

# Plastics in Packaging

Issue 243: January 2022

# PLA your part

*Why researchers  
believe they have  
found the magic  
formula to make  
thin-walled PLA  
injection moulded  
packaging*

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# Optimal gains

With the plastics industry increasingly focused on finding improvements across the whole production chain, the role of test and inspection systems is becoming ever-more important, as **Noli Dinkovski** discovers

**I**t wouldn't be an overstatement to suggest that the pandemic has challenged the creativity, resilience and flexibility of every business in the plastics packaging industry. But while Covid continues to create uncertainty across wider business activities, there have at least been positives for the test and inspection market.

"There has been growth in permeation testing, owing to closer inspection of packaging to prevent Covid contamination risks," says Toby Lane, product and applications manager at Industrial Physics, which supplies testing equipment to the plastics industry through its Ray-Ran brand.

"There has also been huge demand for take-away food packaging following the closure of hospitality industries," adds Lane. "And demand for products in the market typically has an upstream effect for test and measurement."

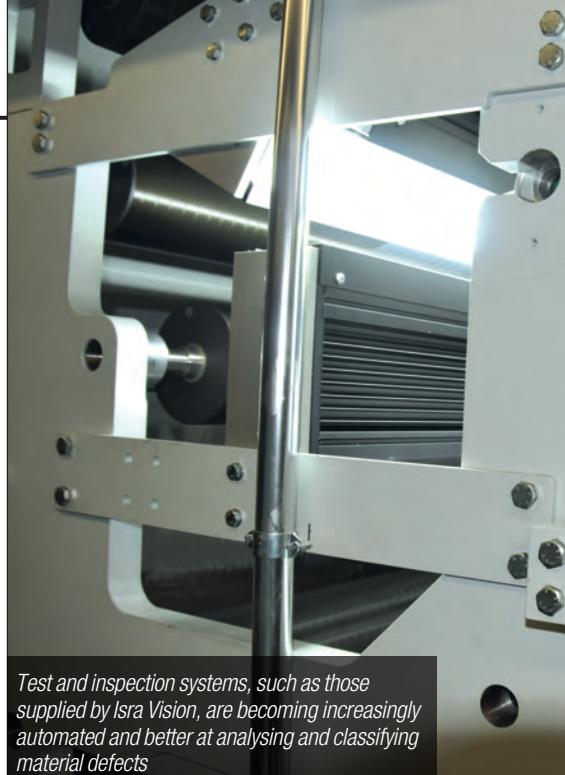
A sales boost in test and inspection kit on the back of more demand for plastics

packaging, however, is just one part of the story. A less obvious benefit to the market is how closer scrutiny of supply chains in the current post-Covid climate is making businesses review each process step in the production chain.

Converters and packaging manufacturers are more focused than ever on ensuring that quality is at its highest, from the raw material right the way through to the final sealed or enclosed product – and they are turning to increasingly automated and intelligent test and inspection systems to help them.

For Industrial Physics, the benefits of optimising material properties are clear – more efficient processes, less waste by-product, and a longer service-life for plastics products.

"To meet this demand, testing equipment needs to be widely accessible, reliable, and increasingly accurate as time moves on," says Lane. "Ray-Ran products are designed to cater for smaller-scale testing campaigns as well as the exploits of large companies by creating a



*Test and inspection systems, such as those supplied by Isra Vision, are becoming increasingly automated and better at analysing and classifying material defects*

simple-to-use and consistent user interface across the range of products."

The latest developments in the Ray-Ran range include the incorporation of measurement devices that allow users to look more closely at their test results. Rather than just having a single result for a test, Industrial Physics says the use of high-accuracy optical and digital encoders, as well as force transducers, add a new depth of accuracy to test results.

An example of this is seen in the MFR300 Melt Flow Indexer, which now uses a high-resolution optical encoder. "This technology allows us to take multiple data points of melt

## Flawless bottle flows

**O**ne sector that demands high levels of automation in test and inspection is bottle filling. With line speeds typically well over 50,000 bottles per hour, the human eye and tactile sense are no match for automated systems, and online vision inspection is paramount.

Miho provides inspection equipment for the whole filling line of PET bottles. The German company says its ASEBI Miho David 2 inspects all aspects of refillable PET bottles, down to stress cracks and holes.

Recently, the David 2 was equipped with an extra camera and light-

ing module, adding more reliability to the inspection of stress cracks at the bottle base. "A flawless bottle flow from having only complete containers leads to a constant bottle flow and thus, increases the line availability," says Oliver Kory, regional director for the Americas, China and eastern Europe at Miho.

"An excellent product appearance at the point of sale is more important than ever. With our label, closure and print control, we make sure that only flawless products hit the shelf."



Through its Pilot-Vision+, Agr International, meanwhile, offers what it describes as an "in-the-blow moulder" camera-based inspection system. Pilot Vision+ is designed to monitor preform and bottle quality during blow moulder operation,

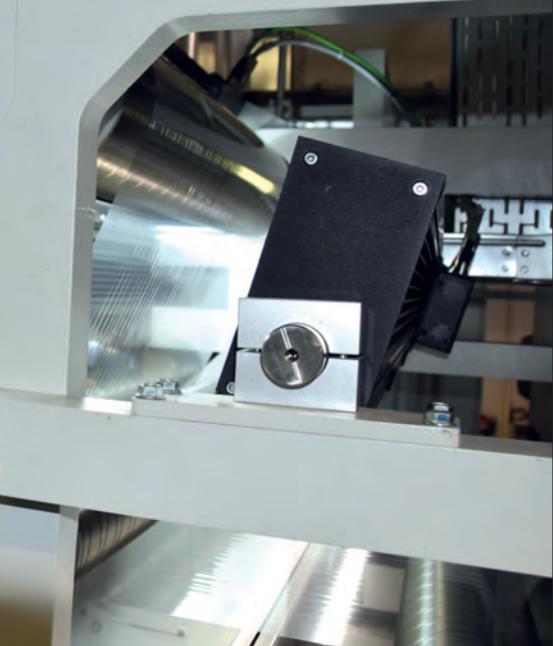
identifying a range of defects as well as contamination during the bottle production process. It can be used independently or in conjunction with Agr's Process Pilot system.

Automation is also finding a place in the laboratory testing side of the bottle filling market. Agr's latest development in this area is the Gawis 4D system, which provides comprehensive measurement of a bottle or preform, taking the place of a multitude of hand measurements.

Gawis 4D incorporates several new technologies including AutoJob, a

feature that creates a new measurement profile by scanning the bottle and automatically identifying the critical finish dimensions.

"With this feature, an operator can set up a job for a new bottle in a matter of seconds," says David Dineff, director of marketing at Agr International. "The system also features telecentric optics for high precision dimensional gauging, and a robotic autofeed option. The robotic handling system makes it possible for a laboratory technician to set a complete mould round or shot of preforms and have the device perform the handling and measurements in one hands-free operation."



flow index, and melt volume rate readings," says Lane. "Rather than a single result, 'multi-slicing' over the course of the test shows the stability of the sample during the extrusion process. None of this is possible without our latest dedicated microprocessor."

A similar approach to materials optimisation is deployed by Optical Control Systems (OCS), which has a portfolio that extends from raw materials inspection and surface testing to the production of quality measurement and turnkey laboratory systems.

The highest level of product quality can only be achieved if every process step in the production chain is continuously examined and optimised, argues Jessica Bonnes, senior marketing manager at OCS.

"That is why it is of the utmost importance that the entire production process satisfies the highest standards of quality – and that starts with the raw materials used. The goal: 100 per cent material purity."

OCS's latest innovation for plastics is the Wide-Web Inspection OCS FSP600, which Bonnes says is able to recognise every type of irregularity in films, laminates and non-wovens in real-time. This is made possible, she adds, by a high-speed camera capable of recognising gels, black specks, burn marks, fish-eyes, holes, wrinkles, scratches, coating defects, water droplets, oil stains, insects, bubbles, nozzle marks and craters – as well as many other defects and irregularities.

The systems, which come in a standard width of 2,500mm, are installed in blown and cast film lines, laminators, calendaring lines, doctor rollers, slitters, and nonwoven and printing lines with speeds up to 800m/min.

Another company involved in the surface inspection of plastics web material is Isra Vision. With sustainability and waste reduction – from the earliest stage possible – now so important to the packaging market, Isra

claims to support its customers to produce less defective materials, to increase the saleable quantity – all of which saves raw materials and energy.

"For the packaging industry, achieving high and consistent quality standards is a set goal," says Dirk Broichhausen, managing director for the Surface & Print Inspection – Advanced Materials business unit at Isra Vision. "To ensure this, and at the same time reduce production costs, a high degree of automation and continuous process improvement is required. This is the only way to achieve greater sustainability in production, better machine utilisation, and competitiveness."

Isra offers the Smash system for optimisation and the creation of 'inspection recipes' without stopping the production line. This, it says, results in reduced set-up time – maximising inspection efficiency and minimising costs.

Smash can also analyse defect patterns and correctly classify them into previously defined defect classes. "Thanks to continuous development of the system, it is now even possible not only to detect but also to classify defects such as bright holes and bright spots," says Broichhausen. "This was previously considered impossible because they were indistinguishable from each other during the inspection."

Automation with sustainability in mind is also a key facet of NDC Technologies' offer. Part of the Nordson group of companies, NDC's measurement technologies include infrared (IR), optical, beta/gamma, laser, terahertz, haze and X-ray devices.

According to Mark Rainville, product manager for film, extrusion and converting, NDC works closely with film and intermediate producers to help optimise their production process and realise savings. "Our measurement and control systems enable their manufacturing operations to use less raw material by downgauging and reducing scrap," he says. "Our systems also help them reduce the energy used to produce materials while ensuring the highest product quality and integrity."

New among its product range is the HazePro sensor, designed to measure the optical quality (haze) of film. With the shift towards easy-to-recycle films, the HazePro is additionally said to be able to distinguish whether the barrier properties of these single polymer substrates are in good health or deteriorating.

NDC has also brought out a new IR sensor that directly measures the moisture, coat weight, degree of cure and film/layer thickness in converted products. The Series 9 sensor expands the company's range of coating, lamination and packaging material applications, and it has added capabilities for increased reliability and advanced diagnostics for what NDC describes as "peace-of-mind" operation.

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# Plastics in Packaging

# TEST & INSPECTION

Its new Terahertz sensor, meanwhile, is said to offer highly accurate measurements for multiple layer film and sheet applications, which in the past would require multiple sensors and scanners.

Too often, inspection equipment is located at the end of a production chain and the quality of a product is only determined when it has already been manufactured. But Rainville says NDC's gauging and control solutions "actively engage measurement and control" as an integral part of the production chain, enabling quality issues to be automatically corrected when a product does not meet defined tolerances.

"Automated process control combined with process data analytics plays a critical role in troubleshooting challenges during the various stages of manufacturing," he explains. "This helps to ensure you achieve product key performance indicators such as adhesion, barrier layer thickness, film and sheet thickness, coat weight, density and other attributes prior to the downstream operations of printing, slitting and cutting processes, for example."

Allied to the increased focus on sustainability within plastics is the growth of testing systems specifically tailored for recycled materials. Last year, Bühler launched the Sortex A GlowVision sorter, which is designed for users of rPET. The sorter is armed with novel detection technology that is able to detect a wide range of defects typically found in rPET flake streams, and colour, polymer, metal and loose label defects can be targeted in a single pass.

"The system is able to make multiple passes on the same machine to recover the maximum amount of good material, and it has the flexibility to have up to three different set-ups on the same machine," says Lawrence Kuhn, global segment head for plastics at Bühler.

"A very high input contamination may require a double pass to reach final accept quality, or more than one chute may be required to cope with the reject pass. This makes the GlowVision extremely versatile."

As far back as the 1980s, Bühler introduced microprocessors as a first step to making optical sorters 'intelligent'. Today, through its Insights platform, it offers customers the option of connecting the sorters to the cloud. This enables the end-user to track changes in the product quality and within the sorter itself, and to receive alarms and notifications when it detects deviations in throughput, product specification, and yield.

With the onset of the pandemic exposing the need for manufacturers to keep processing lines moving, the use of artificial intelligence (AI) in test and inspection systems is perceived by many to be more important than ever.

In 2020, US-tech firm Neurala unveiled its Vision Inspection Automation (VIA) software, which enables manufacturers that have not



NDC Technologies says its new HazePro sensor can distinguish whether the barrier properties of single polymer substrates are in good health or deteriorating

worked with AI before to train and use vision AI to identify defects in products or packaging on the production line. With the ability to run directly on existing hardware on the factory floor, Neurala says VIA makes AI accessible to industrial automation users who prefer not to rely on internet access or cloud connectivity.

Following on from the launch, Neurala added an AI 'explainability' feature, which helps manufacturers improve quality inspections by accurately identifying objects in an image that are causing a particular problem or present an anomaly.

"With our explainability feature, end-users can derive more actionable insights from datasets, identifying whether an image truly is anomalous, or if the error is a false-positive resulting from other conditions in the environment such as lighting," explains Annie Bowlby, senior product manager at Neurala. "This gives a more precise understanding of what went wrong and where, and allows the end-user to take proper actions – whether to fix an issue in the production flow or improve image quality."

According to Swiss company Aisa, the advent of AI has greatly expanded the range of inline inspection possibilities, while reducing costs through self-learning. Many of the online checks it is now doing with the help of AI were previously only possible in the offline laboratory.

Aisa says its Q-Thickness inspection system enables 100 per cent inline control of thickness variations, with a tolerance of 5 microns, despite machine vibrations. According to Stéphane Mathieu, the company's Inspection business unit director, "this

20-year-old concern" has been put to the test on most traditional equipment on the market without success.

"An approach based on AI has made it possible to overcome the technical limitations of current components to deliver a reliable solution that satisfies its users and their specifications," he says.

Widely used for the orientation of caps on packaging tubes, Aisa's Q-Orientation system, meanwhile, provides a solution to high-speed orientation for parts that are complex to locate by sensors or vision.

"Its self-learning operation also greatly reduces set-up times and makes it accessible to the majority of users, whatever the market and the materials used," claims Mathieu. "In particular, we have seen set-up times drop from over 60 minutes to less than five minutes."

If the pandemic has exposed anything, it is the importance of having agile solutions to keep production lines moving, while mitigating the risks for supply chains, operations and workforce. It's little wonder then, that test and inspection is seen as having such an important role to play. P

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