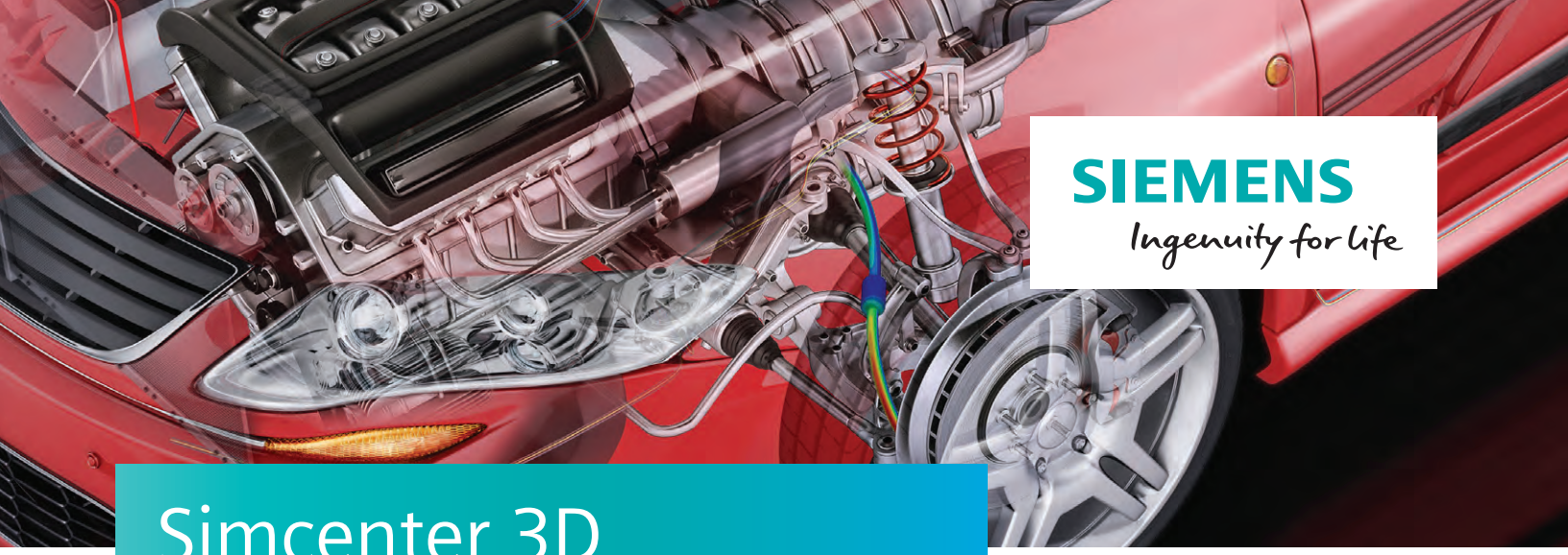


SIEMENS
Ingenuity for life

Simcenter 3D Flexible Pipe

Providing optimal design and routing of flexible hoses in standalone environment

Benefits

- Rapidly design flexible hoses and air/water pipes
- Embedded in your CAD environment
- Increase your product reliability by eliminating expensive iterations during the design process
- Avoid mounting/collision problems
- Detect crushing/buckling conditions prior to developing physical prototype
- Avoid loose connections and leakage by simulating dynamic (harmonic and transient) effects

Summary

Vehicle manufacturers are constantly trying to come up with more robust and cost-efficient solutions. Design cycles and overall time-to-market are becoming shorter and shorter. Pipe manufacturers must increase product reliability by eliminating expensive iterations during the design process. They want to check the key features of their pipes as soon as possible, including curvature, torsion, number of connectors and supports, detection of possible collisions, etc.

Simulate the mechanical behavior of pipes

Simcenter 3D Flexible Pipe software from Siemens PLM Software allows designers and mechanical engineers to perform advanced nonlinear mechanical simulation analyses of various types of flexible hoses and other pipes within your computer-aided design (CAD) environment.

Simcenter 3D Flexible Pipe is comprehensive and powerful software for analyzing pipes.

Simcenter 3D Flexible Pipe Beam

Beam elements are used to model different types of flexible pipes, such as brake hoses, steering, gearbox cables and air conditioning pipes.

During simulation the user defines the parameters of the pipe (such as length, diameter, material, connector position and orientation, stiffeners, spirals and supports) and how it is linked to the car kinematics (real configurations imported, for example, from Simcenter™ 3D Motion software). Then Simcenter 3D Flexible Pipe helps you calculate the deformed shape, curvature efforts and collision information for successive configurations. This simulation can be performed in the case of quasi-static loading or in dynamics (linear so you can check vibrations of a pipe linked to a vibrating car body, or full nonlinear so you can check the inertia effect on, for example, an off-road vehicle).

Simcenter 3D Flexible Pipe

Features

- Simcenter 3D Flexible Pipe is a scalable tool
  - Easy to switch between hypotheses
  - Different type of analyses: quasi-static, linear/nonlinear dynamic (space and time domain)
- Relaxation on boundary conditions (connectors and supports)
- Results available in CAD and CAE context
- Space/time-dependent pressure and temperature
- Kinematics as input: successive configurations
- Dedicated vertical application for geometry definition, mechanical analysis, meshing and the launch of the solver and postprocessing

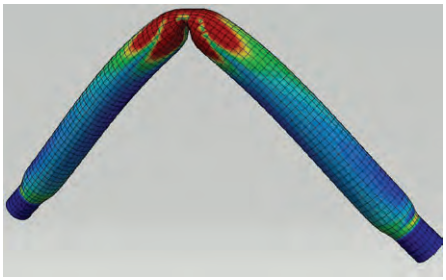
Simcenter 3D Flexible Pipe Shell

Multilayer shell elements are used to simulate air, water pipes, etc. After defining the initial geometry and material, the user performs a simulation taking into account the vulcanization process in the case of pre-shaped hoses. The eventual effect of internal pressure and motor displacements are calculated. Deformed positions of the pipe are displayed. This type of model can be used to precisely simulate ovalization or local buckling, leading to a precise calculation of the deformed geometry of the hose.

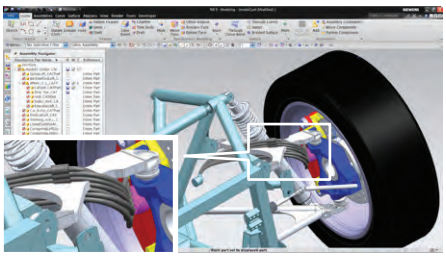
Graphical User Interface

Simcenter 3D Flexible Pipe is available in its own graphical environment for the modeling, nonlinear mechanical analysis and postprocessing of pipes. The results that can be postprocessed include deformed mesh, nodal normal distance, curvature, forces and moments on successive configurations. Deformed CAD geometries linked to the pipe can be generated.

Simcenter 3D Flexible Pipe benefits from advanced analysis visualization tools of the embedded GUI. Models and results may be exchanged easily with your CAD system through generic (STEP, IGES) or dedicated interfaces.



Pressurized hose buckling.



Successive hose positions subject to kinematics.

Siemens PLM Software
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