

## **Product Highlights**

- Process oriented, feature based finite element modeling software
- Automated mesh generation without CAD geometry cleanup
- Reusable mesh specifications at feature level; for example fillets, cylinders, holes
- Templates for contact detection, bolt and crankshaft modeling
- Automation of individual operations and processes such as DOE
- Solver interfaces include OptiStruct, Abaqus, Nastran and PERMAS



Automated Durability Engine Analysis from CAD to Bore Distortion in 24 hours



Automated Transmission NVH Analysis from CAD to Vibration Results in 24 hours

# **SimLab**<sup>®</sup>

## Simplified Modeling Solution for Complex Analysis Problems

SimLab is a process oriented, feature based finite element modeling software that allows you to quickly and accurately simulate engineering behavior of complex assemblies. SimLab automates simulation-modeling tasks to reduce human errors and time spent manually creating finite element models and interpreting results. SimLab is not a traditional off-the-shelf pre- and post-processing software but a vertical application development platform for capturing and automating simulation processes.

### **Benefits**

Highly efficient, feature based, modeling approach

- Improves modeling repeatability and quality
- Directly identifies geometry features inside of the CAD environment such as fillets, gaskets or cylinders.

Automates modeling tasks for complex assemblies

- Meshing
- · Assembly of parts and components
- Mesh generation for mating surfaces of an assembly
- Part connections

Eliminates tedious CAD geometry clean-up and removes geometry translation errors

Accelerates CAE model development for complex assemblies

- Employs an advanced template based meshing process
- Removes manual mesh clean-up
- Simplifies load and boundary condition definition and generation

Simplified model and assembly modifications

- · Part replacement
- · Add or modify ribs within solid models
- Change fillet / cylinder / hole properties
- · Local model morphing

Fast access to model parameters of DoE studies

# **Capabilities**

#### Meshing

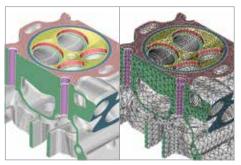
SimLab takes a different approach to generating a high quality mesh. It transfers the features from the CAD model, such as fillets and cylinders, to the finite element model. These features can be used in a later step in the process without the need to access the original CAD geometry again.

For volume meshing with hex or tetra elements the SimLab approach is to create a high quality surface mesh for every component of an assembly first. The surface mesh is then used to generate a volume mesh keeping the quality of the mesh on the surface.

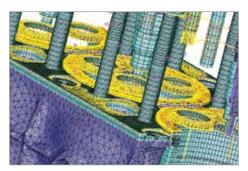
There are many unique and useful tools for generating various types of meshes within SimLab. A template system pulls all of these tools together into streamlined and automated processes geared towards generating the highest quality mesh that adheres to requirements of any analysis type: NVH, durability, fatigue, CFD and more.

Automated mesh generation

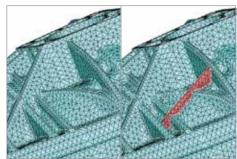
- Tetra and hexa meshing of solids
- · Quad and tria meshing of surfaces
- 1D mesh creation for joining parts and contact surfaces



Quickly Mesh Complex Assemblies Using Templates



Automatic, Template-Based, Contact Creation



Easily Create, Edit or Translate a Rib

#### Feature based meshing

- · Automatically identifies CAD features
- Applies template criteria to mesh creation of features; for example, cylinders, fillets, holes
- · Automatic recognition of contact surfaces
- Analysis and Criteria based meshing uses templates and captured knowledge to generate appropriate meshes for each analysis type; such as, stress, NVH, acoustic, fatigue, and others

#### Geometry

SimLab uses a unique methodology in working with CAD geometry to generate an accurate mesh quickly. The processes used by SimLab make it possible to eliminate all geometry clean-up which enables users to focus on the mesh generation procedures instead of healing poor geometry.

SimLab contains routines to directly access the native geometry of the following CAD systems:

- CATIA V5
- Pro/Engineer
- UG
- Any Parasolid based CAD systems such as SolidsWorks, SolidEdge, etc.

For CATIA and Pro/Engineer SimLab can access the geometry on Linux and Windows platforms, including model features, parameters and topology information

#### **Assemblies**

The typical analysis today requires not just an individual component but an assembly, a full system of components. Assemblies can be very time consuming for positioning components, determining contact areas, making nodes coincident and connecting individual parts. SimLab provides several simple and robust tools making it easy to generate a complete assembly of components for finite element analysis. These tools can reduce the time spent in the assembly by a factor of 5 or more.

Managing Assemblies

- Robust and comprehensive tool-set for handling a full system of components.
- Recognition of mating components and contact surfaces
- Quickly automates assigning of boundary conditions to many groups within an assembly
- Automatic re-meshing of contact areas to ensure coincident nodes
- · Library of common connecting elements

#### Loads and boundary conditions

When working with complex models and assemblies the average model size can easily reach millions of elements and nodes. At this point it is no longer practical to apply boundary conditions on an individual node or element basis.

SimLab provides a host of advanced tools and utilities that guide users through automated processes to manage this task easily.

#### **Process oriented features**

- Conversion of results from a fine to a coarse mesh and from a coarse to a fine mesh
- · Applying distributed bearing pressure
- · Menu driven modeling of bearings
- Positioning of spatially displaced result fields onto the model. (Example, thermal analysis results onto a structural model)
- · Automated templates for
  - Bolt modeling
  - Gasket, bearing loads and joint modeling
  - Mass property idealization
  - External material and property based connections
  - Contact detection (between parts) and modeling of the contacts



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