

PRESS RELEASE

Oliver Wyman study on auto electronics

## Electronics are driving the development of the automobile industry

- **Strong growth in all segments of auto electronics**
- **Electronics innovations are being developed mainly by automotive suppliers**
- **Cooperation ventures and the standardization of auto electronics will be increasingly important in the future**
- **Electronics suppliers need to develop a better understanding of end users**
- **Mechatronic components can differentiate suppliers from their competitors**

*Munich, December 14, 2006* – Electronics are the main driver of nearly all new functions in automobiles. The worldwide market for automobile electrical systems and electronics is expected to grow at a rate of 5.9% per year, reaching 230 billion euros by the year 2015 and ultimately representing more than 30% of the automobile's value. Demand is strongest for those electronic functions that benefit drivers directly: safety, entertainment, information and comfort. These are the results of the Oliver Wyman study on auto electronics, which examined the major trends in the field of auto electronics and the consequences for automotive suppliers. The electronics architectures and standards that are currently being contemplated represent a major challenge for the industry. No one knows how and when that will happen. The Oliver Wyman study recommends greater cooperation among suppliers. Due to excess production capacities around the world and the rising competition from developing countries, cost pressures are bound to increase in the automotive supplier industry. Thus, successful strategies involve cost reduction measures, but also ways to avoid cost pressures. The Oliver Wyman study also found that suppliers of automotive electronics should increase their understanding of the needs of end users, in order to better estimate the future order volumes for new functions and special features, but also to develop and market products that consumers will like. Finally, mechatronic components represent a good way for automotive suppliers to differentiate themselves from their competitors.

Engine, brakes, radio and air conditioning: There is hardly a function in today's automobile that does not rely on electronic control systems. And the proportion of an automobile's value represented by electrical systems and electronics will continue to grow in the future. Today, electrical and electronic components and software make up 20% of an automobile's value, on average, on a worldwide basis. By the year 2015, this proportion will grow to more than 30%, according to the Oliver Wyman study on auto electronics. Because the number of autos produced in this period is expected to grow at a rate of only 1.5% per year, automotive suppliers will have to rely on electronics to boost their sales.

Already today, suppliers of auto electronics are considerably more profitable than the average automobile manufacturer. While the industry as a whole generates a gross profit margin of 4% of sales, the operating profit margin of electronics suppliers is frequently higher than 7%. And champions like Gentex, the specialist for auto-dimming mirrors, and the infotainment producer Harman Int. enjoy considerably higher profit margins. "Thanks to the constant flow of innovations in automobiles, auto electronics will continue to enjoy above-average growth rates and solid profit margins in the future," says Dr. Guido Hertel, the Oliver Wyman automobile expert who authored the study.

## **Above-average growth for electronics applications**

In total, the worldwide market for automotive electrical systems and electronics can be expected to grow at a rate of 5.9% per year until 2015 – in particular because the applications now being used in premium models will spread to the lower-end market segments. But we can also expect to see innovative new features as well. The strongest growth will be experienced in the area of electronics for the car interior: According to the Oliver Wyman study, such applications could see growth rates of 7% per year. "Car interior" refers mainly to Infotainment applications, displays and various comfort functions. In the future, navigation systems will be able not only to recognize the route, but also to take factors such as traffic jams, work sites and road signs into account.

Growth rates of close to 6% can be expected in the chassis and car body segments. In these areas, electronics applications like active suspension systems, ABS, ESP and adaptive steering, intelligent headlights, active safety and driver assistance systems are leading the way. The systems used in the chassis and car body increase comfort and enhance safety. Before long, cars will be able to park themselves. Lane recognition systems will keep the automobile in its lane and even help with changing lanes. Also, stop-and-go systems will enable the car to automatically follow the car in front of it in slow traffic situations.

Even in areas like drivetrains, engine control, electrical systems and on-board networks, electronics applications are expected to grow at rates of 4.9% to 5.5%, much faster than the rest of the auto industry. The main driver in these areas is the trend towards fuel-saving, more eco-friendly drive systems, including hybrid technology in particular. The additional electric drive in hybrid autos requires numerous new electrical and electronic components.

## **Coming to a better understanding of end user needs**

Innovations in hardware and software are driving progress in the auto industry. These days, most new functions would not be possible without electronics. More than two thirds of all innovations have been made possible or were at least significantly influenced by electronics. Electronics suppliers also conduct most of the necessary research and development in this area. In 2005, automotive suppliers on average spent a sum equivalent to 4.3% of their sales on R&D expenditures, while many electronics suppliers spent a sum equivalent to more than 8% of their sales on R&D.

Many new functions, including electrically adjustable seats and headlights that automatically adjust to the driving direction, were initially available only as special features. More than half the special features of an upper mid-range automobile are influenced by electronics and the trend is rising. However, the diversity of functions created by electronics also requires automotive suppliers to take a closer look at the needs of end users. Precisely those suppliers which conduct a majority of the research and development activities and often have no direct access to customers must become more active in this regard. "Many German suppliers hold a worldwide leadership position in the area of electronics innovations. In the future, however, innovations will require a more thorough

understanding of end users. In this regard, electronics suppliers need to increase their understanding of end users in order to better master their unit sales risk," Hertel said.

Aside from those electronics functions that are originated by automobile makers and suppliers, another important source of electronics applications has nothing to do with car making in the traditional sense. The new developments in consumer electronics, Internet applications and communications technology, which are increasingly changing our day-to-day lives, are also finding their way into automobiles. I-pods, WLAN and electronic toll collection systems are only a few examples. Besides increasing the diversity of functions, these applications also give rise to new challenges for the technical integration and maintenance of these systems in the automobile.

Europe and Japan will continue to lead the automotive electronics markets in the coming years. But the Asian market will become increasingly more important. In China, the strong growth in electronics generally (PCs, consumer electronics, semiconductors, etc.) and the strong interest in automotive technology will give a powerful boost to the development of automotive electronics. So far, the established suppliers are still dominant. But new suppliers from this region can be expected to emerge in the next few years. "Consequently, most producers of auto electronics simply must have a presence in Asia. But they should also be prepared for the emergence of Asian competitors in the medium-term future," Hertel commented.

### **Rising importance of standardization and cooperation ventures**

A key issue in the automotive supplier industry today is the future standardization of auto electronics architectures. In the last 20 years, auto electronics have grown from one system to the next. That led to massive quality problems, due to the diversity and complexity of functions. However, the turning point came in the last one to two years. Many new car models – especially those of German manufacturers – perform very well when it comes to reliability. But the existing architectures are coming up against their limits. These days, even small cars have up to 20 control devices, while upper-range cars have up to 70. These systems control the engine, balance the shock absorbers, operate car windows and keep the interior temperature constant, among other things. Most of the experts interviewed by Oliver Wyman as part of the study believe that the number of control devices can be reduced almost by half in the next few years.

A number of standardization initiatives, like AUTOSAR in the area of automotive software, are currently in the process of developing the foundations for uniform interfaces and software architectures. The auto makers are betting that such standards will result in a lower degree of development redundancy, higher quality and more innovations. In the past, those standardization efforts that promised direct benefits to automobile users, and therefore had better sales chances, were more successful. New markets like hybrid technology and driver assistance systems promise to generate additional benefits for customers, but also require strict cost management in order to be successful. And cost management can be improved through cooperation ventures and standardization. "These are the markets of the future, in which everyone wants to participate," said Hertel. And yet, those standardization initiatives or cooperation ventures which are focused exclusively on cost reduction are considerably less likely to succeed.

The steady march of electronics applications into automobiles gives automotive suppliers and manufacturers the chance to transform the automobile from a mass-market product to a more individualized product. For example, the engine function, suspension, transmission, air conditioning and heating, seating position and information can be customized to suit individual preferences. In reality, however, those functions which do not require settings and operation are the most successful. Between these two extremes will be found a large number of business models, from the "new" systems supplier to mechatronics specialists and various software business models. But not

every one of these business models will succeed. “The key is to correctly understand the end user, and to develop innovations and an appropriate business model on that basis,” Hertel said.

## **Strategic requirements for electronics suppliers**

**Mastering the complexity:** The growing degree of networking among the different electronic systems means that the complexity of such systems will continue to rise. To master this complexity and to utilize the same components for more than one function, automotive suppliers will have to cooperate with each other to a greater degree. Electronics suppliers that manage to solve overarching problems and apply a networking mentality will enjoy a competitive edge in the coming years. Increasingly, auto manufacturers will be looking for systems suppliers who can take care of some of the tasks they were formerly used to performing.

**Persistent cost pressure:** In the future as well, system decisions will be made primarily on the basis of costs. Even for high-tech products, Western suppliers will face rising competition from low-wage countries. That means they must continue to use the full range of cost reduction instruments, including the possibilities of standardization, outsourcing and offshoring. However, the sharing of development activities makes sense only for very large automotive suppliers.

**Customer-oriented electronics functions:** New extras will continue to influence the positioning of future car models and generate profit margins that are well-above average. The success of new functions will be decided primarily at the human-automobile interface. New functions should not overwhelm the driver, but make it easier to operate the automobile. In the past, too many new functions were driven by technology alone, and were not adequately motivated by customer needs.

**Mechatronic components:** Sensible combinations of electronic and mechanical components not only save space, but can also lead to new functions and improve the cost position. They pose an important barrier against the competition. Mechatronic components require more sophisticated skills both in development and in production and therefore the manufacturers of mechatronic components can differentiate themselves better from the competition.

## **Four key tasks for auto electronics suppliers**

### **Focus on the end user**

The development of new features is still being driven more by technical feasibility than by customers' needs. Those who can correctly interpret the customers' needs will be able to design products that set them apart from their competitors. They will also be able to better gauge the future order volumes for special features.

### **Achieve differentiation through mechatronics**

To date, a clear trend towards purely electronic components has not been observed. That is because many electronic functions can be usefully combined with mechanical components. By integrating these two types of components to form a complete system, automotive suppliers can set themselves apart from their competitors.

### **Pay close attention to the development of standards and automotive architectures**

No supplier can escape the trend towards standardization and new architectures. At the moment, however, it is impossible to tell what standards will be established, at what time and in what way. Quick decisions can be expected only in those areas in which new end user benefits can be created. For automotive suppliers, it will be very important to achieve an advantageous positioning within the changing world of automotive architectures, at an early stage of development.

### **Keep costs under control**

Automotive suppliers from emerging markets are quickly catching up to established suppliers. In the coming years, electronics suppliers from Asia will intensify the cost pressure on the industry even more. Therefore, Western manufacturers will have to master the full range of cost reduction instruments.

## **The Oliver Wyman study on auto electronics**

**The auto electronics study reveals current trends in the area of automotive electrical systems and electronics and suggests possible courses of action for automotive suppliers. The study is based on nearly 50 interviews with development engineers and corporate executives of the first and second management tiers, as well as industry experts, which were conducted in 2005 and 2006. The study also builds on the experience that Oliver Wyman has collected in the course of numerous consulting projects for automotive suppliers and manufacturers.**

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