Bucher Emhart Glass:

REACHING NEW LEVELS OF GLASS QUALITY INSPECTION

Powered by SCOUT technology

Bucher Emhart Glass, the leading provider of glass-forming and inspection technologies, has launched a new inspection technology named SCOUT. SCOUT offers a new level of automation and a completely modernized user interface, helping to improve control of glass quality while making the inspection operators' work much quicker and easier than ever before. It is not an all-new machine, but rather a new technology platform for Bucher Emhart Glass' existing FleXinspect line that will become the foundation of the machine's architecture from now on.

THE STORY OF SCOUT

SCOUT may be new, but it has been in development for quite a while – longer, in fact, than Bucher Emhart Glass' existing inspection lines, as Mike Rentschler, Inspection Product Manager, explains. "The project that became SCOUT was first discussed in February 2008," he recalls. "The concept was to develop a next-generation inspection machine in which we owned and controlled all the inspection technologies. We saw an opportunity to take the engineering expertise from Inex, the firm we'd acquired the previous year, combine it with ours, and create something completely revolutionary." However, commercial imperatives meant that ambitious idea had to be put on the back burner, at least for a while. "During development and design, we had to take some decisions so we could get our new product to market," explains Mike. "The result of that was the FleXinspect product line, which we launched in 2010. Since the successful launch of the FleXinspect products we've gone back to our original ideas and set out to finish what we started eight years ago."

TURNING OVER A NEW LEAF

For the firm's software developers, the brief was wide-ranging and, to some extent, open-ended. "SCOUT was envisaged as our next-generation inspection system software," says Joe Fradley, Principal Software Engineer. "We needed to update SMAN, our previous software, and at the same time satisfy a host of new inspection algorithm requirements. That gave us the chance to learn from everything we'd done previously, and make an even better system."

Delivering against the brief has meant expanding Bucher Emhart Glass' in-house technology team, partly to take over areas previously subcontracted to suppliers. "The project involved an almost complete rewrite of our software, which has taken around 18 months to complete," says Joe. "I started laying out the ground work alone, but wenow have a team of people working exclusively on the algorithms, the interface, and so on. We always had some expertise in those areas, but we needed to add more resources in order to accomplish the entire project."

MAKING LIFE EASIER

Development work on SCOUT was guided by the aim of making life easier for Bucher Emhart Glass customers and their operators. "While our inspection technology has always performed very well, we've been criticized over its ease of use," admits Mike. "We've created some incredibly powerful tools, but they needed skilled operators to work them. With SCOUT, the main focus was to make something much simpler, with a higher level of automation, so you didn't need to be a system expert to get the most out of it."

SCOUT introduces a number of changes, some operational, some to the user interface. On the operational system side, the vision processors and management computers have all been updated to the latest industrial PC hardware, providing the fastest, most reliable system available. Much of the new servo and computing technology comes from fellow Bucher Industries company Jetter AG.

At the same time, the human-machine interface (HMI) has been radically changed, with a new, larger 21.5" HD multi-touch screen and a simplified, 'flat' navigation system that's been designed to make it far easier for operators to set up jobs, identify defects, and access key data.

INTUITIVE INTERFACE

The most noticeable change is the HMI, which is unique in the market and a major departure from traditional inspection interfaces. "The experience of using it is a huge change from

Joe Fradley and Mike Rentschler in discussions with Engineering, David Huibregtse and Christopher Anderson

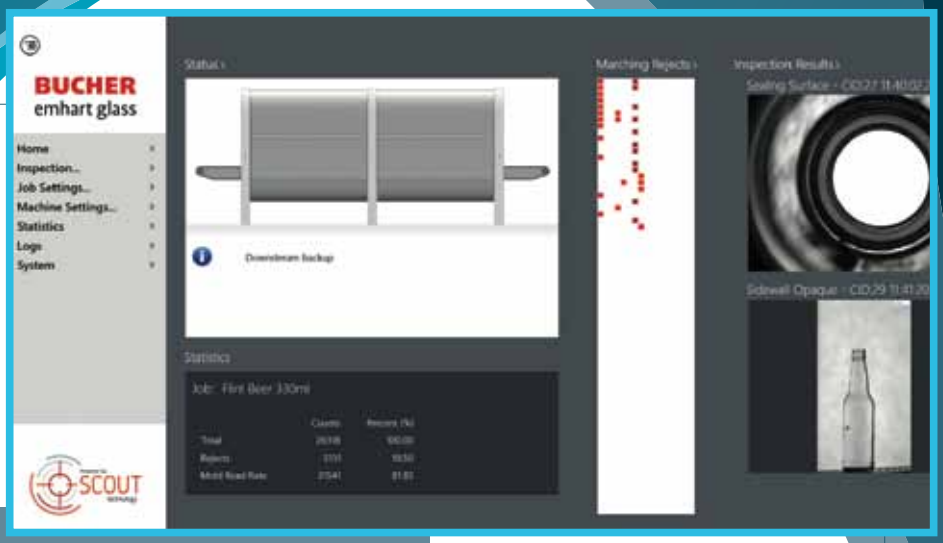
what people are used to in the glass industry," affirms Mike. "Traditionally, our software used a Microsoft Office-style navigation, with tabs and drill-down menus, so navigation was a matter of learning where everything was buried.

The new interface is much flatter and more intuitive, like a smartphone or tablet app, so you're never more than two taps from where you need to be."

As Joe explains, this wasn't simply a question of 're-skinning' existing code; there are many changes 'under the bonnet' too, with visual changes reflecting a thorough rethink of data and controls. "The previous technology was over 10 years old," he says. "The new interface takes advantage of the new multi-touch, scrollable, physics-based behaviour that we're all comfortable with from our devices.

Now, instead of multiple rectangular tabs, we have a compact hub that offers a snapshot of the application.

From there, the user can quickly get into key statistics, machine status, inspection results, and so on. But this wasn't just a UI change – hand in hand with the visual update, we had to change our business logic behind the scenes to cut down the number of pages and parameters too."



NEW LANGUAGE

The emphasis on touch and gesture in the reworked HMI unlocks a whole new visual and tactile language for interacting with the underlying technology. "When you're setting up a container, you can directly manipulate the on-screen image of it, zooming in or out and targeting the region you're interested in," explains Joe. "Previously, that would have involved altering configuration parameters off to one side of the screen. Not every value can be altered that way, but many can." The easier-to-use interface will be a huge help to customers in emerging economies, where highly skilled operators can be harder to find and retain. "In prosperous Western societies, the inspection operator will often be an electromechanical engineer," explains Mike. "But in many areas of the world, they may be a high-school graduate as the higher-qualified workers in those countries tend to gravitate towards white-collar roles, or more pleasant working conditions than you typically find in glass plants. That's why we aimed to create an interface that was accessible to as many operators as possible. Having said that, we do also have expert modes for those who really want to push the limits."

DEEPER AUTOMATION

SCOUT's other big step forward is in terms of automation. "Previously, our machines were lagging in terms of automated setups," concedes Mike. "We relied on operators to set up their own inspection areas, sensitivities, and so on. Now, SCOUT does all the hard work. Basically, you give the machine a container, it learns what it is, and it can then perform a high level of inspection without you needing to do anything else."

A prime example is the 'Super Classifier', which lets users control the quality limits for each defect type independently. Instead of going by size alone, SCOUT identifies and evaluates each flaw on its individual characteristics.

"The system also makes it far quicker and easier to update parameters across the board – and with simpler processes and fewer steps, the operator can spend less time on setup and more on their daily tasks." says Joe. During development, the team also paid close attention to

SCOUT's quality control framework, with an eye on improving inspection quality. "We've really expanded the suite of automated quality-control testing tools," says Joe. "In addition, we can now check the performance of our algorithms over large image sets. We can record images of hundreds of thousands of live containers from production, then run our algorithms on them over and over to fine-tune them. That's given us a big advantage in terms of the quality of inspection."

BACKWARDS COMPATIBLE

SCOUT is being offered as standard on all new FleXinspect B, C, and BC machines, and can also be retrofitted to existing FleXinspect B, C, and BC machines, plus older Veritas machines. The technology will be released for FleXinspect T and M later in 2016. "It's still FleXinspect, so if you're a current user, the upgrade is relatively simple – we just go in and replace a few components which takes a matter of hours," says Mike. "For Veritas, it gives a whole new lease of life to iB and iC machines, which may have been in production for up to 16 years," he adds. "Customers who are at the end of a furnace campaign and considering whether to renew their Veritas inspection system can now keep the same machine but update all of the electronics inside it, effectively giving them a new FleXinspect in a Veritas frame. It does take a couple of days' work, but you don't have to reconfigure your whole line, and the potential boost in performance means it will pay for itself in a year or two."

POSITIVE REACTION

SCOUT has been in use in a working glass plant for more than nine months. "We've had machines in live field trials since June 2015, working with multiple container types and glass colours," says Mike. "We've also conducted an array of virtual tests to ensure there were no surprises when SCOUT was rolled out." So how did the operators react to the new system? "Everybody loved it!" replies Joe. "They said it was easy to use, and they were very excited about the performance of our algorithms as well – dimensional analysis and detection of critical defects were both reported to be well ahead of our previous FleXinspect machines."

CLOSED LOOP

As its name suggests, SCOUT seeks out information and brings it 'back home' so it can be used to improve quality. In the future, it will play an important role in Bucher Emhart Glass' move towards closed-loop control, where quality data is fed directly back to the Hot End and used to optimize production settings.

"Using the same Jetter technology as the Hot End was our first step towards closed-loop integration," says Mike. "The next step is for inspection to become a more active sensor for the forming process. For example, we could spot trends and fix problems before any bad wares are made, rather than waiting for a threshold to be passed and actual defects to appear. Even though we may be inspecting the container up to an hour and a half after it's made, that information is still valuable if you can catch it early enough."

INTO THE FUTURE

Once the technology has bedded down, Joe hopes that it will help Bucher Emhart Glass take the analysis of inspection data to the next level. "Right now, inspection images come and go," he explains. "But with full image archival for up to six months, we could achieve much more accountability and enhance quality even further. We'd need new technology to achieve that, but it's definitely an area I'd like to explore."

FleXinspect was Bucher Emhart Glass' first modular inspection product, and SCOUT continues on the same theme, making it as future-proof as any specialized manufacturing technology can be. "We used to make inspection machines for a particular purpose and function, and when things changed, they couldn't really adapt," explains Mike. "Now, our machines can be expanded and upgraded indefinitely. Cameras, lights, and software will evolve, but I expect the machine frames we're selling today to still be in glass plants 30 years from now."

For more information on SCOUT, please visit www.scoutbyemhart.com. The site also includes detailed Technical News Bulletins with full details of technical specs and upgrades. ■