

# Case Story: Horizontal Modeling

*Fresh Ideas Growing*

Delphi Technologies, Inc.

Driving Tomorrow's Technology  
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## Driving Down Design Costs

For decades, Delphi's Saginaw Steering Systems Division has been widely recognized as one of the world's most modernized, well-equipped, and efficient manufacturer of steering technology. Automotive customers — General Motors, Ford, Toyota, and a host of others — all appreciated the group's technology leadership and responsiveness.

But Ron Andrews, a senior product designer, wanted more. He saw inefficiency in the way they used their CAD software for designing steering system parts. The software let Andrews create precise 3D models of a part, but making changes to these models — such as reordering, removing, or adding features — was far too time-consuming.

"In the past," says Andrews, "our design group might be designing a plastic reservoir for a power steering pump and had to remove a flange. Making this simple change took a full day's work. We had to move backwards through the model, menu by menu, feature by feature. That's because features were built on other features, so changing one affected others. To make matters worse, we often destroyed half or most of the model in the process."

So Ron and his colleagues took on a new challenge: finding a better way to design parts so that they could be more easily modified.

The team succeeded in inventing a radically different CAD modeling approach — a simple, elegant, new methodology called Horizontal Modeling™ (HM).

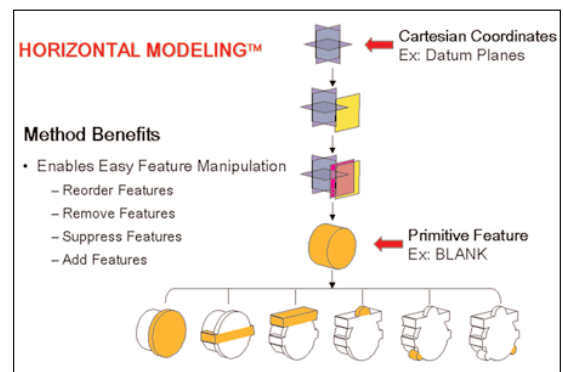
Now, HM is proven, it's patented, and it has dramatically reduced the time and cost of designing products.

## A New Vehicle for Design

Before HM, Delphi used the traditional method of feature-based modeling to create a part. Features were built on top of one another, in a vertical hierarchy. So one feature — such as a hole — was associated with another feature, creating many "parent/child" relationships between the features.

The problem was that, because of these parent/child dependencies, simple changes to any or all of the features were usually very complicated and often altogether impossible. Product designers were often forced to dismantle or completely recreate a model in order to make a change.

"This is still the method endorsed and taught by most 3D CAD software vendors. We call it the 'hack and whack' method of changing models," says Andrews. "You have to hack and whack your way through the menus to see which features are related to each other."





The team wanted to continue using their current CAD software but had to eliminate the hacking and whacking. So they decided to change the paradigm — to look beyond the standard techniques for using their CAD software. The result was Horizontal Modeling.

With HM, designers can capture design intent without creating parent/child feature dependencies. HM enables rapid changes to any and all features in the model without the need for arduous dismantling and rebuilding of the design.

**Old vs. New:**

**A Head-to-Head Comparison**

The team realized that for HM to be fully appreciated and supported, they needed some credible, verifiable proof that it worked and provided significant business benefits for Delphi.

They asked 70 Delphi product designers to use HM to create a new part that was nearly identical to one they had created in the past. The goal was to compare the total time spent using HM versus the "traditional" method.

They found that with HM, Delphi product designers spent 20% less time creating models and 65% less time editing models.

Product Design Activity	Productivity Improvement
CAD Operator Functions	Using HM & DPD ~70 CAD Operators
(% of total time spent)	(% of total time spent)
Create Models	20% → 20% Reduction
Detail Drawings	30% —
Edit Models	50% → 65% Reduction

**Horizontal Modeling Offers Significant Benefits**

- Shortens lead, cycle, release, and to-market times
- Decreases staff requirements and ramp-up time
- Increases available resources and flexibility

**HM Becomes a Great Success**

Horizontal Modeling is a huge success. It's a method of designing products that Andrews and his colleagues could only have dreamed of just a few years ago.

HM now plays a key strategic role at Delphi, improving total design productivity by 35%, enabling many more projects without adding resources, and increasing innovation. HM is now in production use at 14 Delphi and partner sites worldwide.

Looking back, Andrews says, "Essentially we went from an inflexible, time-consuming approach to a quicker, more automated one. And it paid off in a big 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](http://www.delphi.com/dti) or contact Jeffrey Solash using the information below:

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