glass WORLDWIDE

Speed is money in glass container manufacture

Amir Novini discusses ways to increase production line speeds at the cold end, while minimising the money spent on conveyance and other material handling and inspection equipment, overall plant maintenance and labour costs.

Frankly, speed is money in manufacturing plants. In the container industry, aluminium beverage cans are manufactured at speeds in excess of 2000 cans/min, while some lines achieve even higher rates with occasional 'burst rates' in excess of 3000 (50 cans/second)! This is hard to achieve in glass manufacturing for several reasons, including but not limited to hot end individual section limitations, the varying weights, sizes and shapes of glass containers, followed by speed limitations of cold end inspection equipment.

In fact, the output of the lehr is often split into multiple lanes, so the inspection equipment can keep up (figure 1)! Of course, this is nothing new. When the author first entered the world of glass container inspection over 30 years ago, he observed many of the same processes that still take place today. As an engineer, he was horrified at the sight of those rotary machines touching the glass in all forms and fashion. He remembers looking at large stacks of necessary 'change parts' in the glass companies' maintenance shops, thinking to himself "what a waste of hardware, time and money!"

Over time, the IS machines, lehrs, sprayers and conveyance systems have improved in throughput and quality of manufactured glass but not much has changed in the overall process. The stacks of slotted metal plates and the rows of timing and feed screws needed for each ware size and shape still remain. Oh boy, what a waste of time and resources.

For glass base inspection, a side belt/grip conveyor is necessary, at least for now to allow for an unobstructed view of the bottom of the glass. But these conveyors can and do run at much higher speeds than the rotary type of handling and are seldom the limiting factor for faster line speeds.

One may wonder if 'technical limitations' from decades ago such as inadequate imaging and computing systems were kept in place so that cold end inspection companies could continue performing maintenance on manufacturing lines and producing so-called 'change parts'.

The Applied Vision mission has always been and continues to be minimal or non-contact glass container handling, eventually leading to the elimination of split lines after the lehr. This will allow glass manufacturers to maximise yield, save money and stay competitive.

The company developed the first non-contact dip saddle and plug gauge over 20 years ago (figure 2). This was in striking contrast to inspection machines of the day that had to ▸

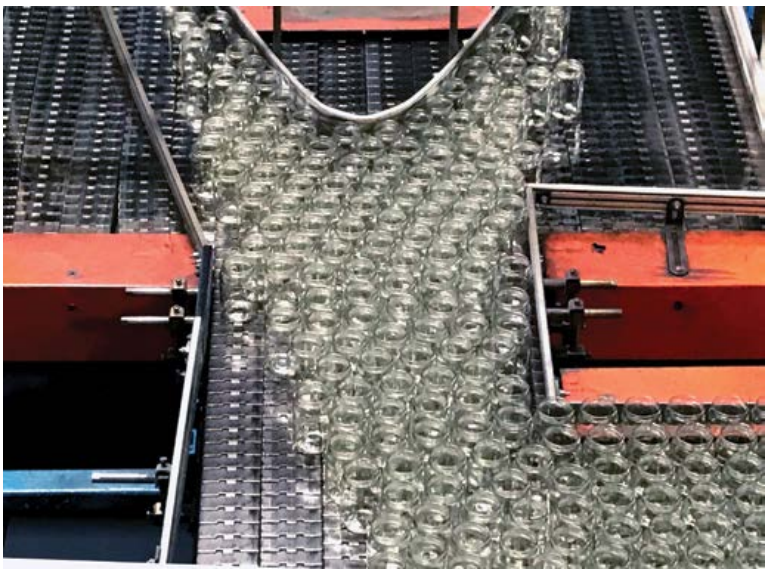

Figure 1: Line divider.

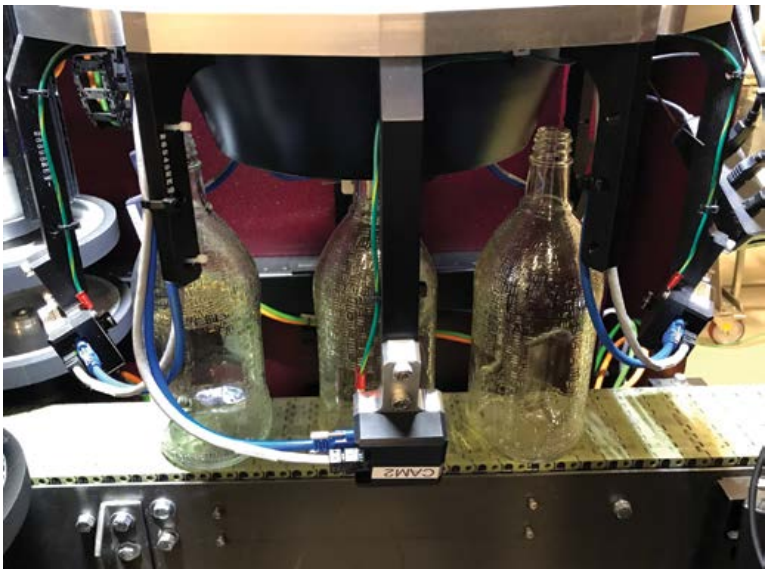

Figure 2: Non-contact dip and saddle.

Figure 3: Neutron entry.

Figure 4: Volcano base and sealing surface.

slow production lines in order to utilise a suction cup to check for leaks caused by a dip or saddle; or machines that would force a plastic plunger into the opening of a container to determine the minimum/maximum opening of the neck. Now these processes seem like something from the Stone Age!

Non-contact wall thickness measurement

In its never ending quest for innovation, Applied Vision recently unveiled the world's first non-contact wall thickness measurement system for containers of any shape and colour, including complex containers with handles. Called Neutron, this system (figure 3) was one of the highlights at last year's glasstec show in Dusseldorf, Germany. It examines glass wall thickness and detects thin areas, while providing 100% coverage of the container sidewall at line speeds no matter the container shape and colour.

Presently, the entire Volcano family of glass inspection products (figure 4) is essentially 'non-contact', with the exception of base, sealing surface and mould number reader. But as mentioned earlier, the straight through side grip conveyor can and does run at full lehr output speeds without any need for line splitting.

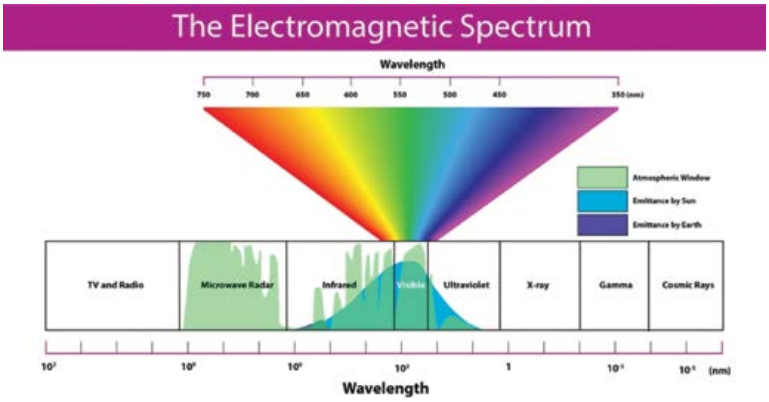

Figure 5: Graph depicting the colour spectrum.

Development approach

So how does Applied Vision provide this industry leading non-contact inspection technology, thereby saving manufacturers significant costs by eliminating extra conveyors, machine downtime and unnecessary complications? The answer is simple: A focus on science and an open-minded, outside-of-the-box development approach. Now the company has mastered a holistic, non-contact 100% wall thickness inspection process, the sky is the limit on what comes next.

Among the ingredients that make this technology possible are:

- Understanding and utilising a much larger portion of the electromagnetic spectrum (EM) (figure 5). People generally concentrate on what the eye sees but there are many untapped possibilities by focusing on the misunderstood and under utilised portions of the EM spectrum. The Neutron wall thickness inspection system relies on these parts of the spectrum. Airport body scanners utilise similar technology. By using millimeter waves of low energy x-rays and 'back scatter' techniques, body scanners are able to see right through clothing and detect illegal and unusual non-tissue objects.
- Sensing and camera technology has improved by leaps and bounds over the past few decades. But in order to make use of these technologies, it is necessary to understand exactly how they work and are best utilised. The fact that Applied Vision manufactures its own sensors also helps.
- Computing technology both in hardware and software has improved dramatically. The implementation of artificial intelligence (AI) is changing the way business is conducted. Based on the number crunching powers of today's computers and improved software and algorithmic capabilities, the company is able to greatly reduce its customers' burdens when it comes to setting up their machines, defect classification and traceability functions.

Applied Vision has achieved the ability to inspect over 90% of all aspects of glass and is confident the remaining 10% is well within reach, both technologically and practically. ●

About the author:
Amir Novini is President and CEO of Applied Vision

Further information:
Applied Vision Corp, Akron, Ohio, USA
tel: +1 330 926 2222
email: amir.novini@appliedvision.com
web: www.appliedvision.com