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Femap 11.4.2 What's New

Femap Release Schedule

Regular release schedule
- v11.4.2: November 2017
- v11.4.1: October 2017
- v11.4: May 2017
- v11.3: May 2016
- v11.2: March 2015
- v11.1: November 2013
- V11: January 2013
- v10.3.1: January 2012
- v10.3: October 2011
- v10.2: October 2010
- v10.1.1: January 2010
- v10.1: August 2009
- v10: December 2008

Femap Direction

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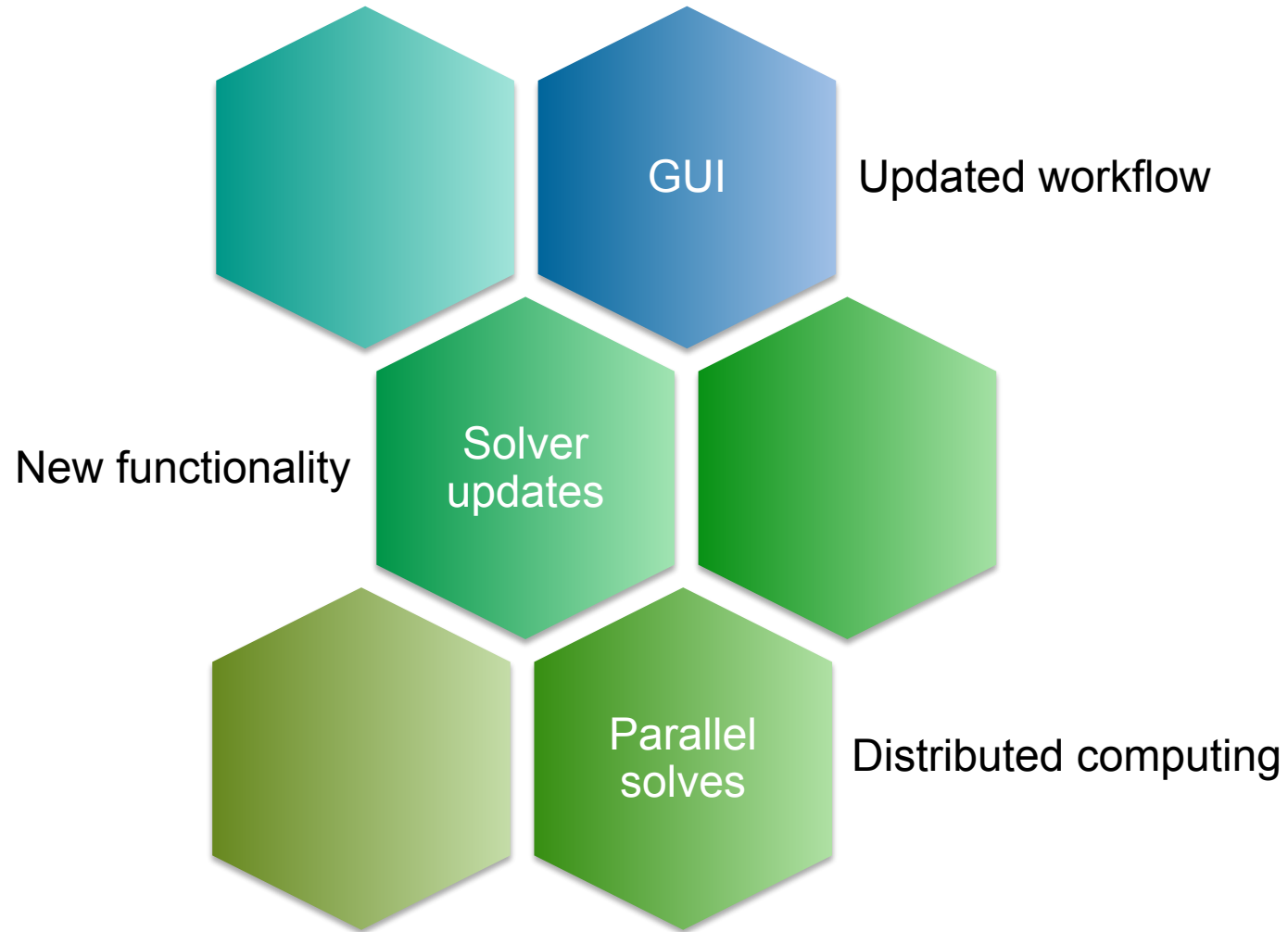*Ingenuity for life*
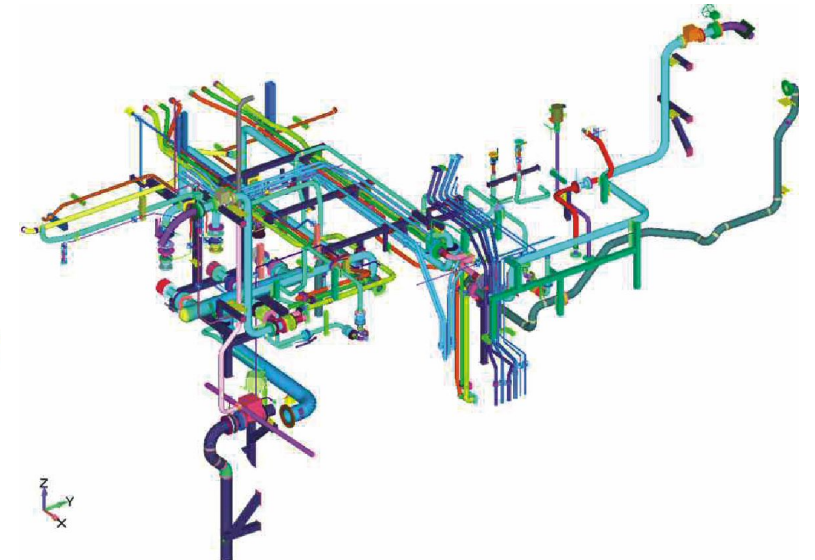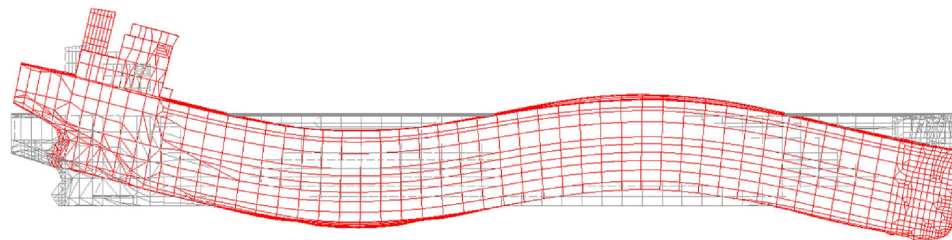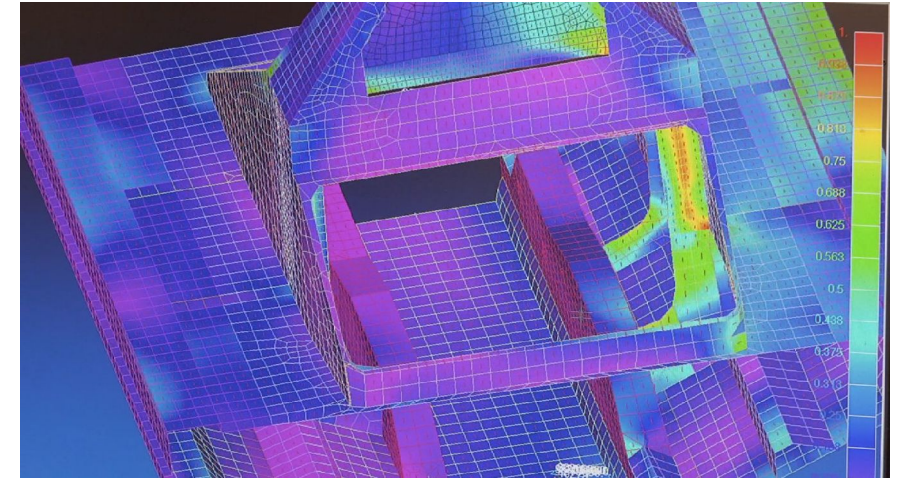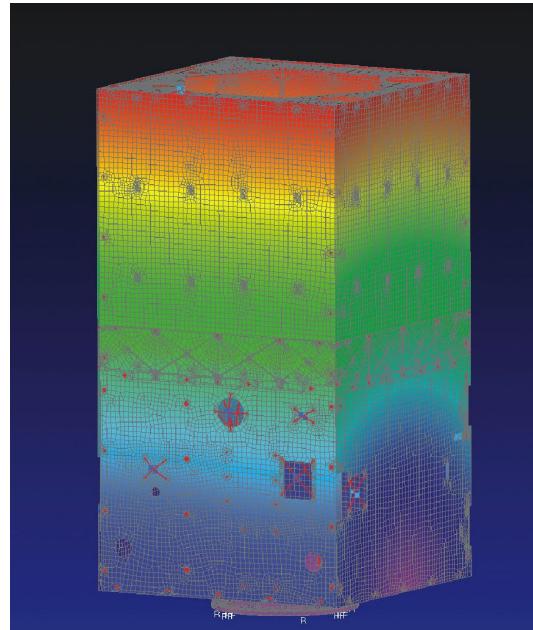
Maximize efficiency of FEA tasks

- Efficient creation of high fidelity FE models that accurately represent real-world engineering problems
- Intuitive interpretation of analysis results to improve the design and performance of engineered products

Build upon strong Femap capabilities

- Geometry idealization and processing for FE models
- Powerful meshing, model creation and interactive editing
- In-depth support for industry standard solvers
- Flexible customization tools to streamline analysis processes

Femap 11.4.2
Overview – Thermal and Flow Solver Enhancements

GUI — Updated workflow

New functionality — Solver updates

Parallel solves — Distributed computing

Femap 11.4.2
Thermal and Flow Solver Enhancements

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Updated UI for Improved Workflows
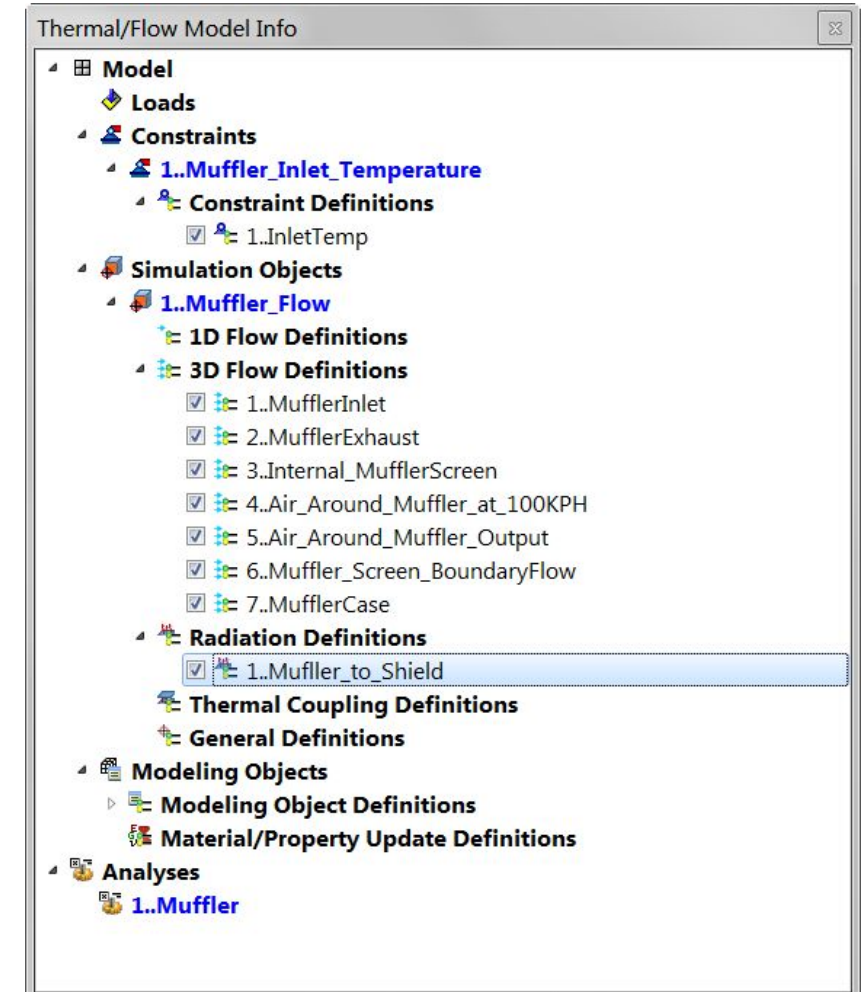Updated Solver with Parallel Processing
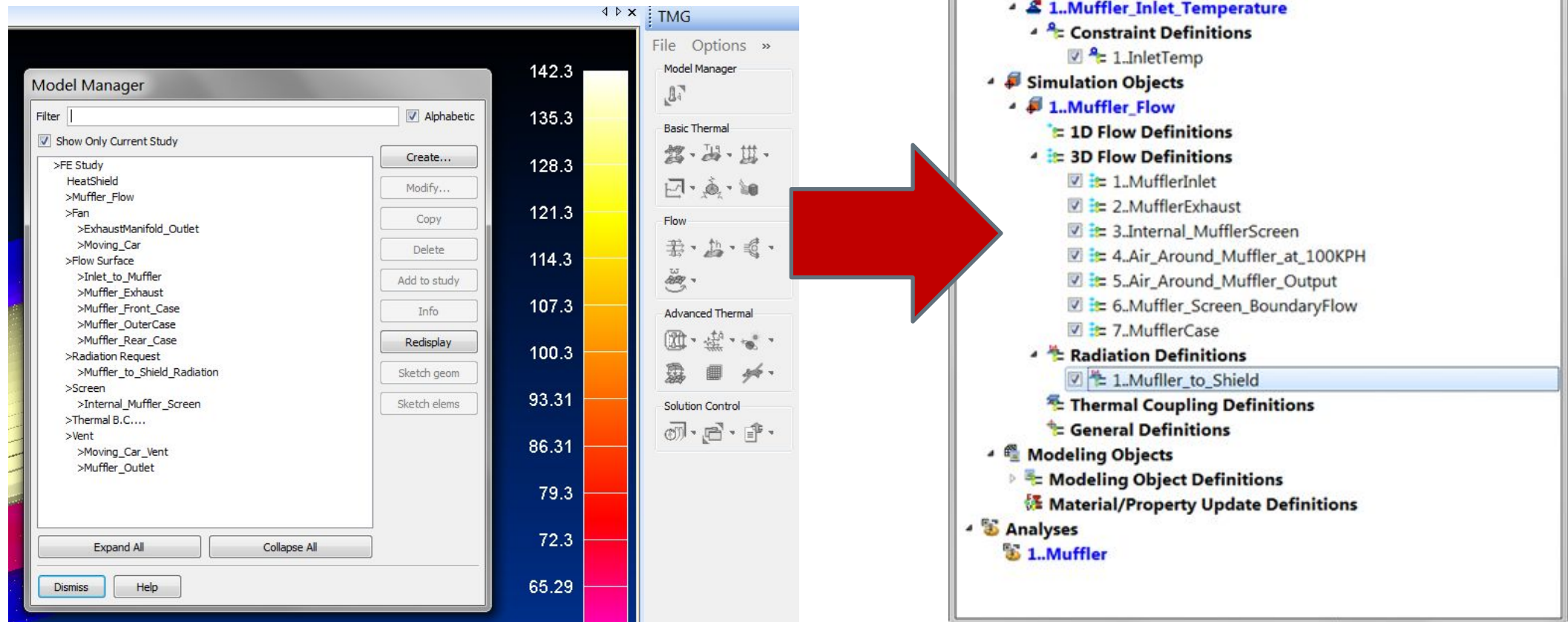
Femap 11.4.2
Contemporary Graphical User Interface

Thermal/Flow Model Info pane, analogous to Femap *Model Info* pane

- Activate from the *Panes* toolbar or with the *Tools > TMG Thermal/Flow Analysis* command

Femap 11.4.2
Thermal/Flow Model Info Pane

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Create all loads, constraints, and other simulation entities using the right-click commands in the *Thermal/Flow Model Info* pane
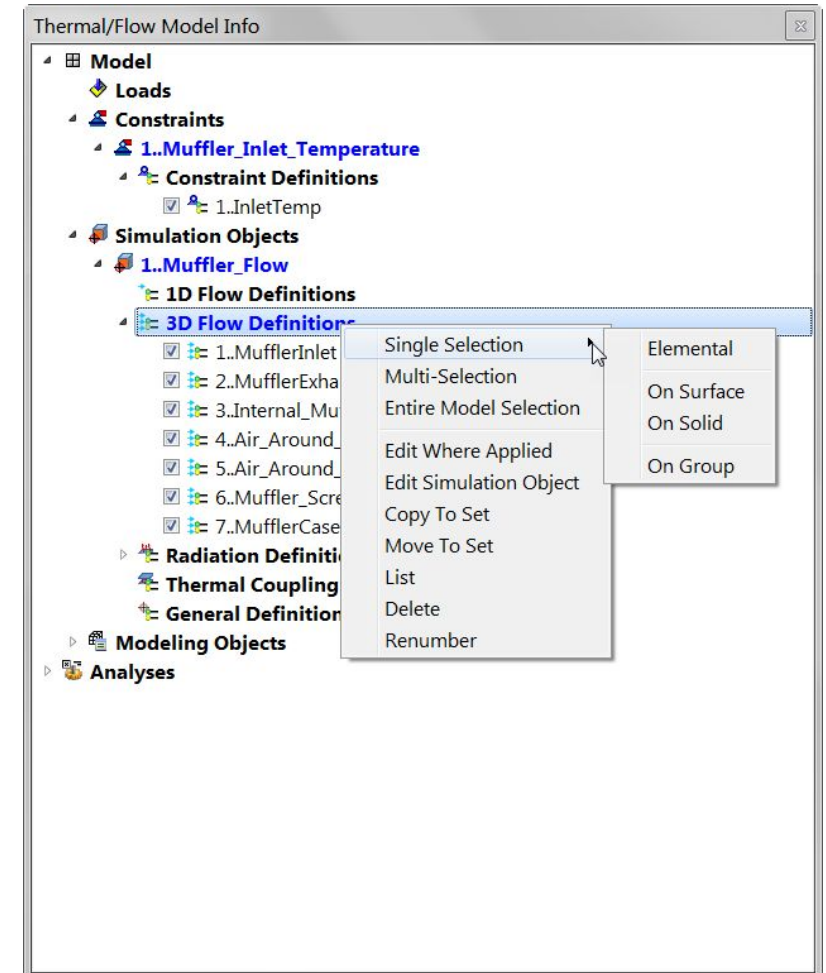
Model – Set-Based Objects
- Loads
- Constraints
- Simulation Objects

Model – Other Objects
- Modeling Objects

Analyses – analogous to *Analysis Sets*

Femap 11.4.2
Loads

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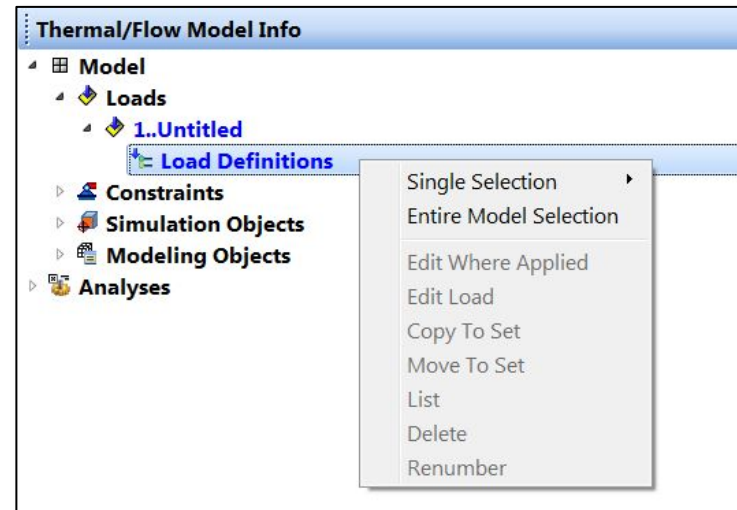
New – Create New Load Set
- Multiple Load Sets can be defined

Single Selection – Use to apply Loads on Elements, Curves, Surfaces, Solids, or by Group
- Joule Heating
- Rotation – apply Angular Velocity to selected individual entities
- Thermal Loads

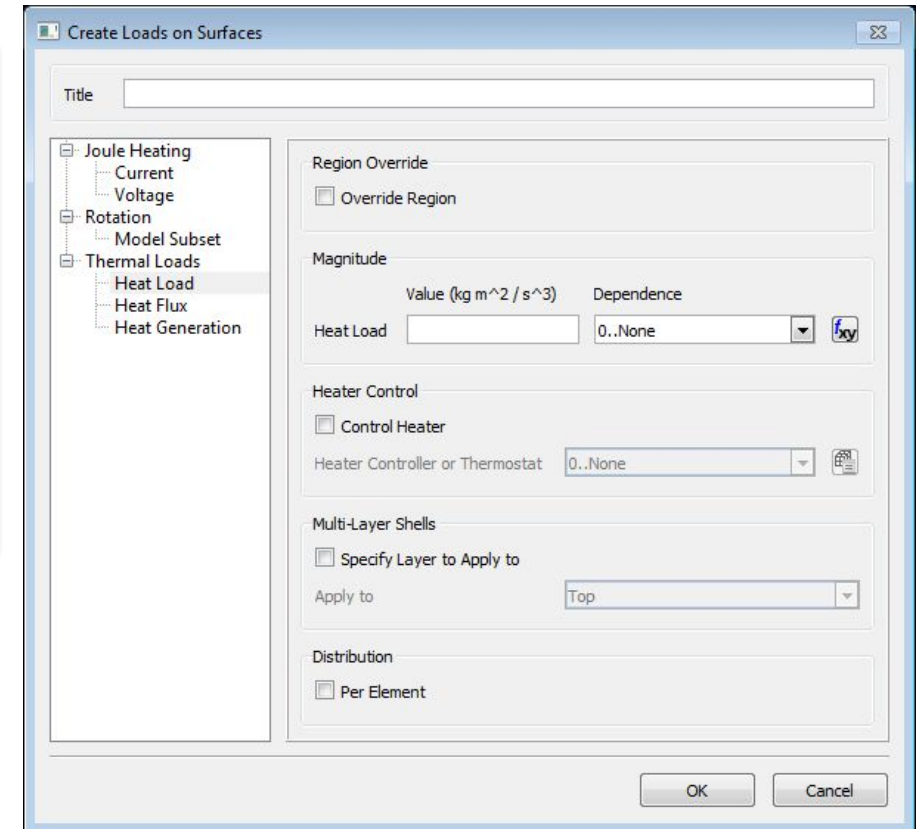Entire Model Selection – Use to apply loads to entire model
- Rotation – Angular Velocity

Thermal/Flow Model Info
- ⊞ **Model**
  - ⬦ **Loads**
    - ⬦ **1..Untitled**
      - **Load Definitions**
  - ▷ **Constraints**
  - ▷ **Simulation Objects**
  - ▷ **Modeling Objects**
- ▷ **Analyses**

| Single Selection ▶ |
| Entire Model Selection |
| Edit Where Applied |
| Edit Load |
| Copy To Set |
| Move To Set |
| List |
| Delete |
| Renumber |

Edit Where Applied or Edit Load

Copy and Move between Load Sets

List, Delete, or Renumber individual Loads

Create Loads on Surfaces

Title [   ]

- ⊟ Joule Heating
  - Current
  - Voltage
- ⊟ Rotation
  - Model Subset
- ⊟ Thermal Loads
  - Heat Load
  - Heat Flux
  - Heat Generation

Region Override
☐ Override Region

Magnitude

	Value (kg m^2 / s^3)	Dependence
Heat Load	[ ]	0..None ▾	fxy

Heater Control
☐ Control Heater
Heater Controller or Thermostat [0..None ▾]

Multi-Layer Shells
☐ Specify Layer to Apply to
Apply to [Top ▾]

Distribution
☐ Per Element

[OK] [Cancel]

Femap 11.4.2
Constraints

New – Create New Constrain Set
- Multiple Constraint Sets can be defined

Single Selection – Use to apply
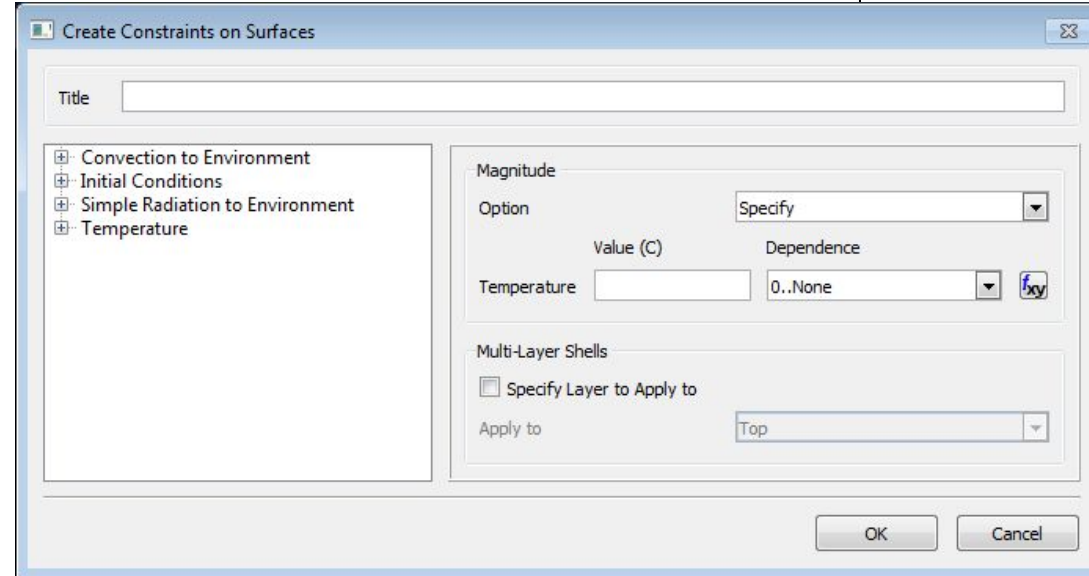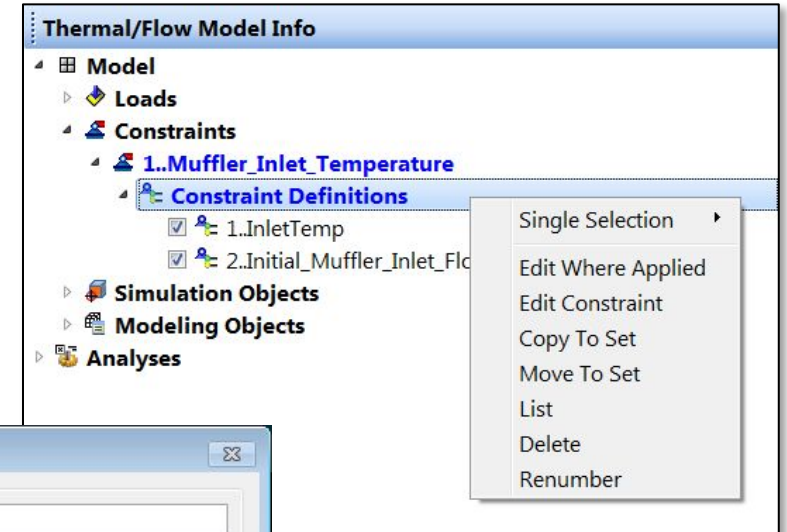
Constraints on Elements, Curves,

Surfaces, Solids, or by Group
- Convection To Environment
- Initial Conditions
- Simply Radiation to Environment
- Temperature

Edit Where Applied or Edit Constraint

Copy and Move between Constraint Sets

List, Delete, or Renumber individual Constraints

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Convection to Environment
- General
- Free Convection to Environment
- Forced Convection to Environment

Simple Radiation to Environment
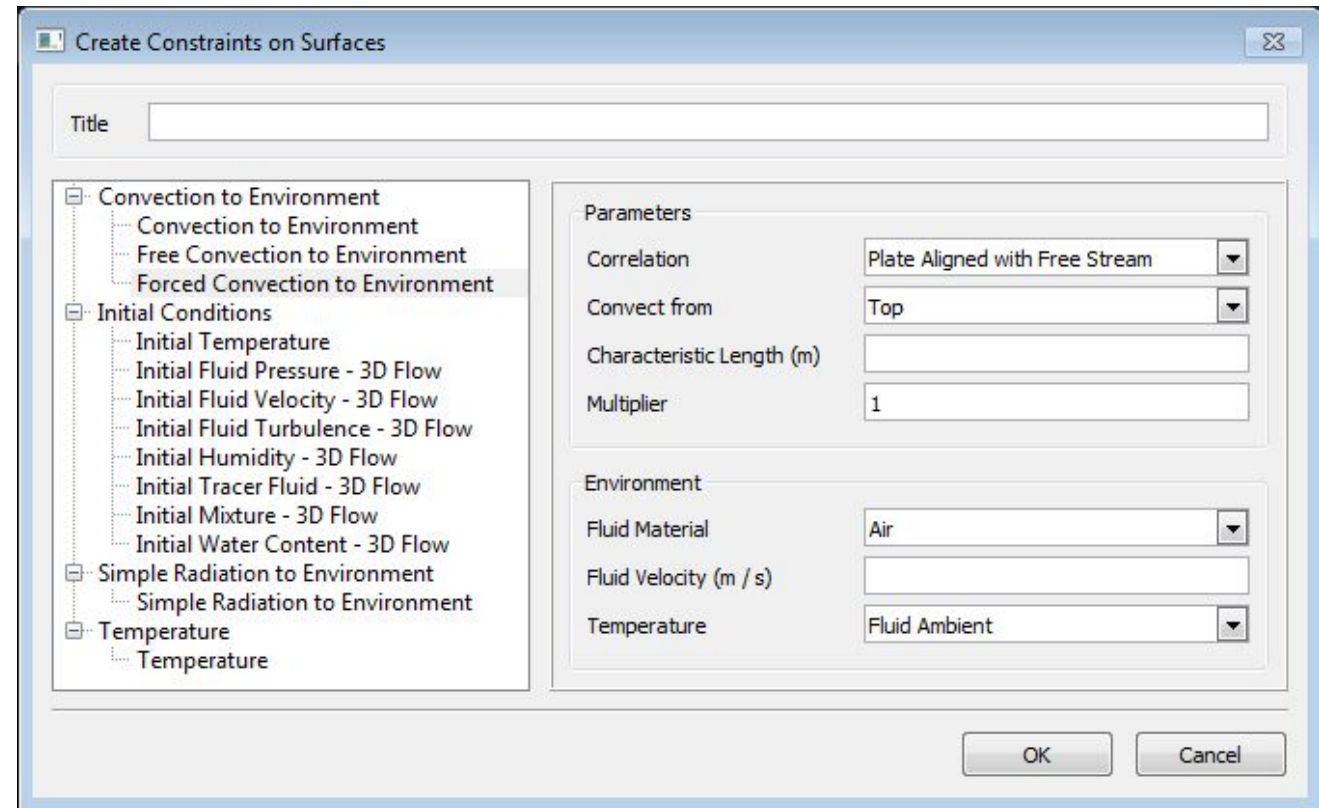
Temperature

Initial Conditions – All
- Initial Temperature

Initial Conditions – 3D Flow
- Initial Fluid Pressure, Fluid Velocity, Fluid Turbulence, Humidity, Tracer Fluid, Mixture, and Water Content

Femap 11.4.2
Simulation Objects

New – Create New Simulation Object Set
- Multiple Simulation Object Sets can be defined

Single Selection – Use to apply Simulation Objects on Nodes, Elements, Curves, Surfaces, Solids, or by Group
- Entities vary depending on Simulation Object

Multi-Selection – Use to apply Simulation Objects which require multiple inputs
- Inputs vary depending on Simulation Object

Entire Model Selection – Use to apply Simulation settings to entire model
- Settings vary depending on Simulation Object

Edit Where Applied or Edit Simulation Object

Copy and Move between Simulation Object Sets

List, Delete, or Renumber individual Simulation Objects

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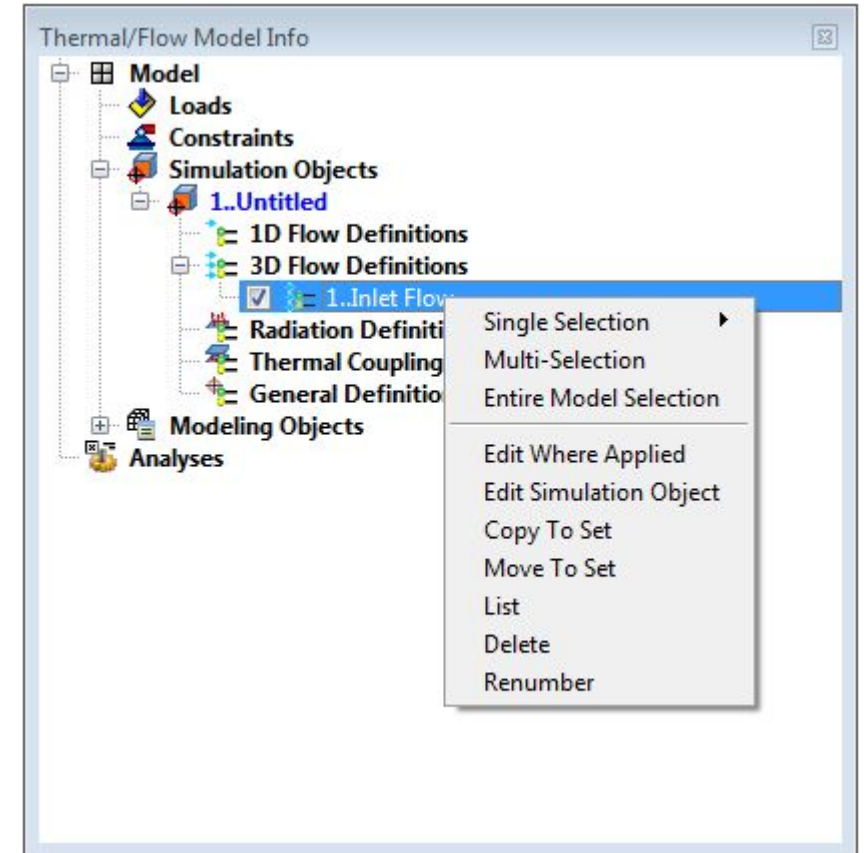
1D Flow Definitions
- Single Selection – Duct to 3D Flow Interface
- Multi-Selection – Duct Flow Boundary
  Conditions for One or Two-sided Convection
  from a "Convecting Region" to Ducts

3D Flow Definition
- Single Selection – Flow Boundary
  Conditions, Flow Surfaces, Screens,
  Supersonic Inlets, Symmetry Planes
- Multi-Selection – Disjoint Fluid Mesh
  Pairing, Flow Boundary Condition, Flow
  Surface, Periodic Boundary Condition
- Entire Model Selection – Translating Frame
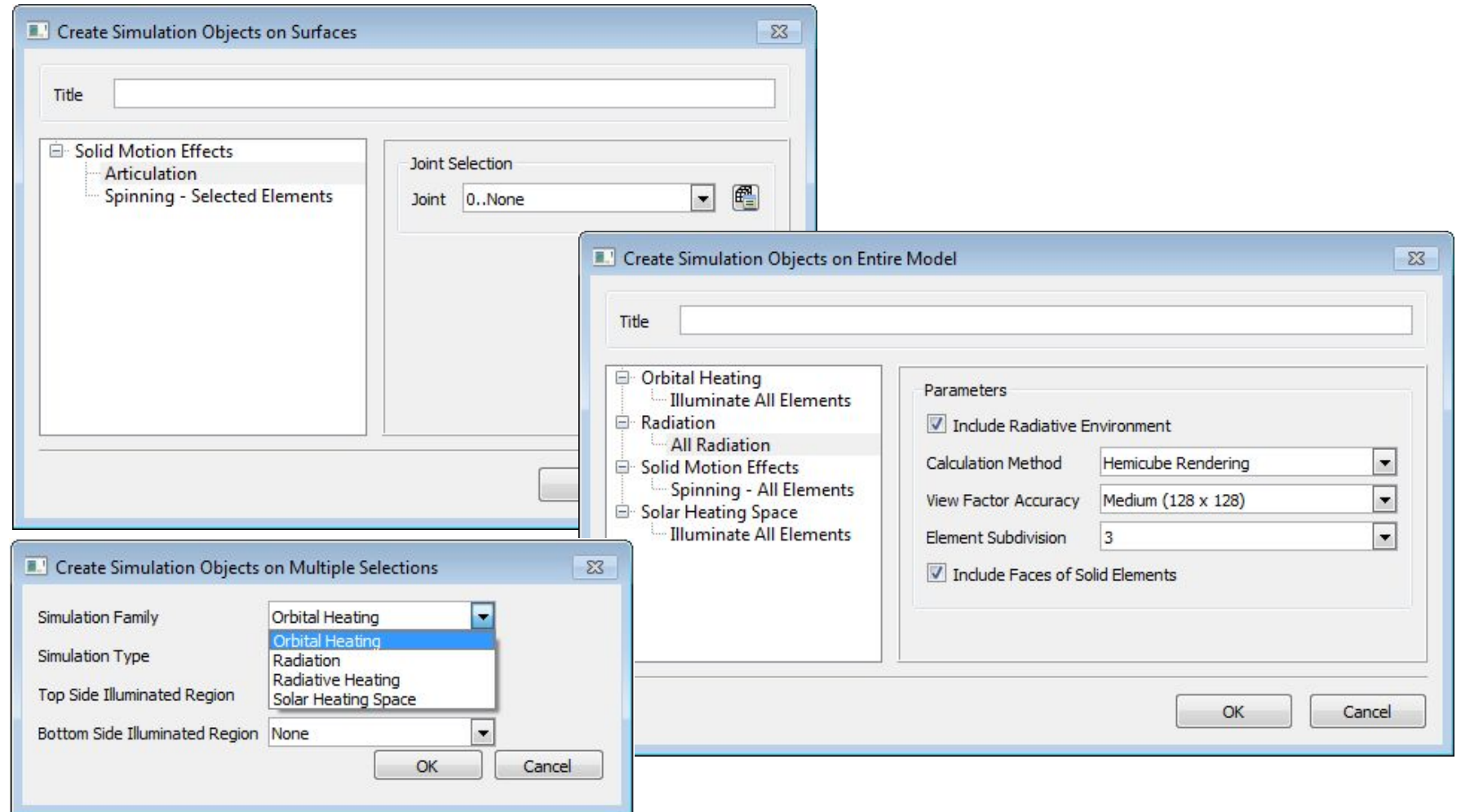 of Reference
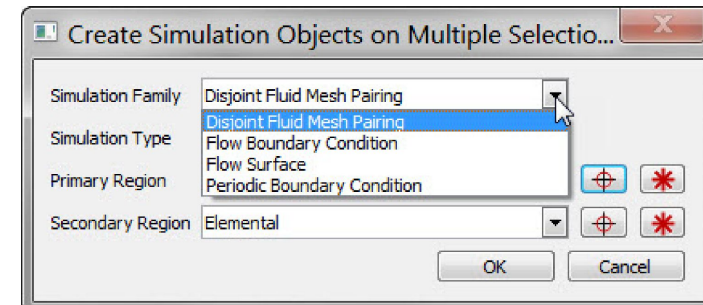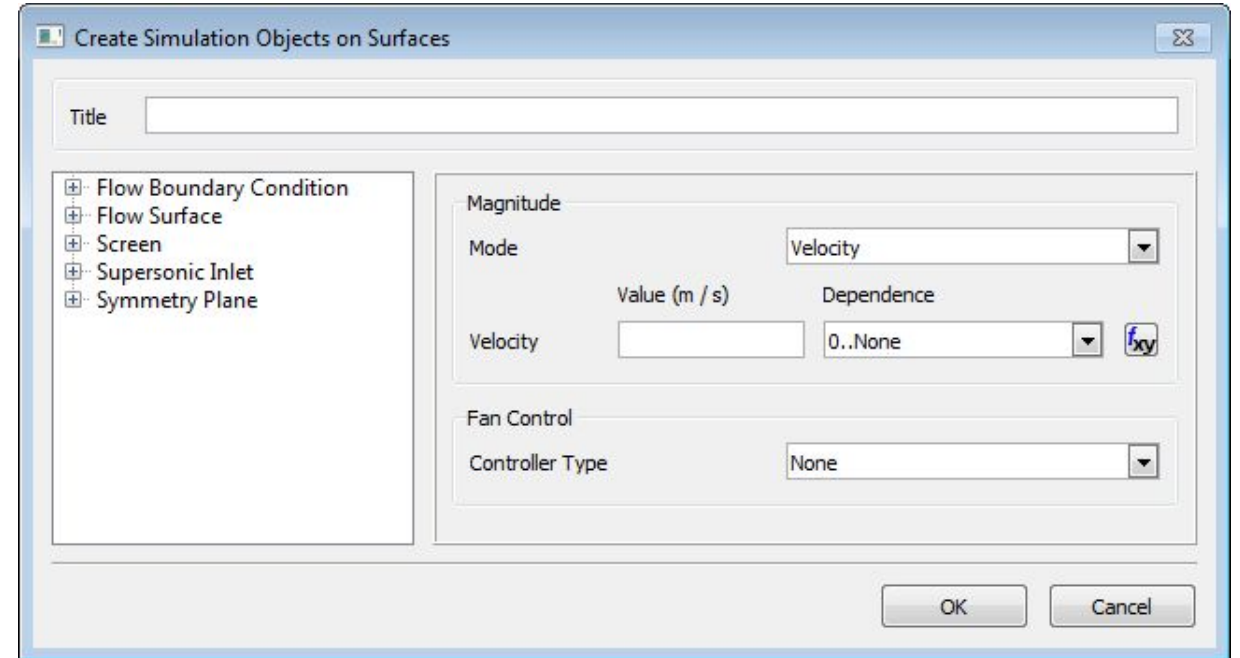
Single Selection
- Articulation
- Spinning

Multi-Selection
- Orbital Heating
- Radiation
- Radiative Heating
- Solar Heating Space

Entire Model
- Orbital Heating
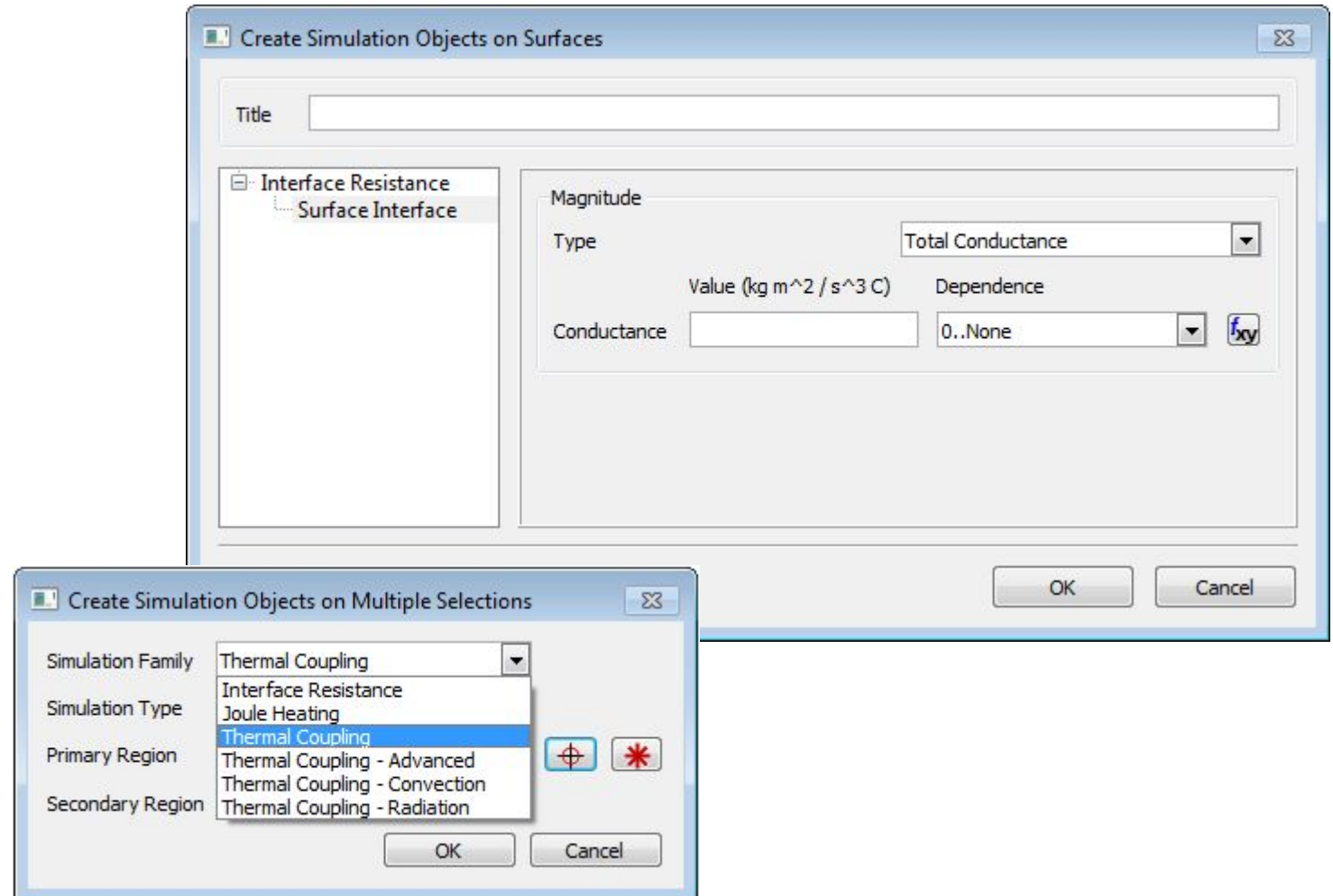- Radiation
- Solid Motion Spinning
- Solar Heating Space

Siemens PLM Software

Femap 11.4.2
Simulation Objects for Thermal Coupling

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Single Selection
- Interface Resistance

Multi-Selection
- Interface Resistance
- Joule Heating
- Thermal Coupling
- Thermal Coupling – Advanced
- Thermal Coupling – Convection
- Thermal Coupling – Radiation

Femap 11.4.2
Simulation Objects for General Definitions

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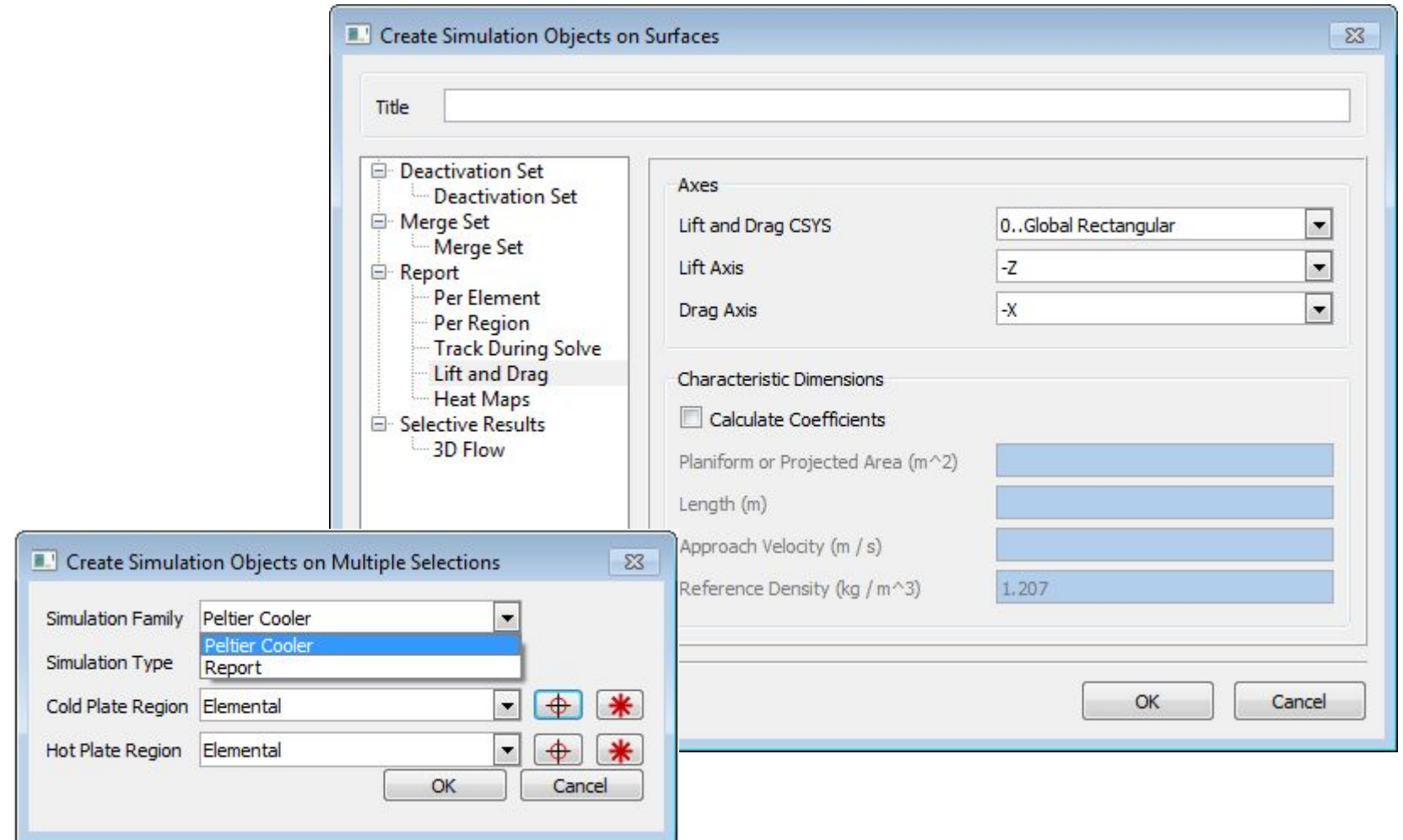*Ingenuity for life*

Single Selection
- Deactivation
- Merge Elements
- Report
- Selective Results

Multi-Selection
- Peltier Cooler
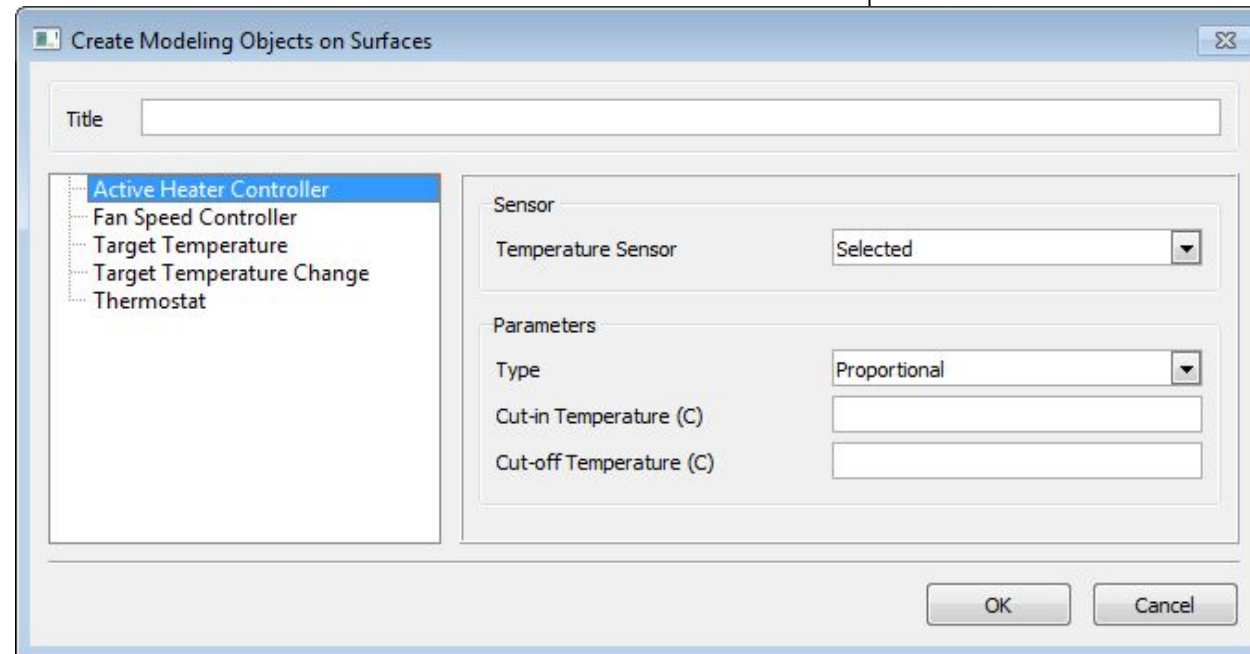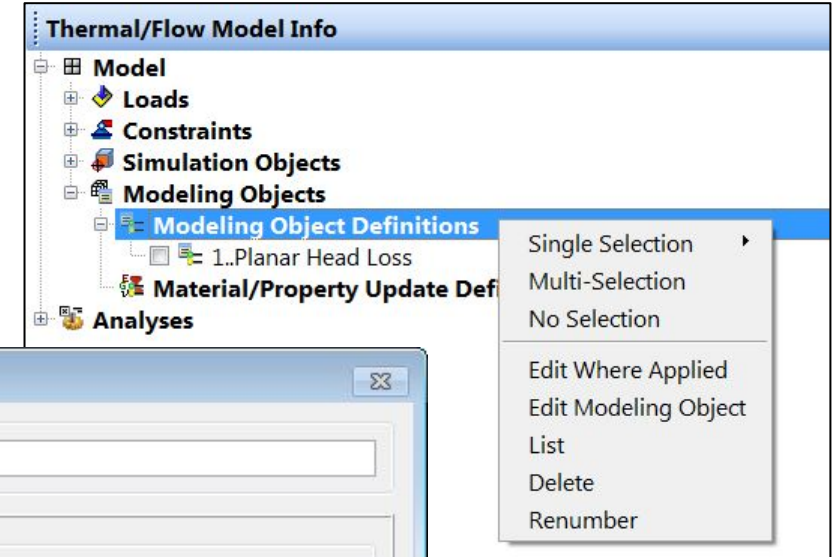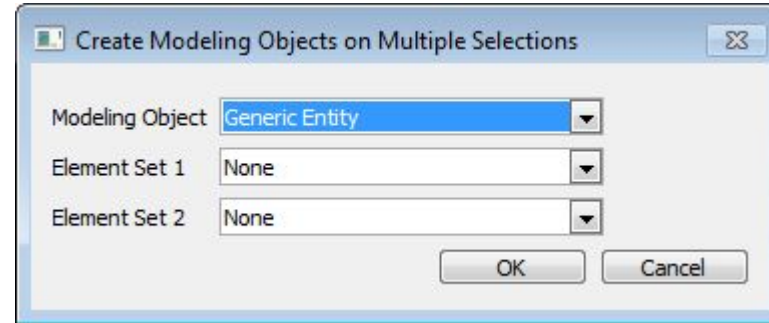- Report

Entire Model Selection
- Immiscible Fluid Report

Femap 11.4.2
Modeling Object Definitions

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Single Selection – Use to apply Modeling Object Definitions on Elements, Curves, Surfaces, Solids, or by Group
- Active Heater Controller
- Fan Speed Controller
- Target Temperature
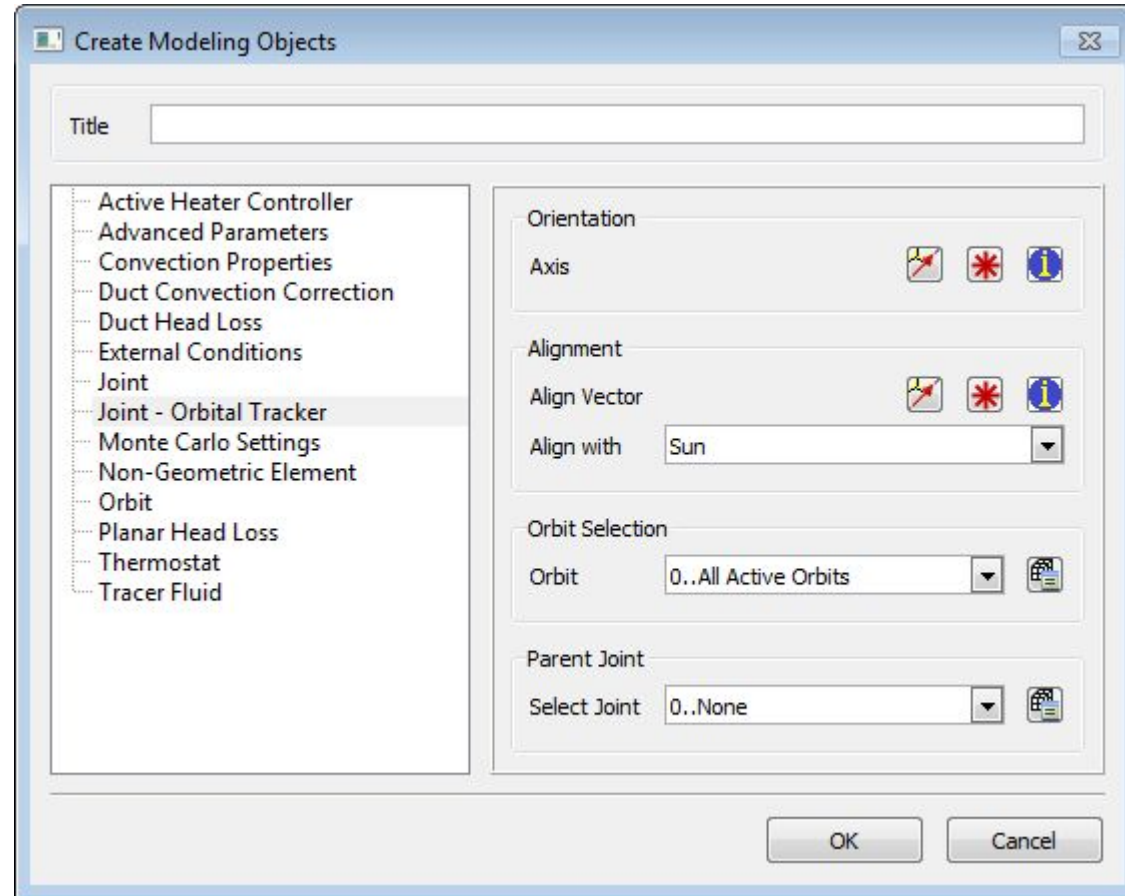- Target Temperature Between Time Steps

Multi-Selection
- Generic Entity

Create Modeling Objects on Multiple Selections

Modeling Object: Generic Entity
Element Set 1: None
Element Set 2: None
OK   Cancel

Thermal/Flow Model Info
- Model
  - Loads
  - Constraints
  - Simulation Objects
  - Modeling Objects
    - Modeling Object Definitions
      - 1..Planar Head Loss
    - Material/Property Update Defi
  - Analyses

Single Selection ▸
Multi-Selection
No Selection
Edit Where Applied
Edit Modeling Object
List
Delete
Renumber

Create Modeling Objects on Surfaces

Title:

Active Heater Controller
Fan Speed Controller
Target Temperature
Target Temperature Change
Thermostat

Sensor
Temperature Sensor: Selected

Parameters
Type: Proportional
Cut-in Temperature (C):
Cut-off Temperature (C):

OK   Cancel

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No Selection

- Active Heat Controller
- Advanced Parameters
- Convection Properties
- Duct Convection Correlation
- Duct Head Loss
- External Conditions
- Joint, Joint Orbital Tracker
- Monte Carlo Settings
- Non-geometric Entities
- Orbit
- Planar Head Loss
- Thermostat
- Tracer Fluid

Create Modeling Objects

Title

- Active Heater Controller
- Advanced Parameters
- Convection Properties
- Duct Convection Correction
- Duct Head Loss
- External Conditions
- Joint
- Joint - Orbital Tracker
- Monte Carlo Settings
- Non-Geometric Element
- Orbit
- Planar Head Loss
- Thermostat
- Tracer Fluid

Orientation

Axis

Alignment

Align Vector

Align with   Sun

Orbit Selection

Orbit   0..All Active Orbits

Parent Joint

Select Joint   0..None

OK   Cancel

Femap 11.4.2
Material/Property Update Definitions

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Single Selection – Use to apply Material/Property Update Definitions on Elements, Surfaces, or by Group
• Bottom Side

No Selection
• Ablation-Charring
• Homogeneous Gas Mixture
• Immiscible Fluid Mixture
• Multi-Layer Shell
• Non-Newtonian Fluid
• Stack Layer
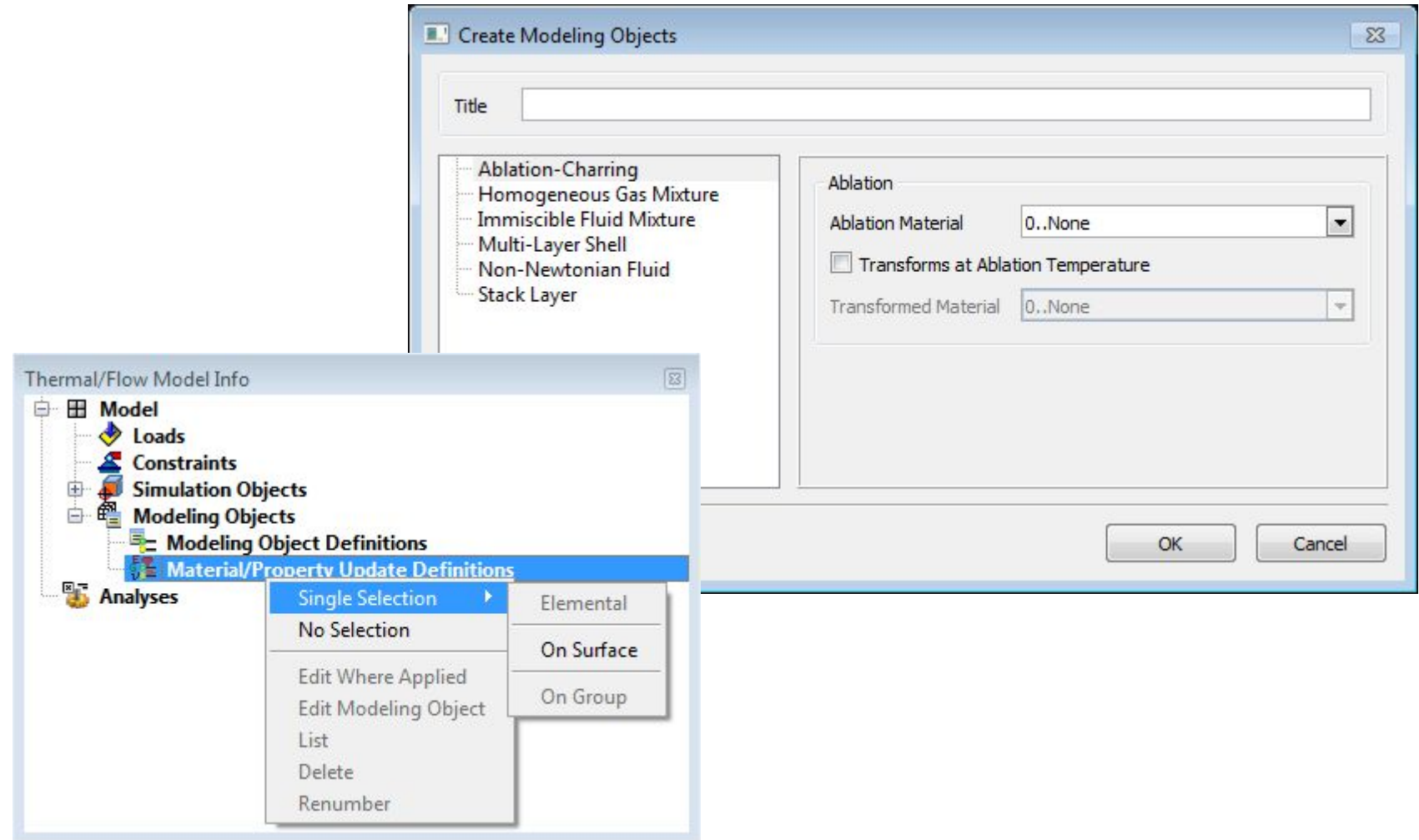
Femap 11.4.2
Thermal/Flow Analysis Setup

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Analysis Manager replaces multiple commands and dialog boxes:

Femap 11.4.2
Thermal/Flow Solver Enhancements

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Solvers synchronized with Simcenter 3D solvers

Flow
- Parallelized solver
- Extended two-equation turbulence models
- Large Eddy Simulation
- Fractional step scheme
- Enhanced second-order discretization schemes
- Enhanced freeze-flow and re-start options
- Static pressure and convective outflow boundary conditions

Thermal
- Parallelized solver
- Improved adaptive time stepping
- Enhanced thermal couplings
- Initial conditions from dissimilar meshes
- Thermostat and active heater controller reports
- Enhancement to transient end time options
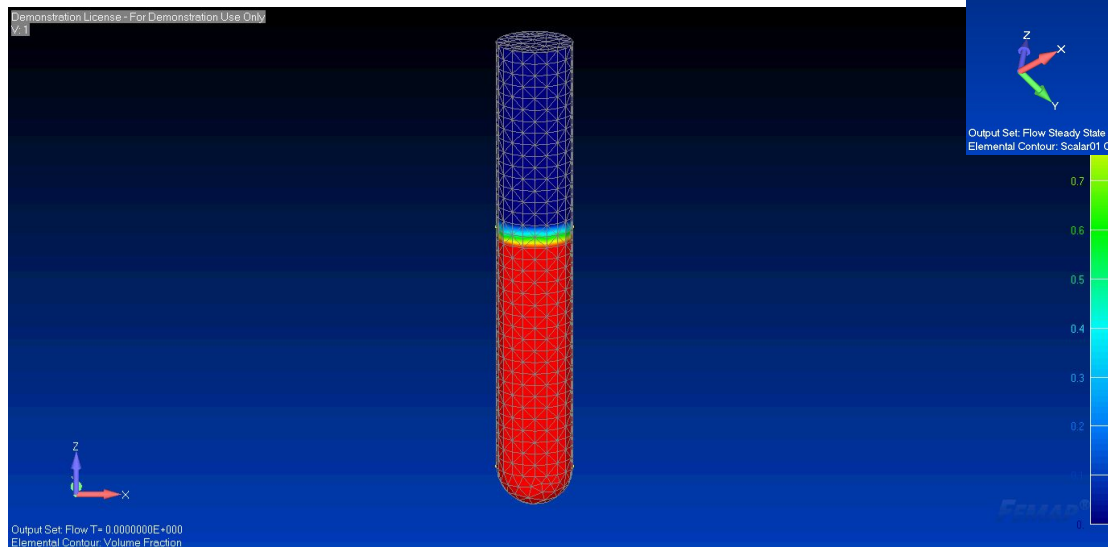- Hydraulic Networks

Advanced Thermal
- Enhanced Orbit Visualizer

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New capabilities

- Homogeneous gas mixtures

- Immiscible fluid mixtures (volume of fluid method)
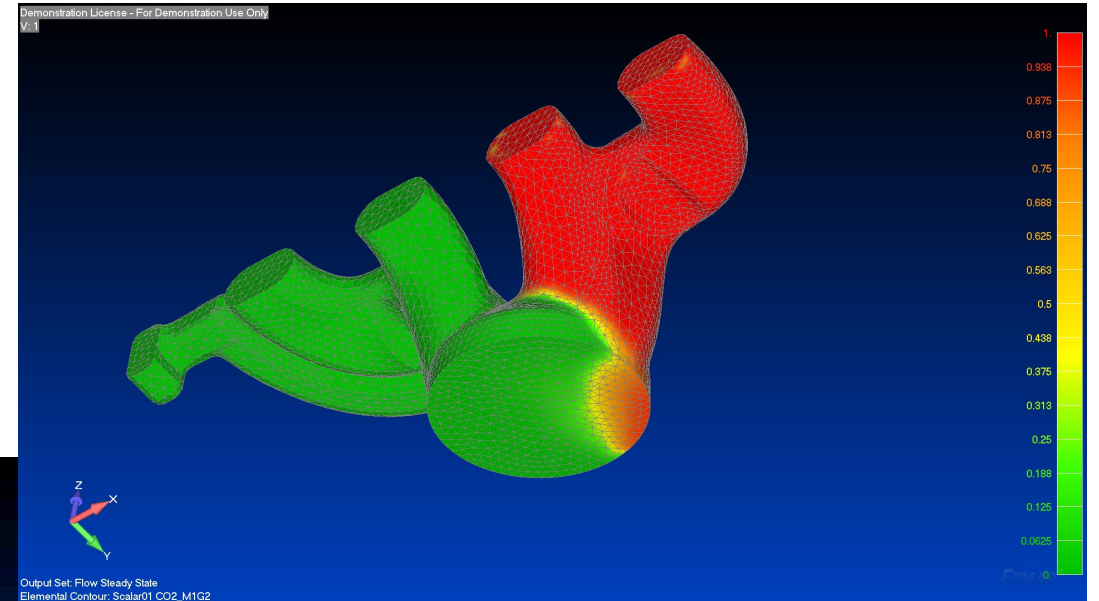
Femap 11.4.2
Parallel Processing

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Extended parallel processing from view factor calculation (available in previous releases) to entire solution sequence for thermal and flow runs

Distributed Memory Parallelization (DMP) of the thermal and flow solvers: parallel solution threads can separately access both CPU and RAM
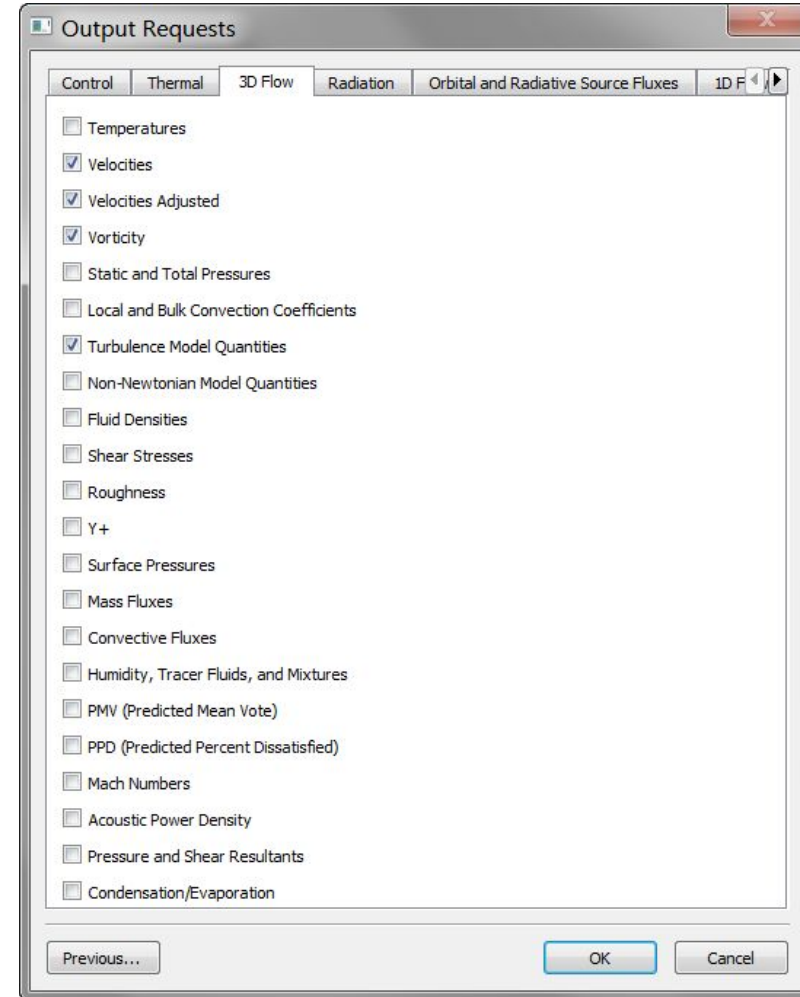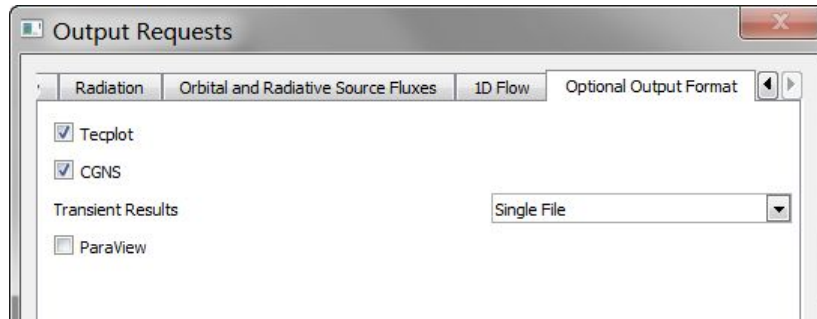
Up to 8 processes on a compute node can be executed with Femap Advanced Thermal and Femap Flow licenses for no extra cost
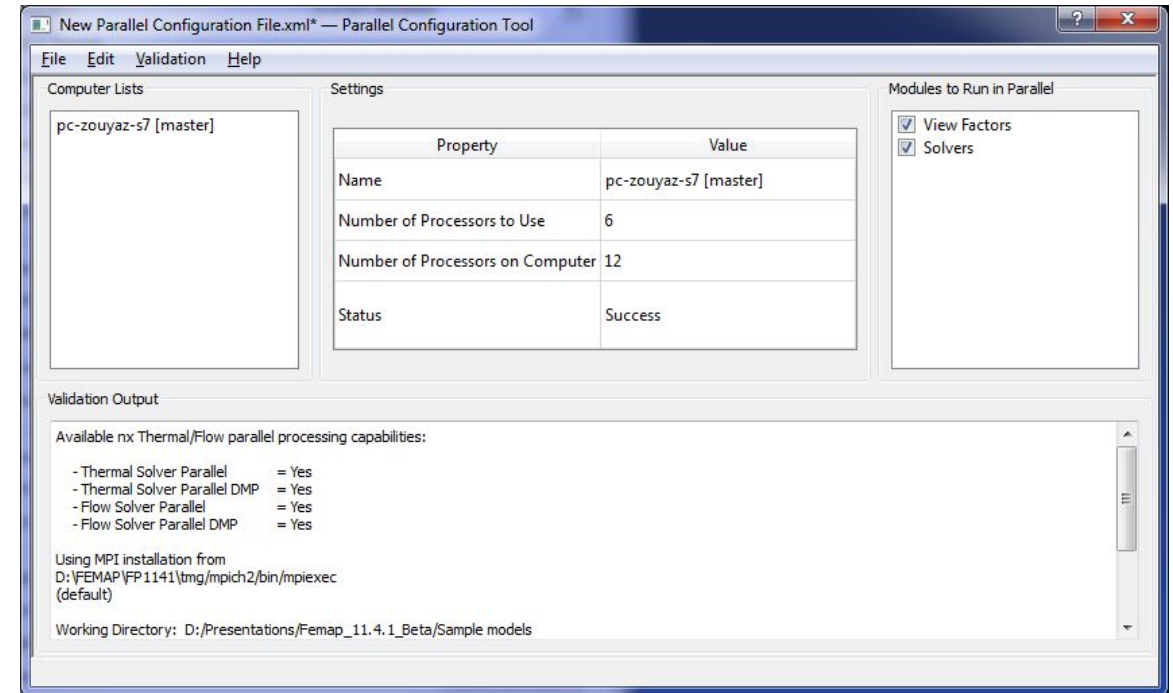
Femap 11.4.2
Simulation Results

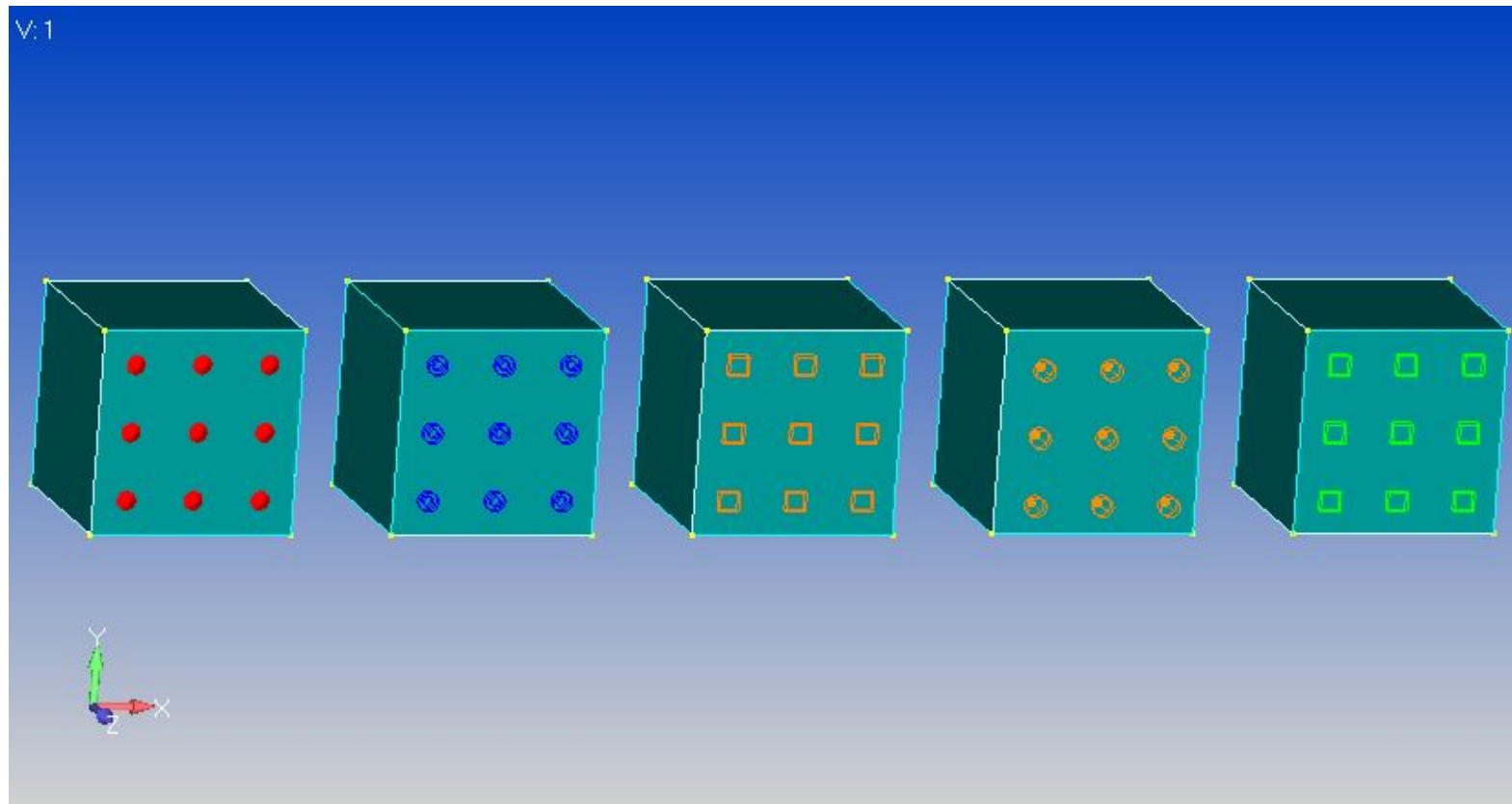Expanded results output options

Enhanced CGNS export

Femap 11.4.2
Boundary Condition Symbols

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Symbols for Boundary Conditions now appear in the graphics window
- Symbols vary based on type of boundary condition

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Visibility of Boundary Conditions controlled via "visibility check box" next to each individual Boundary Condition in the Thermal/Flow Model Info tree ("Constraint – Temperature" and "Simulation Object – Inlet Flow" hidden)
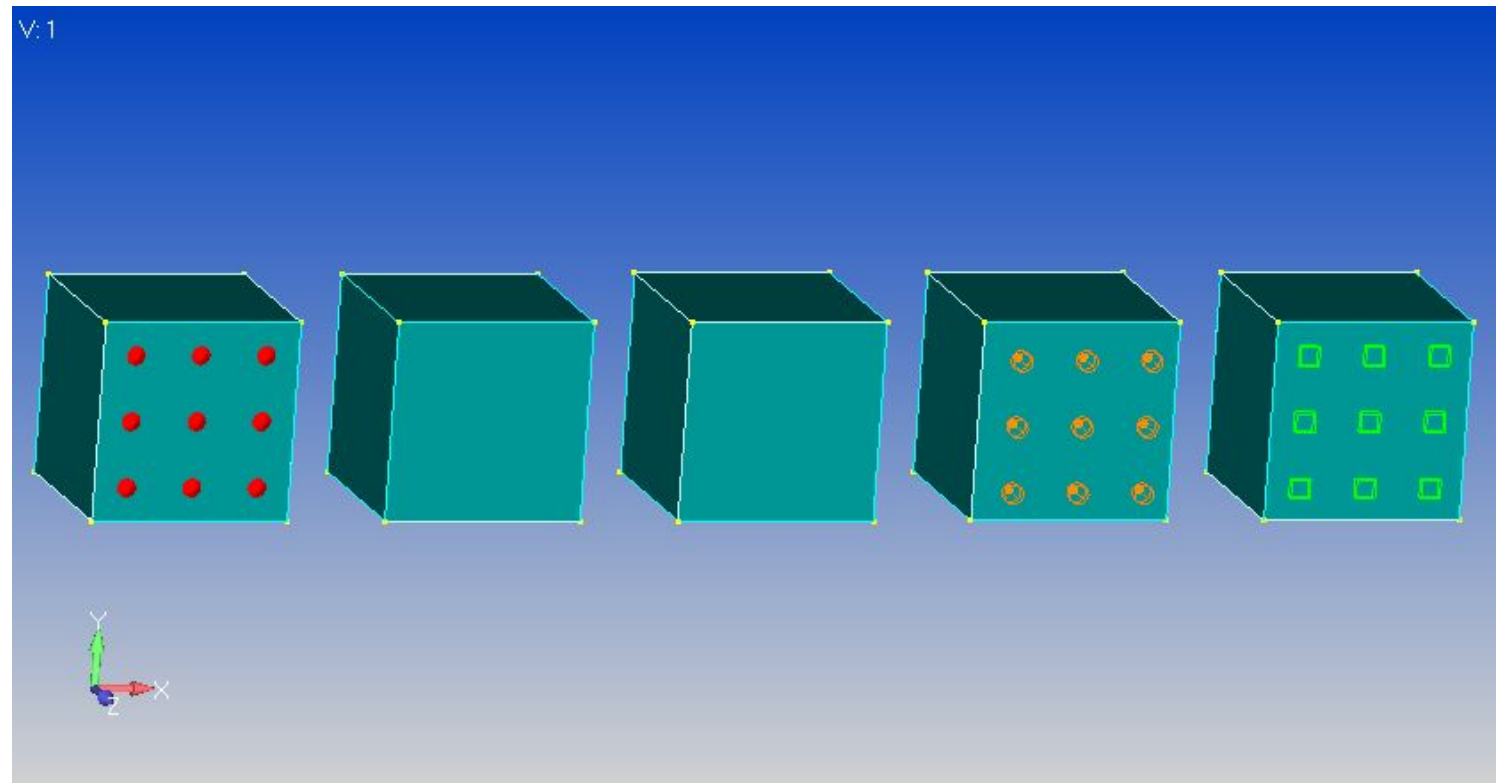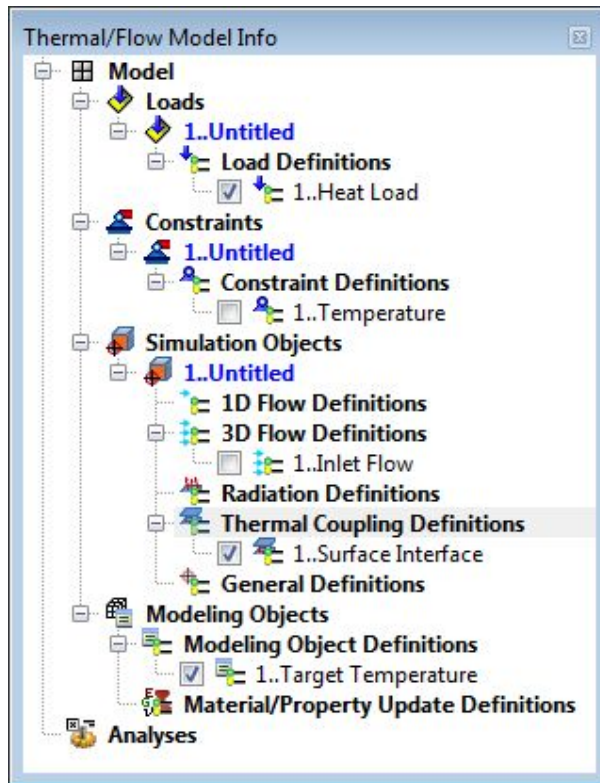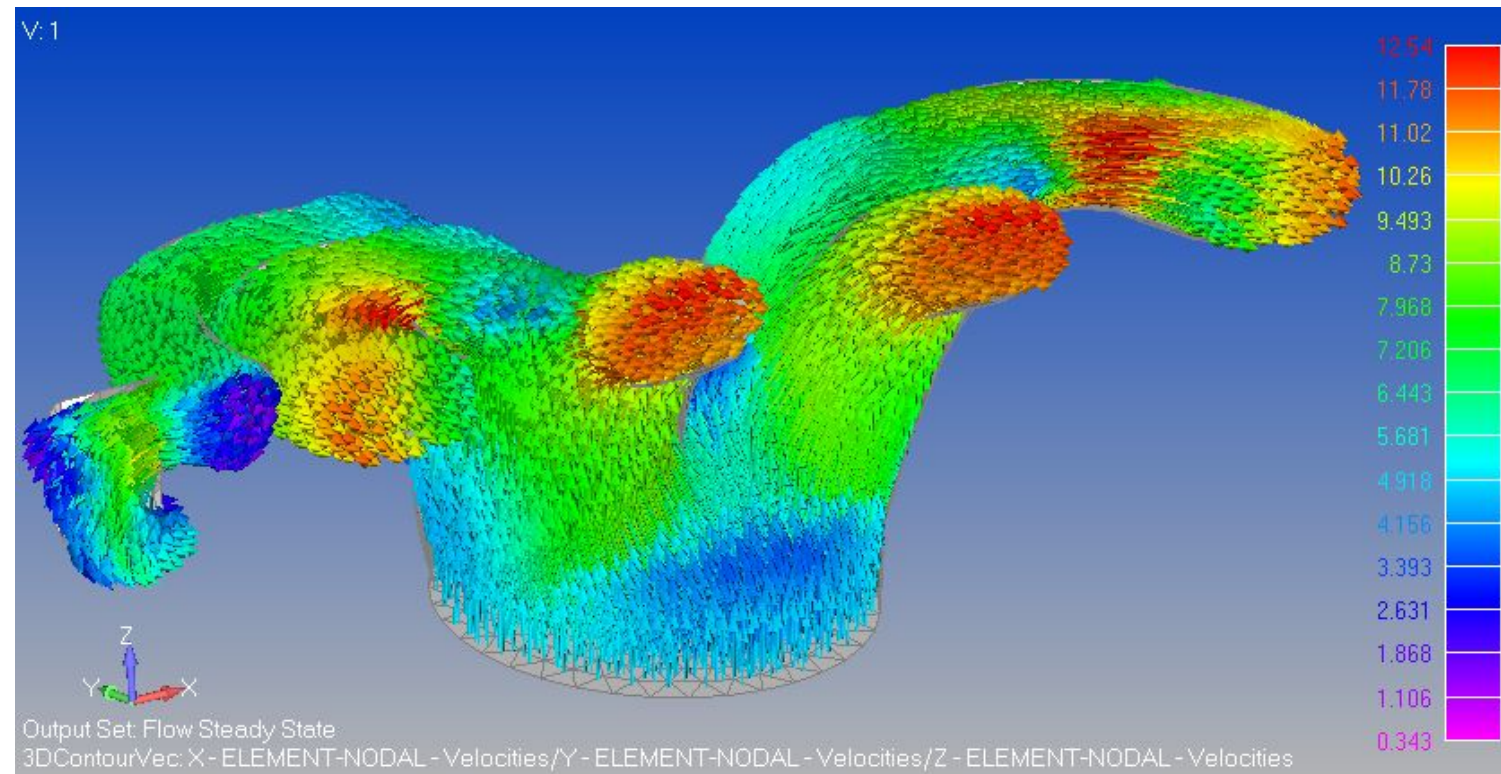
Femap 11.4.2
Contour Arrow Plots

Update of Contour Arrow plots in Femap 11.3.x have made creation of Contour Arrow plots much more robust and easier to create

- Select a *Total Vector* as the Contour Output vector to display an Arrow Plot of Flow Velocity

Femap 11.4.2
Q and A

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