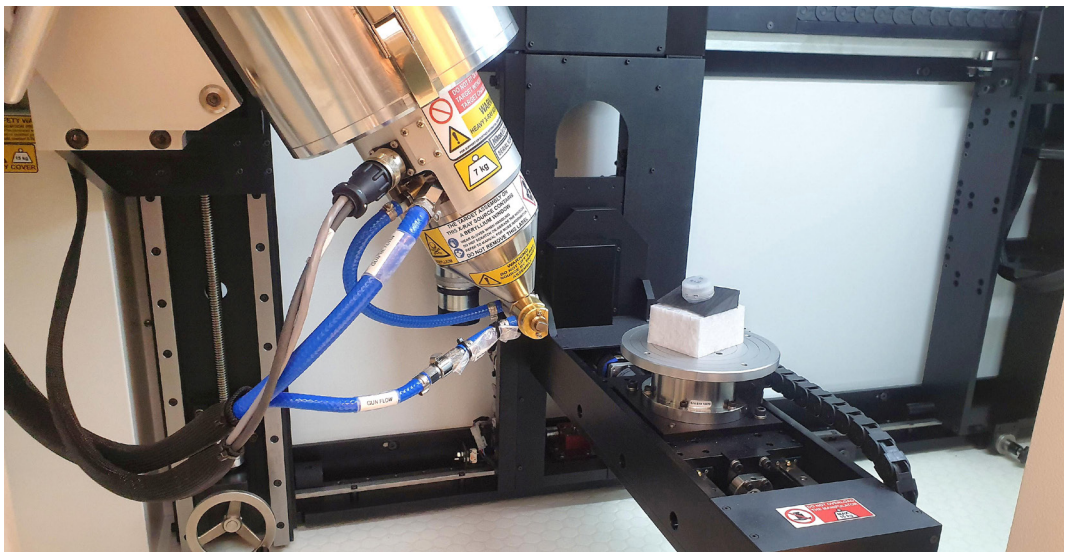
CASE STUDY

Plastic bottle closure quality optimised by non-destructive testing and mould validation improved



With a staggering annual output in excess of 10 billion plastic caps and closures, designed and manufactured in 10 factories across Europe and more recently Asia, UNITED CAPS supplies leading global brands with products to maintain the freshness and hygiene of food and drink packaged in bottles, jars and cans.

Quality is naturally the watchword and to help the manufacturer raise it even further, the company has started to move from conventional inspection and measurement to more advanced methodology based on non-contact X-ray computed tomography (CT) from Nikon Metrology.

Pioneering this innovation is laboratory manager Xavier Goursaud in the R&D department at UNITED CAPS' French manufacturing plant in Messia-sur-Sorne.

He said, "We support the value chain of our customers by safeguarding product integrity, assuring safety and consumer health, and ultimately protecting brand reputation.

"People don't always realise the level of technical expertise that goes into the development of a plastic closure. But the quality of our closures is vitally important, not only to food and drink producers but also to protect our own reputation, which supports the jobs of 750 people around the globe and generates an annual turnover of more than €156 million."

Every UNITED CAPS employee, not just those in the quality control (QC) department, is engaged in quality management and adheres to strict working practices and procedures. Products are tested and controlled at every stage of the manufacturing process. All facilities are ISO 14001 certified, comply with the BRC Global Standard for Packaging and Packaging Materials and conform to the hazard analysis and critical control points (HACCP) preventative approach to food safety. Mr Goursaud states that the company can only

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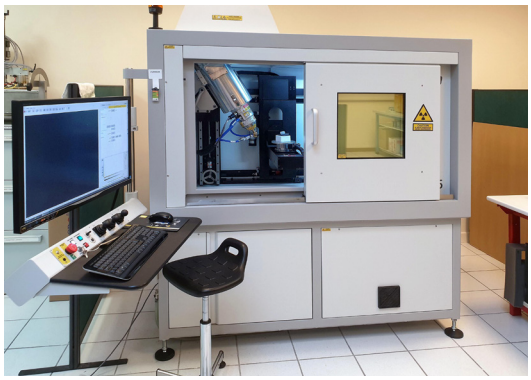

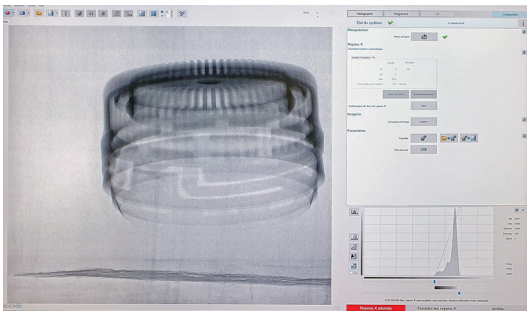

achieve its mission of supplying the highest quality, secure caps and closures if it pursues constant product improvement based on in-house exchange of best practices and client feedback. Key performance indicators help keep the manufacturer on track in this important area and procedures have been implemented to help create and maintain optimal manufacturing conditions.

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> Xavier Goursaud, laboratory manager in the R&D department

One such process improvement has been the adoption of X-ray CT in the research and development department in Messia-sur-Sorne, which provides QC services for the whole group. A Nikon Metrology XT H 225 was installed in 2020 to work alongside and largely take over from traditional measurement equipment, including a coordinate measuring machine (CMM), profile projector, calipers and gauges. Not only are products validated more efficiently after manufacture, but so also are the plastic injection mould tools, both new and refurbished, that manufacture them in the group's 10 factories.

Mr Goursaud continued, "With a CMM or other conventional metrology equipment, it is difficult to inspect the cap's internal dimensions and it can take a long time to extract the data needed.

"The real problem, however, is that we also need to measure the cap as an assembly fixed to the neck of a customer's container before implementing functional testing.

"The only way to inspect such an assembly is to section it, but when the material is cut it deforms, so there is no possibility to check it precisely. To avoid the need for sectioning and the consequent deformation, enabling precise measurements to be made, a non-destructive process is needed and X-ray CT is the most effective solution."

The Nikon Metrology XT H 225 kV system offers 2D X-ray as well as 3D CT functionality. It is controlled by industry-leading Inspect-X software, an advanced graphical user interface providing intuitive workflow that can be tailored to the application. Coupled with world-leading reconstruction times using in-house software and cutting-edge visualisation and analysis software, the XT H series is a comprehensive package for inspection and measurement.

This make of equipment was chosen by UNITED CAPS, according to Mr Goursaud, partly due to its operational ergonomics and because the interface is easy to learn. He also mentioned that a good customer / supplier relationship developed during the sales process and the installation and training provided were excellent.

He foresees further benefits in the future from adopting the new QC technology, including the ability to use a succession of individual radiographs to produce a time-lapse video that shows precisely, for example, how the neck of a bottle behaves as a cap is screwed onto it.

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