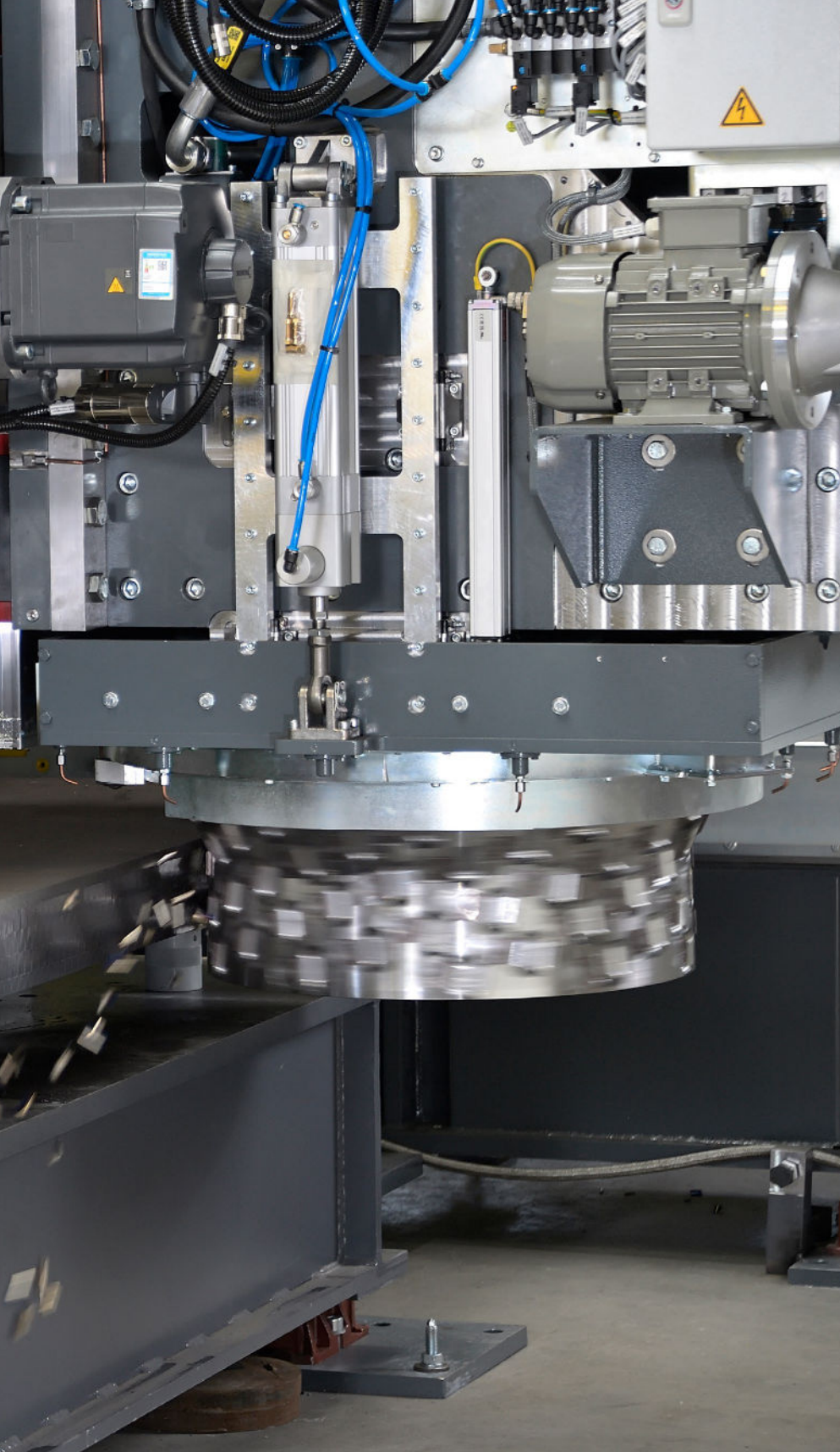


The image shows a close-up of a yellow industrial machine, likely a CNC mill, with the word "FALCON" in large, bold, black letters. To the right of the text is a black silhouette of a falcon's head. The machine is equipped with various components, including a grey electrical control box with a yellow warning symbol, and a large metal cutting tool is visible at the top. The machine is processing a large, flat metal plate.

Making the grade with edge milling

As steel plates for monopile production continue to increase in thickness, reaching up to 200 mm, it becomes crucial to have a cost-effective machining solution. Michael Steinkogler, Chief Operating Officer of Linsinger, explains how, by combining cutting-edge machine technology with its dedicated tool development, the company can offer a comprehensive solution that addresses all the challenges.



PES: Quality and accuracy are basic yet important requirements of the industry. How is Linsinger ensuring it can deliver these, as the market and therefore demand grows?

MS: With over 80 years of experience in designing and manufacturing heavy-duty edge milling machines, we have solidified our position as a leader in the industry.

As a company, we take great pride in our dedicated team of over 500 skilled craftsmen, high-level engineers, and R&D professionals. Their expertise and passion equip us to tackle the challenges that will accompany the increasing demand in the near future. Our steady commitment to upholding the highest quality and safety standards has earned us a strong reputation and the trust of our valued customers.

We continuously invest in research and development to remain at the forefront of innovation, ensuring our customers receive cutting-edge solutions that meet their evolving needs. With our experienced team and advanced technology, we are perfectly prepared to cover the growing demand in the market and the rising importance of high-quality plate prefabrication.

PES: A recent launch is the PFM Falcon milling machine isn't it?

MS: In our last article in the PES Wind, we were only able to present 3D graphics of our new machine concept. However, we are very happy to now share that within just one year since its introduction, we have already received orders for several machines, and three of them are now ready for shipment to our valued customers.

This accomplishment fills us with pride and demonstrates the confidence and trust our customers have placed in our innovative solutions. It has also confirmed that we've made the right decisions to allow us to continue delivering exceptional products and services to the wind industry.

PES: Talk us through the main mechanics of the machine and how it works.

MS: The Falcon edge milling machine has emerged as a very important component in modern monopile production lines. With its high-level capabilities, it enables fast and precise machining of sheet metal plates measuring up to 45,000 mm x 4,200 mm x 200 mm. Powered by 2x 90 kW milling power and boasting over 6000 Nm of milling torque, it ensures efficient and accurate operation.

Loading the steel plates into the machining area is made easy, either with the assistance of a shop crane or through a fully automated roller conveyor system equipped with a self-aligning clamping system. The machine intelligently detects the plate position, eliminating the need for manual intervention by the operator to initiate the plate processing.

PES: Welcome back to PES Wind Michael. I'm looking forward to learning more about your latest milling machinery and its benefits for the sector. Your main focus is on plate prefabrication for wind towers, isn't it?

Michael Steinkogler: Hello! It's great to be back with exciting news. We have expanded our scope beyond plate prefabrication to offer turnkey solutions for tower, monopile, jackets, and floater production lines. However, the key to such successful development is in having the best experts

in their respective fields with us. That's why we have formed a close partnership with Haeusler, MIBA, ENABL, and Uhrhan & Schwill under the name BIG5, providing our customers with maximum possibilities and advantages.

At Linsinger, our expertise lies in plate prefabrication. We are committed to developing a customer-friendly plate logistics system, covering everything from storage to the interface in front of roll bending. Our Falcon edge milling machine plays a crucial role in this state-of-the-art concept.

As automation continues to gain significance in the industry, we are looking forward to the introduction of our new ideas and enhancements. We are committed to staying at the forefront of innovation, constantly striving to improve our solutions and meet the evolving needs of our customers.

PES: What are the advantages of the machine, primarily?

MS: The Falcon edge milling machine offers numerous advantages, including maximum cost savings and, optionally, an efficient plate logistics system. One of its key benefits lies in its ability to achieve tight machining tolerances and high machining speed. With a milling tolerance of +/- 1 mm on a 30 m long steel plate, it enables highly precise length tolerances. This eliminates the need to wait for the completion of matching pipe section diameters, allowing the sections to go directly into the 'growing line' after rolling and welding. This eliminates extensive prefabrication and the need for corresponding storage space for the can-segments.

Furthermore, the machine is configurable to easily mill the cones to the required size, enabling direct further processing.

Additionally, the milling process itself ensures smooth and eco-friendly plate preparation. It does not induce thermal influence on the plate edge surface, resulting in the best possible welding qualities. This enhances the overall welding

process and contributes to the production of high-quality welded structures.

The combination of precise machining tolerances, high-speed operations, efficient logistics, and superior welding qualities make the Falcon edge milling machine a valuable asset for cost-effective and high-quality plate preparation.

PES: You're focused on ensuring high feed and output rates at lowest possible tooling cost, correct?

MS: As steel plates for monopile production continue to increase in thickness, reaching up to 200 mm, it becomes crucial to have a cost-effective machining solution that can efficiently handle weld seam preparation. To achieve this, the machine must possess high milling performance, complemented by a specially developed milling tool.

We are uniquely positioned to offer a perfectly tailored solution to our customers. With our in-house tool development and tool production capabilities, in addition to machine construction expertise, we can provide an integrated solution that ensures optimal performance and efficiency. This integrated approach enables us to meet the specific requirements of our customers, delivering precise and effective machining results.

By combining our cutting-edge machine technology with our dedicated tool development, we can offer a comprehensive solution that addresses the challenges

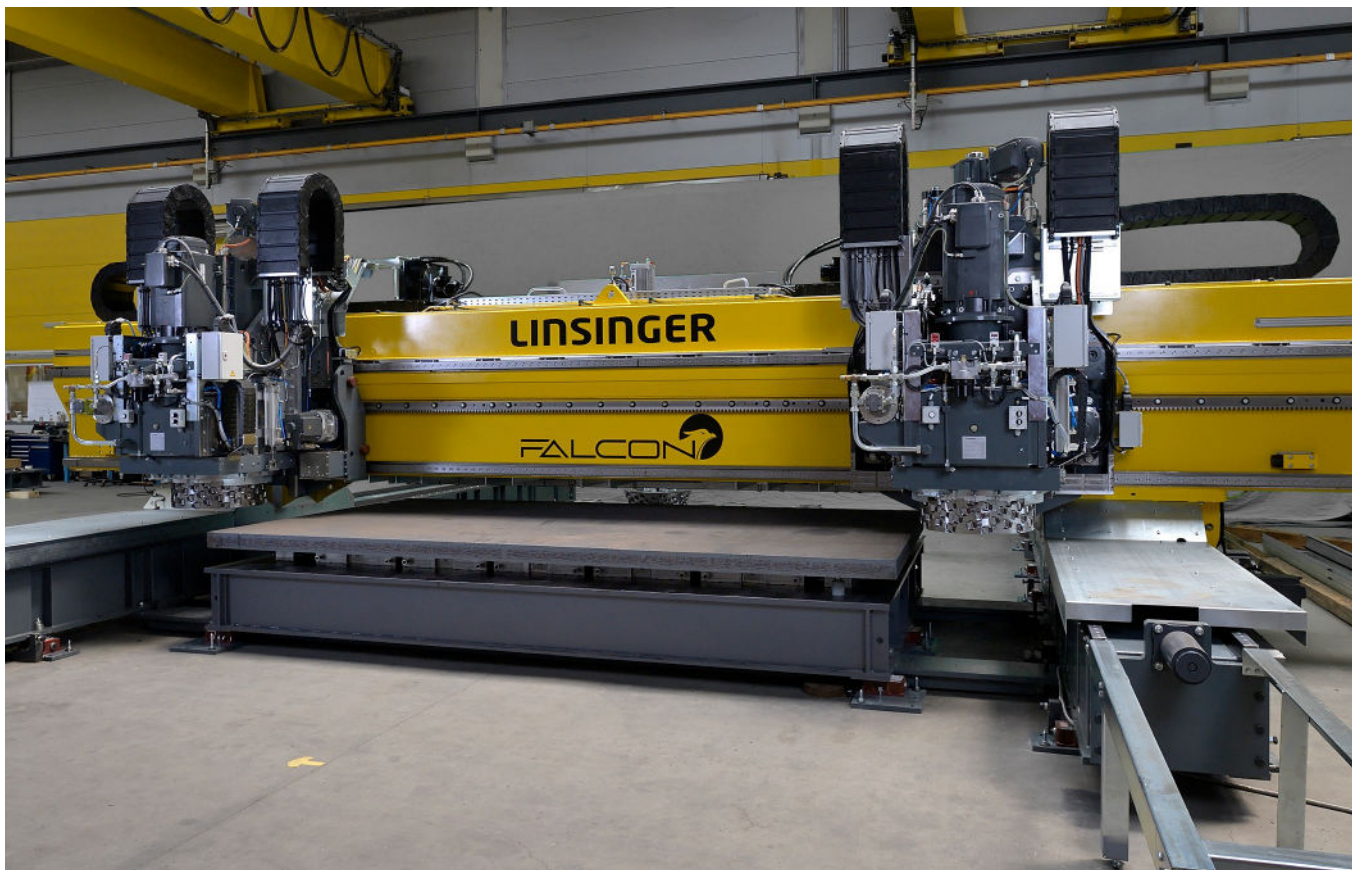


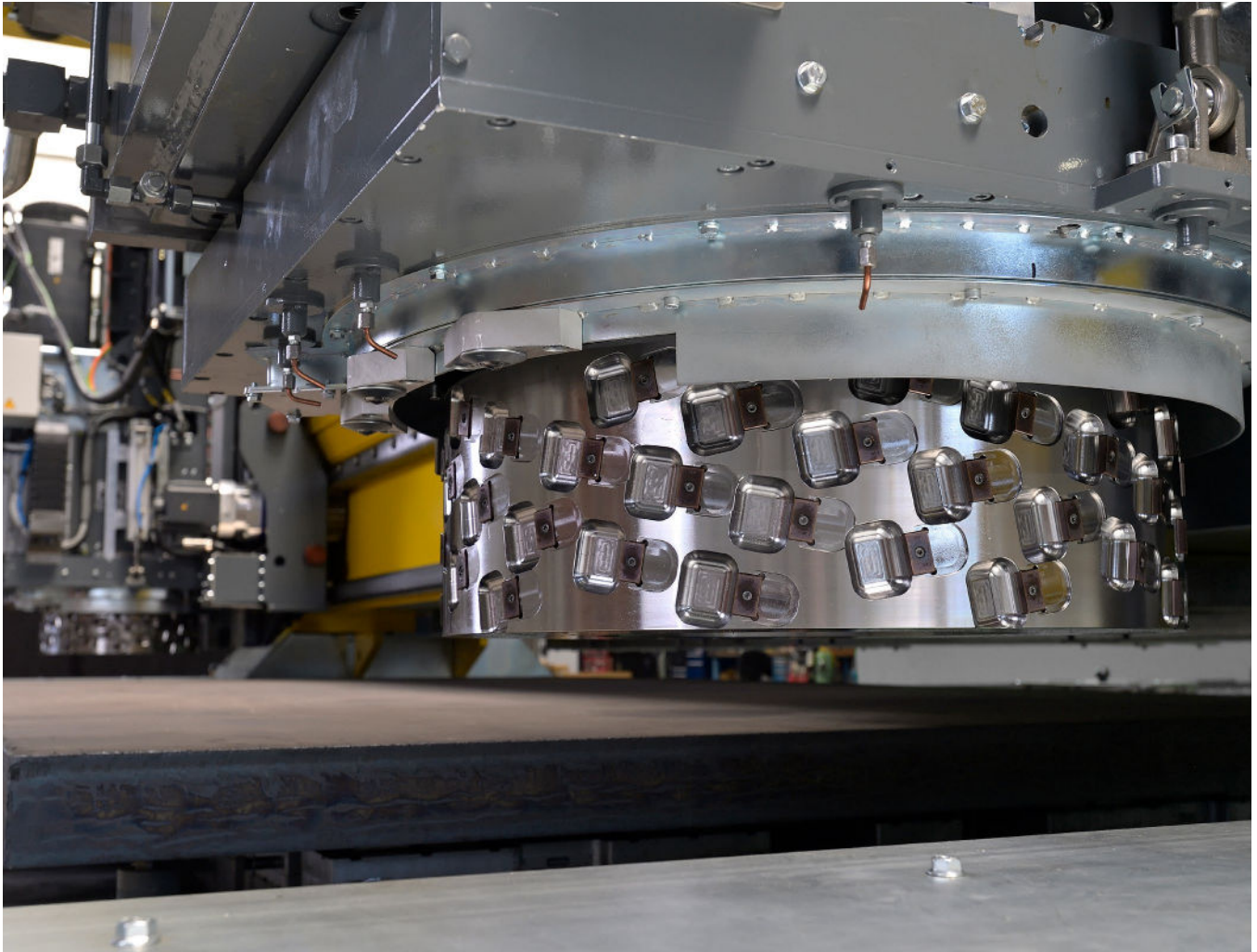
Michael Steinkogler

associated with machining thicker steel plates for monopile production.

PES: Is it possible to process even more of the complex plate shapes for the wind tower with this latest machinery, such as trapezoidal and curved plates for example?

MS: It is worth noting that advancements in technology and machinery are constantly being made to accommodate complex plate shapes in various industries. The wind power industry especially is continually working on improvements, such as for example their





tower designs, so it's very important to be able to handle a wide range of plate shapes, including trapezoidal and curved plates.

PES: What about non-magnetic and complex materials like stainless steel and high alloyed steels? Is it possible to ensure economic machining of these too?

MS: That's an excellent question, and it highlights why Linsinger stands out as the technology leader. Over the years, we have had numerous opportunities to showcase our edge milling technology's capabilities with complex materials such as duplex, super-duplex, and clad plates. The installation of over 200 edge milling machines worldwide is a testament to the success and effectiveness of our core technology.

Here again, what sets us apart is our in-house tool technology, which provides us with a unique advantage. It allows us to design our machines and cutting tools in perfect harmony, ensuring the most efficient and cost-effective plate processing solutions. This integrated approach ensures that our customers benefit from optimal performance and productivity, delivering superior results.

We are committed to pushing the boundaries of technology and continuously improving

our solutions. We take pride in our ability to offer the most advanced and economical plate processing options by leveraging our expertise in both machine design and cutting tool technology.

PES: How do your solutions differ from the competition?

MS: One of the most important issues is the machine stability during plate machining. With the right cutting angle, the perfect cutter geometry and a heavy-duty machine design, the result is a smooth milling operation. This directly leads to maximum vibration compensation for the longest possible tool lifetime and also machine lifetime. This combination makes the most economic machine concept with a possible ROI within two years. Thanks to the Linsinger self-built gearboxes, we've generated a significant advantage. Where others use off-the-shelf drive spindles or torque motors, we develop our own special heavy gearboxes to absorb the enormous milling forces.

PES: How do you think the wind industry will continue to evolve?

MS: The wind industry has experienced significant growth and evolution over the

past years, and it is expected to continue evolving in the future. One important figure is the increased capacity and offshore expansion. Wind turbines are becoming more efficient and capable of generating larger amounts of electricity. Offshore wind farms are also gaining prominence due to their potential for higher wind speeds and larger capacities. The industry is likely to focus on expanding offshore wind installations in the coming years.

The integration of energy storage solutions, such as batteries, with wind power systems will likely increase too. Energy storage can help address the intermittent nature of wind energy by storing excess power and delivering it when demand is high, thus enhancing grid stability and enabling better utilisation of wind resources.

Finally, the wind industry is embracing digital technologies and data analytics to optimise operations, improve maintenance strategies, and enhance energy production. Artificial intelligence, machine learning, and predictive analytics will play a significant role in maximising the efficiency and reliability of wind farms.

 www.linsinger.com