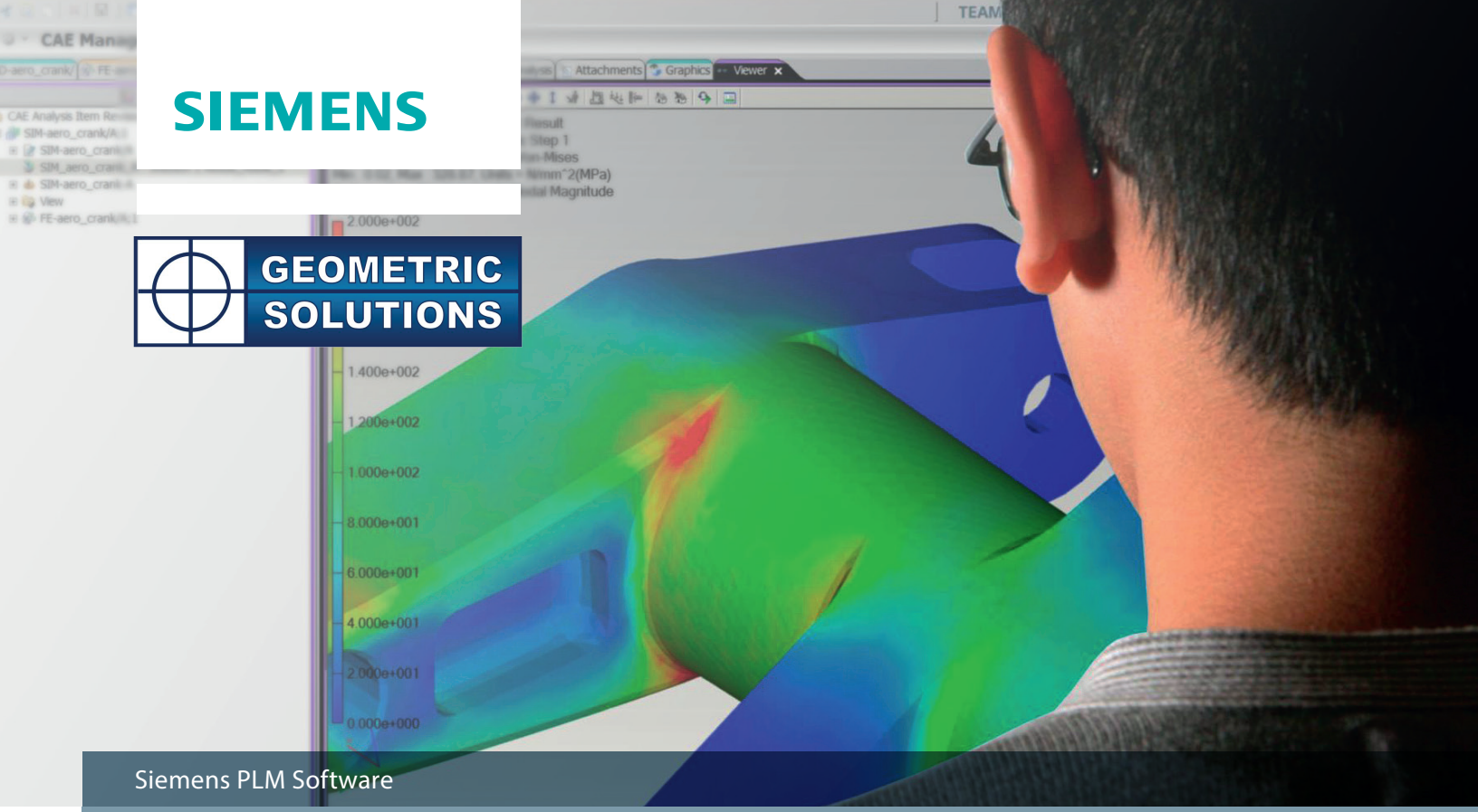
SIEMENS

GEOMETRIC SOLUTIONS



Siemens PLM Software

Simulation process management

Gain control of simulation data, workflows and processes

Benefits

- Support the increasing volume and complexity of simulation work by managing data and processes
- Increase confidence in your simulations with complete traceability from requirements through design and validation
- Speed simulation b y reducing time to find data and enabling greater re-use of work
- Deliver results faster by standardizing and automating simulation processes

Summary

Teamcenter® software for simulation pro - cess management is specifically developed for engineers and CAE analysts. You can use Teamcenter – a leading product lifecy - cle management solution – to manage all your simulation processes, data, tools and workflows in context with other product data that you are already managing. Engineering teams benefit by being able to speed up simulations and use that knowl - edge to more effectively drive product development.

Simulation data overload

Product complexity is increasing across every major industry, and the need to serve more markets is resulting in greater num - bers of product variants and configurations. While digital simulation is increasingly seen as the key to product development effi - ciency and a means to handle product complexity, simulation often becomes a process bottleneck. Analysis teams fre - quently work with obsolete data or deliver results too late to influence design direc - tion. Program managers lack visibility and struggle to gain insight because computer-aided engineering (CAE) results are only viewable with the help of the analyst. And as the number of simulations being per - formed grows exponentially, there is a danger that teams will get bogged down with the vast amounts of data being generated.

Gain control of CAE data and processes

In order to address these challenges, simu - lation work must be managed as an essential element of a company's overall product lifecycle management (PLM) strategy.

Teamcenter simulation process manage - ment allows organizations to gain control of their CAE data and processes. As an inte - gral module of the Teamcenter platform, simulation process management allows all

Simulation process management

Benefits *continued*

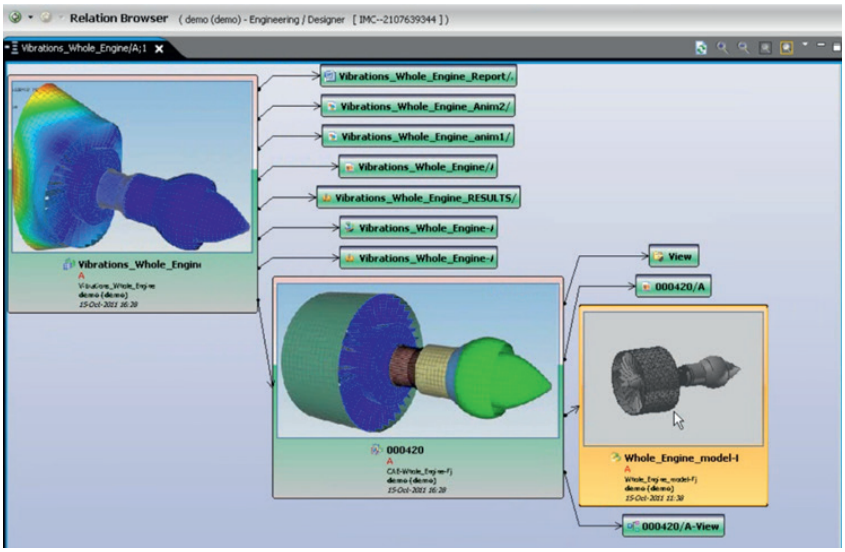
- Provide visibility into the simulation process and results for program management and downstream operations
- Manage and standardize access to simulation tools
- Minimize implementation costs and risk by leveraging the proven Teamcenter platform as your common infrastructure solution

simulation-related data to be managed in context with product data. Teamcenter, therefore, provides a single source of truth to the entire organization and enables simulation teams to fully participate in the product lifecycle by using the latest product data as inputs to simulations and by providing easy access to key simulation results for all decision makers and stakeholders.

When simulation data is managed outside of the PLM environment, it leads to duplication of data and increased hardware investments. Teamcenter eliminates such duplication by enabling simulation data to be managed on the enterprise PLM platform. Furthermore, simulation users benefit from all the capabilities of the Teamcenter platform. These include coverage of comprehensive security and data access protocols and global multi-site collaboration and fail-safe mechanisms that both protect data and ensure access as needed. Additional capabilities that are available from the foundation include workflows, classification, schedule management, document management, and others.

Addressing the needs of simulation engineers

The Teamcenter simulation data model supports all types of CAE data. The out-of-the-box data model, which is fully extensible, is used to capture and manage geometry, models, input decks, results and reports. These objects are stored in the database with relationship links that enable complete traceability from a product revision all the way to the associated simulation results. The extensibility of the CAE data model is a unique and powerful capability that allows key parameters to be managed as simulation objects with all the associated lifecycle actions. Large files can be managed in the database or kept outside the database and managed through links.

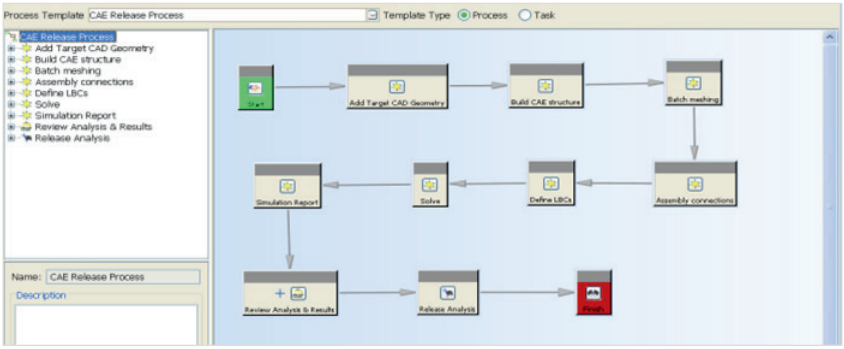


Visually browse relationships between simulation objects.

Engineers can perform lifecycle operations on simulation objects such as create, revise, update, delete, release or archive. The lifecycle of simulation objects can be managed independently from the product lifecycle while still maintaining contextual relationships. For instance, a single geometry model may be associated with multiple mesh models, and a mesh model may have multiple analyses associated with it. With Teamcenter, users can detect when an analysis is out-of-date because a parent model has been revised.

Most engineering organizations use tens or even hundreds of simulation applications ranging from commercial tools to in-house programs. This poses a challenge to analysis organizations to manage all of these tools. Teamcenter simulation process management provides a complete framework for configuring and seamlessly launching all simulation applications. These applications can include CAE preprocessors, solvers, postprocessors, process orchestration tools, in-house utilities and scripts. Applications can be launched interactively or through workflows and on a local or remote machine. Files needed for the external application, meta-data, and structure information are automatically exchanged between Teamcenter and the CAE application.

One of the unique features of the tool launch framework is the ability to manage and control access to different simulation tools. This enables organizations to efficiently manage access to CAE applications



Plan and include simulation activities in engineering workflows.

for a given simulation context. For instance, a thermal engineer may only be presented with tools that are related to thermal analysis, making his selection of the correct tool and version easier.

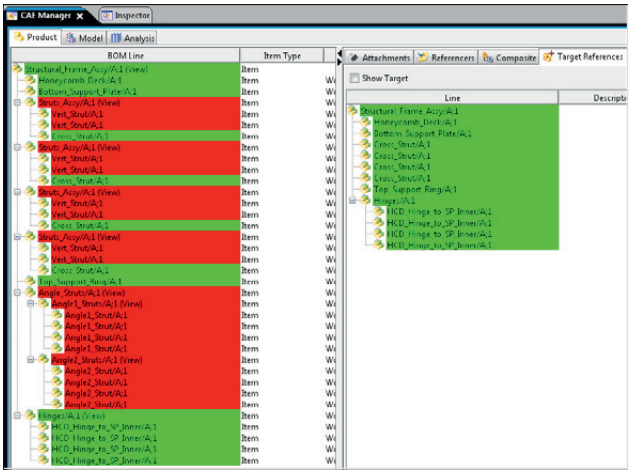
Data access can be controlled at the user, group, role, or project level and can vary for different simulation objects. This enables an organization to provide access to, and share appropriate data with partners and suppliers while protecting intellectual property (IP) and ensuring compliance with regulations.

Speed up simulation and deliver results faster

Analysts spend a significant amount of time searching for data and providing it to others. This data can be the basis for building a simulation model, choosing material properties and applying loads. Any time the design changes, it can impact all these decisions, so staying synchronized with others on the design/engineering team is critical to ensure that analyses are being conducted using the correct and latest versions of all data.

Teamcenter can speed up the search for data with comprehensive capabilities for query and navigation of simulation data. Users can navigate between associated product, model, analysis and results in a specially designed CAE manager application. Queries can be based on attributes such as user name, program name or analysis type, or by relationship such as an analysis performed on a specific design variant. Full text search within stored files and custom queries are also supported. Relationships can be leveraged by users to quickly identify all simulations that were performed on a particular design variant or determine what tool was used to generate a specific result.

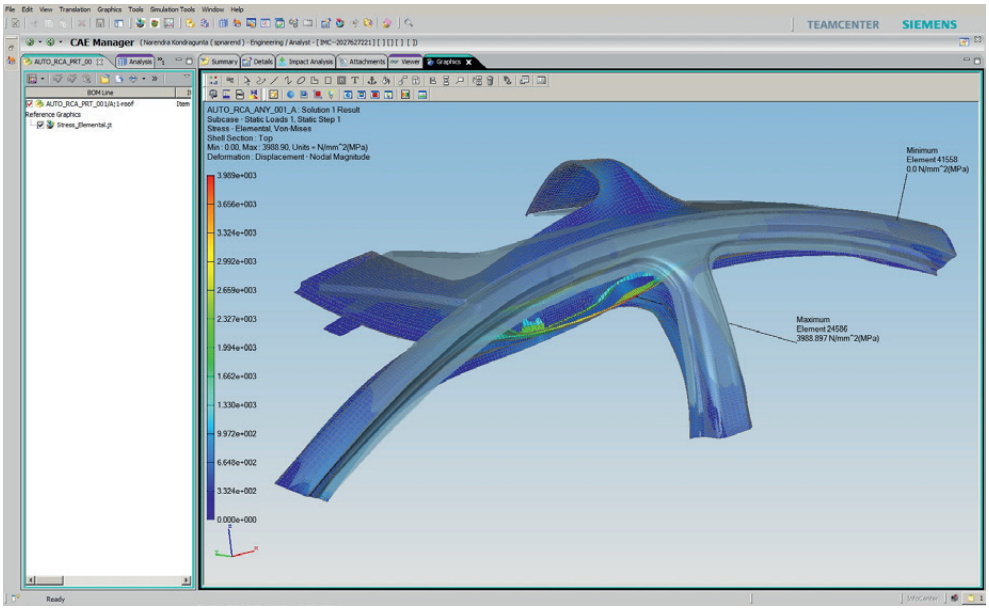
Another area of significant effort for analysts is the process of transforming a complex product structure into an equivalent CAE structure for analysis. Not all components of a product are needed for the analysis, and sometimes additional models needed for the simulation may not exist in the product structure. Teamcenter has a unique capability called structure mapping that can dramatically speed up creation of simulation structures. Automatic creation of simulation structures from a product structure is facilitated through the use of predefined rules, such as filter rules, re-use rules, include rules and others. Once a structure map has been defined, it can also be managed as an object in Teamcenter that can be revised and shared within the organization.



Derive an analysis structure from the product structure using a structure map.

Leverage simulation to make better product decisions

One of the bottlenecks to broader utilization of simulation results to drive product decisions is the inability of program managers and other decision makers to access CAE results without first knowing how to use the CAE authoring tools or postprocessors. Siemens PLM Software has developed the JT™ data format and supported its adoption as an International Organization for Standardization (ISO) standard to enable companies to overcome such hurdles. Simulation results can be captured in lightweight JT format for quick visualization, and simulation reports can be made more visual and useful with embedded JT images that can be manipulated using appropriate viewers. Using the embedded viewer in Teamcenter, all stakeholders have the ability to visualize simulation data, including geometry, meshes, load cases and results, without the need to use a heavy, analyst-specific tool. Team members can also easily markup the JT images to add notes or highlight specific regions of interest for broader collaboration.



Easily view, annotate and share simulation results with stakeholders to make better decisions.

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