The main aims behind the development of the new 2010 extrusion line for High Tech Extrusion (HTE) were to achieve significantly higher output, attain greater systems and energy efficiency, and ensure ease of use and monitoring. HTE, which was formed from the merger of Theysohn, Topf, and Technoplast, has pooled expertise for the wider procedural optimization of the entire extrusion chain – from the extruder itself to processing equipment and tools.

In addition to the unique design, the uniform, standardized structure of the new modular extrusion lines has been a particularly important factor for HTE. This structure means that all system parts are compatible with the latest Siemens electrical, control, and drive technology, and that they are networked together via Profinet. The most striking feature of the modular line is the lack of hoses and cables. Instead, there are multipole connections for the power supply and measuring signals between the extruder and nozzle, quick coupling blocks for the vacuum and water supply between the calibration table and calibrating device as well as a single installation level between the tool and calibration table. The system is fully backward compatible, so existing tools can be installed without any restrictions.

In order to optimize the plasticization process and at the same time to further increase output, the proven screw technology was further developed and the L/D ratio increased. The energy balance has improved significantly, thanks to the addition of frequency-controlled drives for the vacuum and water pumps at the calibration table, an approach that had previously not been tried. The power required for the vacuum pump motors has therefore fallen from 4.3 to 1.1 kilowatts. As regards the extruder, a highly efficient gearbox, insulated heating bands, optimized screw geometry, alternative fan technology, and reduced water consumption have all contributed to an improved energy footprint.

Automation systems from a single source
The programmable logic controller (PLC) for the 2010 extrusion line includes a Simatic 427C microbox with the WinAC RTX real-time extension of the latest expansion stage and the highest performance level currently available. The PLC’s Intel Core 2 Duo processor was officially designed as a way to separate the operating system and visualization (Windows XP Professional / WinCC flexible) from the real-time controller (WinAC RTX). This means that it is easier than ever for the line to continue to run unaffected or be shut down correctly if the operating system crashes.
All input and output signals are controlled by the Simotion ES10 distributed station, which was specially developed for use in plastics technology. The scalable system cost-effectively caters to different quantities of I/O devices. With regards to the drive, converters from the Sinamics G120 series are primarily used and drive a large proportion of the motors. The remaining motors are connected with motor starters from the ET 200S line.

A Sinamics S120 series drive on the caterpillar, to which the separator is attached, ensures greater accuracy in separating the profiles (either by saw or guillotine). HTE uses the integrated Sinamics basic positioning function to generate a cut signal at exactly the right position.

The window to the line operation is a pivot-mounted IP65-rated Simatic Flat Panel Pro with a 19-inch touchscreen display on the extruder. The entire line can be operated using this screen. There is an additional Simatic OP177B operator panel for operation functions at the end of the line; this panel is also standard for stand-alone calibration.

Integrated Profibus-compatible components allow for diagnostics via intranet and Internet. The manufacturer’s service technician can easily log into an extrusion line from the other side of the world and perform a diagnosis up to the drive level. He or she can offer targeted troubleshooting support to the user, keeping availability high, without needing to be on-site.

**One source – no problems**

“From the outset, Siemens’ integrated automation technology has saved us a great deal of work on calibration, as the interaction between all the components is tested from the start – and it works, simple as that,” says René Theimer, head of development at HTE. “The Siemens brand is recognized by users in the plastics industry worldwide; in many cases it is even requested. Siemens speaks our language and knows the specific requirements of our processes, which, for this complex project, has meant that they were quickly able to find the optimum solution, in terms of both technical and commercial considerations.” Sourcing everything from one supplier can also dramatically simplify the ordering process.

The high productivity and energy efficiency levels of the new 2010 extrusion line have been proven in tests performed over the course of several months at HTE and other selected pilot locations. The entire package is ideally suited to profile extrusion using modern profile tools with very high throughput levels. The first two extruders including follow-up equipment will be available at K 2010.