Focus on Applications

Forms and Transparencies

Time was when car glazing were simple flat glass panes. Today, automotive glazing surface becomes wider to increase visibility to the outside and the amount of light of the car inside. Glazing style becomes richer and more complex to fit car shapes of all segments, becoming more and more flexuous and appealing, but above all it is now integrated with additional services, like de-vapour devices, optical and temperature fitting, sensor-type sound insulation, radiofrequency antennas, safety systems. Glass fitting with simple rubber trims is gradually going out of use, and is replaced by gluing thus making of glasses a real component of the car body, that as such has to meet structural and mating characteristics that are similar to those of sheetmetal.
As a result, glazing manufacturers have had to adapt their manufacturing technologies to this essential part of automotive evolution. This step has been neither fast nor simple. It has required the creation of new Research and Development centers with the task to define, inspect and provide Production with new technological solutions.

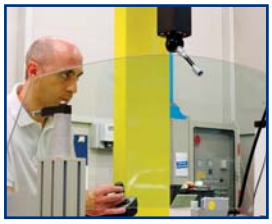
Pilkington Group Limited is one of the world's largest manufacturers of glass and glazing products for the building and automotive markets, with manufacturing operations in 24 countries and sales in 130 countries. Pilkington was founded in 1826 and remained a private company until 1970 when its shares were listed on the London Stock Exchange. Over the last ten years, Pilkington has set up three development centers (GSC - Glazing Systems Centre) for Product Technologies and Tertiary Operations, serving the three main geographical areas: Americas, Asia and Europe.

On the subject, we've interviewed Mr. Sergio

Pulcini, who is responsible for Prototyping and R&D in the GSC unit of Pilkington Europe, based near Turin.

"Tertiary Operations in our production represent a very complex, value-added part in the making of automotive glazing" Sergio Pulcini explains. "Our development activity spans over the whole process, from production of the flat pane to pane shaping, but in GSC in particular, it concentrates on the implementation of technologies and processes related to tertiary operations. The GSC units are equipped not only with development tools and resources, but they reproduce in little the manufacturing equipments. In this way, we are able to simulate the whole process and to deliver the full solution to the manufacturing plants. Pilkington's commitment to innovation means new glazing systems and technologies that undergo rigorous quality and durability testing. It also provides prototyping, testing and sampling facilities in the run-up to production to ensure that all demands have been met in the final product."

Pilkington is a leader in the development and use of computer simulation for advanced glazing



The Glazing Systems Centre Europe uses a DEA Typhoon 33 15 13 equipped with a Metris sensor for laser digitizing, besides contacting probes.

technology, at centres in Europe, North America and Japan (NSG). Computer simulation plays a key role for the vehicle manufacturer and for the glazing supplier providing quick, accurate information on:

- manufacturability/shape achievability/cost;
- tooling design (performance, cost impact);
- optical performance;
- process selection (e.g. press bending vs. sag bending);
- surface manipulation (optimised surface control).

This is the reason why dimensional and form inspection plays a key role in all GSC activities: from the inspection of raw material, i.e. shaped glazing that will subsequently undergo tertiary operations, to the design of technologies for accessory components integration, inspection of gauges for series production and not least – the check making sure that a good job has been done during simulation processes."

"The forms of car glasses get more and more complex thus originating considerable complications in the integration of tertiary operations" Sergio Pulcini continues. "If they do not meet dimensional tolerances and the shapes defined in the design stage, glasses may be subject to breaks in the integration of trims, assembly frames, reinforcement structures and gluing material. For this reason, the employment of the measuring machine is essential to suitably define the processing cycles and correct any anomalies. We use tactile sensors for the dimensional control and surface inspection of characteristic points, while form inspection is performed for glass surface digitizing through a laser system and subsequent comparison with the mathematical model."

The support provided by GSC to manufacturing departments also includes the certification and calibration of fixed gauges that are used for in-line inspection of glasses.

"Many of the in-line inspection activities are still carried out with traditional tools (fixed gauges). We as a development center instead have started and grown with coordinate measuring machines. We derive an undoubted advantage from using them and the most important step in the last few years has been the possibility to use laser-stripe digitizing sensors. Through the fast reverse engineering of the glass surface we are able to analyze and correct in a short time any anomalies that might cause problems to production and in some cases we are also capable of reproducing parts whose mathematical definition is not available."

Mr. Pulcini, what are the next developments in car glass technology and what do you expect from your suppliers of control systems?

"Once again, I'll talk of forms. In many cars that are already being manufactured, but in particular in many style prototypes, the windscreen and the rear window extend to the body sides wrapping a considerable portion of the interior compartment. This means not only bigger sizes but also forms that are difficult to manufacture and then measure. Therefore, we have to think of measuring tools that are capable to gain access to tight areas and details, and measurement softwares that are able to process data suitably. One more aspect is important for our analysis: the representation of measurement results. The flexibility and the possibility to customize inspection reports are fundamental to be able to accurately and quickly identify the information contained in a huge amount of data. "Not least important is the rate at which the information are produced that go along with every development stage. By now, development takes a really reduced time that would be unthinkable a few years ago." ■

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