Case Story: Digital Process Design

Fresh Ideas Growing

Delphi Technologies, Inc.

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Gaining the Upper Hand in Design for Manufacturing

More than anything, it was the time savings that Kevin Marseilles, senior process designer, noticed first. The CAD files from the product groups were so different — they were unbelievably easy to reuse and modify. Delphi's Horizontal Modeling™ (HM) and Digital Process Design™ (DPD) methodologies were making his work at Saginaw Steering Systems Division go a whole lot more smoothly.

It Doesn't Have to Stop at Design

Manufacturing process designers, like Marseilles, use 3D parametric solid models developed by one of the division's product groups to create "process models." Process models, when printed as "process drawings," show what needs to happen on the shop floor, step by step, when machining or assembling a part.

Before the late 1990s, the product designers gave Marseilles feature-based 3D solid models to create his process models and process sheets. He would take their models and spend many hours breaking them up into different manufacturing steps. Then, he'd manually put each of these steps into process drawings.

According to Marseilles, "The problem was, the models supplied by the product groups were difficult to break into individual processes. The models literally had to be tossed aside and recreated."

One CAD software vendor offered a fix to this waste. But with their method, Marseilles still had to manually break down the original 3D model, this time into many smaller 3D models, making his job even more complicated. A process with 10 operations could require 40 or more solid models. So when Marseilles needed to make a change, he'd have to change every model — a nightmare of updates and rework.

Delphi Methods Take Just 1/4 the Time

When the product groups started using the new Delphi methods, the difference was tremendous.

HM is a new methodology, designed and patented by Delphi, for creating, detailing, and editing 3D CAD data. DPD is a new method for using HM data to automatically generate and update process models and sheets. These new strategies have made Marseilles' job a whole lot easier and his entire organization more productive.

Now, when he gets a 3D model created with HM, Marseilles no longer needs to recreate anything. And using the DPD method, he usually just adds a few process steps of his own, but that's it. He estimates he's putting out process sheets in 1/4 the time he used to.

Product Design Activity CAD Operator Functions		Productivity Improvement Using HM & DPD ~15 Process Designers
(% of total time spent)		(% of total time spent)
Create Models	20% →	50% Reduction
Detail Drawings	30%	—
Edit Models	50% →	90% Reduction

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Shorter Product Cycle, from Start of Design to Assembly

All features of the original 3D solid model, all drawing information, and all related process sheets, are contained within a single Master Process Model.

According to Dr. Nady Boules, Director of Delphi's Dynamics Innovation Center, "This has significantly reduced the cost of product and process design. Greater integration between design and manufacturing has resulted in a much shorter design-to-manufacture cycle, which yields a faster time to market for our products."

Easy Changes, Easy Improvements

When a designer makes a change in a Master Process Model, all process models and process sheets are automatically updated. There's no need to change multiple files. This saves a huge amount of time.

"Product designs are constantly evolving, so you never want to create something that you can't change. With HM and DPD, designs can be manipulated easily," says Marseilles. "During the assembly process, I can instantly edit the Master Process Model — move features around, up and down, or reorder them between operations — without affecting the model's quality, integrity, or usefulness."

Now, There's No Other Way

Over the last decade, Marseilles has seen HM and DPD evolve. As the benefits became more clear, he became a supporter and helped push the methods through Saginaw and its supply chain. Currently, HM and DPD are in production use at 14 Delphi and partner sites worldwide. "Now, our design and manufacturing processes are built on these techniques," says Marseilles. "It's efficient, and it's cost effective. It gets designs and process sheets into people's hands fast, and lets them easily make changes and improvements. We can truly innovate. I couldn't do it any other way."

For More Information

Delphi Technologies, Inc., a subsidiary of Delphi Corporation (NYSE:DPH), is sharing Delphi's CAD/CAM methodologies with other manufacturers through licensing and training arrangements. For more information, please visit www.delphi.com/dti or contact Jeffrey Solash using the information below:

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Digital Process Design Offers Significant Benefits

- 100% reusable CAD files from design to manufacturing
- 90% reduction in time to create and edit manufacturing process sheets
- 75% reduction in total project time