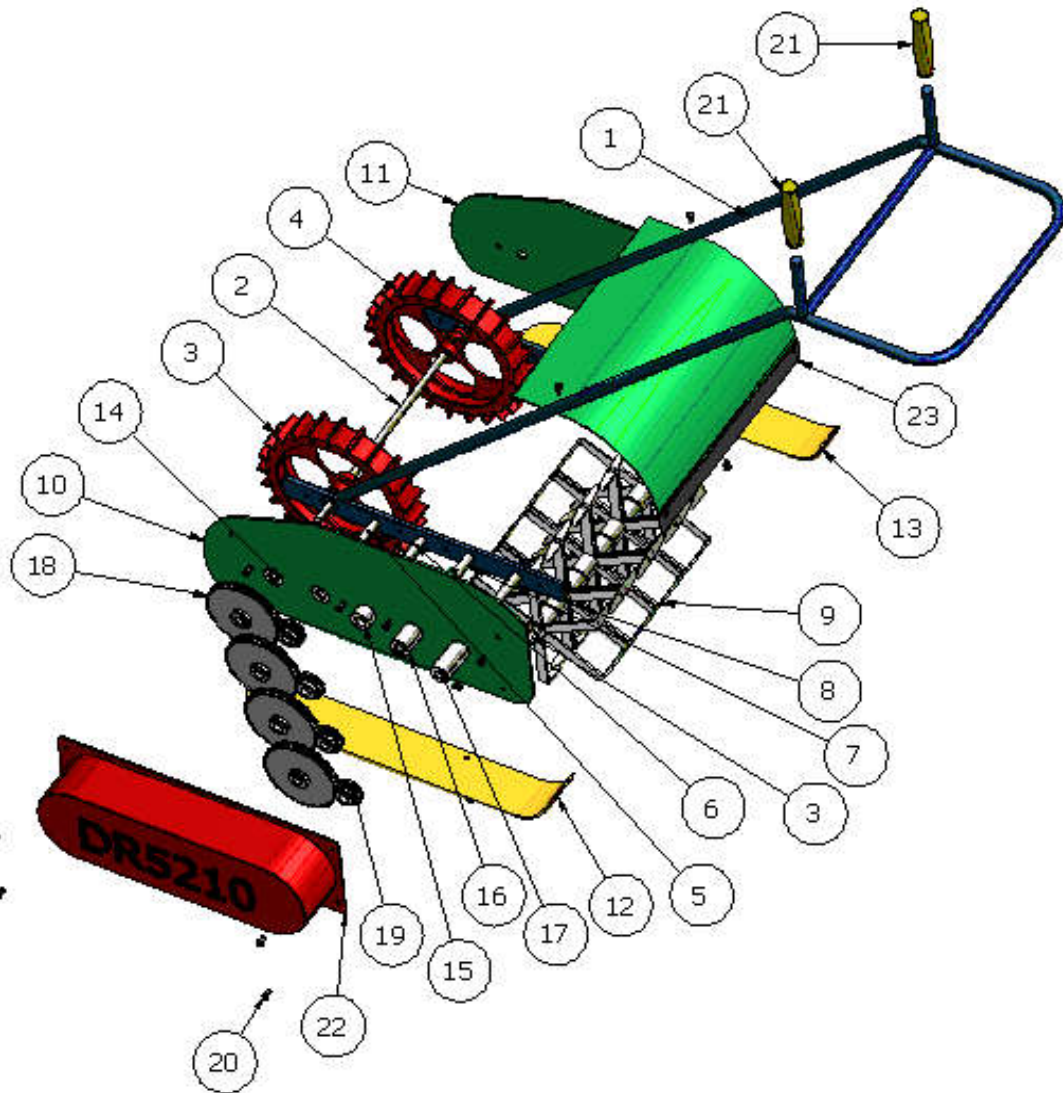


Glass spider

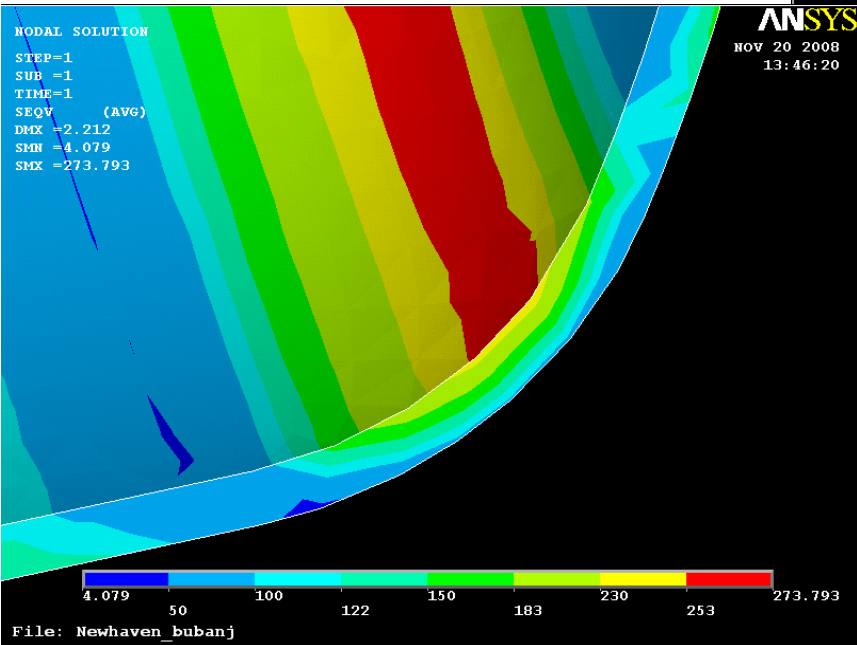
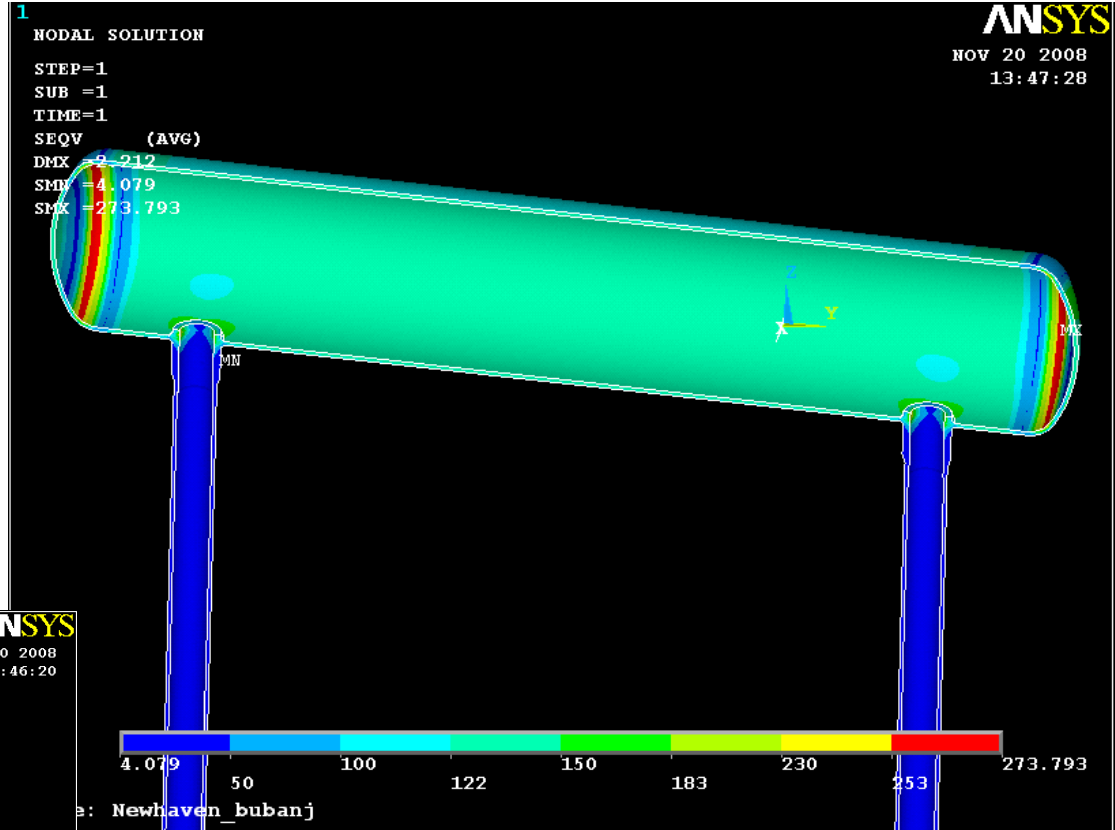


Crankshaft

Machine for soil crushing

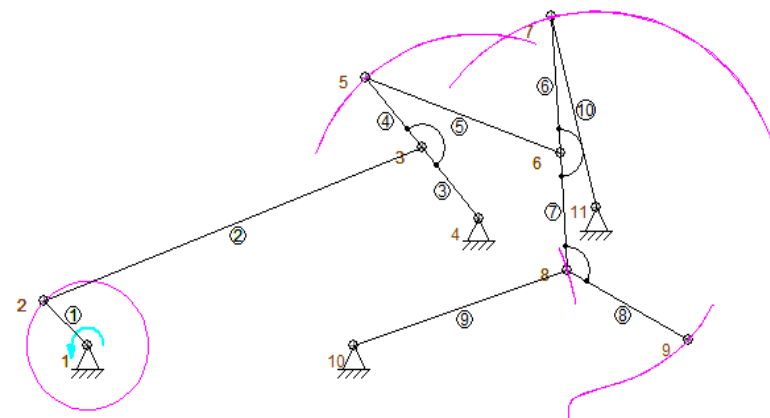
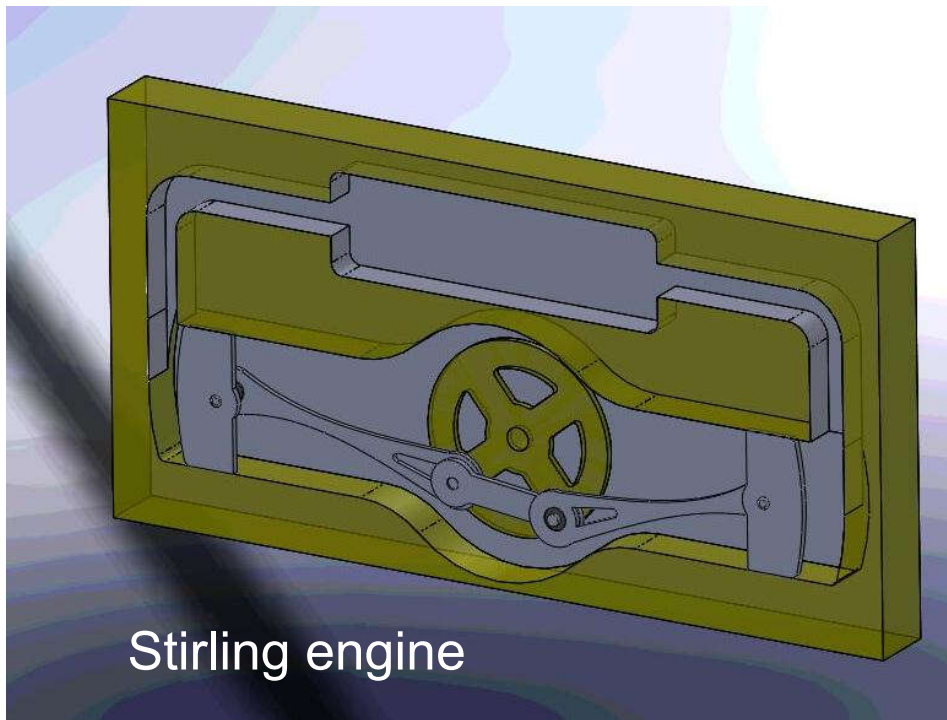


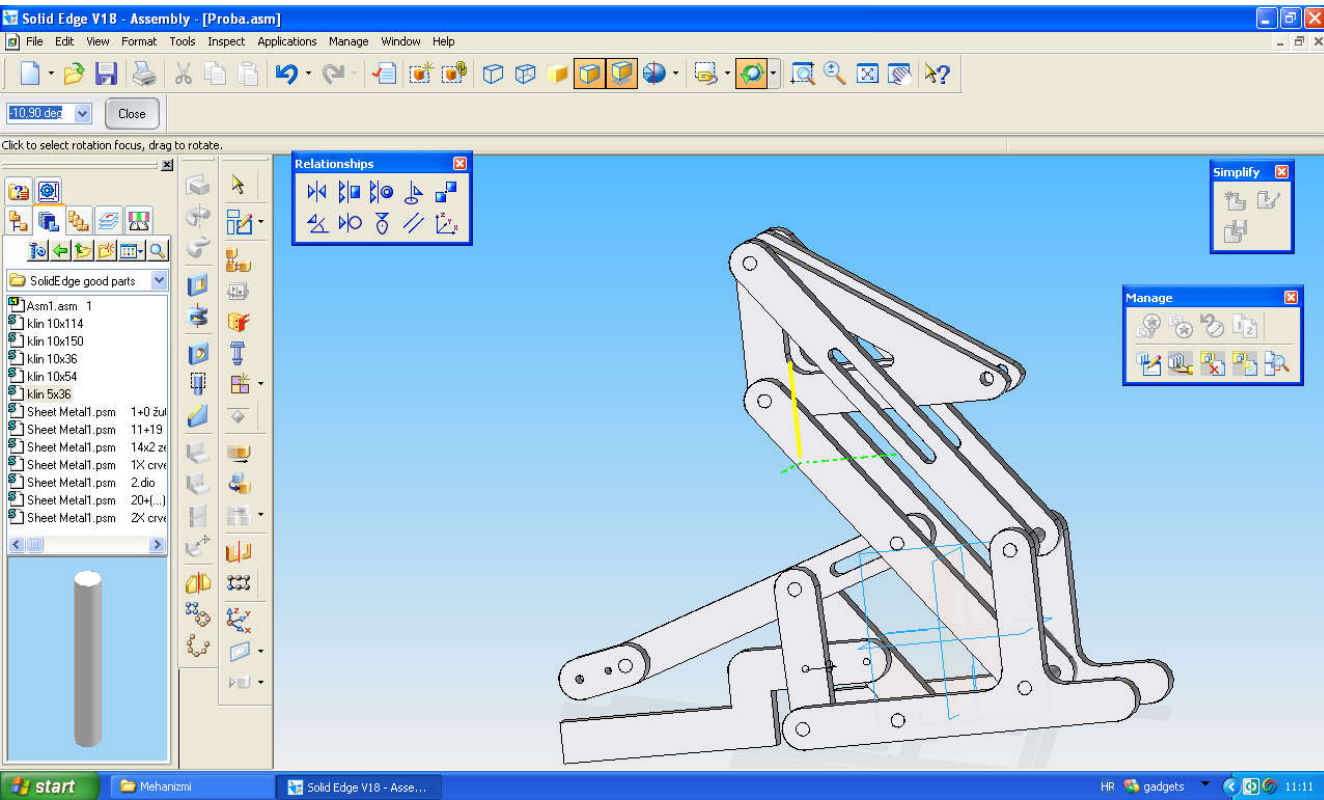
A diploma work



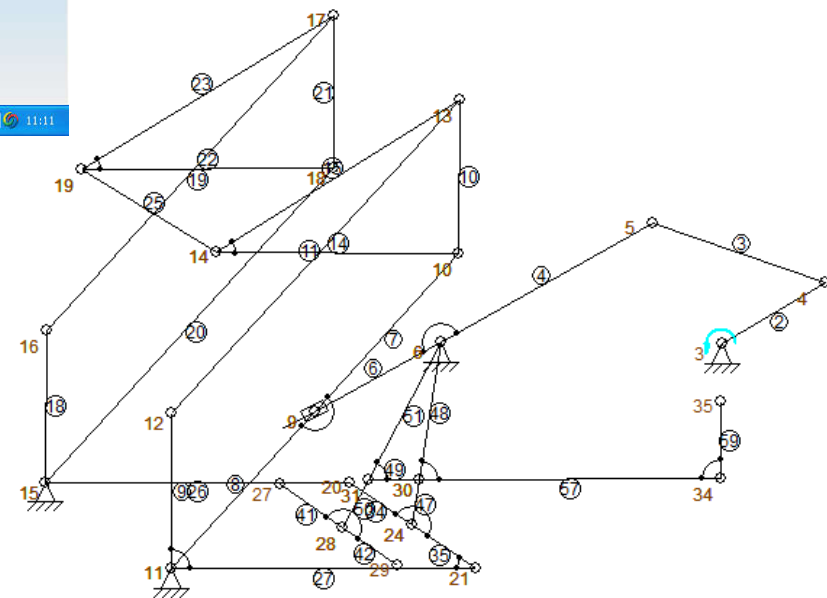
Seminar works from the course Mechanisms

<http://vtsbj.hr/mehanizmi-predavanja-vjezbe/>



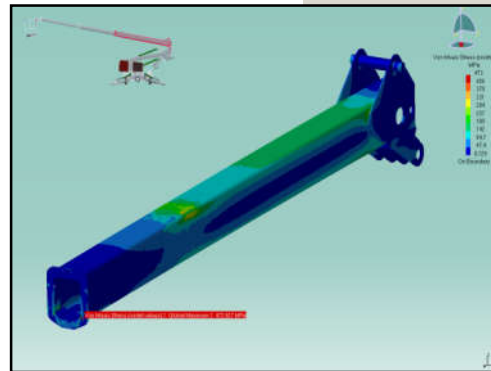
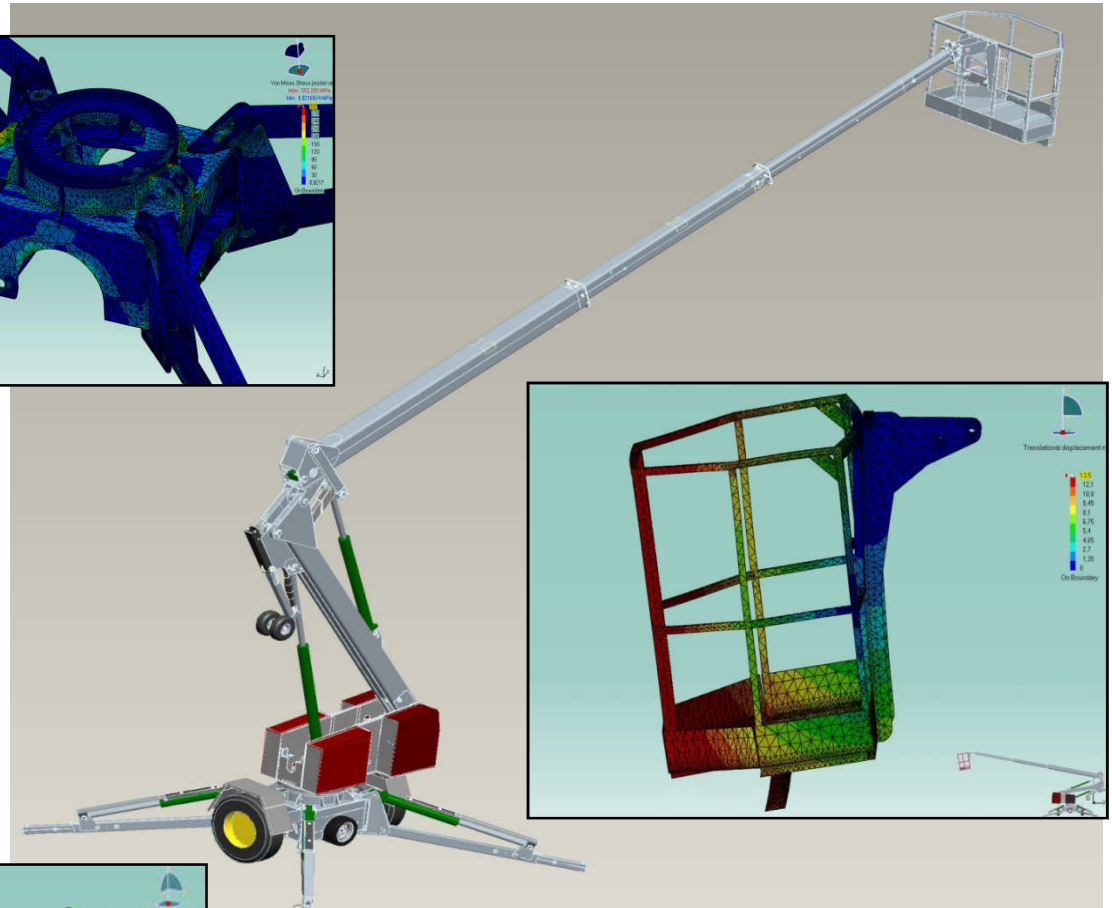
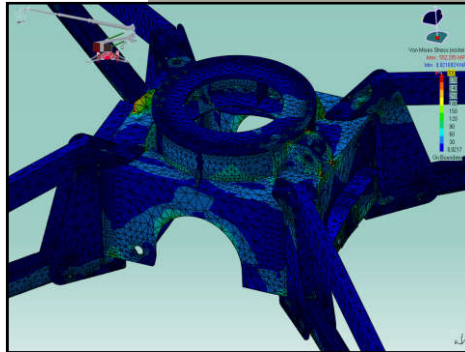


Drink delivery assistant mechanism



Laboratory for numerical modeling and simulation

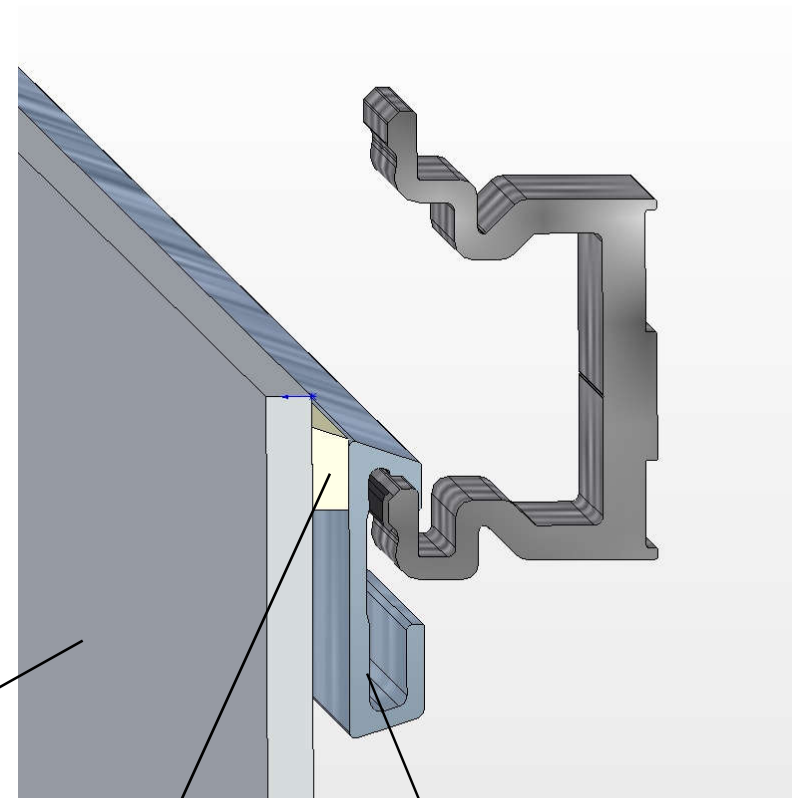
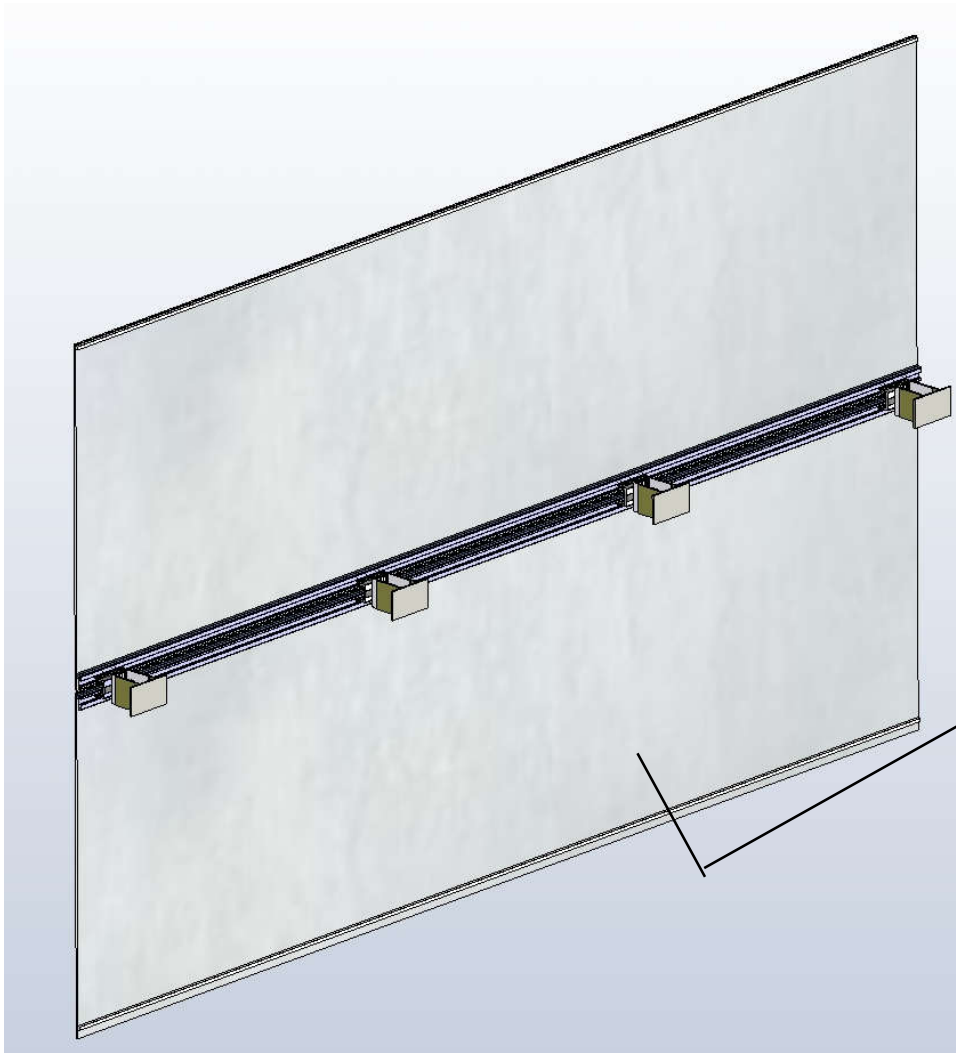
<https://www.sfsb.hr/fakultet/ustroj/zsk>



Al-Glas panels as building facade



Al-Glas panels as building facade

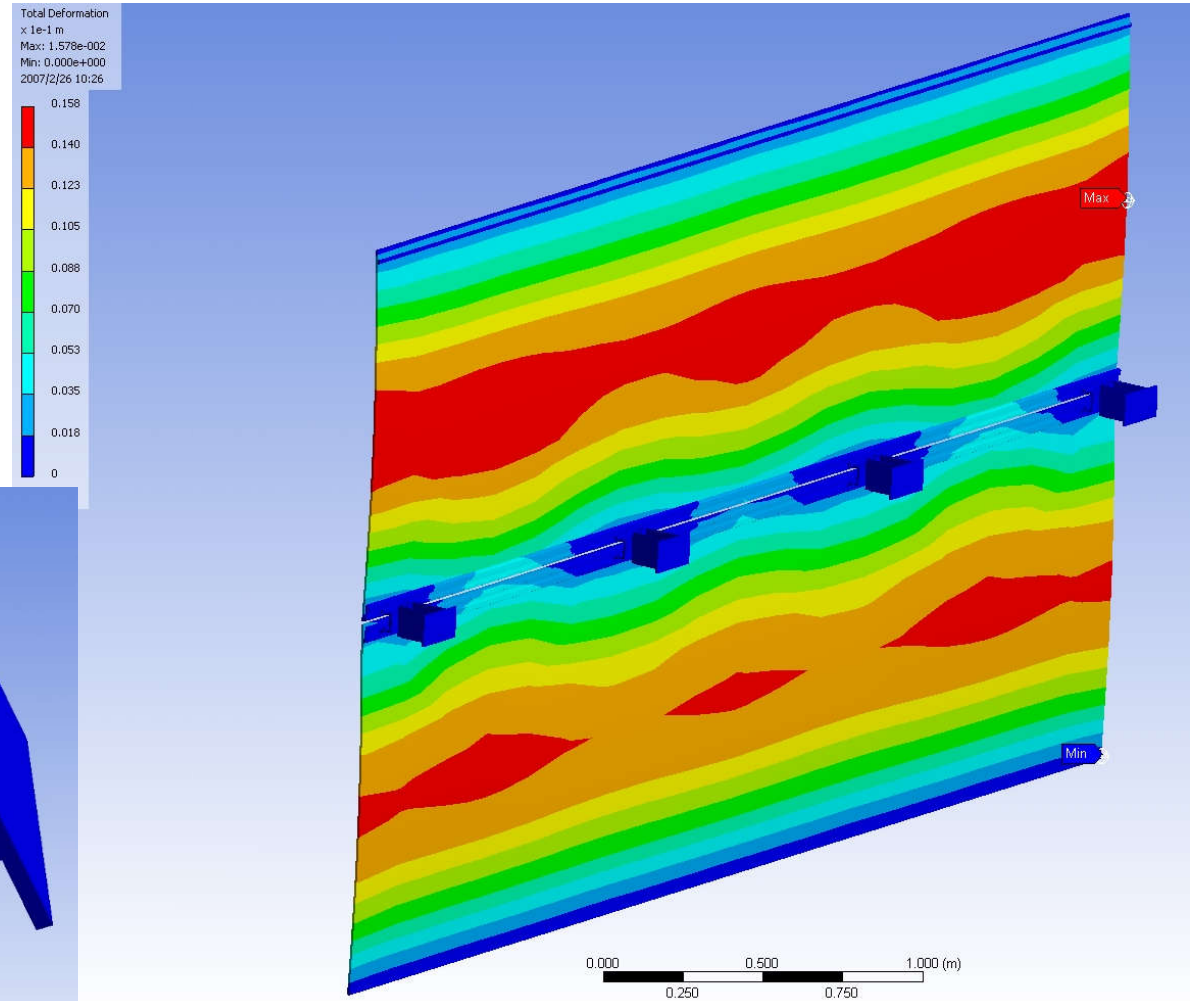
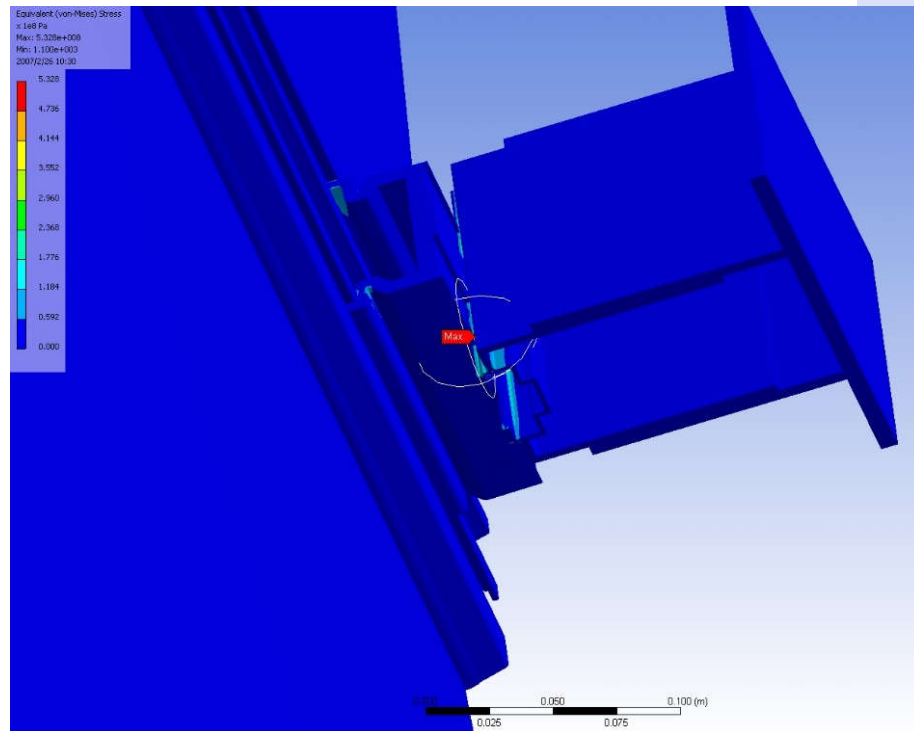


Silicon

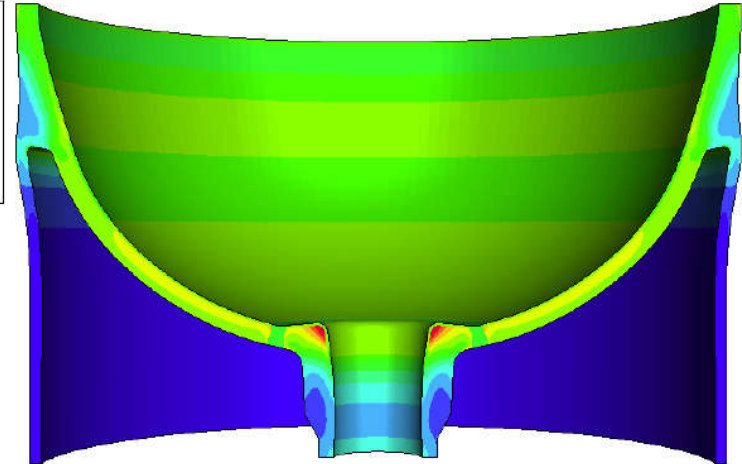
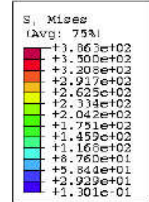
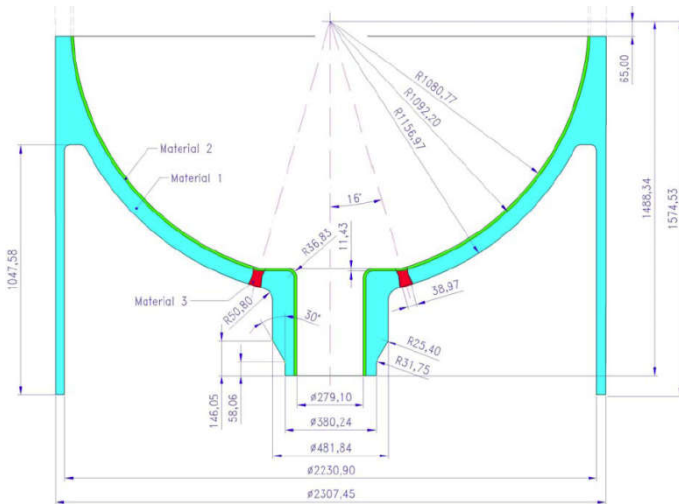
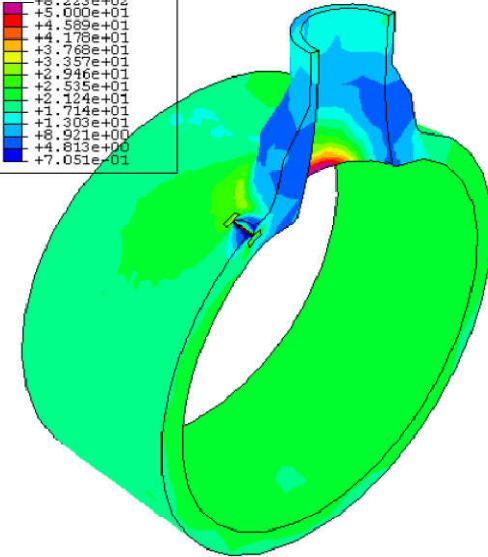
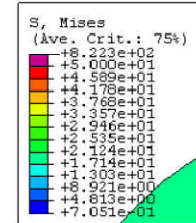
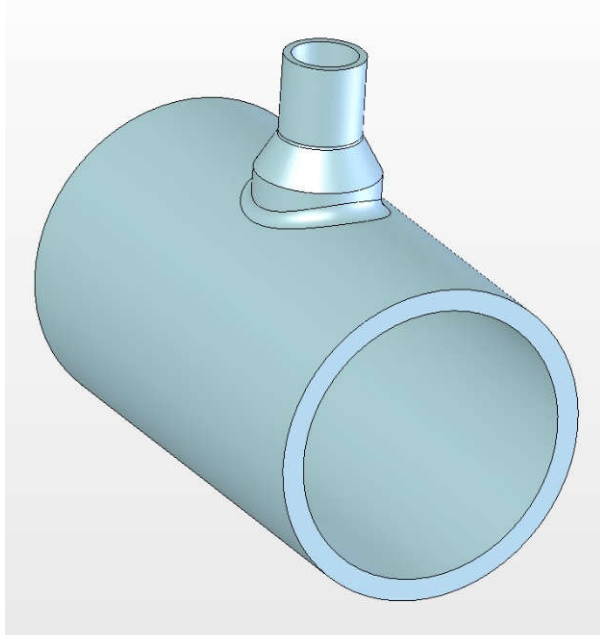
Alumina profile

Contact problem!

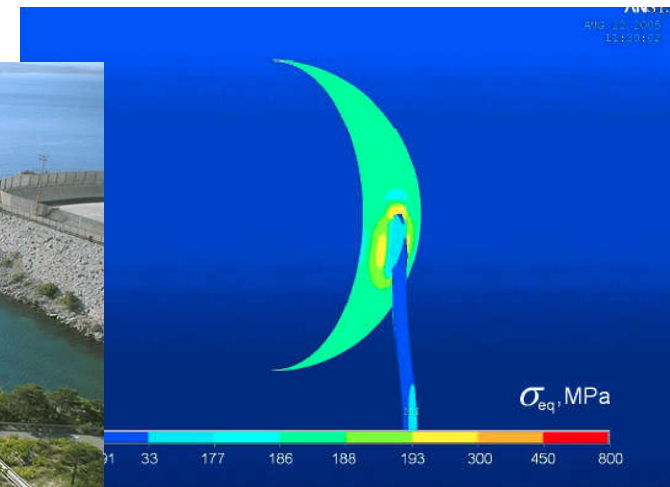
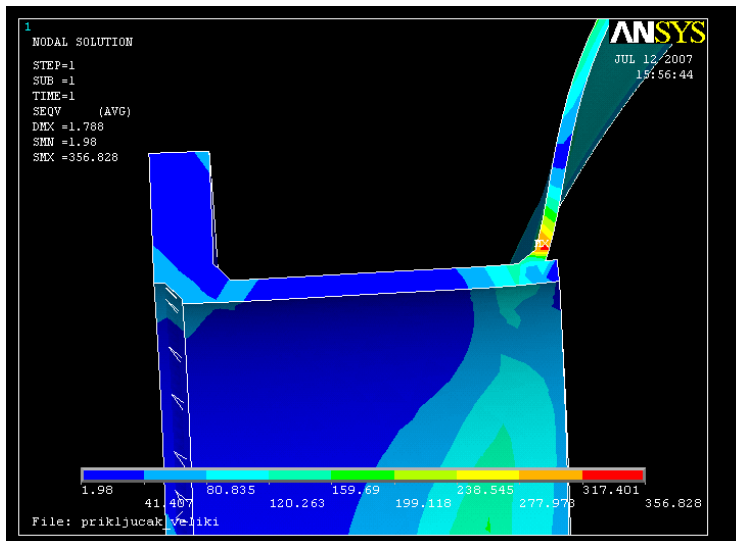
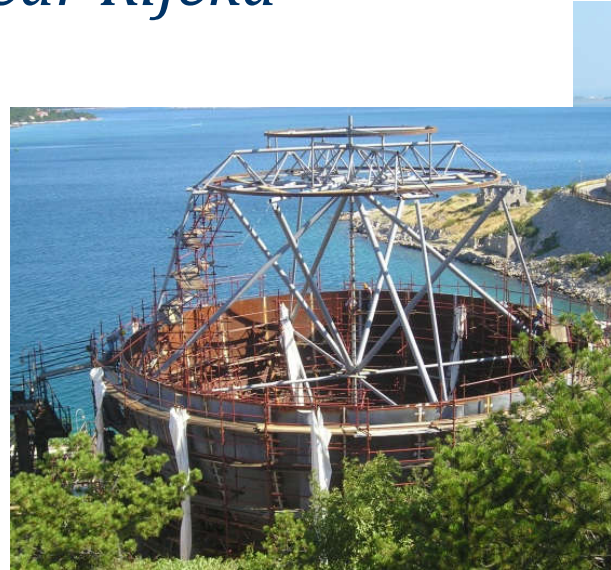
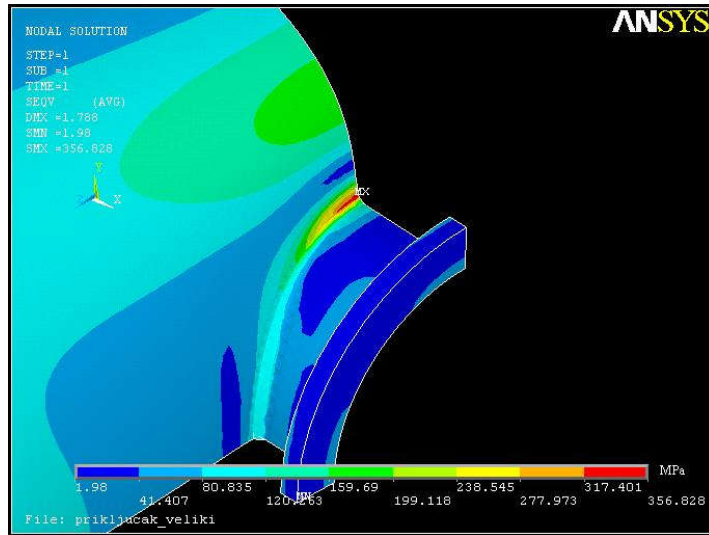
Al-glass panels as building facade



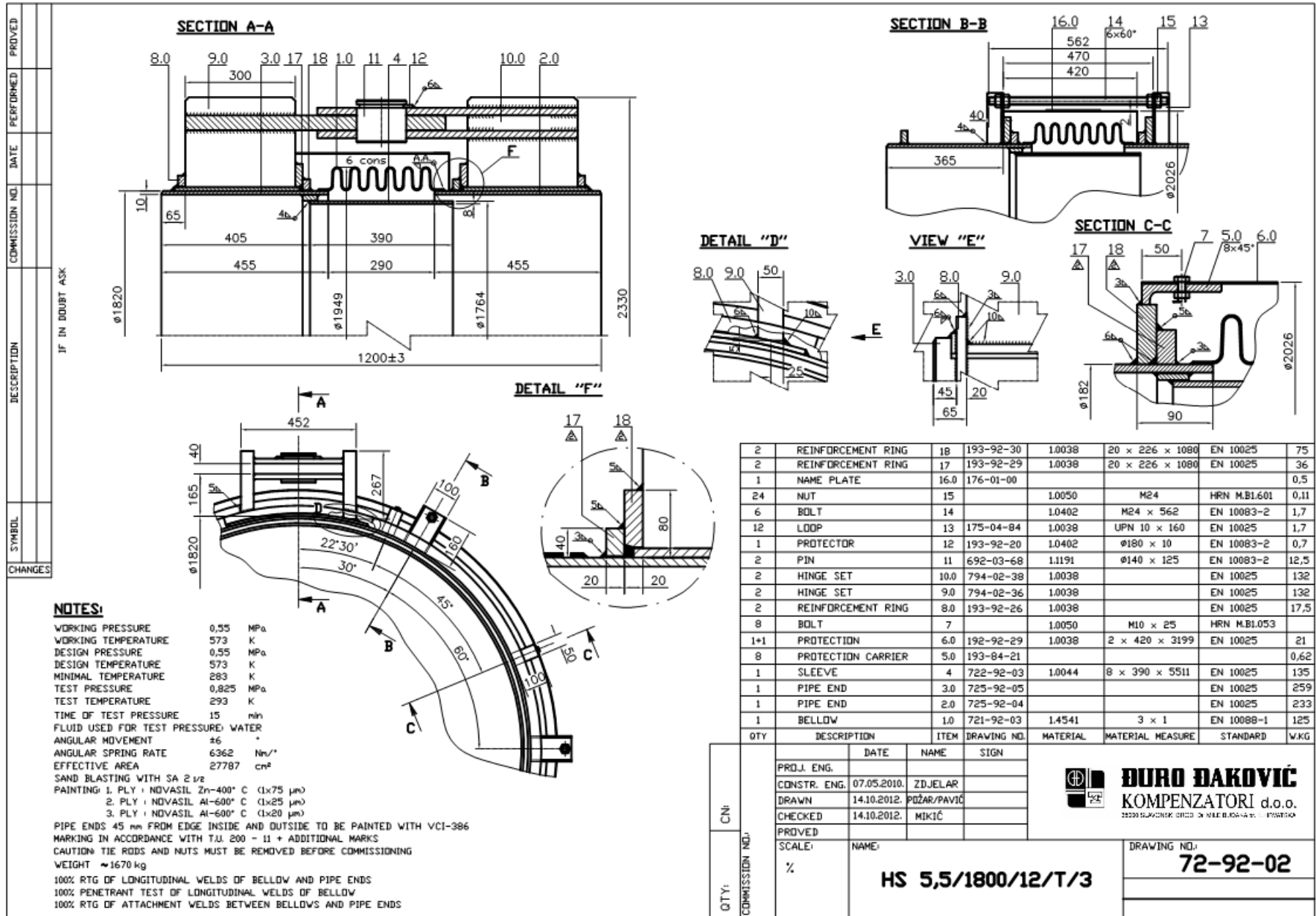
Nuclear Power Plant Krško, Slovenia



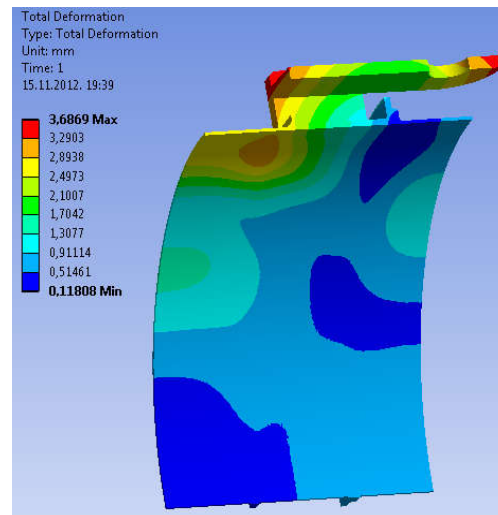
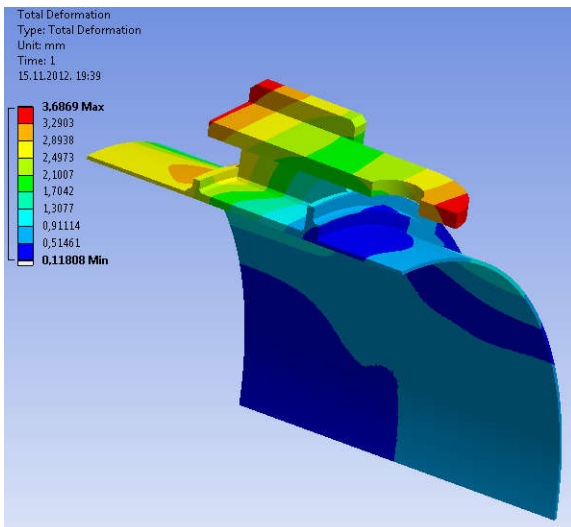
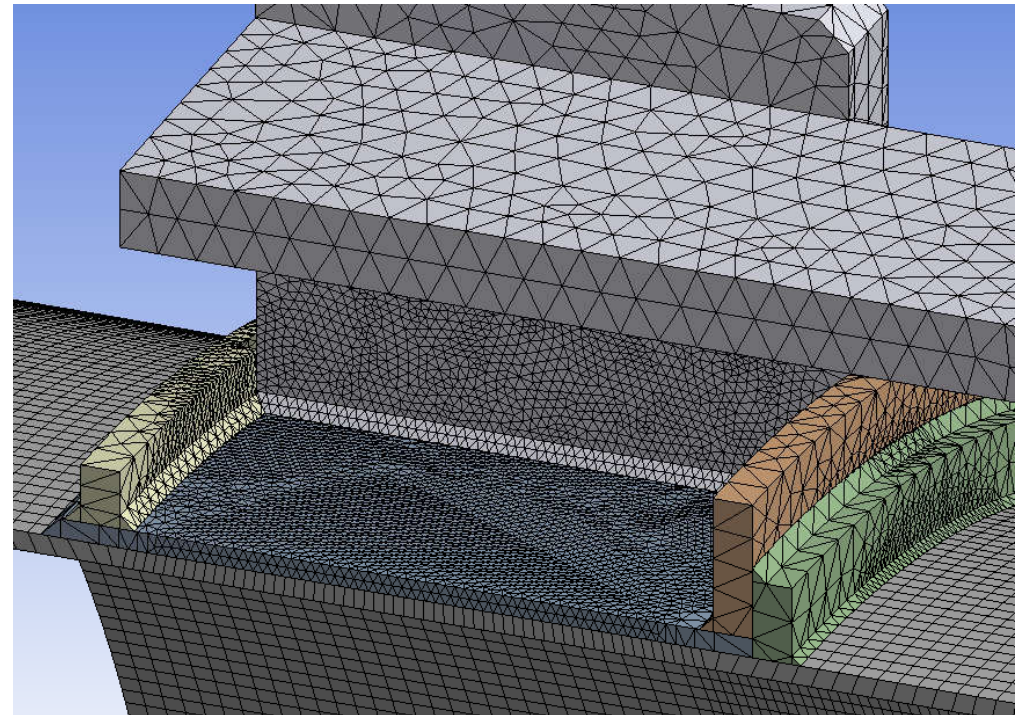
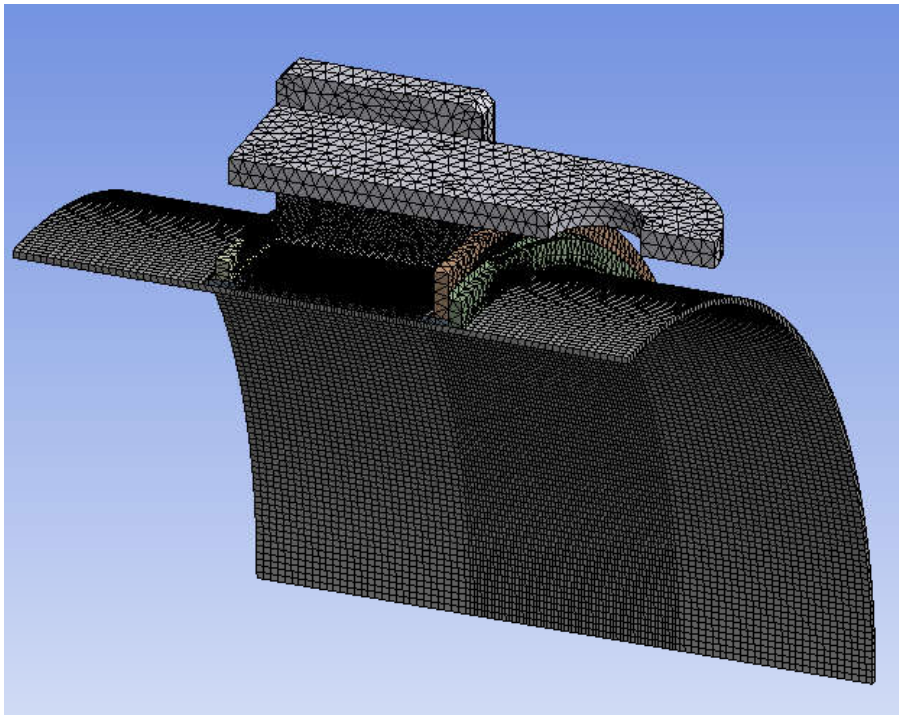
Spherical pressure vessel for INA, Urinje near Rijeka



Single hinged expansion joint model

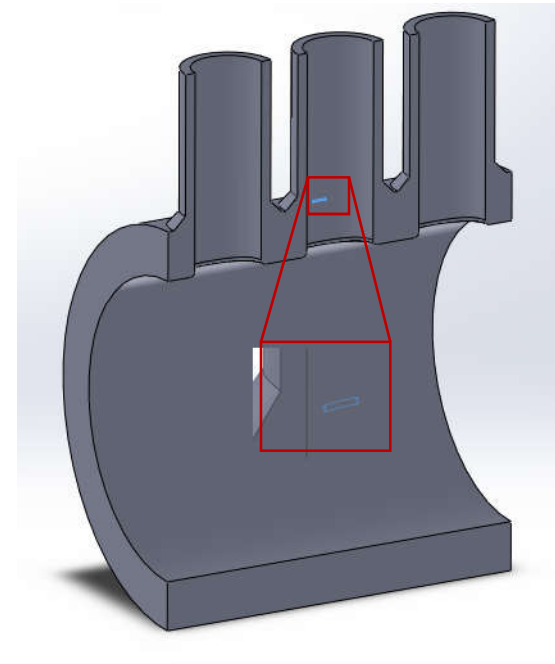
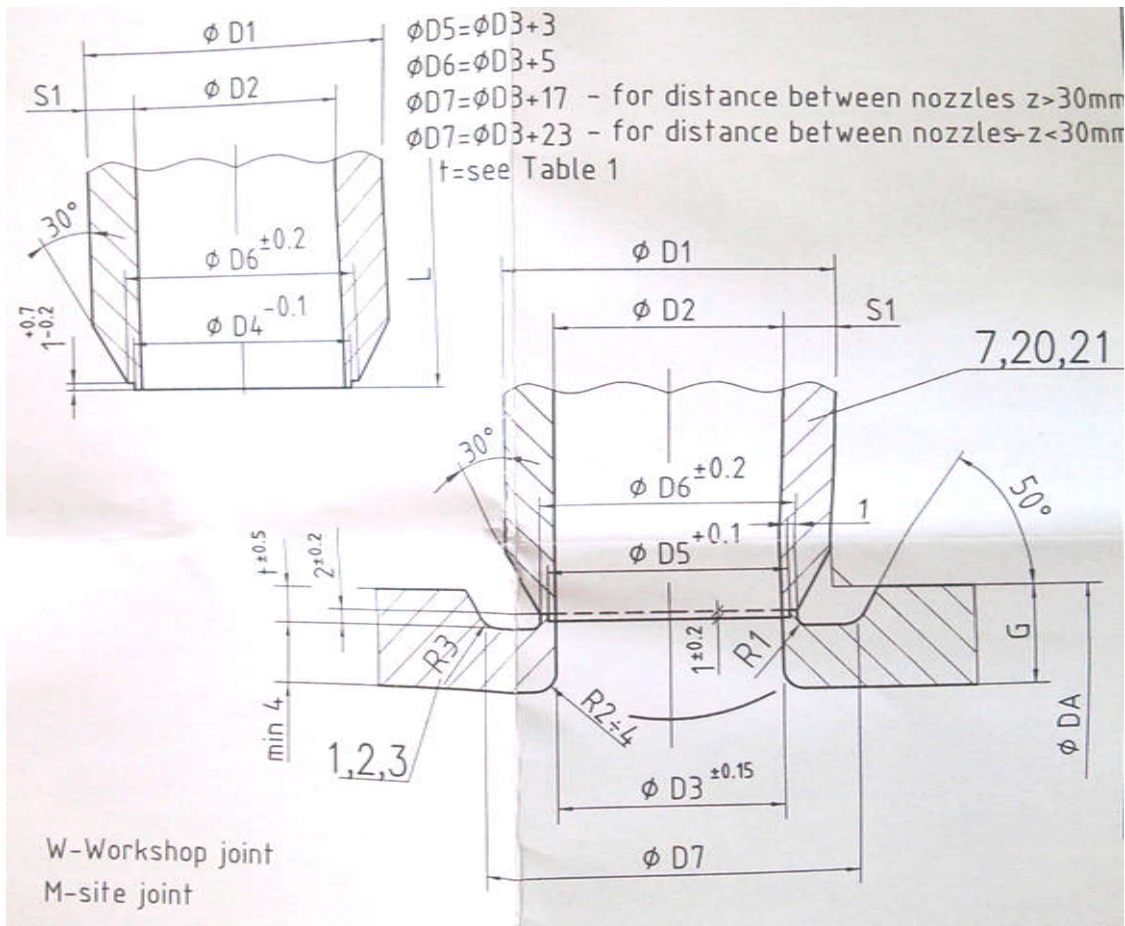


Single hinged expansion joint model

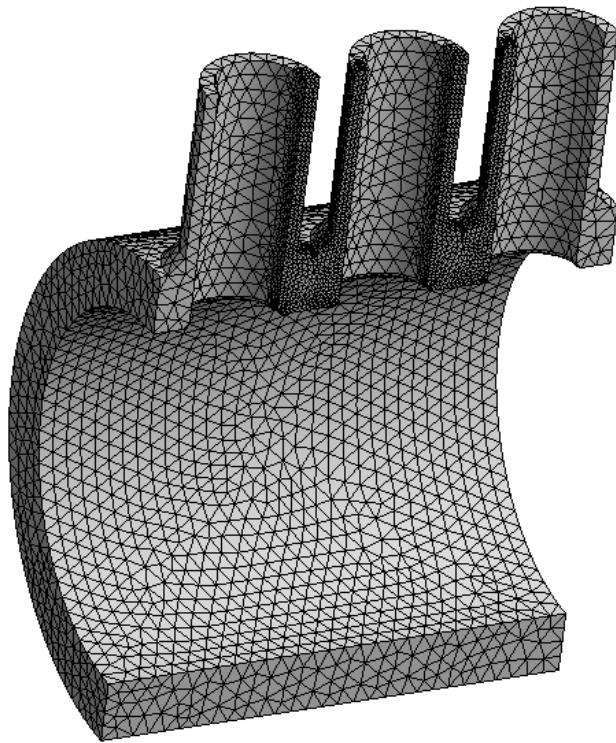


Total displacements

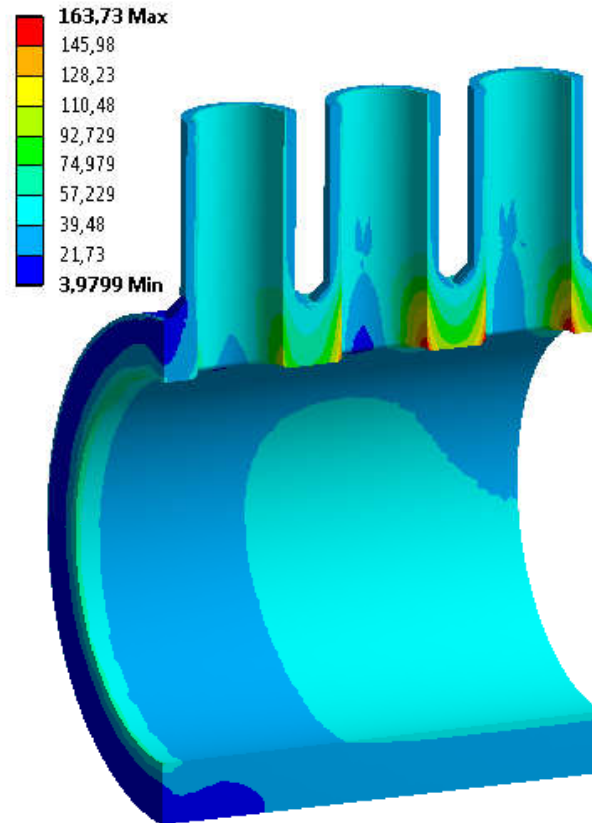
Weld joint failure at header-nozzle connection



Weld joint failure at header-nozzle connection

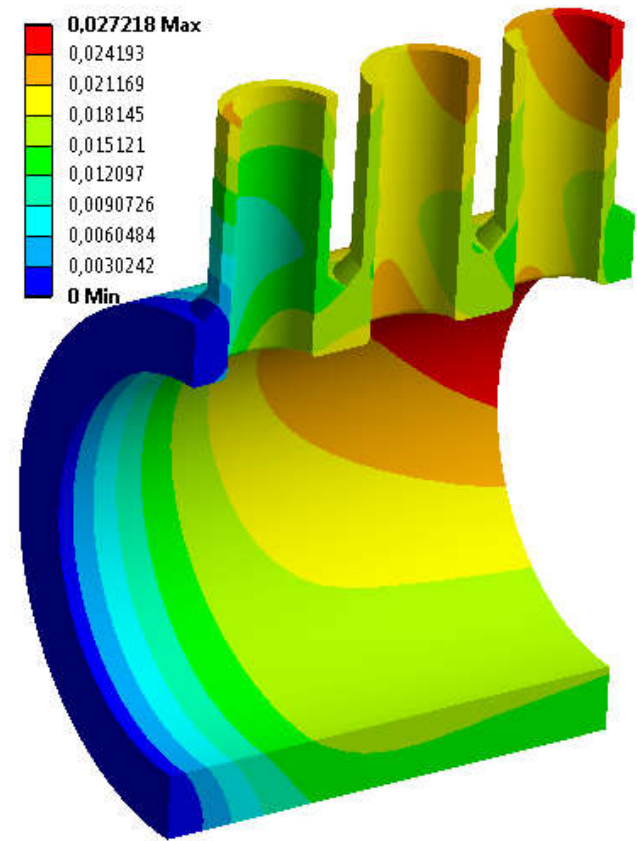
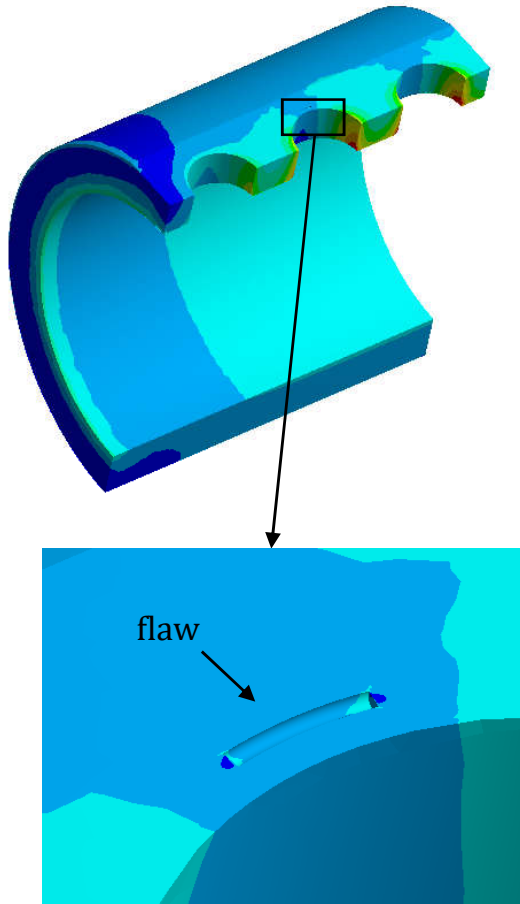


Finite element mesh



Von Mises equivalent stress

Weld joint failure at header-nozzle connection



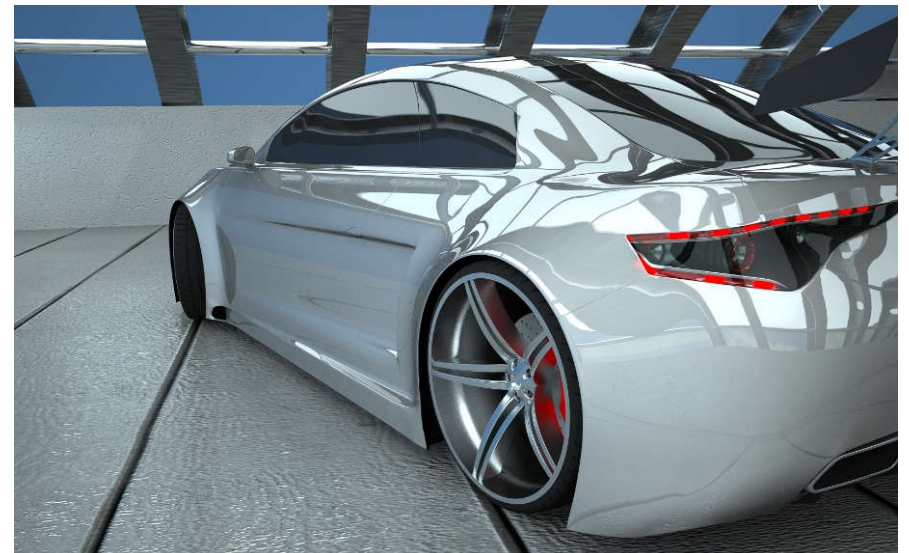
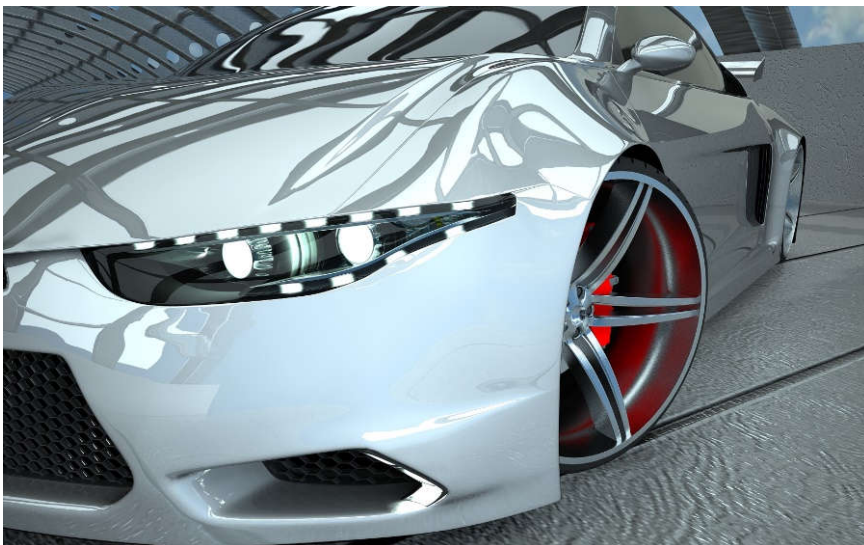
Total displacements

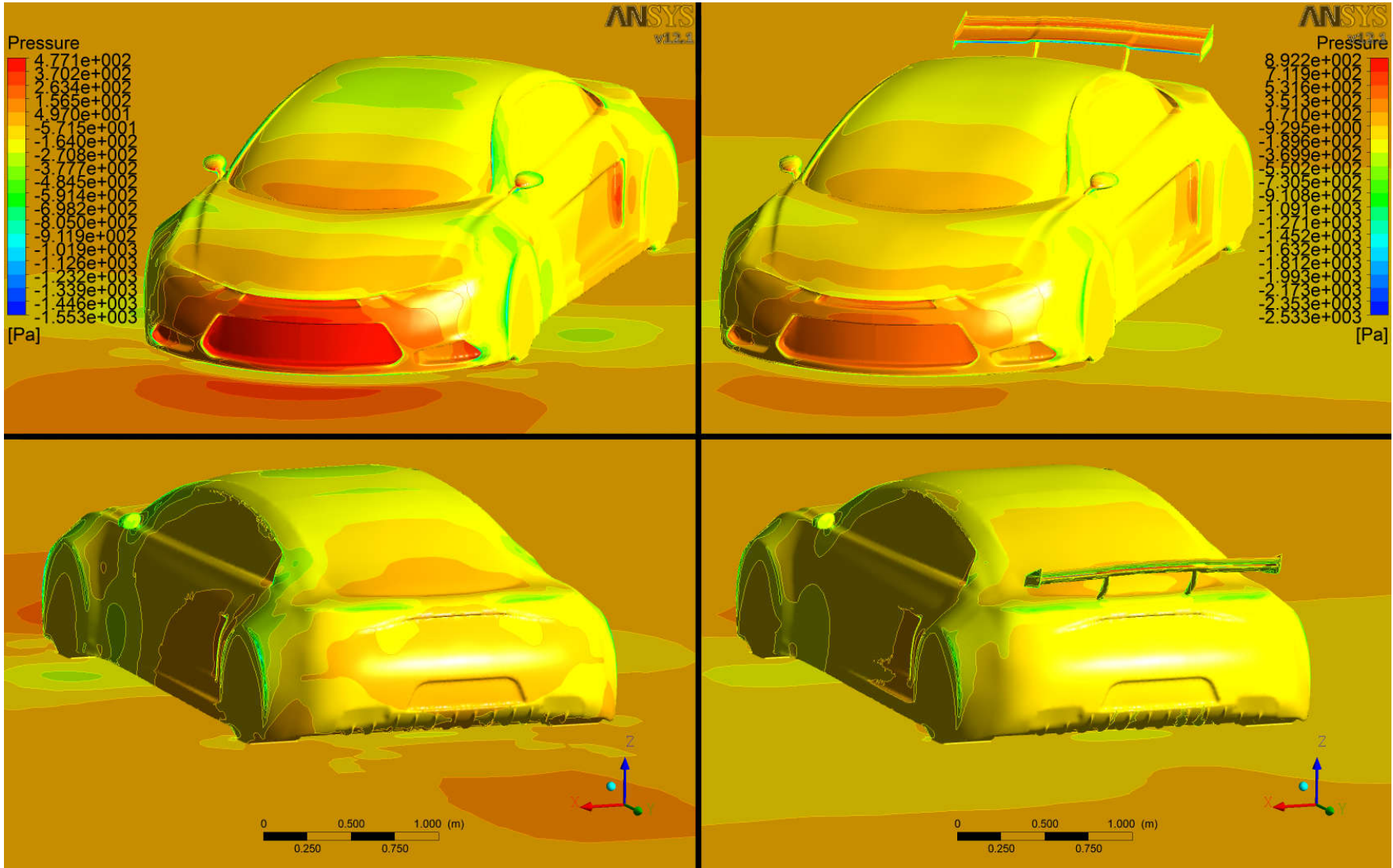
Award for best paper at the TEAM 2010 Conference



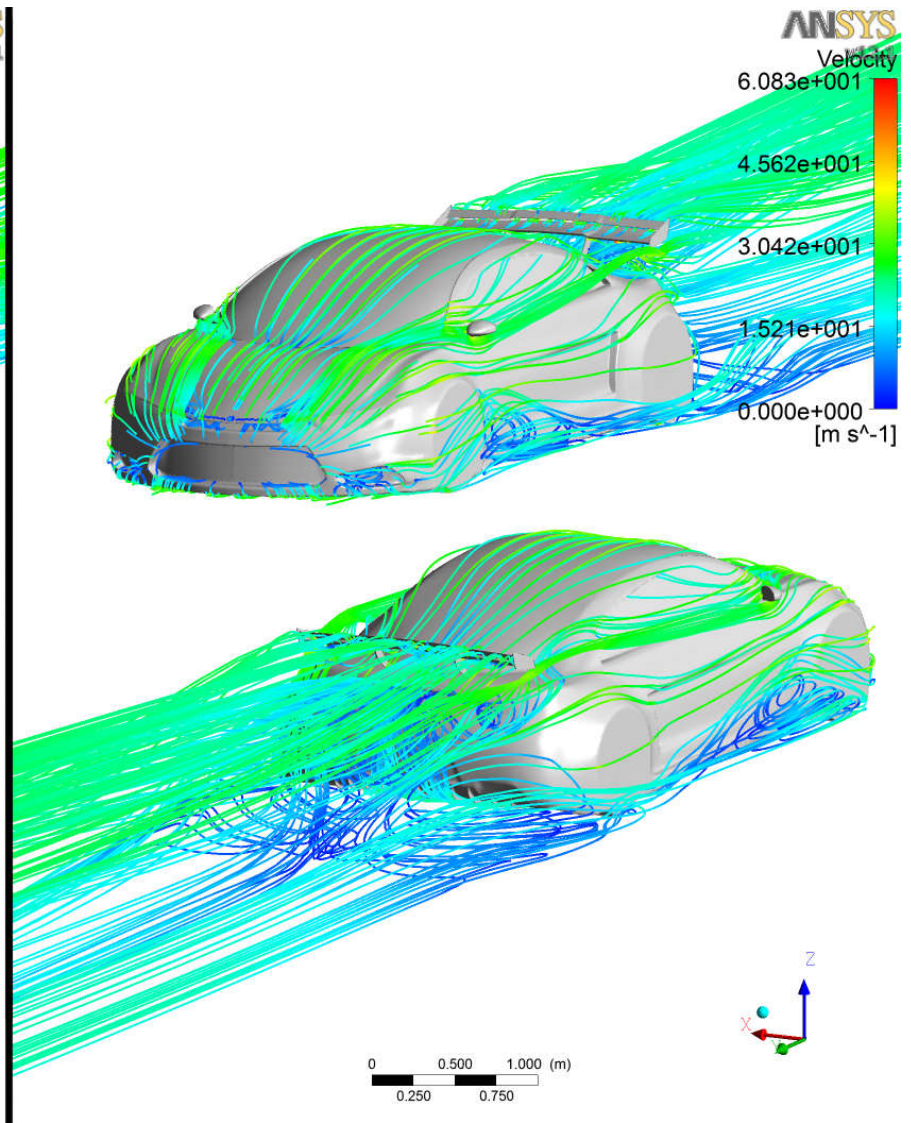
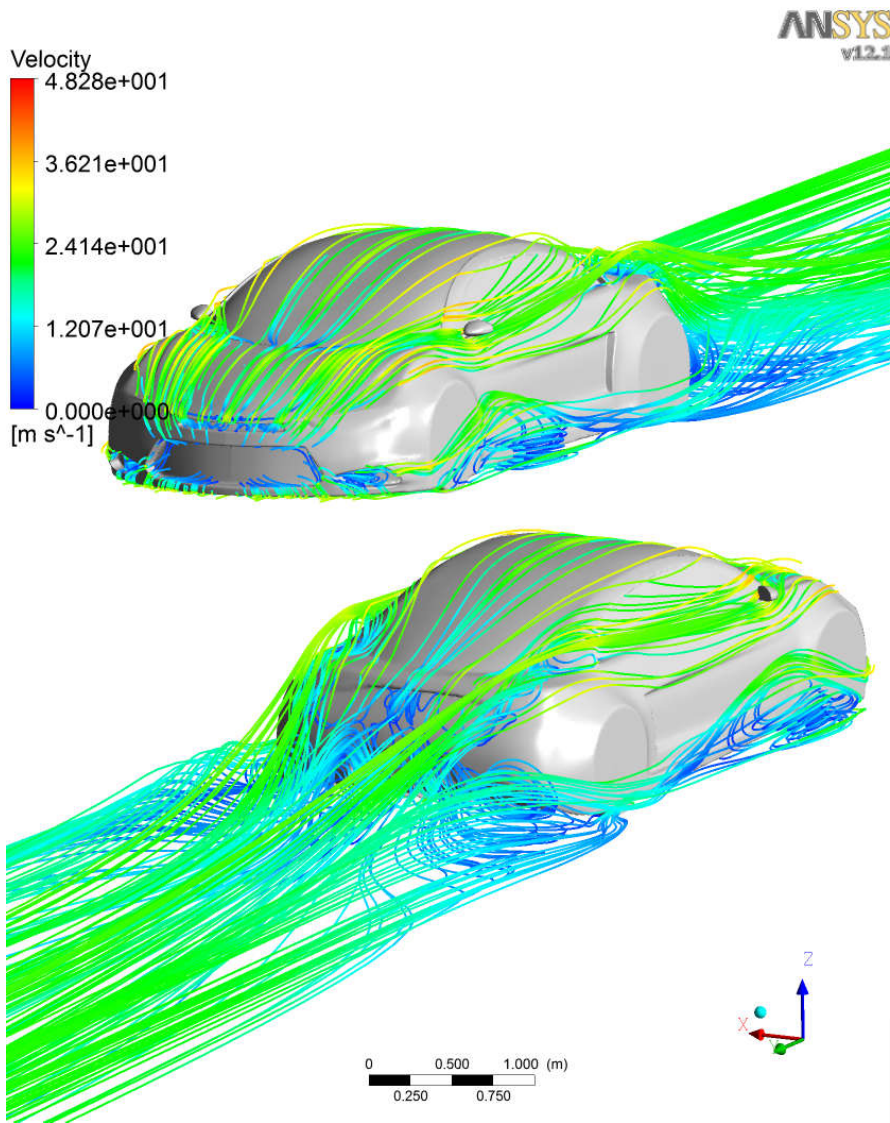
<http://www.youtube.com/watch?v=qnaYIX025LI>

Renderings of redesigned car model

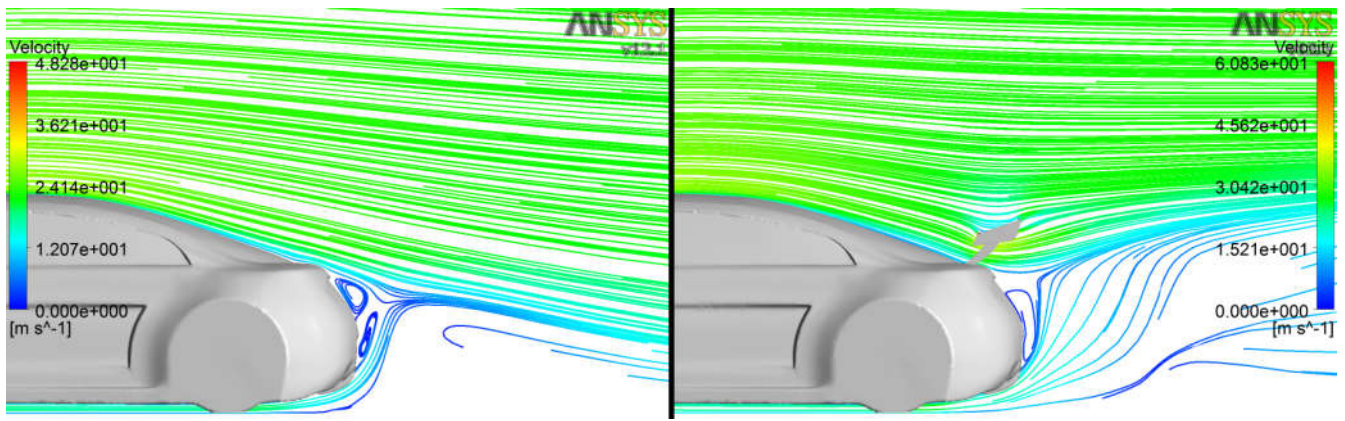




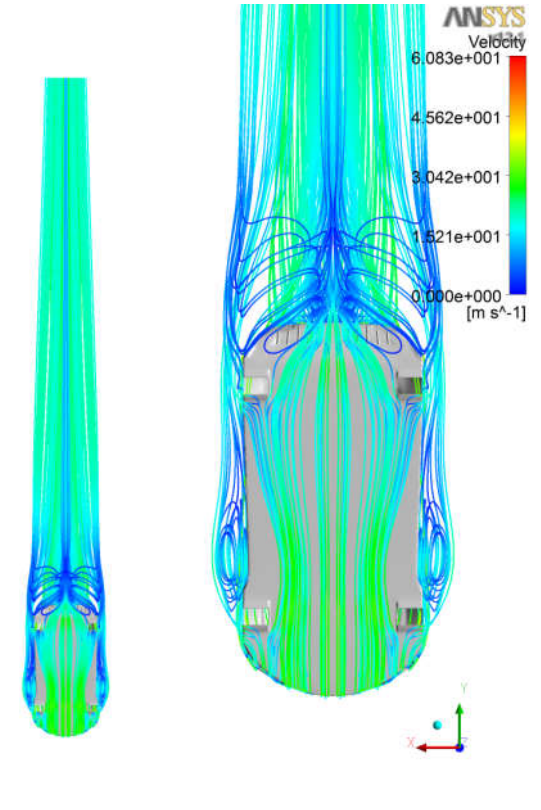
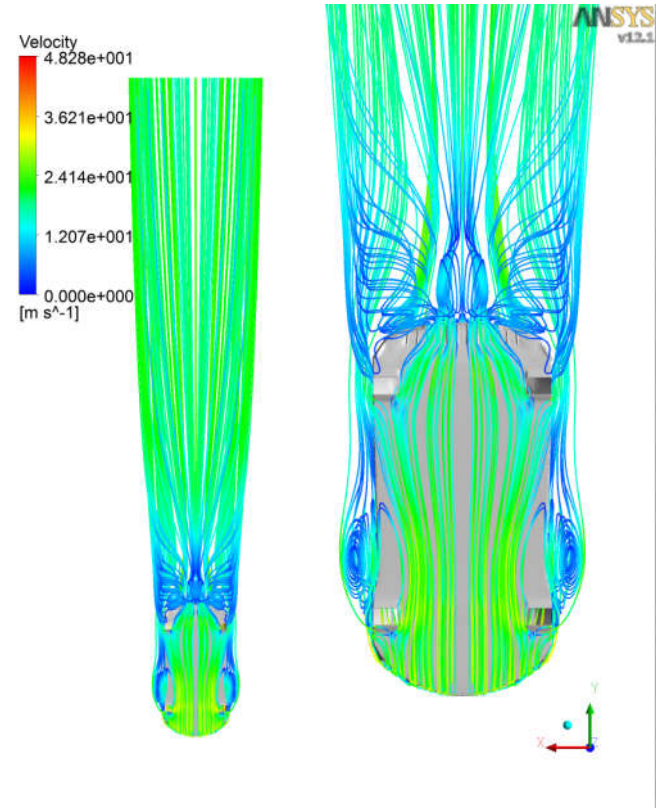
Pressure distribution on car body and ground

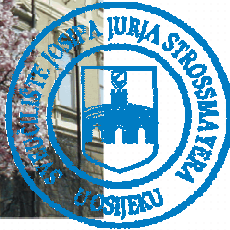


Velocity streamlines over car body



Velocity streamlines on symmetry plane of the car





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Thank you for your attention

