

Computer simulation speeds specialist composite design

Femap with NX Nastran helps Australian company meet delivery dates and reduce the risks of long-lead time parts

RPC TECHNOLOGIES PTY. LTD.

Siemens PLM Software

www.siemens.com/plm

▶ Business initiatives

New product development

▶ Business challenges

Meet delivery deadlines and performance targets to avoid financial penalties

▶ Keys to success

FEA preprocessor with composite modeling capability

Industry standard solver

Local FEA support

Analysis results available in five minutes in some cases

▶ Results

Designs are optimized for maximum strength and minimum cost

Prototypes and production parts are available sooner with lower development cost

Higher confidence that parts comply with performance specifications

A level of service that distinguishes RPC from its competitors

Sea water to seats

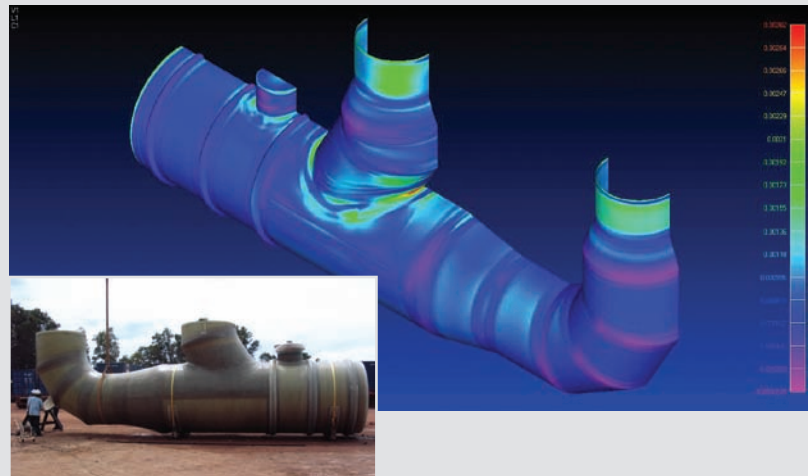
RPC Technologies is a leading supplier of corrosion resistant, structural fiber-reinforced plastic (FRP) fabrications; piping and ducting systems; acid-resistant, heavy-duty linings; and specialist composite products. RPC is an abbreviation for reinforced plastic composites, and true to its name, the company provides a full range of reinforced plastics and composites products together with specialty fabrications

tailored to customer requirements. It serves a broad assortment of industries including: defense equipment fabrication and rehabilitation, water and wastewater, power, mining and process, aerospace and marine, transport and communications. Its products range from large pipes (six to 10 feet in diameter) to train components such as seats, panels and lighting systems.

RPC's contracts typically contain substantial penalties for missed targets and delivery dates. Two factors pose challenges for RPC in this regard. One is the country's shortage of engineers, which is forcing the company to make its product development process as efficient as possible. (Its engineering work on a project typically involves design, analysis, verification testing and creation of production drawings.) The other challenge is long-lead time parts, such as castings for train seats, which have the potential to cause lengthy delays if anything goes wrong. "We must have a high level of confidence that those designs will work before we get prototypes made," says Mark Harrison, engineering manager at RPC Technologies.

Quality software, quality reseller

Finite element analysis (FEA) is helping RPC meet these challenges by allowing the company to simulate design performance early in the development process. Its FEA solution is the Femap® pre and post-processor and NX® Nastran solver, both from Siemens PLM Software, a global division of Siemens Automation and Drives.



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Structural/Composites Engineer
RPC Technologies

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Senior Project Engineer
RPC Technologies

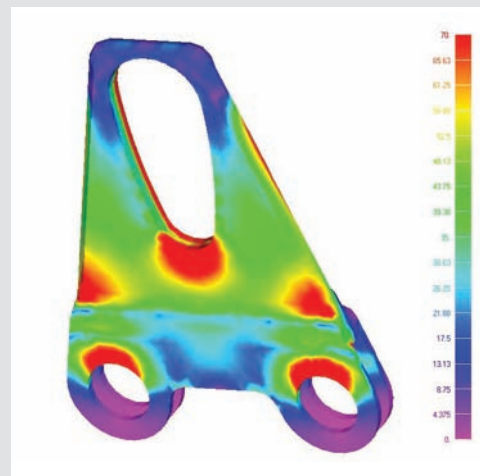
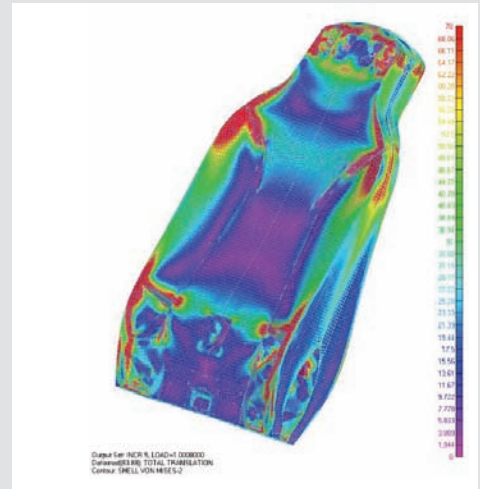
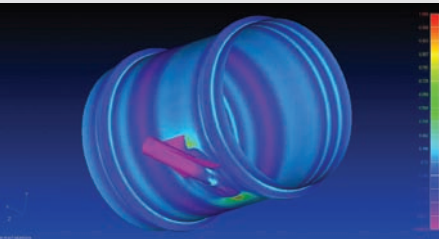
This solution was chosen over other alternatives, according to Grant Griffin, senior project engineer at RPC, on the basis of both the quality of the software and the expertise of the local reseller, EnDuraSim. “NX Nastran is the industry standard in our area,” Griffin says. “And Femap has good composite modeling functionality, which is important to us because we do so much work with composites. But some of our choice was also due to EnDuraSim. We really wanted local support, which was not available with another program we were considering.” One other point in favor of this solution: “a good price,” Griffin adds.

Design optimization

FEA is currently used by two RPC groups: the Industrial group, where it’s used predominately in the design of piping; and the Transport group, where it’s used for complicated design challenges such as train seats. In piping design, the analysis concentrates on high stress areas such as joints. “All of our pipes and fittings are fiberglass reinforced, so having an FEA package where we can model laminate elements is very important,” says Pierre Gouhier, a structural/composites engineer who performs the analyses. “There can be anywhere from 50 to 100 laminate layers.” If, during the course of analysis, Gouhier determines that certain laminate layers should be reoriented, he uses Femap’s geometric modeling tools to do that, eliminating the need to go back and forth with the CAD system.

In the design of train seats, FEA helps the company reduce the cost of the seats by reducing mass. Mass specifications are built into the contract, and the penalty for missing the target can be severe. In one recent contract, for example, if the actual seat mass were to exceed the tendered mass by five percent, the commercial penalty to RPC would be many million dollars across the contract.

“FEA plays a big role in our effort to optimize designs for maximum strength and minimum cost,” Harrison explains. The extra design iterations necessary to achieve this kind of design optimization are possible, even with a small engineering staff, because results of stress analyses are available within as little as five minutes in some cases. FEA is used for more than just reducing mass, however. Train seat design is complicated by the fact that seats must be able to handle fairly extreme loads, such as 5G longitudinal, 2G vertical and 2G lateral loads as well as “vandalism” loads. They must also absorb energy.



Solutions/Services

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

Client's primary business

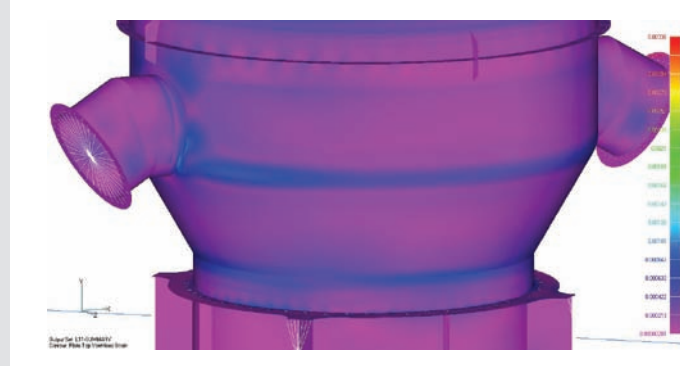
RPC Technologies is a leading supplier of corrosion resistant, structural FRP (fiber reinforced plastic) fabrications, piping and ducting systems, acid resistant heavy-duty linings and specialist composite products.
www.rpctechnologies.com

Client location

Seven Hills, New South Wales,
Broadmeadow, New South Wales,
Kooragang Island, New South Wales
Australia
Batam Island, Indonesia
Singapore

"Femap with NX Nastran is essential to this work," says Harrison. "It allows us to get to a prototype/production part much faster, and with a greater degree of confidence that the part will be compliant with the performance specification." By verifying that seats will withstand the required loads prior to ordering castings, RPC is able to avoid lengthy delays with these long lead-time parts.

Harrison says that while more and more customers are requiring FEA reports as part of the contractual agreement, the use of Femap with NX Nastran is still a competitive advantage. "It's a great marketing tool," he says. "And design optimization is a way of differentiating ourselves from the competition."



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Engineering Manager
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