Contact-free and accurate: An alternative to 3D measuring machines

In the field of quality assurance, 3D measurement machines are often indispensable. This is especially the case if via sensors, coordinate values (x, y and z) are to be registered from workpieces automatically, and with a high level of repeatability and transferred, for further processing to a PC, which then calculates and stores the measured results. However the situation is complicated if a component to be examined is weak in such a way that no reliable measurement data can be established via a sensing system. A new development now makes this possible – without contact, however with efficiency and a high level precision.

As Uwe Schneider, Managing Director of Modellbau SCHNEIDER GmbH (Olpe at Lake Biggesee) explains, “We basically manufacture caliper gauges for 3D parts”. With an unassuming position in the field of foundry technology, the master model maker is surely respected. Yet, over the past couple of years, Schneider has successfully steered his company to become a specialist in the development and manufacturing of test gauges and measurement equipment. In addition, the company develops and manufactures foundry models, functional models, designer models, prototypes and welding equipment on over 800 square meters of production space. Here, an exceptionally large range of materials is processed with a high level of vertical integration on modern five-axis milling machines.

A solution was sought for examining weak components

Modellbau SCHNEIDER’s clients mainly come from the automobile industry, and are both manufacturers as well as suppliers. And from what was, to some extent, an initial spark, it is exactly this source that gave the company the stimulus to develop a completely new kind of measuring system. “An automobile supplier needed a solution that enabled a component to be examined at various measurement points, both highly effectively and quickly. As the component was very weak however, a tactile system could hardly be considered”. Looking back on the event, Uwe Schneider adds: “The examination also had to take place without contact. In doing so, the measurement data for the evaluation and documentation had to be transferred to a PC”. “In addition, the system should be operable by all, i.e. deliver the measurement results straight away at the touch of a button.”

Valuable support in the field of sensors

With such a long ‘wish list’, it isn’t any wonder that Uwe Schneider and his staff had to work meticulously for around a year until they could then present a system that was ready for the market. In so doing, the master model maker gained key support from ipf electronic, the sensor specialists from Lüdenscheid. As Uwe Schneider adds: “As a master model maker, I surely have some knowledge relating to the potential applications of sensors. However, we required advice and help in this field. For us, the expertise and the experience of ipf electronic was very valuable in the course of

the development process. I particularly learnt to value the ability of the company to immerse itself in totally new applications. Through this, it is also possible, among other things, to quickly limit options related to the respective sensors which come into question. Furthermore, during the entire development phase, ipf electronic was always there for me with help and advice."

With persistence, the road to success

If somebody develops something new, setbacks should also be accepted. With the development of the new measurement system, it wasn't any different. As such, the initial approach involving integrated measurement clocks did not lead to the desired aim, "The component to be examined was so weak that the vales of the individual measurement points changed with different measurements. In addition, it was not possible to rule out system-related operating errors on the part of the machine operator. Also, the use of inductive sensors did not fulfill our requirements. Furthermore, I felt that this approach, with regard to a system that is supposed to work reliably over a long period of time, seemed to be too insecure. Finally, ipf electronic recommended that we use distance-based laser sensors which, at the end of 2011, helped us achieve a breakthrough. At the start of 2012, we were able to envisage the first system with a registered trademark - MS-Lasermess."

Modular, non-contact, accurate, fast

The MS-Lasermess is a modular measurement system which is integrated in a test gauge. Without making any contact, the system measures the permissible maximum and minimum dimension of a specimen at one measuring point or several measuring points with an accuracy of up to 0.01mm. This is where the 1800 series distance-based laser sensors (Fig.1) from ipf electronic come in. These are positioned around the component to be examined depending on customer requirements and/or the number of measuring points on holders.

Fig. 1.

The sensors have a measurement range of up to 120mm, and with the integrated microcontrollers, they deliver an accurate, proportional output signal for the measured distance. The signals are transferred to measurement boxes (that Modellbau SCHNEIDER has designed itself) and emitted, wherein up to four distance-based laser sensors can be connected to each measurement box.

The results of the examination are visible straight away

In different ways, the examination results are visualized for the operator of the system via the measurement boxes (Fig. 2). As such, as a result of integrated green and red LEDs, it is immediately clear to see whether a measured value is within or outside the programmed limits. Furthermore, via a diode display with an arrow indicator, the operator can immediately see whether the deviations in the measurement move up or down (respectively) with regard to the limits. In addition, another display (also integrated in the measurement box) emits the results concerning the individual measurement points as a number.

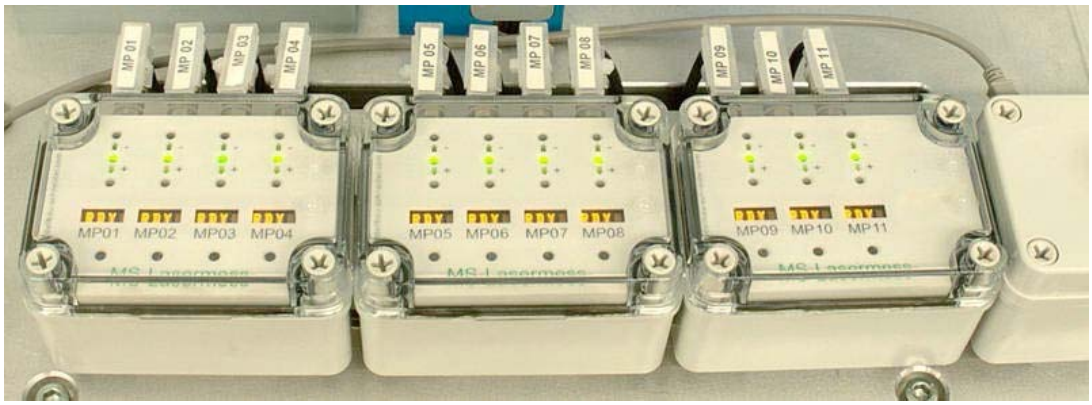

Fig. 2

“Insert, clamp, press the button, ready”

Other benefits of the MS-Lasermess lie in its exceptional ease of use, speed and modular construction. As such, as opposed to 3D measurement machines, no qualifications are needed for the handling of this non-contact measurement system. The component is merely inserted into the clamping device which is provided and fixed. The examination sequence is started at the touch of the button and the results are transferred to a PC for evaluation and the memory. This takes place using freely selectable QA software. “Insert, clamp, press the button, ready”, Uwe Schneider summarizes the minimum step procedure and at the same time, provides the following consideration:

"For a component with eleven measurement points, a 3D measurement machines needs approx. 0 minutes to establish all the values. With MS-Lasermess (Fig.3), the same examination takes around 20 seconds, and by that time, I have already stored the measurement results in a PC. Apart from that, in particular, very weak components cannot be examined with 3D measurement machines."

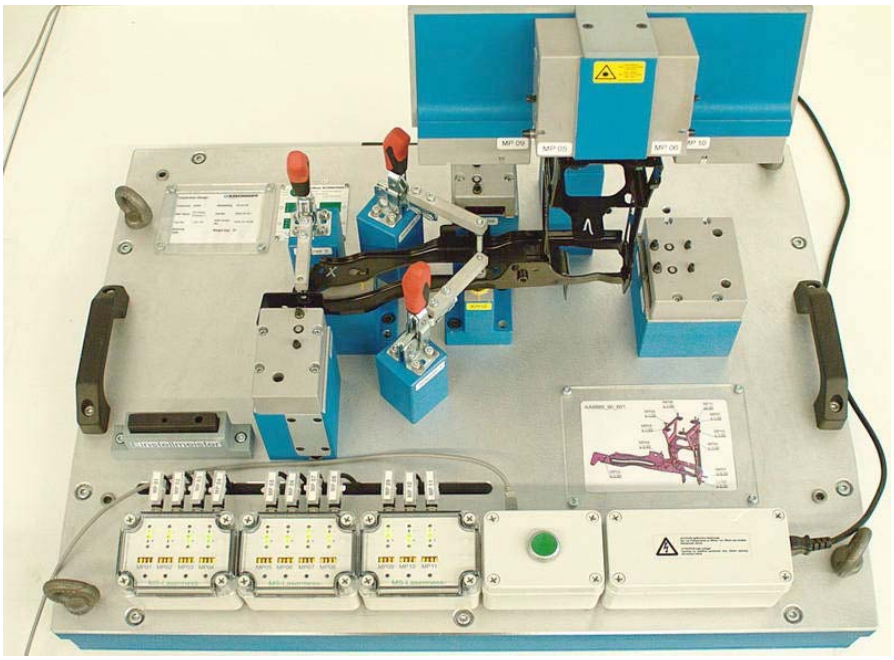

Fig. 3

Can be flexibly expanded to suit

When it comes to the modular design, the sky is essentially the limit for the new development. Based on the number of measuring points that are required, the MS-Lasermess can be flexibly expanded using other measurement boxes and distance-based laser sensors. Here, there are limiting factors, e.g. the size of the test gauge alone and perhaps certain physical limits related to a specific component. As Uwe Schneider states, "With respect to the number of measurement boxes, I have not yet set an upper limit. Currently we are developing a test gauge for a client, with 24 measurement points."

According to the Managing Director, the integration of other inquiry options into the MS-Lasermess does not present a problem. "Recently, a client wanted to inquire about the temperature of the gauge and the component in addition to the examination. We were also able to realize this solution with the help of sensors from ipf electronic."