Inspection

Bubble-X securely identifies air bubbles

Best practice

When liquids are inspected during pharmaceutical production, it sometimes happens that camera systems consider flawless products to be defective. The cause is often harmless air bubbles mistakenly registered as particles. The Seidenader Bubble-X inspection technology from Körber uses refraction effects to clearly identify such objects and thereby reduce the false reject rate by up to 50 percent.

It's often the small things that make a big difference. This is particularly true in pharmaceutical production. For example, if a particle is discovered during the inspection of a liquid, whether in a syringe, ampoule, or another glass container, the inspection system has fractions of seconds to decide if the product is safe or not. "As a precautionary measure, such products are declared to be rejects even though they might actually be in flawless condition," says Werner Halbinger, image-processing and laboratory engineer at the Inspections unit of Körber Business Area Pharma. This problem is prevalent in the biopharmaceutical industry. Why is that? The protein-based nature of these pharmaceuticals makes them prone to the creation of air bubbles, which many camera systems mistakenly consider to be dangerous glass particles resulting in the rejection of the product. Because such products cost up to €500 per unit to manufacture, such false interpretations can rapidly become very expensive. "A reliable inspection solution with a low false reject rate (FRR) thus helps companies save a lot of money," says Halbinger. That's why Halbinger and his team developed Bubble-X, a technology that reliably inspects sensitive liquids at high speeds commonly used in pharmaceutical production.

Viewed in the right light

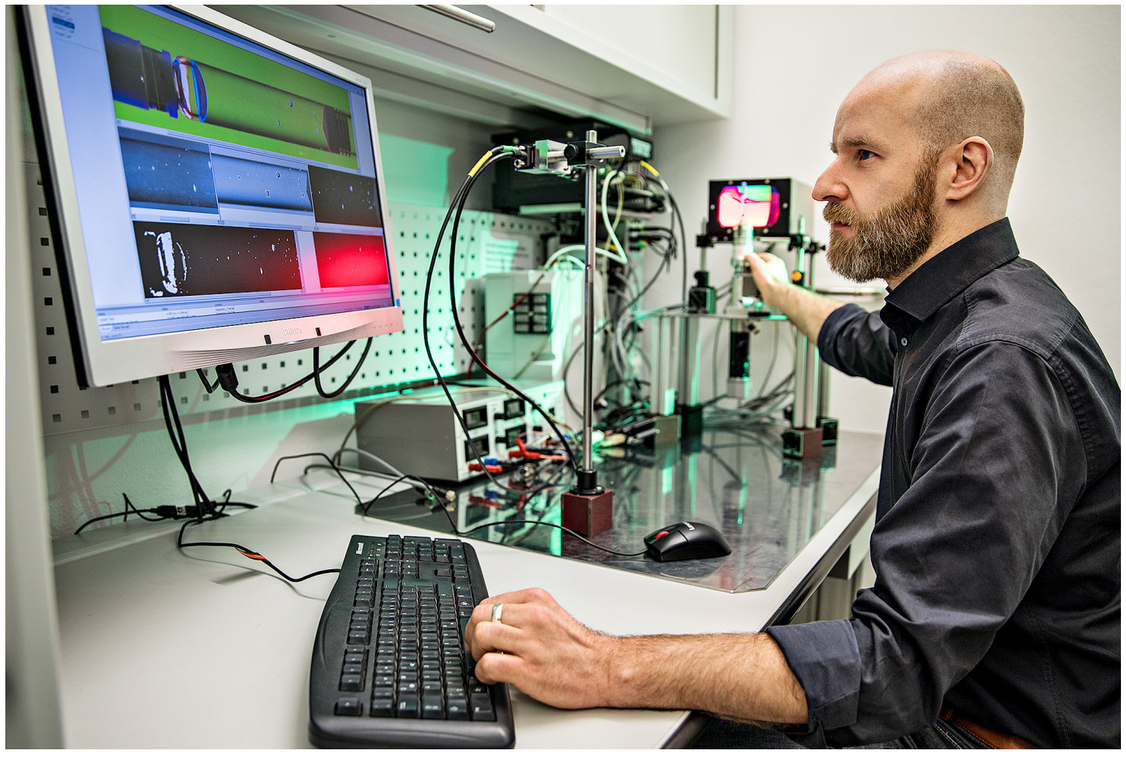
Conventional solutions for distinguishing air bubbles from foreign objects in liquids are generally complex and make inspections take longer. Waiting for particles and air bubbles to distinguish themselves takes far too long to be suitable for high-speed inspection. "By contrast, Bubble-X uses the speed of light, or, more precisely, the effects of the refraction of light," says Halbinger. It employs a spectral-coded illumination system that consists of three colored light sources: red, green and blue. The rays of light pass through the liquid in the individual containers. A special arrangement of lenses guides the light to pass through the liquid unhindered, allowing only the green rays of light to hit the detector in the color camera behind the container while the other colors of light go past it.

Color patterns help distinguish objects

However, if the rays encounter air bubbles or particles as they travel through the liquid, one of three things will happen. A normal, opaque particle blocks the light and appears in the camera image as a dark object in front of a green background. By contrast, transparent particles such as glass particles and air bubbles refract the light and redirect it in different ways. "Because of the laws of refraction, transparent particles cause not only the rays of green light but also those of blue and red light to hit the detector, where they create a specific color pattern," says Halbinger. "An air bubble does the same, except that air refracts light differently than glass, for example, and causes the color pattern to reverse." This physical effect enables Bubble-X to distinguish between the two objects -and it does this within fractions of a second.

Saving millions of euros with Bubble-X

This spectral-coded illumination can cut the false reject rate during inspections by half. Whereas



Werner Halbinger spends a large part of his working day in the laboratory where Bubble-X was created.

"Bubble-X uses the speed of light, or, more precisely, the effects of the refraction of light."

Werner Halbinger, image-processing and laboratory engineer at the Inspections unit of Körber Business Area Pharma

Air bubble or foreign body — Bubble-X knows what's floating in the lower part of the syringe.

Saving
million euros
per year

Seidenader Bubble-X can save million euros per year by cutting the false reject rate in half for the production of an expensive product.

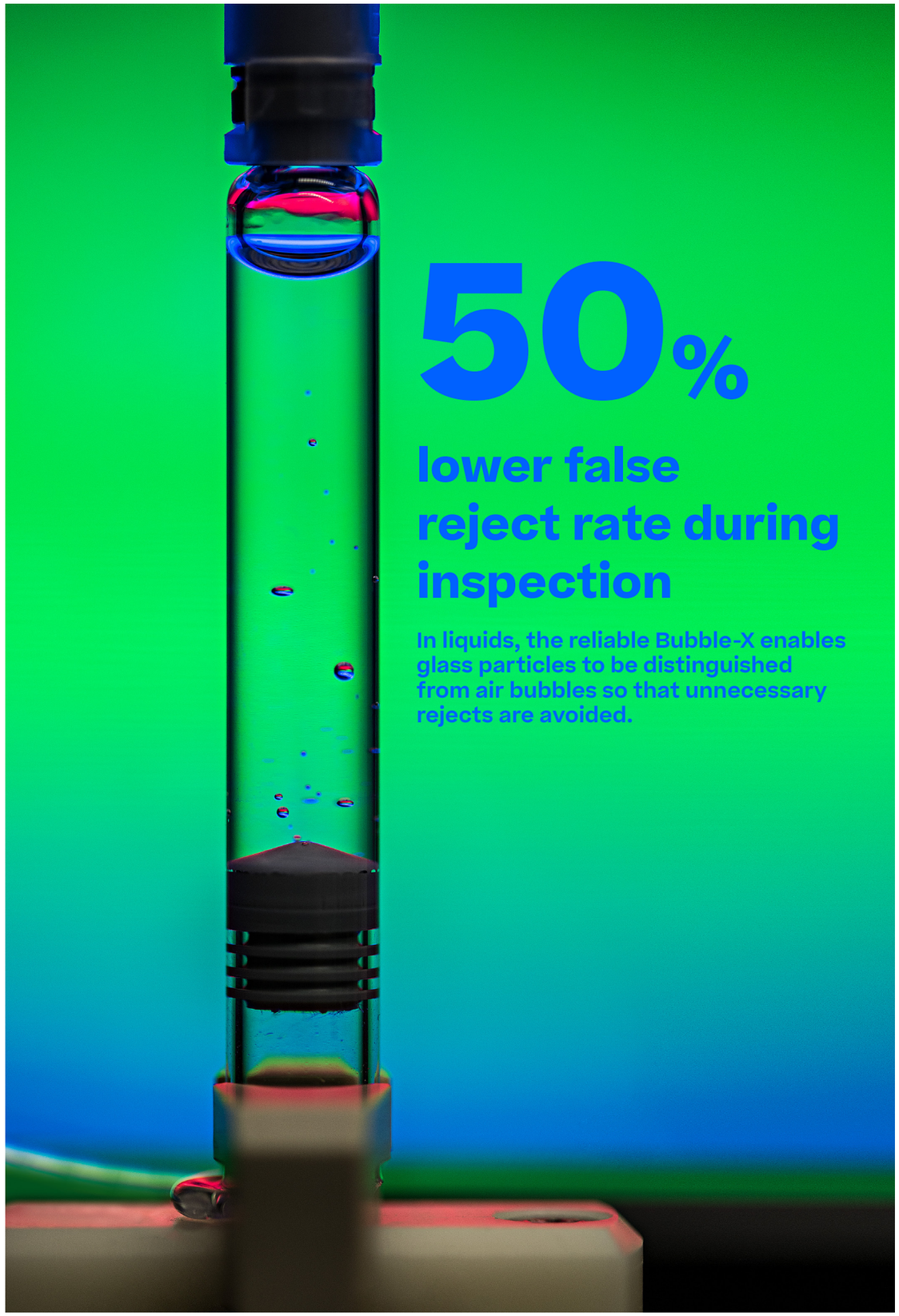
conventional inspection systems have an average false reject rate of two percent, Seidenader Bubble-X reduces this rate to one percent. Although this reduction may seem unspectacular at first glance, it quickly adds up. “A pharmaceutical company that produces one million units per year worth €500 each can save up to five million euros if the FRR is cut in half,” says Halbinger.

Even more efficient thanks to deep learning
Bubble-X reduces the false reject rate by as much as 50 percent. In combination with the new deep learning software Seidenader Eject-X from Körber, it can decrease the number of mistakes even more. The software solution uses artificial intelligence to analyze images of production defects. “In doing so, Eject-X trains an algorithm that makes the image-processing software of inspection cameras even more reliable. As a result, companies can improve specific stations of their inspection machines,” says Halbinger.

Inspection solutions from the market leader
At the Körber Business Area Pharma, the inspection experts have been developing solutions for the pharmaceutical and biotech industries for over 125 years — Körber is the global market leader in this field. The portfolio includes automatic inspection machines as well as semi-automatic systems, inspection applications for in-process control, and inspection equipment for laboratories and product development. Depending on customer requirements, various technologies can be combined in the fully automatic systems for high-performance inspections. In addition to camera-based solutions such as Seidenader Bubble-X or a 3D inspection system for highly viscous products, Körber also offers technologies for high-voltage leak detection or laser-based head-space analysis. The machines are tailored specifically to the containers and products of the pharmaceutical and biotech industries. The machines also provide companies with the required level of flexibility: The machines’ modular arrangement enables them to be adapted and expanded to change production conditions at any time. As a result, pharmaceutical and biotech companies can ensure both the safety of their products and the future-proof quality of their manufacturing operations.

Körber – delivering the difference in pharma

Further questions about Seidenader Bubble-X or another inspection solution from our portfolio? Get in contact with us.



We have you covered, always and everywhere

With local pharma inspection experts around the world we support you wherever your business is located.

About Körber

Körber is an international technology group with around 10,000 employees and more than 100 locations worldwide. At the Körber Business Area Pharma we are delivering the difference along the pharma value chain with our unique portfolio of integrated solutions. Spanning in-depth expertise in consulting, inspection, handling, packaging machines and materials, track & trace and software, we always have the right solutions to unlock the potential of our customer's productivity. With our profound understanding of pharma processes and regulation challenges, Körber is the right partner for leveraging all potentials of global pharma and biotech productions.

Delivering the difference in pharma

At Körber Pharma, we deliver the difference along the entire pharmaceutical value chain by offering a unique portfolio of integrated solutions. Based on in-depth experience spanning consulting, inspection, transport systems, packaging machines and materials, track and trace and software, we understand the challenges in pharmaceutical processes and regulation that our customers face day to day, from the beginning to the end of their production. For them, we deliver the difference to unlock the potential of global pharmaceutical and biotech manufacturing.

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