

**M**aking vehicle production more efficient has meant better control over workflows and inventory levels. Of course, fluctuations in customer demand make progress in this area more difficult. The automotive industry has made great strides over the past 20 years in reducing costs and increasing the efficiency of production. This accomplishment is of particular note because companies in the industry's production chain and distribution channel differ so widely. Many automotive manufacturers and their suppliers are part of the Fortune 500, but the supply chain also encompasses many small- and mid-sized companies. The dealer channel also varies widely, including public companies, large

### Demand-Driven Manufacturing

Demand-driven manufacturing has been attracting a lot of attention as a means of reducing the impact that demand fluctuations have on inventory and production. Essentially, it takes lean manufacturing another step by making product according to actual customer orders, anticipating demand and delivering in more rapid time frames. Demand-driven manufacturing appears particularly attractive to the automotive industry because procurement and inventory replenishment occur closer to the point-of-sale, shortening the cash-to-cash cycle.

Many discussions of demand-driven

works can improve demand response, other strategies create a DDSN leader, including becoming market driven, channel-driven fulfillment and demand-driven replenishment. Some of these strategies are again directed to suppliers. Others are directed to the dealer channel or require greater integration between the supplier and dealer channels.

# Closing the Loop

Dealer channel business intelligence closes the loop in demand-driven manufacturing.

dealer groups, multi-branded franchises and independent dealerships.

Automotive manufacturers have invested in supply chain integration and implemented lean manufacturing practices to reduce assembly cycle times and inventory levels. Downstream activity pulls the last activity only when needed. Common platforms allow mixed model assembly lines. A customer can specify paint color and interior equipment, and it will be built to order.

These investments and best practices have focused on integrating suppliers, product engineering and manufacturing. An automotive manufacturer may use forecasts to set inventory targets but still struggle to increase accuracy or proactively manage demand with capacity. After all the investments in vehicle production, vehicles still sit at dealerships waiting to be sold.

manufacturing emphasize quicker response to demand through high levels of production flexibility and rapid delivery. Sometimes, anticipating demand is neglected, which may be because in the past, manufacturing and suppliers have been unable to rely on trustworthy demand forecasts. However, accurate forecasting must exist for an automotive manufacturer and its suppliers to succeed at demand-driven manufacturing.

AMR Research created a handbook for becoming demand driven (*The Handbook for Becoming Demand Driven* by Lora Cecere, Debra Hofman, Roddy Martin and Laura Preslan. AMR Research, 2005). The authors state that demand-driven supplier network (DDSN) leaders are more *demand sensing*, have more efforts for *demand shaping*, and focus on a profitable *demand response*. While building more agile, customer-centric supply net-

### Being Proactive, Sensing and Shaping Demand

While focusing inventory replenishment and production layout on flexibility does mitigate risks stemming from demand fluctuations, it is not proactive enough by itself. Its reactive nature still leaves a manufacturer and its suppliers exposed to demand variation risk. Inventory targets should be based on measured *and* forecasted demand variability. A high-performance system alerts all stakeholders to changes in demand and informs them on how these changes impact forecasting. Dealer business intelligence can help close the loop on implementing the demand-driven strategies that complement agile supplier networks.

Merely collecting purchase and demographic data does not lead to better forecasts. Some universal performance metrics, including revenue, profit, supply costs, staffing and certifications, are measured by organizations in all industries for business intelligence purposes. Typical dealer-specific measurements include First Fixed Visits (FFV); Customer Satisfaction Index (CSI); parts and accessories purchases; warranty payments; customer, parts and service profitability; and certification. These metrics are addressed in one way or another by most dealer channel business intelligence efforts. What is some-

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times missing from the data collection effort is an understanding of how these and other variables interact with one another and how they impact supply and demand.

Tracking performance results without an understanding of cause-and-effect relationships does not accurately predict customer demand. Forecasts become too intuitive and less rigorous, expressed by heuristics and rules-of-thumb—not by a statistical model of cause and effect. Without a statistical model, forecasting judgments are based on anecdotal experience, where the validity of cause-and-effect relationships is less clear.

For example, peak demand may be explained by a promotion or new product introduction or an interaction between the two events. A rule-of-thumb approach might expect an  $x$  increase in demand with the promotion and a  $y$  increase due to the new product introduction, with a total increase of  $x+y$  in demand. However, the rule-of-thumb doesn't account for an interaction between the promotion and new product introduction, even when they are not directly related. Demand is actually  $x \bullet y$ , and the forecast will grossly underestimate demand.

## Theory of the Dealership

In medicine, the skill to properly read the signs and symptoms uncovered by tests and other diagnostic tools is called semiotics. The tests work because they embody scientific theories of human anatomy and physiology that explain biological interdependencies. We do not have the semiotics of dealerships because the interdependencies of all the relevant variables in the life of the dealership have not been studied. What is lacking is a good theory of the dealership, which would identify the critical variables in all areas of interest and how those variables impact forecasts.

Figure 1 demonstrates how a portion of this theory of the dealership more accurately predicted unit sales. The figure shows how several different underlying dealership variables might have an effect on unit sales, which would be of interest for production capacity and inventory planning for a dealership.

manufacturer and dealership can use to make valid inferences about the effectiveness of the activities, they can know where to improve and how to allocate resources and effort. Furthermore, by allocating resources and effort with this knowledge, the manufacturer can increase or decrease demand to match



Figure 1. Theory of the Dealership

The variables affecting unit sales include attributes of the dealership itself (e.g., size, recognition), as well as attributes about the sales manager (e.g., training, satisfaction) and about both dealer and corporate sales and marketing activities (e.g., promotions, ad campaigns). A complete theory of the dealership might incorporate other factors, such as customer satisfaction with the brand, and would also take the cause-effect relationships one step further and determine whether high- or low-unit sales had any impact, either directly or indirectly by affecting another variable.

It is easier to locate the true cause of a failure, or potential failure, in the process rather than in the final product. Similarly, a theory of dealership helps rationalize what metrics to measure. By selecting those measurements that the

capacity and optimize supply and demand operations.

For example, suppose that an automotive manufacturer has developed a theory of dealership for its channel and finds that different types of sales training yield different increases in demand for a new vehicle. Through a certification program, the manufacturer may mandate that the dealership sales managers complete the training type that will yield the demand increase best matching the supplier and production capacity for the new vehicle. A theory of dealership, therefore, provides both demand sensing and demand shaping benefits. The results?

- A greater confidence in how promotions and other activities or factors will affect future demand, leading to better forecasts.
- An ability to exercise greater



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control over what the future demand will be, synchronizing supply and demand, by allocating resources according to a predictive model.

### Dealer Channel Awareness with a Scorecard

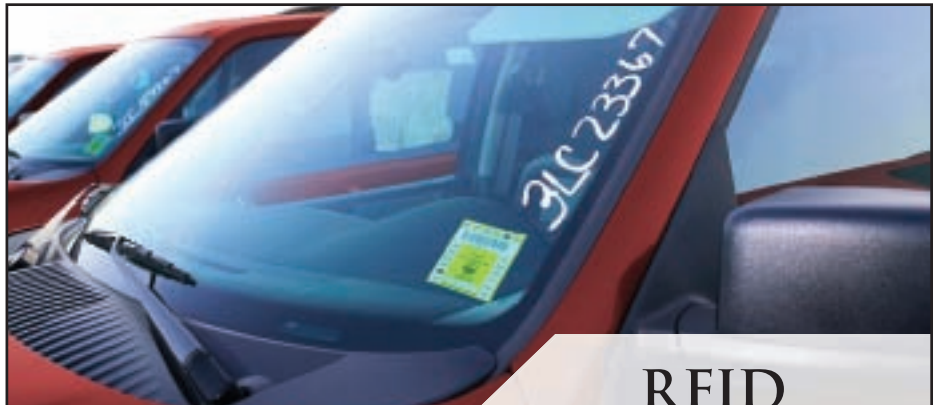
The theory of dealership provides a mechanism to understand and more accurately predict demand. It does not, however, provide perfect predictions—only better ones. Being aware of the dealer channel means knowing what is actually happening now as well as what is expected to happen. Both reactive and proactive strategies must be in play. Effective dealer channel awareness also requires visibility. Information must be efficiently distributed and available to the decision-makers and cross-functional teams that need it.

The automotive industry continues to Web-enable itself with supplier and dealer portals, which allow companies of all sizes to benefit from dealer-channel awareness. A Web-based, demand-driven scorecard can track all the metrics required for a theory of dealership and provide more visibility into demand activities, including ordering information. A scorecard can provide many well-known, technology-based benefits. For example, the scorecard provides a single point-of-truth where all stakeholders obtain a valid picture of where the dealer channel stands regarding key metrics and forecasting data. Most importantly, a scorecard with a well-designed underlying architecture ensures that stakeholders are acting on timely and accurate data. If assembling information is too cumbersome and time consuming and the data is outdated or even incorrect, the scorecard does not create dealer channel awareness.

One of the primary challenges when launching a scorecard application is the migration and integration of a diverse range of existing data sources into a single solution. Data feeds, often in a flat file format, may be processed on different systems, including those of third-party vendors. Creating reports and correcting mistakes can be difficult, often involving many people

exchanging flat files. In addition, unlike a scorecard used solely by corporate managers, security and other technical or political requirements may dictate that supplier, dealership and corporate staff each access data through different systems. A demand-driven scorecard must be able to handle multiple access modalities to accommodate multiple groups of users.

The manufacturer can move data to a corporate data warehouse. All data owners can update this consolidated data source, which can be used by the scorecard as well as other corporate, supplier and dealership applications. Therefore, a demand-driven scorecard data mart can provide a unified data access point for corporate, supplier and dealer systems. A data mart's flexibility in supporting ad hoc query



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requests provides for sophisticated information retrieval in time to meet pressing business requirements. Extract, Transform, and Load (ETL) tools can create monthly updates with minimal administrative effort.

Consolidating and automating the collection of the manufacturer's business data reduces sources of error and ensures accurate and up-to-date information can be shared more extensively with a minimal degree of administrative effort. Reporting flexibility and intuitive user interfaces are also key to making the data available and easily accessible. Intelligent use of reporting tools, such as Cognos or business objects, can ensure that dealers and corporate users see the same report. In addition, the scorecard's interface can be designed to group metrics into distinct categories and provide an easy-to-use, drill-down capability that allows dealers to identify areas requiring improvement or attention and restricts

## Theory of Supplier Demand

The theory of the dealership can be extended to suppliers beyond more accurate forecasts and rapid response. Just as an automotive manufacturer might build a statistical model to sense and predict its demand, a supplier can build its own demand sensing and shaping model, a theory of supplier demand that includes variables about its clients. In addition to performance metrics and demographic information, the supplier might want to know more about the sales and marketing activities of its clients to make its own demand forecasts.

access to sensitive data depending on the user's access.

### Summing Up

Demand-driven manufacturing can provide several benefits to the automotive industry. To be effective, it requires efficient transfer of meaningful demand information throughout the production chain. While basic Web technologies and data management architectures can collect dealer channel data, the theory of the dealership provides statis-

tically validated business intelligence. Statistical validation ensures that demand data and forecasts have the greatest positive impact on a demand-driven manufacturing program. ➤

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## Short-Term Thinking—Long-Term Pain

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and can provide outstanding control.

Unfortunately, short-term thinking often defers investing in these products until after a catastrophe occurs. Conventional thinking is to save a little money up front and take the risk of not having an issue. When it does occur, the supplier pays double: the cost of the customer concern and also purchasing the devices to establish the control, usually under a panic situation.

- **Intense validation at launch.** In launching new products, there is tremendous pressure to get the process up and running with limited time and resources. Automakers send people out to verify critical processes, and everybody conducts a process sign off that confirms the equipment, etc. Perhaps we complete a check list with positive responses stating that the process is OK. Unfortunately, everything looks good on the surface, but the true

opportunity for improvement is not seen.

The right way to conduct the process sign-off is to look for things that can go wrong and identify them for improvement. The ideal process sign-off at launch usually points out failures, and that's really what you want—no surprises in production. Of course, this takes intensity during the validation. Production people must drive this intensity and help the engineers understand the possible problems. The engineers have to understand that finding the issues is not a black mark against their capabilities or what they have done. Rather, it is the revelation of a world the engineer cannot see—the daily variation of production—knowledge that seasoned operators can bring to light.

With short-term thinking, the validation at launch can be superficial. The correct way to validate a launch is to complement the short-term run-at-rate with a complete investigation into the process

limitations. An intense validation at launch must include multiple equipment change-overs (planned and unplanned); it involves multiple new operators doing the job with normal training from production supervision. Finally, it needs multiple lots of inbound parts to see the variation.

Customer representatives cannot be there for months at a time to witness these events. It needs to be supplier driven: the supplier is there, and they need to address their own issues and determine their own destiny. This is long-term thinking and involvement that results in an execution everyone can enjoy. ➤

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