



Distance measurements in robot positioning tasks

In series production of vehicles, numerous production steps are automated and are performed using modern manufacturing processes based on innovative technologies. Precision sensors are an essential part of automotive production. They enable assembly robots to locate the installation positions of components with millimeter precision. This is also true for cockpit assembly. The vehicle bodies move in cycles to the respective position on the assembly line. The car body must stop at exactly the intended position. This is the only way to ensure smooth installation via the robot, which must guide the cockpit between the A and B pillars into the vehicle.

The correct position at which the car body should stop is determined by optoNCDT ILR1030-8/LC1 time-of-flight laser sensors from Micro-Epsilon. They are particularly suitable for these and other comparable applications due to their short response time. The sensor is located on the same side of the assembly line as the assembly robot for cockpit installation. Measurements are taken at 100 Hz at the height of the A and B pillars of the vehicle and at a distance of approx. 600 to 700 mm. The sensor emits short laser pulses. When the car arrives on a belt, the laser light first hits the A-pillar and is reflected back to the sensor's optics. The measuring system is set up in such a way that the next time it hits the B-pillar it sends an analog output signal of 4 - 20 mA to the PLC, which finally causes the conveyor belt to stop. The vehicle is now correctly positioned and the gripper with the cockpit is activated by the PLC. The gripper can now guide the cockpit between the A- and B-pillars to the intended installation position. The sensor's advantages include easy integration into the production line, laser class 1, which does not require any additional protective measures for the employees, and its surface independence.

Precise measurements are also possible with the sensors from Micro-Epsilon on demanding black high-gloss surfaces as well as on metallic paints. Thanks to the non-contact measuring principle, the measurement object surface always remains intact.

Requirements for the measurement system

- Measuring range: 600 - 700 mm
- Accuracy: 2 - 3 mm
- Compact design due to restricted installation space
- Reliable detection of all painted surfaces even with problematic paints such as black/metallic
- No danger for staff due to laser class 1

Ambient conditions

- Indoor: production hall, dust, dirty devices, scattered light of production and ceiling illumination

System design

- Sensor: optoNCDT ILR1030-8/LC1
- Power supply unit: PS2031

Advantages

- Compact solution
- Easy integration into the line
- Process automation on the production line
- No influence on car body due to non-contact measurements
- No additional safety precautions for employees (laser class 1)