Manufacturing Industries Move toward Engineering Collaboration

CIMdata Commentary

The widespread movement toward engineering collaboration represents a major trend for companies wanting to improve teamwork among people in different locations. A variety of technologies to support collaboration are now commercially available including synchronous meeting solutions, co-modeling systems, visualization software, digital mockup, and many others.

For the most part, these tools use Web technology and the Internet to allow people in different facilities across town or around the world to interact, resolve problems, reach consensus, and otherwise work together online. Using these technologies is much quicker and more effective than telephone, fax, or mail delivery. They are much more economical and efficient than getting everyone together for face-to-face meetings. Collaboration technology is especially useful in integrated product development where designers in different facilities must work on the same project.

Impressive Time Savings

Collaborative tools have been used to resolve problems in a few minutes that otherwise would have required days of time in travel (or may have gone unresolved) because of difficulties in conveying ideas through telephone conversation and sending documents and data back and forth. Good examples of time savings can be found among users of synchronous visual-collaboration meeting tools that enable people in different locations to view the same CAD model on their desktops, discuss it interactively online through pointers and annotations, and resolve issues in real time. With these tools, all users see and work with the same information at the same time as if they were in one room looking at one computer.

One manufacturer related their experience in a design project where two weeks of traditional communication between their US facility and the company's design center in Europe had not produced a solution to a design problem. A synchronous collaboration meeting tool was implemented and a solution was reached in two 30-minute sessions.

Why Boardrooms Are Interested

As impressive as such time savings are however, the most far-reaching impact of collaboration technology is not that companies can speed up current methods of operation, but rather change the way they operate. Specifically, Web-based collaborative tools are facilitating major shifts in organizations, workflow, geographic distribution, and relationships among companies.

There is a major trend today toward business decentralization, and collaboration technologies are an important component to achieving those changes as operations are outsourced through supply chains, new strategic partnerships are formed in extended enterprises, and facilities are dispersed around the world. Because of the sweeping changes that decentralization brings to a corporation, collaborative technologies are capturing the interest of C-level executive chiefs, the CEOs, CIOs, CFOs, and COOs.

Collaboration supports decentralization of engineering and manufacturing operations by providing a framework for distributed working across the extended enterprise, supporting processes that integrate tools and product information, providing methods to help users visualize and access information, supporting data consistency and integrity in a shared environment, and allowing geographically distributed product development.

Decentralization Spawns Major Shifts in Business Operations

The globalization of companies, a proliferation of extended enterprise strategic relationships, and increased use of supply chains primarily drive decentralization. This represents a dramatic departure from the way manufacturers have operated in the past (with everyone working in close proximity under one roof), and relies heavily on collaboration among people working in dispersed locations. In this environment, the new collaborative technologies can facilitate personal interactions. Collaborative tools are an effective mechanism for resolving product development issues in companies with globally-dispersed employees, products, services, and partners, alleviating excessive delays in the communications that are the lifeblood of such distributed operations.

Not only are companies decentralizing their own internal operations, they are also outsourcing through supply chains and extended enterprises that include subcontractors as well as OEMs, consultants, partners, vendors, and customers. In order for companies to embrace the true potential of the distributed supply chain, they need collaborative tools to manage data and processes and serve as an informational bridge to connect these different groups. Collaborative tools are especially useful in unambiguously exchanging and discussing designs that often are developed on different CAD systems.

Led by initiatives throughout the automotive and electronics industries, companies in a growing number of markets are outsourcing not just parts manufacturing but also growing levels of design responsibility. Subcontractors that never thought much about design now find themselves concerned with configuring geometry, selecting materials, analyzing stresses, evaluating reliability, and other aspects of product development. Virtual product development teams are thus distributed through multiple companies, so communication and coordination of activities are critical, and the ability to collaborate becomes essential.

Collaboration in Product Lifecycle Management

The effective use of collaborative technologies always involves integration with other solutions. Since many of the newer engineering-focused collaborative tools are used principally in discussing design and part geometry, visualization of CAD data is an important element in their application. Integration with product data management (PDM) technologies is critical as well, because the design data is typically managed through these tools.

CIMdata considers this blending of technologies and methods to be an integral part of Product Lifecycle Management (PLM) initiatives; solutions that facilitate collaborative work processes, supplier integration, enterprise application integration, and a host of other approaches addressing the needs of the extended enterprise.

Collaboration is a key element in PLM where product definition is regarded as a valuable intellectual asset that extends throughout the entire lifecycle of the product (from concept through obsolescence). It is critical to manage the product definition lifecycle effectively. Through PLM approaches, product definition is closely integrated with production and operations support, and there is a continuous interaction throughout the product lifecycle to provide effective information to people in all roles right through the extended enterprise.

The implementation of collaboration tools within PLM benefits companies on many different levels. Individual users are provided consistent access to the full product definition, a powerful search facility, access to corporate knowledge, and links to other people throughout the extended enterprise. Organizational efficiency and effectiveness are improved by facilitating corporate communications and collaborative teamwork. Some of the primary benefits of collaboration appear in the following areas.

Change Management and Design Review: When product development is distributed across a number of sites, resolving changes can be problematic. Individual parts developed by different designers may not fit together or function properly in the overall assembly, for example. Adopting a collaborative design review and change management process result in significant benefits by clarifying communication, identifying clashes and interferences, visualizing alternatives, and otherwise streamlining the change approval process.

Sales and Bidding: Collaboration tools provide Internet-enabled applications that allow customers to locate and explore the products in which they are interested. In the bidding process, opportunities exist for sales, engineering, purchasing, and manufacturing to engage in collaborative sessions where product options, alternatives, and concepts are reviewed by all disciplines at the same time. This is faster, more efficient, and can produce more accurate and cost-effective bids.

Maintenance and Support: Collaborative tools are beginning to be used in maintenance and support activities in a number of different industrial sectors. Animation and simulation can demonstrate how products are operated and maintained. Web-based product support and maintenance systems provide engineers, operators, and maintenance staff with up-to-date information online, even from remote sites. Shared product data can be exchanged in real-time between maintenance engineers and the support office, with guidance and suggestions explored interactively in shared collaboration sessions.

Manufacturing Planning: Manufacturing personnel in separate facilities can use collaboration to help improve their production processes, plant designs, and tooling, as well as to allow earlier impact on product designs. They can use collaborative, online meetings to review designs and change orders with the design team, interface early with tooling designers, verify tooling assembly and operation, review manufacturing process plans and factory layouts, discuss manufacturing problems with suppliers, and coordinate tooling among dispersed sites.

As illustrated above, PLM benefits groups and departments throughout the organization and enhances the business performance of the enterprise by supporting initiatives such as supply chain management, concurrent engineering, integrated product development, design collaboration, and globalization: initiatives that can make or break a company. Because it enables businesses to bring innovative and profitable products to market effectively, PLM and the collaborative capabilities it provides have become a requirement for effective operation.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic consulting to maximize an enterprise's ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through international conferences. Visit http://www.CIMdata.com for more information.