

Aerospace and defense

SIMERA Technology Group

Improving efficiency and control with NX and Teamcenter

Products

NX, Teamcenter

Business challenges

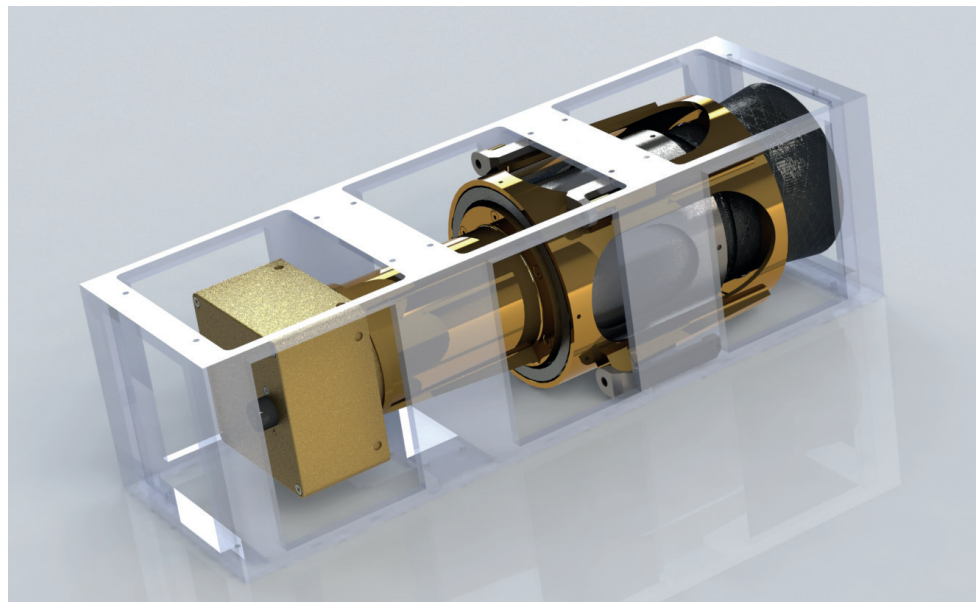
Frequent design changes
Integration of design and simulation
Controlling the engineering design process

Keys to success

Implementing unified NX solution
Integrating CAD and CAE
Design process management with Teamcenter
Excellent local support from partner ESTEQ

Results

Three- to five-times more efficient design iterations
Ability to investigate far more design iterations
Confidence in simulating design performance prior to expensive testing
Improved requirements management and traceability
Strict control over design process



Unified design and simulation environment helps SIMERA optimize performance

Expert engineers, advanced tools

SIMERA Technology Group (SIMERA) is a mechanical engineering development company built around core capabilities of advanced structural design and simulation services. Founded in 2010, the company has 18 permanent employees representing more than 130 years of engineering experience.

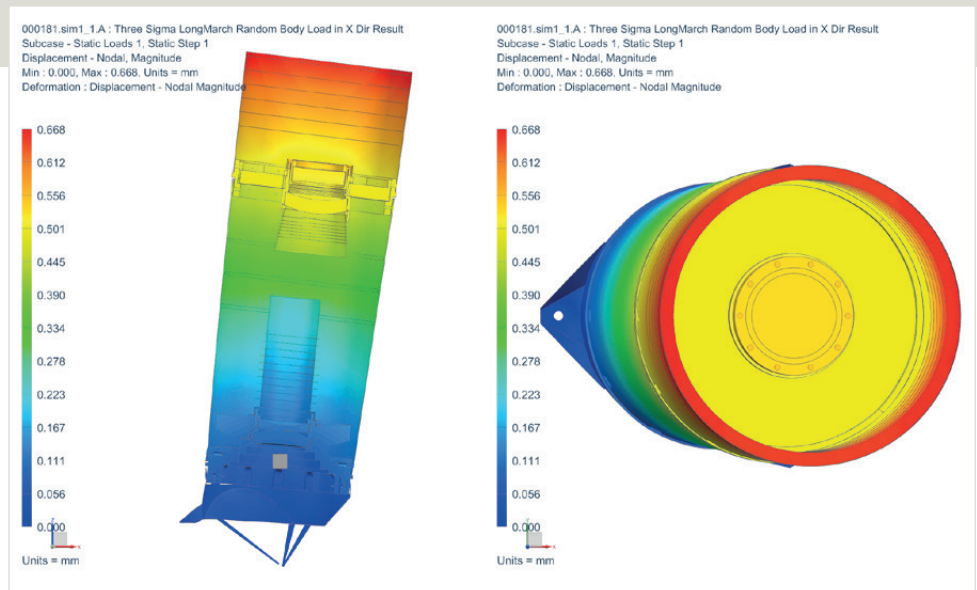
SIMERA's clients include customers in government, research, industrial equipment, and consumer product industry sectors.

To excel in these domains, SIMERA employs highly-skilled, experienced and passionate engineers. Equally important, SIMERA uses advanced, best-in-class engineering and product lifecycle management (PLM) solutions to maintain a competitive edge.

PLM solutions from Siemens PLM Software help SIMERA's engineers work with precision, efficiency and creativity. From design through to simulation and PLM, the cross-functional, comprehensive capability of Siemens PLM Software tools make this possible. SIMERA appreciates the collaboration and rapid design iteration capabilities of the solutions, which aid the creative thinking of development teams.

“The graphical user interface is intuitive and follows practical simulation execution logic.”

Marius Cronje
Lead Engineer
SIMERA



The engineering and PLM solutions help orchestrate projects and track changes in a completely traceable manner, giving design leads immediate insight into the rationale and direction of design iterations.

A unified design and simulation solution

SIMERA formerly used different computer-aided design (CAD) and finite element analysis (FEA) software tools. The tools in themselves were productive, but SIMERA engineers had to transfer information manually, handing data “over the wall” between the design and simulation domains. The manual information hand-offs were not efficient and sometimes lead to versioning errors or simulation model errors.

Implementing NX™ software was a natural step for SIMERA, as it provided a unified CAD and simulation solution that better suited the company’s quality, control and efficiency requirements. NX enables SIMERA to easily and quickly move back and forth during the design and simulation cycle. Simulation engineers can directly or collaboratively request model changes, and validate those changes immediately. The added productivity of the unified solution quickly justified the extra investment.

Improving control of the design processes

SIMERA also uses Teamcenter® software to improve control over design processes. As is typical in small-to-medium enterprises, SIMERA frequently relies on the expertise of

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Johann du Toit
CEO
SIMERA

key team members to track and optimize requirements, link documents and manage projects. This ad hoc approach has many limitations, especially in projects involving extended resources, complex requirements and critical non-compliance implications.

The company realized that PLM was essential for improving design management, particularly in projects with an extended team of stakeholders, larger design teams, complex requirements and strict contractual obligations for execution. After an evaluation of available PLM tools, SIMERA decided on Teamcenter because its capabilities spanned a broad spectrum of the engineering processes. Other important criteria included seamless integration with the NX CAD software and scalability that would enable the system to grow with the company's expansion. The capabilities of Teamcenter for controlling product data with versioning and traceability and for managing the design process were crucial in fulfilling SIMERA's requirements.

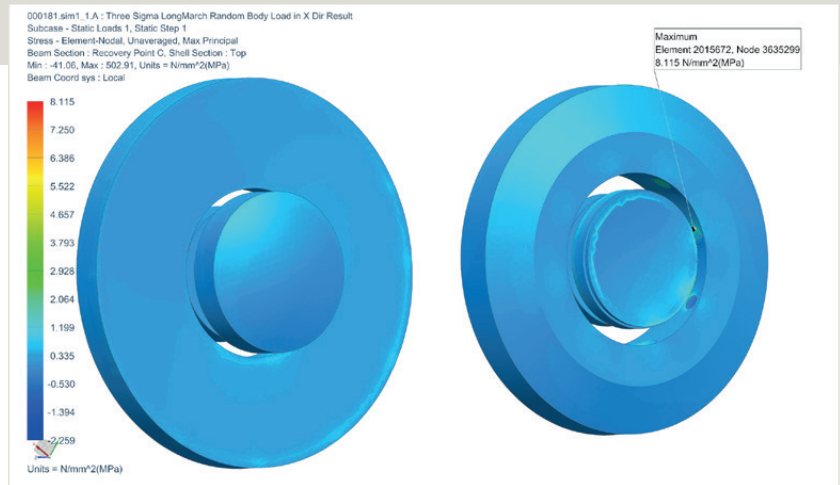
Excellent local support

The availability of local support for the solutions was also an important factor in SIMERA's decision. The company relies on ESTEQ, a Siemens PLM Software channel partner, for strategic consulting, in-house training and system delivery, deployment and support. As the largest provider of engineering simulation solutions in South Africa, ESTEQ brought experience and expertise that were perfectly aligned with SIMERA's own core competencies. "Having excellent local support gives us the confidence to tackle demanding tasks," says Johann du Toit, chief executive officer, SIMERA.

Pushing simulation to the limits

SIMERA engineers apply the unified NX design and simulation solution to optimize the performance of precision spaceborne imaging systems.

Satellite imagers have demanding requirements for controlling optical surface deformations that could compromise image



quality. Typically, a 10 micron rigid body movement of an optical surface can lead to an image plane movement of 100 micrometer or more, and focus retention must be kept within 20 um or less. Likewise – but far more stringent – deformations of optical surfaces themselves must be kept in check to a tenth or more of the wavelength being reflected or refracted, which for visible spectrum imagers starts at 450 nanometers. To put this in perspective, a typical human hair thickness is about 200 times this value. Clearly, error contributors should be fully understood and analyzed to ensure successful operation. Furthermore, for flight systems, structural components are usually made from carbon-fiber reinforced polymer (CFRP) materials, whose behavior under fluctuating thermal and moisture loss conditions are not always apparent due to non-symmetric laminates and their geometries.

SIMERA's challenge is to optimize component stiffness, thermal expansion, and moisture expansion, taking into account the harsh vibration of the launch, the vacuum and the constant thermal cycling of the space environment. Simulating the component's behavior requires a multitude of scenarios involving multiple thermal and moisture-loss load cases, as well as multiple options for the fiber directions in the composite material layouts.

The integrated design and simulation tools of NX help accelerate the extensive investigation. "Having an integrated CAD-to-

Solutions/Services

NX

www.siemens.com/nx

Teamcenter

www.siemens.com/teamcenter

Customer's primary business

SIMERA Technology Group is a mechanical engineering design and simulation company servicing government, research, industrial and consumer product development industry sectors throughout all phases of the product development life-cycle. SIMERA's engineering specialists solve demanding design, simulation and validation tasks, following execution plans optimally tailored to particular project requirements and constraints.

www.simera.co.za

Customer location

Cape Town
South Africa

Partner

ESTEIQ PLM

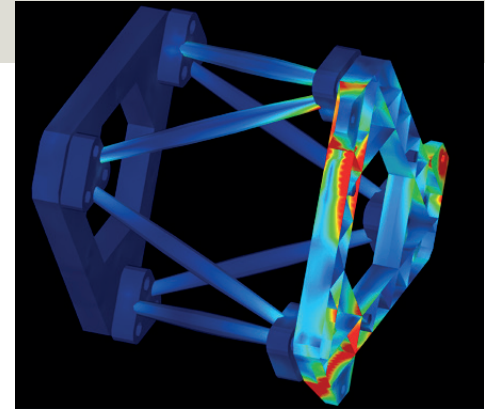
www.esteiq.co.za

simulation environment greatly enhances the efficiency of design iterations," says Hennie Roodt, lead engineer at SIMERA. The system's ease of use was also beneficial to the engineers. "The graphical user interface is intuitive and follows practical simulation execution logic," says Marius Cronje, lead engineer.

After many design and simulation cycles, SIMERA engineers were able to optimize the design, improving the rigidity of the components while minimizing the expansions due to temperature cycles and moisture losses. SIMERA estimates that the all-inclusive tools of NX make the process three- to five-times more efficient. In practice, this means that many more design iterations and scenarios can be investigated to ensure optimal solutions. "Having the capability to quickly and accurately investigate precise structural behavior, exposed to a multitude of operational environments, greatly reduces our product development risks," added Du Toit.

Systems engineering with Teamcenter

The systems engineering capabilities of Teamcenter are also crucial to SIMERA's success with satellite imager projects. To initiate projects, SIMERA engineers use



Teamcenter to capture and analyze the technical and performance requirements of the imaging system as well as to define measurements and verification and validation procedures.

The Teamcenter requirements management tools make the requirements visible to everyone in the development team, which enables SIMERA to allocate them to physical components and to continuously trace, verify and maintain them. Requirements are also fully integrated with the design tools of NX, so designers using NX could view requirements information when creating or modifying component models. With NX requirements validation tools, SIMERA engineers continuously check designs for compliance.

“Having an integrated CAD-to-simulation environment greatly enhances the efficiency of design iterations.”

Hennie Roodt
Lead Engineer
SIMERA

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