

Web Workshop COMSOL

ICPS 2017

Politecnico di Torino

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Today's Agenda

Introduction to COMSOL Multiphysics[®] software

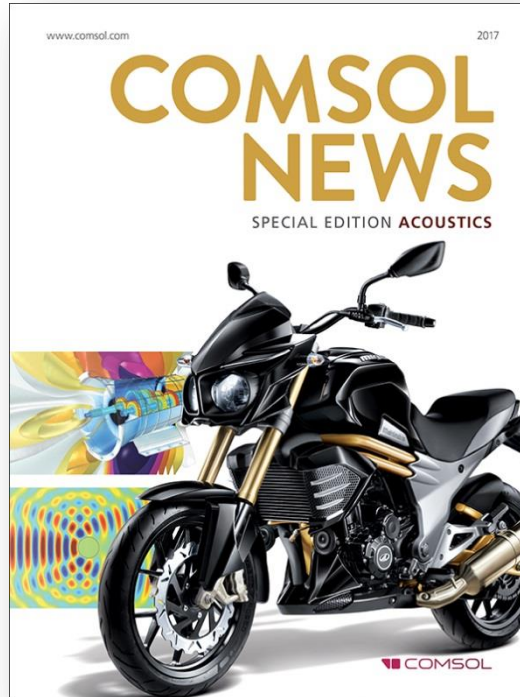
- Workflow of building a model
- Live software demo

COMSOL 2017

- Modeling and Simulation
 - Ready made physics interfaces
 - General mathematics interfaces
 - Built-in CAD tools
 - Add-on modules with specialized physics interfaces
 - LiveLink™ products to connect with partner software
 - Most major CAD tools
 - MATLAB®
 - Excel®
- Development tools
 - Model Builder
 - Physics Builder
 - Application Builder
- Deploying Apps
 - COMSOL Multiphysics®
 - COMSOL Server™
 - Browser and Windows® clients



Special Edition – Acoustics



www.comsol.it/offers/comsol-news-2017-special-edition-acoustics

Resources to Support Your Work

- Online Workshops & Seminars
- Webinars
- Free technical support
- 800+ tutorial models and apps
- Tutorial videos
- Technical blog posts
- Discussion forum and model exchange
- Intensive training courses
- COMSOL Days
- COMSOL Conference



The graphic is a promotional poster for COMSOL resources. The top section, titled 'TRAINING SERIES', lists various courses: 'Application Builder (Free of Charge)', 'COMSOL Multiphysics® Intensive Training', 'CHEMICAL' (Chemical Reaction Engineering), 'FLUID' (Computational Fluid Dynamics (CFD)), and 'MECHANICAL' (Acoustics & Vibrations Analysis, Heat Transfer, and Structural Mechanics). The middle section promotes the 'COMSOL CONFERENCE 2016 BOSTON' on October 5-7 at the Boston Marriott Newton, with the theme 'Present your work at the COMSOL Conference 2016'. It mentions that presenters will receive exposure through a readership of over 165,000 simulation experts worldwide. A red button indicates the 'EARLY BIRD ABSTRACT SUBMISSION DEADLINE' on 'MAY 20'. The bottom right features a photo of people at a conference and the COMSOL logo.

TRAINING SERIES

FUNDAMENTALS
Application Builder (Free of Charge)
The course begins with an introduction to applications and using the built-in model tool as well as simple applications. It progresses with adding external data sources using the built-in editor. The model editor is introduced for using code associated with forces and heat sources.

COMSOL Multiphysics® Intensive Training
An intensive introduction to the modeler and the features of COMSOL Multiphysics via a combination of guided hands-on exercises, lectures, and tutorials. This is a suggested prerequisite for all specialized training courses.

CHEMICAL
Chemical Reaction Engineering
Build reaction kinetic models and process include the effects of species and energy transport. Chemical Reaction Engineering Models.

FLUID
Computational Fluid Dynamics (CFD)
Learn to model various types of fluid flow. The laminar, turbulent, and high Mach number flow multiphase and non-Newtonian flows as well as microfluidics.

The Microfluidics Module addresses problems involving laminar flow in lab-on-chip devices, flow, species transport, and different surface techniques are covered.

MECHANICAL
Acoustics & Vibrations Analysis
This course addresses the modeling of acoustic, electrostatic, piezoelectric, and piezoresistive solid and in porous media. Applications include mufflers and piezoelectric transducers.

Heat Transfer
Heat transfer can occur via conduction, convection, and radiation. This course addresses all modeling phenomena and shows how to couple thermal physics, in particular to fluid flow simulations.

Structural Mechanics
This course covers structural mechanics models, shells, and beams. Topics include stress-based, material nonlinearity, static, transient, buckling and frequency response analysis, as well as joint stress and strain.

ELECTRICAL
AC/DC Modeling
Learn to use the AC/DC Module for simulating steady-state, transient, and low-frequency electromagnetic phenomena around the modeling resistors, capacitors, inductors and coils, sources, magnets, and electromagnetic heating.

MEMS
This course covers the MEMS Module for modeling electrostatic attraction, like flow damping, piezoelectric, and thermal attraction.

RF, Microwave, and Photonics
Learn to model electromagnetic waves, from radio to optical frequencies. Emphasis is on modeling of antennas, resonant cavity resonators, waveguides and continuous lines, scattering

COMSOL CONFERENCE 2016 BOSTON

October 5 - 7
Boston Marriott Newton
Newton, MA, USA

Present your work at the COMSOL Conference 2016

Presenters will receive exposure through a readership of over 165,000 simulation experts worldwide.

EARLY BIRD ABSTRACT SUBMISSION DEADLINE **MAY 20**

www.comsol.com/conference

COMSOL

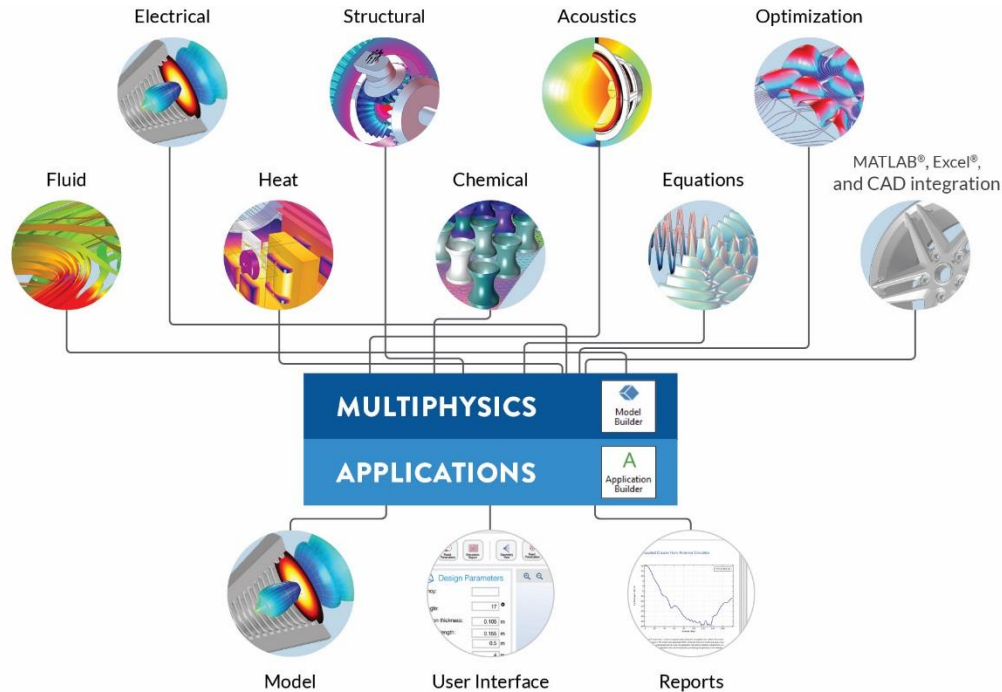


**COMSOL
CONFERENCE**
2017 ROTTERDAM

**SAVE
THE
DATE**

October
18–20

COMSOL Multiphysics®



Demo COMSOL Multiphysics®

Live Demo: Busbar

- Joule heating of a busbar
 - Operates in DC and supports high currents
 - In an unexpected situation, the current is forced through bolts
 - Thermo-mechanical simulation must account for resistive losses

Electromagnetism

$$\nabla \cdot J = q_j$$

$$J = \sigma E + J_e$$

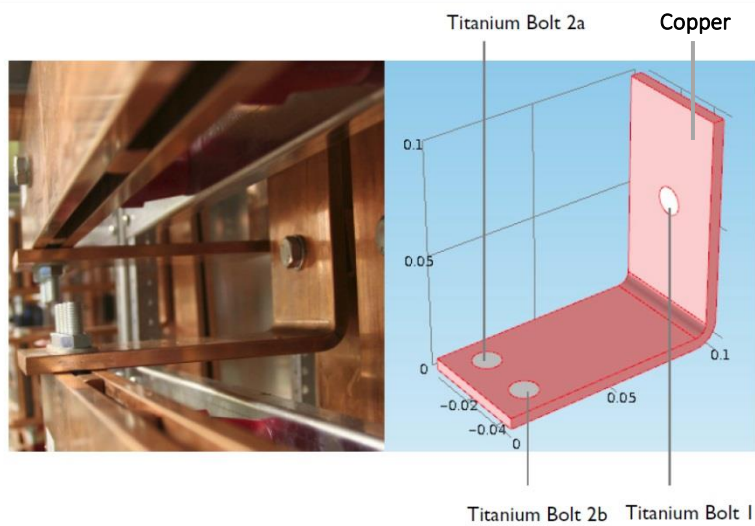
$$E = -\nabla V$$

Heat transfer

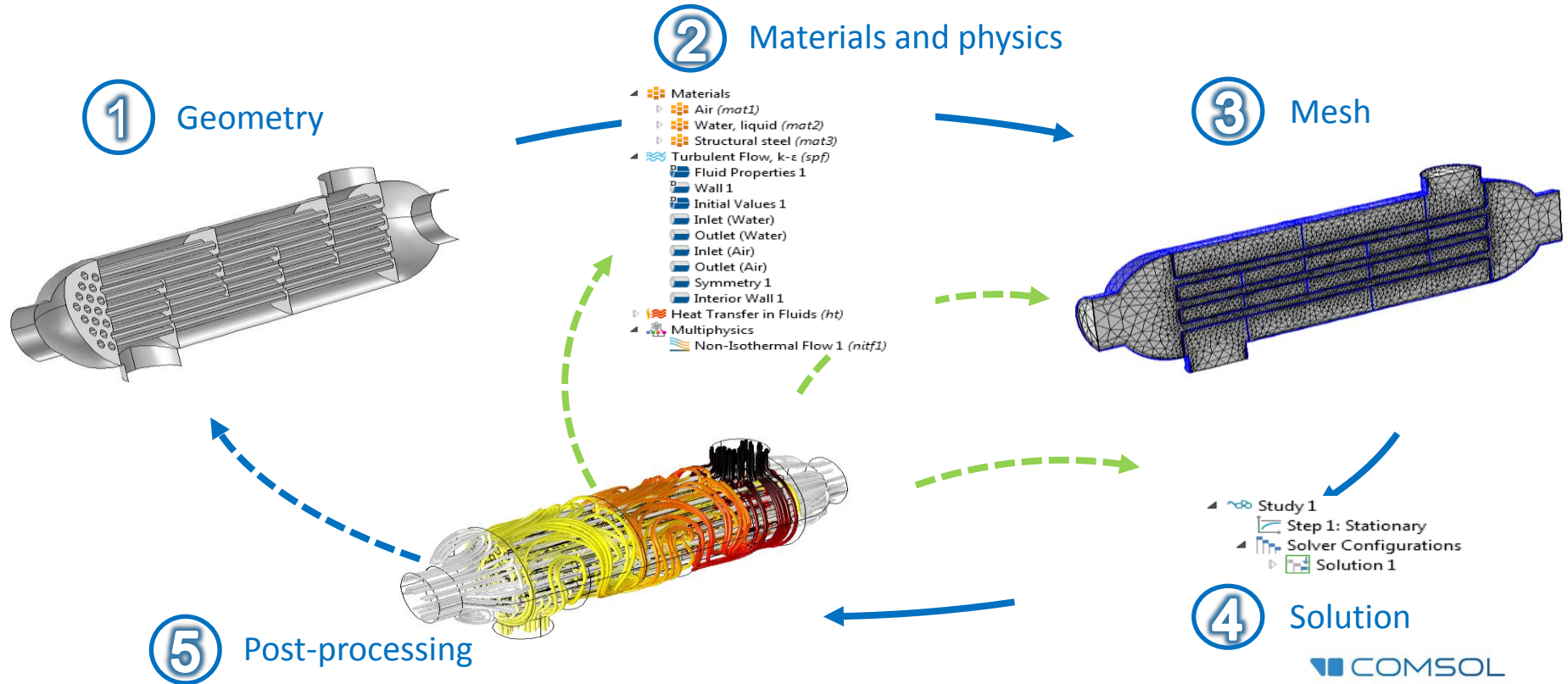
$$\rho C_p u \cdot \nabla T = \nabla \cdot (k \nabla T) + Q$$

Joule effect

$$Q = J_x \cdot E_x + J_y \cdot E_y + J_z \cdot E_z$$



Simulation workflow



Unique GUI for all physics interfaces

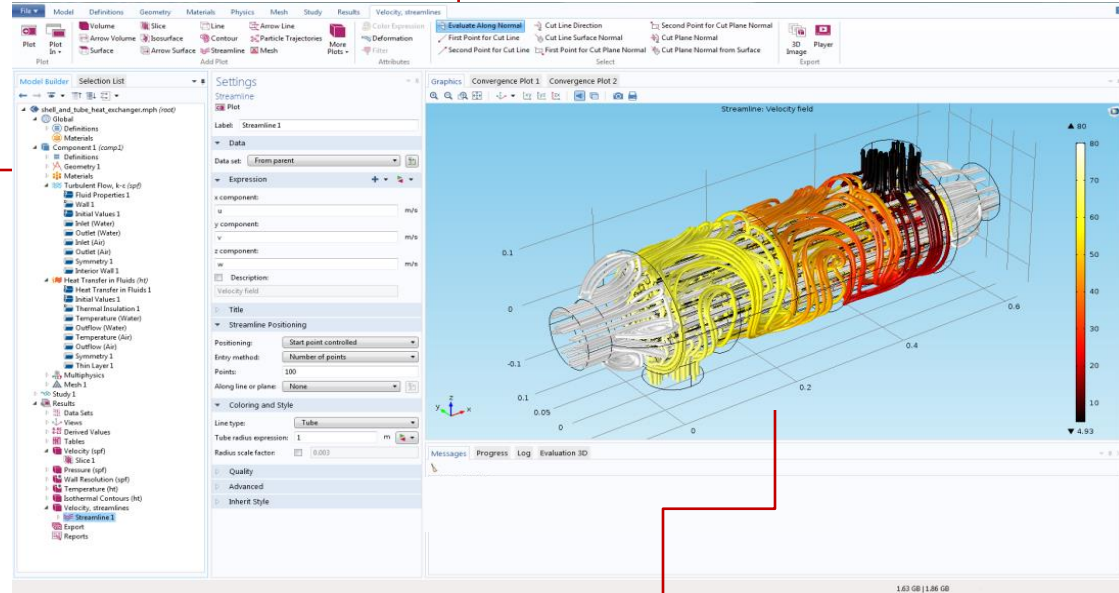
COMSOL Desktop™

provides an integrated environment for simulation and is used for all COMSOL Multiphysics®

Model Builder

Access to all steps in simulation process:

- Geometry modeling and CAD import
- Meshing
- Setting up materials and physics
- Solving
- Visualization
- Postprocessing



Graphics

Fast graphical interface, excellent display and multiple graphics

Demo Application Builder & COMSOL Server™

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