SIEMENS
Ingenuity for life

Simcenter 3D
Motion Flexible Bodies

Extend multibody capabilities to account for flexibility of bodies

Benefits
- Increase the accuracy of the predicted motion of mechanisms with flexible components
- Accurately predict the structural behavior of a body based on exact loads from connections in a mechanism

Summary
Simcenter™ 3D Motion Flexible Bodies software helps increase the accuracy of multibody models by considering component deformations during motion simulation of mechanisms. This approach allows you to combine the standard multibody simulation technology with a representation of the flexibility of one or more bodies through a set of deformation modes, previously calculated by a finite element analysis tool. This approximates the deformation of a body with a usually limited number of additional degrees of freedom, for the best compromise between accuracy of results and computational efforts. When solving the whole mechanism, the exact boundary conditions are applied to any flexible bodies in terms of connection loads and restraints. This ensures the best possible prediction of the structural behavior of any part in the mechanism.

Details
Simcenter 3D can start from any computer-aided design (CAD) geometry associated to a body to create the mesh. The mesh definition and the setup of the preliminary modal analysis can be for both MSC® Nastran® and NX™ Nastran.
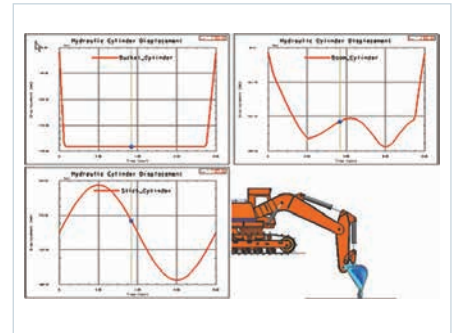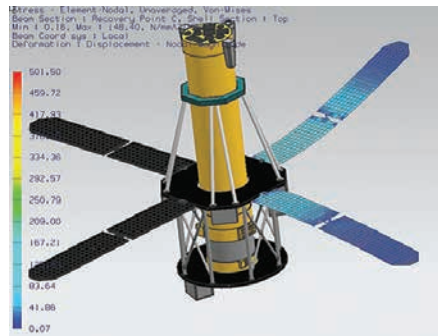
The software includes easy-to-use features for interactive creation of boundary conditions and parameters for modal analysis, such as grid point identifier, active degrees of freedom, position and orientation information on the attachment point, and more.

After the analysis definition, you can seamlessly export the input deck and launch the solver. At the attachment of the results file (or after import), Simcenter 3D automatically positions the modal grid according to the body, based on the interface points. You can then further edit the mode set, for example by selecting/deselecting modes, setting damping for individual modes, or changing high-frequency modes for optimizing the calculation time.
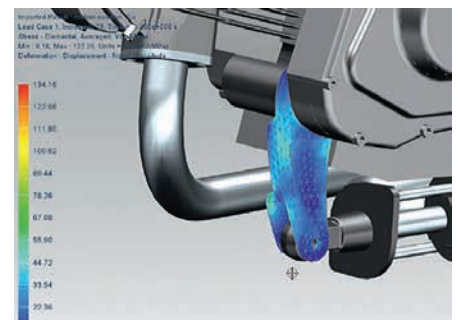
After using the flexible modes in a motion calculation, structural results can be visualized by animating the motion of the complete mechanism with the exact deformation of flexible bodies at any simulation time step, as well as the distribution of structural results in each flexible body such as strains, stresses and more.

Other animation tools include interference detection between any flexible body and the rest of the mechanism. All structural results are also made available as standard outputs from the mechanism for graphing purposes, for example to plot the stress in any selected element of the flexible body during the simulation time.