Every feature in one go: How multi-sensor systems minimise measuring times

by Birgit Albrecht

The precision technology company pretema specialises in the development and manufacture of electromechanical components, but this multitalented company is also a player in the areas of manufacturing technology and material types. When it comes to quality assurance, pretema relies on a multi-sensor measuring device from Hexagon Metrology that drastically reduces measuring times and scores points with its flexibility.

At first glance, some pretema products could be mistaken for jewellery. After all, the city of Pforzheim, aka „gold city”, isn’t that far away. Sparkling surfaces of stainless steel, copper alloys, nickel, aluminium, tin, palladium and other materials reflect light in the factory hall. At their location in Niefern, pretema employs around 550 employees, specialists in punching, galvanising, plastic, assembly and lamination technologies. Tools and moulds also are made there.

And as small as some pretema parts may be, the functions they perform are critical to the success of the final product. The company’s product portfolio includes small enclosures, made of plastic and stamped parts, which house acceleration and pressure sensors that are installed in vehicles. When an accident occurs, the customer-com-
Thanks to its “dual-Z” design, it can be combined with a host of optical and tactile sensors.

With this design, two vertical Z-axes move independently of one another. While the tactile sensor is taking measurements, the axis with the optical sensor is located outside the measuring range. As a result, plenty of space is available for using motorised rotary-swivel heads as well, which usually require more clearance to execute movements without collision. With conventional multi-sensor systems, optical and tactile sensors are attached to a single axis, the amount of space is limited and the danger of collision is greater.

Measuring time is reduced considerably
The Optiv Performance has proven itself to be a flexible instrument that enables measurement technicians to efficiently measure a spectrum of parts that changes every day. In the case of sensor housing measurement, the measuring time was reduced disproportionately. This enormous advantage was a result of training at Hexagon Metrology. Willi Littau, measurement technician at pretema, says „We worked with the Optiv Performance for several months and then received additional training. We saw an Optiv unit with a white light sensor in the training room and asked, ‘What can this sensor do? What is it good for?’ Then we were given a demonstration and were positively surprised. We got the idea of using the white light sensor for recording focus points on the Z-axis when measuring housings. Then we calculated how much time we would save by doing this. Ultimately, we ended up saving more measuring time than we originally thought. “

The technicians used to need three hours for the pallet measurement of 32 housings with a total of 1,200 features. Now, they get it done in just an hour with the Optiv Performance. „Our investment in a white light sensor paid off very quickly,” said Bauerfeld. The advantages of multi-sensor technology are fully utilised with this part, which is comprised of a variety of different materials. The tactile sensor is used for rough alignment. The high-resolution chromatic white light sensor accelerates the capture of surface topographies with a large number of measurement points. It determines the height of the housing. Based on the height measurement, the tactile sensor moves to the component and measures features such as the housing width and length of the plastic part. The diameter of the nearly invisible ball tip is just 0.3 millimetres. The punching geometry, on the other hand, is recorded by the
vision sensor, a high-resolution CCD camera. During the measurement, the white light sensor also detects the levelness that must be present within a very tight tolerance. The acceleration and pressure sensors are adhered to the surface of the housing later on by the customer and must be very level for this reason.

**Standardised software**
The pretema company also desired that the new device be programmable using a programming language with which the measurement technicians were already familiar to reduce training costs. “Another reason we chose multi-sensor technology from Hexagon Metrology is because we already use PC-DMIS on the tactile measuring equipment,” according to Bauerfeld. “Programming with this software is very efficient,” Littau added. “With Hexagon Metrology, we’re sitting pretty. The software hotline is outstanding.”

For series testing by machine operators, the user interface of PC-DMIS Vision was prepared accordingly and combined with third-party software. Programming is handled by the specialists in the measuring room. Staff from the manufacturing department are responsible for making measurements. To start the measuring process, the machine operator clicks a button in the user interface. An input mask asks for a name, batch, confirmation number and other information. An image depicting the clamping situation is then displayed. The machine operator clamps the part as shown and clicks the image. The measurement then runs its course. Operator influence is minimised in this way. The company used the same principle with an Optiv Classic 321 GL-series optical measuring device, which is used in manufacturing with a punch for the 2D measurement of punching strips during series production.

**Greater efficiency**
The advantages of the Optiv Performance are impressive, said Bauerfeld. “We are producing the sensor housing in greater number of variants all the time. In tool making, it’s becoming necessary to integrate an ever greater number of moulding cavities into a tool. For those of us engaged with measurement technology, this means that we have to measure more components and, at the same time, become more efficient in the measuring room. How do we mitigate this greater workload? In my opinion, investing in a second Optiv Performance would be the solution.”
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