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PLM –

enabling energy companies to improve efficiency

Siemens PLM Software

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PLM – enabling energy companies to improve efficiency

We are living during a time of great cultural, technological and social change. New tools are needed to address this change in a way that provides the best future for our people and planet.

Consider energy development, one of the pillars of global economic growth. The transition to electrification, the sustainable exploitation and profitability of shale oil fields, the maintenance of existing plants and the construction of new ones, and the growth of renewable energy present the industry with complex challenges. Energy price wars force companies to improve production efficiency. For example, with the largest oil reserves now located below the sea floor, oil companies need new technologies to make offshore drilling and extraction more convenient and efficient.

Product lifecycle management (PLM) software is one of the best tools for overcoming these kind of challenges. It enables energy producers to better manage complex projects for all involved technologies, as well as the logistics, security and continuity of the operation. Siemens PLM Software's solutions for the energy industry are built on the possibilities offered by new technologies, such as cloud computing, the digital twin, collaborative design, etc.

A market in flux

"When we talk about the energy sector we tend to think of simply generation, but for us it is fundamental to extend the discussion to the planning and management of infrastructures and related services," explains John Nixon, senior director of energy and utilities at Siemens PLM Software. "The industry is broad and includes chemical, petrochemical, oil and gas, each with its own peculiarities and critical issues. The three kinds of customers we typically collaborate with are: 1) Plant owners who produce electricity, process chemicals, refine crude oil, etc., 2) Engineering companies that design and develop plants and 3) Construction companies that build the structures and assemble the machinery."

Siemens PLM Software views the energy sector as broad and diverse, with each operator facing unique objectives and needs. The different geographical locations also contribute to the industry's complexity. Europe, the "mature" continent, is engaged in modernizing existing facilities while the Asian giants, primarily China, will be investing hundreds of billions of dollars in the next few years. The size of this investment is yet to be determined, but it is expected to have positive repercussions for companies around the world.

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John Nixon
Senior Director, Energy and Utilities
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The abundant availability of electricity coming from renewable sources, in particular photovoltaic and wind power, is finally benefiting the environment, yet is also putting pressure on more traditional technologies. With the cost of energy and profit margins falling, they must find new ways to increase efficiency.

The digital twin

In this environment, it is increasingly important to evaluate your process for the entire lifecycle, rather than just in stages. It is necessary to control every factor involved, and intervene wherever there is the possibility of saving time or reducing costs.

"Technology today allows us to observe everything as a whole, closely and in detail, to verify where efficiency can be improved," says Eduard Marfa, director of Teamcenter® software marketing for Europe, the Middle East and Africa (EMEA) at Siemens PLM Software. "A PLM platform that connects all project information, from CAD to CAE, plant engineering to manuals and from the supplier list to the installation history, etc., provides you with insight into every phase, whether that is designing, performing maintenance or retrieving information about a specific component. Our PLM solution, Teamcenter, is a very powerful tool because it is able to drive this level of accuracy while remaining easy to use and available in real time."

To explain this further, Marfa uses the concept of a digital twin, a virtual representation of a physical product or process that includes all relevant information. Using a digital twin, it is possible to perform analyses, tests and verifications, and retrieve all related data, even before a physical version is created.

"For example, consider on-site maintenance workers," he continues. "Using a digital twin, they can look up a specific detail on a tablet and check the conditions of use (how long ago the component was installed, its useful life, its operational parameters, the manufacturer, who installed it, etc.) to decide whether to repair it, replace it, or interrupt the operation."

Accessible information

By adopting visual reporting we have taken another significant step toward making large amounts of product and process information more useful.

"Often, fieldworkers do not have the time to track down reams of complex data, nor the tools to view spreadsheets or analyze their values," Marfa explains. "We wanted to simplify things for them and make the information more accessible. Seeing part of a physical system in front of you and the digital twin equivalent on a tablet – enriched with additional information in the easiest format to understand – makes the task more efficient. For example, everyone knows that green is good and red is bad. With the same approach, a fieldworker can instantly see the condition of a component."

For businesses large and small

PLM functionality, such as in Teamcenter, has earned the favor of large companies due to their need to manage significant volumes of data. Over the years, however, we have evolved Teamcenter to offer the same benefits to small- and medium-sized enterprises.

"Teamcenter is able to help large multinationals remain competitive on the global market, but also to make sure small- and medium-sized enterprises have full control of their information," says Nixon. "For example, think of a small company that deals with maintenance but does not have hundreds of technicians and cannot afford for its staff to travel blindly, yet must solve specific problems quickly and efficiently. This is all the more reason for them to have information immediately available.

"With globalization, we have opportunities on the one hand and challenges on the other," he continues. "I personally followed a project that was designed and developed in India, built in South Korea, shipped to the United States for quality control, and installed in Canada. How do you keep track of all this? How can you be sure that what was designed in India is exactly what was produced in South Korea? How do you know if the project version you are looking at on a video is the most recent and validated by the client? PLM is the right tool, because without the traceability of each phase you would inevitably run into problems."

Continuous cycle of information

Using PLM tools, a project can be navigated from a desk to observe every detail and extract necessary data. This is useful not only for overcoming logistical limits (such as with systems installed up to thousands of kilometers away, perhaps in the middle of the ocean), it also prevents having personnel go into dangerous or uncomfortable places.

Siemens PLM Software is among the few PLM vendors to offer an integration between an Internet of Things (IoT) platform and the PLM environment, all within a single environment and without interruption.

"Rethinking a detail is part of an engineer's workflow," Marfa continues. "Not only from the project to the real plant, but also from the experience in the field to the

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revision of the model. Consider, for example, a component that shows a critical issue. This information can be used to augment the maintenance database, contribute to the eventual redesign of the component, or determine whether the same component is present in other plants around the world."

PLM incorporates and supports the latest technology available to designers, such as topological software and additive technologies. A component designed a few years ago can be rethought to provide greater durability or lower cost. Replacements for failed parts can be available much sooner, thanks to the ability to send a part file to the site where it is manufactured using a 3D printer.

"I have an example that explains how it is possible to reach results that were unimaginable only a few years ago," recalls Marfa. "A customer of ours needed to redesign a burner on top of a petrochemical plant. The burner, which reaches 1,300 Celsius (C), had problems related to the materials used and the dissipation of the heat produced.

"The original design used special chambers and cooling slots. Those proved to be inefficient, however, and so additional work was done to bring the cooling fluids as close as possible to the heat source. Today, by entering design goal parameters and giving software the task of developing a totally free geometry, the resulting design is incredible: It is geometrically very complex but able to offer much higher performance than the original, and at a fraction of the cost. The component was then printed in 3D with metal sintering."

This is just one example. A few years ago it would have seemed too complicated to optimize at the margins of efficiency in this way. By using PLM today, there are many possibilities for interventions that optimize projects at every stage of the lifecycle.

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