Bridging the gap to modernity

Wolfgang Lachmann* explains how a bridging technology for IS machines has helped bring obsolete control systems up to date and which ensures glassmakers do not have to opt for a complete retrofit.

More than 300 IS machines with a futronic-built EPRO control performed impeccably for many years in glassworks around the globe.

Yet the technology is gradually coming up against its limits: the EPRO's ArcNet communication structure is obsolete and several of its components are no longer manufactured and therefore difficult to get hold of.

A comprehensive retrofit is the only way out of this dilemma. A bridging technology developed by futronic for this purpose brings yesterday's control up to date with a slimmed-down version of the FMT24S in return for an altogether manageable investment.

From the outset, futronic has pursued an open source strategy with its machine controls and drives: the systems must be flexibly tailored to machines from different manufacturers as well as to different specifications.

The automation specialists have made a name for themselves as an OEM and supplier to plant and equipment manufacturers for the glass industry. Many end users have likewise trusted for years in technology made in Tettnang, Germany and insist on it whenever they invest in new equipment.

The concept is no less successful whenever it comes to modernising an old plant or used machines. futronic's experts can meanwhile draw on several decades of experience with retrofits – in fact, this has become one of the company's core competencies.

Keeping pace

Provided the system and its mechanical components are carefully maintained and regularly overhauled, the robust IS machines have a service life of 20 or 25 years. This is not quite so easy as far as the electronics are concerned. "To keep pace with modern manufacturing trends, the systems should be retrofitted with the latest generation of control and drive technology in the course of their lifecycle," states Wolfgang Lachmann, Managing Director, Development & Technology at futronic. "At least the operating software should always be up to date."

Not that the technology is liable to give up the ghost at some point – it simply can't stay abreast of the information technology's rapid innovation cycles. Put another way: "There comes a time when something or other is hopelessly out of date and spare parts are not available any more," Lachmann continues. A glance back over the company's history illustrates exactly what he means.

From generation to generation

futronic secured its first contract to design a control system for glass machines in spring 1978.

After just four months, the company's development engineers were able to unveil the MP-ST. This system marked the entry of computer technology into glass production. Transistor logic and relays were no longer up to the challenge – the MP-ST was a groundbreaking invention and a paradigm shift.

Nearly 10 ten years later, futronic presented its successor: at the time, the Computer Integrated Manufacturing of Glass (CIMOG) was the first control system anywhere in the world to facilitate freely programmable special cycles for the production process. The FMT24S machine control has been on the market since 2004: Lachmann refers to this third generation as 'our flagship', not without a certain pride. The Flexible Modular Timing (FMT) is a distributed control system for IS machines with anything up to 24 sections that can be tailored to each customer's individual specification.

▲ Managing Director Wolfgang Lachmann, responsible for Development & Technology at futronic .

Lean version for modest needs

The CIMOG, too, was designed to control IS machines with up to 24 sections, making it definitely oversized for the smaller-scale plant and machinery that was particularly popular in the Far East.

In the early 1990s, therefore, futronic's specialists came up with a lean – and hence low-cost – alternative initially for customers in the Asian market, which

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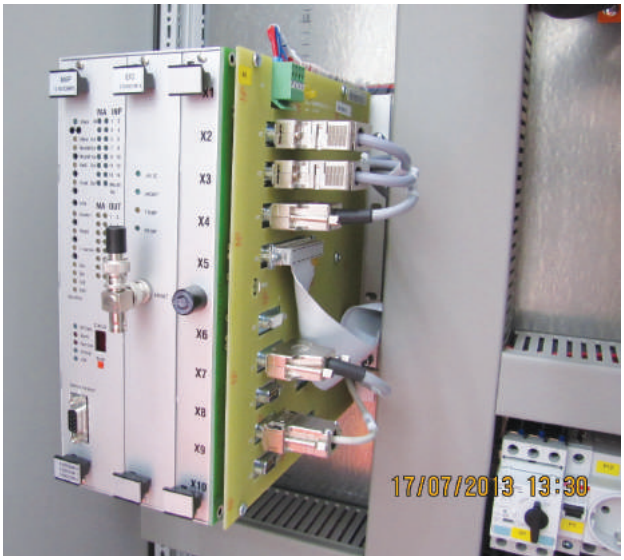
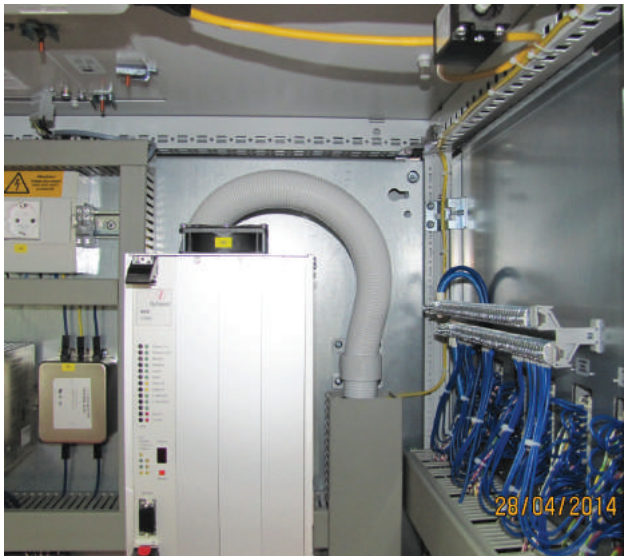


▲ Fig 1. The central processor rack containing the ArcNet module is removed from the control cabinet along with the old connections for the control panel and the flat cables for the valve drivers.



▲ Fig 2. The new module comprises the so-called FMT24S machine processor (left) and the bridging EPRO Interface Board (EIB) developed specially for the purpose. The connections for the EPRO valve drivers and the control panel are located on the front plate and all others on the rear. The rack can be tilted forward for installation.

is traditionally an important pillar of the company's business, and which soon attracted attention of customers worldwide: the EPRO (Economic Production) manages without the CIMOG's high-end functionality and controls a maximum of 12 sections. Approximately 300 EPRO controlled systems are productive worldwide even now and are doing a reliable job.

futronic shipped its last new system in 2013. The EPRO is based on what is essentially obsolete technology. The control and the visualising components OT and MCT communicate via an ArcNet network.

It's a technology that dates back to the late seventies, and since the advent of Fast Ethernet in local area networks it has been relegated into virtual insignificance. There's only one large German automation company that offers ArcNet architecture components, and it is probably thanks solely to its enormous power in the market that parts can still be purchased for it at all.

The future

"We expect to see ArcNet disappearing off the scene very soon. In the foreseeable future, modules such as the ArcNet plug-in cards will cease to be available, and the same also goes for spare parts," Lachmann predicts. Several components such as hubs, controls or so called phys for ArcNet are already difficult to get hold of.

"We buy all our modules from the last manufacturer; there aren't any second sources around any more," he adds.

The situation regarding the software in OT and MCT is no better: "The control software runs under DOS, but computers that still support such an ancient operating system are gradually dying out. In the meantime, there are hardly any left." futronic's technicians have worked out a solution as a temporary measure: modern, Windows-based PCs can now be used in conjunction with the specifically developed ArcWrapper software and a so-called DOSBox.

However, the supplier already has made clear that it will no longer support the DOS-Box. futronic can continue to manufacture the system's other EPRO modules itself without any problems for a while ahead.

Mr Lachmann's conclusion is a double-edged sword: "The ArcNet system and the obsolete software are the bottleneck. Revising them and bringing them into line with the Windows standard would be equivalent to a write-off."

On the other hand, "many of our EPRO systems have got a good few years to go yet." And there's no reason to take a well-maintained system off the production line. After all, customers have made a long-term investment in futronic technology: "We're not going to leave them standing, even if certain parts or components are no longer made." So, what to do?

Retrofits

The answer is surprisingly straightforward. "futronic already has a modern control in its portfolio, namely the FMT24S, the CIMOG's successor," Lachmann points out. And if it's been done with the CIMOG before, why shouldn't it be possible to do it again?

Lachmann outlines the underlying idea: "We discovered that components from the FMT24S system can be adapted at a reasonable cost and used as replacements for the critical EPRO modules." It's the customer's choice: either completely refurbish their existing equipment and invest in a new FMT control, or opt for a retrofit – in other words, the slimmed-down version of the FMT including the EPRO parts that can still be maintenanced, which means to invest in only one third of the costs. "Whichever option the customer selects, he is bound to profit," says Lachmann.

Up to date technology

The first step in the EPRO retrofit is always to remove the central processor rack ***(Fig. 1)*** from the control cabinet and replace it with a similar module comprised of the so-called FMT24S machine processor (FMT24S-MPR) and a new board specially developed for this purpose by futronic's hardware specialists.

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This EPRO Interface Board (EIB) bridges the gap between the internal control algorithm of the EPRO components and the FMT system – that is to say, the old system and the new one.

The new electronics board has connections for the EPRO valve drivers on the front plate as well as the control panel of the glass machine (***Fig. 2***).

All other connections for the machine components controlled by the central processor rack, such as the shear or the reject valve, are located on the rear of the module. Finally, the old DOS computer makes way for a standard PC with a current Windows operating system.

A special version of the control software with the modern, EPRO-tailored FMT24S user interface is then installed on this PC.

All network components and IT hardware, such as switches or cable and connection systems, can now also be purchased 'off the peg' and the network connection is established via the PC's own Ethernet port.

The retrofitted EPRO now offers some new features that meet the FMT standard, provided that the customer has enhanced their production programmes.

▲ Fig 3. Neat and tidy: this (new) control cabinet still houses an original EPRO control (left). Each retrofit should also include new cables, depending on the system's age and condition. They could become brittle over the years and lead to faults in view of the harsh production conditions prevailing in glassworks.

Furthermore the customer can easily add more FMT components for specific functions if required, e.g. an upgrade of the controller for servo proportional valves.

And what happens to all the precious data? What about the jobs and their parameters? Lachmann: "We copy the entire data from the old EPRO control and import it into the new system. That's part of the parcel, of course. Nothing whatsoever is lost."

The retrofit is designed to bring an EPRO controlled system right up to date again. Lachmann admits, however, that the owner must not forget "that a retrofit is only ever an interim solution in return for a manageable investment.

The day inevitably comes when only the big cogs make a difference, and there's no alternative to extensive modernisation." ■

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****This is an abridged version of an article that appeared in the futronic journal of 2016, written by Rene Kius.**