Customer Story

Atomenergoproject

Increasing design accuracy with SIMULIA

One of the major advantages of using Abaqus Unified is its ability to provide comprehensive linear and nonlinear dynamic analyses of building structures, taking into account the interaction of structures with the foundation, which invariably contributes to improving the overall safety of a plant.

Vladimir Korotkov
Technical Lead
Atomenergoproject

Challenge

Atomenergoproject wanted to both improve the quality of its nuclear power plant designs and accelerate its development process.

Solution

The company implemented Abaqus Unified FEA from SIMULIA to virtually test design performance aspects of nuclear power plants.

Benefits

Atomenergoproject has increased the accuracy of its designs thanks to realistic simulation.

DASSAULT SYSTEMES

Major player in the design of nuclear power plants

Founded over 50 years ago, JSC Atomenergoproject has since become a major contributor to the development of nuclear power plants in Russia. Most plants in the Russian Federation, in Eastern Europe and in the CIS countries are based on designs from Atomenergoproject making it one of the leading engineering firms in the nuclear power industry. Facilities such as the Kozloduy plant in Bulgaria, the Temelin in the Czech Republic, the Belene in Bulgaria and the Kudankulam in India are examples of nuclear power plants that are currently or were built based on its designs.

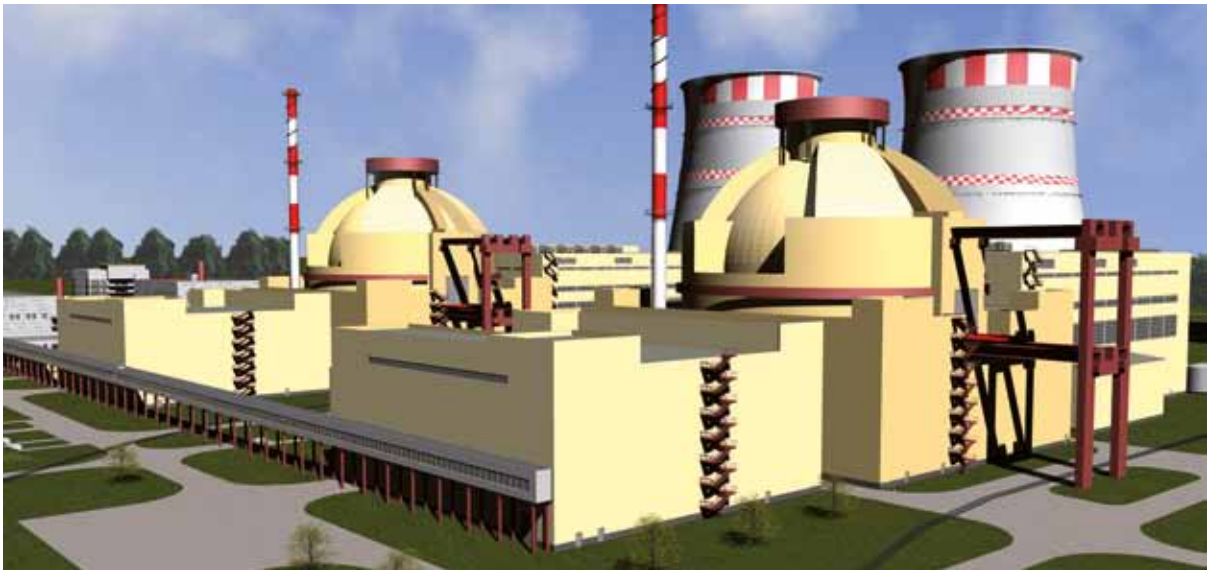
Atomenergoproject is also the contractor for the design and construction of the Novovoronezh NPP-II (two generation units with VVER-1200 reactors using the NPP-2006 design). Atomenergoproject is a subsidiary of Atomenergoprom, which represents civilian assets in the Russian nuclear sector.

Implementation of realistic simulation

During an assessment of Atomenergoproject's IT solutions, it became clear that there was an urgent need for a system that would enable its engineers to analyze, during the design stage of a nuclear plant, the various types of dynamic forces (plane crashes, earthquakes, etc.) on the different structures of a plant. The methods used at the time were outdated and could not keep up with new technologies. To address this need, Atomenergoproject selected Abaqus Unified FEA from SIMULIA, Dassault Systèmes' solution for realistic simulation.

Even before the implementation of Abaqus began, Atomenergoproject's experts had already acquired experience in working with the software suite within the framework of the Technical Assistance to the Commonwealth of Independent States (TACIS) program, which is supported by a consortium of companies from the EU and the Ministry of Industry and Energy of the Russian Federation.

"One of the major advantages of using Abaqus Unified FEA," said Vladimir Korotkov, Technical Lead, Atomenergoproject, "is its ability to provide comprehensive linear and nonlinear dynamic analyses of building structures, taking into account the interaction of structures with the foundation, which invariably contributes to improving the overall safety of a plant. Abaqus takes into account all nonlinear relationships, such as



> The company's goal to improve the reliability of designs and the high accuracy of the results led us to acquire Abaqus Unified FEA, as well as annual technical support.
>
> **Vladimir Korotkov**
> *Technical Lead*
> *Atomenergoproject*

contact or geometric nonlinearities, and has a comprehensive library of finite elements. It is also possible to research choices of materials such as metals, concrete, soil, elastomers and so on, " said Korotkov.

The implementation project was divided into a number of phases. During each phase, Atomenergoproject's specialists benefited from efficient training courses that enabled them to take full advantage of the realistic simulation capabilities of Abaqus. Company experts are currently solving nonlinear impact problems taking into consideration contact interaction and the nonlinear behavior of concrete.

Atomenergoproject experts not only learned how to use the software, they also suggested new functionalities for future releases of Abaqus. Some proposals were the improvement of damping, activation of damping in the spring, and visualization of a beam's finite elements. Some of the suggestions were included in subsequent releases.

Enhance reliability with Abaqus FEA

"For us Abaqus is a very reliable solution that takes into account nonlinear factors, damping in systems, and so on," said Vladimir Korotkov. Atomenergoproect is looking forward to the implementation of innovative projects, realized with Abaqus, such as a new model of inelastic work of concrete, taking into account soil foundation with elements of continuum and models of materials and soil. Usage of innovative solutions for design would invariably result in significant improvements in the quality and reliability of nuclear power plants today as well as tomorrow.

SIMULIA

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Images courtesy of Atomenergoproject.

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