Fast and accurate dimensional measurement of glass containers

Philippe Spiteri presents ProLab, an innovative system designed specifically to help glassmakers bring the forming process to target pack-to-melt efficiencies.

A glance at the containers travelling on the cullet conveyor at the cold end of a glass container factory usually gives a good indication of the overall quality of production. Unfortunately, a fair amount of glassware produced every day fails to reach customers and although the industry as a whole has made significant progress towards zero defect production, the cullet conveyors are still getting plenty of use at most cold ends. Each one of those containers is not only a loss in term of revenue but most importantly in the intrinsic cost of energy to produce it.

Over the last 15 years, the focus of the industry has shifted from quality selection, with cold end inspection machines sorting the good from the bad, to quality improvement, with equipment putting information in the hands of the bottle maker at the hot end, where quality is made. This shift from an environment where quality is controlled to prevent packing defective containers to a paradigm where quality is manufactured has proved essential to increasing productivity and reducing production costs necessary for long-term sustainability against alternative packaging solutions.

Experience shows that continuous monitoring, trend analysis and careful planning of corrective actions are the main ingredients to a stable process. A slow drift in production, if not corrected in due time, can affect the critical dimensional characteristics of a container. The challenge, of course, is to anticipate the drift and take corrective action before any defective containers are produced.

DIMENSIONAL MEASUREMENT

ProLab is the latest addition to an array of tools to keep the forming process under control and improve the quality of containers produced. It provides fast, accurate, semi-automated dimensional measurement of glass containers at the hot end, where the bottle maker can take immediate action. ProLab is designed specifically to measure dimensions of the container including lean, internal bore and glass thickness. As this information comes traditionally from the cold end, this results in a significantly reduced feedback time to the hot end operator. The machine is equipped with a high-precision laser system to perform all external dimensional measurements. In addition, a non-contact chromatic glass thickness device measures the wall thickness of containers. The glass thickness sensor is mounted on a linear positioning slide, which automatically moves the sensor to the correct distance from the glass surface for optimal measurement. Containers up to 250ºC are placed on a temperature-resistant table with an elevator lowering the container to different locations in front of the measuring devices. During 360º rotation of the container, these two measuring devices continuously capture information to calculate the absolute measurement for the corresponding location.

INTUITIVE OPERATION

ProLab uses proven technology to perform the measurements. Particular care was given during the design to ensure the machine withstands the harsh environment at the hot end. It also became clear during the early phase of field tests that to be accepted by hot end operators, the machine had to be very intuitive and easy to use.

Besides its high-precision measuring capabilities, an important feature of ProLab is the simplicity of its user interface. Live graphical representation of each measurement is displayed on the touch-screen monitor, providing real-time feedback. When measurements fall outside predetermined limits, icons change to red, while measurements within specification show up in green. If the operator requires more information, he

simply touches an icon on the screen to display a more detailed graph. Throughout the various screens, the user can zoom into the data and pan around with ease.

To complement its capabilities, ProLab comes standard with onboard database storage and data analysis software to review historical data and perform trend analysis. The system offers built-in ability to display SPC control lines for specific cavities or the complete machine and calculate process improvement variables (average, distribution, standard deviation and various other key performance indicators). When connected to a network, all measurement values are available to a factory information system for further processing and custom reporting.

VALUABLE INFORMATION RESOURCE

Providing semi-automated dimensional and wall thickness measurements of containers at the hot end is a major breakthrough in keeping the glassmaking process under control and increasing productivity. ProLab provides valuable product quality information where the bottle maker can take immediate action, thus significantly reducing the response time to possible anomalies. Furthermore, by shortening the feedback time to the hot end operator, the machine is proving to be an effective tool in bringing the forming process to target pack-to-melt efficiencies after a job change.

With a relatively small footprint of 1200mm x 650mm, ProLab easily finds its place at any hot end to bring the glass container industry one step closer to the ultimate goal of zero defects production, necessary for long-term sustainability. ■

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