

ISMR SAYS:

"The projection press, with high electrode force, can weld the projections while avoiding the associated spattering caused by force-fit redressing."



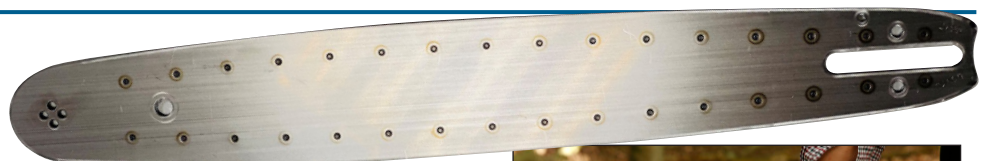
The portal projection welding system from NIMAK, which produces guide bars for chainsaws at STIHL's U.S. factory. In a fully automated process, a projection press joins the three sheets required.

MAKING THE CUT

STIHL relies on NIMAK portal projection welding systems for the production of guide bars for chainsaws.

At its North American factory and German headquarters in Waiblingen, the STIHL Group relies on automated welding systems for producing guide bars. The components, also known as saw chain guide bars, are elementary for chainsaws (where the company has been a global market leader for over 50 years). They ensure precise guidance of the saw chain with minimal friction. The saw chain transfers the engine's power to the wood.

For some time now, the corporation has depended on NIMAK, a provider of resistance welding technology, to produce these bars along with the necessary welded joints. The company's portal projection welding systems are used to produce guide bars for chainsaws. NIMAK, with its headquarters at Wissen (Germany), has also made its mark as a supplier of intricate automation solutions.



Projection welding is a form of resistance welding which uses pressure and electrical current to join two or more metal parts that have been designed to meet at one or more specific points, with the maximum amount of contact. This allows for more efficient welding with less energy and greater weld strength.

Connecting the components

A guide bar essentially consists of three components that need to be connected: two outer sheets and a relatively smaller sheet in the middle, which ultimately creates a channel



Above top: A guide bar for a chainsaw, where the various welded joints are still clearly visible. Above: STIHL has been the world's largest supplier of chainsaws for more than 50 years.

for the saw chain's drive links to run through. A portal projection welding system, developed by NIMAK, welds the three sheets. It has delivered several of these huge machines to STIHL. Another system is currently being built, which will also be deployed from Spring 2023.

Thomas Steegmaier, in charge of procuring production equipment for the STIHL Group and leading the project, commented that "our trust in NIMAK's technical and developmental proficiency, as well as the performance of the machines they have provided thus far, are undoubtedly crucial factors in this enduring partnership."

Despite the high availability of portal projection welding systems, proximity is a significant advantage for such a complicated production process. Malfunctions would have serious consequences, particularly as large quantities of a crucial part for the chainsaws are involved.

Fully automated production

Production of the guide bars is fully automated. A handling system feeds the three metal sheets required for this purpose into the machine and first places them on top of each other so that they can be welded together. The two outer sheets are each provided with several welding projections. This is followed by transport to the projection press, where the welding electrodes press the sheets together and synchronously melt the numerous welding projections, heated as a result by the current flow and the electrical resistance of the parts to be welded.

"The real challenge lies in the high number of projections that have to be welded uniformly in one stroke," Steegmaier emphasized. This is precisely why the company opted for a portal system, he explained. "The symmetrical force and current distribution through the portal projection welding system provides ideal



Thomas Steegmaier (right) is project management at STIHL and is also responsible for the procurement of production equipment. Manfred Ramb (left) is head of design at NIMAK.

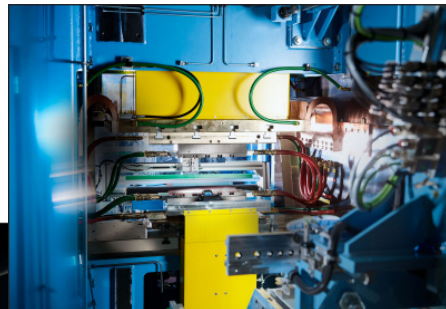
distribution over the part being welded."

This would not be possible with a conventional C-shaped projection welding machine, as the projections would not be pressed and welded as evenly. But, because

of the design of the portal system as well as the parallel left and right feed of the current and centrally distributed pressure that is possible as a result, it is distributed in a parallel and even fashion over all projections.

NIMAK has provided six transformers, for the high duty cycle, on each side for this purpose.

Right: The projection press of the NIMAK gantry system has an extremely high electrode force and is equipped with a hydraulic drive. It is adjustable, enabling the setting of force profiles.



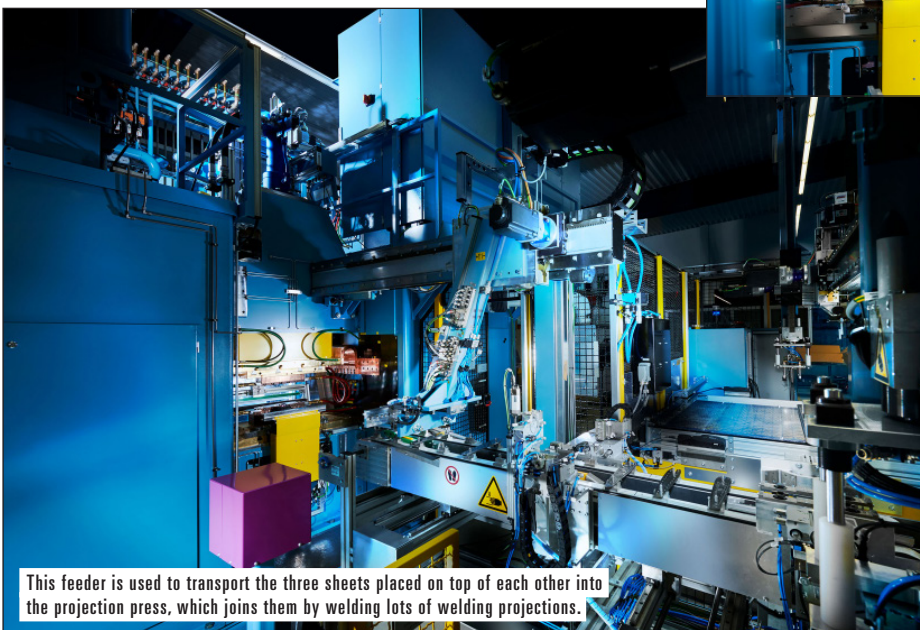
Consistency and quality

The upper and lower sheets require high-precision welding of

between 72 and more than 100 welded joints in total, depending upon the length of the parts being produced.

"To accomplish this, our machine must be capable of producing numerous projection joints consistently day after day," emphasized Manfred Ramb, Head of Design, NIMAK.

"At the same time, meeting extremely high-quality requirements is mandatory. This is because joining the three sheets requires precisely matched pressure and current-controlled welding profiles. Moreover, to attain optimum metal structure, significant demands must be met for the forming and laying tolerances during the subsequent tempering and cooling phases. This can only be achieved to such a degree with an automated portal system and would be unthinkable using any



This feeder is used to transport the three sheets placed on top of each other into the projection press, which joins them by welding lots of welding projections.

FOCUS ON WELDING

other method,” he continued.

To reach such capacities, the projection press has an extremely high electrode force. While this was still generated pneumatically in the first system from 2006, the machine commissioned in 2013 is equipped with a hydraulic drive. The system currently being produced, which will be commissioned in a few months, will also utilise this drive technology. The hydraulics are now controllable in this process, which allows force profiles to be set.

“This, in turn, enables fully hydraulic and fast redressing which is unique in the market so far,” explained Ramb. The highly dynamic system can weld the projections while avoiding the associated spattering caused by force-fit redressing.

High levels of automation

“This new development, as well as the welding technology used so far, is proof that we have the right partner on our side,” emphasized STIHL project manager, Steegmaier. “NIMAK’s decades-long experience in resistance welding technology and expertise in automation have proved to be invaluable.”

NIMAK’s affiliation with the TÜNKERS Group go beyond the diverse range of automation solutions it has developed over the years (including robot welding cells, rotary transfer systems and linear transfer systems).

“Thanks to this group of companies, we can purchase most of the components required for automation at particularly attractive prices and even influence their development and



Various guide bars for chain saws are made from this steel strip in STIHL rail production.

adaptation to our own needs. In addition, this provides security for our supply chains,” NIMAK told *ISM*.

“These are all advantages from which we also benefit as a customer,” added Steegmaier.

An eye on the future

The STIHL Group’s founder, Andreas Stihl, developed his first chainsaw in 1926. Since its foundation more than 90 years ago, the STIHL Group has grown from a one-man business into a global chainsaw and outdoor power

Projection welding in focus

NIMAK’s projection welding machines feature completely rigid, torsion-free base-frames, steel construction and massive press tables with T-slots for mounting the welding fixture. They are individually configurable via the modular system and options include alternating current technology, a medium frequency version or a capacitor discharge machine. Drive options include pneumatic, hydraulic or servomotors as well as ‘magneticDRIVE’ (full flexibility, force and dynamics of an electromagnet).

Table-top or floor versions of the machines are available, as well as a space-saving C-module for welding cells. With over 50 years of experience, NIMAK develops, designs and manufactures most of the various components of the modular system itself. Depending upon welding requirements, individually adapted appliances and special tools also supplement the projection welding machines.

The STIHL Group has grown from a one-man business into a global chainsaw and outdoor power equipment manufacturer.



equipment manufacturer. It now has a broad and steadily expanding product portfolio.

The STIHL MS 172, MS 182, and MS 212 gasoline-powered chainsaws are three of its latest new entry-level models. Equipped with a STIHL 2-MIX motor delivering up to 1.8kW of power (depending upon the model) the compact and versatile chainsaws are designed for use by consumers and professionals.

Battery-powered products represent the fastest-growing market segment for STIHL. Today, its product range includes more than 80 battery-operated tools for private consumers and professionals, which account for 20 per cent of the STIHL tools sold worldwide. By 2027, STIHL plans to increase this share to at least 35 per cent, with a goal of 80 per cent for 2035. It is stepping up its battery strategy, with new plans to manufacture battery-operated tools for professional users at its headquarters in Waiblingen, Germany. A new production facility will be set up at STIHL Plant 2 in Waiblingen-Neustadt and is set to begin operations in 2024.

STIHL is also investing in the advancement of combustion engines, particularly in terms of their sustainability. To do so, it is focusing on biofuels and e-fuels. Because STIHL products are already e-fuel ready, all STIHL tools with a combustion engine can be powered with these alternative, environmentally friendly fuels without technical alterations. STIHL plans to achieve the widespread use of e-fuels in its tools starting in 2027.

"Thanks to e-fuels, even 10- or 20-year-old chainsaws, as well as all other STIHL power tools, can be operated with virtually no carbon emissions. The reduction in carbon emissions from the use of products with a combustion engine has an immediate effect, without customers having to invest in new products,"

The STIHL plant in Waiblingen-Neustadt where gasoline-driven tools, such as chainsaws for professional users, are manufactured.



STIHL is making massive investments in battery technology while continuing to invest in the future viability of gasoline-powered products and its focus on e-fuels.



explained the STIHL Group.

The STIHL Group finished fiscal year 2022 with record-breaking revenue of 5.5-billion euros, equating to growth of 8.6 per cent compared to the previous year. As an international business, the company generated 90 per cent of its revenue outside its domestic market of Germany. ■



www.stihl.com



The STIHL Executive Board.

About Nimak

NIMAK supplies resistance welding and gluing technology as well as manual robot welding guns, welding machines and glueing/dosing equipment. The company also develops customised automation solutions for various applications. The joining specialist from the Westerwald district of Germany is, it told *ISMR*, "the sole premium supplier of the automobile industry that has approval to meet customer-specific standards for welding guns."

With more than 50 years of experience, NIMAK is active around the world. Approximately 250 employees support customers from highly diversified sectors. Since July 2020, the company has belonged as an independent brand to the TÜNKERS group of companies which, with 1500 employees and 13 branches, is a market specialist for automation tasks related to body-in-white.

"In 2011, we launched the first robot welding gun with capacitor discharge on the market. Since we brought two new technologies to market maturity with our magneticDRIVE and short-pulse welding, spot or projection welding of aluminum is no longer a problem. With our new-generation a.tron systems, we have also proved that gluing systems can manage without a separate control cabinet and can work with an integrated controller," NIMAK told *ISMR*.



www.nimak.de/en/