

Sensor systems in the car

The use of sensors in modern cars is today indispensable. Everyone is familiar with the application of ABS systems where sensors measure the wheel speed and derive control parameters from it for the brakes. Although this system was initially only fitted to top range vehicles, today almost no cars are produced without ABS.



Sensors in cars are now used to increase comfort for the occupants or to improve the safety and technical performance of the vehicle. Examples in the comfort field are sensors which control the adjustment of the seats or headrests. Especially important are however sensors which are needed due to stricter exhaust regulations in order to reduce emissions.

Other fields of applications for sensors lie in the increasing "electrification" through "by-wire" applications of functions which were previously primarily mechanical. These already include systems already in large-scale production, e.g. brake-by-wire.

Micro-Epsilon offers a wide range of sensors and sensor principles predestined for automotive applications. Above all, these include displacement sensors and rotational speed sensors. Displacement sensors can be used anywhere where mechanical movement paths must be acquired and converted into control signals.

Examples here are the pedal displacement for the brake pedal, the clutch displacement for automatic gearboxes (shift-by-wire) or the valve lift for electrically or hydraulically driven valves.

Valve-lift sensors are used to control actuators which control the valves in the engine. By dispensing with the camshaft and its replacement by actuators, improved exhaust values are possible while reducing consumption and improving engine performance.



Valve lift sensor
Measuring range: 10 mm
Temperature range: -40... +150 °C
Housing length: 19 mm

Rotational speed sensors have been used for some time in turbochargers for trucks. Here, they help to control the exhaust feedback, leading mainly to improved exhaust characteristics. But also an overload of the charger can be promptly detected, permitting the charger to be operated closer to the specification limits. This in turn leads to a more effective operation and to smaller, lighter turbochargers. With the increasingly strict exhaust regulations in the car sector it would appear that the next step is to introduce this technology also here. Speed sensors based on eddy-current technology are also ideally suited to this task.



Speed sensor for turbo-chargers
Revolutions up to 400,000 min⁻¹
Temperature range -40...+190°C

MICRO-EPSILON's range of capabilities starts with development and ends with the large-scale production of innovative sensor solutions for mass-produced items. Here, the emphasis lies not only on the actual measurement element, but rather also covers the electronics and the signal evaluation. The development of ASICs in cooperation with suitable manufacturers enables sensors to be offered as mechatronic elements together with integral electronics.



Displacement and position sensor for applications in gearings
Measuring range 40 mm
Temperature range -40...+125°C
Integral ASIC electronics

The large-scale capability, already tried and tested with sensors for washing machines, is now also being extended to applications in vehicles through cooperation with a well-known subcontractor in the automotive industry. The expertise in development ensures that also even apparently insoluble tasks are solved to achieve the objective and are implemented in practice. The manufacturing capacity for large-scale production is about one million sensors per annum and is being gradually expanded. Consequently, also future innovative sensor designs in the automotive sector can be brought into large-scale production rapidly and economically.