

# Simulation

Easy-to-use and tightly integrated motion simulation and stress analysis in the Autodesk® Inventor® Professional software help you predict how the design will work under real-world conditions before building it.

A comprehensive simulation environment provides support for motion simulation and static and modal finite element analysis (FEA) at both the part and assembly level. Results from dynamic simulation allow engineers to use FEA more effectively by leveraging the reaction forces to set up the conditions for finite element stress analysis.

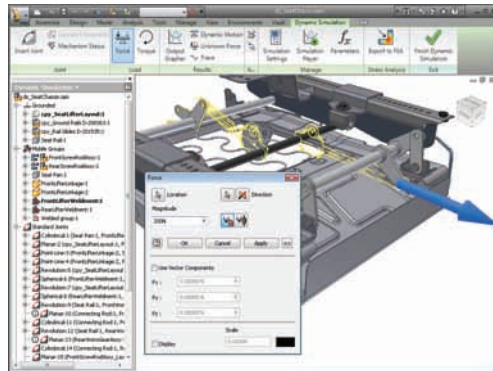
## Integrated Motion Simulation

Use motion simulation—not intuition—to enhance your design decisions. The motion simulation feature in Autodesk Inventor software uses the assembly constraints in your 3D model to identify relevant rigid bodies, generate correct motion joints, and compute dynamic behavior. This helps you to quickly understand the design's behaviors, including the position, velocity, and accelerations of the moving parts.



## Load Definition

Apply different driving loads and torques as well as time-based force functions using the Load Profile editor. Use this tool to investigate the design's performance under a range of different load conditions.



## Integrated FEA

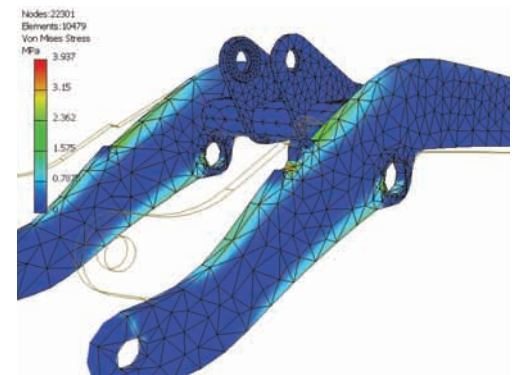
Increase the accuracy and reliability of your design stress analysis. Use integrated FEA to predict stress and deflection with accurate peak loads by transferring reaction forces from simulation time steps to AIP stress analysis.

## Adaptive Solver

Conduct finite element studies faster and apply the results sooner. Adaptive solver technology and localized tuning algorithms within Inventor give you accurate results more quickly.

## Static Analysis

Make sure your designs are strong enough while avoiding over-designing. Examine the deformation of parts and assemblies under static loads to determine maximum and minimum stresses and deflections. At the same time, you can help assure designs meet the necessary safety standards.



# Simulation

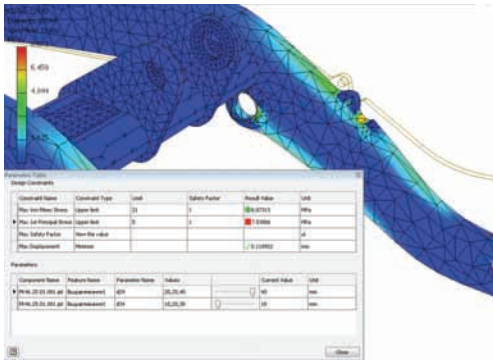
Optimize and validate product performance before the product is built. Because these tools are part of the 3D design software, it's practical and cost-effective to employ simulation throughout the design process.

## Modal Analysis

Prevent annoying and potentially hazardous vibrations without having to build and test physical prototypes. Use studies of oscillating modes to explore the vibrations and natural frequencies of the parts or assemblies within your design. Then make changes that reduce the amplitude of oscillations.

## Parametric Studies

Improve the structural performance of your designs. Use the Parameter Table tool to create parametric studies of design constraints and understand the effect of different parameter values. You'll be able to explore the impact of changes, such as wall thickness, fillet radius, and hole diameter, to your design.



## Optimization Studies

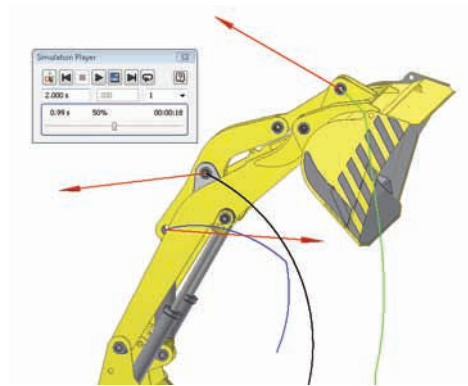
Find the best design solution without having to investigate an excessive number of options. When you conduct optimization studies, Inventor automatically seeks parameter values that meet your design criteria.

## Design Update

Quickly apply the results of simulation studies to your 3D model. You can select new parameter values from parametric and optimization studies. The Promote tool automatically modifies the assemblies and parts within your model.

## Point Trace

Easily calculate motion paths and save time by simplifying the design of cams, grooved paths, and other motion-dependent components. Select any point in the model and use the Trace tool to display the point's location at each step in the motion simulation. Using Inventor, you can also save simulation outputs, including path traces and assembly positions, for use in part and assembly design.



## FEA Environment Definition

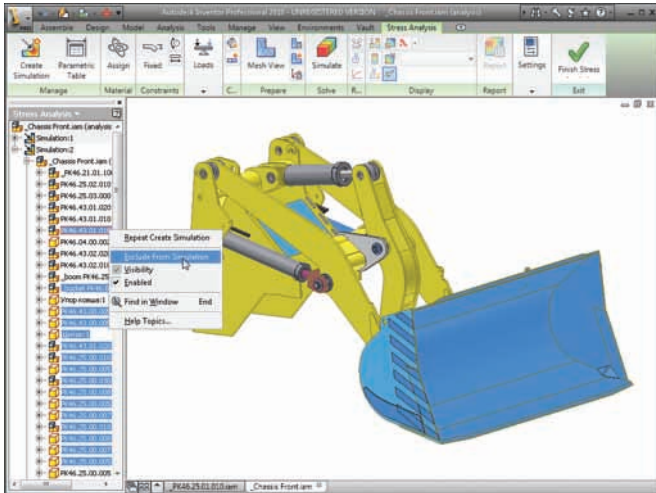
Spend more time analyzing performance and less time preparing the analysis. Inventor gives you full control over materials, loads, constraints, contacts, mesh, solution quality, representations, and component visibility. Automatic and manual contact definition and support for multiple simulations also provide you with definition control.

# Simulation

Autodesk Inventor Professional gives you the tools to record your engineering decisions and share the results of simulation with team members - allowing you to derive maximum benefit from your digital prototypes.

## Model Simplification

Reduce the time required to generate results from stress analysis by simplifying part geometry to suppress features during FEA.

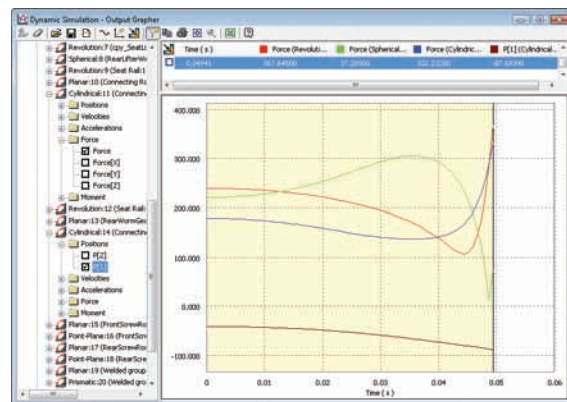


## Visualization

Interpret the behavior and performance of your design more fully. Watch as Inventor software provides animated visualizations of your 3D model. These accurate visualizations are based on the underlying physics models and load conditions applied to the design.

## Graphing

Use the comprehensive graphing capability in Inventor to quickly investigate how the dynamic characteristics of your design vary through its operating cycle. Plot physical parameters—such as position, force, and acceleration—versus time. Compare different properties at each point in the simulation cycle, using multiple plots on the same graph.



## Analysis Output

Select different ways to view analysis results to make it easier to understand and visualize complex problems. Your analysis visualization options include smooth and contour color plots, mesh plots, animation, and interactive probes. You can focus on specific components of the design by selecting other components and hiding them from view.

## Report Generation

Easily share and record the results of your analysis. Inventor includes a custom report generator with embedded graphics.

## Microsoft Excel Output

Export XY plot data to Microsoft® Excel® worksheets to analyze simulations and incorporate results in presentations and reports.