

DYNAmore GmbH

**Information Day:
Multiphysics with LS-DYNA**

17 March 2014, Stuttgart

DYNAmore – The Company

■ Countries and Main Offices

- Germany – headquarters in Stuttgart
- Sweden – headquarters in Linköping
- Switzerland – headquarters in Zurich
- Italy – headquarters in Torino

■ Further Offices

- Ingolstadt
- Dresden
- Langlingen (Wolfsburg)
- Berlin
- Gothenburg

■ On-site Offices

- Sindelfingen & Untertürkheim (Daimler)
- Weissach (Porsche)
- Ingolstadt (Audi)
- Gothenburg (Volvo)



Stuttgart [Headquarters]

DYNAmore – The People

■ Who we are

- In total 85 people
- Civil and mechanical engineers, mathematicians, computer scientists,...
- The employees are from 13 different countries
- The percentage of female staff is above 25 %
- The fluctuation of employees is below 2%
- The company is financially stable since its foundation



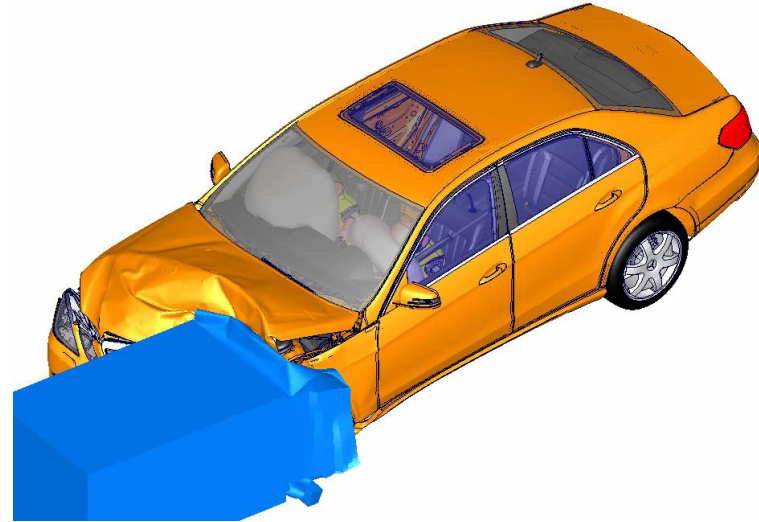
DYNAmore – The Products

■ Software

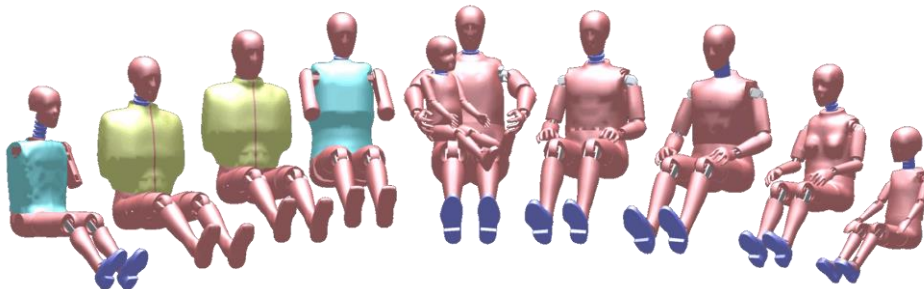
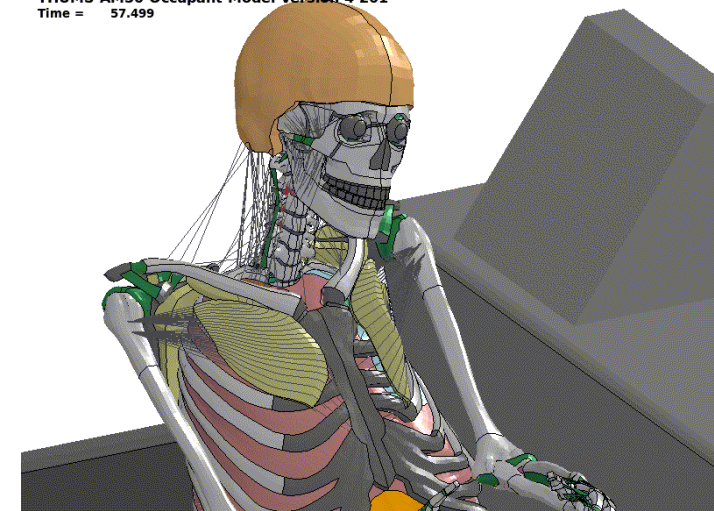
- LS-DYNA
- LS-OPT und LS-TASC
- LS-PrePost
- eta/DYNAFORM
- FEMZIP
- Digimat

■ Models

- Dummy models (FAT/ PDB/ Humanetics)
- Human model (THUMS)
- Various barrier and impactor models of Arup, Daimler, Porsche, LSTC



THUMS AM50 Occupant Model Version 4 201
Time = 57.499



DYNAmore – The Services

■ Software

- European master distributor for LS-DYNA (w/o UK and France)

■ Engineering

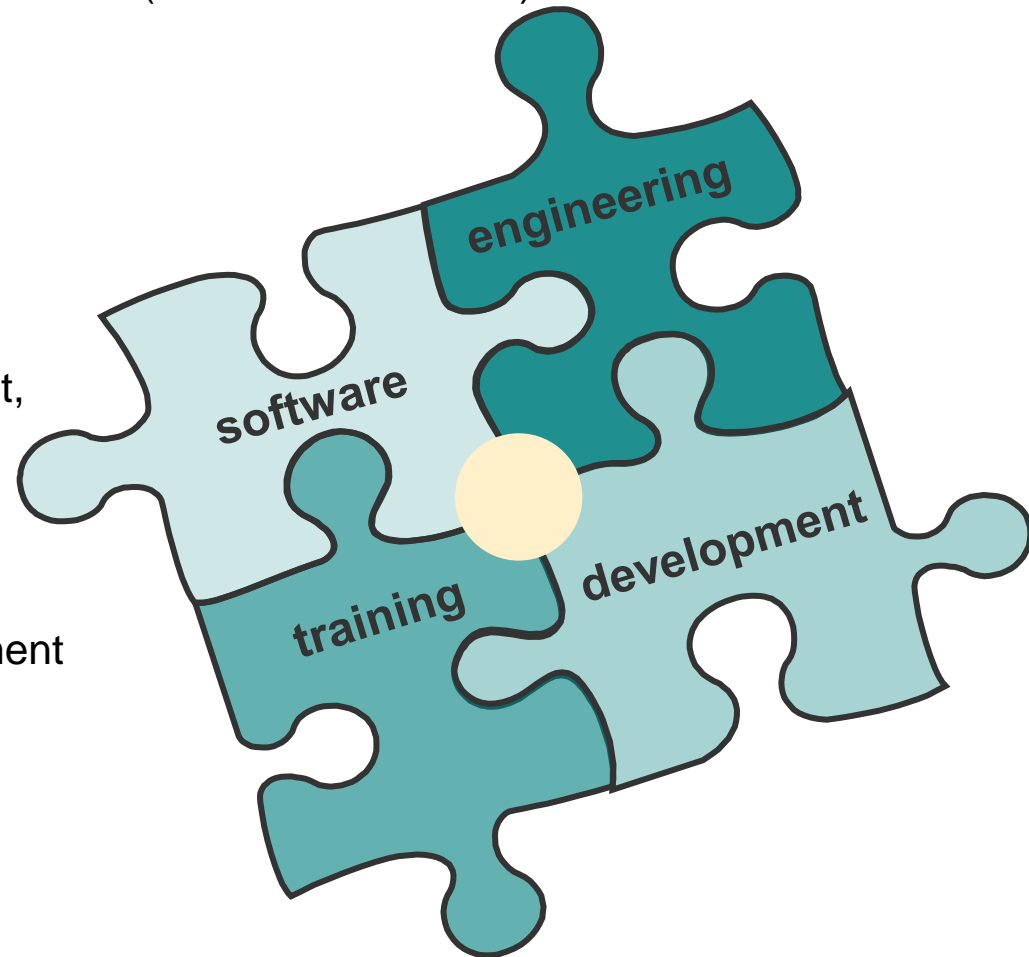
- Benchmarking
- Pilot projects

■ Development

- Software development for
 - LS-DYNA, LS-OPT & LS-PrePost,
 - CAx-LoCo, CAViT, Status.E
- Material & dummy models
- System & process integration
- Customization & method development

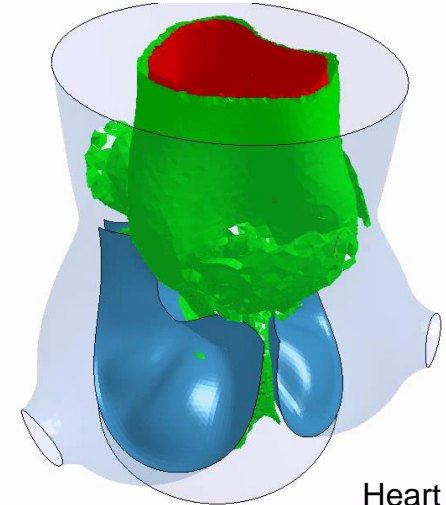
■ Training

- Seminars & on-site coaching
- Conferences
- Support

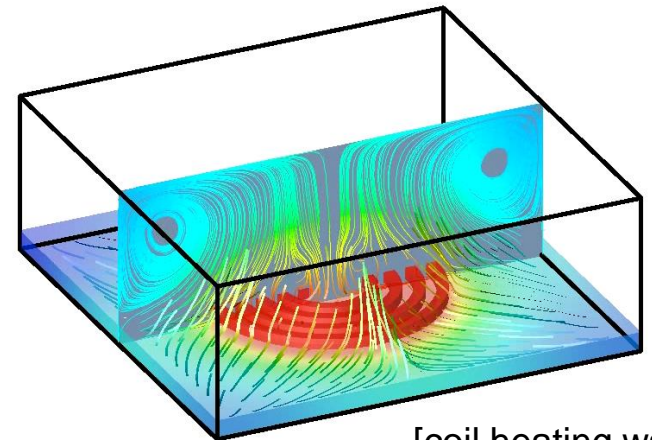


LS-DYNA R7 – The Multiphysics Solver

- Combine the capabilities
 - Explicit/ Implicit **structural** solver
 - **Thermal** solver & heat transfer
 - **Incompressible fluid** solver (ICFD)
 - **Compressible fluid** solver (CESE)
 - **Electromagnetics** solver (EM)
 - **Frequency domain**, acoustics, modal analysis
 - Finite elements, iso-geometric elements, ALE, EFG, SPH, DEM, CPM, ...
 - User elements, materials, loads
- Into **one** scalable **code** for
 - highly **nonlinear transient** problems
 - **static** problems
- To enable the solution of
 - coupled **multi-physics** and
 - **multi-stage** problems
- On **massively parallel** systems



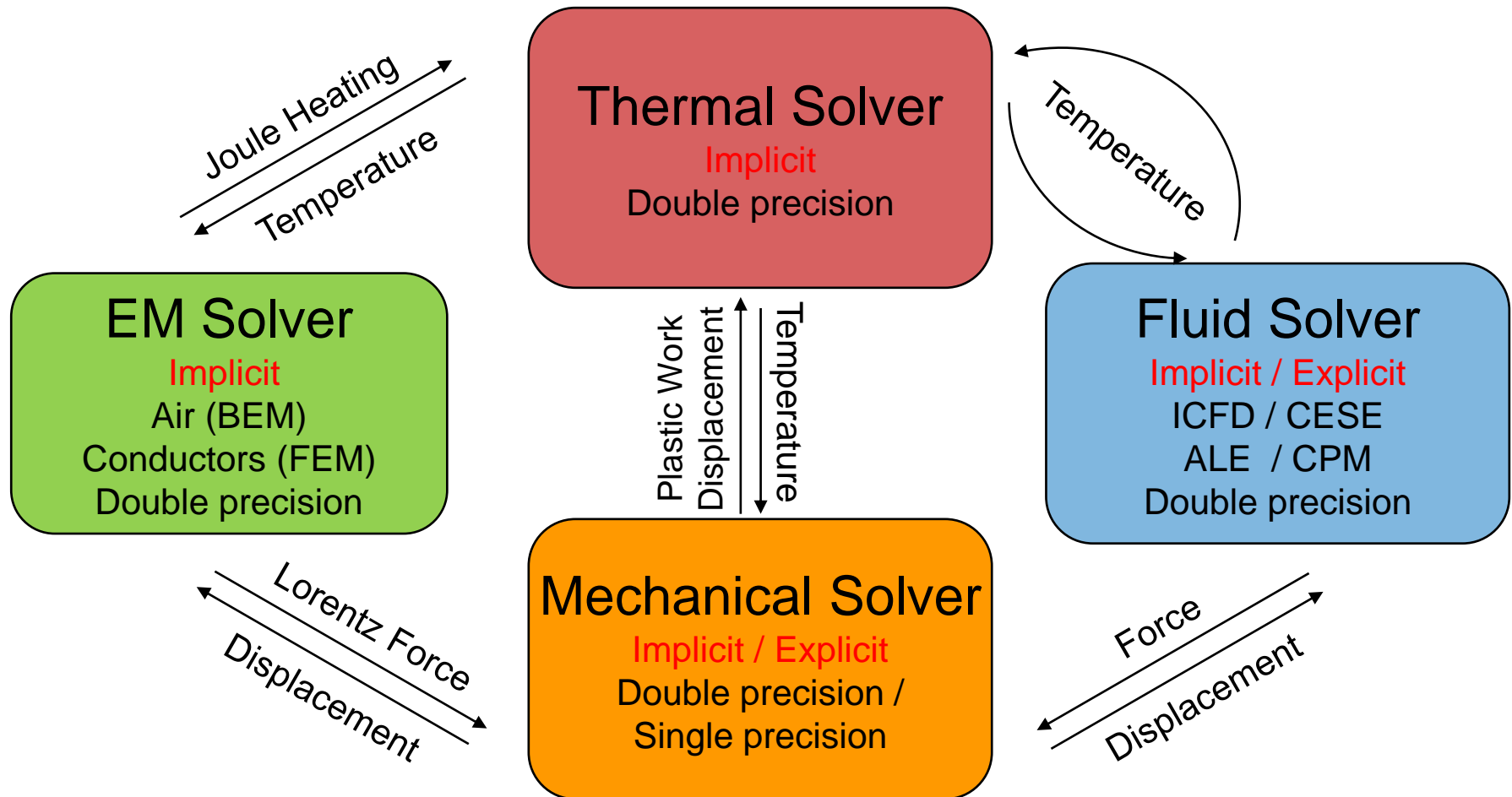
Heart valve:
Courtesy of H. Mohammadi,
McGill University



[coil heating water]

LS-DYNA R7 – The Multiphysics Solver

- No need for co-simulation, as all solvers are included!



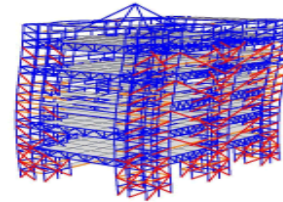
LS-DYNA R7 – The Applications

Automotive



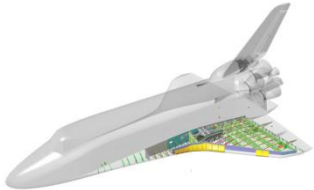
Crash and Safety
NVH
Durability

Civil Engineering



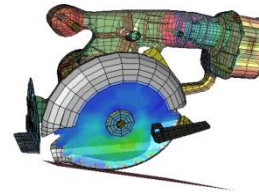
Concrete structures
Earthquake safety
Wind- & Waterpower

Aerospace



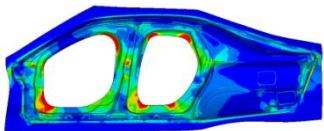
Bird strike
Containment
Crash

Elektronics



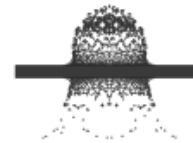
Drop analysis
Package analysis
Thermal

Manufacturing



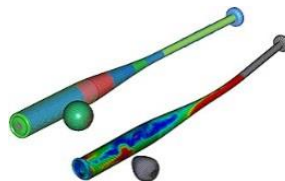
Stamping
Forging

Defense



Detonations
Penetrations

Consumer Products



Biomechanics



More Information on the LSTC Product Suite

■ Livermore Software Technology Corp. (LSTC)

www.lstc.com

■ LS-DYNA

■ Support / Tutorials / Examples / FAQ

www.dynasupport.com

■ More Examples

www.dynaexamples.com

■ Conference Papers

www.dynalook.com

■ European Master Distributor

www.dynamore.de

■ LS-PrePost

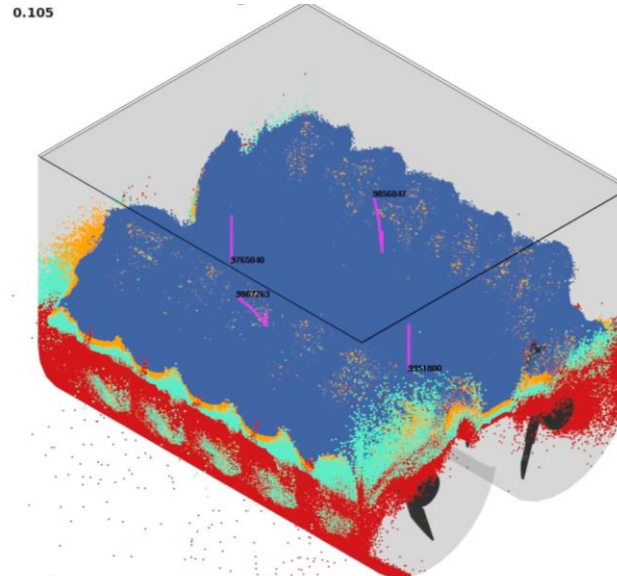
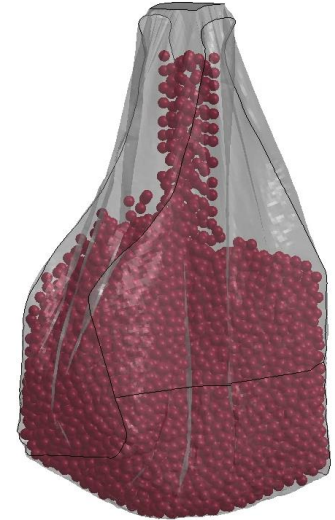
■ Support / Tutorials / Download

www.lstc.com/lsp

■ LS-OPT

■ Support / Tutorials / Examples

www.lsoptsupport.com



Overview of Today's Talks

■ Before the Break

- Multiphysical Solver Capabilities of LS-DYNA R7
 - I. Çaldichoury, F. Del Pin, P. L'Eplattenier, Z.-C. Zhang (LSTC)
- Thermo-Mechanically Coupled Simulation with LS-DYNA
 - T. Loose (Ingenieurbüro Tobias Loose); A. Erhart (DYNAmore)
- Process Simulation of Resistance Spot Welding
 - K. Anakiev, I. Lepenies (DYNAmore)

■ After the Break

- Simulation of Thermoplastic Composite Induction Welding
 - M. Duhovic, P. Mitschang, M. Maier (Institut für Verbundwerkstoffe GmbH); I. Çaldichoury, P. L'Eplattenier (LSTC)
- Simulation of Hot Hydroforming with Incorporation of the Inductive Heating Process
 - C. Scheffler (Fraunhofer IWU)
- Coupled Simulation of the Fluid Flow and Conjugate Heat Transfer in Press Hardening Processes
 - B. Boll, U. Göhner (DYNAmore); I. Çaldichoury (LSTC); T. Wicke (Volkswagen AG)