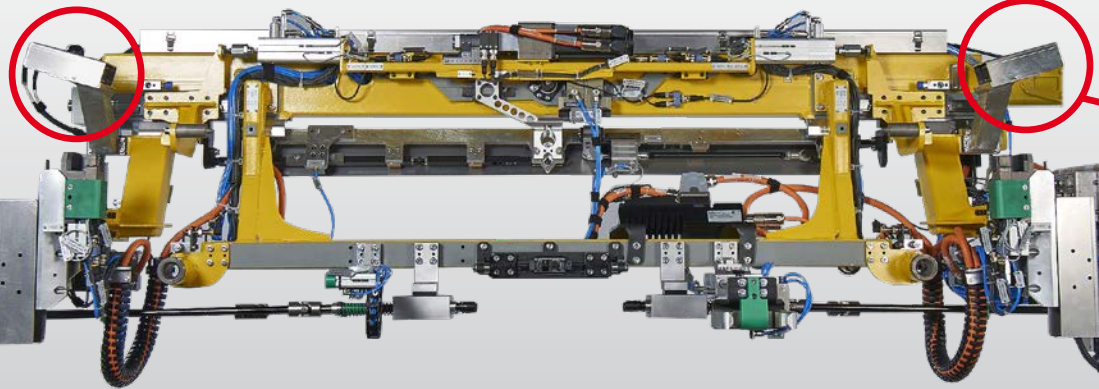




Laser profile scanner for cockpit assembly in cars

Fully or semi-automatic assembly of cockpit modules in the automotive industry requires the gripper tool to precisely position the assembly parts. Therefore, prior to attaching the module to the car body, a centered and height-adjusted alignment is performed. This compensates for possible gap tolerances between the cockpit module and the vehicle body. In addition, the module is positioned so that the other assembly steps, for example the attachment of adjacent vehicle parts such as design elements, can be done with ideal gaps.

During assembly, the gripper docks with the cockpit on the vehicle chassis. When the cockpit is successfully docked on both sides, laser profile scanners measure the current position of the module in the Y- and Z-axes in the vehicle coordinate system. In order to determine the measurement values, reference points on the cockpit skin are used, which are e.g. defined via certain intersections. Subsequently, the measured values are compared with the predefined set point values in order to determine whether the cockpit has been positioned correctly. When the values are calculated, the actuator is activated, which correctly aligns the cockpit module based on the reference points. In the next step, the cockpit is screwed onto the car body. As the laser scanners take over the measurement and positioning tasks, each cockpit module is individually adapted to the respective car body.

Micro-Epsilon laser scanners are particularly suited for these measurement tasks due to their SMART functions and the particularly small and lightweight measuring head. They can be easily installed on a robot or manipulator. Using the SMART function, a parameterization of the sensors can be realized without further hardware components via Ethernet. In addition, measured values can be visualized and transmitted directly to the controller.

The precise scanCONTROL laser profile sensor evaluates the complete profile internally and transmits the measurement values via Ethernet to the

control system. This enables the actuators to change the axis positions on the gripper in order to assembly the cockpit module in the ideal position in the car body. After the cockpit is fixed, the sensor determines the installation position of the cockpit which serves as proof of quality for each vehicle. For the entire process including the fitting of the cockpit, an extremely short cycle time of less than one minute is required. Measuring independent of surface conditions, the sensors provide reliable measurement values whether bright or dark paints are used, different gloss levels, variable surface structures and in unsteady ambient light conditions. The sensor automatically readjusts the exposure.

Requirements for the measurement system

- Measuring area: 100 mm (X-axis)
- Resolution: 50 μm
- Linearity: 200 μm
- Parameter set up via Modbus TCP
- Data transmission via Ethernet UDP

Ambient conditions

- Production hall (clean, dry)
- Constant room temperature
- Vibrations and ambient light (sunlight)

System design

- Sensors: 2x LLT 2910-100
- Software: scanCONTROL Configuration Tools

Advantages

- High availability of the system (utilization)
- Fast adjustment (cycle times are adhered to)
- Ensures highest assembly quality
- Fully automatic cockpit assembly