PRESS RELEASE

UNIPART INSTALLS AUTOMATED CLEANING LINE

Multi-stage, ultrasonic equipment from Turbex

prepares fuel delivery system parts for brazing

International legislation requires vehicle manufacturers to improve the efficiency of their engines in order to decrease fuel consumption and minimise the production of pollutants. One way to achieve this is to increase the pressure of the engine's fuel injection system so that the liquid hydrocarbon is more finely atomised in the cylinders.

In the 1.5-litre petrol and diesel engine options that power the Ford Focus, for example, the fuel delivery pressure is 180 bar, while in the next generation of vehicles it will exceed 200 bar. Contrast this with the norm in the automotive industry of less than 10 bar a few decades ago.

Integrity of a fuel injection system is essential to withstand the high pressures. So Unipart Powertrain Applications (until March 2015 called Unipart Eberspächer) ensures that every stainless steel fuel rail it manufactures for the Ford Focus engine passes leak-testing at its Coventry factory. This is carried out at 200 bar using air and then 180 bar with helium, which is more searching due to the smaller molecule size.

Periodic flush testing of rails and daily sectioning of a random brazed joint followed by inspection through a microscope are also performed.

One measure that is taken to ensure fault-free production is to wash the delivered components in an automated, multi-stage, ultrasonic cleaning line supplied by Turbex. It promotes the subsequent production of consistently good brazed copper joints, without any porosity at the relevant pressures.

Simon Stowe, project planning engineer at Unipart commented, “Every element of the fuel rails, apart from the non-critical cast mounting legs, is processed through the Turbex line.

“In the past, we did not wash any fuel rail parts on-site but relied on our suppliers to guarantee their cleanliness. This worked satisfactorily and we always met the quality standards laid down by our customers.

“However, Unipart management took the decision to bring control of cleaning in-house, as systems carrying pressurised fuel are safety-critical and specifications are becoming increasingly stringent.”

Another factor in the decision was the possibility of contaminating the brazing furnace if oil, lubricant or particulates are on the surface of components. This could compromise the integrity of the copper-brazed joints of the rail assembles and perhaps necessitate expensive stripping down of the furnace. Any risk of scrappage or system downtime is unacceptable, especially with manufacturing volumes for the Ford 1.5-litre

engines alone, currently around 4,500 per week, predicted to rise to 8,500 per week by the end of this year.

When Unipart took the decision to install in-house cleaning, Turbex was the front-runner as it was already an approved supplier. One of its AC-series of front-loading spray washing machines has been in use at the Coventry factory for more than a decade and is currently employed mainly for cleaning kanban boxes. A couple of other potential industrial washing equipment providers were considered, but Mr Stowe and his team saw no reason to change, from either a technology or cost standpoint.

Initially, a small Turbex ultrasonic bath was rented to develop the process for cleaning the Ford fuel rail components. The machine was later purchased to provide a permanent on-site facility for further development projects.

The latest Turbex five-stage cleaning line was originally ordered as a manually operated facility, whereby baskets of components are moved along an overhead gantry and lowered by hand into each tank in succession. However, Mr Stowe quickly realised that an automated system would be preferable in view of the rising volumes of rails, so asked Turbex to amend the order accordingly.

Virtually all of the stainless steel parts are processed, including the main rail, injector cup and tube, collars, inlets and end plugs. They are washed in Kanban batches and the carriers can accommodate a pair of baskets

one above the other, so two different component types may be handled simultaneously.

Mr Stowe has programmed the line to complete the cleaning and drying cycle in 10 minutes. The versatility of the line is such that up to five carriers, each holding one or two baskets of components, can be in the system at the same time for simultaneous processing, allowing the high and increasing volumes of fuel rail components to be accommodated.

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Eight photographs :

The Turbex automated, five-stage cleaning line at Unipart Powertrain Applications, Coventry.

Kanban batches of two different stainless steel fuel rail components ready for cleaning in the Turbex line.

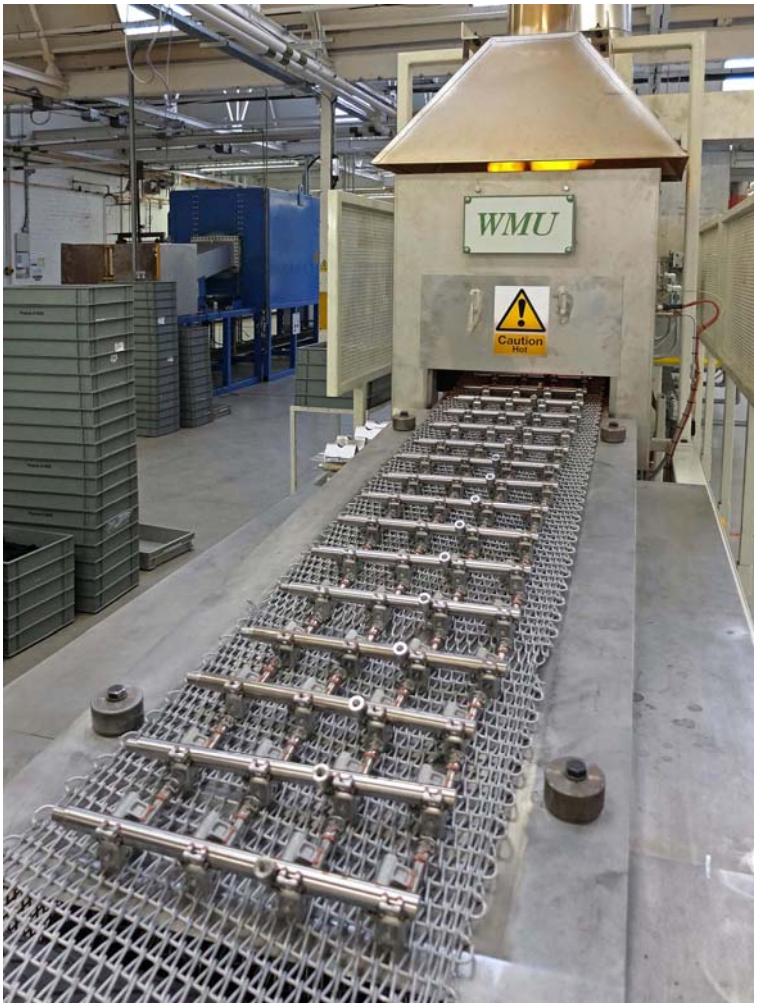
Processing at the first wash stage, with detergent. Turbulation and repeated dunking of the basket carrier assist the cleaning action.

Automatic transfer of the carrier to the second stage.

Simon Stowe watching as the carrier is lowered automatically for washing in the second stage.

The deionised water rinse tank. By this time, the level of component cleanliness is very high.

The components about to enter the first of two drying stages.



Cleaned components assembled and tack-welded to form fuel rails for the latest Ford 1.5 litre engines. Copper paste has been placed on the joints, ready for brazing in the furnace.

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