



The latest from our R&D department

R&D report
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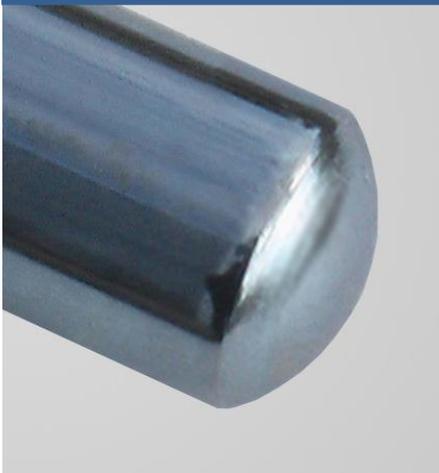


Image1: Tube ends can be reliably and cleanly sealed without the need for additional material

Innovative forming technology

Efficient tube sealing technology without the need for additional material

Sealing the ends of metal tubes requires either plugs to be fitted or end pieces to be welded in. However for many applications these alternatives are ruled out for structural, production, or design-specific reasons. ATEC's tube end sealing technology for the production of high-quality tubular radiators is an innovative solution for sealing tube ends pressure-tight and without the need for additional material.

A plant solution was needed for sealing tube ends quickly, reliably, and cleanly for a new production line making designer radiators. ATEC GmbH, a specialist in automation solutions, welding and forming technology, developed both a process and a piece of equipment for this need. This gave rise to a solution which, solely by forming, is able to round off and seal tube ends and furthermore can achieve a pressure resistance of ≥ 12 bar.

The process involves the tubes being fixed individually in a fixture. Then the tube ends to be sealed are

inductively heated. The temperature can be controlled by a medium-frequency converter. The heat input is varied according to the type of material, its strength, and the area to be heated.

The actual forming process is undertaken with the help of a specially coated metal dome, a semi-spherical metal tool. The mounted dome rotates around the tube, seals it, and produces a predefined radius while doing so. So that no oxidation of the material occurs, this step is carried out in an inert gas atmosphere.

To achieve the optimal joining of the material and the desired forming result, machining time and heat input must be adjusted individually to suit the particular workpiece. The dome is provided with a thin-film coating specially adapted to the processing temperature and material. A tool with thin-film coating benefits from reduced friction during machining and provides better resistance to oxidation.

The patented tube end sealing technology from ATEC differs from other processes in that the tubes do not have to be rotated during the sealing process, which makes it possible to also process geometries that are not rotationally symmetrical. This brings with it a series of benefits from a plant engineering standpoint. For example, the tubes do not have to be inserted from the side by clamping elements. This reduces the



Image2: Since the workpiece does not move, it is also possible to process geometries that are not rotationally symmetrical



Image3: ATEC tube sealing technology allows you to produce a wide array of different radiuses

area needed for setting up the system by at least half of the space that would otherwise be needed. It is also possible to entirely do away with a central support for longer tubes, as the tubes do not move during the machining process. Since it is the tool that moves, and not the workpiece, cycle times can be defined based on the length of the tube. As a whole this process has far fewer active elements than are used by conventional systems, which reduces the risk of failure and increases system availability. Finally, ATEC tube end sealing technology can also be used for small batches and with a low level of automation. ATEC tube end sealing technology allows you to produce a multitude of different radiuses, and the seal is both gas-tight and pressure-tight. This results in a diverse range of potential applications. For example, hydraulic and pneumatic components, piping and valve systems, airbags or shock absorbers can be produced for engine and automotive technologies. In the area of radiator production, the process is used to produce tubular heating elements, and there are also interesting fields of application in the manufacturing furniture, door handles, fittings, and trade fair construction or storage logistics systems.

Compared to conventional and alternative processes, the tube

sealing technology from ATEC's new system achieves significant efficiencies and increases in productivity for production. This reduces machining times tremendously and makes it possible to maintain lean system technology. Thanks to its high capacity for integration, ATEC's tube sealing technology is easy to combine with plants and systems both up and downstream. Due to the low number of active components used, the risk of failures is minimised and process reliability increased.

If you are interested in our new process and want to hear how you can integrate it into your production technology, we are always happy to answer your questions.

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