

Companies join together to produce protective masks

As an experienced technology provider for mask production equipment, Weber Ultrasonics AG now manufactures respiratory and surgical masks in Germany, with the help of the fast and active support of surrounding companies and the dedication of its own employees.

Ultrasonics is probably not the first thing that comes to mind when you think of respiratory and surgical masks. Yet ultrasonic welding plays an important role in making these products.

Efforts to stem the spread of COVID-19 have made one problem of globalisation clear, the dependency on low-cost manufacturing countries for personal protective equipment (PPE). This is why, in addition to protective clothing and gloves, breathing protection and surgical masks have been in short supply in Germany and other European countries since the global spread of the Corona Virus.

"Since the SARS pandemic in 2002/2003, we have been producing equipment for the manufacture of different protective masks made of nonwovens based on thermoplastic synthetics. The equipment is primarily supplied to customers in Asia," says Christian Unser, chief sales officer at Weber Ultrasonics AG.

Unser notes that producing masks was never an issue for the component and plant manufacturer based in Karlsbad, Germany – until the start of March 2020 when some countries started their shutdown.

He notes that what triggered the idea of mask production was an enquiry from a mechanical engineering customer who was unable to get filter domes for its special ventilated respiratory masks in FFP2 protection class, because of the export restrictions in place for these products.

"Together with the customer, we developed a plant design for producing the three-dimensional filter elements. The customer immediately placed a separate order for the three machines, which were manufactured by Weber, after seeing the production results," explains Unser. Parallel with this development, Weber Ultrasonics converted the design into one standard machine for the production of complete breathing protection masks. The first process step of deep-drawing the masks represented a challenge.

"This takes place through hot-forming, which requires a suitable tool as well as special heating elements and corresponding control units. In order to be able to produce corresponding prototypes quickly, we decided

to turn to a market player that also works in this segment, who provided a heating element and control unit," he explains. "Our head of design at Weber Ultrasonics obtained a second heating element and control unit from his former employer to accelerate the production process. The necessary deep-drawing tool was made almost overnight by a neighbouring model maker and long-standing partner of the company. It was great to see how different companies offered spontaneous support and cooperation to put the necessary elements together," comments the chief sales officer.

60 respiratory masks per hour with one machine

The production of the breathing protection masks takes place with one standard machine in a multi-stage process. In the first step, an open-pored fibrebond used as a stabiliser, a layer of meltblown nonwoven as particle filter and a layer of spun-bond are shaped through hot-forming. The edges of the masks are then joined in an ultrasonic welding process. To do this, an ultrasonic converter converts the electrical signal produced by the generator into mechanical oscillation. This is transferred via a booster and a customised welding tool – the sonotrode – onto the surface to be joined. The frictional heat this generates causes the nonwoven materials to melt specifically at the edges, where they form a permanent bond without distorting. At the same time, the reliable, energy-efficient and productive joining technology ensures a soft and skin-friendly surface. The masks are then punched out mechanically, and tapes are attached to fasten them.

The production capacity of the compact standard plant with the single tool is around 60 breathing protection masks per hour. In line with current standards, Weber Ultrasonics aims to achieve protection class FFP3 for the masks produced and to perform an accelerated inspection of corona virus pandemic breathing protection masks for Germany.



For the respiratory masks produced according to the standards for protection class FFP3, an accelerated inspection of corona virus pandemic breathing protection masks for Germany will be carried out.

Unser adds that Weber Ultrasonics has also experienced increased demand for production equipment for surgical masks. The company's solutions in this segment so far enable the production of 200 masks per minute. "For this application we are currently working to set up a testing plant at our premises that will use a newly developed procedure for continuous ultrasonic welding. This will enable us to increase production capacity to 400, maybe 600 masks a minute," explains Unser.

The machine combines the steps of folding the fabric, integrating the nose wire, vertical and horizontal welding, welding on an elastic band and separating.

One reason for the fast implementation of the system in the factory in Karlsbad is the current travel restrictions. "We need to put the plants into operation virtually at our customers' premises and to do this, it is important that we have the same performance here in Karlsbad," says Unser. "This also has the positive effect that we can push forward developments directly on the plant, perform tests for customers and, above all, produce surgical masks in large quantities ourselves," he concludes. □



In order to start the production of the respiratory masks quickly, different companies supplied equipment for the deep-drawing process of the nonwovens.