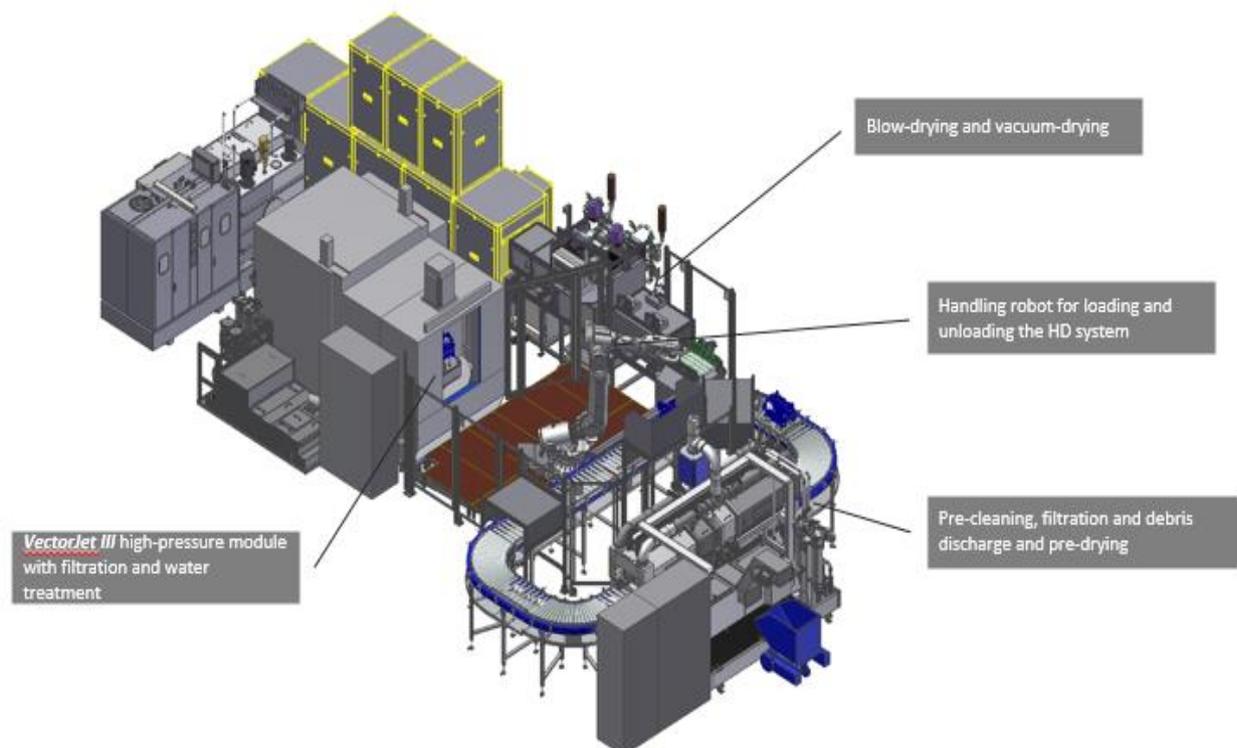


## The new trend: Cleanliness - right at the start of the process chain

It is more than a trend. The development that has caught on in recent years is already sustainable and has significantly changed the manufacturing structures in many foundries. There has been a considerable increase in mechanical machining immediately after the casting process. This is especially true for complex components such as crankcases and cylinder heads. The days when only risers and sprues had to be sawn off are over. Bearing faces, transport, index and mounting holes, surfaces and a lot of other machining points now often already have to be machined by the casting manufacturer. This is also associated with increased demands on the delivery condition. Automotive manufacturers' specification sheets not only include perfect casting quality, machining dimensions and surface quality, but also requirements for cleanliness and an absence of burrs and shavings. This challenge was also faced by the company NEMAK based in Dillingen in Germany, who had to produce 3 and 4-cylinder crankcases.

In addition to casting and machining, the company was tasked with cleaning the components. Several alternatives for cleaning the parts soiled with moulding sand, casting debris, shavings and cooling lubricants were investigated for this purpose. The system should be as automated as possible, flexible with regards to parts (because deliveries may be chaotic), process-reliable and energy-saving. The complex internal water and oil chambers of the crankcases were seen to pose particular difficulties.

NEMAK decided on the solution offered by PILLER Entgrattechnik based in Ditzingen-Heimerdingen in Germany. At the heart of the multi-stage cleaning system is the **VectorJet III** high-pressure water jet system, which accesses the component contours with a four-axis movement using a wide variety of injection tools and removes debris and shavings from the crankcases. At the same time, the high-pressure water jet also eliminates machining burrs. The **VectorJet III** system also includes a supply module for the cleaning and treatment of the HP washing medium. This HP process is preceded by aqueous spray cleaning with filtration and debris discharge, as well as pre-drying to reduce the propagation of the first cleaning medium. The components are bolted to a workpiece carrier and transported via a roller conveyor to a handling robot. The HP process is followed by blow-drying and vacuum-drying as preparation for the leak tests.



## Complete cleaning system for 3 and 4-cyl crankcases with the subcomponents

In this project, PILLER Entgrattechnik was able to draw on experience from many different automotive projects and design a cleaning system manufactured completely in-house. Particular attention was paid to two aspects: first of all to the filtration and cleaning of the two wash media that carry a high pollution load after the casting and rough machining process, and secondly to a solid design of the variety of high-pressure tools, so that the requirements for cleanliness of these very complex components can be met. The opportunity to try out individual HP parameters and tools in advance at the in-house PILLER technical centre was again advantageous. The system was installed at NEMAK in Dillingen, put into operation and now works in the full production process. The cycle time per crankcase is less than one minute.

The focus on workpiece carrier transport and the use of a **VectorJet III** system has yet another advantage for NEMAK, as Michael Thorn, Project Manager for the project at Nematik in Dillingen explains: "The flexibility of the Piller system concept even enables us to use the system to clean and dry geometrically different components. The high-pressure spray programme can be adjusted with further high-pressure tools and freely programmable movement paths. This means we are also prepared for future projects!"



**VectorJet III** from PILLER Entgrattechnik: The high-pressure system has the same degree of freedom as a 4-axis machining centre and can be automatically loaded and unloaded.