SURFACE TEMPERATURE CHECK WHEN SPOT LASER WELDING PLASTICS

Plastic welding is one of the most widely used technologies in the industry today to permanently join parts together. There are several plastic welding technologies: hot body, hot gas, friction, and ultrasound and also laser welding. Laser beam welding is good for welding very small plastic parts because of the size of the laser beam. The laser beam passes through the transparent part of the plastics and stops on the underlying part. At this point, the joint begins to heat until the two parts are joined together. To keep the temperature constant and for the long-term quality of the weld, this process must be monitored.

Task specification

In the company Xxxx, which is an important firm in the automotive industry and is one of the leading manufacturers of headlights for Mercedes Benz or, for example, Scania, - when welding the plastic parts of the LED module of headlights, maximum temperature of weld must be monitored during the welding process. Any temperature fluctuation outside the limits can result in a poorly welded part, which is consequently reflected in the quality of the final product. So, this process must be checked for each individual weld. For this check the ThermoInspector system was used due to visualization on the screen.
Solution

The **ThermoInspector** thermal imaging system was used to solve this application, which is the system for checking manufacturing processes, monitoring the stability and homogeneity of the temperature during processes, input - output thermal checking, etc. where up to 4 WIC thermal imaging cameras can be connected at the same time.

In this particular case, one camera was connected via Ethernet cable to the **ThermoInspector control unit**. The thermal imaging camera WIC was mounted on the robotic arm together with the welding laser. Because the component has three points for welding, the robotic arm moves with the laser, as well as the camera to the stated positions at the same time. The system was configured for a **fixed time measurement mode**, i.e. the camera checks the area in an image (ROI) for a fixed number of shots after the trigger signal arrives. The Trigger signal was sent to the ThermoInspector from the control PLC and activates it when the laser starts to weld. The control PLC serviced not only the robotic arm but also the entire production line. However, in this case, the other option would be also to use the **Start / Stop measurement mode**, where the camera checks the area during the time specified with two trigger signals. The robot speed can easily be adjusted. If the thermal limit is exceeded, an alarm is displayed on the screen informing the operator and a **record is saved** in the ThermoInspector. The system also has digital outputs that inform the control PLC of a wrong weld.

Because on this welding station three LED modules were welded, specific parameters were set in the system for each model, in particular the monitored area (ROI) - different for each model. The **ThermoInspector system enables the product type to be automatically changed**, i.e. type of LED module **without changing the setting**. As soon as the Thermolnspector trigger receives a signal from PLC about changing the LED module, it automatically adapts the setting for this LED module. A rectangle ROI was used as the ideal, which exactly defined the position of the weld. The maximum measured value / temperature in real time was checked and compared with the set limits in this area. **The whole process visualization was displayed on the ThermoInspector Touchscreen control unit for the operators.**