

Speaking the same language

Thomas Bewer* discusses how communication between multiple subsystems is vital to guarantee optimised production and seamless integration in a glass plant

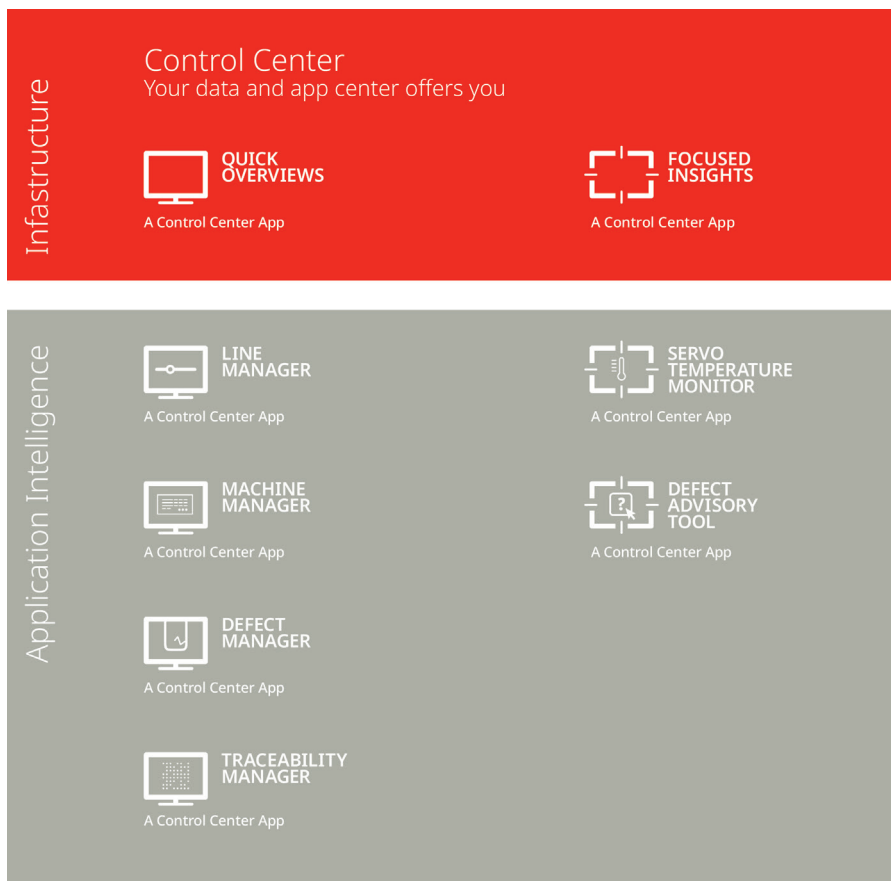
Production lines for glass containers are equipped with ever more sophisticated sensor systems. This promises a much deeper understanding of the production process. However, before we embark on using any data analysis tool, or attempt to set up a closed-loop control system, there is a much more basic issue to address: The ‘partners’ involved must be able to talk to each other.

In other words, the various systems that collect data must be able to communicate directly with each other, or the various data has to be translated to achieve the same effect. While this may sound simple and straightforward on paper, the reality is different

A major advantage of sensor systems is that the results of their measurements can be used to adjust control-system parameters automatically, in what is termed a ‘closed loop’ system. These systems can help to stabilise the production process and shorten the time required for job changes. For a closed loop system to operate, a measurement value must be passed to an actuator, so it can carry out some adjustment based on what it learns. Within the Bucher Emhart Glass range, all the elements can talk to each other, thanks to the FlexTernal software within FlexIS, which acts as an ‘interpreter’.

FlexTernal passes data from sensors to actuators, and also makes sure that such data is free from outliers and misreadings that could skew the system. Figure 1 summarises the closed loops available from Bucher Emhart Glass, and the various ‘partners’ that can be integrated into the system.

The more sensors are involved in a closed loop, the more important communication between systems becomes. As we move into the second generation of closed loops – currently in development – this will become even more vital. For example, an upcoming closed loop is the smart feeder, which will combine data about the cut gob with data on the gob falling into the blank. Another system relates to vertical glass



distribution, and uses the temperature of the parison, combined with the container’s intensity distribution, to stabilise glass distribution.

Bucher Emhart Glass has also developed automated solutions such as FlexRobot, which takes on the repetitive and sometimes hazardous job of swabbing. In the future, robots like this will communicate with sensors and control systems in order to prevent collisions, and ultimately take on additional tasks beyond process adjustments. For instance, data on the gob falling into the blank might alert FlexRobot that deflectors need to be swabbed, adjusted or exchanged, allowing it to take prompt action without any need for human intervention.

Every container on the production line passes through the same stages – but it reaches them at different times. This raises a challenge when combining data

across multiple systems, each with their own time series. The right data needs to be picked out and correlated with the right time frame. This tricky task is handled by the Control Center, which stores data from measurement systems and the change log of the timing system and translates it into tailored data analysis and aggregated views for users to review. The information is available through different applications and formats for every hierarchical level in the plant, so every user can find the information they need to fulfill their own tasks.

One example of this is the Defect Advisory Tool, which shows the Hot End operator an aggregated view of currently detected defects, aligned with imagery drawn from inspection machines and advice on how to remedy the defect.

Continued - page 45>>

	Partner 1	Partner 2	Interpreter
Plunger up closed loop	Plunger Process Control measurements	FPS pressures in the FlexIS control system	FlexTernal
Mold temperature closed loop	Mold temperature measurement by TCS or Blank Radar	Mold cooling timing in the FlexIS control system	FlexTernal
Plunger temperature closed loop	Plunger temperature measurement by TCS or Blank Radar	Plunger cooling timing in the FlexIS control system	FlexTernal
Bottle Spacing closed loop	FlexRadar measurements	Pushout timing in the FlexIS control system	FlexTernal
Smart feeder	Gob weight and shape measured by the Gob Radar. Gob length at section level measured by the BlankRadar	Feeder multi gob timing in the FlexIS control system	FlexTernal

<<page 42

This is achieved by matching the classification in the inspection machine with defect information generated at the Hot End. Thus, the operator is not confronted with a screen full of confusing statistics – instead, they receive vital information in a language they can understand.

Correlating inspection results with the forming settings and measurement results obtained at the Hot End is an expert job, and it calls for an additional ‘interpreter’: the datamatrix code.

This takes the form of a reference number that is inscribed by lasers by the Emhart ID Mark unit on the conveyor at the Hot End. Thus, each bottle has its own unique identifier, which allows its

‘life story’ – that is, all the information about how it was formed – to be gathered together in the Control System. When the bottle reaches the Cold End, the inspection machine notes the datamatrix code and all the inspection results are attached to the same number. This, the settings and measurements from the Hot End can be linked to any defects that are discovered later on at the Cold End.

Artificial intelligence and machine learning can open up new possibilities for improvement, but they depend on a clean, consistent data model. Data science companies suggest that data cleaning and modelling account for around 80% of the time (and cost) of data-science projects. To help customers take control of their data, Bucher Emhart Glass provides them

with an ‘Advanced Data Interface’ that allows them to access measurements and machine settings via a single interface.

As this brief overview shows, communication between multiple subsystems really is vital in order to guarantee optimised production and seamless integration. Bucher Emhart Glass offers all the necessary components under one roof, thus ensuring that all the ‘partners’ involved are speaking the same language: the FlexIS control system, the relevant measurement systems from the Radar family, FlexRobot, FlexInspect and Symplex B or C inspection machines. ■

***Senior Project Manager, Bucher Emhart Glass, Cham, Switzerland**
<https://www.emhartglass.com/>