Metaphase® Helps Lockheed Martin Meet DOD Requirements for New Fighter Jet

The Goal

Achieve the key goal of the Department of Defense for the new Joint Strike Fighter (JSF)—affordability—by substantially reducing the cost and time required to develop and produce combat aircraft, while improving the quality of the end product.

The Challenge

Coordinate a multi-company, multi-continent effort to develop a new jet fighter concept. Provide highly secure, immediate access to product data via a LAN, WAN, and the web. Enable collaboration among more than 9,500 people. Manage engineering processes involving Lockheed Martin, two partners and four levels of suppliers.

The Metaphase Solution

Metaphase Aerospace & Defense Solution, a collaborative product knowledge management (PKM) system developed specifically for the aerospace and defense industry, helps Lockheed Martin meet the affordability requirement of the JSF program by:

◗ Enabling a virtual company environment with geographically dispersed teams.

◗ Providing data access to any team member (with proper authority) to all product definition data regardless of where it is maintained.

◗ Supporting the Integrated Product Team concept where different functional organizations coexist and develop product definition data together.

◗ Managing the control and release of all product definition data using "build to" or "buy to" packages.

◗ Automatically selecting the proper review and approval process depending on the contents of the package.

Metaphase®

Key Results

▶ Scalable Metaphase A&D Solution allows seamless collaboration among thousands of Metaphase users at various sites throughout the U.S. and Europe. The scalable nature of Metaphase A&D Solution enables Lockheed Martin to quickly provide product data access to more than 9,500 users distributed around the globe and across multiple companies.

▶ Pre-configured functionality in Metaphase A&D Solution enables fast creation of product structure, and automation of the engineering release process.

▶ Management of CATIA data within Metaphase has reduced access time for CAD data from days to minutes and increased information reuse compared to other programs.

▶ Integration of Metaphase with UGS/EAI's Vis family of digital mockup software speeds the time involved, and reduces the cost of design reviews by allowing them to take place virtually.

▶ Lockheed Martin's experience with Metaphase on the JSF program, combined with the pre-configured functionality in Metaphase A&D Solution, will permit rapid implementation of product knowledge management on subsequent efforts such as the new C-130 program.

Focus on Affordability

Lockheed Martin, in partnership with Northrop Grumman and BAE Systems, is in competition to build a new jet called JSF for the United States and Great Britain. The focus of the JSF program is to create an affordable aircraft, reducing the development, production, and ownership costs of the entire JSF family of aircraft. Specifically, Lockheed Martin aims to deploy software tools to reduce development and manufacturing cycle time and cost by 50%, and to reduce O&S (Operations and Support) costs by 50%. This initiative is creating a virtual development environment, which can model and simulate almost every aspect of a program, from design through fabrication and assembly, to in-service support.

With affordability as the underlying requirement of this new jet, Lockheed Martin is looking to software solutions for ways in which the expertise of the company, its partners and suppliers can be leveraged. Central to this effort is the ability to manage product data in order to eliminate redundant data creation, and promote the reuse of existing systems and components. Data management is a huge undertaking that involves CAD models, drawings, specifications, engineering requirements, change orders, and other items defining tens of thousands of components that will be melded into thousands of parts and hundreds of assemblies. Lockheed Martin not only needs to provide a secure repository with access control, it needs to enable fast access to the information by users across the U.S. and the U.K. Fast access permits the most effective use and reuse of data possible. Another area where Lockheed Martin is looking to technology to cut costs is in managing development processes such as design change and engineering release. Because this is a collaborative effort between Lockheed Martin, its partners and many suppliers, these processes involve many people at many different sites and with many different levels of security clearance. And because this is a government program, these processes must comply with explicitly defined requirements and standards.

Lockheed Martin chose Metaphase, the world's market-leading suite of PKM solutions, to address these needs. Specifically, the company is using Metaphase A&D Solution, a set of collaborative product knowledge management capabilities built on top of Metaphase and developed specifically for the aerospace and defense industry. Metaphase A&D Solution complies with established government standards for configuration management and change management. Its out-of-the-box functionality makes it possible to rapidly implement PKM capabilities into the JSF program.

"PKM has evolved from being a competitive advantage. It's now a flat-out requirement," says Mike Jones, multi-company PDM project lead for the JSF program. "In our industry, contracts are won by those who can deploy the fastest, and in the case of the JSF, for the best price. PKM plays a big role in doing that, as most companies now realize. By providing extra functionality needed by designers and consumers of product data, Metaphase A&D Solution is allowing us to step out in front of how other companies traditionally implement this technology."

Tuned for Aerospace and Defense

Metaphase A&D Solution applies the principles of configuration management to product design and development by providing standards-based configuration identification, configuration control, configuration status accounting, and configuration auditing. To support these objectives, Metaphase A&D Solution augments Metaphase's basic PKM features with special A&D-oriented capabilities for change management, scheduling, audit management, document management, and contract delivery requirement lists (CDRL)/subcontract delivery requirements list (SDRL) data management. In the area of engineering change management, for example, the software speeds the creation of an automated change management process through built-in compliance with MIL-STD-2594, MIL-STD-973, EIA/IS-649, and EIA/IS-836. In the area of document management, Metaphase A&D Solution enables Lockheed Martin to manage special-purpose documents that are frequently used within the A&D industry. Users can inject these documents into automated workflows and incorporate them into Metaphase-maintained product configurations. They can define structured documents (documents that reference a master document), including contracts, technical documents, specifications and manufacturing plans. Users can also create and manage non-structured documents, including packages of product definition data, program-related correspondence, implementation schedules for staged programs, and impact assessments. In addition to providing a great deal of preconfigured functionality, Metaphase A&D Solution includes a rapid implementation option that combines special software, services, and best practices to provide a fully functional system in 90 days.

Lockheed Martin has installed a distributed Metaphase environment that currently has users in Lockheed Martin sites in Palmdale, California; Ft. Worth, Texas; and Marietta, Georgia; as well as other users at multiple partner and supplier sites. The company and its partners, Northrop Grumman and BAE Systems, access information in the Metaphase vault using a dedicated, encrypted LAN or WAN. Eventually, Lockheed Martin will extend Metaphase access to tier three and tier four suppliers who will interact with the system via the web.

Metaphase has been integrated with Lockheed Martin's CAD system, CATIA, to provide access and control over all CAD data associated with the JSF program. Jones estimates that the improved information access provided by Metaphase boosts CAD model reuse compared to previous programs. The company has also integrated Metaphase with UGS/EAI's VisMockup and VisView web tools to permit virtual design reviews with team partners. Design teams use the integrated CATIA-VisMockup-Metaphase solution to digitally review even large assemblies consisting of components created by different companies. Metaphase tells VisMockup where to find the appropriate CATIA models and permits the display of the assembly at the different sites. Metaphase is also used to manage the product structure for the JSF program and to control the engineering release and bill-to-package processes.

Lockheed Martin has been so pleased with the Metaphase A&D Solution that it plans to use it on future programs as well. "We have been very pleased with our Metaphase implementation," says Pamala Stanfield, manager of enterprise data management for Lockheed Martin. "We plan to use Metaphase on future programs such as some new C-130 programs that are coming up."

About Lockheed Martin

Lockheed Martin is a customer focused, global enterprise principally engaged in the research, design, development, manufacture and integration of advanced technology systems, products, and services for government and commercial customers. The corporation's core business areas are systems integration, aeronautics, space, technology services and global telecommunications. Lockheed Martin had 1999 sales surpassing $25 billion and employs approximately 140,000 people. Lockheed Martin Aeronautics Company produces the world's most advanced and successful fighter aircraft, including the F-22, F-117 and F-16.

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