



P R E S S R E L E A S E

AQUEOUS CLEANING IS BEST FOR REMOVING COOLANT RESIDUE

Electron beam welding requires components to be scrupulously clean to ensure integrity of the welds, according to specialist provider, Electron Beam Processes (EBP), whose customers in the aerospace, subsea and other sectors demand the highest quality levels. Historically, cleaning with solvent and detergent removed oil from the surfaces, but coolant residue left after CNC machining often had to be removed by hand using acetone.

Peter Vincent, Managing Director, said, "We wanted to eliminate manual cleaning, as it is labour intensive and there are health and safety issues with using acetone.

"After two years of research, we identified what we believe to be the best automated process for removing all of the contaminants from our components.

"It is the Turbex AC 1.7-2 aqueous spray wash machine, which cleans parts using jets of hot, high pressure water and detergent. After a demineralised water rinse, the machine dries the components ready for assembly."

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Previously, EBP was approximating this process using a small aqueous washing machine, a separate demineralised water rinse tank and an oven, with manual transfer between the three stages. A small load took an hour to complete this way and it had to be repeated several times a day. Removal of stubborn coolant stains with acetone was still required and large parts also needed to be processed by hand.

Now, the 1,400 mm cube chamber of the Turbex is large enough to wash even the biggest components, such as one-metre diameter nickel alloy seals for the Trent XWB engine or a titanium fuel tank for a torpedo. One 44-minute cycle is usually sufficient to process all components on an average day, even though some need to be washed a second time after they have been tested using a dye penetrant.

A wide range of materials is cleaned, from nickel and titanium alloys through stainless steels and case hardening steels for motorsport applications to aluminium. It is impossible to mill, drill and turn the tougher metals without the presence of coolant. After processing in the Turbex machine, the level of cleanliness achieved conforms to NADCAP and AS9100 Rev C requirements and meets no less than 22 customer-specific approvals from aerospace firms, including Rolls-Royce and BAE Systems.

Jeff Boyes, EBP's Operations Executive, commented, "We did a lot of research into different cleaning machines and found that, even with the

assistance of ultrasonic agitation, solvents left a white residue on areas where coolant had been in contact with the components.

"Solvent replacements, introduced as a 'green' alternative to organic solvents, performed even worse and some produced an awful result.

"Aqueous cleaning was the superior process for our needs and of the systems evaluated, the Turbex machine was by far the best.

"We conducted trials at their technical centre in Alton, cleaning sample parts which we kept in plastic bags for a week before successfully welding them.

"By contrast, we had problems welding parts cleaned in all of the other aqueous systems we trialled."

The Turbex was duly installed in the Woking factory in May 2013. The programmable machine with built-in diagnostics is generally operated on one standard cycle. It comprises a heated spray wash using tap water mixed with low-foaming liquid detergent, followed by tap water spray rinse, demineralised water spray rinse, steam extraction, hot air drying and fan cooling before unloading the components from the chamber.

Parts are completely free from water when they emerge, owing in part to drying the load for over half of the total cycle time and also thanks to optimal orientation of parts within the chamber, sometimes using special trays, to minimise the risk of water becoming trapped in difficult areas.

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The Turbex AC 1.7-2 aqueous spray wash machine processing electron beam welded, high pressure bearing housings for the Trent 1000 engine at EBP, Woking.



A titanium fuel tank for a torpedo being loaded into the Turbex at EBP for cleaning.



The fuel tank is pushed into the work chamber.



A view of the interior of the Turbex, showing the rotating spray bars that direct jets of high pressure water onto components.



Almost any wash-rinse-dry cycle can be programmed into the Turbex control system, although EBP uses one proven program most of the time.

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