

# Jotne EPM Technology to supply software to EADS and Saab

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*EDMmodelServer™* for 3D and PLM  
used at European Space Agency

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PLCS as a common  
data backbone

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AIA recommends PLCS

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# About Jotne EPM Technology

**Jotne EPM Technology (EPMT) is a member of the Jotne Group, specializing in information technology. Since 1990 the company has developed database solutions to handle standards such as ISO 10303 STEP, PLCS, etc. These are open specifications with public availability used among others by aerospace, space and defense related industries to manage information about complex systems. Jotne employs about 250 people. Its IT products are used by clients all over the world, including the US Department of Defence, the European Space Agency and leading aerospace/defence/space contractors.**

## About the Jotne Group

The Jotne Group consists of companies focusing on information technology, engineering and manufacturing, and real estate. Wholly owned subsidiaries operate on an independent basis. The Jotne Group was established in 1982 and today has approximately 250 employees. The group has workshops, development facilities and offices in Norway and abroad.



More information: [www.jotne.com](http://www.jotne.com)

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### ACHIEVEMENTS

Over the years, EPMT has worked closely with some of the most advanced aerospace and defense projects in the world, including the MODs, EADS, Lockheed Martin, SAAB, Boeing, etc. EPMT has proved itself to be trustworthy and capable. Recent contracts at ESA will utilize the EPMT EXPRESS Data Manager™ server as the heart of ESA's innovative Concurrent Design Facility (CDF). The CDF is used for the design of cutting-edge space projects. It allows the various system engineers to work simultaneously to optimize the spacecraft integration and development.

### PRODUCTS

The suite of products, called EXPRESS Data Manager™ (EDM), is designed to meet the needs of engineering, manufacturing and operating enterprises for the purpose of accurately and reliably exchanging and sharing technical data about products with colleagues, customers, sub-contractors, suppliers and other business partners and for archiving product data.

tors, suppliers and other business partners and for archiving product data.

EDM products ensure that the data is stored, available and usable for the life of the product and beyond regardless of the proprietary hardware or software system being used. Products from Jotne EPM Technology can be used for:

- Data modelling and database management
- Application development
- Data sharing
- Open-format data exchange
- Data quality assurance
- Long-term data archiving

EPMT products are used worldwide to facilitate cost-effective business practices ranging from concurrent engineering to product life cycle management to electronic commerce.

# Welcome to this issue of EXPRESSway!

Jotne EPM Technology is busy. We have so much news to share with you that we decided to dedicate this issue to our business areas Aerospace and Defense.

There is one common denominator to the enclosed project reports and articles: PLCS, the international standard ISO 10303-239 with the title "Product life cycle support".

This popularity needs an explanation. So we asked Howard Mason – as you will see the ideal person for this task – to explain to you why PLCS is important and is gaining so much momentum. One of the answers we give ourselves, in setting focus on a report by the Aerospace Industries Association, AIAA: after a thorough analysis and comparison with other standards they recommend PLCS as the best choice for engineering data interoperability.

Most of the remainder of this issue gives you insight into how industry and authorities currently base their solutions for industrial data management on PLCS. You will find defence related material in the first part of this magazine followed by space; articles of general interest conclude this issue. Enjoy reading!

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# Why PLCS?



by **Howard Mason**

Chair, ISO TC184/SC4, Industrial data  
Co-Chair, OASIS Product Life Cycle Support  
(PLCS) Technical Committee

*Large and complex products such as aircraft, vehicles, ships and buildings depend on accurate information for their successful operation and maintenance through a lifecycle often measured in decades. Configuration, documentation, maintenance requirements and records all need to be maintained in line with the product.*

Suppliers are also facing a new business environment as the end users of such products move to shift responsibility for through-life support and maintenance to the original manufacturer. The business model is expanding beyond the traditional delivery of products and components for maintenance, to a range of levels of service up to contracting for a capability, with the supplier assuming full responsibility for ensuring that the product is available for use, and only being paid if the availability targets are met.

This new environment opens up fresh opportunities to reduce the through-life costs for operating a product and to drive up quality, by eliminating - or at least redefining - some of the traditional information flows across the customer and supply network. For example, if the supplier is undertaking all the maintenance tasks, the need to develop comprehensive information for the maintenance of a product by the end user is removed. A bigger challenge arises where the tasks are shared, and successful operation is dependent on the quality of the information exchanged between the end user and the supply network. If both a customer and a supplier have the ability to change components on an aircraft, for example in daily service or during hangar maintenance, then it is critical that both customer and supplier know what the other has done, with information flowing freely in a timely manner.

In practice, digital information exchanges are used to increase speed and accuracy, reduce costs and improve quality by eliminating manual paper-based transcription. However, there are a number of practical difficulties which need to be addressed:

- Individual enterprises use different software tools to undertake their work, with the data held in different forms, leading to potential barriers in communication.
- The life cycle of a product is often measured in decades, far longer than the software tools, operating systems and equipment used to create the information in the first place. This means that, unlike electronic transactions,

product information must be maintained in a usable form over an extended period.

- Different business functions often require diverse aspects of the product information to be extracted from a comprehensive model.

Product data standards offer the key to addressing these challenges and enabling industry and its customers to take full advantage of the new business models. A wide range of specifications have been created over the years to address particular parts of the problem, but these represent a fragmented approach to the whole problem.

## A COMMON DATA BACKBONE

ISO 10303 - usually known as STEP, the STandard for the Exchange of Product model data - provides a common data backbone for linking systems that create or use product information. The standard defines an integrated information model that supports multiple views of product data for different applications - such as mechanical design, wiring harnesses, pipework and printed circuit assemblies. For each application area covered by the standard, a standardized application protocol (AP) describes the scope of the information requirement in terms that are familiar to domain experts. The AP then links the users' view of the information to the integrated STEP information model. The resulting standardized definition of information can be used to develop and validate translation software to allow free and open exchange and sharing of digital information between different computer systems.

STEP has been in use for over a decade to provide open communication in the engineering industry. The aerospace industry makes extensive use of the standard for exchanging design and configuration information on projects such as the Eurofighter Typhoon, Boeing C-17 and civil programmes and the Airbus family of commercial airliners. Automotive and shipbuilding activities are growing in many countries.

These mature applications have tended to focus on the exchange of information for the design and manufacture of products across the supply network, and the management of design changes through life. It was, however, recognised that the core information model could be extended to cover the configuration of each individual product through life and all the associated information required to maintain the product in working order through life.

## APPLYING STEP THROUGH THE LIFECYCLE

The Product Life Cycle Support (PLCS) part of STEP (ISO 10303-239) has been developed to expressly



**BAE SYSTEMS**

BAE Systems is a global company engaged in the development, delivery and support of advanced defence and aerospace systems in the air, on land and at sea.

## Howard Mason

Howard Mason is responsible for information standards and engineering business solutions in the Corporate IT Office of BAE Systems, including corporate implementations of the STEP standard for projects and links to customers. He leads the ISO activities on industrial data as Chairman of ISO TC184/SC4, which received the prestigious 2007 ISO Lawrence D. Eicher Leadership award for excellence in standardisation. He is a Board member of the PDES, Inc consortium for accelerating the industrial implementation of STEP, and Co-chair of the OASIS PLCS Technical Committee, which is exploiting extensions to STEP to cover the complete product lifecycle.

He chairs the Management Group for the MoU between ISO, IEC, ITU and UN/CEFACT with responsibility for coordination of Electronic Business standards worldwide, and is a member of the corresponding UK organisation.

He is a member of the leadership team of the US aerospace industry Electronic Enterprise Integration Committee, which recommends eBusiness standards for industry adoption.

Other standards activities include the chairmanship of the European CEN Technical Committee TC310 on Advanced Manufacturing Technologies, and membership of the BSI ICT Coordination Strategy Committee, which is responsible for all information and communications technology standardisation in the UK.

address the various through-life information requirements of complex products in an integrated manner. Building on STEP and a range of legacy specifications, this International Standard provides the capability to support all the information required to design maintenance solutions for a product through life, to track planned and unplanned maintenance based on the actual state of the product, and the changing configuration of the product as components are replaced and repaired. PLCS can also be used to associate technical documentation and training materials to various valid product configurations.

PLCS is now in production use in Norway, Sweden, the UK and the USA, with many other pilot and production applications under way. The standard is being used by OASIS (Organization for the Advancement of Structured Information Standards) consortium to develop a range of consistent data exchange specifications (DEX) to support different business processes across the life cycle. The first two of these DEX, covering Aviation Maintenance and Task Descriptions, are currently out for public review prior to adoption as OASIS standards, and many more DEXes are under development based on the PLCS information model.



# EPMT keeps STEP with EADS

*– When European Air Defence Systems (EADS) chose Jotne EPM Technology (EPMT) it was because we needed a partner with world beating competence in advanced data exchange, explains Thomas Drehmel, director of data administration and standards at EADS. He has nothing but praise for his partner since 1999.*

– We have been working with EPMT on data exchange for the Eurofighter programme since 1999. The STEP based exchange of design standards and configuration data between the four different PLM (Product Lifecycle Management) systems of the key companies involved in the Eurofighter project is one of the most sophisticated and complex data exchange projects in its class. EPMT's competence and products have supported us in setting it up and operating it, says Drehmel.

He goes on to explain that this collaboration led to the MIMER project, in which EPMT and EADS became the first to devise a standardised method for quality assurance and record keeping of 3D CAD and PLM data for the aerospace industry. Drehmel also mentions EPMT's vital assistance in helping EADS gain experience of model quality, which is a demanding task.

#### **OPDIM**

The next item on the agenda is the development of OPDIM, Open Product Documentation and Information Management. The goal is that OPDIM will become the de facto reference system for information and data structuring, as well as the acquisition of data.

According to Drehmel, many suppliers claim to be able to deliver such an all in one system. But the reality is that in every system you will find isolated islands of information, where different technology,

or even pen and paper, mean that part of the data has no contact with the rest of the information system. That means there is data which cannot be part of a coordinated whole, which is so vital to have for proper planning of the kind of complicated projects which are found in the aerospace industry.

Drehmel points out that it is quite normal to find old and varied technology in aerospace development, since the extended life cycles of the products mean that the technology which has been used for development and PLM cannot be changed very often. In some cases we are talking about products with a 50 year lifetime. Drehmel also points out that data structuring and exchange is particularly affected by the intricate legislation and regulations aimed at the aerospace industry, as well as by changes to these regulations.

This is what OPDIM is intended to solve and Drehmel says that the most important thing to solve is standardisation, which he believes is the most important thing lacking in the systems currently available. Only standards which are eventually followed by everybody can resolve the complexity of data exchange, structuring and organisation for engineers. EPMT has a lot of experience of open standards, particularly through its *EXPRESS Data Manager™* product. A product which will also form part of the basis of the OPDIM project.

#### **WANTS TO BE RESPONSIBLE FOR NEW STANDARD**

– That's why we have decided to develop, in our strategic collaboration with EPMT, a complete, standardised foundation of information which will bind together our most relevant data and information sources, says Drehmel.

He concludes by describing this as the way forward to a practically paperless office, in which all sources of data relevant to the project one is working on, at all levels, are gathered and structured in one place. If this is done correctly – and that is the whole point of OPDIM – we will gain a tool which shows the very heart of all the company's processes.

– Knowledge is power, said Sir Francis Bacon about 400 years ago. Information gives us knowledge, which in turn gives us power over our competitors and success for our customers. It will be fascinating to watch the OPDIM project develop.





## Jotne EPM Technology to supply software to Saab

*As a result of the framework agreement between Gripen International and the Ministry of Defence, Jotne EPM Technology (EPMT) has entered into an agreement with Saab for the management and communication of maintenance data for Gripen. The project will make use of EPMT's EXPRESS Data Manager™ software.*

Saab will be gaining efficient information flow and decision support between the departments handling development, production, purchasing and customer support. In addition, by using EXPRESS Data Manager™, Saab will be fulfilling the Norwegian Armed Forces' 2004 requirement that all new procurement projects should supply operating and management information in accordance with the open standard ISO 10303-239:Product Life Cycle Support (PLCS). Saab and the Norwegian Armed Forces are working with other authorities and industrial partners to develop the PLCS standard.

– The use of product data standards is a prerequisite for effective communication in our own organisation and externally with customers, partners and suppliers, as well as giving us the flexibility to use the best applications and systems, says Carl-Johan Wilén, Technical Fellow at Saab and a

key player in the international work of standardisation. – The project will exploit the functionality in EPMT's software to manage our important maintenance data independently of proprietary suppliers. We can thus fulfil our vision of being able to offer our customers all the information necessary to take the right decision at the right time. Jorulv Rangnes, managing director of Jotne EPM Technology, comments: – For us Saab is an ideal customer. They produce complex products with a long useful life and they have shown great faith in us by adopting our solutions for seamless communication (interoperability) based on open standards.

The project started in August and will run over 18 months. It involves up to 10 persons at EPMT. The project will use existing software from EPMT and establish a communications solution between two important programme systems for the production, management and distribution of maintenance data for Saab's Gripen aircraft. These are advanced maintenance procedures which also involve handover of the aircraft to the customer and the customer's own maintenance programme. The project will be valuable to Saab because it will enable a more efficient handover to the customer. The project is valuable to EPMT because we have developed and industrialised our own advanced solutions for system integration. This opens up many interesting marketing opportunities.



## People behind the project

### JOCHEN HAENISCH

Jochen Haenisch leads the Defense and Aeronautics Business Area in Jotne EPM Technology. With his engineering background as naval architect he has contributed to and managed many implementations of the EXPRESS Data Manager™ (EDM). These applied various STEP standards including ISO 10303-203 (configuration control), ISO 10303-214 (automotive), ISO 10303-239 (product lifecycle support, PLCS) and ISO 15926 (oil&gas). The experience gained he fed back into industry specific EPMT products.



Jochen also leads EPMT's activities in International Standardization. In 1990 he entered into the ISO Subcommittee for Industrial Data, ISO TC184/SC4, for many known as STEP. He regularly attended their plenary meetings as head of delegation for Norway. For several of the STEP standards he was the project leader. Currently he is deputy convenor of WG12, Common Resources.

### CARL-JOHAN WILÉN

Saab Aerotech  
Carl-Johan Wilén is a Technical fellow - Informatics and Customer Support Standards at Saab Technologies. He has more than 35 years experience in information management and technical publications production in different industry sectors, such as Nuclear power, Heavy vehicles and Military aircrafts.



Carl is a member of ASD Customer and Product Support Committee and the Swedish Security and Defence Industry Association ILS Group. Carl is one of the founders and forces behind S1000D since the very beginning back in the last century and he has been the European chair of the S1000D maintenance group, TPSMG. Carl was just nominated to be the first chair of the new S1000D Council.

Carl has also been involved in the development of PLCS since its start in 1998, and in the coming ASD standards S3000L and S4000M.

# Jotne EPM Technology expanding in the Space market

– We must continue to supply quality products to our customers and maintain our good reputation. The biggest challenge will be to expand in the North American market, says Mark Tantillo, director of the space division at Jotne EPM Technology. Three recent contracts with ESA, the European Space Agency, strengthens Jotne's position in the aerospace market.

With a wealth of experience behind him from various jobs from both USA (NASA) and Europe (ESA) Mark Tantillo took up the job as director of the space division at Jotne EPM Technology in February 2007.

## WIDE NETWORK OF CONTACTS

– I have been working in various parts of the space industry for several years. So I'm familiar with the language, the concepts and the special challenges of the space industry. Even more important, over the years I have got to know many people in the industry, both in Europe and in the rest of the world and I have a wide network of contacts, says Tantillo.

Jotne has definite plans for expansion across the Atlantic and looks upon this as EPMT's biggest challenge.

– Norway is recognised as a prominent member of the European community and EPMT can easily become a European player. It's harder to get into the American market unless you have good local connections or a long history of offering a unique product, believes Tantillo.

EPMT has been a sub-contractor on many projects for ESA and others and will now be prime contractor for the TruePLM and Multi Mission Archive projects for ESA. Both of these projects will make use of Jotne's EXPRESS Data Manager™ product EDM, with the introduction of the ISO STEP, PLCS and OAIS standards for exchange and archiving of product model data.

## THE ADVANTAGES OF INTERNATIONAL STANDARDS

What are the advantages of EXPRESS Data Manager™ (EDM) and other EPMT products from Jotne?

– They are based on international standards and have an open format. That applies especially to STEP ISO 10303. Any user of, for example, 3D CAD models from our servers can read them no matter what software they are using. Perhaps even more important is that our systems save and exchange



Mark Tantillo heads Jotne EPM Technology's space division and has experience of both NASA and ESA.

data based on internationally recognised standards, says Tantillo.

This means that product data will be accessible for years, regardless of the lifetime of the original data sources.

– The lifetime of hardware is getting shorter and shorter, which means the need to save programme data in a standardised format is getting ever more important, Tantillo stresses.

– Collaboration and decision making are totally dependent on being able to operate systems right across the board," says Mark Tantillo. "To take the right decisions, the right information must be made available in the right way at the right time. That's what our data management system does. We at Jotne EPM Technology are very proud to be able to add ESA to our list of customers.

These projects have been carried out in partnership with companies such as Thales Alenia, Det Norske Veritas, Jaqar, EADS Astrium, Simulog, Critical Software and Daysha among others.



– The lifetime of hardware is getting shorter and shorter, which means the need to save programme data in a standardised format is getting ever more important, Tantillo stresses.



# MMAS BRTADEIDK GJEOIGERGF TKF The Multi-Mission Archive gblieella Serverksddkkoerkljiergr

*Jotne EPM Technology was recently awarded a contract with ESA/ESOC to develop a standards based archive server for the storage of downlink data for multiple satellite missions.*

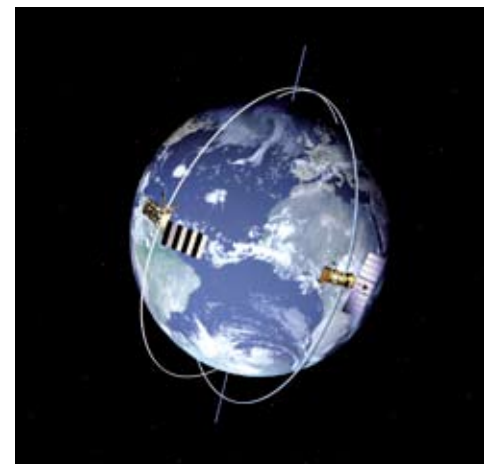
In the last few years, the preservation of digital data has quickly become a pressing issue worldwide with both corporate and community entities. A challenge posing our generation is how to maintain and safely preserve the immense volume of information that we have accumulated as a global community. Digital information is an extremely valuable yet vulnerable resource that is easily mishandled, corrupted, deleted and lost. Exponential rates of technological evolution also render systems and files obsolete in a few years at best. The archiving and preservation of digital data is not unique to any particular industry. Institutions such as museums, national libraries, hospitals, public administration, research centres, educational institutions and media outlets, among others, are all searching for secure methods of long-term digital archiving. The space industry generates huge amounts of data in both the design & development of space hardware and even more so in the downlink of satellite GNC (Guidance Navigation and Control) and scientific data.

In an effort to expand our expertise in the area of long-term data archiving, Jotne EPM Technology began discussions with ESA specialists, experts in the data archiving industries and the Norwegian Space Centre. The result of these discussions is a contract to develop a standards based archive server for the storage of downlink data for multiple satellite missions.



Traditionally the data archives for a particular ESA (European Space Agency) mission have been handled on a per mission basis, with dedicated hardware and software specific to that mission. In common with other users of electronic archiving the rapid evolution of hardware and software means that there is a significant issue in preserving the stored data over the long term. The OAIS (Open Archival Information System) recommendation produced by the CCSDS (Consultative Committee for Space Data Systems) specifies a reference model that is intended to address the issues in long term preservation of data.

The purpose of the Multi-Mission Archive Project is to deploy the next generation of data sharing and open-standard methodologies to provide a fast-track prototype of the multi-mission archiving server to ESA. By utilizing open standards and web tools, this archiving server will demonstrate the concept of a long-term platform-independent repository which is accessible to necessary users.



What is required is to develop a space domain specific multi mission server adhering to the OAIS standards as much as practical. At the end of the project the goal is to deliver a prototype product to be used as a design basis supporting space and other industries. It is expected that the prototype will demonstrate the capability and confidence to proceed with a follow-up project for further development of an operational multi-mission archive server for ESA/ESOC. The technology will have multiple applications in the future in several market areas.

Jotne EPM Technology is proud to work with Mr. Nestor Peccia and ESA at the European Space Operations Centre in Darmstadt, Germany to develop this innovative standards-based archive capability.

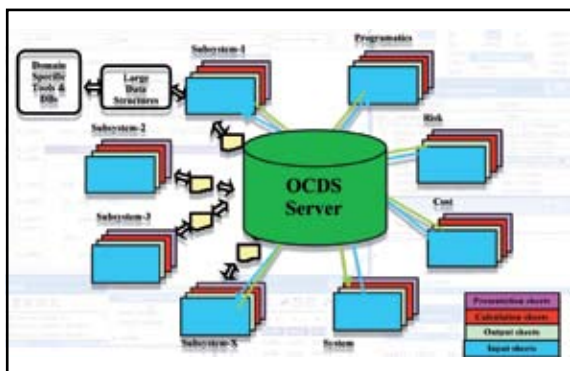
# OCDS

## - The Open Concurrent Design Server

*It has been declared as one of the most innovative tools for the development of complex integrated systems. The Concurrent Design Facility, or CDF, was created by the European Space Agency (ESA) for the efficient development of complex multi-system space projects in the early design phases.*



The new CDF room at ESA/ ESTEC in Noordwijk, NL.



A simplified pictorial of the OCDS concept with a central EDMserver™.

The CDF is a facility created and based at the European Space Technology Centre (ESTEC). The idea is to bring all system engineers together to iteratively develop and integrate their subsystems during the early design phase of a complex space mission. By beginning with baseline design parameters, the subsystem engineers begin to refine their system performance. Working together in one facility and sharing their data, the engineers can immediately see how changes to one subsystem affect the performance of the system as a whole. By making successive iterative changes to each system, the design as a whole eventually converges on the most efficient integrated design.

While originally developed for the design of complex space missions, the CDF has successfully demonstrated its capability in the design of complex non-space multi-system projects.

The original CDF was developed as a concept uti-

lizing off-the-shelf tools and software. The heart of the original CDF utilized Excel™ spreadsheets for the calculations, sharing and transfer of subsystem information. With the success of the CDF and its eventual expansion of capabilities, the Excel workbook solution began to show its limitations. As a result, in early 2007 ESA proposed to further enhance the CDF capabilities and replace the heart of the system with a more robust and expandable solution. The EXPRESS Data Manager™ Server (EDMserver™) developed by Jotne EPM

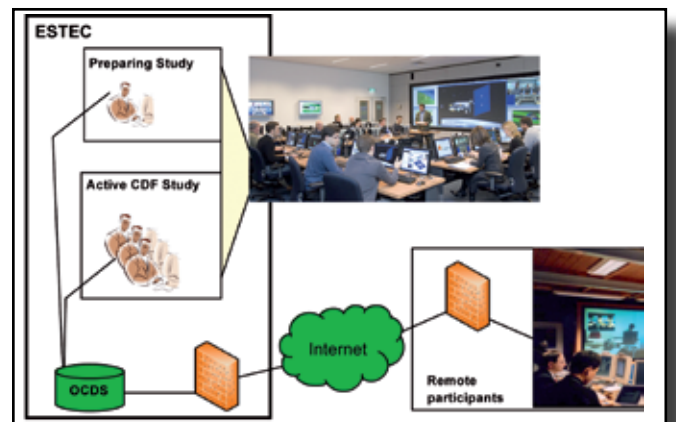
Technology was the chosen solution.

An invitation to tender was announced by ESA in early 2007 and a consortium of four international companies was awarded the contract to upgrade and enhance the capabilities of the CDF. This project was appropriately named the Open Concurrent Design Server (OCDS). Working together with DNV (Norway), Daysha (Ireland) and Critical Software (Portugal), Jotne EPM Technology is modifying its innovative EDMserver™ to operate as the nucleus of the future CDF. By using the STEP standard based EDMserver™ the system is easily expandable in the future. Similarly, with the introduction of web services, the CDF will soon be able to perform integrated design studies while including design centres simultaneously worldwide.

Massimo Bandechi, the ESA CDF Manager says:

- Our vision is to perform the design phases of a satellite mission in a concurrent environment. We have demonstrated this capability with exceptional results in our Concurrent Design Facility, but we realize the need to bring the technology beyond the dedicated facilities here in Noordwijk, The Netherlands. The goal is to expand the capabilities and create a facility that brings together the competence of ESA, our partners and our suppliers. We have chosen the STEP standard as one of the key elements in our project and EXPRESS Data Manager™ as a suitable cost-effective associated technology.

The success of the OCDS project demonstrates the capabilities and flexibility of the EDMserver™ solution as well as the ability of Jotne EPM Technology to integrate within an international environment.



The upgraded OCDS will allow interactive participation of remote users.

# TruePLM

## A model for the Future

*Managing, sharing and archiving data from various phases of a project can be difficult. Performing similar data management tasks over the lifecycle of a complex project can become overwhelming. The TruePLM project, in cooperation with the European Space Agency, utilizes ISO-standards to manage data over the entire space project lifecycle.*

Jotne EPM Technology, with support from the Norwegian Space Centre, submitted a proposal to the European Space Agency (ESA) in 2006 as the prime contractor to develop a prototype lifecycle data management system. The project, called TruePLM, was approved in mid-2007 with the focus on providing a solution that addresses two main market opportunities—standards-based information exchange, and intelligent information archive. The solution includes:

- A standards-based data storage server and exchange facility
- Long-term data archival capabilities based on PLCS-standardized data

The 18-month TruePLM program will deliver a data management system that is capable of integrating Product Data from various stakeholders in complex space projects. The system will store data and documents in a product structured way, to support the exchange & archiving of systems engineering, CAD/CAE, modeling, analysis, documentation and logistics data throughout the entire product lifecycle. This activity is being carried out with the support of ESA and will eventually be tested in a real-world environment through the development of an actual satellite program with a major space contractor.

Space projects are characterized by:

- a project schedule involving well defined phases O/A to F,
- standards based processes for project management, technical development, and quality assurance

- a long life cycle, often 8 – 10 years
- a large project organization, including participants within ESA as well as external contractors, most often shifting during the project life-time

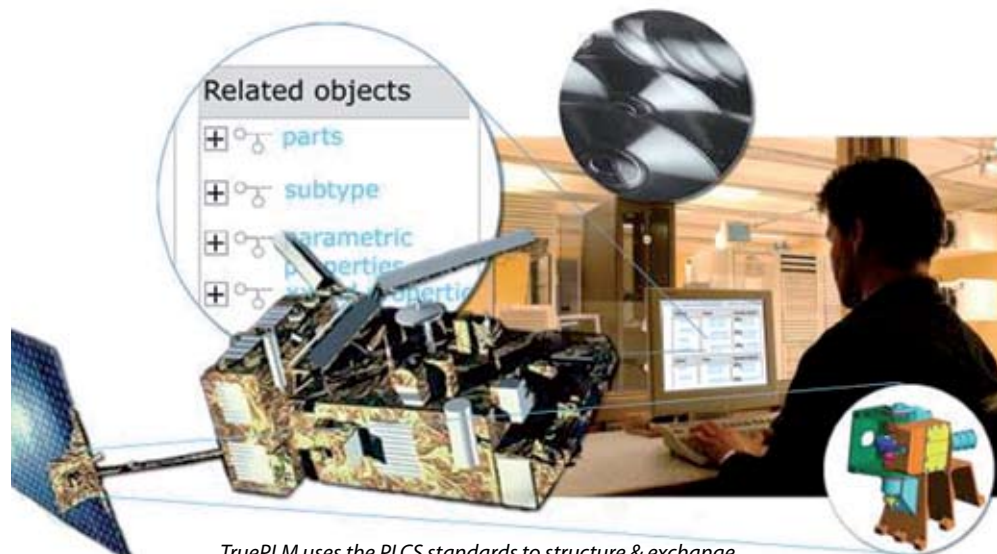
The TruePLM implementation will offer solutions adapted to the needs for such projects:

- ISO 10303 compliant data representation (independent of the original application);
- Client-server solution utilizing web services as communication method
- User administration handling roles and access to data in a user-friendly and secure way
- An interfacing method for importing and merge and for export of data from external

software applications

- Data access methods based on the product structure (tree structure)
- Easy-to-use end-user application
- Versioning of data and definition of baselines to enable traceability of data

The final delivery of the TruePLM project will be a functioning product lifecycle server configured for various types of space projects and business models. Eventually, the TruePLM model server will be modified to support various product lifecycles outside the space domain.



TruePLM uses the PLCS standards to structure & exchange complex system data over the entire life of the project.

# Will improve French-Norwegian space collaboration

*The mighty French Space Agency CNES visited Svalbard and the Norwegian Space Centre in Oslo to discuss future cooperation with Norway.*

France and Norway have many common strategic interests in space activity, and the top manager of the French Centre National d'Études Spatial (CNES), Yannick d'Escatha, recently came with a team to Svalbard and Oslo, to discuss further cooperation between France and Norway. In addition to the CNES and Norwegian Space Centre delegates, Ambassador Chantal Poiret and Secretary of State Øyvind Slåke also joined in on the trip to Svalbard.

CNES is Europe's largest space centre and one of the major driving forces behind Europe's space activity. France has also been a driving force to spread space activities to other countries.

The French delegation and the Norwegian Space Centre spent time on Svalbard for bilateral talks on future cooperation and to share views on its proposals for new programs that will be up for discussion at ESA's ministerial meeting this fall.

The French delegation also had the time to visit the satellite station SvalSat and the University Centre at Svalbard.

As an important part of the visit, the third French-Norwegian space forum was held Monday April 14th in Oslo. Around 70 participants from both nations gave presentations on several of the projects

that the countries are involved in. The symposium was opened by State Secretary in the Ministry of Trade and Industry, Øyvind Slåke.

Slåke said that France and Norway have long traditions of cooperation in this field, both from the work that is done in the European Space Agency ESA and on a bilateral basis.

– Looking at the national priorities of France and Norway, it is clear that the complementary aspects of our space ambitions gives opportunities for further cooperation, said Slåke.

Mr. Slåke received support from the French ambassador, Chantal Poiret.

– I think there are good chances of developing cooperation in all fields where CNES operates, she acknowledged.

The top manager of CNES, Yannick d'Escatha, praised the Svalbard-trip. He had a great sense for both nature and the technological potential of the islands. D'Escatha is keen to establish more industrial contacts across the borders.

– We have several examples of successful cooperation with practical results, including telecommunications and the environment and climate. The goal now is to find new ways for us and Norwegian industry to work together, he says.

Managing director Bo Nyborg Andersen at the Norwegian Space Centre says that it is important from the Norwegian side to have a close cooperation with France, which is Europe's most important space nation.



NSC Managing Director Bo Andersen (left) and the Director of CNES, Yannick d'Escatha.

– But collaboration requires that both parties are mutually beneficial. Norway has a unique space related terrestrial infrastructure in the north that is attractive to all space nations, France included. In addition, Norwegian expertise are in key niche markets of the space activity, he says.

Jotne EPM Technology has a long experience of joint projects with French aerospace companies including Thales Alenia Space, Simulog (Incka), Airbus, Astrium and other EADS companies and leading French universities. We look forward to continued cooperation with our French colleagues and integration of our knowledge & expertise on future projects.

Jotne EPM Technology contributes to the following professional membership organizations.

## Joint STEP/PLCS offer in the Aerospace and Defense sector

Jotne EPM Technology AS and the Swedish provider of Product Lifecycle Management (PLM) information solutions and services for advanced products and systems, Sörman Information AB has entered a Memorandum of Understanding to jointly develop market opportunities and products related to the Aerospace and Defense sector.

More specifically the agreement expresses the desire to jointly work together with the ambition to address the aerospace and defense markets with an integrated solution to enhance standards based information usability throughout the lifecycle of the material.

The MOU assists in the process of running joint market and project activities as well as possible integrations with the EPMT product EXPRESS Data Manager™ and Sörman UpTime and RODON. These products have proven their capabilities over many years.

# The 10th NASA-ESA Workshop on Product Data Exchange (PDE 2008)



*On the 26-28th of March 2008, Jotne EPM Technology was a key participant in the 10th Annual NASA-ESA Workshop on Product Data Exchange at ESTEC in Noordwijk, The Netherlands.*

What began originally as an informal meeting venue to discuss and share information on a number of ISO 10303/STEP related data exchange standards ten years ago has now become a focal point for the sharing of a broad range of data exchange and data sharing technologies & standards. The workshop is jointly organized by the National Aeronautics and Space Administration (NASA), the European Space Agency (ESA) and an international advisory panel. It is held annually and alternates each year between America and Europe. Alternating the location provides a fresh mix of participants each year and this year's workshop was no exception with speakers from Germany, France, Netherlands, Belgium, Italy, UK, Norway and USA.

The objectives of the workshop are:

- To bring together developers, implementers and users of product data exchange and data sharing solutions, and to share experience obtained in development, implementation, deployment and operational use.
- To provide an international forum to discuss methods and technology for the reliable capture, management, exchange, sharing and long term archival of product/system information, especially through the use of

open standards.

- To identify or showcase interoperability standards and technology for product lifecycle management of complex systems, including cross-fertilization between solutions developed in different industry sectors.
- To identify gaps where new solutions need to be developed – or where existing ones need to be extended – and to bring together the people to foster such initiatives.
- To promote development and adoption of open standards for model-based systems engineering – improving the specification, acquisition, design, analysis, verification, validation and operation of complex systems through the use of executable models (executable in a simulation environment).

Common topics include:

- Open standards as enablers for multi-disciplinary integrated product development teams and advanced engineering analysis and simulation:
- Reliable long-term archival and re-use of product data for complex systems
- Awareness and application of underlying standards and software technology that enable efficient product lifecycles.
- Use of open standards for cost-effective implementations that avoid vendor dependencies
- Success stories and lessons learned in developing, implementing and/or using open product data exchange and data sharing standards
- Sustainability of open solutions, including total cost of usage/ownership, stakeholder

win-win mechanisms, and balancing openness versus business viability and competitive advantage.

Jotne EPM Technology has been an active participant each year since 2000. This year Arne Tøn, Senior Software Developer for EPMT, was well-received with his presentation, 'The ESA OCDS Project - Enhancing the Concurrent Design Concept'

Next year's workshop will be held in America. The following year the workshop will return to Europe and Jotne EPMT has volunteered to host the 2010 event in Norway. For more information, please see NASA STEP Central at <http://step.nasa.gov/>.

We hope to see all of you in 2010 here in the land of the fjords!



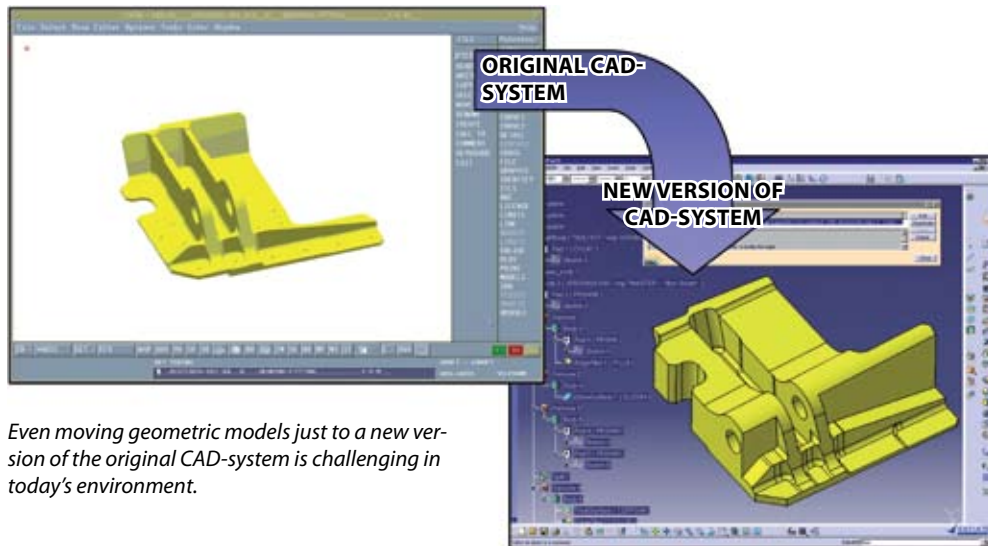
# The challenge of time for CAD-archiving

*This article is based on the article, "Long Term Retention of Digital Models" by Sean Barker, Advanced Technology Centre, BAE SYSTEMS. It presents the "The Challenge Of Time" for CAD-archiving in the aerospace industry, and a project aiming to solve this problem.*

How do we synchronize the 10-20 year lifespan of cars, 40 years lifespan of ships, the maybe 70 year lifespan of aircraft designs, and 100 year lifespan of nuclear reactors, with the limited lifespan of computers and normal design software?

How can we read digital models, many years after the original application that the model was made with ceased to exist? Historically, new versions of CAD systems are released at least every six months, and are replaced or completely rewritten every few years.

The LOTAR project has been established to find the answers.



*Even moving geometric models just to a new version of the original CAD-system is challenging in today's environment.*

The picture above illustrates the sort of change that could happen when copying a model from one generation of system to the next. The part in the new version would not fit where the old one did, and the risk would require us to perform detailed checks on a part design every time we updated the CAD system.

## A BUSINESS PROBLEM

We are not merely speaking of a pure technical problem. What we see is a real business problem. A complex product may take up to five years to get into production, and be in production for

many years. However, design data does not cease to be used when production finishes. It continues to be used in servicing the product, in manufacturing spares, and in modifying the product - not just upgrading it, but responding to changes in regulations or finding new suppliers.

The original CAD system will become obsolete quite early in the life of a major product, especially in the aerospace industry. Not only will it be obsolete, but even if a version is available, the number of people who know how to use it will also get fewer and fewer. Hence the CAD system must be replaced at several points in the product lifecycle. Even if we are able to drop the product after 20 years (and risk losing customers), we would still be legally liable while it continues in service, and usually for several years longer, and would need to provide design data in case of accident.

## THE LOTAR PROJECT

This gives us the needed background to understand the LOTAR project, which, through the European body for the development of global Aerospace standards (ASD-STAN), aims to develop a standard for long term retention of digital aircraft data.

Project members in LOTAR have included BAE SYS-

would be redrawn automatically.

While there has been much development in CAD since the 60's, most has been about improved tools for creating and checking shapes. In the last few years this has changed. More complex functionality has been added, in which the tool itself generates extra information, such as geometric tolerances.

## MODEL IN MUST BE MODEL OUT

Consequently, if we use the model as the master source of the product design, we need to keep it. However, since the model is always interpreted through software, we need to show that software correctly interprets the model. That is, if we take a model, and put it into an archive, then, when we take it out again, we must show that what went in is what comes out again.

## A TECHNIQUE FOR VERIFICATION

A verification solution is needed. Cloud of points is a technique of putting points over the surface of a model, and using these as the verification mechanism. That is, we can use the cloud of points to automatically check that what went into the archive is the same as what comes out. Further, rather than putting points at random over the surface, points can be put at critical points, either to show that the surface is accurately reproduced, or that edges have not moved significantly.

## THE FOCUS OF LOTAR

We have now defined the data retention problem, and seen a possible verification solution. At the simplest level, one could keep the computer and the operating system and the software. There has been work on this for document retention, but is out of scope for the LOTAR project, since the sorts of modeling tools used in the aerospace industry not only require complex software, but also skilled users.

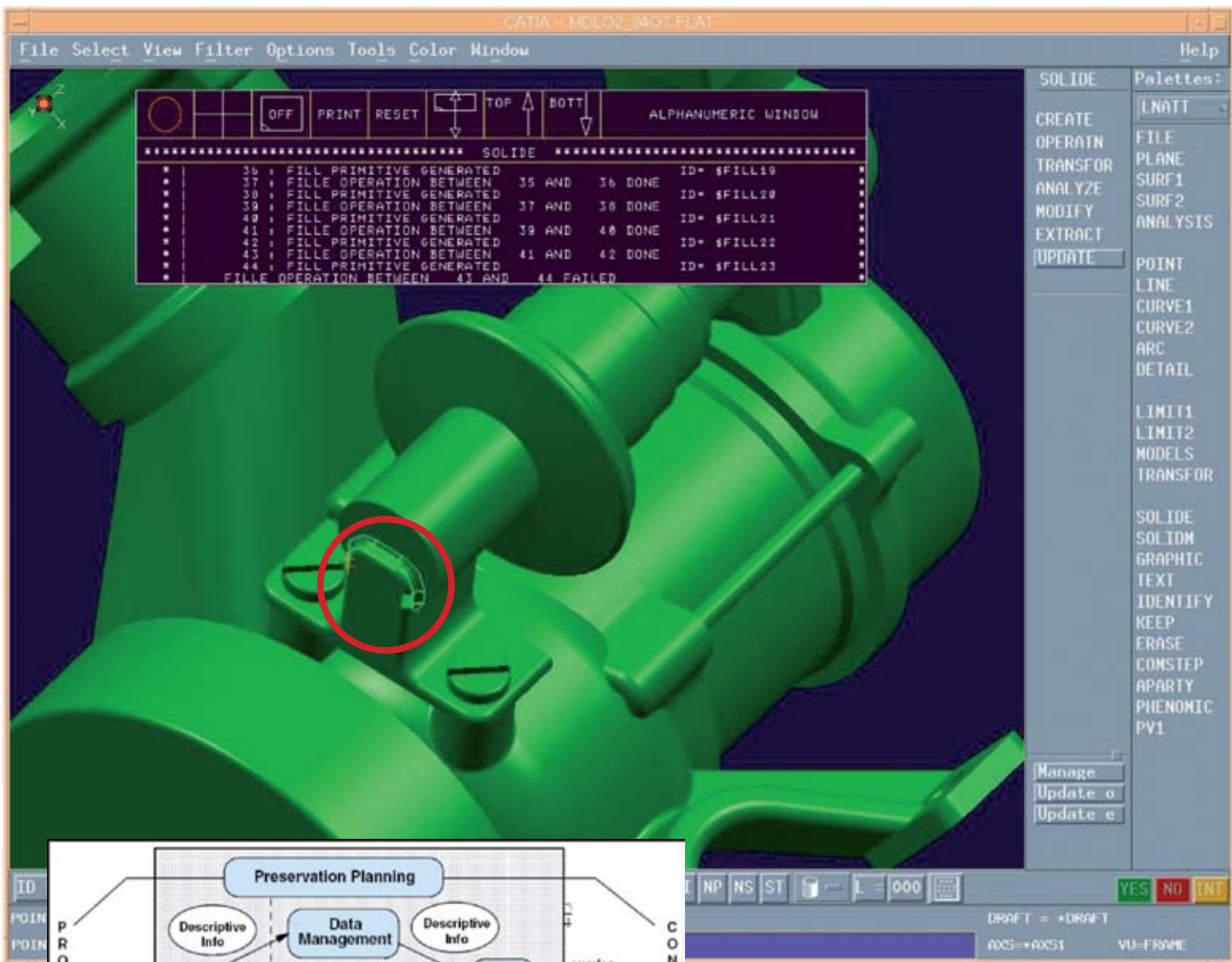
At a higher level, there is a problem of retaining data, for which the OAIS archiving standard provides not only a reference model, but a template. The next level is to retain the model, that is, to ensure the information remains well structured and accurate when read into a new modeling tool.

This is the focus of the LOTAR project. However, the model does not tell the whole story, and needs to be supplemented by the knowledge of how to interpret the model - an area where much work has started in recent years.

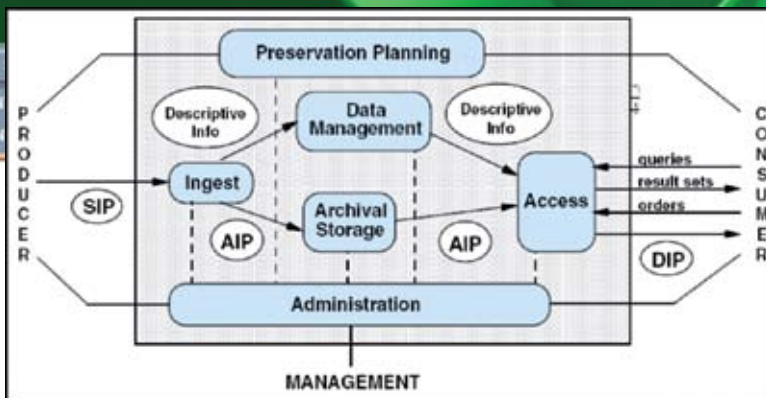
TEMS, Airbus, EADS, Dassault Aviation, SNECMA and MTU, and is supported by the ProSTEP association. The European industry is working closely with its US counterpart, the AIA to promote a global consensus, and with the PDES Inc. Long Term Data Retention project.

## FROM DRAWING TO MODELLING

Early CAD systems were viewed as an electronic version of the work that had been done by pencil for centuries. The main advantage in the electronic version was that when changing one line all others



*This small failure in the source data lead to total loss of the model when imported into the target application.*



*This picture shows the OAIS archival processes.*

#### OAIS - ISO 14721.2003

NASA's Open Archival Information System is a reference model describing an archive environment, to enable archive architectures and services to be compared.

An OAIS-type archive is expected to meet certain minimum responsibilities:

- negotiate and accept appropriate information from information producers;
- obtain sufficient control of the information to ensure long term preservation;
- determine the scope of the Designated Community (the people who will use the information in the future);
- ensure the information is understandable by the Designated Community without the assistance of the information producers;
- follow documented policies and procedures to ensure the information is preserved against reasonable contingencies, and to enable the information to be disseminated as authenticated copies of the original or as traceable to the original;
- make the information available to the Designated Community.

The OAIS reference model details a conceptual design for an archive, including its primary components and their associated functions and relationships, to support these requirements.

#### USEFUL LINKS

- LOTAR: LOnG Term Archiving and Retrieval of digital technical product documentation, such as 3D-CAD and PDM data (<http://www.prostep.org/en/projektgruppen/lotar/>)
- ASD-STAN: Aerospace and Defense Industries Association of Europe – Standardization (<http://www.asd-stan.org>)
- AIA: Aerospace Industries Association - US Trade association representing the nation's leading aerospace manufacturers (<http://www.aia-aerospace.org/>)
- ProSTEP: A association of industry members is to provide support to companies in their endeavor to meet the challenges posed by today's networked collaboration. (<http://www.prostep.org>)
- BAE SYSTEMS: The premier global defence and aerospace company (<http://www.baesystems.com/>)
- Airbus: A leading aircraft manufacturer with the most modern and comprehensive product line. (<http://www.airbus.com/en/>)
- EADS (European Aeronautic Defence and Space Company): A global leader in aerospace, defence and related services ([http://www.eads.net/1024/en/Trailer\\_EADS.html](http://www.eads.net/1024/en/Trailer_EADS.html))
- Dassault Aviation: A major manufacturer in civil and military aviation (<http://www.dassaultaviation.com/en/aviation.html?L=1>)
- SNECMA: Designs, develops and produces engines for civil and military aircraft, launch vehicles and satellites (<http://www.snecma.com/index2.php3?&lang=en>)
- MTU: A strong player in the development, manufacture and repair of commercial and military engines (<http://www.mtu.de/en/index.html>)

# Integrating CAD and analysis

*Advanced iso-geometric analysis is fundamental to state-of-the-art systems for PLM and archival that include CAD models and engineering analysis data. For, today's often leaky CAD-models make the integration and the archival of CAD and analysis data a real challenge. A project has been established between SINTEF, Aker Solutions and Jotne EPM Technology to solve the problem.*



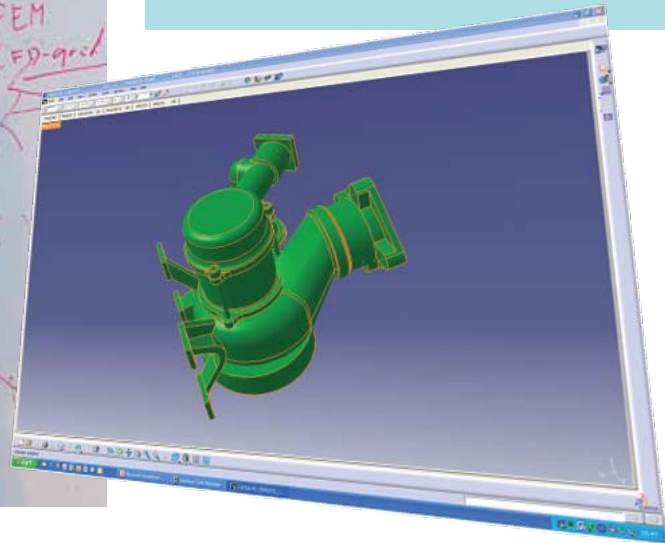
## About SINTEF ICT

The Department of Applied Mathematics within SINTEF ICT Institute [www.sintef.no/math](http://www.sintef.no/math) focuses on complex problems and processes in industry and public sector. We focus on challenges where improved mathematical based methods and algorithms will make a difference. The work is centred on:

- Geometry processing with a focus on CAD, semantics and visualization
- Numerical simulation with a focus on CFD and reservoir flow
- Discrete optimization with a focus on planning and finance
- Algorithms harvesting the potential of heterogeneous computing using multi-core CPUs, programmable graphics processor units and the Cell BE processor.

Our work envelops the span from basic research to industrial initiated R&D, and is funded by national R&D-program, EU framework programs and directly by industry.

The SINTEF Group, [www.sintef.no](http://www.sintef.no), is the largest independent research organisation in Scandinavia. Every year, SINTEF supports the development of 2000 or so Norwegian and overseas companies via our research and development activity.



– The cooperation between Jotne EPM Technology and SINTEF started with the EU-sponsored PRODEX- project "Product Model Exchange Using STEP" (1992-1995) in the ESPRIT 3 program. SINTEF helped Jotne EPM Technology to be integrated as a partner in the project. Jochen Haenisch, now an employee of Jotne EPM Technology, was the project manager for the SINTEF activities in PRODEX in close cooperation with me, says Dr. Tor Dokken, Chief Scientist in the Geometry group of the Applied Mathematics Department in the SINTEF ICT Institute.

In the years following there have been a close contact between Jotne EPM Technology and SINTEF. SINTEF has been assisting Jotne EPM Technology to address challenges related to quality of geometry in STEP-models. The close contact identified a need for more basic research within CAD-quality to improve product data management and better integrate CAD-models in industrial processes. Discussions were started between Kjell Bengtsson

and Dr. Dokken to establish such a project with support from the Research Council of Norway.

Parallel to this Trond Kvamsdal from SINTEF Applied Mathematics stayed half a year at the Institute for Computational Engineering and Sciences at the University of Austin, Texas learning about iso-geometric analysis where NURBS-elements replace traditional FEM-elements in simulation systems. Tor Dokken points out that when returning to SINTEF Kvamsdal's new knowledge was disseminated and triggered a further focus on the need for research within CAD-model quality. Iso-geometric representation and analysis has the potential of establishing a close integration between CAD and analysis, thus removing a tight and troublesome bottleneck in design optimization and reuse of previous design models and results.

The iso-geometry project, <http://www.sintef.no/iso-geometry>, is funded by the Research Council

of Norway under the structure of Knowledge Based Projects within User Participations. Such projects are granted to research institutes or universities with at most 80% funding from the Research Council of Norway, at least 20% funding should come from industry. To increase the industrial basis of the project a number of Norwegian companies was approached for financial support. This resulted in Aker Solutions MH supporting the project in addition to Jotne EPM Technology.

– The main focus of the iso-geometry project is to address the challenges of the integration of CAD and analysis to open up for the use of isogeometric analysis in industry on the broad scale. As a successful integration is dependent on high quality CAD-models, the results of the LOTARproject are a natural starting point for the work in the iso-geometry project, Dokken answers when EXPRESSway asks about the LOTAR connection

# Jotne EPMT contracts CIMdata Services

*Jotne EPM Technology (EPMT) recently worked with CIMdata to perform a detailed study of the PLM market within the aerospace sector.*

CIMdata is a global, independent, non-biased, strategic PLM consulting firm that has established itself as a world-leading source of information and guidance to both industrial organizations and suppliers of PLM technologies and services. With more than 25 years experience in the PLM industry, CIMdata consultants are experienced professionals with diverse backgrounds. Having worked in manufacturing, engineering, management, and technology based companies themselves, CIMdata consultants have a firsthand appreciation of the challenges in the global PLM market.

In our desire to expand within the aerospace market, Jotne EPM Technology decided to enlist the consulting services of CIMdata to better understand the challenges and opportunities within the aerospace PLM markets. The process began with a two-day face-to-face meeting and analysis of the specific needs of EPMT. CIMdata then prepared a detailed report on the status of the aerospace PLM market within the context of EPMT's areas of interest. The analysis and accompanying report provide detailed information of, among other things, market capacity, potential customers, partnering possibilities, general marketing strategies, pricing, competition and the likelihood of success within the target market areas. Based on the results of this report, EPMT has been able to sharpen our market focus, identify new customers & potential partners, as well as adjust the direction of future product developments.

## CIMdata®

*CIMdata is a non-biased, independent, global consulting firm that has established itself as a world-leading source of information and guidance to both industrial organizations and suppliers of PLM technologies and services.*

The outcome of the aerospace industry review activity, in addition to indispensable insight into the aerospace PLM market, is a valuable and growing relationship with CIMdata.

### THE CIMDATA 2008 PLM VENDOR FORUM

Jotne EPMT has since attended the annual European CIMdata PLM Vendor Forum, which was held in Stuttgart, Germany at which CIMdata presented an extensive review of the global PLM market. This one-day forum gives a detailed overview of the worldwide PLM market, key players, acquisitions, historical & projected market investments by industrial sector and geography, challenges, and the vision for the future. The CIMdata PLM Vendor Forum is vital to any company wishing to play a key role in the growing global PLM market.

In summary, Jotne EPM Technology is proud of the working relationship with CIMdata and looks forward to a continued cooperative relationship in the future.

## He will fight in the US for Norwegian Defence suppliers



*His name is Tom Ivar Stie and this fall he becomes the Norwegian defense industry man in Washington. Sties new job has been*

*established as a result of a collaboration between Innovation Norway, The Norwegian Ministry of Defense, Norwegian Defence and Security Industries Association (FSi) and eight Norwegian defense suppliers, among them Jotne EPM Technology AS.*

– I really look forward to work in Washington for the interests of Norwegian defense industry, as the first in more than twenty years to be dedicated for Norwegian defense industry over there, says Tom Ivar Stie to EXPRESSway. He is pleased because, like the Americans have had for years in their own embassy here, Norway will now get our own representative in the US. This is of course only fair and proper.

The background of Stie is rather special. As of today he runs his own software company, a company with relevance to EPMT markets. Here he sells to the defense industry, included in the US. Hence he knows firsthand where the challenges are.

Stie also has a background from three years in the Norwegian Ministry for Defense, where he worked with materiel and purchases.

### BUILD GOVERNMENTAL CONTACTS

– The main goal for me will be to build the contacts with the US authorities, which will be crucial to succeed over there. Then it will be to find the market possibilities with the best chances of success, Stie says. He has one big warning though, of a real challenge for all Norwegian players that will be involved in defense business in the US.

– Time, it usually takes a long time from a contract has been signed until something really happens when you deal with American defense players, says Stie and talks because he knows. One contract he got for his own company took three years from signing to action. And this is normal in a market where strength and quality are buzzwords, and the only way to success.

– The quality of Norwegian products is a selling point for us over there, and this will be something I will stress in the contacts I will make, Stie says.

### YOU NEED PATIENCE AND STAMINA

– Patience, stamina and sound finances are necessary if you want to play in the American defense market, Stie explains, particularly to the most vulnerable part of the usually small and even medium sized Norwegian companies. But Tom Ivar Stie's own company is not big either, and they have made it over there. So nothing is impossible, and the profit may be very good for the ones that have the needed patience.

After talking with a very enthusiastic Tom Ivar Stie the old US of A sounds like a challenging haven for Norwegian defense suppliers. Even though he presents challenges, it is the possibilities that have triggered him in his new job. He welcomes Norwegian defense suppliers, but hopes they can wait for still a few more months. As soon as he is installed over in Washington he will do whatever he can for a new dawn for Norwegian defense suppliers that want to try their luck in the most interesting market they will ever find.

Torbjørn Svensgård, president of FSi cannot agree more with Tom Ivar Stie. He really wishes Stie luck, and is convinced that Stie and the regional director for Innovation Norway over in the US, Kristin Dahle together will do a great job in the American market for the betterment of Norwegian defense suppliers.

– To EPMT Tom Ivar Stie in Washington means a door opener to US DoD, Pentagon and major defence contractors in the Washington D.C. area, says, Kjell A. Bengtsson SVP Marketing and Sales.



# AIA recommends PLCS

*The aerospace industry has in all of its history been struggling with lack of a common interoperable data exchange language. This is now about to change.*

The Engineering Data Interoperability Group, EDIG of the Aerospace Industries Association Inc., AIA now recommends their member companies and suppliers to adopt a Standards-based interoperability solution utilizing PLCS (ISO 10303-239), a part of the internationally accepted STEP standard.

EDIG recently published a position paper with their present views on this matter. Their view is based on a survey made among their member companies and a comparative analysis of the leading data exchange Standards from ISO/STEP and GEIA.

The EDIG position paper presents one word that describes the reason for the current EDIG view better than anything, and that is "maturity". The interoperability standards have now reached a sufficient level of maturity, and have been evolved into both a technical and psychological level making them ready to be feasibly and cost-effectively implemented. On this background the EDIG recommends that AIA member companies and suppliers adopt a standards-based interoperability solution utilizing PLCS (ISO 10303-239), part of the internationally accepted STEP standard.

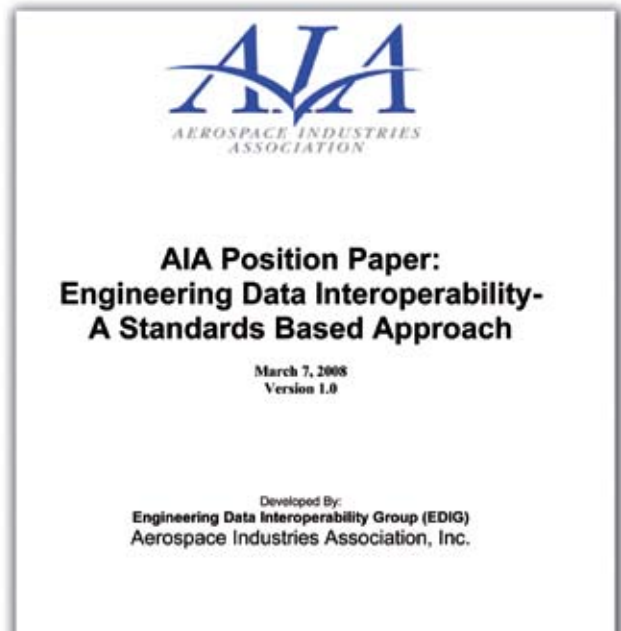
The maturity and scope of coverage of the Standard will provide coverage for the widest cross-section of engineering applications now in use. PLCS also offers the capability to define exchange specifications (DEX) to meet particu-

## 7 Recommendations

Based on the outcome of our research and analysis, the EDIG recommends that AIA Member companies and Suppliers transition to a Standards-based interoperability solution utilizing PLCS (ISO 10303-239) and its associated DEXs. The maturity and scope of coverage of the Standard will provide coverage for the widest cross-section of engineering applications now in use.

lar data requirements. A number of such DEXs are already being developed, and others may be created as necessary by industry.

In order to minimize the time and cost required to implement, and to maximize the potential benefits, EDIG recommends that aerospace companies implement Best Practices in standards-based interoperability as described in the Engineering Data Interoperability Guide. It is also recommended that PLCS be adopted as part of the overall AIA eBusiness framework.



*ISO 10303-239 - Product Life-Cycle Support: A standard data model now ready to implement within your organization.*

## The EXPRESS Data Manager™ suite of products

Jotne EPM Technology has established itself as one of the leading providers of solutions for product data technology – the open paradigm for the 21st century. Our product suite EXPRESS Data Manager™ is designed to meet the needs of engineering and manufacturing enterprises to accurately and reliably exchange and share technical data with colleagues, customers, subcontractors, suppliers and other business partners. The products fully implement the EXPRESS data-modeling language which supports most international

product data technology standards - including ISO 10303. EXPRESS Data Manager™ can be used for data-modeling, application development, data management and quality assurance. Our product suite is under constant development to adapt to changes in customer needs as well as international and industry standards. Contact us for the latest news.

**EDMserver™**

A Product Model Server capable of storing all data for complex systems, including native support for the PLCS Data Model. The unified database system uses a model-driven architecture to manage the life cycle of products and systems.

**EDMvisualExpress™**

A complete tool for creating and visualizing data models based on the graphic notation EXPRESS-G.

**EDMmodelMigrator™**

Supports the migration of data from a legacy system to a different product-data support environment, such as PLM.

**EDMmodelConverter™**

Quickly and easily uses EXPRESS-X to convert data from one EXPRESS schema to another.

**EDMdeveloperSeat™**

A comprehensive package of tools for all EXPRESS users – application developers, system integrators, data modellers, etc.

**EDMmodelChecker™**

Validates a data set and ensures that it conforms to all rules and constraints defined in one or more EXPRESS schemas.

**Business Partner Program**

Our commitment to our partnership with you includes training and educational services, customer support and consulting services.

[www.jotne.com/epmtech](http://www.jotne.com/epmtech)