SIEMENS
Ingenuity for life

Oil and gas

IHC Handling Systems

IHC Handling Systems improves virtual prototypes and ultimate quality of offshore equipment; tight integration of Femap and Solid Edge makes it possible

Products

Femap, Solid Edge

Business challenges

Improve the predictability of product functionality and quality in a market where prototypes are almost impossible to effectively create and errors are very expensive

Keys to success

An integrated CAD/CAE approach that frees more time and attention for design and simulation

User-friendly programming

Process automation via preset tasks

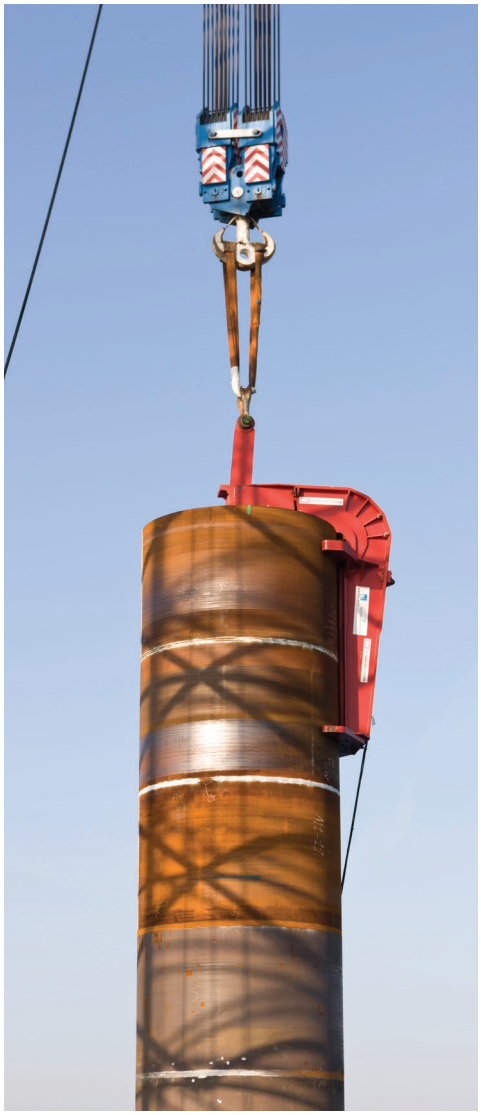
Results

Eliminated time-consuming geometry corrections

Reduced the turnaround needed for analyzing variants through significantly improved meshes

Increased productivity through re-use of proven designs

Notably improved product time-to-market and quality while reducing costs



With Femap, company increases re-use of proven designs, boosting productivity and decreasing costs

The need for virtual prototypes

In the offshore industry, operational certainty is one of the most important requirements. The installations are large and the investments are high. Virtually everything is unique and leaves little room for error. As a supplier of tools for the installation of offshore equipment, IHC Handling Systems v.o.f. (IHC Handling Systems) is very familiar with the market. Functionality and quality must be validated prior to production. Virtual prototypes are the only way to ensure this.

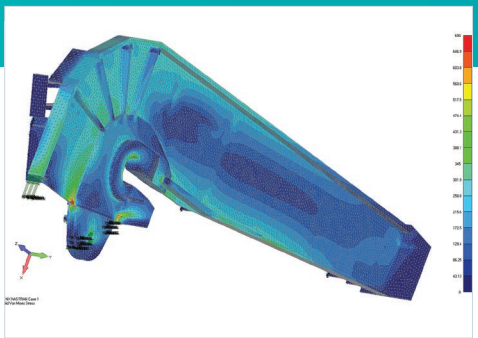
IHC Handling Systems is part of IHC Merwede, a world leader in the dredging and offshore industry. IHC Merwede's products include dredging vessels, equipment and components, as well special-purpose vessels and technology. IHC Handling Systems focuses on products for oil, gas and wind, such as equipment for pipe laying, equipment for the installation of oil and gas rigs and equipment for the installation of offshore wind mills.

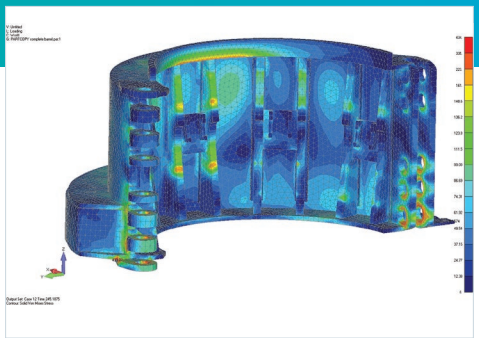
Quick response and communication

In order to lay pipelines on the seabed or put piles of windmills upright, the thin-wall, tubular pipes need to be picked up by grippers. These are metal clamps that are

Results *(continued)*

Realized a full return on software investment in short-order





placed on the inside and outside of the tube. The force with which the clamps grip the steel enables the lifting of the product.

For the leveling of oil rigs, IHC Handling Systems provides equipment to establish a temporary connection between the seabed construction and the jackets on which the platform rests.

Most of the products produced are project-specific. IHC Handling Systems usually has an early involvement in new offshore projects. "Customers approach us because of our reputation and experience," says Cor Belder, concept engineer at IHC Handling Systems. It is important to have certainty about the concept solution in an early stage. A quick response to customer demands and communication are essential. "At the same time, we also want to offer functional certainty. That can only be achieved using advanced and integrated design tools."

Lower cost of software

A few years ago, IHC Handling Systems purchased licenses of Siemens PLM Software's Solid Edge® software, a comprehensive hybrid 2D/3D computer-aided design (CAD) system, and Algor® Simulation software (which is currently owned by Autodesk and is offered under the name Autodesk® Simulation Mechanical) for finite element analysis (FEA). Both solutions were bought through Bosch Engineering, a Siemens PLM Software partner. "Together with a sister company in the IHC Merwede group, we were forerunners in using Solid Edge," says Belder. "Algor worked nicely together with Solid Edge, and data transfer between the two applications allowed for quick analysis of design alternatives." But in a recent reassessment of the computer-aided engineering (CAE) applications, Belder saw room for improvement, specifically in the areas of data integration, meshing and programming.

"Early on in the evaluation, we developed a preference for Femap," says Belder. "Femap offers a significant improvement in functionality over Algor at lower software costs. We want to spend our time on the evaluation of alternative designs and don't want to lose it over issues related to data transfer. Femap and Solid Edge are tightly integrated, which saves time and reduces risk." Belder notes that in addition to the

"The integration of Femap and Solid Edge allows for fast iterations in this concept phase."

Cor Belder
Concept Engineer
IHC Handling Systems

“Femap offers a significant improvement in functionality... at lower software costs.”

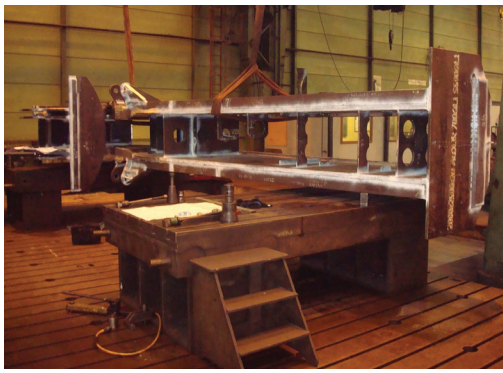
Cor Belder
Concept Engineer
IHC Handling Systems

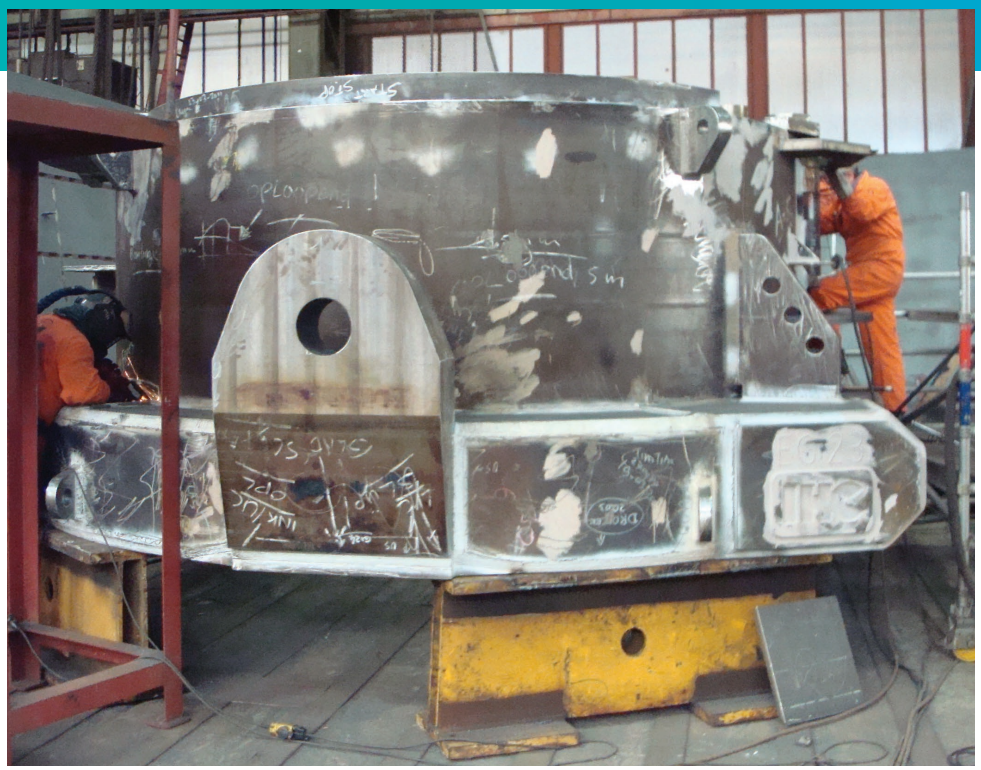
robust geometry exchange, the mesh is more constant and allows for better local refinement.

Fast iterations

In a typical project, the concept engineer develops new models or combines and re-uses existing ones. “Concepts are almost always modeled in Solid Edge,” says Belder. “In the early stages, these are simplified designs focused on functionality, but ready to be used in preliminary CAE analyzes. The integration of Femap and Solid Edge allows for fast iterations in this concept phase.” These functional concept designs are also used for client communication.

IHC Handling Systems uses both the linear and the nonlinear functionality of the NX™ Nastran® software solver embedded in Femap™ software. The linear functionality is used for all static calculations as well as for contact analysis. Contact analysis is often used for designing lifting tools, where steel friction pads are pressed on





"Femap offers a significant improvement in functionality over Algor at lower software costs. We want to spend our time on the evaluation of alternative designs and don't want to lose it over issues related to data transfer. Femap and Solid Edge are tightly integrated, which saves time and reduces risk."

"We were satisfied with the engineering tools we had, but there is always room for improvement. Using Femap allows us, better than ever before, to serve our customers with our experience and quality."

Cor Belder
Concept Engineer
IHC Handling Systems

the inside and outside of the pipe or pillar using hydraulic cylinders. The nonlinear analysis is used for the calculation of the friction between the steel pillar and the friction pads. This friction is the basis of the grip needed to lift the pillar or pipe. The amount of friction is defined by the pressure exerted on the cylinders. At the same time, the pressure should not lead to deformation of the pipe. "These are complex calculations taking up to 20 hours," notes Belder. "We need to find the technical and economical optimum, in other words, the functionality must be ensured at the lowest cost possible. We take the calculations to the elasticity limit of the material."

Re-use of proven designs

The re-use of meshes and load cases saves IHC Handling Systems a lot of time, especially in projects where existing concepts can be used, even though there may be many possible variations. An example is the upending tool that is used for lifting pillars. Upending tools must be able to handle many different diameter/wall thickness combinations and must be able to

"Femap saves us a significant part of the time needed for modeling, meshing and applying the load case. The preparations can be reduced from hours to minutes."

Cor Belder
Concept Engineer
IHC Handling Systems

Solutions/Services

Femap
www.siemens.com/plm/femap

Solid Edge

www.siemens.com/solidedge

Customer's primary business

IHC Handling Systems develops, produces, sells and rents equipment for the installation of offshore equipment.
www.ihciqip.com

Customer location

Delfgauw
Netherlands

pick up pillars with diameters up to 6,000 millimeters. The customer specifies the diameter of the pillar and the lifting capacity of the available crane. To find the most economical solution, the engineer would traditionally select variants and perform the necessary calculations. This implies that, for every variant, the generation of the mesh and the application of the load case are required to perform a single calculation. The geometry of the variants differs too much to re-use the mesh and load case.

Using the programming capabilities of Femap, the CAE model can be configured and generated automatically, for example, from Excel® spreadsheet software, including the mesh and the load case to be analyzed. Moreover, programming with Femap is easy to learn. "Using the traditional way of working, we would be able to analyze only three combinations a day," says Belder. "Programming in Femap saves us a significant part of the time needed for modeling, meshing and applying the load case. The preparations can be reduced from hours to minutes. We can respond much quicker to changing customer requirements."

According to Belder, building the application of the upending tool took, all in all, no more than a week: "The investment has already paid for itself, because we always need to do calculations in projects for upending tools, which we use often in our projects."

The goal to work better, faster and more cost-efficient using Femap has been achieved. "We were satisfied with the engineering tools we had, but there is always room for improvement. Using Femap allows us, better than ever before, to serve our customers with our experience and quality," concludes Belder.

"Using Femap allows us, better than ever before, to serve our customers with our experience and quality."

Cor Belder
Concept Engineer
IHC Handling Systems

Siemens PLM Software

Americas +1 314 264 8499
Europe +44 (0) 1276 413200
Asia-Pacific +852 2230 3308

www.siemens.com/plm

30617-A14 7/17 C