



P R E S S   R E L E A S E

## **BATCH CLEANING KEEPS PACE WITH FLOW LINE PRODUCTION**

Worcester, part of the Bosch Group, is a market leader in domestic heating and hot water appliances, employing over 1,800 people at its headquarters and manufacturing plants in Worcester and at Clay Cross in Derbyshire. In the first half of 2012, the company required fast, thorough, compact washing systems for two new production lines to clean heat exchangers after machining.

Production engineer, Chris Packer, selected two aqueous batch cleaning machines from Turbex, UK sales and service agent for the German manufacturer, Mafac. The KEA models were supplied as a turnkey installation with special stainless steel fixtures and overhead manipulators from Dalmec to assist with the manual handling.

At the outset, Mr Packer thought that the relatively high throughput of the production lines meant that continuous tunnel washing would be required, although early trials proved disappointing. However, further research showed that batch cleaning systems could keep pace with production.

There were three important stipulations regarding the cleaning equipment. It had to be capable of washing a pair of heat exchangers in six

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minutes; the footprint needed to be compact; and a high degree of cleanliness was essential to ensure reliable boiler operation and avoid unnecessary service calls.

In each production line, after the process of friction stir welding of four cast aluminium alloy panels, the cuboid component passes to a 4-axis, horizontal machining centre where the cycle includes drilling a series of small holes. The part and especially the holes are filled with swarf and coolant after machining, so washing and removal of the swarf requires a method that can penetrate all the difficult areas.

This is where Mafac's patented system of moving the holding fixture and spray jets independently pays dividends. They can be programmed to oscillate or rotate in the same or opposite directions, allowing an almost limitless choice of relative movements to access even the most awkward areas of the complex components.

Mr Packer explained, "We looked seriously at three potential machine suppliers and sent parts to each for cleaning trials.

"Turbex was already known to us, as for many years we have used one of their ultrasonic tanks for washing copper pipes.

"They were very helpful with this latest project, loaning us a smaller Mafac PICO for several months to tide us over in the early stages of production.

"After extensive evaluation at the Turbex technical centre in Hampshire, the KEA machines were purchased and installed on the shop floor. They have integral condensing systems, so there was no need for an extraction unit to be fitted.

"To meet our particular safety requirements, the supplier fitted an additional interlock on the pneumatically operated, vertically sliding door, which itself is a special feature, albeit a standard option.

"As it happens, Mafac is a preferred supplier to the Bosch Group worldwide, but this was not the sole reason for making our decision – rather an additional reassuring factor."

The washing sequence in each KEA, which has a footprint of just 2.0 x 1.2 metres, is completed on two heat exchangers at a time. They are secured in one fixture so that they cannot move, avoiding damage. Plain water at up to 50°C is used during the process, which has proved to be highly effective at cleaning to the required level without the need for detergent.

The wash cycle starts with a 10-second pre-wash, during which the components turn through 360 degrees to remove most of the

contamination. The fixture and spray bar are then set to oscillate in opposite directions at one end of the heat exchangers for 2.5 minutes, followed by a similar sequence at the other end for 2 minutes, during which the components are inverted. Finally, after one full rotation of the fixture to remove any excess water, the components are dried by pulsed compressed air.

After the components have cooled, the assembly is completed and the heat exchangers are individually leak tested before being transferred to the boiler assembly lines.

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A Mafac KEA aqueous washing machine (foreground) from Turbex in one of the new Worcester heat exchanger production lines. The 4-axis machining centre and friction stir welding machine are pictured centre and left respectively.



Two heat exchangers are held in each stainless steel fixture so that they are not damaged during washing, which involves rotation and rocking.



A heat exchanger being removed from a fixture and transferred to a roller table to cool.



A view from the other side of the KEA washing machine, showing in the background a batch of heat exchangers waiting to be leak tested.

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