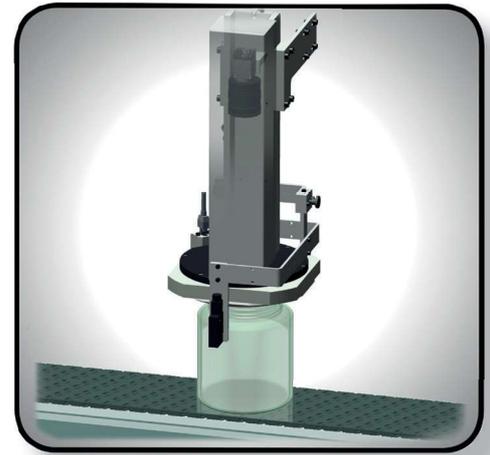


Tiama's Dip and Saddle measurement device

Pascal Leroux* discusses a new feature for a 3D characterisation of the container finish surface.



► DSM operating principle.

For many years, Tiama has worked as a pioneer in the digitalisation of the glass industry.

In particular its aim was to reduce the handling of articles and gradually give up control devices that only give basic good bottle/bad bottle information and move towards ones that deliver real measurements.

These measurements are fundamental to the approach of industry 4.0. In addition to being more relevant in the discrimination of defective articles and optimising productivity, the measures allow to detect process deviations and act by anticipation in order to ultimately, regulate automatically the glass process by multiplying closed loops.

In the past two decades, Tiama was at the origin of some major breakthroughs in the glass inspection industry. The NCT+ which was a non-contact thickness system, has revolutionised this type of control and helped glassmakers decrease the weight of their articles. The NCG, launched more recently, can also be highlighted for ring and neck diameters. In 2017 Tiama launched the WEM - Wire Edge Measurement- providing the possibility to measure the containers finish inner protrusions.

With the Dip and Saddle Measurement (DSM) Tiama is once again proving its inventiveness and proposing to its customers a major new step forward that will allow them to optimise the approach of this critical defect, especially in the production of jars.

Finding an alternative solution

Currently, the Dip and Saddle defects are detected by carousel machines, using mechanical tools in contact with the containers. These types of systems, although useful, have disadvantages. Due to continuous metal contact with

the finish, the mechanical spare parts wear out involving maintenance costs and downtime. Plus, the concept of mechanical measurement presents precision limitations and the accuracy of the initial mechanical settings are directly linked to the operator's level of expertise.

Therefore, Tiama's challenge was to develop and offer a new in line, non-contact system able to provide an alternative solution with improved performances. The company then decided to launch the DSM, a non-contact, non-rotating, optical system with high speed analysis for the measurement of uneven surfaces of the containers finish.

Operating principle

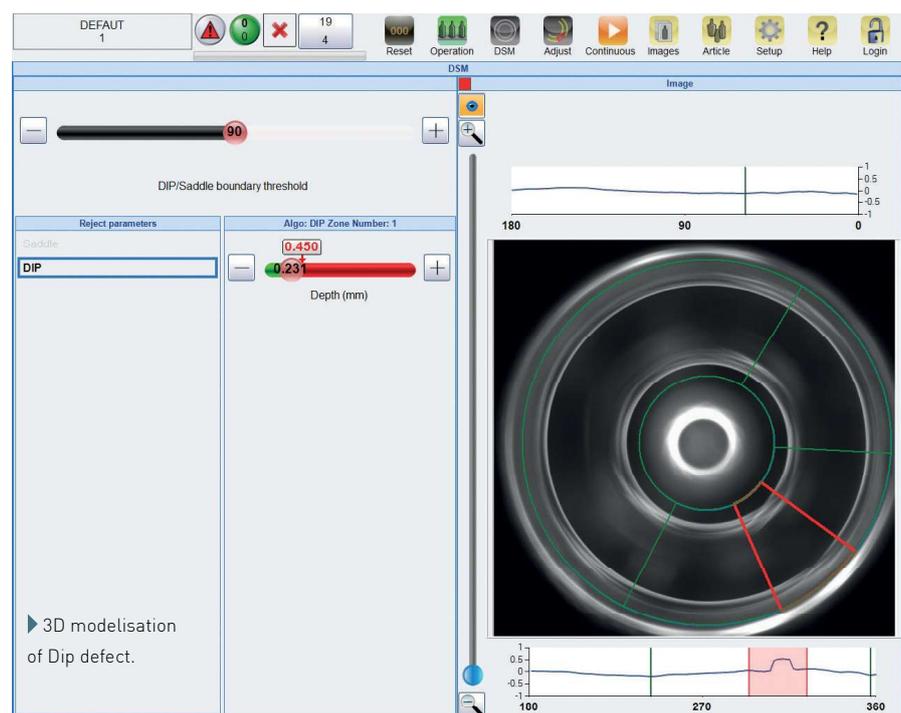
With a dedicated, patent pending light source, integrating optical mirrors produced by partners from the space

industry, and highly defined cameras with five million pixels, the finish surface has never been more precisely characterised.

While other solutions on the market combine several 2D views with matrix cameras, not found to be precise enough to guarantee a good repeatability of measurements, the Tiama system, with its high resolution images and optical principle, can give precise 3D mapping of the container ring surface that can be used to assess the quality of the container's finish and establish the measurements of:

- Dip defects (lack of material of the finish surface) up to $150\mu\text{m}$ ($\pm 15\mu\text{m}$)
- Saddle defects (Double and symmetrical distortion of the finish surface) up to $350\mu\text{m}$ ($\pm 50\mu\text{m}$)
- Off level finish (Slope on the finish surface) up to 1mm ($\pm 200\mu\text{m}$)

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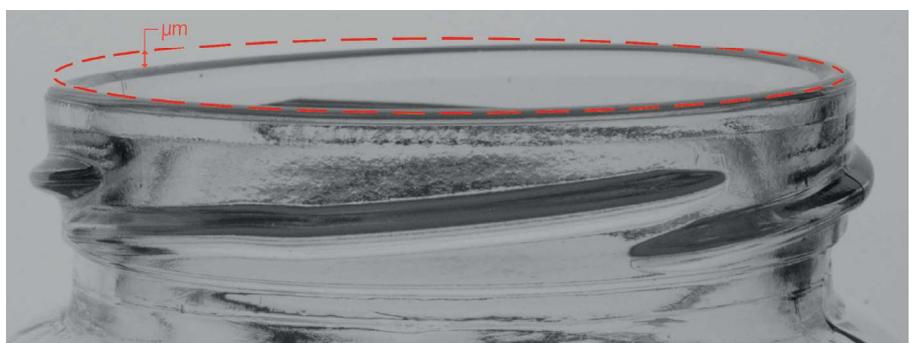
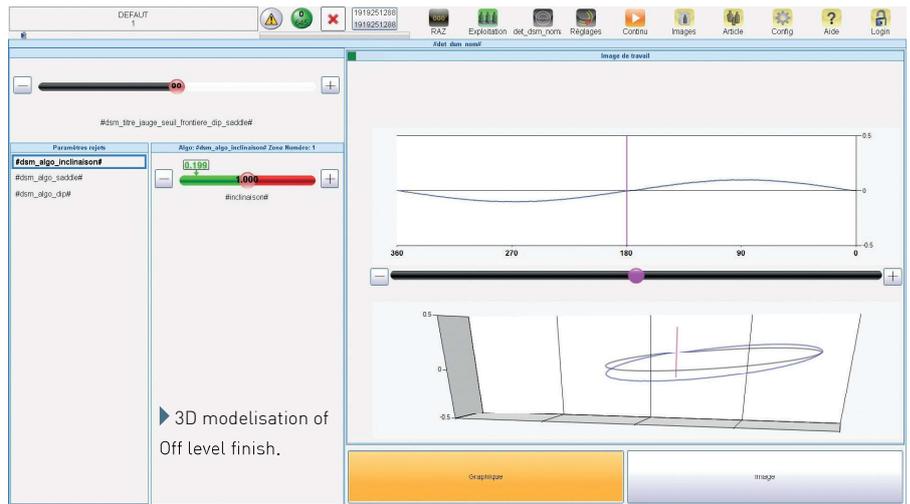
■ Height Defects ($\pm 200 \mu\text{m}$)

The DSM can be used to inspect all articles ring, and especially jars up to 110mm finish diameters. It is effective on all glass colours and can inspect up to 400 bottles per minute, as a new feature for MULTI4 machines or as a standalone solution.

In addition to the fact that it is an optical system which offers faster inspection and less maintenance costs than a mechanical system, the DSM has many other advantages. Its precision of defect measurements and its repeatability makes it a reliable system by eliminating the risk of false rejects and therefore both level of quality and productivity are improved.

The system uses powerful electronics of MULTI4 and correlation of the measurement with the cavity number. Its set up interface has been thought to be ergonomic and user friendly so that the final users could easily appropriate it.

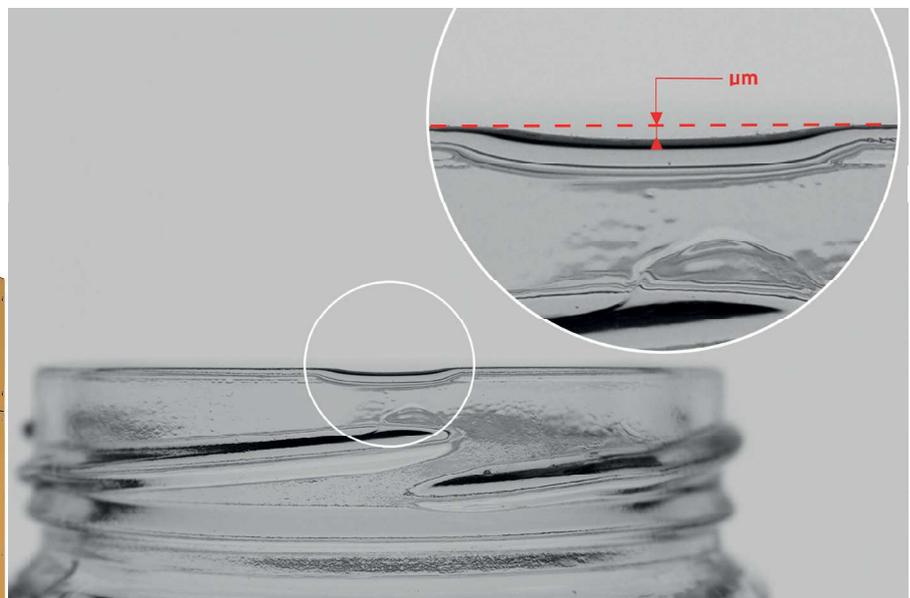
The DSM has also been designed, just like the WEM, to be easy to setup. The operator only needs a few seconds to adjust it and its auto learning capacity of the reference image allows it to improve its measurements precision.



▲ Saddle measurement.

Towards a Smart Factory

With sensors displayed at the hot end and at the cold end in its different machines, Tiama is able to provide valuable data such as images or different types of measures. Thanks to a datamatrix code



▲ Dip measurement.



▲ Multi4 base finish detection.

engraved at the hot end, all these data can then be associated to a single container.

Tiama's five range of expertise: Monitoring, Inspection Traceability, Intelligence and service are all very important to build the Smart Factory

concept YOUiverse so that the company can have a better view of the process to work on a global efficiency process improvement. ■

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