

Managing Change Across Virtual Design and Manufacturing



Before the advent of concurrent engineering, it was common for engineers to "throw designs over the wall" between disciplines and departments, with a final toss to production planners who often determined the products couldn't be made. Either the designs were sent back for rework or the production issues were reconciled through trial-and-error testing on physical prototypes, wasting time and money.

Over the last decade, technological advances have driven an avalanche of change, opening geographically diverse markets to each other and to the world, and heating competition to the boiling point. To keep pace, most large development organizations have implemented digital design, analysis, and manufactur-

of a successful PLM strategy, this unified framework should enable on-demand design change impact analysis of production processes and resources to ensure manufacturability and market success.

In strong contrast to file-based PDM systems, this approach organizes and links product, process, and resource (PPR) information, including the relationships between the PPR objects and their specific configurations. Why PPR? Simply put, PPR comprises the three functional and material areas impacted by any change to product definition. The relationships among the three must be maintained in real time across disciplines, data sources, and suppliers to provide decision support for concurrent lifecycle processes and "guided exploration" of design alternatives.

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ing solutions to streamline processes and reduce the need for physical prototypes. While the return on investment can be significant, digital development can dramatically increase the volume and complexity of changes—each requiring routing and reconciliation. Instead of paper-based data, designs and plans are digitally "thrown over the wall" from one application to another. As a result, designers and planners still don't have visibility into how design changes could impact downstream processes and resources, and vice versa.

What is needed is a common data model or framework linking digital design and production requirements from concept through retirement. As a critical enabler

The logic behind these relationships is simple yet powerful in its reach. Each part is linked with at least one manufacturing process and one resource. Any of the relationships between the PPR objects can be exploited at any time, enabling rapid change in response to business drivers. Since such relationships are explicitly defined and managed within the database, one can clearly see the impact of changes from one class of objects to any other. Having this PPR knowledge early on is essential to avoiding time and cost overruns during planning and production. Without it, designers may make a "simple" change that could derail a production schedule halfway around the globe.

Having a unified PPR data model as the foundation of integrated development of the virtual product and the virtual factory facilitates intense collaboration between design and manufacturing planning, letting them evaluate designs and make changes in the virtual phase when the cost of change is low. This results in optimized designs that mature rapidly with faster production ramp-up and overall time-to-value cycles.

These rich relationships between PPR objects also provide a robust and consistent way to control and reconcile changes from manufacturing planning and consumption, all the way to the shop floor. This might involve traditional EBOM-

MBOM comparisons, BOM-process plan consumption analysis, interrogations of the data authored in both engineering and manufacturing domains, as well as reconciling information that feeds or comes in from other enterprise application systems such as ERP. It allows changes to be executed efficiently and accurately without disrupting daily operations until the product reaches retirement or obsolescence.

The ability to respond to change quickly and strategically is critical to survival in the 21st century marketplace. To create a global business model that is responsive to customers and competitive threats, manufacturers must "build in"

operational agility. Failing to track and manage change can forever bury key processes and real production costs deep inside a maze of application silos. Change management based on the relationship-driven PPR data model unifies people and processes far beyond traditional design and production planning, providing the path to a truly "live" product and factory development environment where constant change offers opportunity, not chaos. ■

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