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Aerospace • Electronics and semiconductor

ABB Analytical Business Unit

In-house FEA permits faster, better product design

Products

Femap, NX

Business initiatives

New product development

Regulatory compliance

Business challenges

Design sensors to meet harsh on-orbit environmental demands

Comply with regulations prohibiting use of subcontractors

Keys to success

Advanced FEA solution with complete structural and thermal analysis capabilities

Automated response dynamics postprocessing

Specific analysis functionality for space applications

Results

Faster turnaround time on analyses speeds product development

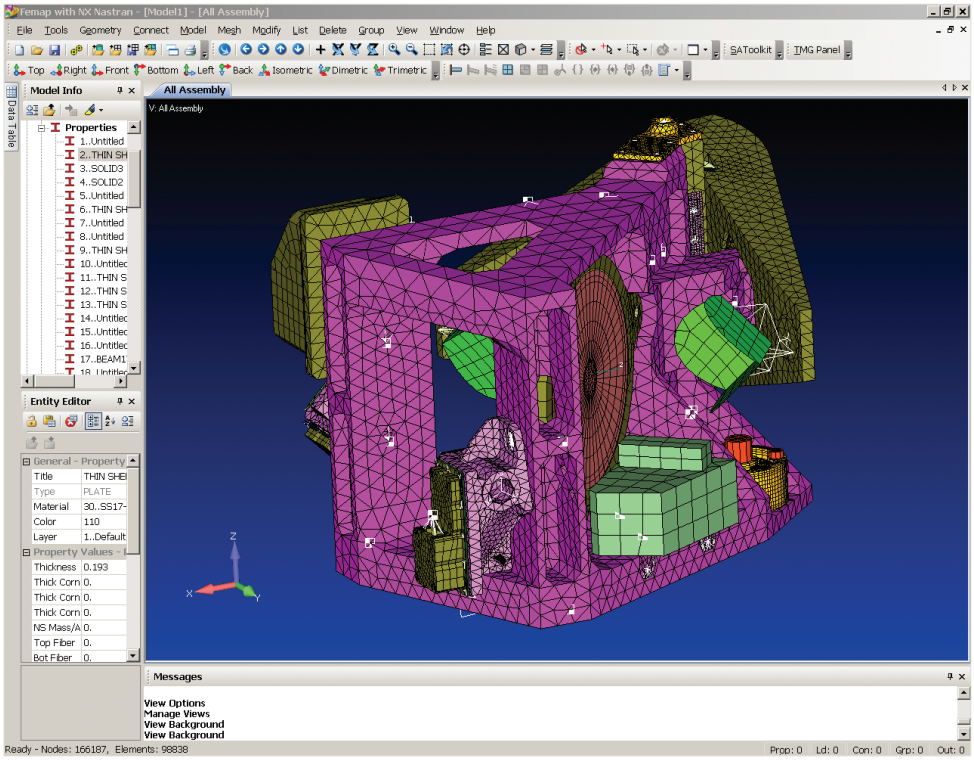
Greater flexibility in how and when analysis is used

More productive discussions with customers

Advanced structural-thermal solution speeds analysis turnaround and permits more flexibility in how and when analysis is used

FEA aids sensor design

ABB is a global leader in power and automation technologies. It employs approximately 107,000 people in multiple companies and business units that operate in nearly 100 countries. One of those companies is the Analytical Business Unit, which designs, manufactures and markets interferometers and spectroradiometers used in petroleum, chemical, life science and remote sensing/aerospace applications. The Analytical Business Unit has been supplying both land and satellite-based sensor equipment for more than 30 years. Some of the uses of its equipment include measuring the chemistry of the ozone layer for the Canadian Space Agency,



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Mechanical Group Leader
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tracking and predicting hurricanes for U.S. satellite programs and monitoring greenhouse gases in keeping with the Kyoto Protocol.

Finite element analysis (FEA) plays an important role in the design of this equipment. "Structural analysis is important because airborne and satellite devices must survive the intense vibration during the launch and flight." explains Daniel Gingras, a mechanical engineer with the Québec-based part of the ABB Analytical Business Unit, formerly called ABB Bomem. "The structures must resist fatigue but they also need to be as light as possible because every pound adds significantly to the cost of a satellite. We perform thermal analyses, as well," he adds. "Some ground-based equipment that goes into Nordic climates must withstand a thermal variation of as much as -60 degrees C to 40 degrees C." ABB Analytical engineers design this equipment and then simulate real-world performance using FEA, which allows them to optimize the designs. After that, they test physical prototypes.

Bringing FEA in-house

For many years, ABB subcontracted the FEA work to another Québec-based company, MAYA HTT Ltd., of Montreal. But some projects under U.S. International Traffic in Arms Regulations (ITAR), for example, prohibit the company from using subcontractors. Compliance prompted the installation of a comprehensive in-house FEA system. "We already had engineers with FEA experience," explains Nicolas Étienne, mechanical group leader at ABB Analytical. "Selecting software was a matter of comparing various Nastran-based solutions. Nastran is a well-known solver and many of our customers require it."

The company chose an FEA system from Siemens PLM Software consisting of NX™ Nastran® software, the Femap™ pre- and postprocessor software and the Femap Structural Analysis Toolkit for Nastran. The toolkit is an additional module that complements NX Nastran and Femap by processing data from Nastran results files and presenting it in Microsoft Excel, HTML formats, universal files and ASCII text files. It is particularly useful in organizing large Nastran results data blocks into meaningful summaries, saving valuable analysis time.

The availability of the toolkit was one of the main reasons ABB Analytical chose this solution over other Nastran-based alternatives. "No other option could match the response dynamics capabilities that the Femap Structural Analysis Toolkit offers," says Étienne. "And because postprocessing is more automated, it saves us time," adds Gingras. "Having results in an Excel format lets us quickly verify whether a design is good or not, for instance, and also helps

Solutions/Services

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

NX Nastran for Femap
Structural Analysis Toolkit
www.siemens.com/nx

Customer's primary business

ABB's Analytical Business Unit designs, manufactures and markets high-performance FT Mid-IR/Near-IR analytical system solutions and spectroradiometers.
www.abb.com/analytical

Customer location

Québec City, Québec
Canada

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us deal with design changes as fast as possible." Engineers also use Femap TMG Thermal Analysis software, which brings specific thermal simulation functionality for space applications. Developed by MAYA HTT Ltd., this module is completely embedded within Femap.

Faster turnaround, more flexibility

Installing FEA in-house has brought a number of benefits to ABB Analytical. Turnaround time for analysis is faster now that the company doesn't have to assign the work to a subcontractor. Ultimately, that has a beneficial effect on the pace of product development. "In this way, our FEA system helps us develop products in the shortest amount of time possible," says Étienne.

Another benefit is that the company has more flexibility in how and when FEA is used. "Simpler analyses, that might have been done by hand in the past, can now be performed on the computer," says Gingras. It's also easier to reanalyze a design after modifications have been made since there is no need to schedule subsequent analyses with an outside supplier. The company also finds that having its own FEA system helps in discussions with customers. "We can look at our computer and see the analysis, rather than contacting the subcontractor," Étienne notes.

In addition to the advantages FEA brings to ABB's own product development process, the Siemens solution positions the company to offer a comprehensive range of analysis services to others. "We have set ourselves up with an advanced solution that lets us perform a complete range of structural and thermal analyses," Étienne adds. "With the Siemens software, we can handle any analysis application related to space."

Siemens PLM Software

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