

Press release

Sustainable laser solutions for key industrial applications: Diode laser specialist Laserline at Photonics West 2024

Blue diode lasers for copper and semiconductor processing as well as laser-based processes for battery drying as key topics presented in the trade Show

At SPIE Photonics West in San Francisco, CA, High Power Diode Laser specialist Laserline, Inc. will be showcasing laser solutions for key industrial applications such as the production of electric copper components, semiconductor processing and the drying of lithium-ion batteries. The technology leader in the field of infrared and blue diode lasers has unique systems such as a blue CW laser with 4 kW output power and a blue 200 W pulse laser in its portfolio.

Mülheim-Kärlich/Germany, January 15th 2024 – Laserline, Inc. US subsidiary of the German High Power Diode Laser specialist Laserline, will be presenting pioneering laser solutions for industrial applications at SPIE Photonics West 2024 (January 27 to February 01 in San Francisco, CA Booth 2155).

With the LDF_{blue} 4000, the world's first commercially available blue diode laser with 4 kW CW output power, Laserline is underlining its technological leadership in industrial lasers in the blue wavelength spectrum. The product range covers a span starting from 400W and comes in a selection of three beam qualities with beam delivery cables of 400 or 600 µm diameter. Blue diode lasers are way more energy-efficient compared to conventional high-power lasers in the visible range, leading to reduced operating costs over time. As a pure semiconductor laser, they are virtually maintenance free. The outstanding power range and beam shaping options open a wide range of untapped applications such as surface modification of semiconductor materials and thin layer stripping. The main use of high-power blue lasers is copper welding and copper coating respectively additive manufacturing. Their wavelength of 445 nm is absorbed by copper alloys ten times better than infrared radiation, resulting in almost perfect melt pools without pores and spatter in a thickness range up to 2 mm. In additive manufacturing of copper components up to the size of rocket nozzles it enables build-up rates more than five times higher than infrared lasers and a powder efficiency of up to 90 percent, which is well above average. In addition to the blue CW systems, a new pulsed blue 200 W prototype diode laser is on display at the booth. It features pulse durations below 1 µsec and a line spot of 2 mm x < 100µm for advanced front end semiconductor applications. It shows Laserline's capability to customize products to specific application requirements.

Also on display will be solutions for the latest semiconductor packaging innovations such as Laser Assisted Bonding (LAB). LAB powered by Laserline offers advantages over legacy bonding methods such as mass reflow ovens. Laserline's precise energy delivery utilizing our OTZ zoom optic realizes reduced thermal stress resulting in significantly reduced warpage. This approach is particularly useful for thin substrates and offers excellent stability over

varying package types. LAB solutions also offer a significant improvement in fab costs by reducing required fab floor space and energy consumption in comparison to reflow oven solutions while maintaining high throughput. Direct Chip Attachment applications with dimensions from 3 x 3 to 100 x 100 mm² and material thicknesses between 50 and 780 micrometers are running in advanced mass production applications.

Finally, the Laserline booth display will be rounded off by the presentation of diode laser-based drying processes for battery foils complementing hot-air based furnaces. LIB battery cells are made with pairs of double-sided copper and aluminum foils which are wet coated with the active battery materials. Conventional drying machines require large amounts of very expensive dry production space of modern GigaFabs and consume 30% of the total energy consumption in cell production. Research facilities as well as various pilot lines worldwide have shown that implementation of high-power diode lasers booster drying performance and cuts space requirements of the drying operation roughly in half. Laserlines's systems come with powers of typically 15-30 KW narrow IR light emission, precise top hat beam profile up to 1,4 m wide and a leading wall plug efficiency of over 50%. Users benefit from 28% reduced Operational Expenses (OpEx) and a 19% reduction in CapEx compared to conventional furnaces.

Stop by Laserline's booth 2155 to learn more. Further information on Laserline and the Laserline diode lasers can be found at www.laserline.com

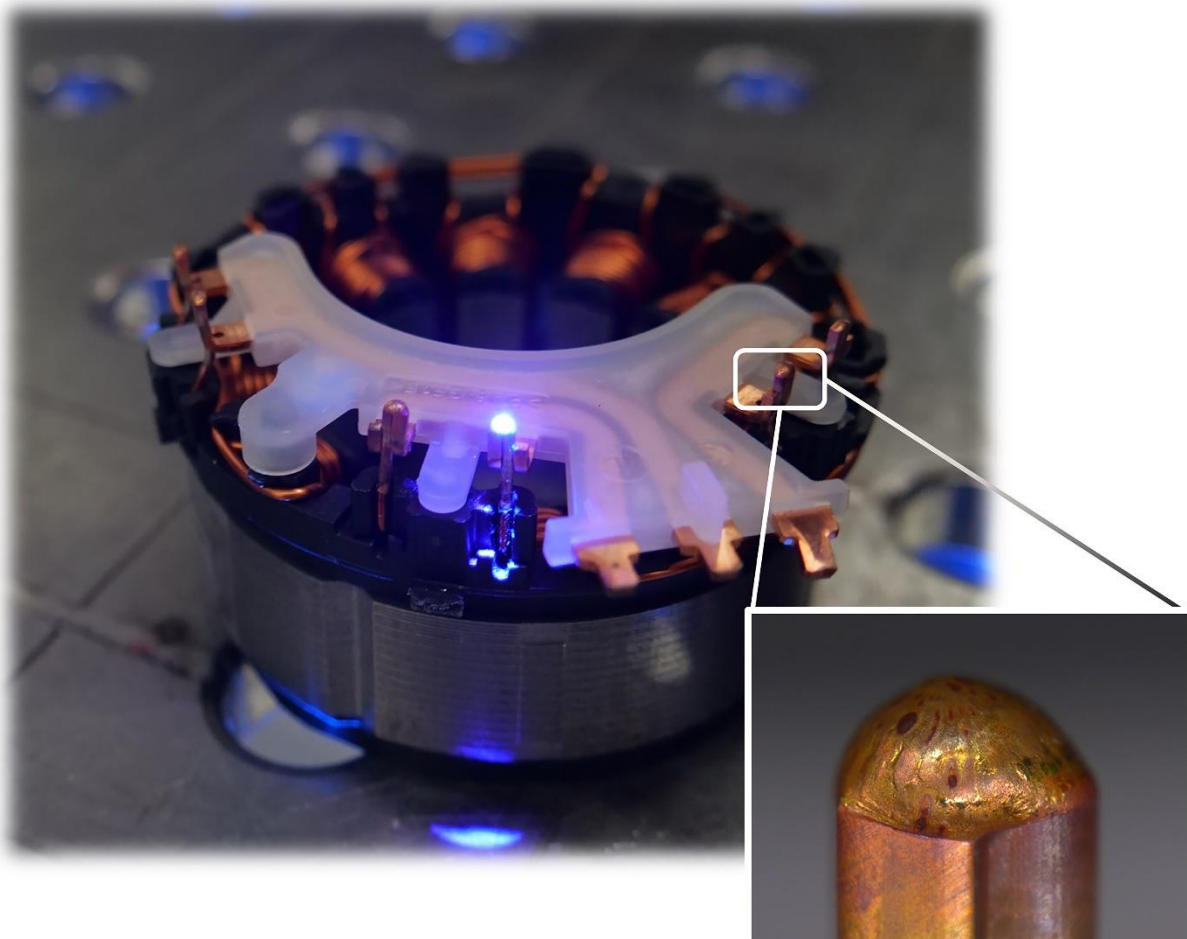


Image 1: Installed Rotor with laser-welded hairpins © Laserline GmbH



Figure 2: Additive manufacturing of a copper component using a blue diode laser. ©Laserline

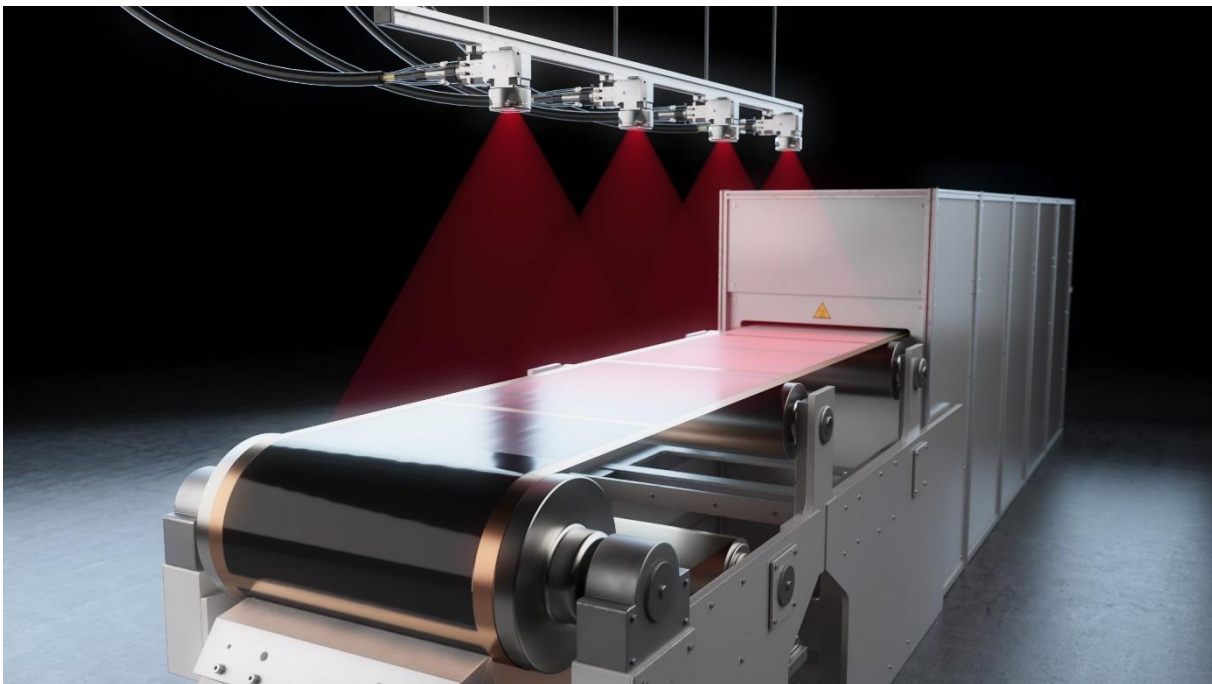


Figure 3: Production of laser-dried anodes and cathodes using the roll-to-roll process. ©Laserline



About Laserline:

Laserline GmbH, based in Mülheim-Kärlich near Koblenz, was founded in 1997. As a leading international manufacturer of diode lasers for industrial material processing, the company has since become the epitome of this innovative technology and can look back on more than 25 years of company history. More than 7000 High Power Diode Lasers from Laserline are currently in use around the world, demonstrating their performance in a wide variety of processes and applications. Laserline currently employs around 370 people and has international subsidiaries in the USA, Mexico, Brazil, Japan, China, South Korea and India. Further information at <https://www.laserline.com/de-int/>

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