Ceramicx puts the 'thermo' into plastics thermoforming

Ballydehob-based Ceramicx claims world leadership in infrared heating technology for plastics. Founder and managing director Frank Wilson's itinerary for this year will take him to Korea, Chinaplas, the USA, and eventually to the company's centrepiece exhibit at the K 2010 plastics exhibition in Düsseldorf this autumn.

The greater part of the company's output goes into heaters and platen systems for plastics thermoforming machines. Both the needs of plastics processor clients and the machines they buy vary widely. Heating systems, and the expertise to design and support them, must provide for a range of requirements – from fast-cycling thin-walled containers to thermoforming the largest components.

Ceramicx designs and manufactures all its products and bespoke systems in-house. In the past five years the company has invested in a large machinery shop, with Hurco CNC milling machines and Safan metal cutting, shaping and finishing machinery, to underpin the continuing independent manufacturing success of the company –"no dependence on outsourcing," Wilson points out, "and full control of both innovative design and materials.

"Much of what we do here is engineering bespoke solutions and systems for new customers. Each infrared heating solution needs designing and testing before full production. And because we made the investment in CAD, CAM, metal fabrications, milling and tooling, we have been able to upskill our workforce."

Frank Wilson: Full in-house control of innovative design and materials

One current project – joint with the University of Limerick – will see Ceramicx implement a failsafe system of quality assurance and product identification that will render individual heaters traceable, with its in-service heating performance data available online from Ceramicx.

The company's quality assurance work centres on developing systems of more closely specified nominal power tolerances for the proprietarily designed ceramic and quartz electrical elements.

Wilson says: "Thermoforming machine builders and thermoforming processors evidently need the security of these data, with full product traceability. This will include infrared performance parameters that can be accessed numerically and visually – online and offline – via the serial numbers on the heating product."

Best practice for plastics thermoformers

"Any thermoforming production system," says Wilson, "presents areas of opportunity and weakness – high-speed packaging lines even more so. Thermoformers often forget that the thermal systems installed are the 'engine' of production. Without sufficient performance analysis and adequate maintenance, production output and quality will suffer."

Wilson explains that "in typical thermoforming production, systems of preheating serve to even out temperature across the raw sheet feed before it enters the main heating system proper. Infrared preheating systems are preferred, owing to the greater degree of temperature control possible. The goal at preheating is to completely eliminate temperature variation later in the processing cycle. An effective heat 'soak' will also pre-empt faults and flaws such as pearlesence on the finished product, or lack of gloss."

When it comes to the main heating phase in thermoforming, the build and quality of the infrared platens are decisive. Given this, Wilson says that "it is somewhat strange that the principles of infrared heating are so little understood by its users in packaging and thermoforming production."

The key to a good infrared heating system, says Wilson, is converting incoming electrical energy into infrared output as quickly and efficiently as possible. In plastics thermoforming, for example, a number of infrared ceramic heaters are mounted on reflectors which are then arrayed upon a platen – or two – which is part of the production line; typically after pre-heating and before the "trauma" of part forming and then sheet cutting prior to product stacking at the end of line.

The performance of the background reflectors – their material composition – and the overall performance of the platen are vital in directing the infrared heat to its the target material – namely the sheet plastic.

According to Wilson, all too often, many thermoformers end up fighting the demands and design of their machines in order to achieve efficient thermal performance. Ceramicx has found that as a thermoforming platen system starts to discolour and degrade under use – through dirt, process plastic and other materials – so its reflectivity will be compromised. The machine operator will then typically be involved in a vicious circle of increasing the temperature in order to achieve the same performance. Regular performance monitoring and maintenance could pre-empt the problems of increasing lack of control and extra cost.

Wilson says: "Time and again, we see that a 30-40% improvement in the operational efficiency of most packaging thermoforming systems can be achieved through the single and simple step of reviewing and renewing the infrared heating platen. When the temperature starts to rise – taking more and more energy – the user should be alerted to take action."

Frank Wilson concludes: "In plastics, we work hard to give our thermoforming customers – whether processors or machine builders – the quality, repeatability and cost savings that they need."

Ewikon gating technology for accurate moulding with ease

The HPS III-MH direct side gating nozzle from hot runner specialist Ewikon has proven its performance in a variety of demanding applications up to 128 impressions, says the company. For example, German mouldmaker and injection moulder Hans Rethwisch designed a compact 16-impression mould to produce disposable syringes from "Topas" material for a new dental application. The part features an adapting cone for a Luer lock thread. Since Topas cannot be demoulded by force, the undercut of the cone required a slide mechanism in the mould. A side gating nozzle with linearly configured tips was the obvious solution. Ewikon supplied the HPS III-MH nozzle in a linear version with tips angled at 60°. The mould measured 296 x 446 x 443 mm, with four nozzles, each with four tips, positioned in a row so that the 16 parts form two rows of cavities. Row spacing is 67 mm and cavity spacing 48 mm.

The HPS III-MH works with standard mould inserts. Maintenance is facilitated by the accessibility of the nozzles from the mould's parting line.

A principal customer requirement was high dimensional accuracy, with minimal core deflection to guarantee a smooth movement of the syringe plunger. The 60° tip insert allows the gating point to be 3 mm closer to the core support, giving a uniform flow front during injection. In practice, a core deflection of only 0.02 mm was achieved. Two product versions were required – one highly transparent and one in light-impermeable black, so a quick colour change was essential for efficient production. The HPS III-MH nozzle design scores here with fully balanced flow channels with no dead spots in which melt residues might be left behind. When used in combination with the fully balanced Ewikon manifold technology with streamlined direction elements, a complete colour change can be achieved rapidly.

Ewikon's facility serving Ireland and the UK is located at Cannock, England.