pro beam - Radial plate press release

Press release

European partners deliver non-planar radial plate for Proxima Fusion’s Stellarator Model Coil

pro beam, Rolf Kind and Mühlbauer combine electron-beam welding, specialist materials and precision machining to turn a three-dimensional stellarator magnet design into industrial hardware – a milestone for Proxima Fusion’s Alpha Alliance.

Gilching / Lindlar / Runding / Munich – Four German industrial companies have completed the first of many radial plates for the Stellarator Model Coil designed and engineered by Munich-based fusion company Proxima Fusion. Built to Proxima’s specifications, the component was handed over by Dr Thorsten Löwer, Managing Director of pro beam GmbH, Markus Kind, Managing Director of Rolf Kind GmbH, and Christoph Mühlbauer, Managing Director Mühlbauer Maschinenbau GmbH, to Dr Francesco Sciortino, Co-Founder and CEO of Proxima Fusion.

Radial plates are the structural backbone of a superconducting magnet: the high-temperature superconducting (HTS) cables are wound into the plate, which holds them in place. In a QI stellarator, the magnet coils are not flat but twisted in three dimensions – and so are the plates. Making non-planar plates to industrial quality is one of the defining manufacturing challenges of QI stellarators. This delivery shows that European industry can meet it.

Four partners, four disciplines

Electron-beam welding – pro beam

pro beam joined the plate using electron-beam welding, a process carried out in vacuum and without filler material, which keeps distortion and the impact on the base material to a minimum. The company operates the largest electron-beam welding chamber in civil use worldwide and has spent more than 50 years taking the electron beam from research into industrial series production. What was new here was the free-form, three-dimensional contour of a stellarator component.

“Power plants usually have big components. The challenge in fusion is that you also have to carry big mechanical loads, and do it with incredible accuracy. So this is perfect for electron beam technology, because you can weld with low distortion and a minimal impact on the base material. That helps to achieve high material qualities and tight tolerances, and therefore very precise parts for this new technology.”
Dr Thorsten Löwer, Managing Director, pro beam GmbH

Base material – Rolf Kind

Rolf Kind supplied the base material. The family-owned company from Lindlar, founded in 1969, has been supplying demanding components to fusion projects for more than two decades.

“This component has to deliver extraordinary mechanical properties in its later use. It needs to withstand extreme forces in one of the world’s most challenging environments.”
Markus Kind, Managing Director, Rolf Kind GmbH

Precision machining – Mühlbauer

Mühlbauer Maschinenbau carried out the precision machining. For a first-of-a-kind part there is no manufacturing template to follow.

“At the end of the day, you have to machine the real part, and at least the final machining has to be right the first time,” says Christoph Mühlbauer, Managing Director.

Building the supply chain for Alpha

The Stellarator Model Coil is a key milestone in Proxima Fusion’s magnet programme on the path to Alpha, its net-energy-gain demonstrator, and Stellaris, the first fusion power plant. Manufacturing stellarator components brings Proxima’s engineers and industrial partners together to develop the capabilities needed for Alpha.

“For stellarator magnets, the three-dimensional geometry is the key challenge in both design and manufacturing. Our engineers and industrial partners have to work through those challenges together. The radial plates are a tangible result of that collaboration: we now have a demonstration of the structural components that will hold the high-temperature superconducting cables of our Stellarator Model Coil. Each delivery builds the manufacturing experience we will carry forward into the magnets for Alpha.”
Dr Francesco Sciortino, Co-Founder and CEO, Proxima Fusion GmbH

pro beam, Rolf Kind and Mühlbauer are also members of Proxima’s Alpha Alliance, which brings together more than 50 industrial partners to build Alpha and develop the supply chain for Proxima’s first stellarator power plant, Stellaris, and the power plants that follow. The work by pro beam, Rolf Kind and Mühlbauer on this magnet plate demonstrates successful collaboration that combines expertise in advanced design, specialist materials, precision machining and electron-beam welding.

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About pro beam GmbH

pro beam is the innovation driver and market leader in electron-beam metal processing. The company develops and builds electron-beam systems and provides contract manufacturing in additive manufacturing, welding, perforation, hardening and coating for aerospace, energy, semiconductors, vehicle manufacturing and big science. Headquartered in Gilching near Munich, with further plants in Germany and locations in the USA and China. www.pro-beam.com

About Rolf Kind GmbH

Rolf Kind GmbH, founded in 1969 in Lindlar, North Rhine-Westphalia, is a family-owned manufacturer of open-die forgings in high-alloy stainless steels, corrosion-resistant materials, nickel-base and titanium alloys for the chemical and petrochemical industries, oil and gas, mechanical engineering and research projects. Managing Directors: Ralf Kind and Markus Kind. www.r-kind.de

About Mühlbauer Maschinenbau GmbH

Mühlbauer Maschinenbau GmbH in Runding, Bavaria, manufactures large precision-machined components, including on multi-axis milling machines with integrated coordinate measuring technology. www.muehlbauer-runding.de

About Proxima Fusion

Proxima Fusion is Europe's leading stellarator company and the first spin-out from the Max Planck Institute for Plasma Physics. The company is developing commercial fusion power plants based on the QI-HTS stellarator concept, building on the scientific breakthroughs of the Wendelstein 7-X programme. With Alpha, Proxima is developing a net-energy fusion demonstrator targeted for the early 2030s, paving the way for Stellaris, the world's first commercial stellarator fusion power plant later that decade. This ambition is supported by the Alpha Alliance, a consortium of more than 50 industrial partners, including Rolf Kind, Mühlbauer and pro beam, and a distinguished Industrial Development Board. A step towards the magnets for both machines is the Stellarator Model Coil, designed and engineered by Proxima and manufactured with the Alliance's support. Proxima is headquartered in Munich, with offices in Zurich and Oxford.

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