



100% Inspection of Vehicle Tolling Computers

Acoustic Testing Delivers 100% Quality Inspection of On-Board Tolling Computers

At Continental AG, Polytec industrial vibrometers are used for 100% inspection of tolling computers. The IVS-400 Industrial Vibrometer is integrated into the tolling computer test station to measure the structure-borne sound of a component without direct contact, ensuring that a specified target value is met and that the component functionality is assured.

Tolling Computers Help Fund Growing Infrastructures

Increasing freight traffic and volume on roads and highways are being forecast. To develop the necessary infrastructure and to properly maintain it, tolling systems have been developed which automatically capturing individual journeys and permit allocating toll charges by individual use. The on-board tolling computers are developed and produced by Continental for the German and European markets.

The product portfolio covers all aspects of the tolling system (Fig. 1). In addition to the dashboard and front screen solutions that can be retrofitted to existing vehicles, DIN slot solutions are being offered. Continental is also providing the on-board units for the Slovak Republic.

100% Inspection in Production

To ensure the uninterrupted service of the tolling computer, the final units are subjected to 100% inspection. In addition to testing the actual functions, for example GPRS tests, the keys are tested mechanically with the aid of a robot. Acoustic testing of the alarm buzzer is also performed. The measurement task involves comparing measured outputs with predefined amplitudes according to vibrations produced at 2,700 kHz for example. All measurement data must be recorded. The acoustic testing has been carried out in a closed cell (to screen out external noises) using a microphone measure-



Fig. 1: Various tolling units.

ment, but this procedure has been relatively unreliable, possibly as a result of the reflections inside the closed housing.

Measurements independent of Ambient Noise

Preliminary tests with an IVS-400 Industrial Vibrometer, initially in the lab, then directly on the production floor under real conditions with running machines, provided such promising results that Continental has decided to integrate these vibrometers into the final test station. The vibrometer makes measurements without making contact, is free from wear and works without specialized fixtures or noise insulation. The high level of noise in the production environment does not affect the measurement results because the laser vibrometer measures the structure-borne sound on the surface of the device under test. Since the IVS-400 uses a collimated laser probe, measurements can be made from great distances without any problems, and the selection of the sample point is not critical. For standardization or "referencing" between the required air-

borne sound level required and the structure-borne sound measured, a "golden sample" is required to verify and calibrate the frequency and amplitude limits.

Seamless Integration into the Production Environment

The IVS-400 Industrial Vibrometer (Fig. 2) is a Single-Box-Solution, only needs a small amount of space and can manage the measurement task from a suitable stand-off distance because of the laser probe and measurement principle. By linking the vibrometer into the production process, integrated real-time 100% quality control on the components with good/bad evaluation is possible. The inspection process can be automated and can be realized with the help of appropriate Visual Basic® macros. It is simple for the customer to program, change and maintain the macros. The interface between the vibrometer and the process control system is also standardized. The IVS-400 is equipped for future applications (new test specimens or other measurement parameters) with its wide fre-



Fig. 2: IVS Industrial Vibrometer in a test stand at Polytec (not related to the application described here).

quency response, making investment in the technology really worthwhile. The IVS-400 helps ensure product quality and increases the cost-effectiveness of the production process.

Polytec's Industrial Vibrometers – Reliable Measurements under Harsh Conditions



The **IVS-400 Industrial Vibrometer** is an integrated single-box digital vibrometer, specifically developed for non-contact vibration measurement in production test applications. It features a robust and compact design, sealed (IP-64 standard) to cope with the challenges of harsh industrial areas. It exploits the latest digital signal processing techniques to ensure accurate and



repeatable measurement from uncooperative surfaces. Further benefits include three measurement ranges up to ± 500 mm/s, an excellent signal/noise ratio and a linear frequency response from 0.5 Hz up to 22 kHz.

The all-in-one **CLV-2534 Compact Laser Vibrometer** comprises a 19" rack-mountable controller supplying laser power to the vibrometer head via a fiber optical cable. The unit is compact and flexible in application. Surface vibration is measured

in velocity and displacement with high precision and low noise over a bandwidth of 3.2 MHz at 10 m/s maximum velocity. A wide range of options such as an integrated video camera and microscope objectives make the CLV-2534 an ideal tool for industrial and lab measurements on structures varying in size from the micro to the macroscopic.

More Info:
www.polytec.com/vibrometers