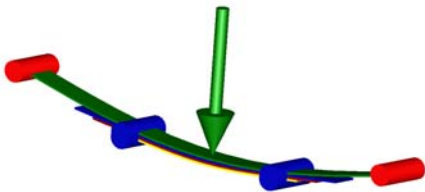# Modelling and Simulation of Rigid and Flexible Multibody Systems in Modelica
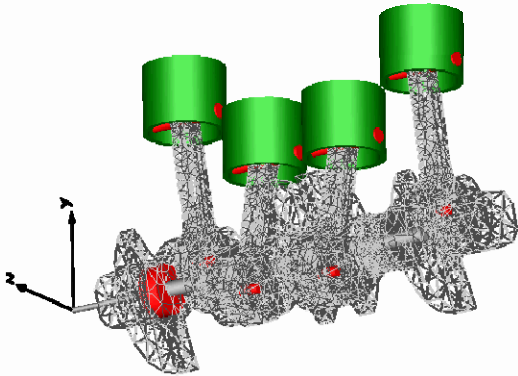
Tutorial with hands-on exercises

**Modelica' 2011
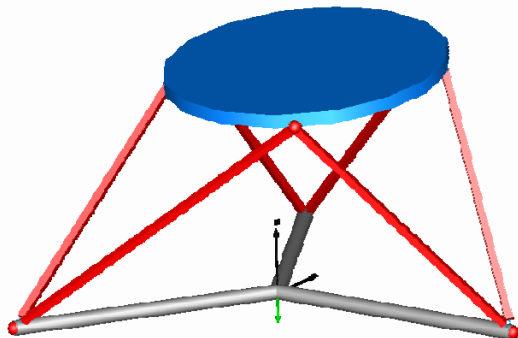The 8th Modelica User Conference 2011
Dresden, March 20th - 22nd, 2011**

Lecturer: Dr. Andreas Heckmann

Model of a leaf spring as a stack of 4 beams

As the first syllable already indicates mechanics is a major element of Mechatronics and quite often the mechanical components are even the core elements of a complex technical system. System design, analysis and control therefore rely on the capability of treating the dynamics of interconnected bodies influenced by various physical quantities.

To this aim the Modelica Multibody Library and the Modelica FlexibleBodies Library provide a range of modelling elements to describe rigid or flexible bodies respectively which may undergo large 3-dimensional translational and rotational displacements.

In addition to forces and accelerations the deformation field of flexible bodies may also be influenced by distributed quantities such as temperature and flow fields. That's why the new version of the Modelica FlexibleBodies Library provides an interface to introduce user-defined distributed forces into the equations of motion.

Model of a 4-cylinder combustion engine with crankshaft and rods as elastic components

The tutorial will give an introduction into these capabilities for people who have a back-ground in classical engineering mechanics, but not necessarily in multibody dynamics. In particular the goals of the tutorial are:
- To present the main modelling components of both libraries from the user's point of view
- To provide initial hands-on experience
- To describe the main underying concepts and their theoretical background
- To discuss essential details of the implementation
- To introduce the multifield interface

Rigid body model of a Steward platform