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ENOVIA SmarTeam Engineering Express:

A review by TechniCom

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Background

Introduction

In late April and early May, 2008 I had the opportunity to spend some time with ENOVIA SmarTeam executives and technical specialists, the goal being to review the recently introduced SmarTeam Engineering Express software. My usual approach to such projects is to review them from a design engineer's point of view, a perfect approach for this project because of my design engineering background and since I more often review engineering tool software such as CAD, CAM, and CAE. Naturally one needs be cognizant of the power and need for products to manage the huge amounts and variety of data created by such systems.

I agreed to review ENOVIA SmarTeam Engineering Express from the perspective of an engineering user, my usual approach. ENOVIA SmarTeam agreed, so the reader of this paper may find that it is different than some review of PLM software that they have read. I will not get into the software technology, but instead focus on the overall capabilities of the system, its usability, and the benefits to an engineering organization. I hope you will find this approach useful.

I have known about SmarTeam and their software products since they became a player in the PLM market in the mid 1990's and was anxious to learn more about their latest solution – SmarTeam Engineering Express.

About the company

Founded in 1995, SmarTeam was an independent company until Dassault Systemes acquired it in 1999. In 2006 SmarTeam became part of the ENOVIA brand organization and is now called ENOVIA SmarTeam. The other brands are ENOVIA VPLM and ENOVIA MatrixOne. The ENOVIA SmarTeam brand is primarily focused on offering easily installable and easily operable product lifecycle management solutions to small to mid-size customers. Their solutions are available from a variety of resellers worldwide, including both IBM and Dassault Systemes direct sales channel. ENOVIA SmarTeam products are primarily aimed at small to mid-size customers. This focus on mid-sized customers differentiates ENOVIA SmarTeam products from other product management software vendors offering PLM (product lifecycle management) or PDM (product data management) to large customers, usually with correspondingly large IT organizations.

Mid-sized customers need product management

PLM and PDM differ in that PDM normally focuses on design data management, while PLM tries to manage product data from birth to death, thus the term product lifecycle. PDM typically manages the product structure or the EBOM and usually includes versioning.

More advanced offerings, those going beyond PDM, may also add engineering change orders (ECO) and workflow control. Since most companies have developed their workflows over time, each tends to have unique processes for controlling and managing changes to products, either released or in development products. In the past, product developments were slower and usually controlled within a single organization. Thus it was possible to manage product structures and their related bills of material (BOM) manually or with home grown systems, even with spreadsheet software such as Microsoft Excel.

Engineering change orders (ECOs) were always complicated to evaluate and approve. If an ECO occurred prior to production only engineering was impacted. ECOs occurring after production are much more costly and tougher to evaluate because production changes, inventory, field replacements, and documentation must also be considered. With modern

technology improvements in computer capabilities, CAD systems, and global networking coupled with a global economy, multi-sourcing, and reduced time to market requirements, companies of all sizes can no longer operate with older product management systems. Small and mid-size companies face the same business challenges as do large global companies, yet usually do not have, nor can they afford to have the IT (information technology) resources to implement a large scale, generic PLM system to manage their product data resources.

Until recently, implementing a product management system meant a costly, long-term project. Prospective buyers usually engaged in an elaborate rethinking of how they designed and delivered products, their existing data structures, and how to integrate multiple CAD, ERP and legacy data systems. Frequently, an external systems integration company was required to customize, train and install the product management system. The result was often a costly and time-consuming implementation, and one that might be difficult to change later.

This is where ENOVIA SmarTeam's Express solutions shine, offering out-of-the-box solutions for CAD data management (Design Express) and Item/BOM management and engineering change management (Engineering Express). The Engineering Express solution supports methodologies "from concept to manufacturing." The Express Solutions include the capabilities of document management related to changes, pre-defined workflow templates for item release, ECRs, ECOs, and more. Customers will reduce costs by the ability to better reuse existing designs, produce new designs faster by using top down engineering, and incorporate product revisions faster and more accurately.

With its pre-packaged offering, installation and follow-on growth, this PLM system does not require a large IT staff. It requires low IT investment in terms of time and resources, a primary contributor to its low total cost of ownership. It does this magic by using its years of experience and from installations at more than 6000 customers to build software that installs easily, offers pre-defined, yet flexible templates for managing business processes and simplifies the administration of the system.

Potential benefits of ENOVIA SmarTeam Engineering Express

ENOVIA SmarTeam Engineering Express, announced earlier this year is an out-of-the-box, scalable and multi-CAD PLM engineering solution, geared for mid-size companies. The solution offers mid-size companies a rapid user ramp-up and low total cost of ownership. It uses predefined best practices for working with bills of material starting with Engineering Bill of Materials (EBOMs) from concept and then progressing to Manufacturing Bill of Materials (MBOMs) for manufacturing phases of the product lifecycle. Managing these BOMs in a controlled manner with SmarTeam Engineering Express allows companies to achieve substantial benefits, such as better control of Engineering changes (ECs), better reuse of designs, and accelerated new product launches. Reducing and controlling ECs results in higher productivity and lower costs.

SmarTeam Engineering Express's item/BOM-centric approach allows better management of and faster development of the MBOM. It also resolves a thorny problem in MBOM development – how to synchronize the EBOM with the MBOM.

The item/BOM centric approach and tailorable workflow processes, support both mechanical and electronic CAD systems, enable improved accuracy, data consistency and configuration control resulting in effective and fast reuse of existing data.

SmarTeam Engineering Express is role-based, allowing simpler deployment. By roles, we mean typical functions performed. Some examples are Designer and Engineer. Designers manage designs in a multi-CAD, multi-data environment, while Engineers manage EBOM, MBOM, item lifecycle, engineering release and change processes.

ENOVIA SmarTeam Engineering Express can deploy in just a few weeks, thus achieving rapid ROI. Users working with resellers can accelerate their implementation success by working closely with resellers to train their personnel.

SmarTeam Engineering Express achieves its results using the following capabilities.

- Item and BOM management
- Product views management (Engineering BOM, Manufacturing BOM and more)
- Top down engineering, by starting with high level product definition
- Enhanced document management for importing and managing documents related to projects
- E-CAD data capture from EDA tools (electronic design automation)
- Pre-defined change management templates and release processes based on ENOVIA SmarTeam experiences with more than 6000 customers
- Standard components management
- Bi-directional ERP data exchange
- Extendibility based on customer needs
- Pre-configured solution with business process roles
- A natural growth path from SmarTeam Design Express, which provides Multi-CAD data management for CATIA, SolidWorks, AutoCAD, Inventor, Solid Edge and Pro/ENGINEER

All of the above is provided with a "Quick Start", out of the box packaging, which is implemented with a single install process, and bundles software together with key implementation services, allowing implementation in just weeks. The “Quick Start” includes an environment to create an on-the-fly, pre-configured, modular database, installation documents, training material, and a methodology guide learned from customer best practices.

The methodology behind the ENOVIA SmarTeam Engineering Express Solution

ENOVIA SmarTeam positions SmarTeam Engineering Express as deploying best practices in working with Engineering BOMs, starting from concept and continuing through development and eventual creation of the Manufacturing BOM (MBOM). The company envisions a scenario consisting of five main phases of the product lifecycle:

- Concept (Phase 1) focuses on customer requirements and product definition.
- Planning (Phase 2) focuses on feasibility and specifications. During this planning phase the major activities are analysis of existing products, keeping in mind the possibility of product reuse. Cost analyses are critical in this phase.
- Development (Phase 3) focuses on the engineering Implementation.
- Test and Validation (Phase 4) captures test results and encourages re-design as needed.
- Production Planning (Phase 5) supports the development of an MBOM, release to an ERP system, and maintenance of item related production drawings.

All these phases are executed in a formal environment using pre-defined, SmarTeam Engineering Express best practices workflow processes. The phases are depicted in the figure below.

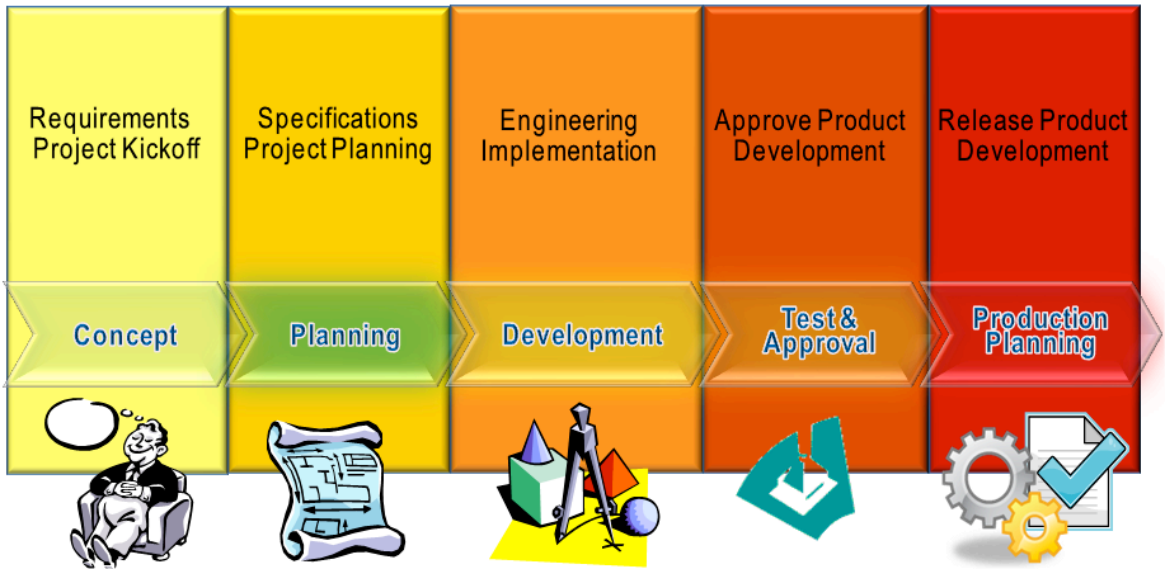

Figure 1: The five main phases of the product lifecycle

The concept phase

During the concept phase, the conceptual view of the project is established, a critical point in the project as it is essential for those who will be involved in the project later on. Products are usually not designed from scratch, but usually are based on company core competencies, market knowledge, and business opportunities. SmarTeam Engineering Express supports the concept phase with requirements management, project management, and its workflow design for reusing existing design data. Requirements management allows capturing all relevant documents surrounding the concept, including requirements, customer needs analysis, market research, and other related documentation.

SmarTeam Engineering Express also can help reduce costs and win more bids related to the customer bid process. The result can be a higher quality response to customer RFQs, with more competitive pricing, and demonstrating a better understanding of customer needs.

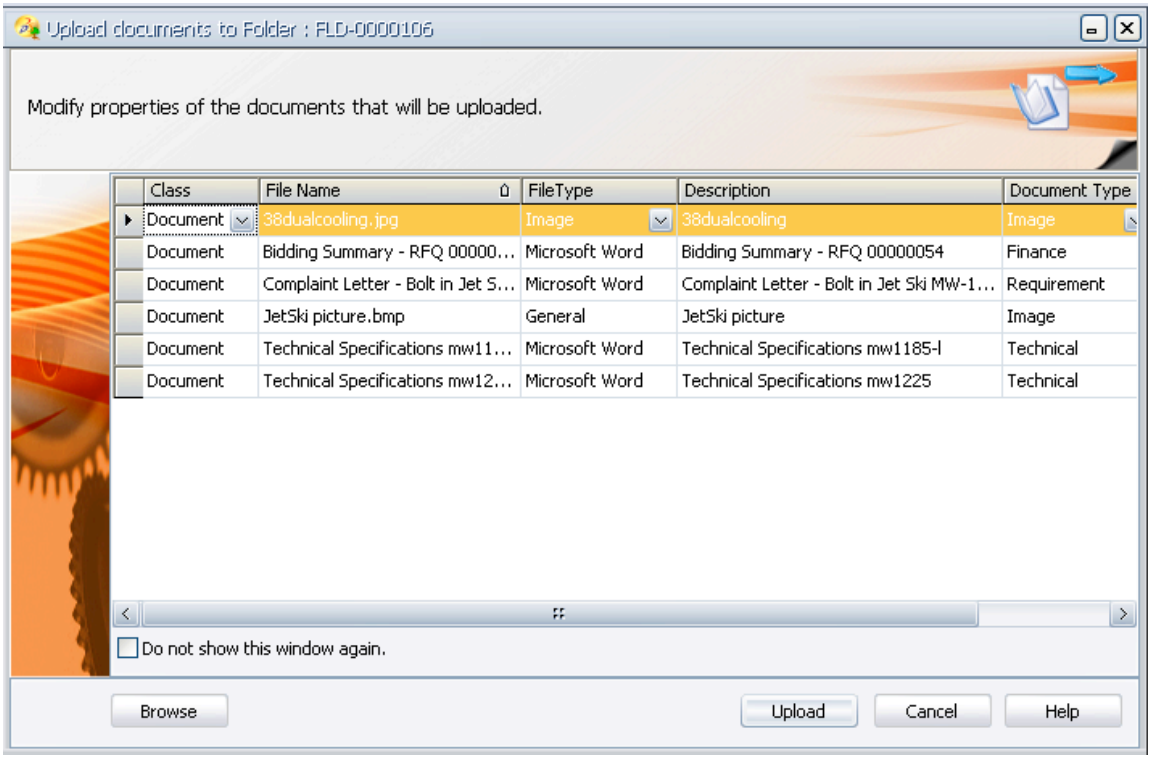

Figure 2: An example of document capture and relating to Item in SmarTeam Engineering Express

The Planning Phase

During the planning phase, the company makes decisions on how to deliver the product considering optimal costs, time to market, and how best to reuse existing product data. SmarTeam Engineering Express supports the planning phase with project and resource management, working with Statement of Work (SOW) documents describing the high level plans, and analyzing key product elements such as product costs and product weight. Some companies combine the planning phase together with the concept phase. Based on such information, the company can decide on making a Go/No Go decision for the project and can define the stages of such a project.

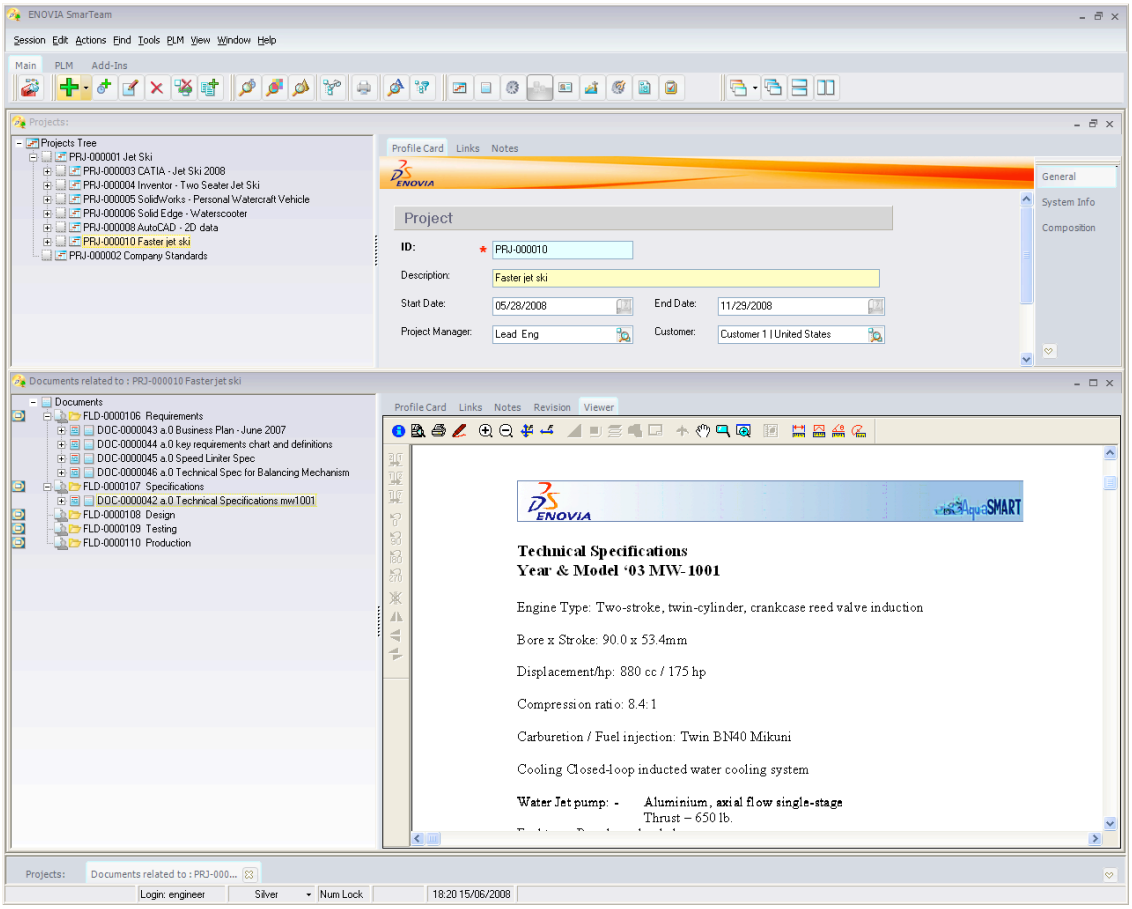

Figure 3: Project management in SmarTeam Engineering Express

The development phase

In the development phase, in which a substantial commitment of resources takes place, a company typically considers reuse by starting with an existing Bill of Materials as well as other existing design data. During the development phase the company must also enable concurrent engineering with multi-party network access to the data, collaboration with vendors and suppliers, configuration management, and Engineering Change (EC) management. The goal is for an EBOM to be created, managed and approved for production purposes. Initially, the EBOM starts with the top levels, the details of each level being further defined by the designers. Such an approach is called a "top down Engineering" approach, starting from the EBOM and eventually synchronizing the design of CAD data with non-CAD data that combine to make up the EBOM, thus connecting the Engineering and the design into a single EBOM structure.

Design data captured from the CAD systems are approved and managed as part of the approval process of the new product. The EBOM will usually include various items in addition to CAD data, such as externally sourced manufacturer items, software items describing the software required to operate the product, standard parts, electronic designs, and other related items. SmarTeam Engineering Express supplies the required tools to import, manage and approve these types of items, in order to help companies with their EBOM process.

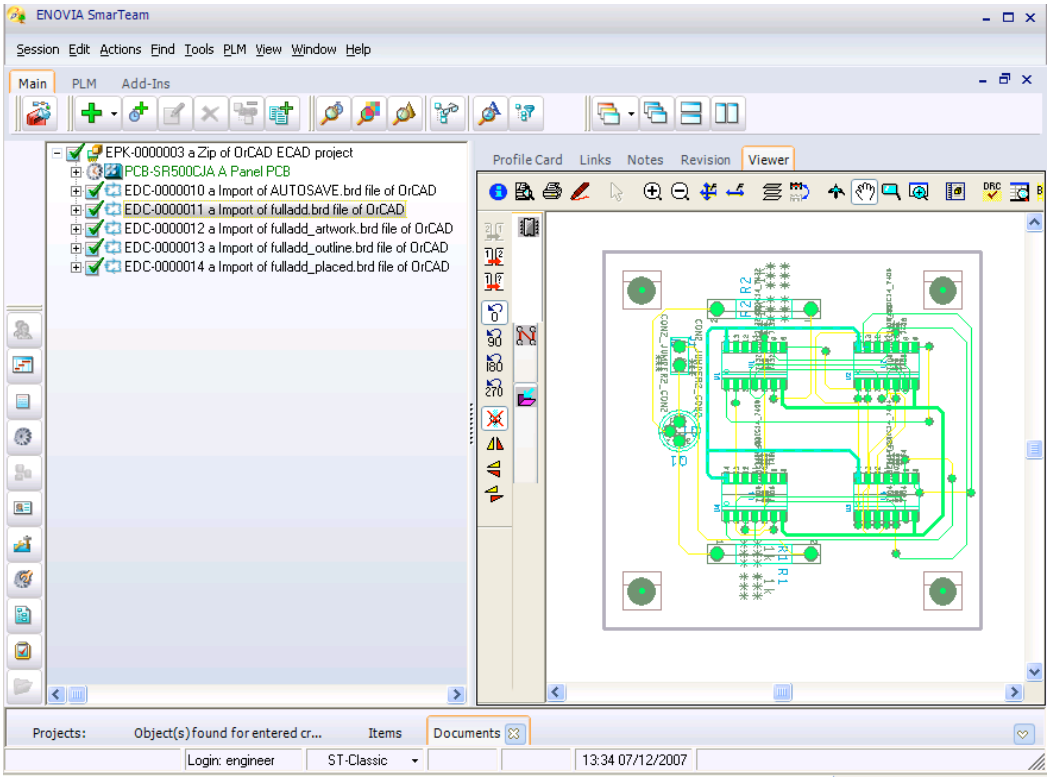

Figure 4: View of an imported ECAD project generated by the ECAD system, where PCB structure (BOM) and design files are captured into SmarTeam Engineering Express

Engineering changes are supported through Engineering Change Requests (ECR) and Engineering Change Orders (ECO). Some companies may combine the ECR as part of the ECO. Many companies today manage their EC process manually or through Excel/Word sheets. While this is often sufficient to track the status of ECs, SmarTeam Engineering Express adds enormous value and visibility with its predefined workflows for managing the ECR and the ECO processes. In addition, a Standard Item approval process enables companies to standardize these items and manage standard parts catalogs. These defined workflow processes should allow substantial improvement in the quality of products and also eliminate bottlenecks that may affect the delivery of the product.

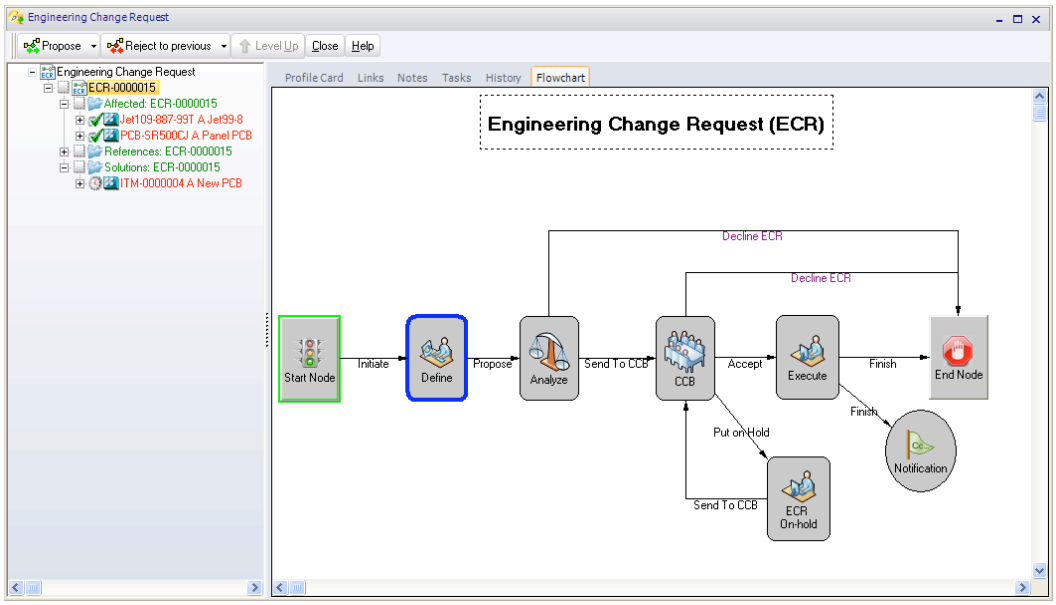

Figure 5: An example of an ECR process in SmarTeam Engineering Express used for requesting an engineering change. SmarTeam Engineering Express allows easy modification of its workflow processes during implementation.

The Testing and Approval phase

During the testing and approval phase, the EBOM is used to manufacture a prototype for testing purposes. Customer acceptance and on-site installation of the prototyped product might be required. SmarTeam Engineering Express helps companies capture their test results, and relate them to the products as part of the product approval prior to production. SmarTeam Engineering Express supplies easy software tools to upload such data and enable the company to store testing results as part of the product data. During the testing phase, changes to the product might be required. Such changes are fully supported using the predefined ECO templates.

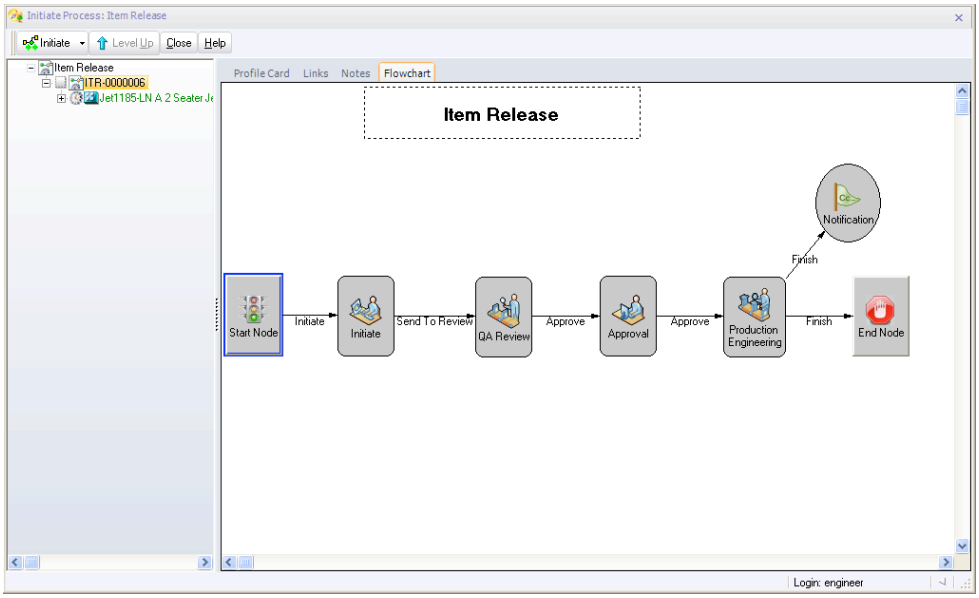

Figure 6: An example of an item release process in SmarTeam Engineering Express used for approving new items and releasing them to production

The Production Planning phase

In preparing for the production phase, the Manufacturing BOM (MBOM) is created as a base for the production planning and includes reference to production data such as production specs, production programs, etc. When the MBOM is released for production, data is readily transferred to an ERP system from SmarTeam, enabling the ERP system to start the production planning and purchasing processes.

In support of production, item related information, such as drawings, are approved and released for production purposes. By relating this production data to the MBOM, the company can best position itself for on-time product delivery, while reducing costs related to product changes required during the manufacturing process.

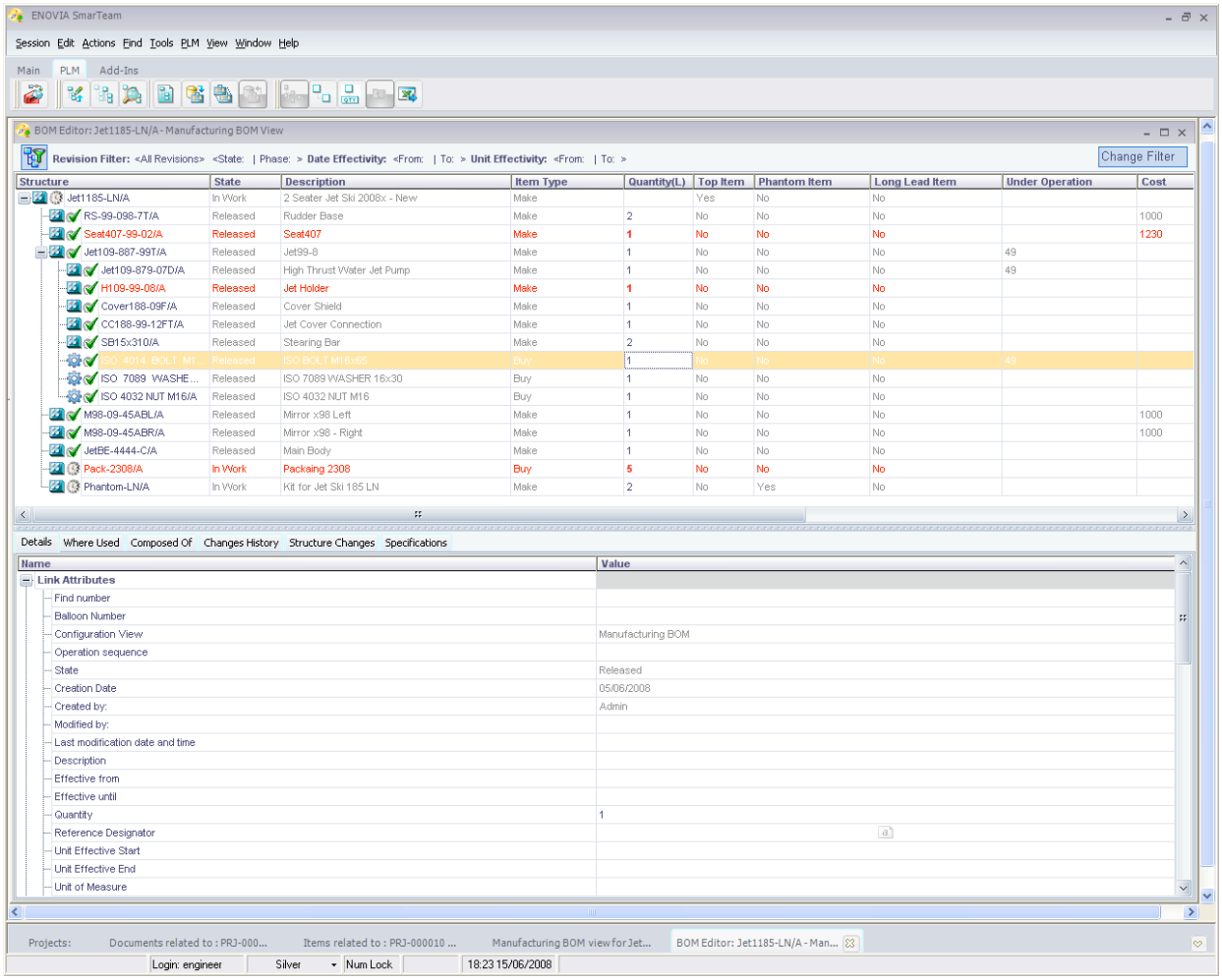

Figure 7: An example of a Manufacturing BOM. Users can easily manipulate the BOM and personalize the data view.

Conclusions

Taking a data management product to the step beyond design management is difficult. While design data includes the necessary parts and assemblies of the product, the design is often discipline dependent and not knowledgeable about the manufacturing processes required. Discipline dependent means that the designs from other than mechanical systems need to be incorporated into the final product. These typically include control systems and logic, electronics, and software. In my opinion, SmarTeam Engineering Express delivers on these needs with an economical, robust, quick-start scenario for item-centric PLM, including workflow processes, quickly extending collaborative benefits across engineering disciplines. It is part of a family offering from ENOVIA SmarTeam that includes Design Express, as well as the full SmarTeam offerings.

For the mid-size customer SmarTeam has a unique position in the industry. It supports multiCAD systems from the major vendors. SmarTeam Engineering Express was specifically designed for mid-size customers, is highly CAD centric, supports collaboration both inside and outside an enterprise, manages items and BOMs particularly well, uses pre-defined best practices workflows, requires easy administration, easily expands to more PLM capabilities, such as standard compliance, supply chain management, implementation for multi-site organizations and more, can be rapidly installed, and can easily interface to any ERP system, such as SAP, Oracle, and others. Its primary competitors, Teamcenter Express and Windchill, both began life as large scale PLM systems and both retain some of their large scale heritage, meaning they are more difficult to install and operate than SmarTeam, are more difficult to customize, do not support the same level of out-of-the-box offering, EBOM synchronization, MBOM synchronization and more.

Customers evidently are excited about the offerings. "ENOVIA SmarTeam has provided a system for managing, communicating, and integrating technical and business change. We have processed about 300% more changes with reduced effort, and reduced processing time on Make-to-Order products by 70%," said Jim Stewart, Engineering Systems Manager of Swagelok, a fluid system component manufacturer based in the United States.

Companies will find that they can, if they have the desire, adopt the necessary disciplines to properly install and manage such a system. Users today cannot afford to continue to use many of the antiquated engineering support systems that fail to deliver the engineering solutions that ENOVIA SmarTeam Engineering Express offers.

About this paper

This paper summarizes the most important new capabilities of ENOVIA SmarTeam Engineering Express and why they are important for prospective users. Dassault Systemes is a client of TechniCom's vendor program and provided indirect funding for this paper. Nevertheless, the impressions and conclusions are solely those of the author, an independent analyst and consultant in the MCAD industry.

About the author

Raymond Kurland is president of TechniCom Group LLC and its principal consultant and editor. His firm specializes in analyzing MCAD and PLM systems and has been involved in reviewing and comparing such software since 1987. Ray frequently consults with both vendors and users. He can be reached at rayk@technicom.com.

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