Managing a Product Called NIF –PLM Current State and Processes

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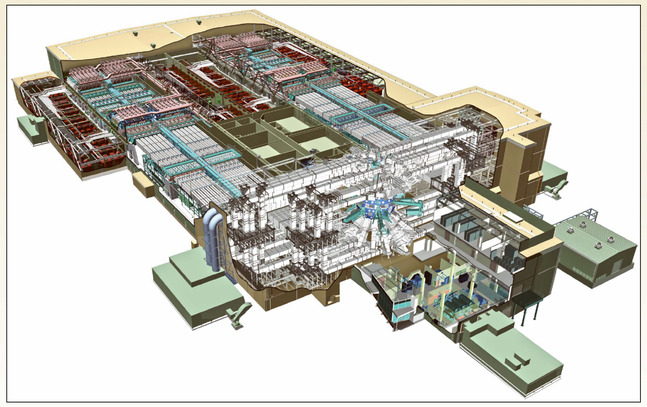
Product Lifecycle Management and Configuration Control

Product lifecycle management (PLM) is the process of managing the entire lifecycle of a product from its conception, through design and manufacture, to service and disposal. The National Ignition Facility (NIF) can be considered one massive product that is made up of millions of individual parts and components (or products). The ability to manage a product of this size consists of controlling the physical definition, status and configuration of the sum of all of these products. This is a monumental undertaking yet critical to the validity of the shot experiment data and the safe operation of the facility. NIF is meeting this challenge by utilizing an integrated approach to implement a suite of commercial and custom enterprise software solutions to address PLM and other facility management and configuration requirements. It has enabled the passing of needed elements of product data into downstream enterprise solutions while at the same time controlling change and minimizing data replication. Strategic benefits have been realized using this approach while validating the decision for an integrated approach where more than one solution may be required to address the entire product lifecycle management process.

A Massive Product

NIF is a massive product that is made up of millions of individual parts . Controlling the physical configuration of NIF is a significant challenge



Product Management Solutions

The strategy for meeting the PLM challenge involves deploying and integrating an enterprise application suite of solutions consisting of both Commercial-Off-The-Shelf (COTS) products and custom developed software.

Application	Purpose
Engineering Applications Computer Aided Design and Engineering	Design and model the mechanical and electrical structure of NIF
ECMS Enterprise Configuration Management System	Enables change and configuration control of NIF product data structure
Glovia Enterprise Resource Planning	Tracks location and status of all NIF component inventory
SMaRT System Maintenance & Reliability Tracking	Preventive and reactive maintenance work control
RAHMA Radiological and Hazardous Materials Applications	Manage radioactive isotope inventory and radiological and hazardous surveys

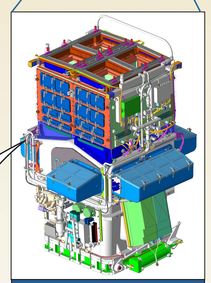
Software systems support the key tenets of good configuration control
- Capable of capturing and maintaining an accurate physical description of the system
- Promote a single source of data to reduce the need for replication
- Ability to track changes and their impact on surrounding systems
- Visibility into what parts are installed in a given location

Engineering Design Applications

NIF utilizes a suite of commercial Computer Aided Design (CAD), Analysis, and Data Management software applications for the three dimensional virtual definition of the facility. The implementation and utilization of this suite of applications has aided in making the physical NIF a reality.

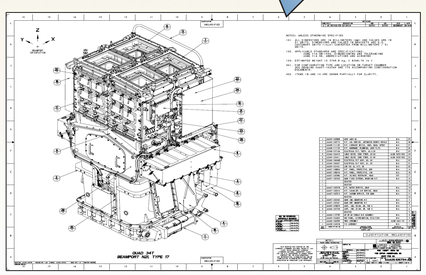
State of the art CAD tools enable engineers and designers to build a virtual model of the entire laser system.

NIF is among the largest of computer designed models of the modern era.



Final Optics Assembly

The detailed structure and individual components of the design are formally documented through the use of engineering drawings.

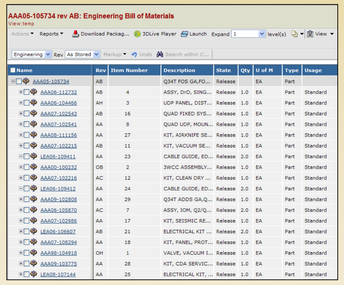


A collection of assembled products are defined through the bill of material (BOM)

The BOM defines the 'as designed' configuration of NIF and provides the data foundation of the build process

Enterprise Configuration Management

The Enterprise Configuration Management System (ECMS) enables product design information visibility across the enterprise and provides the primary change and configuration control capabilities.

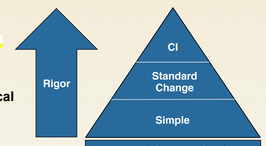


Individual product information and the BOM is passed electronically from the CAD data management system into ECMS

One to one bill of material match is electronically enforced to ensure accuracy

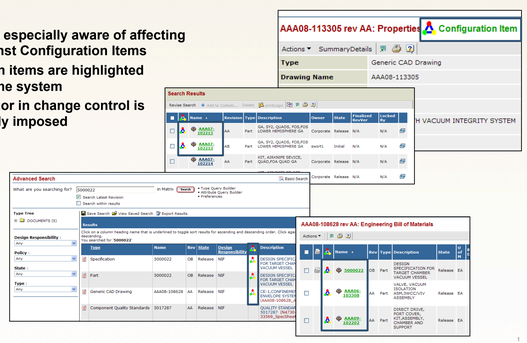
ECMS provides a graded level of rigor in change control

- Items are controlled because they are Configuration Items (Safety Significant)
- Items are controlled because they are needed to meet the functional and technical requirements of the NIF
- Items are controlled to track minor edits and changes



Relational architecture of ECMS helps provide a clear picture of the impact of change

Users must be especially aware of affecting a change against Configuration Items
- Configuration items are highlighted throughout the system
- Increased rigor in change control is systematically imposed

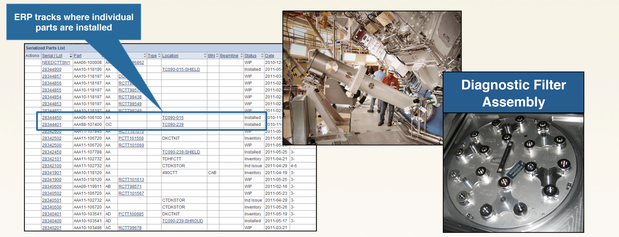


Enterprise Resource Planning

The NIF ERP system is a software application used to manage the assembly, installation, and maintenance of specialized laser and diagnostic equipment. It provides visibility into what parts are installed in a given location at a given time

Tracking begins with serialization
- Over 115,000 parts are assigned serial numbers upon inventory receipt
- Parts are serialized to enable location tracking
- Most serialized parts are bar coded allowing for rapid data acquisition

'Smart' locations pinpoint where parts are located
- Most smart locations are bar coded
- Enables rapid and accurate recording of system installations



Location and status of key optical, target and diagnostic components available to other applications. ERP is the central source for the physical definition of each experiment setup and critical to the accuracy of shot results

- Maintenance Planning
- Shot Planning
- Experiment Approval Manager
- Mobile Installation Tools
- Installation Views
- Laser Performance Models
- Optics Reports

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NIF