**PRESS RELEASE**

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Growth market OLED

New beam profile for 30% more throughput in display production

**The sGauss beam profile features much steeper edges, giving UV lasers used in OLED manufacturing the ability to achieve 30% more throughput while improving the quality and yield of the OLED product.**

Thanks to their brilliant colors, OLEDs have conquered the smartphone display market. But the benefits of this new technology are now also being integrated into smartwatches, tablets, laptops and home theaters. This growth is expected to continue, in particular in the foldable display segment and for the new dashboard displays in the automotive industry.

In response to this trend, significant advances are being made in the industrial production of OLED displays of all sizes. In addition to simply scaling the display area and throughput, the need to boost productivity has also been identified. And that’s exactly where a new beam shaping technology for UV lasers comes into play.

**sGauss beam profile for the LLO process**

One of the key processes in OLED production is the laser lift-off process (LLO). In this technique, the various functional layers of an OLED display are applied to a plastic layer, which itself has been applied to a glass substrate. Once the OLED layers are complete, the film is separated from the glass substrate by sublimation with a UV laser (laser lift-off).

Solid-state lasers are now also available for use with this process. With a comparable output, these lasers are superior to the excimer lasers that have typically been used up to now, primarily in terms of operating costs. Solid-state lasers deliver excellent beam quality, usually in a Gaussian beam profile. With the aid of special micro-optics, several of these laser sources are transformed into the profile needed for LLO, with lengths of up to 1,000 mm and widths of less than 50 µm. For example, LIMO’s Activation Line UV line beam shaping system, which was awarded the prestigious Prism Award in 2018, has been used for years with great success for OLED lift-off processes in the production of flexible mobile phone displays.

The development team at LIMO has now enhanced the optical design far enough that the Gaussian profiles can be turned into a line with a length of up to 1,000 mm and a width of 30 µm. The new features include significantly steeper edges and a wider intensity maximum. This allows the laser energy to be used much more effectively to separate the display film, and LLO process productivity can be increased by more than 30%. In addition, the sensitive OLEDs are subjected to lower thermal loads (lower ash value), yields are higher, and the OLED displays produced have a longer lifespan.

**More productivity or longer laser service life**

The new micro-optics for the sGauss profile are modular and feature a continuously adjustable line length and width. Existing systems can also be retrofitted with an sGauss module. This allows manufacturers to either directly boost productivity or, where less laser energy is used with the same systems, significantly extend the service life of their lasers.

Aside from the pure efficiency gains it affords, this new technology will also unlock other applications for UV solid-state lasers, such as annealing and crystallization. Optics is therefore well on its way to becoming an essential part of the UV laser system value chain. As beam shaping continues to improve, the new systems will be increasingly capable of replacing the excimer laser in its current fields of application.

**About LIMO:**

Since its inception in 1992, LIMO GmbH has been one of the world’s leading manufacturers of optics and beam shaping solutions, as well as a pioneer of groundbreaking new photonics production technologies. The company develops and produces high-precision micro-optics for diode lasers, industrial laser systems for innovative materials processing, and complete optical systems for efficient production processes that use linear laser beam profiles. In the field of optical components, LIMO is currently one of the world’s major suppliers of glass cylindrical lenses thanks to its highly productive wafer-based manufacturing technology. With its innovative optics and laser system solutions, the company serves customers from all over the world in a wide range of different industries, including the laser, display production, semiconductor manufacturing and automotive industries, and the fields of measurement engineering, plastics processing and medical technology. LIMO is headquartered in Dortmund, Germany, and currently employs 230 people. The company has been part of the Focuslight Group since March 2017.

**Caption fig. 1:** LIMO now offers the Activation Line UV beam shaping unit with sGauss for the short-axis profile. As beam shaping continues to improve, the new solid-state lasers will be able to replace the excimer laser in a growing number of application fields.

**Source:** LIMO

**Caption fig. 2:** The sGauss profile (brown line) has steeper edges and a wider intensity maximum than a normal Gaussian profile (blue line). As a result, the use of laser energy to separate the display film is much more effective, and LLO process productivity increases by 30%. The sensitive OLEDs are subjected to lower loads, the error rate (ash rate) decreases, and the OLED displays produced have a longer lifespan.

**Source:** LIMO

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