Inspecting 3D automotive glass

Through close co-operation with customers, Precitec Optronik has been a leading innovator in measuring the thickness and topography of glass of any colour or surface structure. According to Damien Dupraz, recent innovations include the 3D inspection of automotive windscreens.

CHRocodile sensors are the industry standard in wall thickness measurement of glass containers in inspection machines, gauge measurements of display and tubing glass. Even circular deviations in bottles and the wall thickness of hot quartz pipes or function foil in pre-fabricated sandwich layers can easily be determined. Moreover, more innovations are expected in the future, including the 3D inspection of automotive glass.

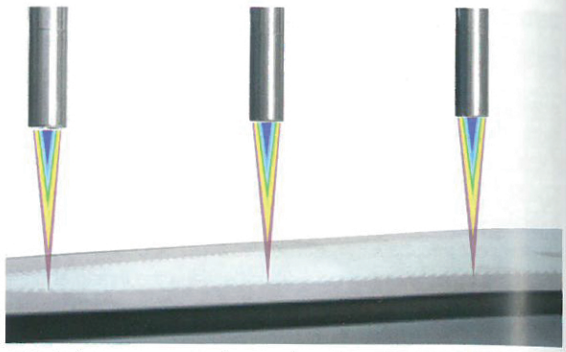
In recent years, the glass industry has been confronted with another challenge: Controlling and inspecting automotive windscreens. Their shapes have become increasingly complex due to highly innovative car designs. As panoramic car roofs with big glazed surfaces become even heavier, traditional measurement tools such as LVDT touch probe sensors have reached their limits.

How is the shape of windscreen controlled? The numerous contact probes are uniformly positioned in a dedicated frame (one frame per windscreen) above the surface of the windscreen. Each frame delivers a point of altitude and the combined data (mesh) provides information on the general shape, which can then be compared to a reference CAD file. However, this technique is severely limited by the fact that the contact between the tools and the windscreen can negatively affect the shape of the windscreen during measurement.

Cost-effective 3D measurement

In partnership with a world leader in the glass industry, Precitec has developed an innovative generation of sensors, the MPS96 multi-point sensor, offering up to 96 simultaneous non-contact measurements (expandable to 140 channels) in distance and thickness mode. This represents an excellent alternative to contact solutions.

To simplify implementation, a dedicated 10mm measuring range probe has been developed to help with the mechanical integration requirements in the windscreen inspection machine. With a frequency of 2000 simultaneous points per second on all channels, the shape of the windscreen is measured instantaneously. This non-contact solution is also a cost-effective solution thanks to the concept's robustness, as it is never mechanically stressed. This is unlike touch probe sensors that suffer from wear, need to be replaced frequently and thus, significantly increase the total cost of ownership.



2000 simultaneous measurements are performed every second on all 96 channels.

Windscreen handled by a robot.

Other automotive industry applications

Precitec sensors are also used in other windscreen manufacturing processes, such as inspecting sound insulators. The sound insulation layer is located between the two glass elements that make up a windscreen (laminated glazing) and prevents the glass from breaking in the event of an accident. As this material is opaque before treatment (industrial press and autoclave), interferometric infrared IT sensors are used.

With the constant increase in the positioning and repeatability accuracy of industrial robots, there are now different ways of measuring shape. These robots are used in combination with a confocal chromatic point sensor, CHRocodile 2S to obtain continuous profiles of a windscreen. Data acquisition is slower but more versatile thanks to fast adaptation while changing the reference windscreen.

Meeting future challenge

Building on its experience in the automotive industry, Precitec is developing solutions for applications in the aeronautical industry. Manufacturers of aircraft windscreens face significant resistance issues as their products are four times thicker than a car windscreen. The CHRocodile MPS96 sensor generation enables the application of ultra-precise technology (submicron accuracy) on very large workpieces of several metres in diameter. ●

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