

VTT Technical Research Centre of Finland

Financial & Business Services Case Study



Challenge

VTT Technical Research Centre must provide its customers with innovative, cost-effective solutions to their design and manufacturability challenges.

Solution

Using the **3DEXPERIENCE** Platform from Dassault Systèmes, VTT is able to deliver efficient human-technology solutions and services using virtual environments and functional simulation.

Benefits

VTT's customers experience the benefits of fewer physical prototypes, right-the-first-time designs, and enhanced user-friendliness through improved product ergonomics and environments.

More competitive engineering services with 3DEXPERIENCE

From bioactive paper to ecomining, Finnish research organization VTT is involved in some of industry's most technologically advanced projects. Founded 70 years ago with a mission "to engage in technical research for the benefit of science and society", it became Finland's biggest research institute by the mid-1960s. Today, it is one of the five most active research institutes involved in the European Union's projects and has approximately 350 international public research projects going on each year.

In the R&D world, VTT Technical Research Centre is a one-stop shop offering multidisciplinary expertise and services to all types of companies in any industry. "Companies can seek VTT's expertise by asking us to do part of their research work for them," Kaj Helin, Team Leader and Principal Research Scientist, VTT said.

Entirely funded by the client, VTT's role is to design and provide a turnkey solution. VTT also works on jointly financed projects such as the ITER Fusion power plant, partially funded by the European Union and currently under construction in the south of France. VTT also undertakes projects that it funds entirely on its own in areas it considers important for scientific or technological research.

Early virtual testing precedes physical prototyping

For the ITER nuclear fusion reactor, VTT designs the robots that will perform the maintenance work in the reactor. "For obvious safety reasons due to radiation levels, all maintenance work must be done by robots that are controlled from a remote location," Mikko Siuko,

Team Leader and Principal Research Scientist, VTT explained. "Our job is to design and test these robots before actually installing them on site."

To ensure the reliability of all remote-handling solutions, Siuko and his team need to verify them using physical prototypes. "We therefore built a physical full-scale platform in our research center of the lower part of the ITER reactor for testing purposes. However, to keep costs down and avoid unnecessary delays, we first perform virtual testing using the **3DEXPERIENCE** Platform from Dassault Systèmes (3DS) and its application 3DVIA, before manufacturing any components. The models and their accuracy are then verified with real devices in full-scale experiments," Mikko Siuko explained.

VTT designs the robots using CATIA and tests them with DELMIA, also part of the **3DEXPERIENCE** Platform, to reproduce the way they will operate in the reactor. It also develops and tests the control software that operates the robots with models to study the dynamic behavior of the reactor in a closed loop with the controller for early validation, before physically deploying this software in the reactor.

"ITER machines are complex and require a multidisciplinary approach to design," Siuko said. "A systems-engineering approach has been used for a few years now at VTT and Version 6 Modelica-based CATIA Systems Engineering for Modeling solutions are definitely an asset to our projects."

Working with 3D models helped Siuko and his team to identify parts that would have presented problems and would need repair, saving time and money. "Without these virtual tools, we could not have detected these problems and certainly not so early in the process," Siuko said. "We can present more design variations in a virtual environment to manufacturing personnel and incorporate their suggestions on how to modify the design so that it is easier and less expensive to produce."

Avoiding a \$1 million problem

VTT also develops human-machine systems and workplaces using virtual environments and functional simulation. One of its projects involves



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Kaj Helin, Team Leader and Principal Research Scientist, VTT Technical Research Centre



VTT's virtual reality lab in design review



VTT's virtual reality lab with motion platform

"Without these virtual tools from Dassault Systèmes, we could not have detected these problems and certainly not so early in the process."



Mikko Siuko, Team Leader and Principal Research Scientist, VTT Technical Research Centre

defining how to assemble a satellite for leading European satellite designer and manufacturer Thales Alenia Space. Physical prototypes are prohibitively expensive so virtually testing the assembly of a satellite was the obvious choice.

"There is only one unique product and you have to do it right the first time," Helin said. "If you make a mistake and a satellite is in orbit and doesn't work, you have a million-dollar problem on your hands. It therefore has to be designed and checked prior to assembly with clear and detailed instructions on how to proceed. We use the 3D models provided by Thales Alenia Space and perform the virtual assembly. It is a good way to understand and learn," Helin explained.

Maintenance design of a rock crusher

Crushing rocks can be hazardous work and keeping crusher machines in top shape is of the utmost importance. This is why Metso Minerals, manufacturer of rock crushers, decided to incorporate maintenance considerations in the design of its machines. It commissioned VTT

to provide maintenance simulation information to its designers for inclusion in its designs.

"The idea is to check whether it is possible to perform maintenance tasks, verify assembly-disassembly sequences and if there is enough clearance when components are removed and repositioned," Helin said. "We use 3DVIA to simulate each sequence using third-party design information from Metso and propose where design improvements can be made early on. Among the benefits are better understanding of the complete process and early elimination of errors."

What do VTT's customers value most? "Functionality and manufacturability," Helin answered. "We can show them different possibilities that enable them to see and plan for the future because virtual reality is a window into the future," he concluded.

Focus on VTT Technical Research Centre of Finland

VTT is a globally networked, multi-technological contract research organization. It is the largest research center in northern Europe and third largest in all of Europe.

Products: High-end and innovative technology solutions and services
Revenue: 292 M€ (2010)
Employees: + 3200
Headquarters: Tampere, Finland

For more information
www.vtt.fi





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Collaborative Innovation



3D Communication

Dassault Systèmes, the **3DEXPERIENCE** Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 150,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit www.3ds.com.

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