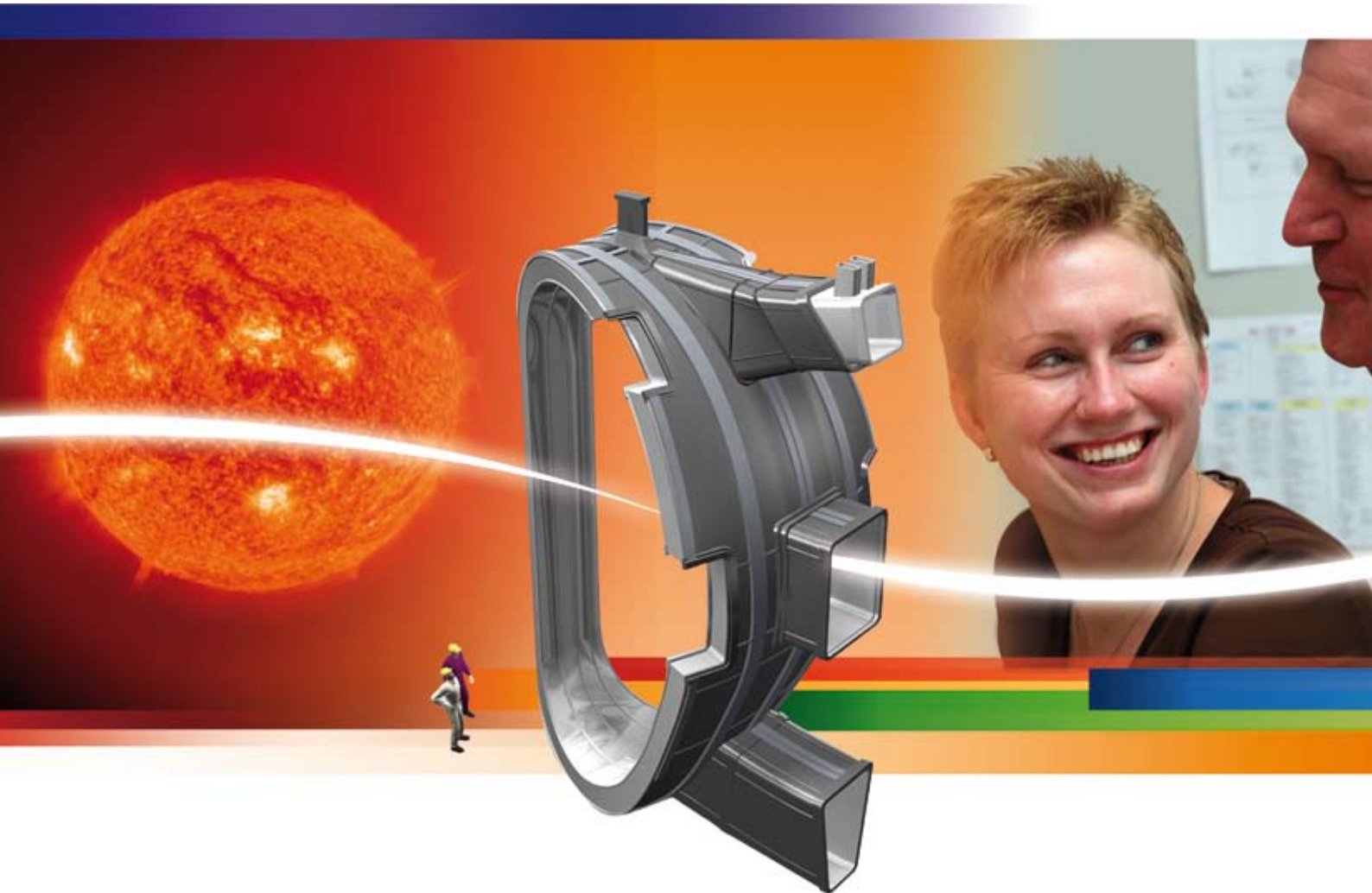
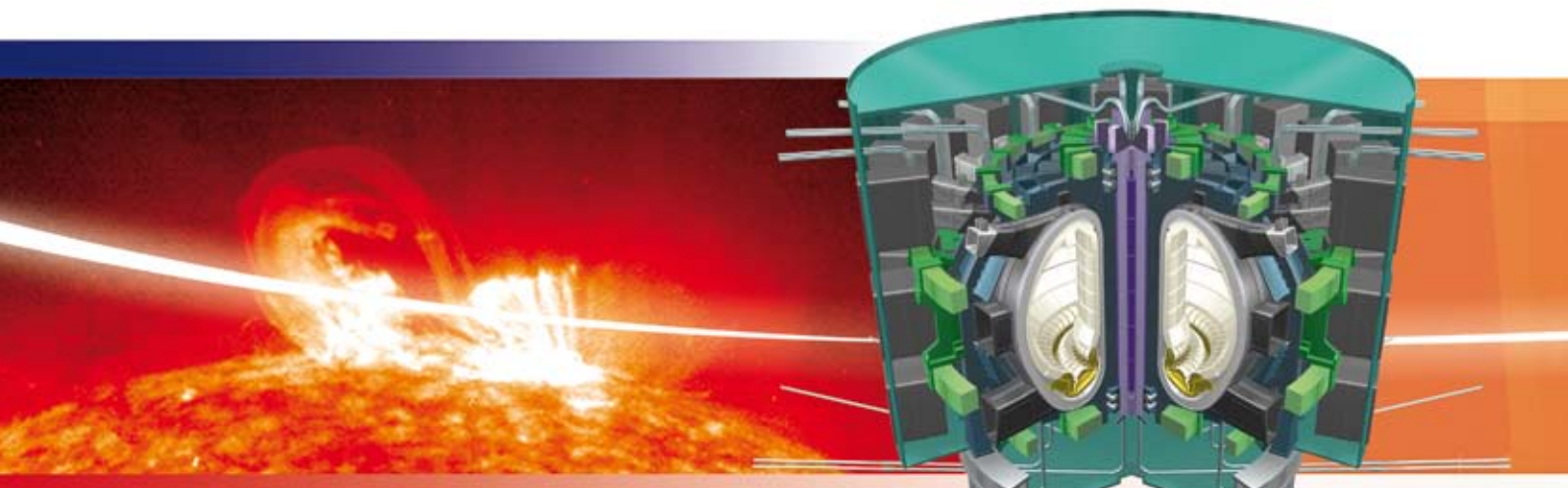


ITER

Forging the tools for fusion power with Dassault Systèmes and Microsoft





ITER Objectives

- **Demonstrate the feasibility of nuclear fusion as an energy source**
- **Complete plant construction on time and to budget**
- **Transfer knowledge from fusion institutes to industry**
- **Maximize global fusion technology spin-offs**

Organization Overview

Nuclear fusion is the energy source of the sun and stars. Harnessing it as a new energy source for mankind is the goal of ITER, the world's largest fusion energy research project. First discussed in 1970, its objective is to build a demonstration fusion power plant capable of producing electricity in a safe and environmentally friendly way.

ITER is an international organization comprised of the central ITER body and seven Domestic Agencies: the European Union, Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation, and the USA. Eventually, ITER will employ 600 people.

Each Domestic Agency will develop elements of the ITER power plant. The plant will cost €10 billion to construct and operate, and will be located at Cadarache in the south of France. Plant construction starts in 2008, reactor (tokamak) assembly in 2012, and plasma operations are scheduled for 2016.

Business Challenges

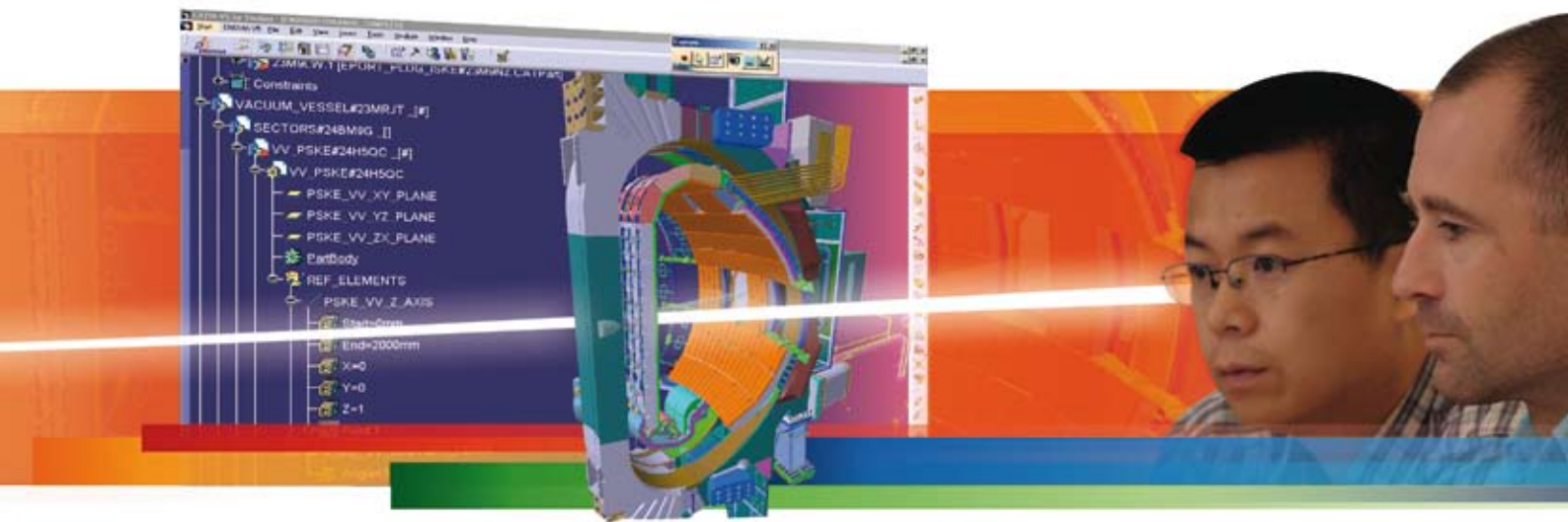
ITER's key business challenge is to orchestrate a pioneering international scientific research project via a small central team. The project's end-product is a one-of-a-kind fusion plant that will become a global energy showcase. The whole world will be watching to see whether this high-risk venture succeeds.

Real-time global coordination and collaboration are vital to ITER's success. The project's political organization spans the globe, and procurement packages break down along geopolitical rather than functional lines. All seven Domestic Agencies may work on a single component, however, even this is overshadowed by the coordination challenge of designing a phenomenally complex facility made up of 10 million parts with extremely rigorous quality requirements.



"ITER is one of the most complex and challenging scientific collaborations ever undertaken."

Kaname Ikeda, Director General, ITER



ITER is at the forefront of nuclear fusion research. Each of its many research partners is highly knowledgeable in a particular domain. Bringing together that expertise to optimize development of the tokamak and plant presents a formidable challenge. ITER must foster a mindset of cooperation and provide the means for concurrent, collaborative work across the Domestic Agencies.

Solution

ITER selected CATIA, ENOVIA VPLM, and DELMIA, Dassault Systèmes Product Lifecycle Management (DS PLM) solutions, to engineer the reactor and plant, structure its design methodology, and ensure long-term data interoperability across the organization.

ITER chose a Microsoft Platform for the organization’s underlying IT backbone. “We needed a single, stable, easy-to-administrate system that complies with standards and fits into the global desktop environment,” says Hans Werner Bartels, Senior Technical Officer for Information Technology.

CATIA: a global design solution

CATIA is the master 3D design solution for both the tokamak and the plant that will house it. The ITER Design Office creates the Plant Breakdown Structure up to “build to print” level, and Domestic Agencies then take over the design of specific components. Using the digital mock-up (DMU) capabilities available in CATIA and ENOVIA, the Design Office ensures that the millions of complex critical parts in and around the tokamak will interface clash-free at assembly time.

ENOVIA VPLM: single-source database

ENOVIA VPLM, installed on the Microsoft Windows Server®, acts as a single repository for all design and engineering data. It enables engineers to work together on the most current designs within the context of a part, a large assembly, or an entire product; important capabilities that both improve decision-making and promote design reuse.



“DS PLM has enabled us to integrate the mechanical and plant design of ITER, respect extremely rigorous quality requirements, and do so with limited resources.”

Eric Martin, Design Office Head, ITER





“We’ve seen major performance improvements when MS servers were used for CATIA and ENOVIA compared to previous multi-OS server platforms.”

Hans Werner Bartels, Senior Technical Officer for IT, ITER

ENOVIA VPLM also provides a rich search capability. For plant design, for example, engineers use virtual ‘Room Books’ that provide full details of all assemblies and systems found in a given ‘room’. ENOVIA enables them to use 3D to search and download all components for a given room, simplifying the process of verifying component compliancy or the impact of a design change.

DELMI: process analysis platform

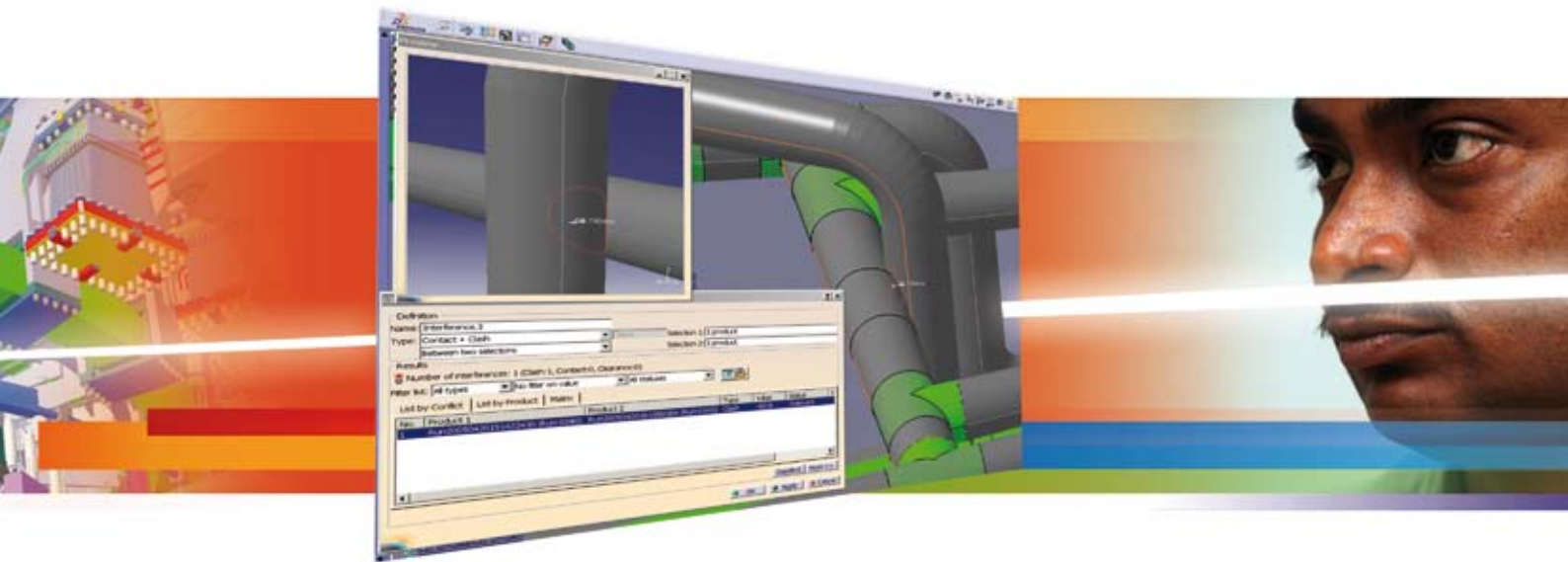
ITER is introducing DELMIA as its process analysis platform. DELMIA planning tools will be used to optimize resource usage throughout assembly and maintenance processes. The process detailing features, including tools for defining equipment kinematics and robotics, will allow deeper analysis of critical processes and the associated equipment, using 3D models directly linked to the latest digital mock-up.

Microsoft solutions for IT efficiency

ITER opted to build its information processing resources around the Windows Server System, and is an early adopter of Microsoft’s 64-bit architecture. The platform includes Microsoft® Exchange Server, Microsoft® SQL Server™ and Windows Server® enabling ITER to benefit from maximum efficiency, high availability, and ease of administration.

Results

The ITER Design Office selected Dassault Systèmes PLM solutions and a Microsoft technology architecture for one overriding reason: there was no other integrated solution that could deliver a unified vision of the mechanical and plant design data, enable concurrent engineering over a widely distributed network, and ensure control by a small central design team.



Engineering: Quality assurance and time savings

Quality compliance is absolutely central to ITER's success. ITER Design Office engineers use CATIA to create 'skeletons' or design templates. By providing a rigorous yet flexible framework to the sub-contractors who will create ITER's highly complex components, the skeletons ensure adherence to quality standards.

The reuse of design skeletons also reduces the time needed to make duplicate components. "One designer took my methodology and added his own ideas to the skeleton. The first component took him six weeks, the second one week, and the third just days," said David Lightowers, Mechanical Design Liaison Designer, ITER.

Concurrent design: project perquisite, lower costs

ENOVIA VPLM gives all ITER design teams access to the same up-to-date product information. The ability to design concurrently on a project of this complexity was essential. "DS PLM has enabled us to integrate our mechanical and plant design with a high level of quality and limited resources. It's played a key role in an international project such as ITER where collaboration is essential," said Eric Martin, Design Office Head, ITER.

Concurrent design also permits ITER to keep the size of its design office to a minimum. "We have a limited team of 80 designers meaning that the design has to be distributed. Without ENOVIA VPLM, it would be very difficult to do the job, and we would need a much larger Design Office team," said Martin.

"We also have monthly meetings with the project managers from the seven Agencies. If we had to travel every time, it would increase costs. But thanks to ENOVIA, we only need to meet in person once every three months," said Martin.

DS PLM Key Benefits

Design time of components cut from months to days
based on 'skeleton' templates created in CATIA V5

Fewer ITER Central team designers
required thanks to concurrent engineering via ENOVIA VPLM

Major IT performance improvement
using Microsoft servers with CATIA and ENOVIA VPLM compared to previous multi-OS server platforms

Increased sense of local ownership
at Domestic Agencies via delocalization permitted through common ENOVIA VPLM database



“ITER will have a 35-year lifetime. Therefore, we needed world-class solutions from companies that will be with us over the long term. We’re happy with our choice of Dassault Systèmes and Microsoft.”

Stefano Chiocci, Design Integration Section Leader, ITER

International collaboration: local ownership

Using DS PLM, the ITER Design Office provides master designs to distributed teams of designers, engineers and subcontractors around the world. The ability to delocalize has given Domestic Agencies a sense of local ownership of their work. It is also crucial in a project where fusion expertise is rare and cooperation among multi-national teams is essential.

Global visibility: understanding for all

ENOVIA VPLM offers multiple ways for distributed stakeholders to consult the project database for a 3D perspective on progress. By ensuring constant product structure congruency, ENOVIA VPLM enables everyone, from designers to procurement officers and non-technical Domestic Agency executives to easily access up-to-date product information and evaluate milestones in real time.

Integrated Microsoft architecture: robust, high performance

ITER benefits from its Microsoft Server Portfolio and 64-bit technology through optimized performance with DS PLM solutions, and robust, easy-to-administer products. “We’ve seen major performance improvements when MS servers were used for CATIA and ENOVIA compared to previous multi-OS server platforms,” said Hans Werner Bartels, Senior Technical Officer for IT, ITER. “We’re also a small organization. We can’t afford downtime in our design office. We went for the high availability that comes with Microsoft,” said Bartels.

With 64-bit CATIA turning on Microsoft-based 64-bit workstations, ITER can manage its large assemblies rapidly with no memory limitations. “CATIA running on a 64-bit Microsoft platform means we can put together our largest assemblies with no problem,” said Bartels.

COMPLEX - Unconfigured

TOXAMAK_COMPLEX
CRYOSTAT#22VENB-- In Work DefaultDO 24 [DefaultDescInst#22VENB.1]
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CC_SYSTEM#23ZSDU-- In Work 12 [##23ZSDU.1]
RAIDTOR#23ZSDU-- In Work 12 [##23ZSDU.1]



Future

ITER plans to expand its DS PLM solution to drive the project forward and further optimize control over the data and its distribution. ENOVIA, for example, will be used to provide the backbone for a procurement tool, enabling bidding agencies to have upstream access to complex data. ITER also plans to introduce ENOVIA MatrixOne to manage project workflows.

Finally, a key element of the DELMIA implementation will be to verify virtually whether the intended plant assembly will operate to specifications. This could save hundreds of millions of euros in testing the project's numerous interfaces before building begins.

DS PLM for the Energy Industry

Dassault Systèmes provides comprehensive PLM solutions to allow owner operators, engineering procurement and construction companies, and equipment suppliers in the Energy industry to plan and execute end-to-end lifecycle management and maintenance of their assets.

DS PLM solutions cover the design, construction, maintenance and monitoring requirements of sectors including oil and gas, chemicals, utilities and power, metals, and mining.

The DS PLM portfolio of CATIA, DELMIA, ENOVIA, SIMULIA, and 3DVIA enable Energy companies to design facilities, simulate complex construction and renovation scenarios, validate schedules and budgets and check the feasibility of proposals submitted by outside contractors. From laying out piping and to creating functional definitions of activities and assets, DS PLM is a powerful new tool in the Energy arsenal.

For information about DS PLM solutions for the Energy industry, visit www.3ds.com

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As a world leader in 3D and Product Lifecycle Management (PLM) solutions, the Dassault Systèmes group brings value to more than 90,000 customers in 80 countries. A pioneer in the 3D software market since 1981, Dassault Systèmes develops and markets PLM application software and services that support industrial processes and provide a 3D vision of the entire lifecycle of products from conception to maintenance.

The Dassault Systèmes PLM offering consists of CATIA for designing the virtual product, DELMIA for virtual production, ENOVIA for global collaborative lifecycle management (including ENOVIA VPLM, ENOVIA SmarTeam, and ENOVIA MatrixOne), SIMULIA for virtual testing, and 3DVIA for online 3D lifelike experiences.

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