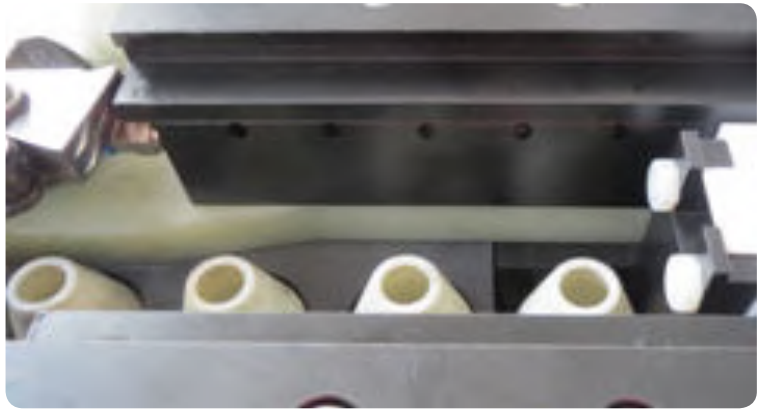
Project: Screw cooling

Engineering of a coolingsystem with an accurate air nozzle

HTK vent

Task:

Automated cooling of screw thread in the production from approx. 1500°C to less than 50°C. The use of heat - resistant metal nozzles is not possible due to the induction used in the system. An increased stress on the nozzle material to be selected due to extremely high temperatures must also be taken into account in the engeneering. The required conveyor belt speed is 1.7 m/min and the length of the possible exposure by the cooling air flow is max 0.25m. The component must reach the target temperature of below 50°C in approx. 8.5 sec. System cooling as a secondary target is also aimed for.



Is state:

The costumer had an automated screw cooling system with six air nozzles, wich were operated by a side channel compressor, and as well as additional nozzles via compressor air. However, these combined nozzles did not achieve the desired cooling result. Operating with compressor air is very inefficient in terms of energy.

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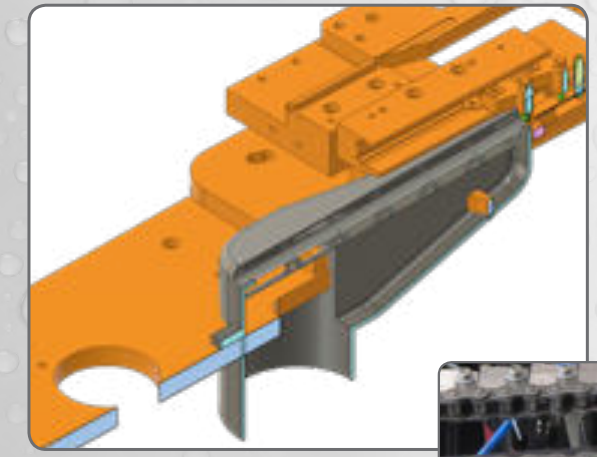
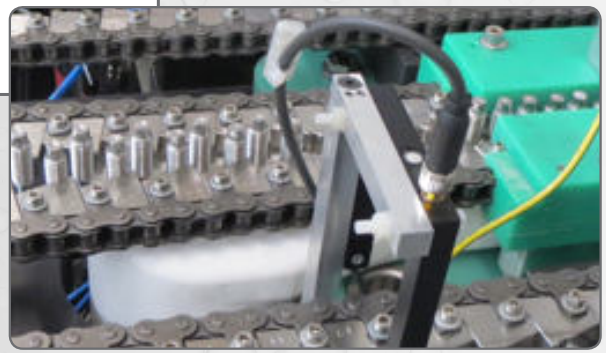
Delivered products & services:

HTK-Vent has determined the required space on the basis of barrier contours (3D data) and then designed the necessary nozzle and optimized the design. CFD and FEM analyses were necessary for this. Outlet openings and distances from the nozzle opening were determinated, to calculate the appropriate outlet velocity. The supply fan was selected accordingly.
The performance parameters were achieved mathematically by convection.
The 3D files were provided to the costumer.



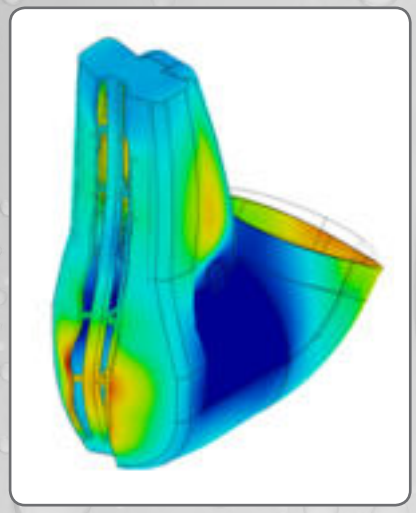
Cut through air nozzle (gray) in the machine



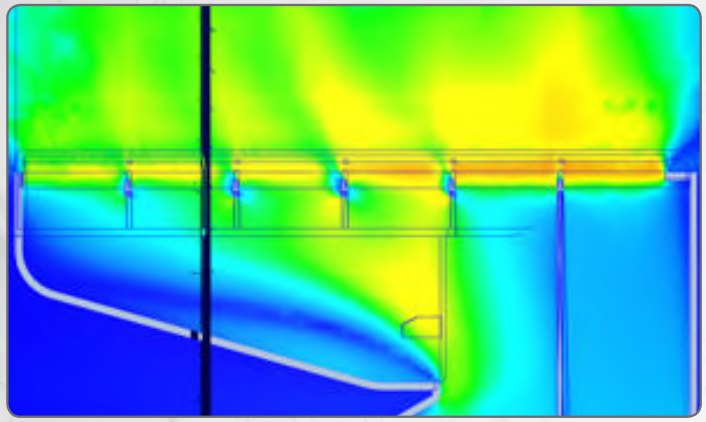
Nozzel (white) installed in the machine

Result with the Air Knife System:

The Air Knife cools (according to the costumer feedback) the screw threads to approx. 40°C and secondarily supports the system cooling as desired. The exit flow velocity is approx. 120 m/s and was achieved with an energy consumption of max. 5.5 kW



finite elements analysis (FEM)



computational fluid dynamics analysis (CFD)

Result:

The costumer is highly satisfied and will continue to delegate fluidic challenges to HTK-Vent

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