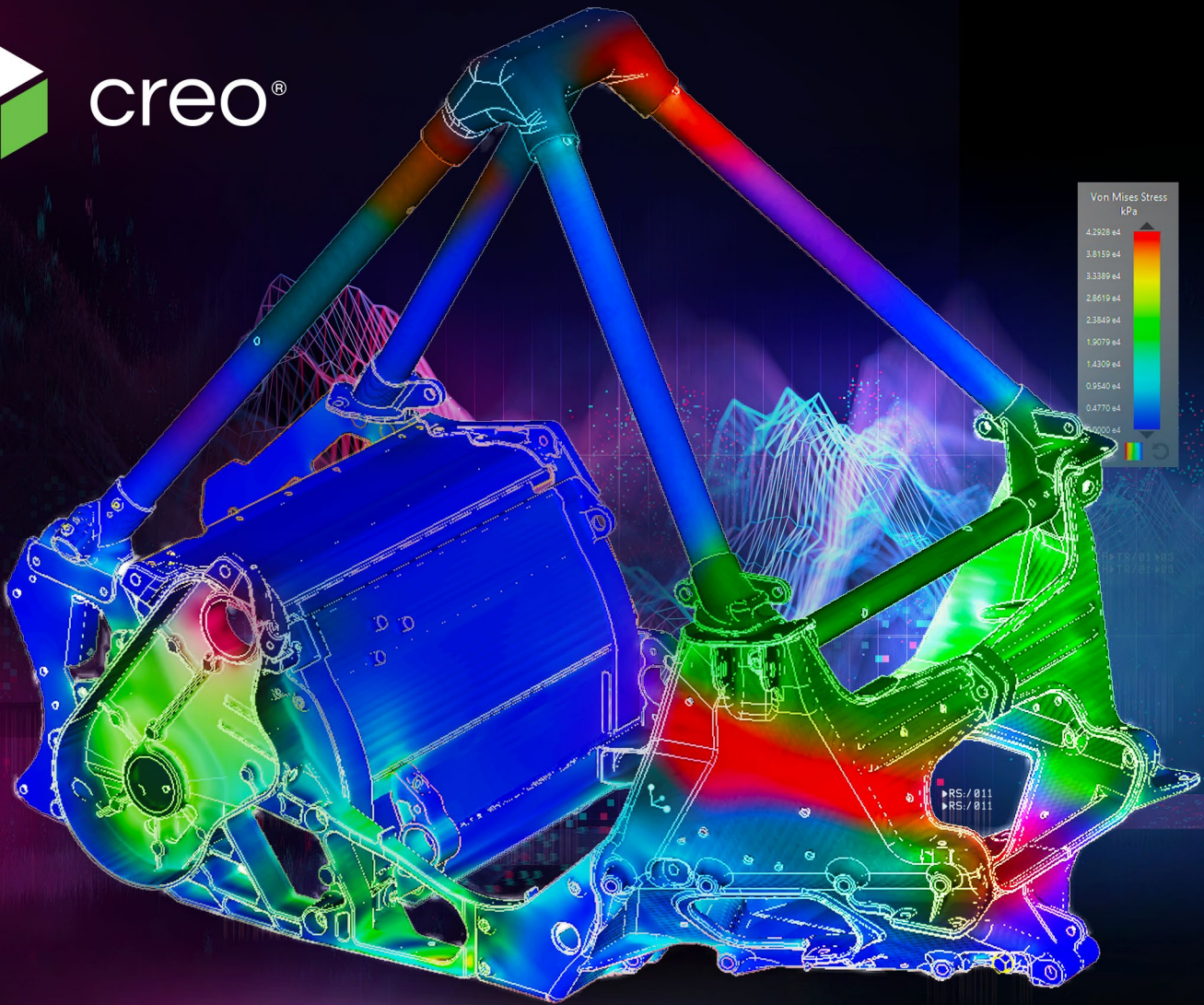




creo®



# SIMULATION CAPABILITIES IN CREO

**ENHANCE YOUR PRODUCT DESIGN WITH SIMULATION & ANALYSIS.**

It's no secret that the pressure is building on designers to create lighter, faster, and stronger products at lower cost that work the first time. What are you going to do?

With simulation, you can analyze and validate the performance of your 3D virtual prototypes before you make the first part. That means you can iterate more quickly and design with greater confidence while saving money and time.

# >>> PTC'S SIMULATION SOFTWARE

Designed uniquely for the engineer, PTC's simulation software has the familiar Creo user interface, engineering terminology, and seamless integration with CAD and CAE data. You have at your fingertips a complete structural, thermal, and vibration analysis solution with a comprehensive set of finite elements analysis (FEA) capabilities.

When you want real-time feedback as you design, choose the newest addition to PTC's simulation software portfolio: Creo Simulation Live powered by Ansys. Just define a few simple conditions and the software does the rest, presenting results in real time as you edit or create features. That's not just convenience and speed, that's design guidance as a normal part of your workflow.

Want a full-fidelity simulation tool for the design engineer? Choose Creo Ansys Simulation.

Capability	Creo Simulation Live	Creo Ansys Simulation	Creo Simulation Extension	Creo Advanced Simulation Extension
Real-Time Simulation	✓			
Finite Element Analysis for Parts & Assemblies	✓	✓	✓	✓
Static Structural Analysis	✓	✓	✓	✓
Finite Element Modeling Idealizations		✓	✓	✓
Automatic Meshing	✓	✓	✓	✓
Results Display & Reporting	✓	✓	✓	✓
Fluid Simulation	✓			
h-element technology		✓		
p-element technology			✓	✓
Modal Analysis	✓	✓	✓	✓
Steady State Thermal Analysis	✓	✓	✓	✓
Design Optimization			✓	✓
Linear Contact Analysis		✓ (linear and non-separating)	✓	✓

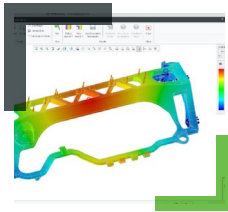
Capability	Creo Simulation Live	Creo Ansys Simulation	Creo Simulation Extension	Creo Advanced Simulation Extension
Large Deformation		✓		✓
Midsurface shell compression			✓	✓
Transient & Non linear Thermal Analysis				✓
Joints		✓		
Non-linear Contact				✓
Non-linear Materials				✓
Advanced Finite Element Idealizations				✓
Pre-stress Static and Modal				✓
Transient Structural and Thermal				✓
Random Vibration				✓
Dynamic Analysis				✓

# >>> THE CREO ADVANTAGE

Creo is the 3D CAD solution that helps you accelerate product innovation so you can build better products faster. Easy-to-learn Creo seamlessly takes you from the earliest phases of product design to manufacturing and beyond. You can combine powerful, proven functionality with new technologies such as generative design, augmented reality, real-time simulation, additive manufacturing and the IoT, to iterate faster, reduce costs and improve product quality. The world of product development moves quickly, and only Creo delivers the transformative tools you need to build competitive advantage and gain market share.

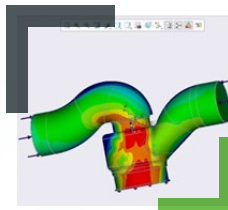


## CREO SIMULATION PRODUCTS POWERED BY ANSYS: >>>



### Creo Ansys Simulation

- Supports structural, thermal, and modal
- Automatic mesh and contacts (advanced options for manual control)
- Preserves all Creo Simulation Live setup
- Support for masses, springs, shells and beams
- High-fidelity, high-accuracy simulation for design refinement and validation

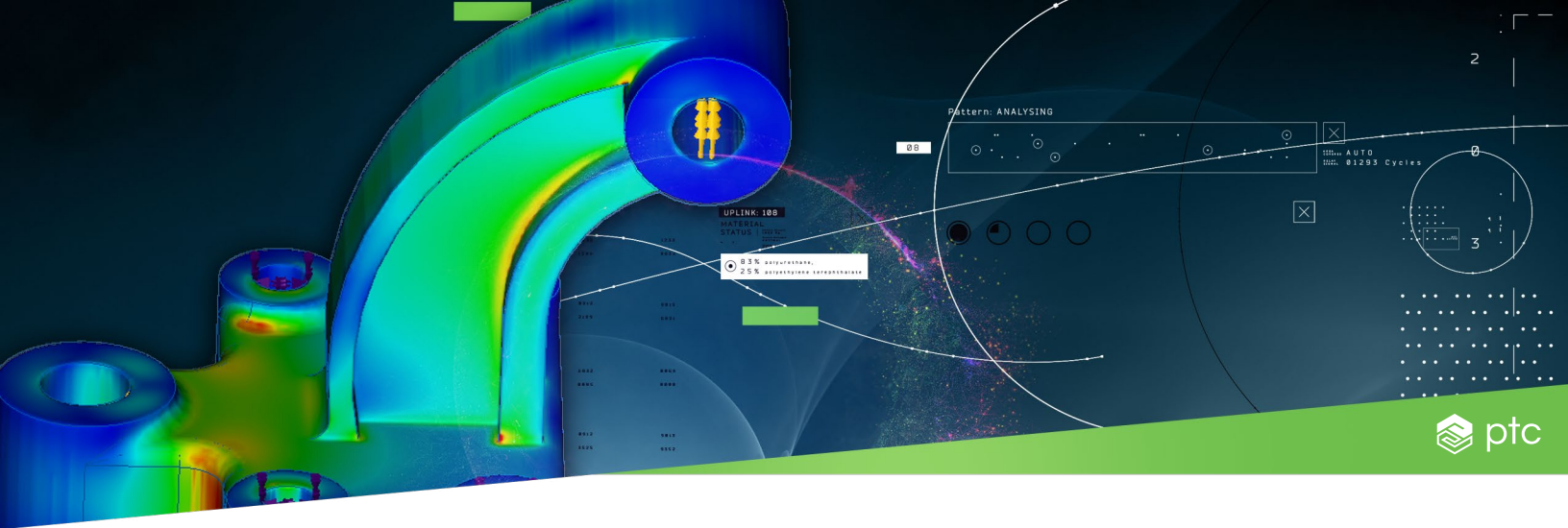


### Real-time Simulation with Creo Simulation Live\*

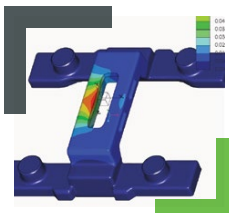
- Supports, structural, thermal, modal and Fluids.\*\*
- Instantaneous simulation for parts and assemblies
- Real-time simulation for every engineer
- Fully integrated into Creo Parametric
- Analysis results update dynamically as user makes geometry modifications

PLEASE NOTE: \*Ansys-powered products are not eligible for Remix or Restack.  
\*\* Fluid Flow Simulation is only available in Creo simulation Live Plus.





## CREO DESIGN ESSENTIALS CAPABILITIES: >>>



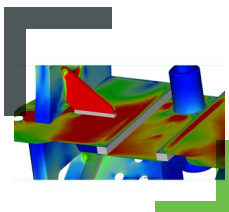
### Finite Element Analysis for Parts & Assemblies

- Understand the response of your design when subjected to various loading conditions
- Integrated seamlessly with the Creo 3D CAD environment
- Automatic checks to ensure robust and reliable analysis results
- Comprehensive materials library provided
- Fully automatic mesh generation directly on 3D CAD geometry
- Units of measurement are managed consistently throughout the application



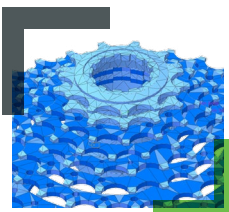
### Static Structural Analysis

- Determine accurate stresses, strains and displacements in your product
- Conduct linear static analyses
- Loads and boundary conditions are easily applied and use engineering terminology



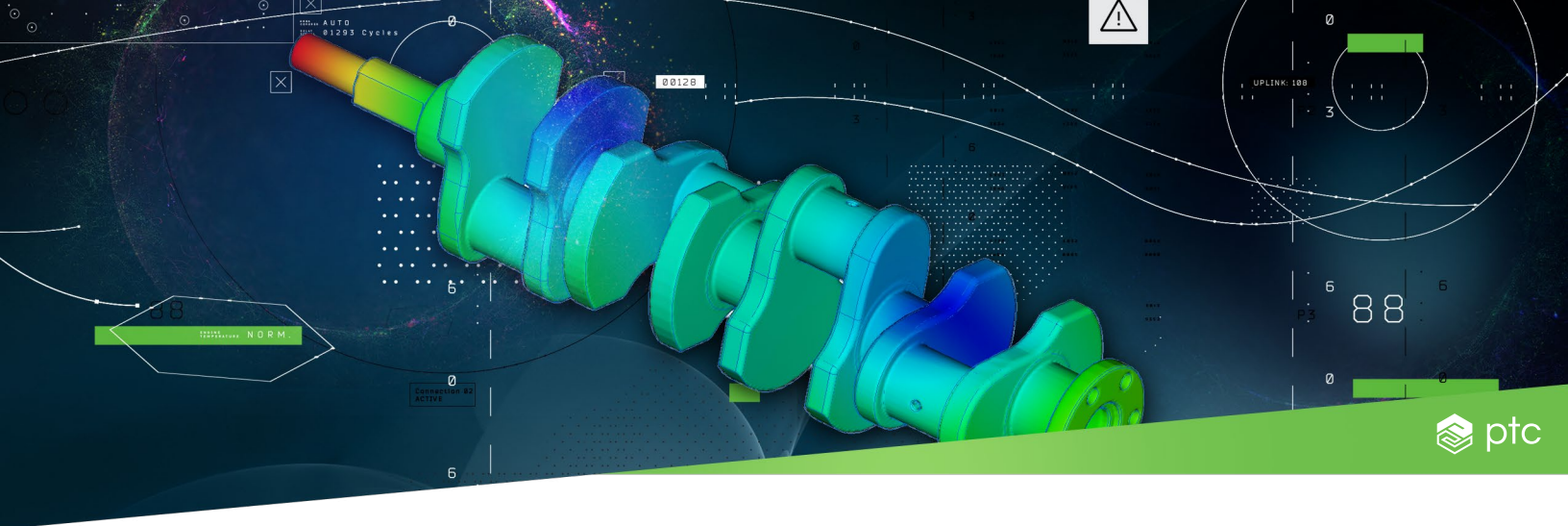
### Finite Element Modeling Idealizations

- Solids, Shells and Beams
- Springs and Masses
- Welds and Fasteners
- Rigid Links



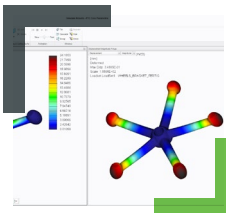
### Automatic Meshing

- Create accurate meshes directly on 3D CAD geometry
- Meshes follow highly detailed and curved geometry precisely
- Automatically update and refine meshes to ensure accurate simulations
- Supports solid (tetrahedron, wedge, hex), shell (triangle, quad), beam, spring, mass elements
- Flexibility to define element sizes, distribution and shapes (mapped meshing, thin solids)



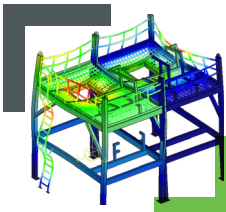
## CREO SIMULATION EXTENSION CAPABILITIES\* >>>

\*Creo Simulation Extension is also available as a standalone application (Creo Simulate)



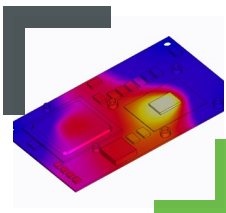
### Results Display & Reporting

- Full results post-processing including contour, isosurface, cross section plots, and 2D graphs
- Create and save animated plots (deformed shape)
- Linearized stress report
- Multiple result window display
- Create templates for results window definitions
- Export reports as common formats: VRML, MPG, AVI, Graph Tables, Microsoft Excel



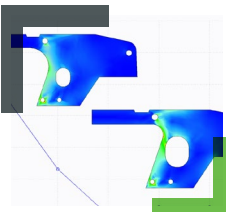
### Modal and Buckling Analysis

- Determine natural frequency modes of vibration
- Automatically handle rigid mode (unconstrained) cases
- Determine buckling loads or solve unstable snap-through problems



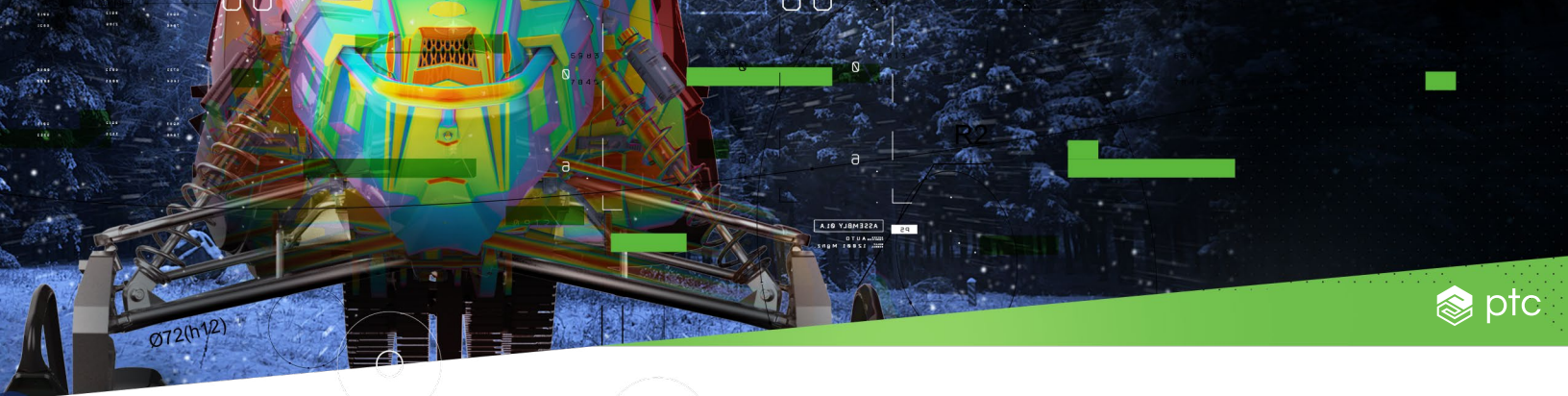
### Steady State Thermal Analysis

- Simulate the effects of temperature on a product
- Analyze conduction and convection heat transfer
- Use highly configurable distributions to apply loads to geometry
- Transfer Thermal Analysis results to Structural Analysis to understand impact of thermal load

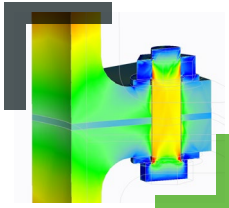


### Design Optimization

- Benefit from a powerful, automated, and structured approach to design optimization
- Reduce product costs by optimizing your design to meet multiple objectives, such as maintaining a product's strength while reducing its weight
- Save time by automatically iterating your design to meet your design requirements
- Reduce errors by using the results from external tools to drive your design directly, without manually transferring data



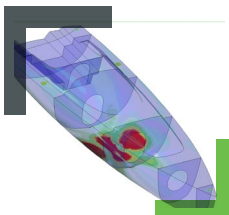
(Creo Simulation Extension Capabilities continued)



## Contact Analysis

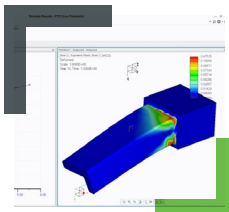
- Simulate the forces transferred between components when they come into contact
- Automatic contact interface detection
- Simulate shrink-fit or snap-fit situations

## CREO ADVANCED SIMULATION EXTENSION CAPABILITIES: >>>



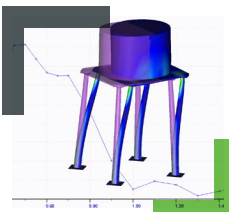
## Advanced Finite Element Idealizations

- Composite shells (laminate layup)
- Non-linear springs (force-deflection curve)
- Cracks, fracture mechanics
- Weighted links



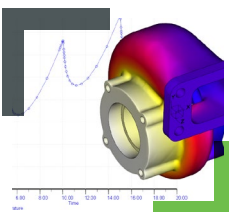
## Nonlinear Analysis & Large Deformation

- Easily define elasto-plastic materials and hyper-elastic materials
- Perform nonlinear static structural analysis
- Time varying loads
- Understand residual stresses in the model
- Large deformation of thin/slender products
- Non-linear contact including finite and infinite friction



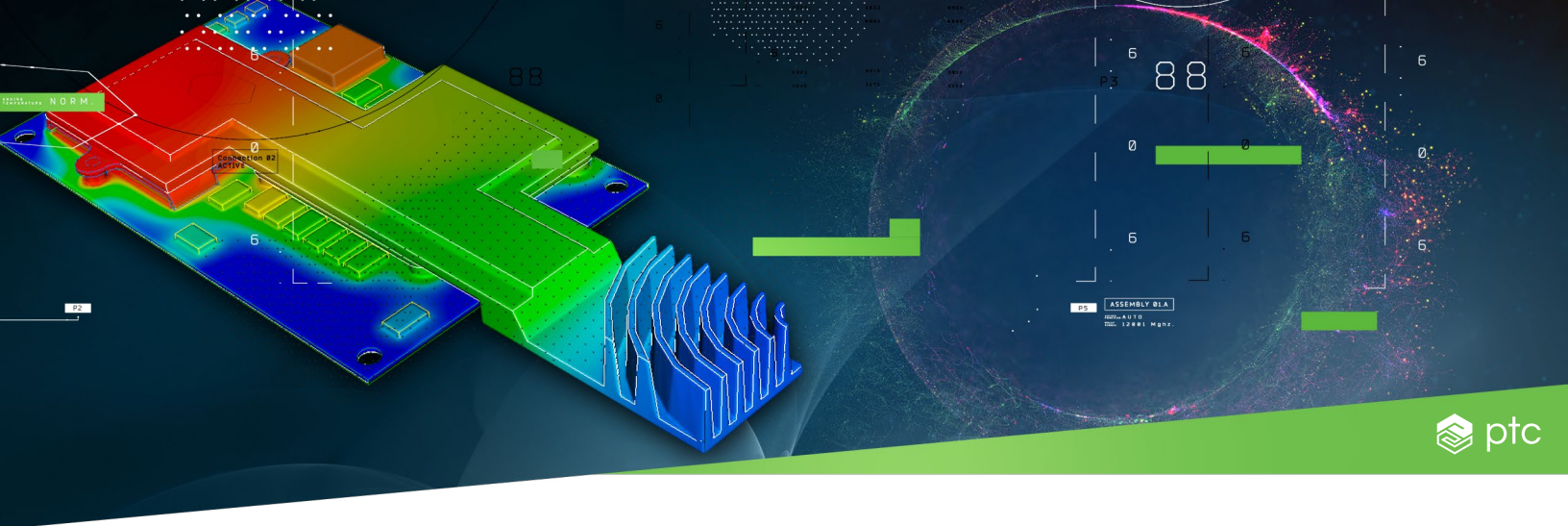
## Dynamic and Pre-stress Analysis

- Dynamic structural analysis of time response, frequency response, random response, and response spectrum
- Utilize previous static analysis results to determine effects of pre-stress on modal or structural analysis
- Display full results at any frequency or time intervals

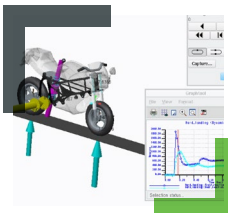


## Transient and Nonlinear Thermal Analysis

- Temperature dependent convections
- Radiation heat transfer
- Temperature dependent material properties
- Time dependent boundary conditions

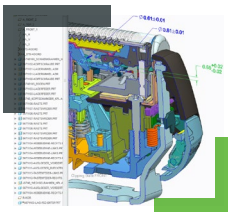


## EXPAND YOUR SIMULATION CAPABILITIES AS YOUR REQUIREMENTS GROW >>>



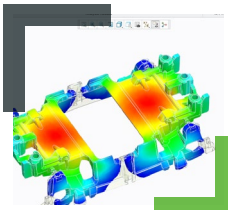
### Mechanism Dynamics

- Determine reaction forces in mechanism design
- Ability to include gravity, springs, dampers and force-based drivers
- Define cam/follower connections between parts in the mechanism
- Automated transfer of MDO results to Structural Analysis to evaluate stresses in the mechanism



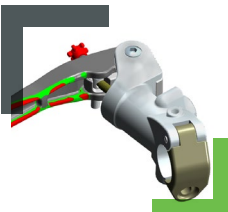
### Tolerance Analysis

- Evaluate the impact of tolerances on the manufacturability of designs
- Tolerance stack-ups
- Automatic validation of dimensions and dimension loops
- Graphical display of statistical distributions
- Contribution and sensitivity output plots



### Mold Filling Analysis

- Identify potential mold filling problems
- Improve design quality, reduce manufacturing cycle times and rework of molds
- Easily usable by a non-specialist without extensive knowledge of plastic analysis



### Fatigue Analysis

- Dynamic structural analysis of time response, frequency response, random response, and response spectrum
- Utilize previous static analysis results to determine effects of pre-stress on modal or structural analysis
- Display full results at any frequency or time intervals

## EXPAND YOUR SIMULATION CAPABILITIES AS YOUR REQUIREMENTS GROW >>>



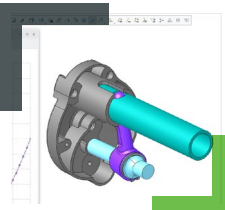
### Human Factor Analysis

- Reduce time, budget, and obsolescence associated with physical prototypes
- Ensure conformance with safety, health, ergonomics and workplace standards and guidelines
- Communicate and share complex human-product interaction issues



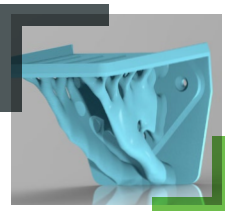
### Engineering Notebook

- Embed a PTC Mathcad worksheet directly within the Creo model
- Embedded worksheet can be opened, edited and saved within the Creo model
- All design details in the worksheet automatically travel with the Creo model



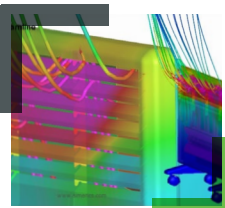
### Behavioral Modeling

- Easily evaluate geometry and variables to determine the feasibility of design goals and objectives
- Automatically iterate geometry to achieve the optimal design



### Generative Design

- Quickly generates optimized designs to meet your requirements and converts them into rich B-rep geometry so you can enjoy an uninterrupted parametric workflow
- Cloud-based option allows for multiple scenarios at once



### Creo Flow Analysis

- Complete computational fluid dynamics (CFD) solution for product designers and analysts
- Analyze liquid and gas flow early in your design process

Please visit the [PTC support page](#) for the most up-to-date platform support and system requirements.

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