Interoperability Solutions for Manufacturing
The OMG Manufacturing Domain Task Force

Business Environment

Throughout the world, and across every industry, information technology has had a tremendous influence on every organization’s ability to stay competitive. The Manufacturing Industry is a prime example. The electronic interchange of manufacturing information within manufacturing enterprises, supply-chain networks and partners often provides the ability to get products to market before competitors. One of the biggest expenses and obstacles to the effective exploitation of information technology is interoperability among these systems.

The Problem

Many manufacturers realize that building custom software to support operations requires a level of competency on par with that required to manufacture any hardware product. As a result, manufacturers have decided to outsource software development and systems integration rather than establish a core competency in software development. However, integration through custom-coded interfaces is costly. It’s Expensive to Build, Expensive to Maintain and it Reduces Agility. Much of the value of off-the-shelf software is lost through Custom Interface Integration. Future value in E-Commerce, supply-chain management, as well as distributed product development and operations will involve systems communication across businesses. The technology must provide seamless interoperability over disparate hardware and software, regardless of its location. The solution to the lack of interoperability is enterprise-wide application integration via distributed object technology. The organization that is making distributed object computing a reality is The Object Management Group™ (OMG).

The OMG responds to industry priorities for interoperability solutions by helping to define technically sound, neutral integration standards in cooperation with industrial partners. Developing viable information technology standards for manufacturing is particularly challenging given the rapid pace of change in technology. Standards must be developed with an eye toward future extensibility. Technical work within the OMG Manufacturing Domain Task Force relies heavily on partnerships with manufacturing end users, software suppliers, industry associations, and other standards organizations to achieve interoperability standards.

The Solution: CORBA®

The Common Object Request Broker Architecture (CORBA) is an open, vendor-neutral, software standard that allows the proliferating number of hardware and software applications to communicate with one another no matter what language they are written in or where they are located on a network. CORBA is not merely a manufacturing-specific standard. It is a complete, distributed object computing framework that extends applications across networks, languages, component boundaries and operating systems. CORBA was designed with the enterprise in mind and can be used in all aspects of a business. Distributed object computing systems based on CORBA are scalable to thousands of clients and servers across all computing platforms.

CORBA provides the foundation for hundreds of mission-critical applications in dozens of industries from banking to manufacturing, retail to utilities, transportation to healthcare. CORBA-based products are offered by dozens of vendors including IBM, Oracle, Netscape, Sun, Hitachi, Hewlett-Packard, Fujitsu, SAP, Silicon Graphics, and Computer Associates. With such significant deployments and constantly growing array of available products, CORBA is “The Middleware that’s Everywhere.”

The Object Management Group is dedicated to the creation and implementation of distributed computing specifications. The OMG accomplishes this by bringing together IS vendors and users who come to agreement...
The OMG Manufacturing Task Force

The OMG’s Manufacturing Domain Task Force (MfgDTF) is dedicated to bringing distributed computing solutions to manufacturing industries. The scope of manufacturing in the MfgDTF includes:

- Automotive
- Aerospace
- Petrochemical
- Pharmaceutical
- Semiconductor

Suppliers and Manufacturers in this market have a significant need for the interoperability and portability benefits provided by current and future OMG standards. The MfgDTF is in the process of defining standard interfaces for the many facets of a manufacturing process, including:

- Computer-Aided Design (CAD)
- Computer-Aided Manufacturing (CAM)
- Computer-Aided Engineering (CAE)
- Finite Element Modeling (FEM)
- Product Modeling & Simulation
- Process Modeling & Simulation
- Product Data Management (PDM)
- Product/Part Classification & Catalogs
- Enterprise Resource Planning (ERP)
- Plant Design & Engineering
- Process Engineering
- Manufacturing Execution Systems (MES)
- Machine Control (MC)

Help Drive the Technology

You are invited to join the OMG’s Manufacturing Domain Task Force in their mission to bring true interoperability to the Manufacturing Industry. You and your organization can effect changes that will increase your ability to stay competitive in an increasingly complex market. The OMG Manufacturing Domain Task Force meets in conjunction with regularly scheduled OMG Technical Committee meetings (five times a year around the world), where OMG members carry out the steps in our specification adoption process in an open and productive forum. OMG members also work between meetings through email, conference calls, and through reviews of work in process.

Ken Blakely, senior vice president and general manager at MSC.Software Corporation said, “In representing the National Center of Manufacturing Sciences in the OMG, we found a unique and valuable collaborative environment. In the OMG Manufacturing Domain Task Force, vendors and customers work side-by-side to enable the development of practical solutions to real-world problems based on standardized object component technology. The OMG’s accommodation of existing, usable technology enables us to provide our existing products in the integrated component environments that our customer is seeking. The OMG Architecture also provides a framework for offering our new generations of distributed, web-enabled products.”

For more information on OMG, see www.omg.org, or call +1-508-820 4300. To find out more about the Manufacturing Domain Task Force, its activities and its successes, see http://www.omg.org/homepages/mfg.

The mission of the OMG Manufacturing Domain Task Force is to:

- Recommend technology for adoption that enables the interoperability and modularity of CORBA-based manufacturing domain software components;
- Encourage the development and use of CORBA-based manufacturing domain software components, thereby facilitating the integration of all facets of the manufacturing process;
- Provide an internationally recognized forum for industry on information processing and business requirements that are unique to manufacturing;
- Identify relevant business architectures, research and technologies in the area of manufacturing systems;
- Assist and advise the Liaison Sub-Committee regarding its relationship with related manufacturing industry specific standards organizations and consortia;
- Promote the use of Manufacturing Systems, Applications and specifications that utilize OMG standards;
- Provide an internationally recognized industry forum to focus on the information processing and business requirements that are unique to manufacturing;
- Identify relevant standards, business architectures, research and technologies in this area of computing;
- Coordinate potential future specification activities with other industry specific Task Forces and Special Interest Groups;
- Issue RFIs, RFPs and RFCs for OMG technology relevant to the Manufacturing Industry;
- Evaluate RFI and RFP responses and recommend technology adoption by the OMG’s Domain Technical Committee.
CORBA In Manufacturing—A Case Study

Boeing Commercial Airplanes Group is the world’s largest producer of commercial jetliners. Commercial Airplanes employs more than 90,000 people and has about 350 customers, including airlines, leasing companies, governments and private firms. In 1994, Commercial Airplanes began overhauling the way the company builds airplanes. The goal is to reduce the time between initial negotiations with customers and the delivery of a finished airplane.

Define and Control Airplane Configuration/Manufacturing Resource Management (DCAC/MRM) is a “breakthrough” initiative that improves the processes Commercial Airlines uses to configure and produce airplanes, and is a significant opportunity to further reduce costs, cycle time and defects. DCAC/MRM has four main activities:

- Create a simplified business system for handling the flow of parts data by grouping the parts in modules (a collection of parts, plans and tools).
- Simplify the configuration management process within Commercial Airplanes.
- Develop a Single Source of Product Data (SSPD) for each airplane.
- Take advantage of the tailored business streams to track and order parts, schedule production and manage inventory.

Using DCAC/MRM, each piece of data within Commercial Airplanes is owned, managed and updated in one place, the SSPD. Under the old airplane configuration methods, airplanes were associated with parts; using DCAC/MRM, parts are now associated with airplanes. This is made possible by eliminating the traditional parts-based drawing storage system. Storing part details within the SSPD allows Commercial Airplanes to keep track of parts while maintaining details of individual airplane designs.

Using distributed computing technology, DCAC/MRM allows the Boeing business practices to evolve in a constantly changing environment. The System Integration project is chartered with producing the architecture, designing and building the integration framework that allows commercial off-the-shelf application packages and existing Boeing production systems to interact under the guidelines of CORBA standards.

Boeing decided to integrate its chosen software packages with CORBA, allowing the project to make rapid initial steps by avoiding extensive application-level revamping. As a result, Boeing was able to establish communication between its various applications in a de-coupled manner while allowing the applications to remain autonomous. “We are pleased with our CORBA-based framework. It offers us the ability to satisfy our increasing business demands by utilizing the growing availability of CORBA-based products,” said Van Cleland DCAC/MRM System Integration Program Manager.

This new architecture will help reduce customer order lead time from 24 months to only six months. Additionally, the cohesive nature of the solution means fewer errors and a more flexible development environment. Boeing can provide airplane components just in time for installation and create a single bill of material, rather than multiple bills of material, for each airplane. This reduces inventory buildup and decreases the impact of the shortages that cause production slowdowns.