

Accurate Fixing of Thermoformed Parts

Dry Claw Vacuum Pump for Holding Plastic Parts

The bonding of individual thermoformed parts requires high precision. The vacuum experts at Busch rely on a claw vacuum pump without lubricants to produce housings in medical technology. The frequency-controlled system adapts its performance to the respective requirements.



Parts for the housing on magnetic resonance imaging (MRI) devices are thermoformed at Hombach using the twin-sheet process and then completed into finished components © Hombach

The repertoire of Ernst Hombach GmbH & Co. KG includes complete cladding solutions – e.g. for devices in the medical technology. For holding plastic parts during bonding the plastics experts rely on a mobile Mink MV claw vacuum

pump from Busch Vacuum Solutions. Advantages of the new system are:

- exact fixation in clamping and holding devices,
- demand-dependent power through frequency control,

- flexible holding of one to three parts,
- less maintenance due to no lubricants,
- flexible use due to mobile device.

Hombach manufactures plastic products in Uehlfeld, Franconia, Germany, ranging from high-quality individual parts to pre-

fabricated mass-produced components for medical technology, railway vehicles and many other industries. The company was founded in 1947 by Ernst Hombach.

Vacuum Thermoforming of Hollow Bodies in One Operation

During the early years, they only manufactured lampshades, but in the 1960s Ernst Hombach became involved with vacuum thermoforming and revolutionized this process with the development of closed-chamber twin-sheet forming. This process makes it possible to thermoform two thermoplastic plates simultaneously into an upper and lower mold, allowing hollow bodies to be produced in a single operation. Today, twin-sheet technology is used, among other things, to produce cladding for machines or equipment in medical technology, such as housings for magnetic resonance imaging equipment (**Title figure**). Hombach can offer virtually all steps of production to its customers, from the concept to series production – from design, construction and prototyping to thermoforming, further processing, pre-assembly and finishing. Timo Tobolla, Managing Director, thus rightly sees himself as a system supplier for his customers.

The New Pump Operates Three Holding Devices Individually

Individual thermoformed parts are bonded in a separate production hall. In this process, the individual plastic parts are fixed in a holding device under vacuum and joined to other components by bonding. Due to the required high level of precision of these bondings, it is indispensable that the parts are securely and precisely fixed. In the past, an oil-lubricated vacuum pump was used for this purpose, which was placed on a pallet at the respective work stations and to which a maximum of two holding devices could be connected at any one time. The disadvantage of this solution was that this system was not very flexible. What is more, the vacuum pump always ran at full speed and thus always had an unnecessarily high power consumption. In addition, the vacuum pump was relatively loud, which was annoying when operating directly at the work stations.



Fig. 1. As a mobile unit, the Mink MV claw vacuum pump can be flexibly used in production © Busch

Vacuum Solutions

After consulting with a vacuum expert from Busch Vacuum Solutions, the expert offered a solution that was precisely tailored to these needs, namely a Mink MV claw vacuum pump. This vacuum pump does not require oil as an operating fluid. It therefore works completely dry and contact-free. This makes it nearly maintenance-free: no oil change, no filter change, no wearing parts.

The Frequency Control Maintains the Specified Vacuum Level

The vacuum pump is standard-equipped with frequency control. This means that the vacuum pump can be programmed to set a specific vacuum level necessary to hold the parts.

The vacuum pump adapts its performance to the respective requirements. For example, if the necessary vacuum is applied to a holding device, the pump reduces the rotational speed until it comes to a standstill. If a second holding device is connected, vacuum is also immediately applied there by the buffer in the vacuum vessel. If the pressure in the vacuum vessel rises above the programmed level, the vacuum pump automatically starts to lower and maintain it again via the rotational speed. The Mink MV claw vacuum pump is installed together with the vacuum vessel to form a compact and mobile unit (**Fig. 1**), which

can be easily moved to the respective work stations.

Timo Tobolla sees the main advantage of this solution in the fact that he uses considerably less energy with the Mink MV and that, instead of two holding devices in the past, three can now be simultaneously operated under vacuum. Furthermore, the regular maintenance work previously required and the associated costs are no longer necessary. "In addition," Timo Tobolla continues, "handling the new vacuum supply is much easier and, what's more, the new vacuum pump is quieter than the model used previously." ■

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Service

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