

The Searching *Look*



Industrial Quality and Process Control with Remote, Non-contact Optical Sensors

Polytec's interferometric sensors optically measure vibration, velocity, length and surface integrity. In addition, they offer many specific advantages for industrial production applications such as precise results without contact, a flexible retrofitting and continuous operation under industrial conditions with low maintenance and few repairs. Several applications are outlined within this article.

A company's profitability and success often depend on the optimization of a product's performance. This optimization depends on design as well as the manufacturing process, key to keeping costs low and quality high. A poorly manufactured product can ruin the best design and the company depending on it. Today's products are smaller and more complicated than before. Structures are continuously decreasing in size, and incorporate more semi-finished materials. Inspection of these small structures is a big challenge to test engineers managing the quality and process control. At the same time, the number of products being inspected is increasing enormously driven by the current push towards zero-manufacturing failures leading to 100 % inspection of all manufactured products instead of traditional statistical process control.

Optical technologies are ideally suited to current and future quality control measurement challenges. Polytec has developed a series of compact and rugged interferometric sensors for production testing that cope with the special conditions of an industrial environment. The test parameters measured are not affected by the measurement since contact with the test item is avoided. High resolution along with a large measurement range ensures highly precise measurements with a high level of reproducibility and thus allows an unrivaled test depth. Through flexible stand-off distances the sensors can be integrated into the test environment almost without limitation. The stand-off distance combined with simple integration and static fixturing suggests low maintenance requirements, as no wear and tear on mechanical components is to be expected.

Household and Medical Appliances

Household appliances and medical equipment can have unplanned vibrations and noises when assembled in manufacturing. These anomalies are detected in production using laser vibrometers and are removed from the process. Examples of products inspected in this way are washing machines, vacuum cleaners, electric toothbrushes, dental instruments or drive systems for medical equipment. For critical medical devices such as membrane inhalation systems, 100 %-inspection is required to assure that the products work properly (page 18).



Vibration measurement on a dentist drill (Photo: Myonic)

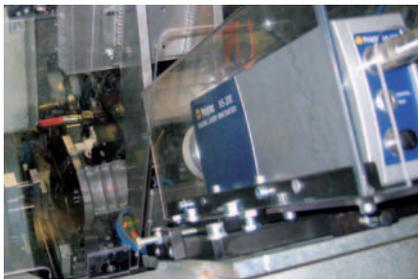
Quality measurements made on a washing machine motor using laser vibrometer (Photo: BSHG)



Automotive Industry

In the automobile and automobile supply industry, laser vibrometers are a familiar sight in production testing. They are used for noise and fault analysis in components with moving parts, such as combustion engines, gearboxes, steering systems, climate control systems, injection valves, actuators and small drives, but also

(Photo: P. Marpe, TRW Automotive)



for material testing, for example on cam shafts or light bulbs. The images show a facility for 100 % quality assurance on vehicle components using the IVS-300 Digital Laser Vibrometer (left), and a test stand for material testing on light bulbs using the CLV Compact Laser Vibrometer (right).

More info: **Issue 2/2004.**

(Photo: Philips)



Semi-Finishing Industry and Production Technology

Polytec Laser Surface Velocimeters (LSVs) monitor the length and speed of strip goods in the production process. The LSV can be used on most surfaces, including metal sheeting, film, paper or red-hot steel (see image on page 6). High frequency vibrometers can monitor the quality of ultrasonic-based joining techniques, such as welding plastics together (page 16) or wire bonding between pads.

More info on page 24 and on www.polytec.com/usa/lsv.

Polytec LSV measures section lengths in corrugated cardboard production



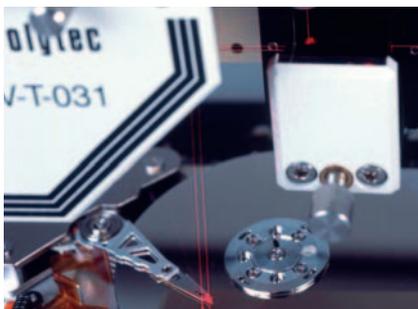
You will find further information and example applications on our industry portal page www.polytec.com/usa/industrial.

Please download previous issues of the LM INFO Special from www.polytec.com/usa/LM-INFO.

Data Storage and Microsystems Technology

Single point and scanning vibrometers are used in manufacturing data storage media, in particular hard disks. They are used as highly sensitive detectors for undesirable deviations in the dynamic behavior of filigree components, but also in testing DVD players or bubble jet printers.

Left image: non-destructive quality control on hard disk components using the OFV-552 fiber-optic interferometer.



Center: Surface quality of a hard disk bearing part measured by the TopMap White-Light Interferometer. Right image: The static and dynamic properties of micro-sensors, actuators and other MEMS components can be tested in production even at wafer level using the MSA-400 Micro System Analyzer combined with a Wafer Probe Station.

More info: **Issue 2/2004, Issue 1/2005 and page 20.**

