



DELPHI CORPORATE DIVISION

“The Build To Order system has made our business more profitable by giving us the flexibility and agility to produce and ship wire harnesses in the right quality at the right time and in the right sequence from a distant low cost location”

Andreas Divece,
MPC Manager, Delphi Corporate Division
Packard Electrical/Electronic Architecture”

The Customer

Delphi is a leading global supplier of mobile electronics and transportation systems, including powertrain, safety, steering, thermal, and controls & security systems, electrical/electronic architecture, and in-car entertainment technologies. Engineered to meet and exceed the rigorous standards of the automotive industry, Delphi technology is also found in computing, communications, consumer accessories, energy and medical applications. Headquartered in Troy, Michigan, Delphi has approximately 146,600 employees and operates 150 wholly owned manufacturing sites across 34 countries with sales of \$18.1 billion in 2008.

For more than 15 years, RedPrairie's Build To Order solution has enabled Delphi Corporate Division "Packard Electrical/Electronic Architecture" to manage complex and mission critical production processes at numerous production facilities around the globe. During this period the relationship has continued to grow and RedPrairie has developed a valuable understanding of Delphi's business and production processes – making new project implementations a quick and smooth process.

The Challenge

For automotive Tier-1 supplier's like Delphi Corporate Division "Packard Electrical/Electronic Architecture" it is absolutely vital to meet the ever increasing requirements and expectations of the OEM's and the consumer driven market. A thing



75% of a car's value comes from suppliers, therefore it is a must that automotive suppliers can maintain low costs on all modules /components as well as an intelligent supply chain structure.

not always easy to do with the rising amount of options available to a consumer configuring a new vehicle. This variety leads to hundreds if not thousands of combinations and hence to a unique car, Ultimately impacting the manufacturing and supply chain concepts, as carmakers can no longer apply a push strategy by building cars to stock if they want to keep costs at a competitive level. This has opened room for gaining valuable market share for those carmakers who can efficiently implement and operate a Build-to-Order strategy in their supply chain and improve order to delivery time. By choosing this strategy the carmakers create a "Forrester effect" where the consequences are multiplied back through their supply chain as their suppliers must adapt their business structure to meet the requirements of their customers.

In order for Delphi to continue to win more business from carmakers, it needed a robust and flexible production system that would enable them to manage their mission critical production processes and meet the most demanding requirements.

One case in point is a recent awarded mid size vehicle project. The OEM needed a supplier who could produce high volumes of customer specific wire harnesses (main car body harness) and ship them in Long Range Sequencing to the vehicle assembly plant in Germany. An expected OEM start of production in October 2008 put pressure on Delphi from the beginning when the project was kicked off in November 2006. Because of this, Delphi needed a system that could cover the OEM requirements, could be implemented quickly, plus was flexible enough to accommodate process changes on the fly.

The production of wire harnesses is extremely labour intensive as most of the processes involved cannot be automated. Therefore it was important for Delphi to move the production to low cost countries while still being in reach of the carmaker in Germany. To achieve this, Delphi decided to start up two new production lines at their manufacturing facilities in

Jelesnia, Poland and Sannicolau Mare, Romania. With a combined total of around 30,000 square metres and almost 6000 full time employees, these two facilities had the specific expertise and capacity to meet the quantities needed at a competitive cost per unit.

For system support RedPrairie was the obvious choice as the solution was already running successfully at numerous other Delphi sites, and since no other software solution would be able to meet all Delphi's demands in such a short period of time.

The Solution

RedPrairie's Build To Order solution which:

- Contained all the necessary capabilities needed out-of-the-box and with no development needed.
- Will schedule and assist the production of wire harnesses
- Will ensure all wire harnesses are produced according to the production schedule and shipped in the required sequence.
- Will retrieve and store test results from various Quality Assurance sub-systems on the production line.
- Manage Delphi's sequencing specific packing and shipping processes.
- The system maps the sequencing processes from the carmaker and is configured to support shipping in Long Range Sequencing.
- The carmaker has the full control to request what has to be shipped and when.

Andreas Divece, MPC Manager at Delphi Corporate Division Packard Electrical/Electronic ARchitecture, explains how the The Build To Order solution schedules and assists the production from order receipt, through assembly all the way through in-sequence delivery. "Once we receive the call-offs from the OEM via EDI, Build To Order verifies the orders to make sure that each order is unique and that the production sequence, container sequence

and slot sequence are correct. If all are correct the system will allocate the orders to the lines according to the criteria we have set up. Once allocated a Build To Order shopfloor station will check the production sequence and that the right orders are being produced at the right line. After this has been confirmed, production orders and assembly instructions are printed out and the production can begin. While the wire harnesses are being produced they undergo several quality checks such as electrical tests and vision control of the cables, and RedPrairie Build To Order retrieves and stores the data from all these sub-systems. If the test values are acceptable, the harness can proceed to the next station on the production line, but if a harness fails a test, it is automatically removed from the production line. This way the quality of the production output is secured effectively through RedPrairie's built-in quality assurance. When the order has been produced, it gets scanned and Build To Order verifies that the harnesses have been labeled correctly."

Once produced the harnesses are now ready to be packed and shipped to the customer. Because everything in an automotive environment has to be lean there is no put-away of the goods before shipping. Instead the harnesses are moved directly to the packing and shipping area, where RedPrairie Build To Order ensures that each wire harness is packed on the pallets in the right sequence with the correct shipment labels and loaded on the trucks according to Last In First Out (LIFO) principles. The system has mapped the sequencing processes from the carmaker and is configured to support shipping in Long Range Sequencing. The carmaker now has the full control to dictate what is shipped and when it is shipped.

When the truck leaves the production plant Build To Order triggers a backflush at Delphi's ERP on how much material was used in production, as well as a Goods Issue containing all information needed to invoice the carmaker. Several times a day, the external logistics service provider collects shipments

from Delphi's plants and transports the wiring harnesses by road to the final assembly plants in Germany.

The Results

According to Divece, Delphi achieved some powerful benefits through the solution from RedPrairie:

Reduction of part numbers

A typical wire harness has between 80-120 options on it, and the more part numbers the more variations. For example 500 part numbers equals 10,000 possible variations of the harness. With RedPrairie Build To Order Delphi was able to greatly reduce the number of part numbers as they were able to define the kits and key modules needed for each harness based on the single order information from the OEM. Because everything is built and shipped exactly according to customer orders Delphi has reduced production complexity and have zero redundant materials. Without this system in place Delphi would have to produce bigger and more generic harnesses matching all requirements and then have the unused parts taped together during final production, with higher cost and harness weight as end result.

For more information

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Stable overall Supply Chain

The solution has helped Delphi successfully adopt a "pull strategy" with reduced inventory and without building to stock, resulting in a more efficient and steady flow in its supply chain.

First Time Quality (FTQ)

The intelligent configuration abilities in Build To Order improve FTQ and guarantee that the right product quality is reached the first time a harness leaves the production line.

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Since RedPrairie Build To Order has a strong presence in the complex vertical of the wiring harness manufacturing business with Delphi, the solution is considered to be able to fit well within other types of commodity manufacturing, based on Build-to-Order and lean philosophies

Therefore Delphi and RedPrairie will seek to continue their successful partnership in the future. As Delphi acknowledges the adaptability of the Build To Order solution, it seeks to expand the footprint of the system within the Delphi business – a business which consists of a diverse set of product and service offerings within the Automotive Value Chain.

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