



Construction of the Olkiluoto 3 nuclear power plant in Finland. Photograph courtesy of AREVA / Paivi Bourdon.

AREVA's Information Management System (IMS)

A key component in delivering Generation III+ nuclear reactors to the world

Bob Aldridge

Principal Consultant – Power, Industry Solutions, AVEVA

AREVA is a world leader in the design and construction of nuclear power plants, and is one of the companies at the forefront of the nuclear renaissance worldwide.

The company in its current shape was created in 2001 by uniting the vast nuclear expertise and experience of the Framatome company with the former nuclear division of Siemens.

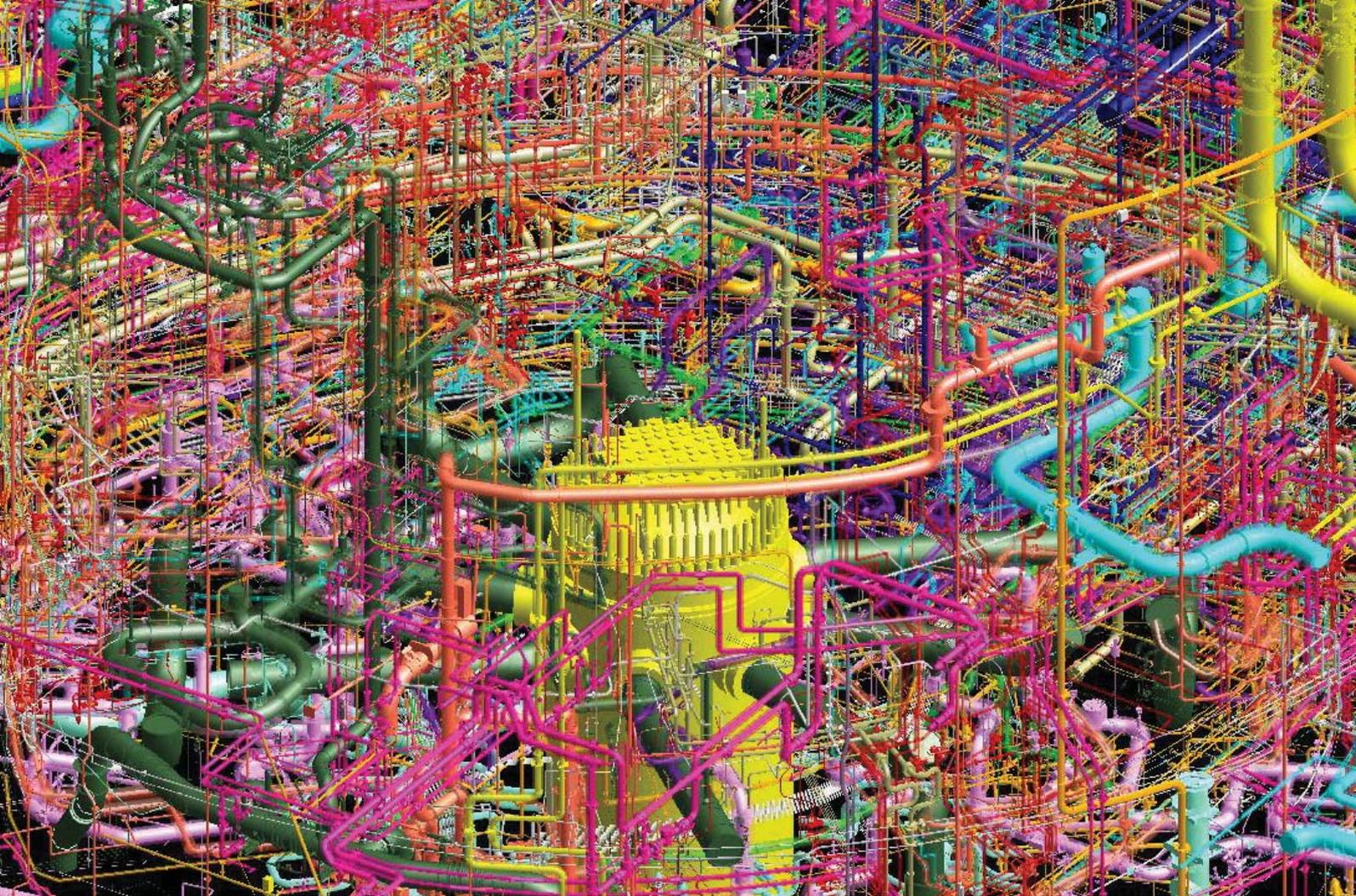
Since then, rapid growth and further acquisitions have created a company with the experience of building more than 100 nuclear plants worldwide, representing 30% of the world's installed nuclear capacity.

In 2003, the company began a major implementation of almost all the AVEVA Plant products. We visited Michel Gonin, Manager of the IMS Methods and Tools Department for AREVA NP at the company's headquarters in Paris, France to learn how their use of AVEVA Plant software has progressed, and what role it plays in the company today.

Olkiluoto 3 (OL3) – a landmark project

In December 2003, AREVA won an order for the design and construction of a 1,600 MWe European Pressurised Water Reactor (EPR) to be built for the client, TVO, at Olkiluoto in Finland, the 'OL3 project'.

This was a landmark project for AREVA. It was the first-ever Generation III+ reactor to be built in the world, and the first EPR. It was also the first new-build reactor project to be started in the European Union for more than a decade.



A highly-detailed 3D PDMS design model of the EPR; this view, showing only the piping systems in the reactor building itself, gives a good idea of the volume, detail and sophistication involved. Image courtesy of AREVA.

‘The new tools also opened up new methods of working for us. We didn’t just adapt the tools to our methods; we also adapted our methods to the tools...’

Creating the AREVA IMS

AREVA decided to implement a totally new IMS for this key project. After a long series of benchmarks and evaluations, the company selected the AVEVA Plant suite (then called Vantage), together with Documentum, Primavera Enterprise and SAP as the key foundation blocks for the IMS.

At the start of the OL3 project, some AREVA entities already had experience of using AVEVA PDMS, but all the other AVEVA tools were new to the organisation, and had to be implemented and configured, then deployed immediately onto the new, live project.

‘Of course, we had our established engineering processes, but it wasn’t as simple as applying the new tools to the existing processes,’ explained Michel. ‘The new tools also opened up new methods of working for us. We didn’t just adapt the tools to our methods; we also adapted our methods to the tools.’

‘This wasn’t always easy but it has been very successful – and we have been able to implement a completely new IMS system across the company. Today, everyone recognises that the tools are working well. We are producing all documents on time and to the correct quality, and there are hundreds of users of the AVEVA Plant software operating across multiple AREVA locations.’

Development partnership

He went on, ‘We worked very closely with AVEVA to implement and configure the new software and to integrate it into our new environment.’



Michel Gonin, Manager of the IMS Methods and Tools Department, AREVA



Computer-generated image showing the new Olkiluoto 3 plant, far left, next to the existing units. Image courtesy of TVO.

'In some cases, we also wanted to have additional features and functions in the standard software, and we were able to build a very successful ongoing development partnership with AVEVA to achieve this.'

Using the IMS on the first EPR project

Over 800 fully intelligent P&IDs have been created for the EPR using AVEVA VPE P&ID. These P&IDs are all interconnected to create a complete logical network. As new or updated P&IDs become available, they are synchronised with AVEVA VPE Workbench, which constitutes the functional reference of the plant and is used by the many engineering disciplines to develop and revise the definitions of the relevant systems and components.



AVEVA Plant products being used to convert the European design of the EPR to US code and standards. Photograph courtesy of AREVA.

As design progressed, newly available and updated engineering data was issued to the layout and detailed engineering teams, who could access and work with the issued data from within the 3D PDMS software.

'The 3D PDMS model of the EPR is very detailed,' explained Michel. 'We include almost all objects in the model – even the small-bore pipes, the instrument lines and the details of every support and anchor plate. Even though our 3D model is very large, it can still fit on an average laptop.'

The production, from the 3D model, of piping isometrics and support drawings, both with full Material Take-Offs (MTOs), is fully automated and is controlled using status information for each object. The MTO information updates VPRM, AVEVA's materials management software, so that AREVA can get accurate and up-to-date materials information at all times.

The Material Management process, including procurement itself, is supported by VPRM, from the material requisitioning to all aspects of site management at Olkiluoto.

Many achievements

Michel explained, 'We have implemented a completely new IMS system in our organisation and deployed it onto many live projects, and it works well. Of course, there are always a few minor things to improve or update from time to time, but the basic functionality is undoubtedly successful.'

The many control and data-management features of the software are used extensively to enforce rigorous working practices, and to ensure that data is only made available to other disciplines once it has been through the appropriate level of quality and consistency checks.

Integrating data and work processes in ways that have not been possible before not only brought greater control, but also achieved higher quality and consistency.

Michel again: 'Concurrent engineering is all about how to work with and manage incompatibilities. We have proved that we can execute and manage concurrent engineering even across work-shares that are sometimes very complex. In the 3D world, we now have over 450 simultaneous PDMS users across our projects, but we can be sure that, every morning, we will have fully up-to-date design information at every location.'

AVEVA tools at the construction site

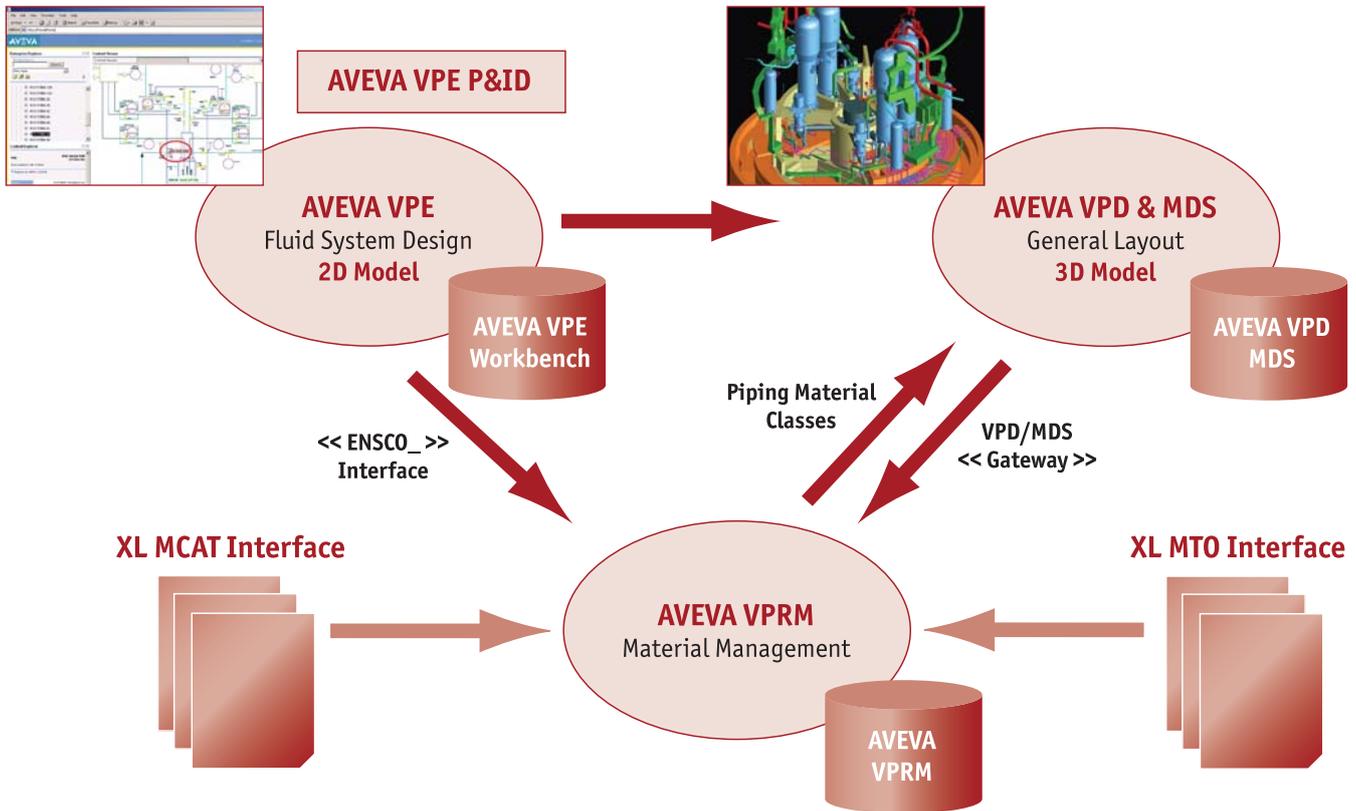
The new tools have also allowed new methods at the construction site. In the past, large numbers of layout and erection/installation drawings were generated and issued to site, all of which had to be separately managed.

Today, AREVA doesn't need to do this any more. Support drawings and piping isometrics for prefabrication are issued. Any additional erection information is simply generated by the team on site, as and when required. The 3D model is also used by the on-site team even in order to carry out certain types of design modification.

Multiple simultaneous EPR projects

AVEVA Plant is now being used for the design and construction of four EPRs, in Finland, France and China, and for Design Certification and multiple Combined Construction and Operating Licence Applications (COLAs) for the EPR in the United States.

All these projects are based on the same generic EPR design but there are, nonetheless, very many differences between the projects. For example, there are different coding systems



The AREVA Engineering Process and the 'AVEVA tools' implementation

(ECS or KKS), different regulations, different component suppliers and different geographical conditions. 'The ability to rapidly reuse existing design information and adapt it to a new project is very important to us and to our concept of a standard EPR,' explained Michel.

Not only the EPR

The EPR is not the only reactor design where AREVA is using AVEVA Plant. It is also being used in both France and Japan for ATMEA1, a new 1,100 MW reactor design being jointly developed by AREVA and Mitsubishi Heavy Industries.

The project uses the full AVEVA toolset, working across a specific infrastructure. The AVEVA Plant suite has also begun to be introduced into another AREVA entity, which specialises in all aspects of the nuclear fuels lifecycle.

As for the future

Michel sees a very bright future. 'We already have a large number of ongoing projects, and it is no secret that we are expecting to win many more. Our current toolset is working well, and we are using it on all our projects, in France, Germany, Finland, China, the USA, and elsewhere but we are, of course, always looking to the future and to new technologies.'

'One big part of that future is the new AVEVA NET technology. We see this as the right path for configuration management needs and data exchange – both of which are vitally important aspects of the Product Life Cycle Management. Achieving a clear separation between the design tools and the management of the data is very important and we clearly have to go in the direction of neutral formats supporting ISO 15926.'

'We worked very closely with AVEVA to implement and configure the new software and to integrate it into our new environment...'

About AREVA

With manufacturing facilities in 43 countries, a sales network in more than 100 and 65,000 employees worldwide, AREVA offers customers reliable technological solutions for CO₂-free power generation and electricity transmission and distribution.

AREVA is the world leader in nuclear power and the only company to cover all industrial activities in this field.

The Reactors and Services division is dedicated to design and construction of nuclear power plants and research reactors, engineering, instrumentation and control, modernisation, maintenance and repair services, components manufacture and the supply of nuclear fuel. Headquartered in Paris with regional subsidiaries in the US and Germany, it has a total workforce of 16,500 employees and is active in Eastern and Western Europe, North and South America, Asia and Africa.

Further information is available at www.aveva-np.com