Chapter XVI
From CAD/CAPP/CAM/ CNC to PDM, PLM and Beyond

ABSTRACT

Companies that have been practicing CAD, CAPP, CAM, and CNC integration have now realized that there is a need to operate in a much broader scope with wider boundaries and more functionality. To foster innovation in a product development lifecycle, change in the early stage is good, and, in fact, should be encouraged. The more iteration a product design can experience at this stage when change is inexpensive, the lower cost our final product will become. At a later stage when hardware set-up is committed against a design, change becomes expensive and should be discouraged. Therefore, there is a need for an effective way of managing product-related information as well as the product development action flow, which captures actions that need to be done, have been done, and what other parts are affected. Engineers that subscribe to a portion of a design also need to be working with other collaborators and then automatically be notified when changes occur. This leads to increased implementation of Product Data Management (PDM) and Product Lifecycle Management (PLM).

PDM systems are used to control information, files, documents, and work processes required to design, build, support, distribute, and maintain products. Using PDM, people can contribute at the early stages of product design and development. In addition, PDM can be seen as an integration tool connecting many different areas, which ensures that the right information is available to the right person at the right time and in the right form throughout the enterprise. In this way, PDM improves communication and cooperation be-

tween diverse groups in an organization, and between organizations and clients (Peltonen, Pitkanen & Sulonen, 1996, Liu & Xu, 2001). PDM is strongly rooted in the world of CAD, CAPP, CAM, and CNC in a more specific sense as well as in the world of engineering and design in a more general sense.

In recent years, more focus has also been on the improvement of the entire product lifecycles. The major concern here is time-to-market, as it reflects the competitiveness of a company. In response to the new area of focus, new generation PDM systems are developed to support the entire product lifecycle; from the initial concept to the finishing product. This has subsequently led to the birth to PLM systems. From the information context, PLM should cater for the management of the information throughout the lifecycle of a product, including multiple domain views, different business processes scattered across enterprises and different representations of a multitude of native product-, resource- and process-models (Stark, 2004, Rosén, 2006).

This chapter starts with introduction to and discussions about product data management systems. Topics covered include PDM's capabilities, its benefits, Web-based PDM and PDM standardization. The concept of integrated and extended PDM is also introduced. This is followed by discussions on product lifecycle management, for example definitions of PLM, its solution model, benefits, and implementation are among the topics covered. Like PDM, issues regarding PLM standardisation are also addressed. Share-A-space™ is a practical case of PLM. The core features and its architecture are discussed. Toward the end, the concept and some of the techniques of "grand" integration are introduced.

PDM'S CAPABILITIES

In terms of capabilities, five basic user functions should be supported by a PDM system,

- Data vault and document management, which provides for storage and retrieval of product information;
- Workflow and process management, which controls procedures for handling product data and provides a mechanism to drive a business with information;
- Product structure management, which handles bills of material, product configurations, associated versions and design variations;
- Parts management, which provides information on standard components and facilitates re-use of designs; and
- Program management, which provides work breakdown structures and allows coordination between processes, resource scheduling and project tracking.

There are some other utility functions that can enhance a PDM system. Communication capabilities such as links to e-mail provide for information transfer and event notification. Data transport functions track data locations and move data from one location or application to another. Data translation capability exchanges files in a proper format. Image services handle storage, access and viewing of product information. Administration functions control and monitor system operation and security.

The PDM user can search company's data or information through his or her desktop computer. The actual searching and finding process are handled by the server, using the meta-database search engine. The files are stored in the managed files or data vault. The