

# OPTIV PERFORMANCE

pretema GmbH, Niefern



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 multitasking 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-



*With the Optiv Performance, the measuring time for this sensor housing was reduced by two thirds.*

pleted units send signals to the air bag, ABS or ESP controller. Manufacturing tolerances are extremely tight, for example, some of the punched parts have tolerances of just a few microns. Miniature versions of pretema technology can also be found on chip cards. The company supplies punched, laminated leadframes for chip cards that serve to retain the chip and provide a contact interface for it. The dimensions of their plastic parts, such as transmission control modules for cars, are a bit larger.

„We work with all sorts of materials with a wide range of thicknesses, widths and geometries. As a result, our measurement technology requirements vary greatly. We might be working with tolerances of plus or minus five micrometres, where we're pushing the measuring equipment to its limits,“ said Thomas Bauerfeld, head of quality management at pretema.

In the past, pretema has used tactile measuring devices from Hexagon Metrology and optical measuring devices from another manufacturer to cover its products. By purchasing an Optiv Performance from Hexagon Metrology, the company has for the first time invested in a unit that combines both measuring methods. The device is used for initial sampling, measuring equipment and process capability analyses, series testing, process improvement and CAD data comparison.

#### **No more machine hopping for measurement**

The major advantage of this measuring device is that it combines tactile and optical sensors in a single machine. „Time and again, we were confronted with the problem of having different clamping situations, as we would first measure optically and then tactilely on different machines,“ said Bauerfeld. „Usually, we'd be using two different pieces of equipment. We don't need to use the tactile machine first and then switch to the optical machine any more, and that saves an enormous amount of time. Thanks to the combination of different measuring processes in a single machine, we save a lot of time.“

It was important to pretema that the new machine be capable of accepting tactile rotary-swivel sensors. „We need a rotary-swivel head to measure our plastic parts. Our existing optical machine could be outfitted with a tactile sensor, but the sensor could not swivel.“ The Optiv Performance proved to be the ideal solution.

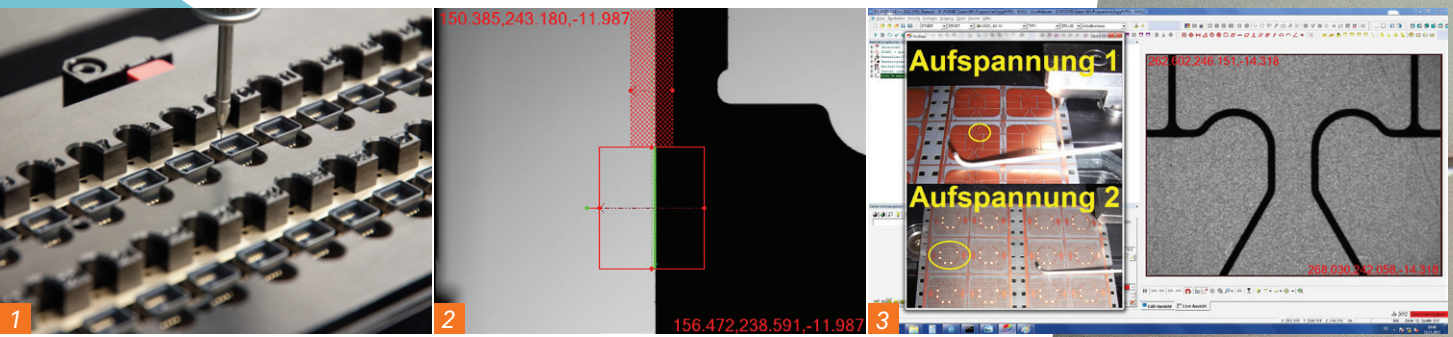
Thanks to its „dual-Z“ design, it can be combined with a host of optical and tactile sensors.

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 pretema as 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



- 1 A sensor with a tip diameter of 0.3 millimetres records the housing width and length.
- 2 The vision sensor records the punching geometries of the housing.
- 3 Machine operators measure leadframes during series production. The user interface of PC-DMIS Vision points the way.
- 4 Every position of the leadframe has to be right.

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.

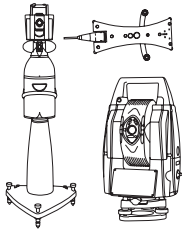
#### Standardised software

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

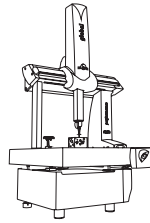
The advantages of the Optiv Performance are impressive, said Bauerfeld. „We are producing the sensor housing in greater number of variants all the time. In tool making, it’s becoming necessary to integrate an ever greater number of moulding cavities into a tool. For those of us engaged with measurement 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.“



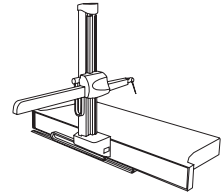
LASER TRACKERS & STATIONS



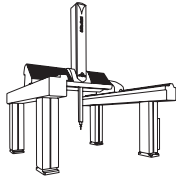
PORTABLE MEASURING ARMS



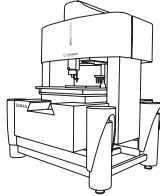
BRIDGE CMMS



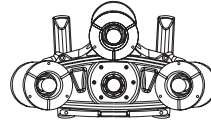
HORIZONTAL ARM CMMS



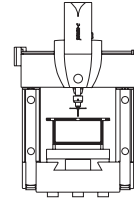
GANTRY CMMS



MULTISENSOR & OPTICAL SYSTEMS



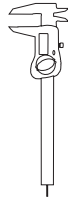
WHITE LIGHT SCANNERS



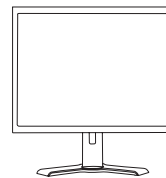
ULTRA HIGH ACCURACY CMMS



SENSORS



PRECISION MEASURING INSTRUMENTS



SOFTWARE SOLUTIONS



## HEXAGON METROLOGY

Hexagon Metrology offers a comprehensive range of products and services for all industrial metrology applications in sectors such as automotive, aerospace, energy and medical. We support our customers with actionable measurement information along the complete life cycle of a product – from development and design to production, assembly and final inspection.

With more than 20 production facilities and 70 Precision Centers for service and demonstrations, and a network of over 100 distribution partners on five continents, we empower our customers to fully control their manufacturing processes, enhancing the quality of products and increasing efficiency in manufacturing plants around the world.

For more information, visit [www.hexagonmetrology.com](http://www.hexagonmetrology.com)

Hexagon Metrology is part of Hexagon (Nordic exchange: HEXA B). Hexagon is a leading global provider of design, measurement and visualisation technologies that enable customers to design, measure and position objects, and process and present data.

Learn more at [www.hexagon.com](http://www.hexagon.com)

© 2014 Hexagon Metrology. Part of Hexagon

*Due to continuing product development, Hexagon Metrology GmbH reserves the right to change product specifications without prior notice.*