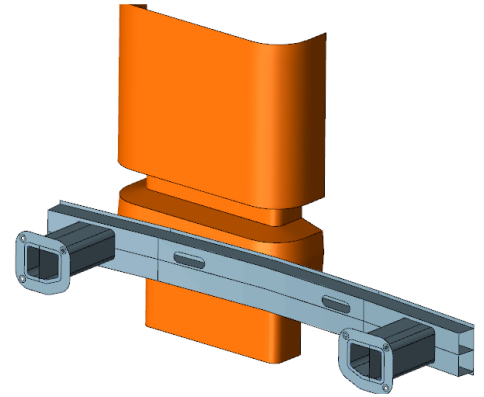
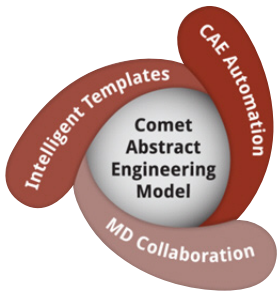


# COMET SIMAPPS™

CAE Automation that Works!



## Leverage Intelligent Simulation Automation



Comet SimApps allow users to run fully-automated simulation processes across multiple tools and disciplines, working robustly across an entire family of products. These solution-focused applications are being safely used by engineers and designers, with little or no expertise in the underlying tools, going from CAD to Reports in a single click – efficiency gains >80% are common.

Web-Deployed SimApps capture expert knowledge and globally enforce best practices. Starting with parametric analysis CAD, users can modify every aspect of their design parametrically from within SimApps, going from CAD to Reports in a single click. Given this level of automation, parameter studies and optimization are easily automated, driving all aspects of the design including geometry and configuration changes.

Glen Steyer, Executive Director of Product Engineering for American Axle & Manufacturing, Inc. (AAM), reports that the use of one Comet SimApp resulted in: improved quality by removing human error, a dramatic time reduction, and \$130,000 annual cost savings at a single engineering site.

## Capture Expert Knowledge

The Comet SimApp Authoring Workspace enables creation of deployable Solution-Focused Applications for simulation known as SimApps. The core of SimApps is the Comet Abstract Engineering Model as the basis of Intelligent Templates which are created by simulation domain experts to define simulation parameters, behavior, tools and processes and are then deployed as Comet SimApps. This novel Intelligent Template based approach results in unprecedented reuse, extensibility, traceability and robustness related to simulation automation.

- Automate your simulation process
- Embed expert knowledge
- Rapidly analyze design variants for better design decisions
- Perform parametric design studies
- Manage the history and traceability of the simulation data
- Deploy broadly within the product development team
- Generate consistent results – wherever, whenever

Intelligent Templates define simulation processes in a geometry and fidelity independent manner specifying input, output, mesh and model parameters, load cases, boundary conditions, data flow between tools, report generation, and a dashboard for straightforward review of the performance of design options. Comet SimApps facilitate Simulation-Driven Design decisions.

## Reuse “Best Practices”

Comet SimApps are suitable for use by everyone from CAE experts to design engineers always generating dependable results for Simulation-Driven Design decisions. The Comet team has built, tested, and deployed desktop and web browser based solutions that put the power of sophisticated CAE analysis safely into the hands of a broad range of users transforming the promise of Simulation Driven Design into realizable business benefits.

Glen Steyer, AAM's Executive Director of Product Engineering, also reports that the use of a Comet SimApp resulted in: the ability to redeploy resources as less experienced engineers are now able to safely run simulations and the ability to run many more NVH analysis iterations, leading to better design decisions, earlier.

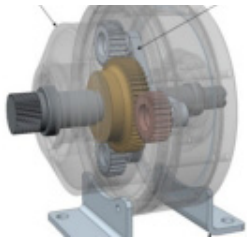
# COMET SIMAPPS™

## CAE Automation that Works!

Working closely with leading organizations in many industries and incorporating the knowledge of recognized domain experts, Comet Solutions has developed multiple solution-focused Comet SimApps that deliver dramatic productivity improvements, and enable broader use of Simulation Driven Design.

Dr. David Thomas, Senior Project Engineer, The Aerospace Corporation states, "The Comet-enabled process allows an interdisciplinary analysis that formerly took several days or weeks to perform to be completed in a single day. The savings in cost and schedule, due to this dramatic reduction in design evaluation cycle time, were substantial."

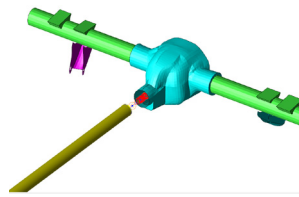
### Gearbox



Comet's Gearbox solution consists of a comprehensive suite of solution-specific SimApps designed to integrate the broad spectrum of tools used throughout Gearbox development: CAD, FEA, Multibody Dynamics, Gear/Bearing Simulation,

and CFD. Gearbox SimApps provide an automated solution allowing manufacturers to predict and optimize performance in the areas of Acoustics/Vibration/Dynamics, Durability/Reliability, Efficiency, and Cost/Weight management.

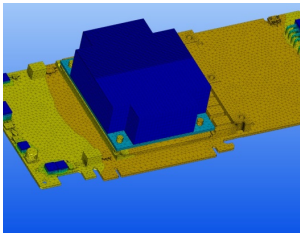
### Driveline NVH



The Driveline NVH SimApp provides a single environment offering comprehensive simulation capabilities for reliable and efficient evaluation of any driveline system NVH performance. It leverages parameterized mixed

fidelity representations of driveline components and subsystems to fully automate NVH analysis.

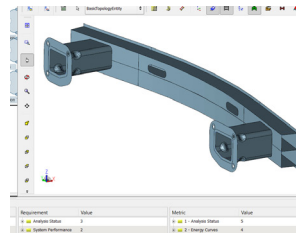
### Socket Stackup



The Socket Stackup SimApp automates the shaker table dynamics virtual testing of semiconductor circuit boards. This Comet SimApp makes it easy for engineers and designers, not just CAE experts, to

perform sophisticated analysis in order to determine the reliability of the socket stack connectors under adverse conditions.

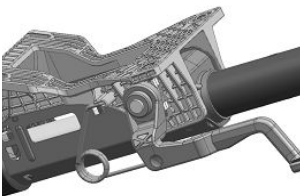
### Bumper Analysis



The Bumper Analysis SimApp sets up and utilizes predefined libraries of bumper impact load cases to fully automate the configuration and analysis of bumper systems. This application establishes a single environment for

bumper system design that allows quick and easy evaluation of any bumper geometry against all required load cases, without error prone manual effort.

### Steering Column



The Steering Column SimApp provides a single environment for reliable and efficient evaluation of automotive Steering Column behavior and performance. It leverages domain expertise embedded in Intelligent

Templates as parameterized representations of Steering Column components and subsystems enabling Simulation-Driven Design by non CAE experts.

### Steering Knuckle



With the Comet Steering Knuckle SimApp, engineers can automate repetitive tasks and focus more of their effort on optimizing the design for the task at hand. Deployed as a web application, the Comet Steering Knuckle Sim App quickly analyzes multiple

designs in a similar fashion.

## Brake Analysis



The Brake Analysis SimApp uses Expert methods for Finite Element Analysis (FEA) embedded into Intelligent Templates automating the design and analysis of automotive brake systems. End-users who are not CAE experts

do not need to learn complex CAE tools to perform the sophisticated engineering analysis necessary to attain accurate results for finding a brake design that meets requirements.

## Rack & Pinion Steering



Comet's Rack & Pinion Steering SimApp predicts the performance of rack and pinion steering systems subjected to a series of standard loading conditions. This SimApp takes advantage of Comet's unique capability to define

parametric libraries of low fidelity components that allow easy integration and reuse.

## Metallic Seal Calculator



The Metallic Seal Calculator SimApp allows users to select their seal within a library, change their defining dimensions, and analyze the new design by submitting it to a series of pressure and temperature loads simulating the various operating modes. In collaboration with engineering

experts in the Aerospace industry, a Comet intelligent template was developed to ensure the latest methods were captured and embedded.

## Flat Spring Calculator



The Comet Flat Spring Calculator SimApp allows designers and non-expert users to safely perform simulations. The web application embeds a Comet Intelligent template that ensures the engineering best practices

developed by the company's experts are captured and applied. Users can choose the design from a library of existing springs, but they also are able to upload and validate their own designs.

## EO Sensor Analysis



Comet has developed a SimApp that has made a significant advance in the ideal of fully integrated STOP analysis. While respecting the unique skills and tools of each discipline (using industry-standard tools such as Thermal

Desktop, Nastran, Abaqus, SigFit, and Code V), the Comet EO Sensor Analysis SimApp™ also uniquely enables the ultimate goal of a complete modeling environment that supports and facilitates Model Based Systems Engineering.

## Axle Design



The Comet Axle Design SimApp sets up and utilizes libraries of parameterized "1-dimensional" and "zero-dimensional" representations of prop-shafts and axles to fully automate the configuration and analysis of complete axle systems.

Using a Comet Abstract Engineering Model™, this application establishes a single environment for axle system design that allows quick and easy evaluation of any axle geometry, without the manual effort.

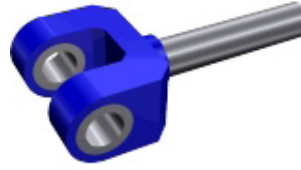
## Bottle Drop



The Comet Bottle Testing SimApp uses an intelligent template to automate pressure and crush testing of a fluid filled bottle. Expert methods for nonlinear Finite Element Analysis (FEA) have been captured and embedded in the Comet intelligent

template, harnessing the power of sophisticated CAE technology in an easy to use application, suitable for use by everyone from design engineer to expert.

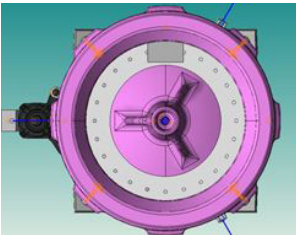
## Hydraulic Rod Assembly



The Hydraulic Rod Design SimApp is deployed as a web-based application using a Comet intelligent template, that automates the design and analysis of hydraulic rod assemblies. Expert methods for Finite Element Analysis (FEA) have been captured

and embedded in the template, and the entire application is exposed in a forms-based web page that can be accessed remotely.

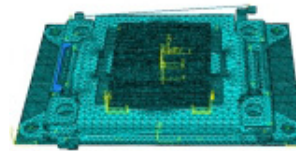
## Machine Dynamics



The Comet Machine Dynamics SimApp helps to automate modeling and analysis related to the design and performance analysis of machines and mechanisms with moving parts. Expert methods for creating and running models for Multi-

Body Dynamics (MBD) and Finite Element Analysis (FEA) have been captured and embedded in the Comet intelligent template, helping engineers evaluate and optimize performance efficiently and effectively.

## Electronics Reliability



The Electronics Reliability SimApp automates the shaker table dynamics virtual testing of semiconductor circuit boards. While the current implementation focuses on the dynamic structural analysis of the board, we

have also demonstrated expert methods for coupled thermal and structural Finite Element Analysis (FEA) embedded in a Comet intelligent template, to simulate both mechanical vibrations as well as thermal cycling.

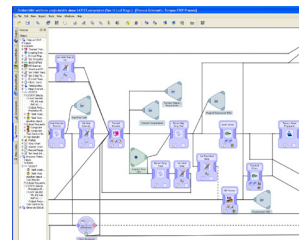
## Coil Spring Calculator



The Comet Coil Spring Calculator SimApp is able to do just that. Utilized in a web-based application, the underlying Comet Template developed and integrated by Finite Element Analysis experts, can help perform various analyses, such

as cost estimation, on coil springs of almost any shape. With the built in versatility of the SimApp, multiple geometry configurations, materials, loading conditions and production parameters are able to be controlled and customized by the user.

## Build Your Own



You can leverage existing Comet SimApps or build your own Solution-Focused Applications using Comet's SimApp Authoring Workspace or by employing Comet services to rapidly build your custom Comet SimApps. The

Comet SimApp Authoring Workspace establishes a single environment to build, analyze, and optimize a functional model representing the components and functionality of your product through deployable and reusable Intelligent Templates for simulation.