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Heat exchangers with dual function

Hybrid heat exchanger with electric flow heater

Combining the ability to cool and heat in one piece of equipment is a tricky business: How did Universal Hydraulik succeed in integrating the two thermodynamic processes of warming and chilling in a single device?

Opposites attract. Special conditions and circumstances often present manufacturers of heat exchangers and hydraulic components with special challenges, which in turn demand equally exceptional solutions. In the course of equipping itself to deal with the unrelenting trend towards more compact systems and units, Universal Hydraulik has developed a product that can accommodate the two thermodynamically conflicting processes of heating and cooling in one device.

Hybrid heat exchanger with electric flow heater

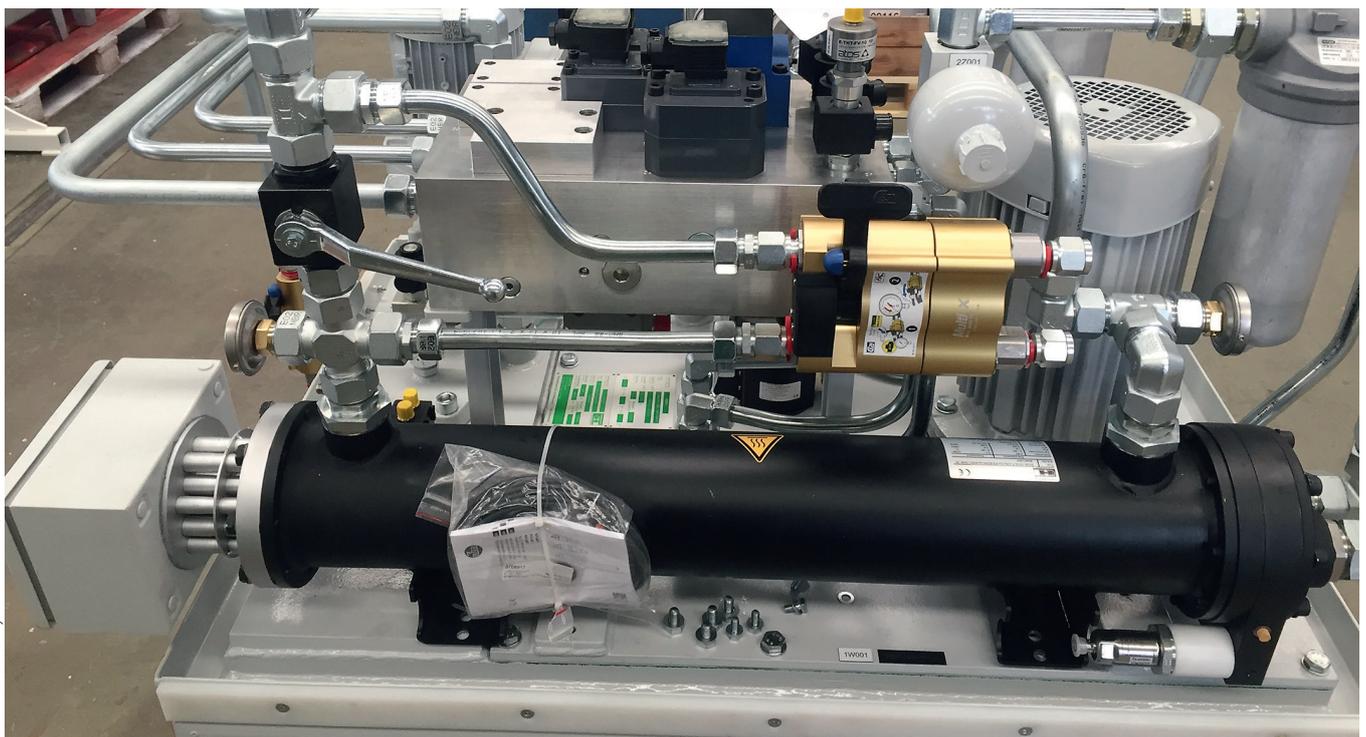
The company's primary objective was to substantially reduce the space requirement in a system. It should be possible to integrate the cooler and the heater element in one housing. Previously, applications involving both heating and cooling could only be carried out using two separate products. Developers were using a standard hybrid heat exchanger (e.g., EKM/SCM series) to

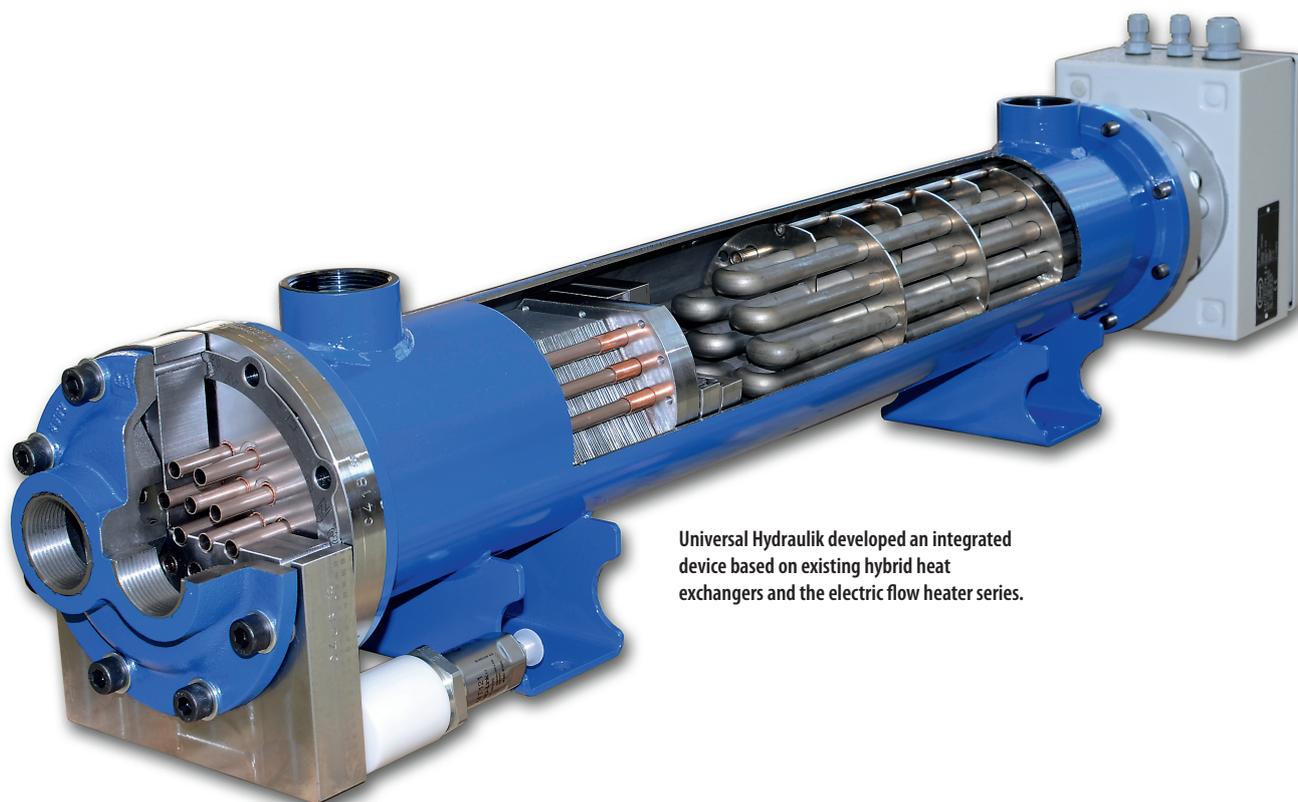
cool the media. For heating, an electric flow heater (EDH series) was also installed. Heater rods are often integrated in the tank to heat the oil. For this, Universal Hydraulik has developed a tank-mounted series with forced flow which guarantees a considerably shorter warm-up time. Built-in temperature limiters further ensure that the oil cannot coke, as can occur when heater rods are fitted in the tank. The integration of both products (EKM/SCM and EDH) reduced the installation space in the system. The process of switching from heater to cooler along with all the pipework could be dispensed with.

Hydraulics for tunnel builders

In close cooperation with Herrenknecht in Schwanau, a custom-fit, individualised solution was developed to satisfy the stringent technical project requirements. Hydraulic units and control blocks from Herrenknecht have been a valued part of the drive and control tech-

After the successful development phase, the cooler-heater combination has been in operational service with the tunnelling specialists Herrenknecht since early 2019.





Universal Hydraulik developed an integrated device based on existing hybrid heat exchangers and the electric flow heater series.

nologies in some of the largest tunnel boring machines in the world for 40 years.

Originally produced for use in the tunnelling industry, hydraulic systems made by the Schwanau-based company are now found in many machine building applications. After the successful development phase, the cooler-heater combination has been used operationally by the tunnelling specialists from Baden-Württemberg since early 2019. The cooler-heater combination is able to regulate the temperature of the medium according to needs with a total installation footprint of just 1100 x 212 x 200 millimetres. Thus for example the medium can be heated by the heater element under cold start conditions, and can be cooled down again by switching to the heat exchanger if temperatures rise too sharply. With constant volumetric oil flow, the device achieves: 25L/min either 5 kW heating capacity or 3 kW cooling capacity. Both the cooler and the heater can also be removed for easy maintenance.

The heat exchanger installed in this combination is a double tube variant in the safety design. Leaks in the cooler-heater combination are detected automatically. The system operator can then use the analyses for Industrie 4.0 data processing. Since the EDH and EKM/SCM series are both based on the same housing sizes, a suitable cooling/heating combination can be calculated and assembled for a wide range of operating conditions. The combination is available optionally with straight or U-tubes on the water side. A simple or a safety heat exchanger can be utilised. The hybrid coolers from Universal Hydraulik are as compact as a plate heat exchanger and as robust, long-lasting and maintenance-friendly as a shell-and-tube heat exchanger. The heat exchanger are now available in eight sizes and with cooling capacities up to 5,000 kW, and can be custo-

mised to specific customer needs depending on the application.

Based in Hessen, Universal Hydraulik has been active in hydraulic systems for over 36 years and is now led by the third generation of its family owners. From its original business of planning, developing and manufacturing hydraulic plant and systems, the company diversified and can now also look back on over 25 years of market success as producer of heat exchangers and cooling systems. Its workforce of 125 employees at three sites in Germany, the Czech Republic and the USA work with customers and partners to create optimal solutions for continuously evolving applications and requirements. Production at all three sites is regulated by a quality management system that is certified according to ISO 9001:2015.

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The original EKM/SCM (hybrid cooler) and EDH (electric flow heater) product series from Universal Hydraulik before integration

