

Marine

Bureau Veritas

VeriSTAR Hull lets ship designers quickly determine if their designs conform to regulations

Product

Femap

Business challenges

Ship designs must conform to many regulations

Keys to success

API of Femap enables extensive customization

Openness of Femap allows use of FE models created using other preprocessors

Ease-of-use of Femap accelerates productivity

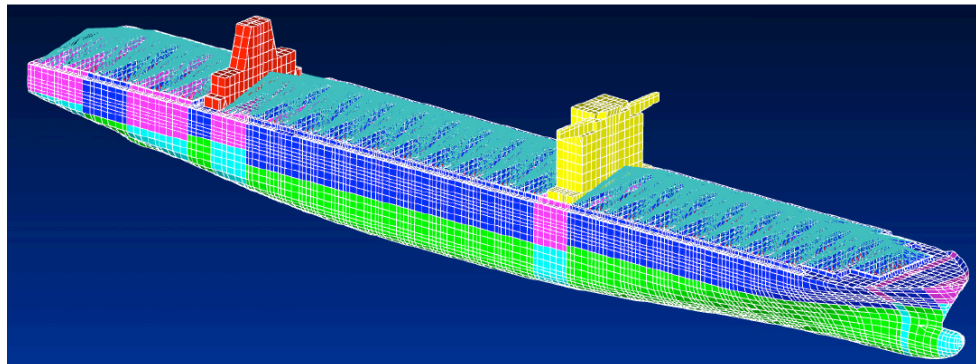
Results

Fast preprocessing of hull FE models

Customized postprocessing tools that quickly identify problematic areas

Latest editions of ship design regulations (BV Rules, CSRs, CSR-H) are implemented using software

Early FEA results are instrumental in guiding the design process



The ease of customizing Femap enables Bureau Veritas to keep its ship hull verification tool up-to-date with the latest versions of international rules

Many more rules for ship design

Founded in 1828, Bureau Veritas is a global leader in testing, inspection and certification. It delivers high-quality services to help clients meet the growing challenges of quality, safety, environmental protection, and social responsibility. In the marine industry, where the company provides statutory certification of ships (among other services), 140 national administrations recognize Bureau Veritas as an official certification body.

Designing ships today is nothing like it was 10 years ago, according to Olivier Degrand, project manager in the

development department at Bureau Veritas. "Ten years ago, you could design a ship using 'basic' calculations, but, now the rules have become more and more complex, and powerful software is essential to apply them," Degrand says. "For ship designers, this means a lot of extra work."

The shipyards turned to companies such as Bureau Veritas for help. "They asked us to provide tools that would save time in the design of the ships," Degrand explains.

Specifically, they wanted a solution that could be used during the design phase to quickly determine whether a ship's design met the rules requirements for the specific vessel type, such as bulk carrier, container ship, oil tanker and so on. Some ship types fall under common structural rules (CSRs) developed by the International Association of Classification Societies (IACS), which are sets of rules that IACS

The analyses of VeriSTAR Hull, an extensive customization of Femap, shows the most heavily loaded areas in terms of stress, buckling and fatigue – information that tells designers where they must modify the design. Some of the post-processor's features include automatic calculations of yielding/buckling ratios and fatigue life.

classification societies around the world have agreed to apply. CSRs exist today for oil tankers and bulk carriers.

Femap as the foundation

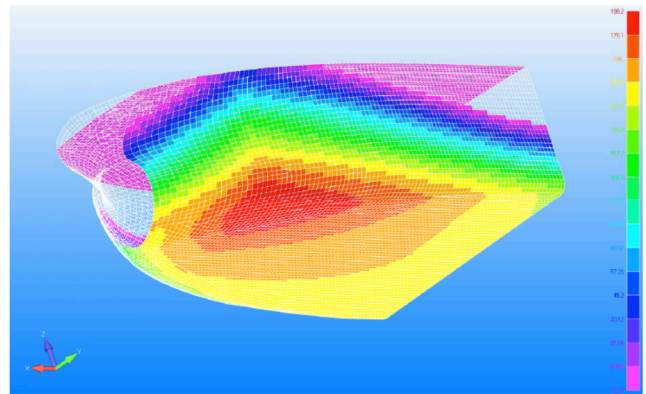
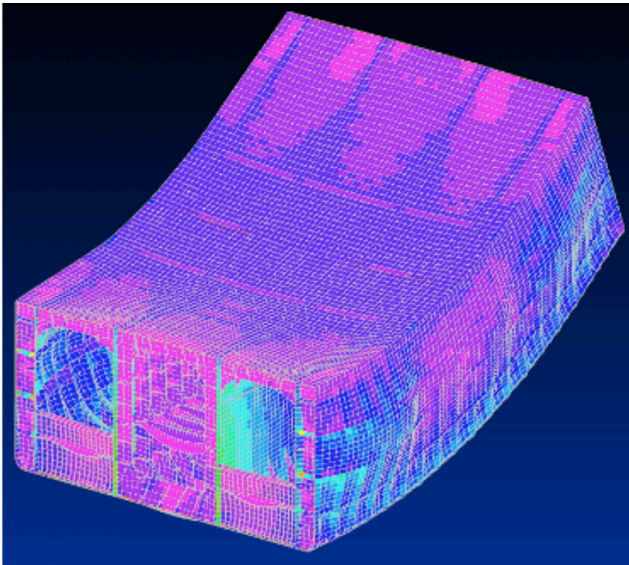
Bureau Veritas began developing its solution, VeriSTAR Hull, in 2004. Knowing it would be based on finite element analysis (FEA) of 3D hull geometry, the first step was to choose the FEA software. The selection committee benchmarked a number of finite element modeling programs.

The VeriSTAR Hull developers chose Femap™ with NX™ Nastran® software from product lifecycle management (PLM) specialist Siemens PLM Software on the strength of the application programming interface (API) of Femap, which was something the other programs didn't have at

the time, according to Degrand. The API of Femap was a key factor because it would let VeriSTAR Hull's developers add specialized functionality to the existing modeling and analysis capabilities in Femap.

"VeriSTAR Hull is an extensive customization of Femap, designed to reduce the time required to generate FE models as well as postprocessing," Degrand explains.

The program assesses hull designs against regulations regarding strength and fatigue. It is typically used as part of the design process. "We cannot separate design from rule verification," Degrand adds. "Verification is a part of design." The software can import 3D hull geometry in IGES data format. It can also import FE models created using other preprocessors, such as Patran software and I-deas™



software. It is compatible with both the NX Nastran and MSC Nastran FEA solvers.

VeriSTAR Hull analyses show the most critical areas in terms of stress, buckling and fatigue; information that tells designers where they must modify the design. Some of the postprocessor's features include automatic calculations of yielding/buckling ratios and fatigue life.

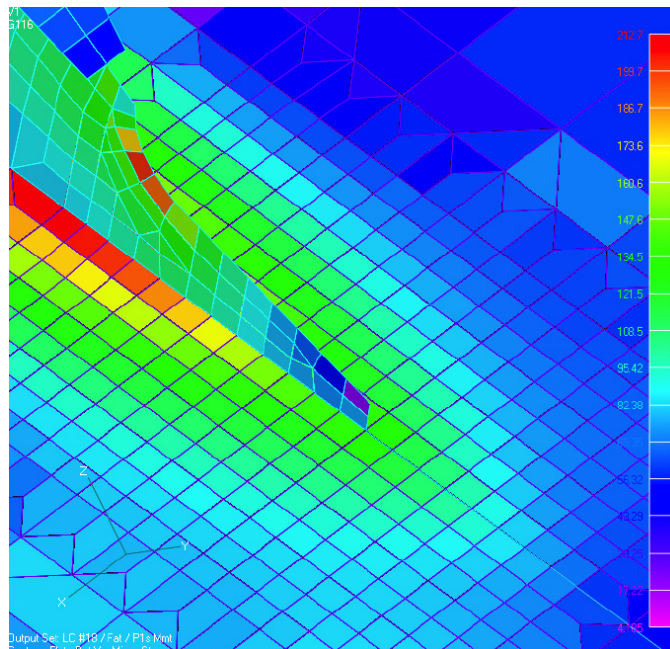
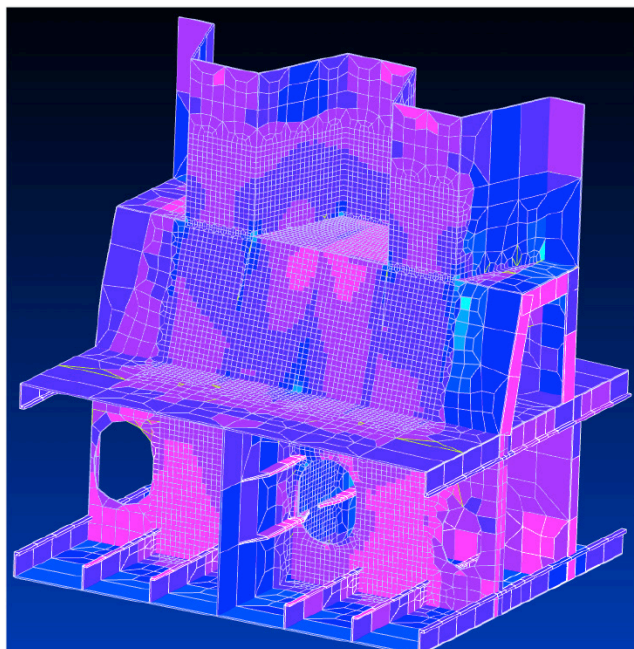
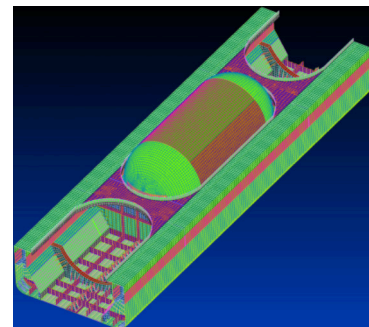
Continuously revised to include latest rules

Since the first version was released, VeriSTAR Hull has been in continuous development. The current version, VeriSTAR Hull 5, incorporates the latest editions of harmonized common structural rules (CSR-H); CSRs for bulk carriers and double-hull oil tankers; Bureau Veritas' rules for steel ships, such as those that

transport liquefied natural gas and liquefied petroleum gas; and Bureau Veritas' rules for offshore units such as floating production, storage and offtake (FPSO) vessels and drilling ships.

Bureau Veritas uses VeriSTAR Hull in its own work, and also makes the software available for purchase. In a typical use case, Bureau Veritas used VeriSTAR Hull (along with another in-house solution, MARS2000) as part of in its work in helping major shipyards in Korea, China and Japan speed the implementation of CSRs and CSR-H.

"Because Bureau Veritas played a leading role in the harmonization of the IACS common structural rules, we were able to rapidly update our software for the new standards," says Christophe Chauviere,



Solutions/Services

Femap with NX Nastran
www.siemens.com/plm/femap

Customer's primary business

Bureau Veritas is a world leader in conformity assessment and certification services.
www.bureauveritas.com

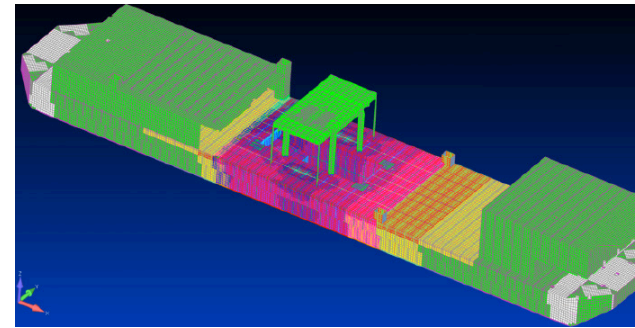
Customer location

Neuilly-sur-Seine
France

head of the development department in Bureau Veritas Marine and Offshore division. "As our software tools are not class-specific and many yards already use our tools, we were able to help them check out their designs and adjust them to be ready for the entry into force on July 1, 2015."

Bureau Veritas professionals used VeriSTAR Hull to evaluate ship designs underway at these shipyards. "A lot of attention has been given to adapting the tool to reduce the time needed for pre- and postprocessing," says Chauviere. "Yards need to react quickly to new design requirements and VeriSTAR Hull delivers rapid and thorough assessment of full compliance with CSR-H. It is the attention to ease-of-use and speed which makes [it] stand out." That ease-of-use and speed are made possible to a large extent by Femap.

VeriSTAR Hull was already compliant with the last version of the CSR-H, including new requirements concerning buckling, aftmost and foremost cargo hold assessment, and fatigue check. "We made it easy for the yards by simplifying conversion of databases for the separate CSRs for tankers and bulkers into a CSR-H database with the necessary extra data," explains Chauviere.



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Olivier Degrand
VeriSTAR Hull Project Manager
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