

Tecnomatix • Solid Edge

## Atomic Energy of Canada

Simulation pays off for AECL and its customers

### Industry

Power and process

### Business challenges

Minimize reactor down time and worker exposure to radiation

Meet cost and delivery terms of proposals

Sell reactor services in a very competitive market

### Keys to success

Import tool and facility geometry into Tecnomatix Robcad software and create virtual reactor environments

Use Solid Edge software to create the digital models that are used in the simulations

Simulate human and robotic operations in reactor environments to find fastest, safest service procedures

Use simulation to support marketing efforts

### Results

Simulation scenarios are created in one day versus weeks for physical mockups

Most physical mockups are now unnecessary

### Computer simulation helps optimize work procedures in nuclear reactors

#### Robots for radioactive environments

Atomic Energy of Canada Limited (AECL) builds and services nuclear reactors all over the world. As part of this service, the company has become a world leader in developing and adapting robotic systems for dangerous radioactive environments. It can supply a wide range of robotic equipment, associated services and specialized expertise for use in maintenance, inspection or decontamination activities.

The business of refurbishing and servicing existing reactors is extremely competitive. "On every proposal we submit, there are many other companies bidding against us for the work," explains Narinder Bains, director, Retube Systems Group, AECL. Nearly all of AECL's proposals have fixed terms for the price and duration of the job. The company must bid competitively, then meet its own terms so it doesn't lose money. "It's critical that we get it right," says Bains.

Refurbishing and servicing nuclear reactors has other critical aspects as well. Because it costs the reactor owner about \$1 million in lost revenue for every day the reactor is shut down, AECL must perform scheduled maintenance and inspection activities as fast as possible. In emergency situations, such as a leaking pipe that supplies



cooling water to a reactor, the repair might be made by humans instead of robots. Because these people are exposed to radiation while making the repair, this work must also be done as quickly as possible.

#### Optimizing work processes in software

AECL relies on computer simulation to optimize its work within nuclear reactors. The company uses Tecnomatix® Robcad™ (formerly eM-Workplace) technology from Siemens PLM Software to simulate reactor repair, inspection and maintenance procedures before carrying them out in real life. "Tecnomatix software lets us evaluate different scenarios so that we can find the safest and fastest possible solution," says Todd Campbell, simulation section head in AECL's Retube Systems Group. With simulation, AECL can compare different paths to get parts through tight spaces, for instance, or determine how long it takes to

## Results (continued)

Optimized work processes are completed faster and cost less, helping AECL meet contract targets

Simulations clarify proposals and help win business

### "Simulation reduces our risk."

Narinder Bains  
Director  
Retube Systems Group  
Atomic Energy of Canada  
Limited

do a job with different tools. Simulation can show bottlenecks and allow them to be worked out digitally, before they have a chance to wreak havoc with schedules or budgets.

For scheduled maintenance tasks, the alternative to simulation is to build a physical mockup of the work environment. This process takes weeks and adds significantly to the cost of a job. (Building a physical mockup isn't an option for emergency repairs; it takes far too long.) "With Siemens PLM Software's Tecnomatix digital manufacturing solutions, we can set up a simulation in about a day and run a number of different scenarios the next day," explains Campbell. By the end of that second day, AECL engineers have usually determined an optimal work scenario. If the crew that will perform the work is already at the reactor site, Campbell and his colleagues send images and video of the simulation via email so the technicians have a clear visual description of what they need to do.

More than 100 people at AECL are involved in designing and simulating the custom robots and other tooling used in reactor work. Designers use Siemens PLM Software's Solid Edge® CAD system, in conjunction with the modeling tools within Tecnomatix, to create the digital models that are then used in simulations. Using two solutions (Tecnomatix and Solid Edge) from the same supplier (Siemens PLM Software) ensures a high level of integration between the applications. Tecnomatix can import digital data in many other formats as well, allowing AECL to use data from suppliers and customers using non-Siemens PLM Software applications.

## Simulation benefits the bottom line

In addition to optimizing work procedures inside reactors, simulation is helpful to AECL in a number of other ways. One application where it has been particularly useful is training. "Because we deal with a hazardous environment, we can't train people on the actual systems," explains Bains. "Instead we do virtual training using the simulation software." Another important use of simulation is for offline robot programming. It can take up to six months to build the custom robotic systems that AECL uses in reactor environments. Once a robot is modeled digitally, its geometry can be imported into the simulation system and placed into a digital replica of the customer's facility. "This is important because it allows us to begin programming the robot without needing the actual physical robot," explains Bains.

Simulation has also become an excellent marketing tool. "Before we propose a major job we simulate it first," says Campbell. "This lets us show customers how we plan to carry out the work." In addition to providing the customer with a nice visual aid (images or animations), simulation has the added benefit of precisely clarifying exactly what AECL intends to do. "We can take very complex jobs and show how we can potentially solve the problem quickly," says Bains. "Instead of just writing a 200-page proposal, we can now visually show how we would implement the job. This helps us with new contracts and clarifies a lot of the scope up front."

The ability to model hazardous reactor environments and to simulate the actions of humans and robots within them brings bottom-line benefits to AECL. One of the

## Solutions/Services

Tecnomatix

[www.siemens.com/tecnomatix](http://www.siemens.com/tecnomatix)

Solid Edge

[www.siemens.com/solidedge](http://www.siemens.com/solidedge)

## Customer's primary business

Atomic Energy of Canada Limited is an integrated nuclear technology company providing services to nuclear utilities worldwide.

[www.aecl.ca](http://www.aecl.ca)

## Customer location

Mississauga, Ontario  
Canada

**"Siemens PLM Software's Tecnomatix and Solid Edge software lets us evaluate different scenarios so that we can find the safest and fastest possible solution."**

Todd Campbell  
Section Head, Simulation  
Retube Systems Group  
Atomic Energy of Canada Limited

main benefits is that it allows the company to do this work as quickly as possible, which is critical for everyone involved: the customer who is losing revenue; the workers who are exposed to radiation; and AECL, which doesn't profit when jobs go over budget or miss their deadlines.

"Simulation reduces our risk," says Bains. Since implementing Tecnomatix software in 1994, AECL has been able to eliminate most of its physical mockups. In addition to being a highly valuable tool for AECL, simulation has saved its customers millions of dollars via shorter down times.

In the highly competitive, fast-paced world of nuclear reactor services, Tecnomatix simulation software gives AECL a tremendous advantage. So much so that the company is expanding its use of simulation technology for its new and growing business unit that supports customers with refurbishing and retubing of Candu reactors. Simulation will allow AECL to simulate and plan major reactor refurbishment projects and ensure peak efficiency during the critical period of work.

## Siemens Industry Software

Americas +1 800 498 5351  
Europe +44 (0) 1276 702000  
Asia-Pacific +852 2230 3333

[www.siemens.com/plm](http://www.siemens.com/plm)

© 2013 Siemens Product Lifecycle Management Software Inc. Siemens and the Siemens logo are registered trademarks of Siemens AG. D-Cubed, Femap, Geolus, GO PLM, I-deas, Insight, JT, NX, Parasolid, Solid Edge, Teamcenter, Tecnomatix and Velocity Series are trademarks or registered trademarks of Siemens Product Lifecycle Management Software Inc. or its subsidiaries in the United States and in other countries. All other logos, trademarks, registered trademarks or service marks used herein are the property of their respective holders.  
Z5 7097 2/13 B