

AUTOMOTIVE PARTS TECHNOLOGY DEVELOPMENTS

Auto Parts Manufacturing Trends & Increased R&D Responsibilities

The technology and features of motor vehicles are constantly being changed as new and updated models are designed in response to evolving consumer preferences, offerings from competitors, and regulatory requirements. The globalization of the automotive industry has brought about increased competition, product innovations, and manufacturing and quality improvements. In response to competitive pressures to reduce costs, the original equipment makers (OEMs) have been shifting more engineering and manufacturing responsibilities and risk down the supply chain, while at the same time asking suppliers to reduce their prices. First- and second-tier suppliers are now assuming a greater amount of research and development responsibilities to develop more sophisticated components and subassemblies, while the automakers concentrate on designing vehicles, managing programs, handling the majority of the vehicle's assembly, and marketing the brands. Suppliers are becoming involved earlier in new product programs and have been able to increase their value added to the OEMs, allowing them greater potential for higher profit margins from proprietary engineering. However, in addition to the constant pressure to reduce costs, these large suppliers experience many financial burdens. For example, they need to have enough capital to fund R&D expenses and tooling expenses well before they receive any associated revenues, as well as have the capital to invest in enough capacity to provide uninterrupted delivery. In addition, suppliers are also coping with the OEMs' demands for higher warranty risk sharing. The trend of shifting R&D responsibilities to suppliers is likely to increase as the OEMs source more modules and systems from their first-tier suppliers. The outsourced content of a vehicle has grown from approximately 20% twenty years ago to approximately 80% today, with almost 70% of the design content occurring in the supply chain. The most outsourced area of the vehicle is interior systems and components. Other areas include door panels, fuel systems, braking systems, and steering systems. "Supplier manufacturing campuses," in which Tier 1 and Tier 2 suppliers are based very near to the vehicle assembly plant and perform subassembly and in-line sequencing tasks, is another key trend in automotive vehicle manufacturing.

The automotive industry's product life cycle is becoming shorter and manufacturers are under constant pressure to reduce costs while delivering high levels of quality. Lean manufacturing systems and quality control process are now standard practice among automakers and major suppliers. Adopting lean practices has resulted in quality improvements, increased productivity, increased collaboration, and improvements in total product cycle times. Suppliers are also incorporating the six sigma system, which uses statistical techniques aimed at controlling and continuously improving process performance to achieve better, faster, and less expensive products and services. The automotive supply chain has evolved from a linear process of distribution logistics into a complex network of strategic relationships involving increased communication between suppliers, global transactions, global transportation and reduced lead times. First- and second-tier suppliers are now focusing on collaborating with lower-tiered suppliers and recently acquired companies to remove waste from joint systems. As the automotive industry becomes more global with parts sourced from around the world and multiple versions of the same car assembled at different locations around the world, supply chain management will become increasingly important to manufacturers at all levels. Challenges in

managing automotive supply chains include: just-in-time delivery requirements, cost pressures, multiple offshore locations, changes in currency and market dynamics, increased security and border crossing considerations, supply availability, and even changes in the weather.

Automotive Technology Trends/Issues

In addition to consumer preferences, car models must be designed and manufactured to address environmental, safety, and fuel economy concerns, particularly if there is legislation mandating changes. Suppliers also need to consider how impending legislation and any new engine technologies could impact their companies and their global position. For example, the introduction of new regulations will inevitably create increased demand for a variety of new safety and emissions control products, which will also result in an increase in the use of electronics. In August 2003, GM, auto suppliers and the U.S. Environmental Protection Agency announced a new partnership, "The Suppliers Partnership for the Environment," to increase the competitiveness of U.S. companies while reducing environmental impacts. There is also a cooperative research project backed by automakers, the plastics industry and the U.S. government is looking to reduce the amount of automotive plastics ending up in landfills and instead divert it back into vehicles. Part of their goal is to be able to preempt an auto recycling-related legislative mandate. For powertrain engineering, there is the dilemma of the automakers being required to focus on emissions and fuel economy but customers wanting to buy larger vehicles and vehicles that offer performance-related technologies, such as engines with more valves and more sophisticated fuel injection systems, and transmissions with lockup torque convertors and extra gears. Of the \$27 billion U.S. consumers spent on aftermarket parts in 2002, nearly \$5 billion went for horsepower-increasing parts, according to the Specialty Equipment Market Association. The most powerful contenders for alternative engines in the next five years are diesels and gasoline-electric hybrids. All of the major carmakers are working on fuel cell-powered vehicles, but affordable, mass-market versions won't be available for at least twenty years, given the need for a completely new fuel distribution system and the difficulty in storing hydrogen.

PriceWaterhouse Coopers' automotive group predicts that 16 percent to 18 percent of the world's vehicles currently come from similar platforms and by 2006 this number could rise to 40 percent. This trend gives auto parts manufacturers the opportunity to supply a broader range of products for multiple versions of the same car worldwide. While there is never a shortage of new products being offered, suppliers must make sure that their new products are user-friendly and be priced low enough for consumers to be willing to buy them. Automotive interiors are becoming an increasingly crucial factor in car selection with people spending more time in their vehicles and consumers wanting to use more of their electronics equipment in their vehicles. In response to this trend, the intelligent vehicles market has become a relatively new area of automotive engineering, incorporating electronics, computers and software applications. The Freedonia Group estimates that the North American original equipment (OEM) market for automotive electronic products will grow 6.7 percent annually from 2003 through 2008 to \$33.3 billion, a rate that is significantly higher than the expected overall industry growth. Freedonia also predicts that more than 90% of future light vehicle technology introductions in North America will prominently feature electronics, and will increasingly be driven by sophisticated software. According to the Alliance of Automobile Manufacturers, the computer technology in today's

cars, minivans, SUVs and trucks is nearly one thousand times more powerful than that which guided the Apollo moon mission. Telematic systems provide the driver with various information, communication, and entertainment services through the integration of wireless communication and navigation signals. Voice recognition applications are increasingly considered a critical component of telematics systems because of concerns about driver distraction. The Telematics Research Group estimates that over 100 models in the United States now carry some form of telematics as standard or optional equipment. Frost & Sullivan estimated that revenue from the telematics market was \$1.23 billion in 2003 and is projected to be \$2.62 billion by 2010. The high price of telematics and consumers not being aware of the benefits and features of telematics have prevented the market from developing as quickly as expected. Connectivity and in-car entertainment are two major trends in telematics, given the growing popularity of rear entertainment and navigation systems, along with the promise of Internet connection in the car via Bluetooth-enabled cell phones and WiFi hotspots. In-vehicle camera-based systems, such as those that help driver's with viewing "blind spots" or assist drivers with parking are also becoming more popular. Navigation systems have been more popular with car buyers in Asia and Europe, but they have been slower to catch on with U.S. car buyers. Constant changes in the American road system and the systems' high price are two major deterrents cited by analysts. Companies are trying to lower the cost to \$500 by the 2006 or 2007 model year from the current \$1300 to \$2000 range. The next generation of onboard navigation systems will also be able to help manage, monitor, and report the vehicle's performance.

The Freedonia Group estimates that demand for automotive sensors in the North American light vehicle OEM market will grow 7.9 percent per year from 2003 to \$4.6 billion in 2007, due to sensor applications for new automotive electronics and new regulations. Engine and drivetrain applications represent the largest and most well-established category in sensor use, but safety and security applications have the greatest growth potential for OEM automotive sensors in North America. The U.S. government requires that 35 percent of 2004 model year cars must be equipped with occupant-sensing systems that can suppress airbag deployment under predetermined conditions. By 2006 model year, all new cars must have the capability. In the past 5 years, the use of proximity sensors in front and rear bumpers has grown quickly. The sensors provide an audible warning to guide drivers in to parking spaces or to warn of obstructions. Other key areas of growth include tire pressure sensors, additional airbag applications, occupant position sensing systems, and headway sensors such as those used in adaptive cruise control systems. In addition, the automotive semiconductor market is expected to experience substantial growth as they replace mechanical components in various vehicle applications.

Active safety features replacing passive safety features has helped to increase the automotive industry's returns. However, the public is still apprehensive about letting the vehicle's onboard computers decide for them what they should do in dangerous situations. Electronic stability control (ESC), which will be installed on approximately 13 percent of new U.S. vehicles in 2004, is the most popular form of active safety today. Future technologies could involve an even greater level of automatic vehicle intervention.

Other Future Concerns

There is a growing concern in the U.S. automotive parts industry of manufacturing and engineering work moving to low-labor-cost countries. Small and medium-sized firms that may not have the financial capability or human resources to move near their customers are especially concerned. U.S. auto parts manufacturers are under increasing pressure from the global automakers to expand production outside of the United States in order to meet the price of their global competitors as well as supply locally to the growing demand of emerging automotive markets. Production of components that require more labor and less sophisticated technology will grow fastest abroad, according to a February 2004 study by Roland Berger Strategy Consultants in conjunction with the Original Equipment Suppliers Association. Examples include: batteries, wheels, plastics, electronics, and some powertrain components. The globalization of the supplier industry has evolved from multinational companies with regional operating groups, to strategic enterprises bidding on global platforms. The shift to low-cost, emerging automotive markets is not unique to the U.S. supplier industry. Japanese automakers are bringing their suppliers with them to China and seemingly replicating the keiretsu system. Another concern for the industry is the expected shortage of skilled workers in the United States, resulting from the retirement of many long-time employees and not having enough college graduates to replace them.

There also continues to be pressure from the automakers to reduce costs and meet their standards. Ford Motor Co. has asked suppliers to reduce component prices another 3.5% this year. In October 2003, General Motors began inserting a clause in its long-term vendor contracts that gives a supplier 30 days to match a competitor's lower price or risk losing GM's business. This has been especially difficult recently for steel-consuming suppliers who have not been able to pass along rises in steel prices along to the customers. GM, Ford, and DaimlerChrysler are also requiring suppliers to be certified in a new global standard called TS 16949, which will replace QS 9000, the current auto-specific quality standard for the North American auto manufacturing industry. DaimlerChrysler wants suppliers to meet the standard beginning in July 2004, while Ford & GM have a December 2006 deadline. Suppliers who are not certified will not be able to do business globally with the Big 3.

The Alliance of Automobile Manufacturers reports that the auto industry spent \$18.3 billion in research and development in 2000, the most of any sector. The U.S. automotive industry is a leader in high-technology systems, which gives it a competitive edge as governments around the world impose higher environmental, fuel efficiency, and safety standards. A challenge for U.S. suppliers will be to have the ability and resources to continue to develop future technology innovations because of relentless international competition, while at the same time trying to cope with global pricing pressures.

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