creo®

Von Mises Stress
kPa

4.2928 e4
3.8159 e4
3.3389 e4
2.8619 e4
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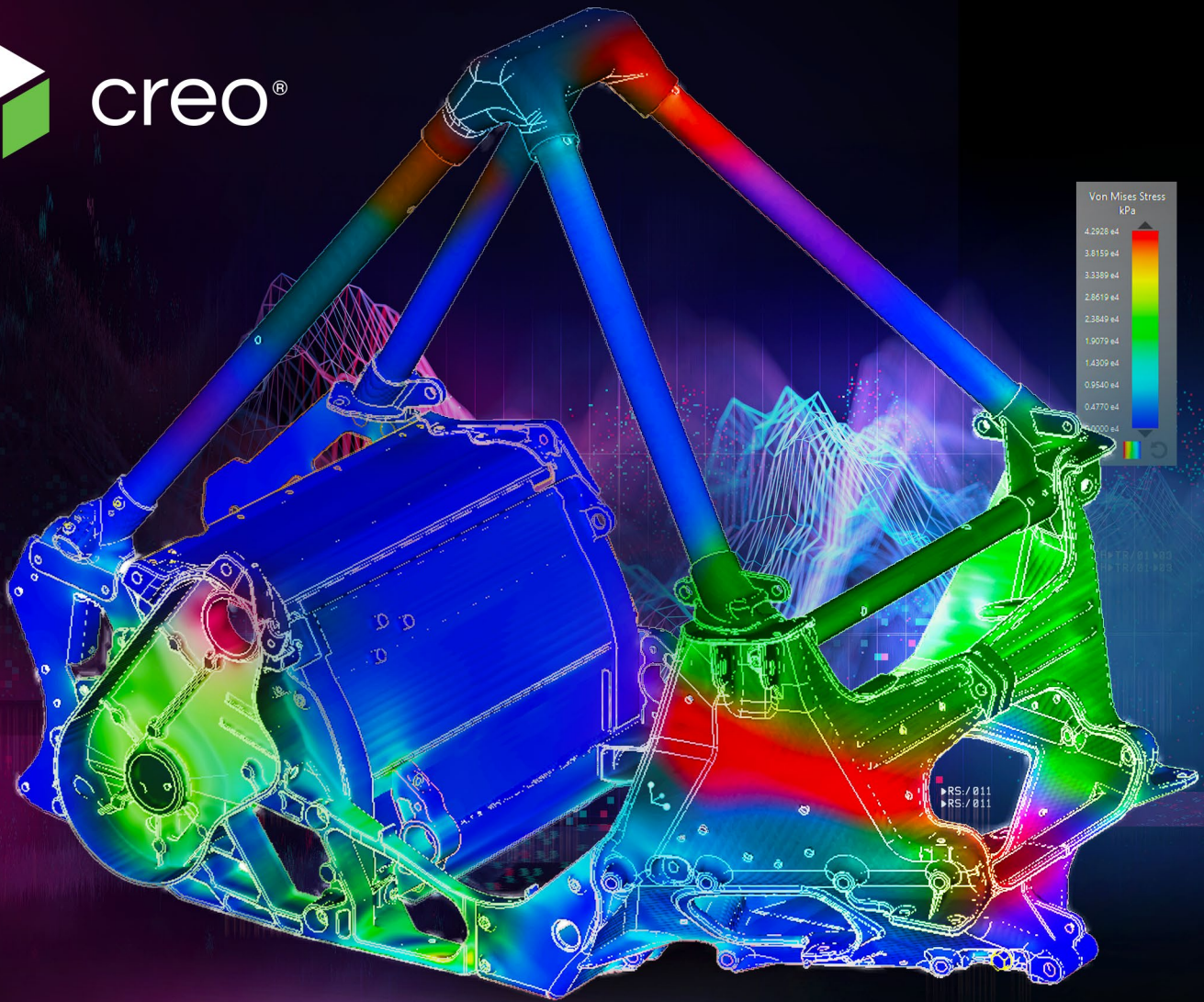# SIMULATION CAPABILITIES IN CREO

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.

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>>> 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.

| Capability	Creo Simulation Live	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	✓ *Meshless Process	✓	✓
Results Display & Reporting	✓	✓	✓
Modal & Buckling Analysis	✓ *Modal only	✓	✓
Steady State Thermal Analysis	✓	✓	✓
Design Optimization		✓	✓
Contact Analysis		✓	✓
Advanced Finite Element Idealizations			✓
Nonlinear Materials & Large Deformation			✓
Dynamic and Pre-stress Analysis			✓
Transient and Nonlinear Thermal Analysis			✓
Fluid Simulation	✓		

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

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Capability	Creo Simulation Live	Creo Flow Analysis
Fluid Domain Creation	✓	✓
Internal Flow	✓	✓
External Flow	✓	✓
Various Result Displays	✓	✓
Fluid Flow and Temperature Simulations	✓	✓
Streamlines, cross sections and animations	✓	✓
High fidelity wall effects		✓
Radiation		✓
Species		✓
Moving/sliding meshing		✓
Multiphase		✓
Conjugate Heat Transfer		✓

>>> THE CREO ADVANTAGE

Creo is a 3D CAD solution that helps you build better products faster by accelerating product innovation, reusing the best of your design and replacing assumptions with facts. Go from the earliest phases of product design to a smart, connected product with Creo. And with cloud-based augmented reality in each seat of Creo, you can collaborate with anyone, instantly at any step in the product development process. In the fast-changing world of the Industrial IoT, no other company can get you to substantial value as quickly and effectively as PTC.

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## CREO SIMULATION LIVE, POWERED BY ANSYS* >>>
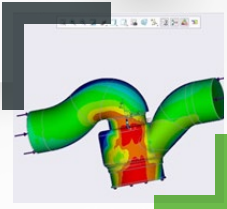
Fluid Flow Analysis**

- Fluid domain creation. External flow. Internal flow.

- Analysis updates dynamically as users modify geometry.

- Results Display and Interactive Probes
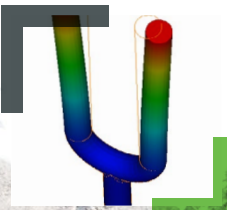
- Fluid flow and temperature simulations
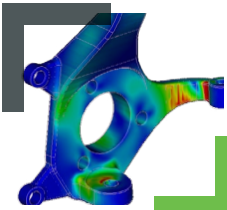
Structural Analysis

- Determine the structural integrity of components subject to real-world constraints and loads

- Examine stress and deflection results
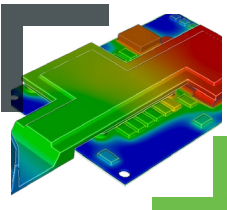
Thermal Analysis

- Analyze the effects of intense heat or cold by adding boundary conditions to your geometry

Modal Analysis

- Evaluate and predict the natural frequencies of your system and the associated mode shapes

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

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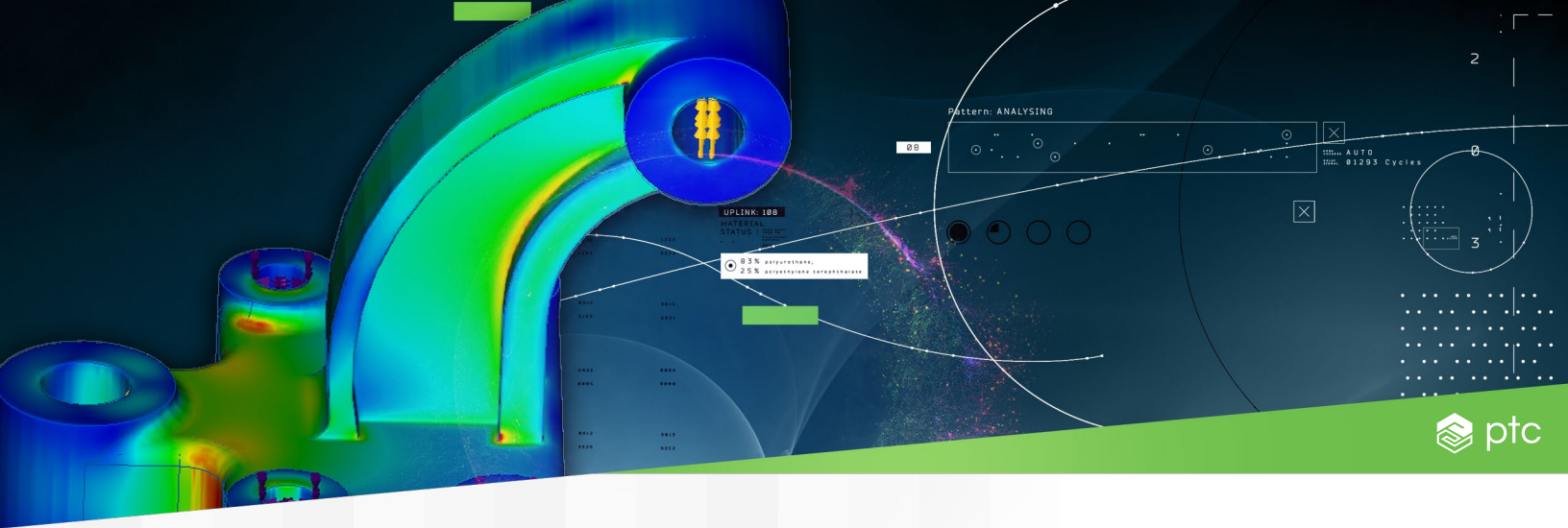
CREO DESIGN ESSENTIALS CAPABILITIES: >>>
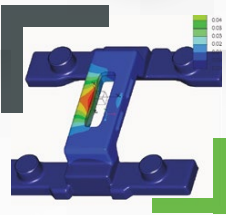
Finite Element Analysis for Parts & Assemblies

- 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
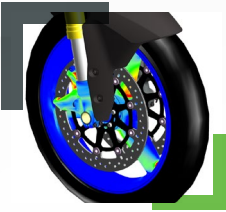
Static Structural Analysis

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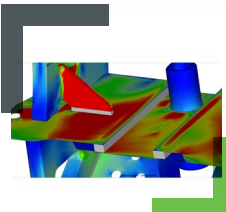
Finite Element Modeling Idealizations

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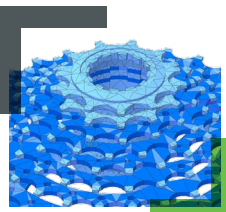
Automatic Meshing

- 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)

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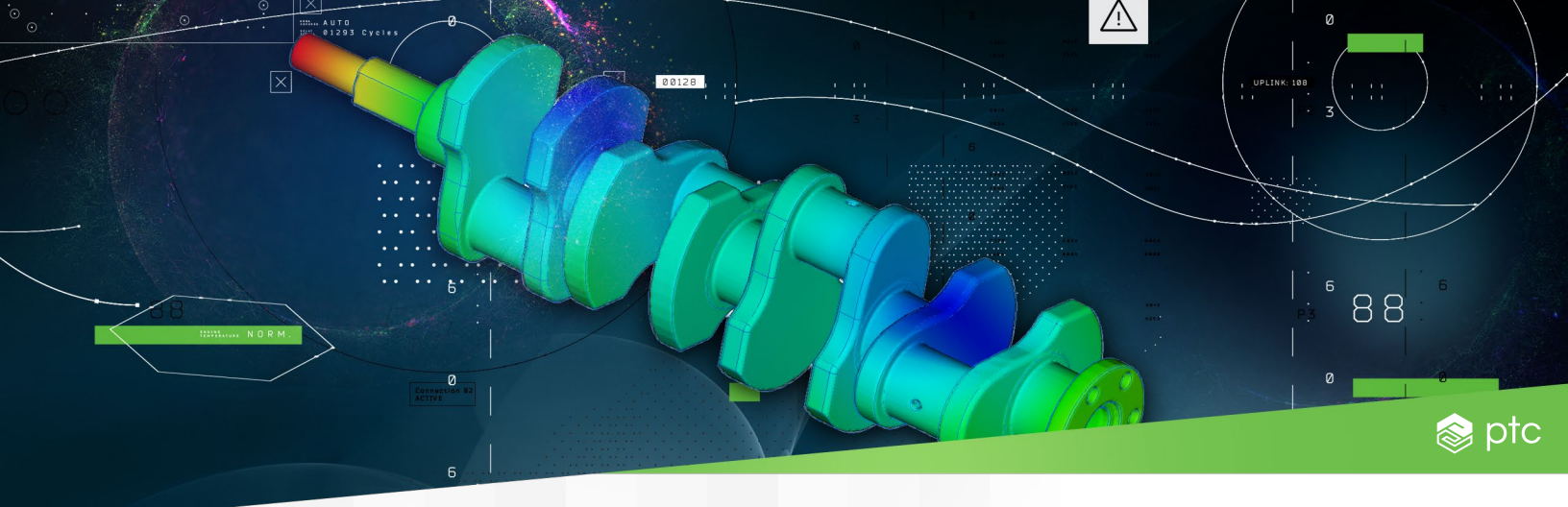
CREO SIMULATION EXTENSION CAPABILITIES* >>>

*Creo Simulation Extension is also available as a standalone application (Creo Simulate)
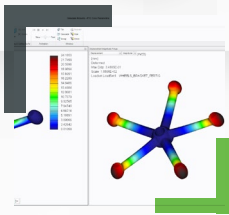
Results Display & Reporting

- 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
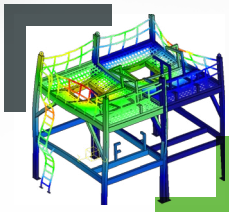
Modal and Buckling Analysis

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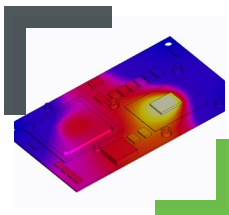
Steady State Thermal Analysis

- 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
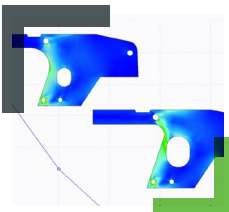
Design Optimization

- 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
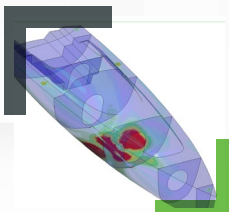
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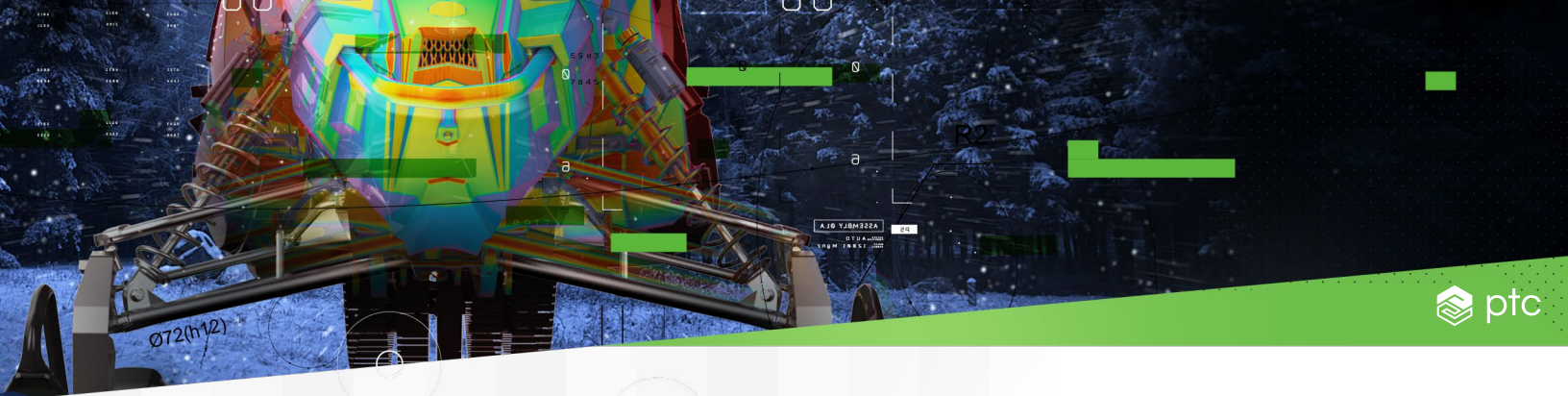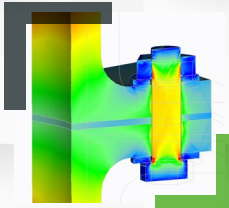
Contact Analysis

- Simulate the forces transferred between components when they come into contact
- Automatic contact interface detection
- Include the effect of friction in contact interfaces
- 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
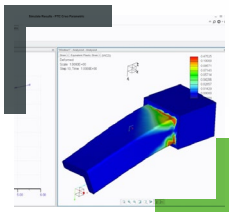
Nonlinear Analysis & Large Deformation

- 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
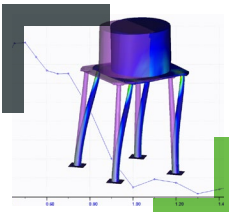
Dynamic and Pre-stress Analysis

- 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
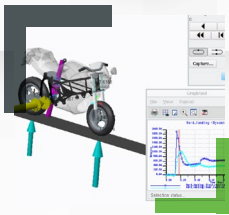- Display full results at any frequency or time intervals
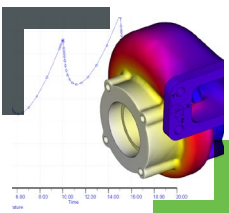
Transient and Nonlinear Thermal Analysis

- Temperature dependent convections
- Radiation heat transfer
- Temperature dependent material properties
- Time dependent boundary conditions
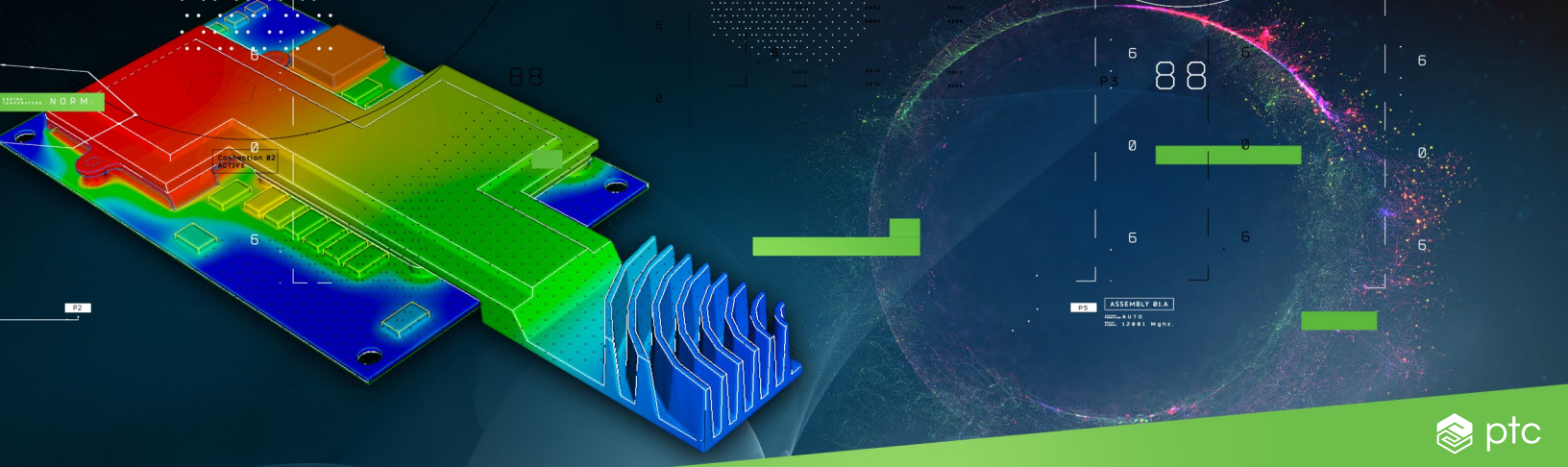
EXPAND YOUR SIMULATION CAPABILITIES AS YOUR REQUIREMENTS GROW >>>

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
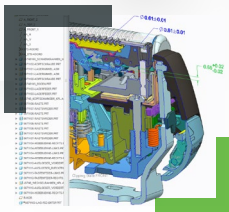
Tolerance Analysis

- 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
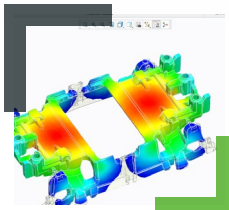
Mold Filling Analysis

- 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
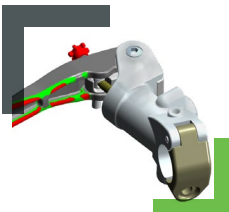
Fatigue Analysis

- 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

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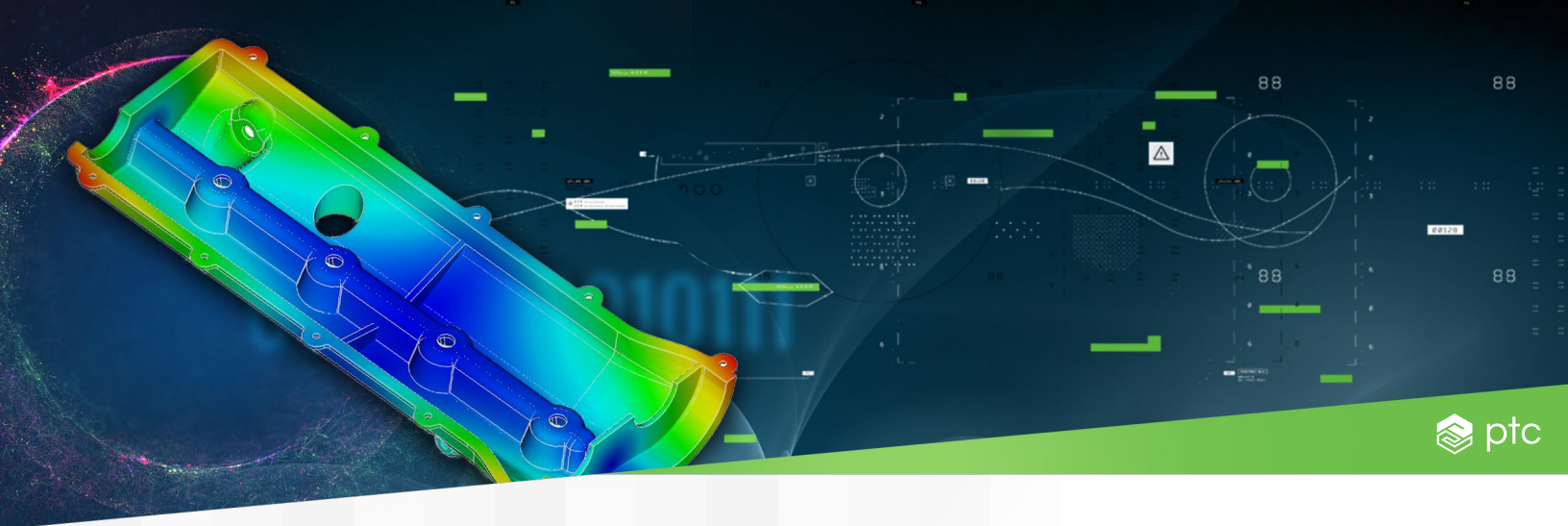
EXPAND YOUR SIMULATION CAPABILITIES AS YOUR REQUIREMENTS GROW >>>

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

Please visit the PTC support page for the most up-to-date platform support and system requirements.

J14455 –Simulation–Capabilities–in–Creo–0520

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