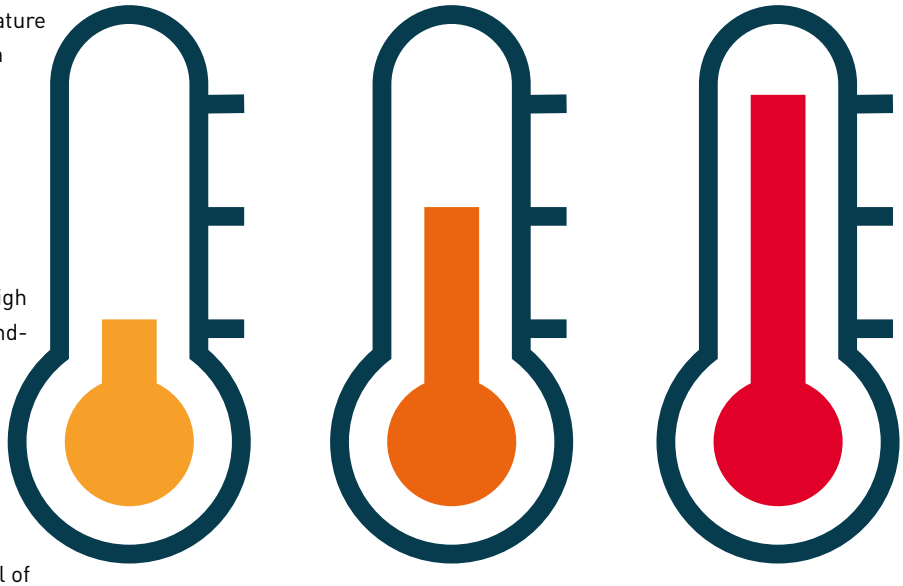
Energy efficiency, processing flexibility and quality control are key issues when selecting a method of temperature control for injection moulding. **Mark Holmes** looks at some of the latest options

The heat is on in mould temperature control



Accurate and flexible control of mould temperature is an essential element in the modern injection moulding process. So, while large centralised chillers supplying a number of machines remain a common feature in many injection moulding operations, there is an increasing move towards systems capable of providing individual mould temperature control that are better able to meet the challenges of today's high performance polymers and increasingly demanding processing conditions. New control developments are also providing opportunities to better optimise mould cooling.

Giorgio Santella, chief marketing officer of the **Piovan Group**, explains that, as the performance expectations of injection moulded polymer parts increases, more accurate control of mould temperature becomes a critical process factor. "The higher the expected mechanical performance of the plastic part, the more stringent the temperature range for the cooling water, and the more difficult the cooling cycle becomes altogether," he says. "The quantity of cooling water circulating in the mould is now the most difficult process parameter to control. Moulds have many different fabrication and manufacturing characteristics that influence the cooling cycle considerably. The water flow must be adequately set. It cannot be too low or too high, as in both conditions the efficiency of heat exchange drops, sometimes to critical levels."

Santella says temperature control today is still perceived as a simple process to accomplish, with the result that is often undertaken by poorly performing equipment. Both process control capabilities and efficiency of operation are elements that are still undervalued. The latest line of thermochillers from Piovan Group company Aquatech – DigitempEvo – combines the functions of a temperature control unit (TCU) and a chiller in a small integrated device. The company says the DigitempEvo is highly efficient, providing users with significant energy savings and stable operating conditions, and eliminates the need for a central chiller.

The DigitempEvo can be employed as part of the Flexcool system from Aquatech. This uses free cooling technology to offer energy savings of 35-50% and can serve many injection moulding machines operating at varying conditions of temperature, flow and pressure.

According to the company, Flexcool provides a more cost effective and better performing alternative to conventional centralised cooling systems, which it says suffer from high thermal energy losses. In a centralised system, for example, the chiller produces cooling water at one temperature – the lowest necessary for all equipment, moulds and machinery hydraulic circuits. This is the case even if some of the injection moulding equipment requires a higher mould temperature (or a lower flow rate).

Piovan says that, while the centralised system cooling system always operates for the worst case scenario, the Flexcool approach using a central

Main image: As processors look to achieve ever high levels of process efficiency, mould temperature control is being taken a great deal more seriously

Right: Piovan's Aquatech Flexcool technology provides an optimised and individualised cooling solution for each moulding machine

Aryacool dry cooler coupled to individual DigitempEvo thermochillers on each moulding machine, makes it possible to achieve the optimum operating cooling temperature, water flow and pressure for each machine according to the specific production requirements.

The main components of a Flexcool system are the Aryacool dry cooler and the DigitempEvo thermochiller. The Aryacool dry cooler performs at a high efficiency level with a temperature differential between the environment and the cooling water of up to 5°C (a traditional dry cooler is sized for a temperature differential of 10°C, which the company says represents half the operational efficiency). The DigitempEvo thermochiller controls flow and pressure of the cooling water, with the additional capability to control two different temperatures simultaneously for separate circuits that can be adjusted between 5-90°C. Each device is equipped with two circuits, two pumps and two temperature controllers, allowing fully independent control of the fixed and moving sides of the mould, for example.

Below: Schematic showing a typical decentralised temperature control system, in this case a Flexcool installation by Aquatech