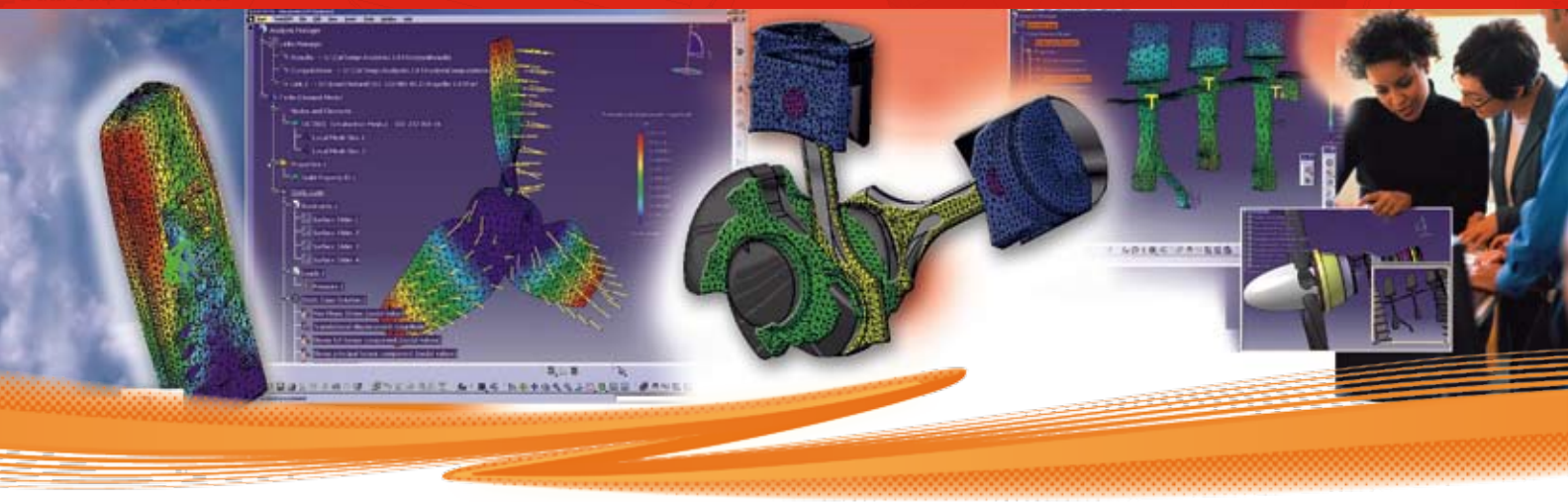
CATIA V5 Analysis

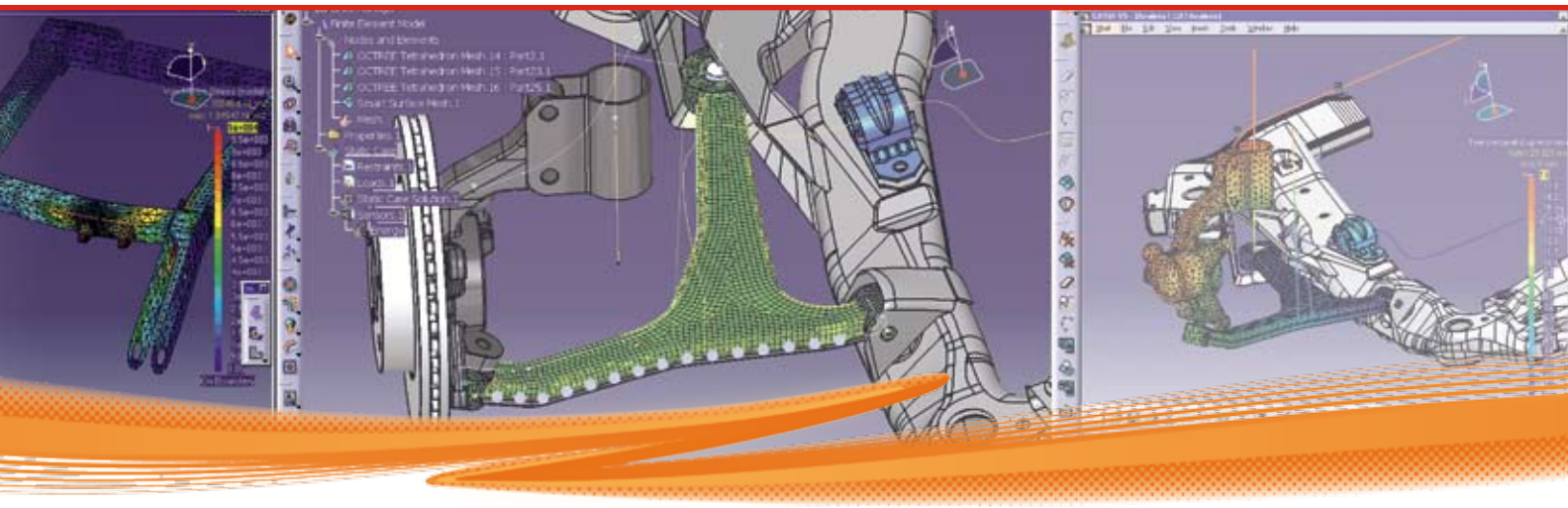
Design for Real World Performance



SIMULIA

Realistic Simulation in the Design Process

Optimize product performance faster with integrated design analysis in CATIA V5



Product Development Challenges

Global competition requires the creation of better products faster and at lower costs—without sacrificing quality. To meet these challenges, many companies have adopted computer-aided engineering (CAE) to reduce the cost of physical testing, decrease overall product development time, and improve understanding of their product performance. Traditionally, however, CAE has largely been used towards the end of the development cycle by a limited quantity of highly-qualified specialists using a standalone product, which has restricted its effectiveness in the design phase.

For CAE to have a positive impact on product development, it needs to be used earlier in the design process and allow designers to explore different design alternatives quickly and reliably. This requires an integrated CAD/CAE environment that is easy to use and focused on the needs of the designer.

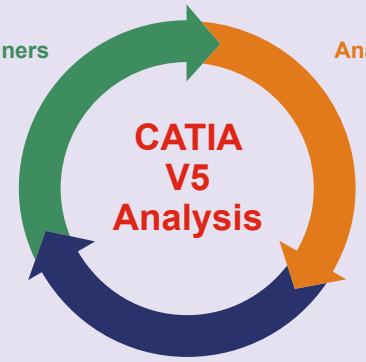
Your Competitive Advantage

To meet this challenge, SIMULIA provides realistic design simulation capability within the CATIA design environment. Designers are able to use the familiar CATIA user interface and perform analysis directly on their master reference model in CATIA. Since there is no transfer and translation of geometry, data integrity issues are avoided. The generative capability of the CATIA Analysis product suite allows design-analysis iterations to be performed rapidly—from simple parts to complex assemblies. The software leverages the CATIA V5 knowledge-based architecture, making it easy to optimize designs based on product performance specifications and analysis results. Unbeatable ease of use makes CATIA Analysis particularly suitable for designers looking to accurately size their designs and quickly evaluate their real world performance.

Capabilities to Meet the Needs of All Users

- **Designers:** Use analysis to size parts and ensure that the design will work the first time
- **Analysts:** Perform a virtual test to evaluate the performance of the design and whether it will meet its requirements
- **Method Developers:** Develop standardized analysis methods and then provide those methods to designers using templates and knowledgeware

Fast Analysis Loop
- Familiar CAD environment
- Geometry associativity
- Automated, adaptive meshing
- Template-based guidance
- Knowledge-based design optimization
- Computation speed
- Results reliability



Detailed Analysis
- CAD integration
- Rapid model building and results evaluation
- Meshing performance and control
- Easy update after design change
- Large model capacity
- Solver performance and flexibility
- Open to multiple applications

Process Automation
- Knowledge-based architecture
- Capture of analysis methods and knowledge
- Templates to deploy standard analysis methods

Why Choose CATIA Analysis?

CATIA Analysis allows designers who are using CATIA to leverage the power of proven analysis technology to evaluate and improve their designs. It also provides the technology for engineering analysts to create complex finite element models while maintaining associativity with the master design in CATIA, thereby avoiding time-consuming and error-prone transfer of geometry.

"Using CATIA Analysis, a designer rather than an expert is now able to perform an analysis on an automobile transmission gear assembly. In the past, such an analysis would only take place if serious problems requiring design modification occurred… With today's improved CAE tools, however, all analysis conditions for the gear assembly can be set within 30 minutes."

—Dr. Takanao Uchida, leader of the CATIA V5 project at Honda Automotive R&D and one of the pioneers of "Designer CAE" in Japan

Features and Benefits:

- User-friendly environment
- Fast design-analysis loops
- Multidiscipline collaboration
- Knowledge-based optimization
- Industry-proven performance

User-friendly environment

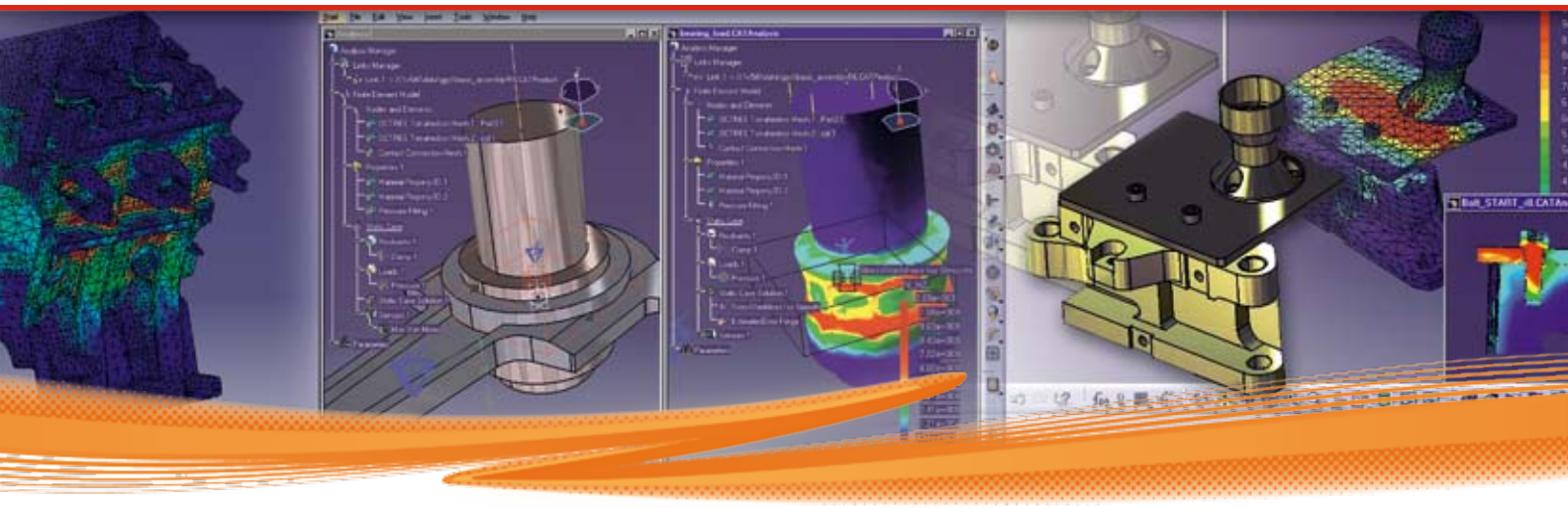
CATIA Analysis provides designers and analysts with an intuitive user interface that meets their varied needs. Since the user interface is a natural extension of that in CATIA, it is particularly easy for CATIA users. They obtain a realistic understanding of the mechanical behavior by quickly reviewing design characteristics in a digital mockup (DMU) environment. The CATIA V5 tools and environment—that are common to all CATIA applications, Abaqus for CATIA, and partner solutions—eliminate the problem of lost productivity associated with using multiple applications.

Fast design-analysis loops

The analysis specifications are an extension of the part and assembly design specifications, and the analysis is performed directly on the CATIA geometry. It is, therefore, simple and convenient to perform an analysis to help size parts and compare the performance of different design alternatives. The impact of design changes can be rapidly assessed with automatic updates. Designers using CATIA Analysis will naturally use analysis as part of their design process, affording them a greater understanding of how their designs perform and improving their ability to deliver the right design the first time.

Multidiscipline collaboration

CATIA Analysis supports concurrent engineering, allowing users to work closely together and avoid rework. Designers and analysts can collaborate since they have access to the same environment, eliminating data transfer, rework, and the need to maintain multiple applications for design and analysis. The analysis environment also allows method developers to create templates that designers can routinely use to perform standard types of analysis.



Knowledge-based optimization

The CATIA Analysis products leverage the native CATIA knowledge-based architecture. They allow designs to be optimized by capturing and studying the knowledge associated with part design and analysis. The reuse of analysis features and the application of knowledge-based rules and checks ensure compliance to company best practices. Automation of standard analysis processes through the use of knowledgeware templates dramatically improves the efficiency of the design-analysis process.

Industry-proven performance

The speed with which analyses can be performed in CATIA often surprises designers and simulation experts familiar with other applications. The time it takes to create the finite element model, solve it, and display results can be a matter of minutes. The robust, built-in finite element solver and mesh generators balance both accuracy and speed. The adaptive meshing capability automatically adjusts the mesh to obtain accurate results without time-consuming manual involvement.

"With CATIA, it's one click to move from design to analysis and then another click to move to NC (Numerical Control) programming. That's invaluable because many of our engineers perform all three tasks, and they only have to learn one user interface. It has cut at least 50% off our development times."

—Steve Oliver, Director of Design Services, Gillett Evernham Motorsports

CATIA V5 Analysis Products

Workbench – Generative Structural Analysis

Generative Part Structural Analysis **(GPS)**

Generative stress and modal analysis on single parts

Generative Assembly Structural Analysis **(GAS)**

Generative stress and modal analysis on hybrid assemblies

Generative Dynamic Analysis **(GDY)**

Generative structural dynamic response analysis

ELFINI Structural Analysis **(EST)**

Complementary advanced options for preprocessing, solving, and postprocessing

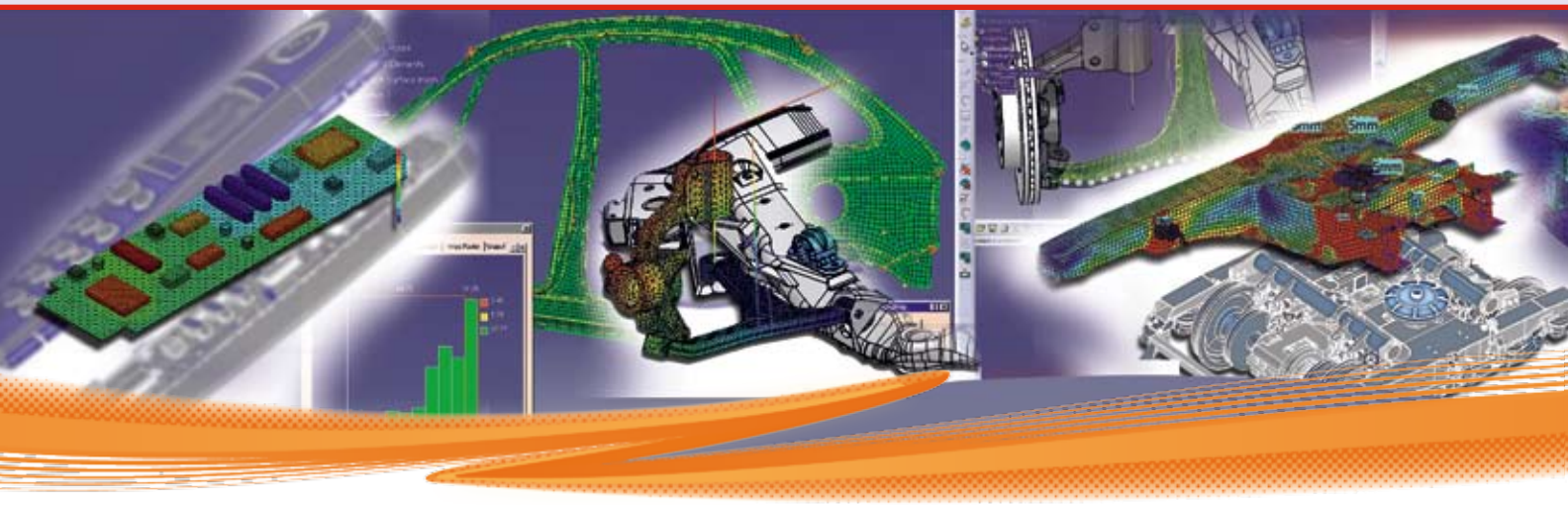
Workbench – Advanced Meshing Tools

FEM Surface **(FMS)**

Complementary advanced options to generate associative mesh from surface design

FEM Solid **(FMD)**

Complementary advanced options to generate associative mesh from solid design



Scalable Solutions

The existing CATIA V5 Analysis capabilities can be extended to include basic nonlinear and thermal analysis by adding SIMULIA Extended Analysis to the existing portfolio. Partner products also provide extended capabilities such as multibody dynamics, computational fluid dynamics, fatigue analysis, and others.

CATIA V5 Analysis Capabilities

- Linear stress analysis on parts and hybrid assemblies (solid, surface, and wireframe)
- Transient and harmonic dynamic analysis
- Contact analysis
- Buckling analysis
- Thermo-mechanical analysis
- Modal analysis
- Vehicle assembly analysis
- Assembly of multiple analysis models

Additional capabilities with SIMULIA Extended Analysis

- Thermal analysis
- Nonlinear analysis
- Thermal stress analysis

Complementary solutions from CAA Partners

- Acoustic analysis
- Computational fluid dynamics (CFD)
- Noise and vibration (NVH) analysis
- Multibody dynamic analysis
- Ride and handling analysis
- Durability and fatigue analysis
- Stamping analysis
- Gateway interfaces to external solvers

For further information on our partners, please visit:
www.3ds.com/alliances/software-partnership

SIMULIA World Headquarters
166 Valley Street
Providence, RI 02909 USA
+1 401 276 4400
E-mail: simulia.info@3ds.com
www.simulia.com

About SIMULIA
SIMULIA is the Dassault Systèmes brand that delivers a scalable portfolio of Realistic Simulation solutions including the Abaqus product suite for Unified Finite Element Analysis, multiphysics solutions for insight into challenging engineering problems, and SIMULIA SLM for managing simulation data, processes, and intellectual property. By building on established technology, respected quality, and superior customer service, SIMULIA makes realistic simulation an integral business practice that improves product performance, reduces physical prototypes, and drives innovation. Headquartered in Providence, RI, USA, SIMULIA provides sales, services, and support through a global network of regional offices and distributors.

For more information, visit www.simulia.com.

DASSAULT SYSTEMES

www.3ds.com

MAR_CAT_Y09