Shifting gear
Capacity management in the automotive industry

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Operating in the automotive industry has always been challenging. Long and complex supply chains, unpredictable demand patterns, changing regulations – not to mention planning-to-production processes that can take up to five years – have all caused headaches for car manufacturers, or original equipment manufacturers (OEMs), for many years.

The global recession in 2008 and 2009 and the lasting damage it caused to the global economy have made things even harder. Collapsing demand and many other factors have squeezed the car industry and hit suppliers particularly hard.

Now, demand is picking up, and OEMs are responding by increasing their production and parts orders to suppliers. But the suppliers are still being cautious after the recession and have neither the capacity nor the capital expenditure plans necessary to deal with the increased demand.

In this new environment, the constraints on the automotive supply chain are even more prominent, and OEMs are struggling to manage these problems as demand levels rise. In today’s globalized market, OEMs are challenged to forecast demand and their parts orders to suppliers with accuracy. With planning and development lead times of four or five years, changes in demand are inevitable. But the OEMs also struggle to manage these changes efficiently. The complexity of automotive supply chains and the lack of spare capacity at the suppliers make this even harder.

There are solutions to these problems. With the right focus, OEMs can improve the accuracy of their forecasts and their ability to manage changes more effectively.

This paper explores how OEMs can solve some of these capacity management problems. Those companies that can make improvements could enjoy very substantial savings. Our research suggests that large OEMs would be able to save as much as US$1b every year via efficiencies in material costs, capacity utilization, logistics and reductions in supply chain risks.1

And it is not just a matter of improving revenues today. The global economy has recovered since the recession of 2008, but it is not completely in the clear. There are systemic issues in the automotive industry that challenge growth and profitability. The OEMs that are able to make the changes explored in this paper could develop a significant competitive advantage.

1Supplier Capacity Planning: Tier One Supplier Survey Findings and GM Comparative Analysis, EY, 2013
The global recession of 2008 had a major impact on the automotive sector. Before the recession, suppliers in the industry were running profitable businesses. They were also able to retain a buffer of idle capacity to use in response to unexpected increases in demand from car companies or OEMs. Most suppliers also had capital expenditure plans in place, which enabled them to increase their production capacity or repurpose their facilities in response to new trends and technologies.

Prior to 2008, it was important for suppliers to have the ability to respond to unplanned or short-notice demand from OEMs as the balance of power usually lay with the manufacturers, and suppliers would have little choice but to comply with their wishes. However, the recession and the economic turmoil that followed have changed the dynamics of the automotive industry.

The downturn caused global automotive sales volumes to plummet. OEMs came under pressure to cut costs — and this pressure ran down the supply chain. As a result, suppliers' business models were pushed to the breaking point. Many smaller suppliers went bankrupt; others were forced to consolidate aggressively, and almost all lost capacity. The pressure peaked with the bankruptcies of GM and Chrysler, which forced their suppliers to further rationalize their operations and slash costs.

Today, global automotive sales have rebounded to pre-crisis levels. Nevertheless, the recession has left a lasting impression on the industry. OEMs are struggling to plan and manage capacity in the post-recession environment and face difficulties in forecasting and managing change accurately and effectively.
Assessing the impact of the recession in a 2009 survey of Fortune 500 companies, Booz and Co. found that 42% of participating businesses had cut capital expenditures by up to 25%, and nearly 20% had cut it by more than 25%.

Global recovery fuels the automotive market

With the recession behind them, OEMs are adapting to rebounding volumes, growth in the emerging markets and demand for more fuel-efficient, technologically advanced vehicles. As a result, car manufacturers are pressuring their suppliers to increase capital expenditure. However, many suppliers are finding it very hard or even impossible to meet these changes in the current environment. Assessing the impact of the recession in a 2009 survey of Fortune 500 companies, Booz and Co. found that 42% of participating businesses had cut capital expenditures by up to 25%, and nearly 20% had cut it by more than 25%. And smaller firms were more likely to have made even more extensive cuts. Such cuts were necessary for some suppliers as they tried to stay afloat during the recession, but the extent of this consolidation means that today, many are unable to respond to renewed demand from OEMs.

Automotive capacity utilization and production growth in major markets

Overcapacity likely to sustain in the next few years as automakers continue to increase capacity, anticipating a rise in demand and exports. Rapid expansion in production and capacity expected over the next few years due to Mexico’s proximity to the US, low costs and free trade agreements with various countries. Automakers cautious about adding capacity are focused on improving efficiency and utilization. Capacity utilization to remain high as automakers add capacity in line with rising demand. Automakers to rationalize capacity to increase localization in other markets. Volume automakers expected to rationalize capacity to deal with overcapacity.

Note: size of the bubble indicates capacity utilization during 2014; capacity utilization (%) has also been mentioned in parenthesis after the name of the country.

Source: LMC Automotive (4Q14) *Period under consideration for the growth forecast: 2013-17

This caution and limited capacity among suppliers make it difficult for OEMs to respond swiftly to rebounding demand and a recovering market.
High capacity utilization and increased caution

Automotive suppliers are not ready to rely on the industry’s production bounce, despite the rebound in global sales volumes. They are also wary about increasing capacity in line with OEM demand, especially because they have suffered after inaccurate OEM projections in the past. And the suppliers are in a stronger position in the post-recession market. According to a recent EY survey of suppliers to OEMs:

- Automotive suppliers are not taking risks — they are willing to make capital investments only if returns are assured from OEMs.
- Only 9% of suppliers have plans to increase capacity by 10% in the next two years.
- As much as 73% of suppliers think they now have more power over OEMs in negotiations than during the pre-2008 era because there is so little extra capacity among suppliers.

After cuts and the unwillingness to increase capital expenditure, both tier 1 and tier 2 suppliers today have overall capacity that is lower than it was pre-2008. Hence, it is no surprise that the utilization of their available capacity is at a record high: on average, suppliers are operating at around 90%, which leaves little room for the spare capacity required to deal with any demand volatility from OEMs.

US auto parts manufacturing capacity utilization

A reduction in the availability of capital for suppliers has been exacerbating this condition.

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4 Figures taken from an EY survey of tier 1 suppliers on capacity planning and management, conducted in October 2013.
5 Tier 1 suppliers supply directly to OEMs, and tier 2 suppliers supply tier 1 suppliers and so on.
As a result, suppliers are tightly controlling their investment choices in order to keep ready cash available. In addition, private equity has played an increasingly important role and has had more influence over suppliers during the consolidation and merger activity of the downturn.

Projected supplier capacity utilization

A changing supply base

The recession has also changed the distribution of the automotive supply base around the world. North American suppliers have traditionally dominated the top supplier rankings. In 2001, North American suppliers took 54% of the 80 top-five spots but only 34% in 2011 – and this share has been declining year on year.\(^7\)

The market share concentration around the world has also changed dramatically as larger suppliers have bought up smaller ones. This means that, in today’s automotive industry, there is less room for small regional suppliers. This trend is expected to become more pronounced over the next five years as suppliers take further cost-cutting measures and consolidate to become more competitive.\(^8\)

\(^7\) *Who makes the car* – 2012, Bank of America Merrill Lynch, 18 April 2012, p. 40, available at rcr.ml.com/Archive/11156895.pdf?q=ny7c5a-C8qAgJAOoWANn0Ohnw8_\_qda_\_=1416566581_0de928d346709765f66875818bb3566.

Most analysts expect that the move away from the historic supplier distribution will continue as increasing globalization renders suppliers’ locations less meaningful. The rise of “global architectures” (using the same components in different vehicles worldwide) will also contribute to this trend. Forecaster IHS Automotive projects that by 2019, global platforms will account for 74% of the world’s light vehicle production, up from 65% in 2013.

Volatile demand patterns and a lack of trust

Although global demand has rebounded, customer demand trends have changed in the wake of the recession – typically becoming more volatile. After the sharp decline in demand in 2008-09, North America has seen a rebound of automotive sales back to pre-recession levels. Meanwhile, in Europe, customer demand is still in turmoil, remaining well below pre-recession levels. European demand is forecast to recover only slowly and may stay short of pre-2008 levels for the next five years. Across both regions, the mix of vehicles sold is changing more dynamically than ever before. On the other hand, demand in the emerging markets, led by China, is still expanding rapidly, although the growth rate has slowed in recent years.

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10 Top Suppliers, a supplement to Automotive News, Crain Communications Inc., 17 June 2013.
Due to increased globalization in the automotive industry, the percentage of export sales as part of total volume has also been trending up. Adding increasing car complexity and a wealth of features and options to these wildly different global demand patterns quickly produces a very challenging situation for OEMs when it comes to planning for demand. Vehicle content is also typically very different in emerging and developed markets. For example, on average, road conditions in the developing world are not as good as they are in the West and, as a result, vehicles in emerging markets are often equipped with more rugged suspension and more durable steering mechanisms.

All in all, many OEMs have become so inaccurate at projecting demand effectively that the majority of suppliers do not trust the planning forecasts they get from OEMs, assuming that there is a bias of around 20%. This means that these suppliers then run their own planning and forecasting processes.

Dealing with the new normal

There is a consensus among industry analysts that increasing product complexity, globalizing platforms, further rationalization of the supply base, tighter supplier capacity with careful evaluation of capital expenses, and market demand volatility are here to stay. Companies should not expect to see pre-recession conditions returning at any point in the near future.

12 EY’s supplier capacity management survey, October 2013.
The recession and its aftermath have presented many challenges to businesses from all sectors. In this sense, the automotive industry does not face unusual obstacles. However, the particular characteristics of the sector have put a unique spin on many of these problems – and made them more difficult for OEMs and suppliers to overcome.

The key difficulties faced by car manufacturers and their suppliers fall into three broad areas:

1. Making accurate order forecasts
2. Managing changes to demand
3. Dealing with the complexity of automotive supply chains

Making accurate forecasts

Car manufacturers need to make forecasts for two key metrics: volume and mix. Volume forecasting is simply projecting the number of vehicles and particular vehicle models that will be sold. Mix forecasting involves projecting demand for particular vehicle features – this includes anything from engine displacement and transmission types to trims and a host of electronic options, such as driver safety and assistance. Nowadays, increasing automobile complexity and the number of optional features make mix forecasting especially challenging for OEMs.

Furthermore, specific problems are raised by each forecast horizon:

- **Short term – forecasting for one year or less**

Over the last few years, volatile consumer demand has made it more difficult for automotive companies to make accurate short-term demand forecasts. This volatility has been exacerbated by the impact of the recession and the credit crunch, as well as unstable fuel prices, evolving fuel-efficiency standards, changing customer preferences (both in terms of vehicle preferences and the concept of mobility) and several natural disasters.
For mix forecasting in particular, short-term planning has become extremely complex for OEMs. This makes it difficult to use traditional, “home-grown” forecasting tools, especially since many OEMs rely on outdated technology solutions, disconnected data and manual spreadsheets to forecast demand. A high volume of marketing and promotional activity can also make short-term forecasting difficult. This activity includes changing financing rates, offering conquest incentives (designed to attract customers over from a rival brand), loyalty incentives or discounts on certain options or packages. These practices make it hard for manufacturers to rely solely on home-grown forecasting techniques to predict customer demand.

The ultimate goal for car manufacturers and dealers is to get the right vehicle, with the right content, to the right dealer, at the right time and at the right price. But ensuring this is no easy task. Most OEMs are not well-equipped to manage demand forecasting across geographies effectively. This is chiefly due to differences in systems used across countries and the inability to rely on a single integrated system with common data. This means that significant manual iterations (using manual spreadsheets) are often required to adjust the forecasts, and the results become highly dependent on individuals.

- **Medium term – forecasting one to two years ahead of regular production**

Medium-term forecasting remains a weak spot for most OEMs. Many companies still use manual spreadsheets in their mid-term forecasting. Such models make the rigorous analysis required for a trustworthy forecast very difficult and expose OEMs to expensive mistakes.

Inaccurate mid-term forecasting can cause problems with suppliers’ capacity planning, which can have a major impact on vehicle production costs. OEMs spend billions of dollars on providing the right tooling (the machinery and equipment required to build car parts) to their suppliers, but inaccurate forecasting means that they are still running out of the right components during production. In part, this inaccuracy is the result of vehicle-program teams taking responsibility for medium-term forecasting. These teams are responsible for individual vehicles and platforms and are experts in many aspects of production, but typically they have little expertise in advanced forecasting. Accurate forecasting requires statistical modelling tools and resources with specialized analytical and quantitative skills.
Accurate medium-term forecasts are also made more difficult by the fact that OEMs tend to forecast every option for a particular vehicle for the mid-term time horizon, rather than forecasting key options that really matter in this time window in order to monitor critical options and parts effectively. When a lot of manual effort goes into forecasting every vehicle and every option the same way, the results can quickly become “precisely wrong.” In addition, the accuracy and bias in these forecasts are often not consistently measured or tracked. This makes it difficult to forecast and plan accurately for critical parts such as powertrains, chassis and wheels.

**Long term – forecasting two or more years ahead of regular production**

OEMs need to make sales volume forecasts three to five years before regular production of a vehicle begins. Obviously, this leaves a lot of room for conditions to change. And as the economy or market preferences change, OEMs need to have an efficient way to account for this in their forecasts and to monitor changes to demand and supply. If these allowances are not made during initial planning to enable flexibility, capacity adjustments have to be made closer to production and this can become very expensive.

However, a number of factors make this kind of long-term forecasting very challenging in the automotive sector. First, OEMs face challenges in their manufacturing environment from changes to exchange rates, tariffs, labor costs and economic conditions, as well as changes to the regulatory environment (e.g., environmental laws and safety standards). Second, OEMs must account for significant shifts in global demand patterns, such as the move toward smaller vehicles, the rise of compact SUVs and the increased adoption of mobility solutions, such as car sharing and on-demand rentals. Finally, changes in the industry environment resulting from volatile fuel prices are constantly causing variations in both vehicle volume and mix.

As suppliers are facing capacity constraints, OEMs need to be able to make firm commitments to the volumes that they will require. To do this, they need to be able to forecast both volume and mix accurately. This is particularly important for dealing with suppliers of components that have long lead times, such as powertrains (engine and transmission) and chassis parts.

**Managing late and last-minute order changes**

OEMs struggle to identify bottlenecks and potential constraints in their supply chains early on. When the supply chain is affected by constraints the ability of OEMs to meet customer demand varies significantly, depending on how well prepared they and their suppliers are to respond to changes.

With forecasts for production made so far in advance, it is inevitable that some of the forecasts for any of the 10,000 parts that make up a car prove to be inaccurate. As a result, OEMs have to make many changes to supplier orders at short notice. This puts pressure on suppliers and leads to high change costs for the OEMs. The problem of short-term changes is an inevitable result of having to make volume commitments so far in advance and this situation is not going to change. However, the poor capacity-change management practices at OEMs often make these issues even worse. Sometimes, OEMs...
have to release supplier schedules that take parts requirements above the constrained capacity of their suppliers. This results in intense last-minute pressure and often premium costs, such as overtime and expedited freight costs, as OEMs must pay their suppliers to increase output. Due to the complexity of options and parts, change in demand for even a single option can have an impact on tier 1, tier 2 and tier 3 suppliers in the supply chain.

The nature of automotive components also presents problems for managing late-notice changes. Due to the physical size and specialization of many parts (such as seating and interiors), quite a few tier 1 suppliers set up dedicated production facilities for individual, manufacturer-specific parts. If an OEM subsequently lowers its order for these parts, then the supplier will end up with sub-optimal capacity utilization and will be likely to charge a cancellation cost.

Due to the complexity of automotive supply chains, failure to properly manage changes can have major cost implications. Nevertheless, it is crucial for OEMs to be able to “sense” demand trends for both volume and mix. They must implement strategies that allow them to respond when a demand and supply imbalance is imminent. However, the majority of OEMs struggle to achieve this.

When OEMs don't plan and manage changes effectively, they risk losing volume and market share. Sometimes, OEMs will anticipate that a particular car model will be more popular than it actually turns out to be. This has two negative outcomes for manufacturers: first, they cannot supply the model or version that consumers actually want, which alienates customers; second, they are then left with a surplus of a particular vehicle version or model that must be sold at a discount.
The conditions that set up capacity-change management problems are established very early on in the vehicle production cycle. The sourcing process in the modern automotive industry is surprisingly unsophisticated. Typically, it is a very labor-intensive, manual procedure completed on basic spreadsheets. There is little automation and coordination between the separate buying teams for different components. Since this is a manual, uncoordinated process that doesn't use common data, it is also highly prone to errors and inaccuracies. What's more, a haphazard approach often makes it very difficult to track the history of changes to a particular part in order to analyze and improve this process.

Once production gets under way, all OEMs have a formal change process that is designed to control and coordinate the inevitable changes to parts orders to the suppliers, and also to ensure that all the necessary parties are consulted about the changes. In theory, this process should lead to efficient and well-managed changes. However, in practice, the formal processes are usually so complex, and involve so many people, that they are very cumbersome and lengthy. And because of this, often, OEM staff will bypass the official change management process, submitting informal requests that add to the problems of tracking, outcome analysis and accountability. Finally, informal changes are often requested by very senior people at the OEMs, and junior staff, who actually execute the changes, often feel that they cannot challenge their superiors if they see a problem.

Even when the proper protocols are followed, the practices involved are not always optimal. For instance, when a change is requested, a thorough cost/benefit analysis should be conducted to ascertain if this change will provide an overall sales or profit increase. It often happens that a sales team for one particular vehicle requests a change in anticipation of increased demand for its vehicle. After thorough cost/benefit analysis, it might become clear that this change is not worth making for the business as a whole because of the high cost of last-minute production and the impact on the entire supply chain – even though there will be lost revenue on one particular model. Unfortunately, such broad-ranging analyses are rarely conducted at OEMs and, if they are, it is often
only with a simplistic yes-or-no outcome in mind. In addition, lack of adequate record-keeping frequently means that decisions made by different departments cannot be traced back to their points of origin. This means that it is very difficult to make improvements to decision-making based on historical evidence. Changes to forecasts are inevitable for OEMs. However, the disorganized way that many changes are managed leads to many unnecessary costs.

In today’s automotive industry, another challenge arises when an OEM has a high volume for a common part that will be included in multiple vehicles. Problems occur when one vehicle team, whose vehicle accounts for, say, only 20% of the total parts orders for a particular component, alters their portion of the order. This will have an impact on all the vehicle teams that use this particular component. In turn, this makes it very difficult for the OEM to get an accurate picture of the true volume forecast and requirements for a particular component – typically, only the total figure is recorded, not how it was constituted vehicle-by-vehicle. And because the change requests are not adequately and thoroughly logged, there is little accountability in the system. It is hard to trace the impact of change requests and log the consequences; this keeps the door open for further change requests – exacerbating the problem. These unmanaged change requests also cause difficulties at the suppliers, which lose track of parts to prioritize for production.

**Supply chain complexity**

OEMs are manufacturing increasingly complex vehicles. This is happening for a number of reasons. First, car companies are offering many options to the market in an attempt to capture marginal revenue. Second, a lot of new technology, such as driver-assistance devices and infotainment systems, has been introduced over the last decade. Third, the powertrain mix has become more complex in recent years, with the development of hybrid, electric and diesel engines, new technologies such as cylinder de-activation, stop-start systems and direct fuel injection, as well as increased use of turbo-chargers.

Car manufacturers offer a high degree of variety in their products because it helps them drive higher market share and sales volumes. In 2013, there were 61 new models launched in the US – 50% more than in any year since 2006. And all of the vehicles have more technology and complexity than the vehicles they replaced.
The production of more vehicles at a higher pace is putting a strain on supply chains and resources. On top of this, the shift to global vehicle platforms is driving a need for global-level planning for key components.13 Sourcing components from around the world has reduced costs for manufacturers, but it also makes supply chains longer and less flexible. Global supply chains also open OEMs up to transport risks. Ordinarily, the lower overall production costs of global supply chains offset the higher transport costs. However, if OEMs’ forecasts are inaccurate and change management processes inefficient, changes to parts orders can lead to much higher costs as a result of new packaging requirements and expediting charges.

On top of this, manufacturers seeking economies of scale by using just one supplier to source components are exposed to further supply chain risks; i.e., if a single supplier hits any obstacles, then the OEM risks severe delays in construction and, eventually, lost revenue.

Against this backdrop, OEMs are increasingly reliant on suppliers to co-develop components. This exposes manufacturers to even more risk: increasingly complex components mean more complex manufacturing processes – and in the event of any problems, it is difficult to switch suppliers or bring an additional supplier onboard quickly.

So OEMs are demanding more and more from their supply chains. At the same time, many suppliers find themselves less able to accommodate these demands. After the consolidation and cost-cutting required by the recession, many suppliers do not have the ability to adjust easily to changes in demand. And in the face of such volatile demand from OEMs, suppliers are reluctant to invest in increasing capabilities or introducing new technologies. In turn, they are pushing OEMs for more guaranteed returns.

For all the above reasons, the automotive industry is not an agile one. However, now is the time for OEMs and suppliers to start thinking creatively and invest in built-in, end-to-end agility in supply chains. As we’ve seen, demand has (somewhat) recovered after the recession. However, the global economy is still fragile. If it falls into difficulties once again, the automotive sector will be squeezed; those manufacturers and suppliers that have invested in agility will be better placed to withstand this.

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**Supply chains and China**

Increasing numbers of car manufacturers are now establishing operations in China. Due to the nature of the Chinese business environment, these operations are usually set up as joint ventures.

While working in China brings many benefits to OEMs, it also poses plenty of forecasting and planning challenges. The joint venture companies are not full subsidiaries, but rather separate (albeit integrated) businesses. Hence, there isn’t as much transparency in forecasting and planning of capacity needs. Such additional barriers limit the agility and accuracy of OEMs in their capacity-planning processes.

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13 “Global vehicle platforms” are shared design and engineering models and structures used to develop multiple car models.
Ultimately, OEMs have to get better at understanding demand, managing changes to capacity and communicating with their suppliers. In such a complex market, making the necessary changes is a very difficult process. Automotive sector firms should focus on making the changes outlined in this section.

**Improving forecasting and planning**

Enhanced forecasting is the foundation of better capacity planning and management. Inaccurate forecasts not only lead to cost risks from late capacity changes: OEMs that repeatedly make inaccurate forecasts and, as a result, must change their parts orders on short notice will gain a bad reputation among suppliers. Once an OEM is associated with volatility, suppliers start planning for inaccuracy. This, in turn, leads to suppliers pushing up component prices as insurance for volatility. Suppliers might also under-invest in capacity or give out contracted capacity to other OEMs.

Forecasting tools that use statistical models can improve forecasting accuracy and avoid bias. Modern tools can account for historical demand patterns, seasonality, trends and other key variables to generate a much more accurate demand forecast.

The output of the statistical model can then be fine-tuned with the help of a “consensus forecasting” process. This involves a cross-functional team that can make adjustments to the statistical forecast in response to competitor action, incentives, marketing and sales inputs, annual financial targets and other variables.

After this fine-tuning, the demand forecast can be moderated according to supply constraints. Alternatively, companies can then invest in additional resources to alleviate some of the supply constraints. Ultimately, the final forecast can be published and used for downstream processes, such as sourcing.

Firms must be disciplined when it comes to combining statistical predictions with consensus among sales, marketing, the supply chain and vehicle dealers if they are to capture the essence of real demand successfully.

Having the ability to capture unconstrained demand using forecast tools, process order-change requests from dealers, perform option and feature velocity analysis, and access click-stream data (consumers’ configuration of vehicles on websites) can help OEMs make much more accurate forecasts. However, at present, few OEMs have the tools to enable these capabilities.
Improving capacity-change management processes

Better forecasting and planning need to be complemented with a robust change management process. This process must be able to control any adjustments to orders with suppliers that are made after the initial order. Furthermore, this process is not designed to stop changes from happening, but rather to help OEMs make informed decisions and measure the impact of changes as they occur.

Any adjustments made to parts orders with suppliers should be requested and approved by the appropriate personnel. In addition, a workflow framework should be in place to track the change from request through to resolution and execution. Decision-making should be backed by rigorous cost/benefit analyses.

Time-phased scenario analyses can also be employed. These processes involve comparing the costs of making a change to supply requests in one quarter with the next. Communication and collaboration, among key functions such as program teams, product development, marketing and sales, engineering and purchasing, are also critical for managing changes.

Communicating with suppliers

Collaboration and communication with suppliers are as important as managing forecasts and changes. Enterprise-wide collaboration with suppliers is the first step toward making them strategic partners. Sharing accurate and timely demand forecasts with suppliers can help create trust and foster collaborative relationships. Giving suppliers access to OEMs’ demand forecasts gives suppliers a clear view of requirements and makes the extended supply chain more responsive.

Some leading car manufacturers give their supply chain access to online supplier portals, which can be used to provide suppliers with insight into forecasts and production schedules at appropriate times. These portals can also be used to get a clear view of capacity utilization at major suppliers. Suppliers should be required to update their contracted, available and utilized capacity on the portal regularly in order to ensure transparency. In addition to frequent updates, the portal will be critical to the change management process. When a supplier-capacity change is anticipated, the suppliers should be sent surveys via the portal to determine whether they can meet the additional capacity requirements.
In addition to purchasing and capacity management, other functions can also use an online supplier portal. For example, engineering can use it for design collaboration as well as sharing drawings and specifications.

**Reducing complexity**

Reducing the number of free options that are available to car buyers, as well as the complexity of car model variations, is another step toward better capacity management. There is a balance to be struck between offering enough variety to meet the demands of the market and limiting complexity for the supply chain. OEMs that are able to work out the optimum level of product variety will gain a real advantage. Reduction in option complexity results in a reduction in build combinations and higher volume-per-build combinations. This in turn leads to higher usage per part and reduction in the number of parts, which improves forecast accuracy and enhances supplier stability. Higher usage per part can also lead to reduced supplier and material costs.

OEMs can help make demand more predictable by thinking carefully about what they offer consumers. Managing complexity and offering fewer free options make demand easier to shape and forecast.

**Introducing part segmentation**

Even with reduced option complexity, automobiles are complex products with thousands of parts. It is extremely difficult to track and manage supplier capacity for each and every component. Part segmentation – clustering parts based on characteristics or attributes – can really help in this area. Segmentation criteria can include cost, complexity and development lead times.

Once parts have been divided into different segments, business rules are developed for each separate segment. The idea is to treat parts differently depending on how critical they are based on the cost impact to the OEM. For example, most people would agree that an engine is more critical than a door handle. Capacity for critical parts should be managed and tracked more closely than it is for non-critical parts. Distinct business rules for critical parts can then be introduced. These might include:

- Sourcing rules based on the part segments
- Lower tolerances for alert triggers in the case of capacity issues
- Contracts with minimum and maximum values
- Restrictions on making changes to capacity in the scheduling horizon
- Firmer change-control rules for key part segments

OEMs that are able to work out the optimum level of product variety will gain a real advantage. Reduction in option complexity results in a reduction in build combinations and higher volume-per-build combinations.
OEMs that can improve their capacity management by using the methods explored in this paper stand to make huge savings. Better capacity management will allow OEMs to make savings, improve forecast accuracy and reduce wastage. Because it has proved so difficult for many OEMs to tackle these challenges, those that do will also have a major advantage over their competitors.

If an OEM were to successfully introduce all of the capacity management solutions discussed in section 3, we estimate that it could see savings amounting to as much as US$1b. These savings emerge in four main areas: reduction in material costs, increased capacity utilization, lower supply chain risks and lower logistics costs.

**Reduction in direct material costs**

OEMs that do not manage their capacity effectively cause problems with both over- and under-capacity at their suppliers. Because modern cars are produced with multiple feature options, planning the mix inaccurately has a double impact on costs as a higher volume of one particular feature means lower volume of another. Consider, for instance, a situation where an OEM makes plans for a production run of 150,000 headlight units. Of this run, the OEM plans for 100,000 halogen headlights and 50,000 xenon headlights. However, in the end, only 50,000 halogen units are required, but 100,000 xenon lights are needed.

Due to the complexity of headlight manufacture, it is likely that two separate suppliers would be used to construct the two different units. And both suppliers would face difficulties in a case like this. The halogen supplier would have problems because it must amortize the costs of producing the halogen headlights over half the number of units. Meanwhile, the xenon supplier might not have the capacity to accommodate the increased production. Therefore, the supplier must run overtime, extra shifts, perform added maintenance and, in turn, increase its own component orders to tier 2 suppliers (hence, the same effects will be replicated down the supply chain). Not surprisingly, as a result, suppliers’ costs go up.
None of this comes as a surprise to suppliers. The problem is that there is no way for them to be able to prepare and process these changes without wholesale capacity investment — and, as we’ve seen, no suppliers are in a position to do this in the current climate. So suppliers account for these inevitable last-minute volume changes by overcharging OEMs. In fact, they know which OEMs are more effective in their capacity planning. So suppliers adjust their prices accordingly, increasing them by 3%–5% for those OEMs that, historically, have been poor at capacity planning and management. Thus, for OEMs, improving capacity management could result in savings of up to 3%–5% on material costs — for a large OEM, that’s over US$1b per annum.

**Increased capacity utilization**

Automobile manufacturers spend a great deal of money on tooling. Large OEMs probably spend as much as US$3b-US$5b every year on supplier tooling. In part, this cost is so high because very few components of a new vehicle can be built using the tools that are or have been used for older cars. As a result, every time you build a new vehicle you have to build new tools (this even applies for updated models of the same car). The tools used to build cars are necessarily very complex, expensive pieces of equipment, such as machines for welding, die-casting or metal forming. Over- or under-use of these tools will lead to increased costs for suppliers, which are passed on to OEMs.

To take only one example, the tooling required for two different types of shock absorbers will typically be different. Inaccurate forecasting and poor change management can result in suppliers having surplus capacity for, say, electromagnetic shock absorbers and insufficient capacity for standard suspension. Overcapacity for electromagnetic suspension means that expensive tools stand idle or run at only a fraction of their capacity,
When the recession struck, over-investment and over-commitment in capacity led many suppliers into bankruptcy. Ultimately, OEMs will pay for a significant portion of these costs as they face claims and court cases over unfilled orders and other matters.

so more accurate forecasting could have resulted in substantial savings. On the other hand, the tooling required to make the standard suspension is vastly overstretched, requiring increased maintenance and, possibly, last-minute investment in extra tooling. Thus, getting the projections right so that capacity utilization is as close as possible to 100% throughout the supply chain results in substantial cost efficiencies. We estimate that by improving capacity utilization by 10%-20%, large OEMs could save as much as US$300m to US$1b a year.

![Percentage of instances](chart.png)

### Supplier % contracted utilization

- **Target utilization range**
  - 75%-100%
  - 100%-125%
  - >125%

<table>
<thead>
<tr>
<th>Utilization range</th>
<th>Percentage of instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;25%</td>
<td>61%</td>
</tr>
<tr>
<td>25%-50%</td>
<td>15%</td>
</tr>
<tr>
<td>50%-75%</td>
<td>9%</td>
</tr>
<tr>
<td>75%-100%</td>
<td>11%</td>
</tr>
<tr>
<td>100%-125%</td>
<td>2%</td>
</tr>
<tr>
<td>&gt;125%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Sample capacity utilization for a large OEM (compact vehicle >200,000 unit sales/year)

### Lower supply chain risks

Supply chain risk comprises three key issues for OEMs. The first is the risk of supply chain disruption leading to a manufacturer failing to make the vehicles it requires — a stalled production line represents a waste of hundreds of thousands of dollars a day. The second problem for OEMs is the risk that they will make the wrong products because they have not produced the right parts in the right quantities. This results in producing vehicles or features that consumers don’t want. If this happens, OEMs have little choice but to offer discounts and incentives in order to sell the less desirable vehicle configurations, reducing revenues as well as margins.

Third, poor forecasts lead to operational and financial risks when suppliers build a particular plant and put in production facilities for an OEM. With inaccurate forecasts, all of the suppliers’ assembly lines will not be optimally utilized. This is a huge risk for suppliers because they face huge costs as a result of such cancellations or wasted facilities. When the recession struck, over-investment and over-commitment in capacity led many suppliers into bankruptcy. Ultimately, OEMs will pay for a significant portion of these costs as they face claims and court cases over unfilled orders and other matters. Therefore, reducing cancellation costs alone could save OEMs up to US$500m per year.
Lower logistics costs

Manufacturers and suppliers always have to account for high logistics costs – even when everything is running to plan – because car components are often very bulky, heavy or fragile. However, inaccurate forecasting and poor change management that leads to unexpected volume demand for components can radically increase these costs. Often, each component will have specially designed packaging that cannot be used for anything else. For instance, packaging and container requirements for particular wheel sizes will be unique. Because today’s automotive supply chains are global, the cost of changing transportation requirements quickly adds up. Unexpected order increases can require booking last-minute space for airfreight. And these long-distance, expedited, last-minute shipments are expensive. But even if a particular component has a domestic supply chain, the price of last-minute orders for freight capacity can be as much as 50% more than the price haulage companies give OEMs for long-term contracts.

All in all, the logistics and transportation costs of unexpected volume orders can amount to hundreds of millions of dollars for OEMs. Therefore, forecasting more accurately and improving change management processes can lead to huge savings.

Changing for an uncertain future

Every sector has been impacted by the recession and the shock waves that rippled through the global economy in its wake. Stability is returning and demand is beginning to pick up, but the truth is that nobody knows exactly what the future will hold – it is entirely possible that the world’s economy could face further shocks. Geopolitical tensions in the Middle East and Eastern Europe, record-low oil prices and slowing emerging market growth are all contributing to an uncertain future.

As we’ve seen, the capacity planning and management challenges that the automotive sector faces have always made it a difficult industry for manufacturers and suppliers alike. The industry is entering uncharted waters, with suppliers operating at close to full capacity after consolidations during the recession and OEMs ramping up production.

The improvements to forecasting and capacity management we have outlined can help both manufacturers and suppliers achieve stability, revenue, margin and sustainable growth. With such huge potential bottom-line savings possible, it is hard to see a convincing reason why OEMs and tier 1 suppliers would not begin to make these efficiency changes. Those that do will be better placed to benefit in an uncertain future – whether the global automotive sales continue to grow or stabilize.
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