CASE STUDY: 3D CAD - PLM Integration

Ingalls Shipbuilding was driven by competitive demand to significantly reduce cost in operations.

About Ingalls Shipyards
Ingalls Shipbuilding is a major builder of ships for the United States Government. With 11,500+ employees and a shipyard encompassing 800 acres, Ingalls Shipbuilding builds complex ships for coastal protection and offshore patrol.

Cost Cutting Pressure
The US Government plans to rapidly and significantly increase its fleet but requires that the cost per ship be massively reduced. To accomplish this, the government has told shipyards like Ingalls that it is moving to fixed price contracts rather than cost-plus. In response, Ingalls Shipyard has been driven to seek major efficiencies in operations. According to Mike Deutch, Ingalls Director of Business Process Architecture, “Cost reduction is an absolute must.”

Integrated PLM is the key to savings
Ingalls realized that in order to reduce costs, the company needed to improve how it managed information. Ingalls had hundreds of databases, Excel files, and custom scripts that were created by various departments to solve particular problems. Unfortunately, the information produced was copies of other data or even copies of copies. It was difficult to ensure that everyone was working from the latest information and multiple support staff were required.

Ingalls identified that a Product Lifecycle Management (PLM) program that was tightly integrated with its CAD/CAM program for engineering would be a significant driver of savings. A powerful PLM program that leverages 3D engineering information provides a central repository of data which would allow for greater control. It would integrate all the disconnected pieces and would disseminate approved information at the appropriate time.
In 2010, Ingalls wanted a software solution that would enable and promote collaboration and communication to increase productivity and reduce errors. As well, the software had to have a visual method for approvals, planning and displaying the impacts of change before they happened. This would allow concurrent engineering and planning.

**PLM Must Handle Needs of Shipbuilding**

A big problem was that most PLM programs were originally designed for automotive and aerospace manufacturing and have difficulty handling the requirements of the shipbuilding industry. Most PLM systems lack the required agility and flexibility and are not resilient enough to accommodate future growth.

**Requirement:** Shipbuilding specific PLM and CAD programs with open architecture to allow for full integration

Technically, what was required was software that is designed with an open architecture platform. The solution was to integrate SSI’s ShipConstructor CAD/CAM software with the ARAS Innovator PLM system using SSI’s EnterprisePlatform product. This integration has the following advantages.

- **Agile**
  The SSI/Aras solution was implemented incrementally, providing increased value to Ingalls at each milestone. The staggered implementation allowed Ingalls to replace legacy systems and processes without disrupting its current business. Ingalls did not have to “rip and replace” everything. The PLM implementation is resilient and accommodates future growth.

- **Flexible**
  The SSI / Aras solution is also uniquely capable of handling how ships are actually designed and constructed. Most PLM systems are designed for discreet manufacturing processes and force shipbuilders to work as if they are building a series of cars; shipbuilding is NOT discrete manufacturing. In shipbuilding, you have to design, procure parts and construct the ship simultaneously. Aras Innovator has the necessary flexibility to be configured to accommodate this.

**The Result:**

**End to End Solution**

SSI and Aras provided an end to end solution that is centralized but available to all departments with all the design information and production output stored in the same location with appropriate workflows linked to various processes. This ensures that when a production documentation or CNC code for the shop floor are pulled from the PLM program, they are the most up-to-date approved versions.

**Data optimized for Specific Scenarios**

All of the data sent is optimized for specific scenarios; different departments and stakeholders require different pieces of the same information. For example, when purchasing stock, the “green” (additional stock) material is used for calculating the purchase length and quantity but green material is disregarded for weight calculations. Therefore, the SSI/Aras solution provides exactly the information needed and no more.
Planning in 3D
The SSI/Aras solution lets Ingalls visualize ShipConstructor data in 3D using Autodesk Navisworks. Within the same interface, Ingalls can edit and plan with the Aras Innovator PLM system. Ingalls can configure the system to show visually how the design has changed over time. Planners have exactly the information they need to plan accordingly.

Visual planning with access to PLM and CAD data.

Concurrent Engineering
Because of the interconnection between Aras Innovator and ShipConstructor, Ingalls has been able to start 3D planning before detailed 2D production drawings are complete. This is true concurrent engineering. Because the planners can visualize the information in 3D, they can give feedback to modelers and draftsmen. This improves design for production which increases both efficiency and quality.

Effective Change Management
The greatest benefit of the SSI/ARAS PLM solution is Ingalls’ improved ability to manage change which, in shipbuilding, is constant. The solution provides a centralized system that is flexible enough to provide the necessary controls required to ensure that the right information is sent to the right people and programs at the right time, and that everyone is updated when needed. Furthermore, throughout a shipbuilding project and even into the operations phases, a "digital thread" of information is generated for each part showing a detailed revision history as to what has changed and what has been affected. This is a powerful tool for change management.

Quick Implementation
Most PLM implementations take years to implement. The SSI/Aras solution was implemented in nine months. Ingalls was grateful that they were able to quickly put the solution into operation and immediately see benefits.

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