

Delivering enhanced safety standards in container production

Inge Friberg considers the importance of automation for the realisation of productivity, flexibility and safety.

No one who has stepped inside a glass container plant could doubt that operators deal with tough conditions. With large, heavy machinery moving at high speed, huge roaring furnaces and molten glass heated to 1500°C – not to mention overwhelming heat and noise – it is no wonder glass plants have their dangers. And that is why equipment designers such as Bucher Emhart Glass (BEG) must aim to protect operators in their work, as well as improving the speed and quality of production.

Safety is a key concern of legislators. EU Directive 2006/42, on machinery, states that manufacturers must eliminate or reduce risks as far as possible by designing and building machinery that is inherently safe. If risks cannot be eliminated, operators must be protected and also educated about the risks, so they know how to keep themselves safe.

THREE TYPES OF SAFETY

Safety in a glass plant has several different aspects. First, there is physically shielding the operator from ambient dangers such as noise and heat. Then, there is making sure the machinery itself can be operated, adjusted and repaired without the risk of injury, which is more complex. And finally, there is automation: Reducing the need for operators



Safety ladder integrated into FlexConveyor.

to interact with the machines at all, so they can work further away from potential danger areas.

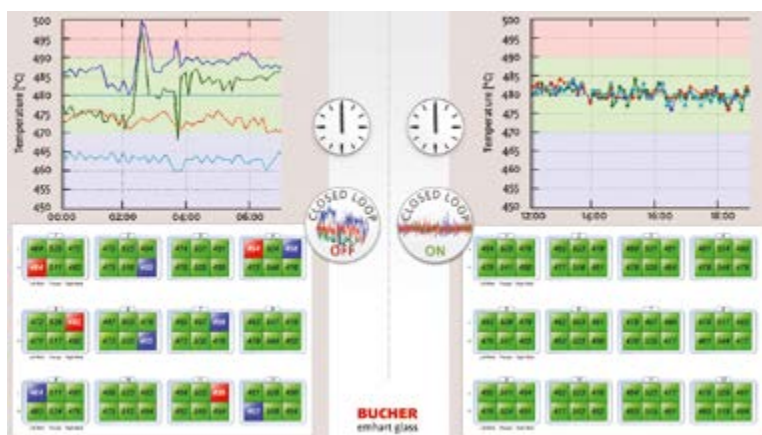
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risks naturally arise when operators are working around the hottest parts of the hot end. In terms of the feeder system, which drops the molten glass into the mould, over 70% of recognised potential hazards are due to interacting with the feeder, while on the forming machine itself, over 60% of recognised risks are due to manual interaction.

BEG has introduced many design improvements that make day-to-day life easier for the operator. Examples include the lifting device, which helps operators avoid heavy lifting; LED section lights, which dramatically improve visibility when working on sections; the conveyor ladder, for improved access to the blow side; and interlocks to control the blow head and blow mould.

PREVENTING MISTAKES

Other improvements make it difficult or impossible to touch parts that are still moving, or to accidentally endanger other operators. For example, safety flaps help to safeguard operators working on the blow side when colleagues on the blank side override blow side >



With and without a blank cooling closed loop.

mechanisms; the gob distributor guard alerts operators to dangerous motion of the distributor and prevents access; and the blank side barrier prevents unintentional access to the blank side during normal operation.

However, the machine itself is only half the story. The other half is the operator's own knowhow. Here, BEG aims to make knowledge transfer much more than just reading a manual, with such innovations as 3D video renderings to explain key processes and provide operating instructions; integrated instructional videos; and interactive setup guides. In-depth training courses are also available at BEG premises around the world, focusing on mechanical aspects, electronics and process control.

MORE AUTOMATION, LESS RISK

Another way to address the risks involved in working with molten

glass and rapidly moving parts is to increase the automation level at the hot end. BEG is the industry leader in automating the glass container manufacturing process. As well as improving efficiency, automation can deliver many safety benefits too.

At present, BEG's automation efforts focus on three main themes: Better controls; the use of servo technology; and closed loop automation with innovative sensors and feedback loops.

BEG's latest controls make it far easier for operators to run machines quickly and reliably. An intuitive user interface clearly visualises the operation setup.

The use of servo technology, rather than pneumatics, makes the process of glass forming far more controllable. Keeping pneumatic sections working precisely requires dozens of manual observations and adjustments to be made continually on the machine itself. But servo

mechanisms, which are electronically-controlled, can be monitored and corrected remotely. They also need less operator attention because they are inherently stable, with consistent motion profiles. And changeover time is reduced because setups from previous jobs can be reloaded by copying previous settings.

KEEPING THINGS MOVING

Finally, closed loops and sensor systems automatically gather data on the quality of containers being formed and then use it to optimise production settings on the fly. With equipment effectively managing itself, staff do not need to be involved and can focus on other ways to improve quality and efficiency, instead of watching the dials. In effect, they become less like operators and more like bottle makers.

A good example that encompasses both servo and closed loop is BEG's FlexPusher, which moves formed ware on to the conveyor to begin cooling. Because it uses servo technology, FlexPusher's motion profile is 100% repeatable and reliable. Also, in conjunction with the FlexRadar sensor system, it is open to closed loop control, so ware is evenly spaced and there are no awkward jams on the outfeed.

As a BEG customer recently noted, any jam would require an operator to intervene immediately, which means hurriedly dealing with a crush of glassware that can still be as hot as 500°C, including broken ware on the floor. With FlexPusher automation, however, there is no need for operators to get involved, which keeps them safe, as well as delivering smoother production, better pack rate and ultimately, higher profits.

CLOSED LOOP INNOVATIONS

BEG also offers several other closed loop innovations. Plunger Up Control – closed loop using the Plunger Process Control (PPC) - automatically controls the motion of the plunger, helping to maintain a constant dwell time. Data collected from the control can be used to optimise gob weight automatically, reducing the need for manual intervention and improving quality. It also cuts the risk of the plunger sticking or glass jams, both of which require manual intervention to clean up the section.

Meanwhile, the Temperature Control System (TCS) or BlankRadar measures mould temperature on the blank side, providing temperature data to the control algorithm operating the blank cooling valves, to maintain the blanks at a constant temperature. This, again, reduces the risk of glass jams that would need resolving by hand.

Increasingly, BEG positions itself as the provider of a package comprising machine, parts and service – not just the machine itself. By staying involved with production over the long-term, the company plays a leading role in helping customers achieve the best possible standards of quality, performance and safety. ■

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Manual temperature measurement.