Dr. Peter Rieth
Head of Systems & Technology at Continental's Chassis & Safety Division

„To Further Develop the Electrical/Electronic Infrastructure of the Vehicle"

A small internal combustion engine, a start/stop function and regenerative braking all help to reduce fuel consumption in hybrid drive systems. But Peter Rieth denies that they also make a vehicle less fun to drive. In this ATZ interview, the head of Systems & Technology at Continental's Chassis & Safety Division talks about electronic brakes, rear-wheel steering, the networking of active and passive safety and further trends.

ATZ Is regenerative braking worthwhile for road vehicles?
Rieth When you generate kinetic energy in a vehicle by burning fuel and then brake again at the next red light, classical powertrains have only a limited means of recovering this energy. It is converted almost entirely into heat. The generator brake of an additional electric motor allows this kinetic energy to be converted into useful electric energy. Therefore, energy recuperation is essential, regardless of whether a diesel or petrol engine is used as the basic power unit.

ATZ Does this mean that we need energy recuperation not only for hybrid cars but also for vehicles powered only by an internal combustion engine?
Rieth In principle, yes, although alternatives to an electric motor, such as flywheels or pressure storage tanks, have proven to be too complex and expensive. Therefore, it is an obvious solution to use this electric motor also for propulsion. The real challenge is to improve fuel economy without having a detrimental effect on the vehicle's acceleration. We are pursuing the hybrid drive concept, which adds together the driving torques of the electric motor and the internal combustion engine to provide higher torque over the entire speed range, that is, even at low engine speeds when the internal combustion engine alone is only able to supply a small amount of torque to the crankshaft. The torque curve of an electric motor is exactly the opposite to that of an internal combustion engine: torque is highest at zero speed and decreases in the higher speed range. The system combines two power units whose speed/torque curves ideally complement each other. This combination allows the internal combustion engine to be made smaller and therefore more economical than that of a car with the same acceleration that uses an internal combustion engine alone. We have to accept a small reduction in top speed for the car with a downsized engine, but that is an acceptable compromise in view of the 15 % to 20 % improvement in fuel economy.

ATZ Can the performance data be added together one to one?
Rieth As far as acceleration performance is concerned, the total torque characteristic curve is what counts. If one accelerates with kickdown in a hybrid vehicle, optimum acceleration can only be achieved if one enters the optimum area of this curve. That is not necessarily linked with revving the engine to a high speed.

ATZ Will it be possible to increase the proportion of recuperated energy?
Rieth An increase is always relative. A driving cycle, including the one used for the homologation of the vehicle, contains acceleration and deceleration phases. What is not included in the cycle cannot be recovered even by the largest electric motor or stored by the biggest battery. For the NEDC, the limit is about 30 %.

ATZ Let me ask you about Continental's latest acquisition: how do you plan to integrate the Electronic Wedge Brake developed by Siemens VDO into your concept of Global Chassis Control (GCC)?
Rieth We will see the introduction of electromechanical brake callipers into vehicles. This is a view that we share with our new colleagues. As part of a braking system, whether it is a hybrid braking system with only a „dry" rear wheel brake or a full brake-by-wire system, these electromechanical components are ideally suited for integration into a Global Chassis Control system due to their universal electronic interface. The aim is to further develop the electrical/electronic infrastructure for maximum safety and even with redundancy for full brake-by-wire. In such decisions, not only the costs but also issues of robustness and complexity have to be addressed.

ATZ Another subject is rear-wheel steering. Where do you see the advantages and disadvantages of this technology?
Rieth If you want to achieve optimum acceleration, braking and steering performance, you need four wheels to transfer the force closure potential offered by the road into the vehicle. Of course, you might say that today's tyres offer so much grip that they are sufficient to allow normal drivers to steer by the front axle alone. But when you steer into a bend at high speeds, the vehicle's inert mass will cause it to understeer. This means that the inert mass will continue to push the vehicle in a straight line and the change in direction is achieved only by steering the front axle of the vehicle. The force closure of the rear wheels remains unused. This shows just how much potential this technology offers. It can improve safety and stability with increased steering agility and offer enhanced driving pleasure. Combined with predictive environment sensors, this can even be achieved to an unprecedented degree.

ATZ When can we expect the first series-production rear-wheel steering system from Continental to be introduced?
Rieth We have several projects ongoing at the moment and I hope that they will find their way into series production in about three-and-a-half years.

ATZ Components such as chips, processors and sensors already account for about 20 % of the value of a family car. Will this percentage continue to increase?
Rieth Yes, it will. I do not believe, however, that the car will only become a chip on wheels. We can also observe a trend in the opposite direction due to the continuing integration of electronic systems. One example is the integration of the previously separate driving dynamics sensor cluster into our ESP sensor unit. This means that the housing, cables, connectors and installation costs for the manufacturer have been eliminated, and reliability is improved. As a result, the value percentage of electronics in the vehicle decreases. At the same time, however, new electronic systems will be created elsewhere.

ATZ Dr. Rieth, the acquisition of Siemens VDO also has the effect of multiplying your research and development capacities. Where will the new areas of focus lie?
Rieth In addition to our classical strengths in the field of Chassis & Safety, the acquisition of Siemens VDO provides significant reinforcement in the Powertrain & Interior sectors. All three areas are influenced by the trends of increasing road safety, reducing fuel consumption and CO_2 emission and the ongoing networking of the vehicle with the environment. There is a tremendous need for research and development here. One example is our ContiGuard Safety Concept, a comprehensive concept which, based on ESP, GCC and the networking of all active safety systems with the passive systems, covers everything from the integration of environmental information and telematics for effective driver assistance right through to the representation of the driver interface in the instrumentation and display systems.

ATZ Isn't it now time to offer vehicles that are not so fully packed with high technology and are therefore cheaper to buy?
Rieth In an economic region such as ours, in which we need to satisfy very high demands in terms of comfort and performance, it will be difficult to offer a vehicle with minimalistic basic equipment. The buyer expects a certain level of equipment for safety, protection and comfort. However, the situation is different in new markets with emerging individual mobility. We are working on offering components and systems for a low-cost vehicle for the Far East regions. But this will not work simply by dictating a price of 50 % for the vehicle specifications in our region. Instead, we have to align the product precisely to the market-specific requirements, that is with regard to performance and price. We can offer solutions for this in all of our business units.

ATZ Dr. Rieth, thank you for this interview.

Interview by Roland Schedel and Katrin Pudenz.

Dr.-Ing. Peter E. Rieth

joined the former Alfred Teves GmbH in Frankfurt in 1983. Since 2003, he was responsible for the Division's Technology Strategy and Advanced Engineering. Since more than 22 years Peter Rieth is working in the field of vehicle and traffic safety where he holds more than 100 patents worldwide. In recognition of his contributions to the enhancement of vehicle and traffic safety Peter Rieth was awarded the US Government Award for Safety Engineering Excellence by the National Highway Traffic Safety Administration (NHTSA) in June 2005. As Head of the department Systems & Technology in the Chassis & Safety division, for which he took responsibility in December 2007, his team is an important interface for central automotive functions.