

## Injection moulding production speaks OPC

With an OPC UA-based host interface between the injection moulding machine and an MES (EUROMAP 77), the injection moulding industry got on board with the OPC UA protocol at an early stage. The possibilities of semantic modelling were a crucial driver. Injection moulding machine manufacturer ENGEL relies on seamless communication based on the I4.0 layer model in all products.

Complex production systems comprising a host of different components need efficient interfaces internally as well. The only way to manage this complexity is a high level of modularisation, starting with the machine design and carrying on through to the software solutions. The integration of options into a series production machine or a retrofit should have no impact on PLC sequence programs or the visualisation system. This requirement is nothing new. Interfaces for the modularisation of control technology existed 20 years ago. The path up to the present day is characterised by a continual progres-

sion of new programming languages, data formats, communication models, electrical interfaces and ever more efficient and ever smaller components that make this communication possible. Enterprises have also carried out extensive development work on many levels of the ISO / OSI reference model.

One of the key benefits of the OPC UA base specification is its scope which, in contrast to previous libraries or frameworks, covers all aspects. For the numerous communication models, as well as coding and decoding options, all security aspects and standardised

modelling are covered; a range of different programming languages and operating systems is supported. Instead of creating its own protocols or modelling, a company can now pick and choose from the OPC UA kit.

## Real-time communication is the next milestone

While many technologies have been in wide use for a long time, OPC UA for machine-to-machine communication with real-time requirements is still in

Networked injection moulding production: OPC UA is one of the essential Industrie 4.0 technologies because it allows for modelling on the basis of an array of predefined data types from basic specifications.



the initial stages. This includes the EUROMAP 79 robot-machine interface from the plastics and rubber industry, which uses the pub / sub mechanism with UDP transport protocol. The challenge lies in exchanging data within milliseconds; for ten years, this has worked very well with Ethernet-based fieldbus systems, but these are mostly based on proprietary solutions with a relatively simple communication infrastructure. When implementing the OPC UA pub / sub data exchange, however, high-performance solutions with the shortest possible latency time must be adapted to the network chips used, the TCP / IP stack of the operating system used, and ultimately to the existing PLC system.

An increasingly critical advantage is the promised, and to some extent already available, communication infrastructure based on broker or cloud solutions with direct OPC UA integration. It will give a further boost to global data exchange – for uses such as asset management, condition monitoring, update management or centralised management of production systems. ENGEL is incorporating these solutions into its e-connect high-performance customer portal, and is working on other products.

A blank spot in OPC UA client implementation processes is the HTML5-based browser technologies that are increasingly finding their way into industry. Especially in the area of visualisation, this technology is becoming more and more widely accepted, and almost all control unit manufacturers are forced to come up with their own in-house solutions. The company has to use its own resources to fill in the gaps in operability.

### Many peripheral devices can already be operated via OPC UA

The company is endeavouring to build on the models from the Companion Specifications. To do this, it is useful to bring our own ideas into the VDMA standardisation process. OPC UA in particular offers numerous implementation options; not all of them have the same level of efficiency and they can also differ significantly in terms of complexity. Being involved with the models at such an early stage also means that once in a while, an implementation needs to be reworked and adapted to a new version of the Specifications.

As things stand, an injection moulding machine can already interact with a whole range of peripheral devices such as tempering units, LSR dosing systems, granulate mixers or hot runners via OPC UA and conveniently integrate those devices for the user, including shared data management and visualisation on the control panel of the injection moulding machine. The interaction of the various components within the production cell, regardless of manufacturer, is considerably simplified by standardised interfaces.

ENGEL was one of the drivers behind the EUROMAP 77 and 82.1 and is now also contributing its expertise to the development of EUROMAP 79 for the operation of handling systems. As the headquarters of ENGEL Automation Technology GmbH, the Hagen site in North Rhine-Westphalia is a key plant for global automation projects. Linear and articulated arm robots in the company's own viper and easix model ranges are fully integrated into the CC300 control unit of ENGEL's injection moulding machines at the Hagen plant, offering many benefits for the

user. These include shared data record management, very fast signal transmission, the synchronisation of robot and machine movements, and combined display of robot and machine on the machine display.



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Communication between injection moulding machines and robots poses a particular challenge. Information on machine and robot movements needs to be transmitted in real time.

But for users of ENGEL system solutions, the new interface opens up even more possibilities. Highly integrated production cells can be constructed in a more modular way, using module connection systems based on established structured ethernet cabling. This will further simplify the configuration and adaptation of production cells to new tasks, better safeguarding investments.

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