

EUREKA EUROSTARS PROJECT 7422 SMART SPLICE



PHOTONICS: A TRULY SUPERIOR LASER JOINING SYSTEM

Lasers have been adopted in a wide variety of manufacturing techniques, but require precision control and consistency. With the help of its German partners, Sweden's Nyfors Teknologi AB has developed a highly sensitive laser heating, tapering and splicing system which is both robust and versatile.

The new SMARTSPLICER™ can perform delicate glass, photonic- and fibre-related joining and processing jobs suitable for medical devices, sensors, telecom fibre-optics, and a range of R&D applications. It features a powerful and clean CO₂-based laser heat source and patented splicing tools which perform clean glass shaping.

"A high degree of automation and low maintenance requirements also make the device simple and cheap to use because operators don't have to be as highly specialised," says Erik Böttcher, CEO of Nyfors Teknologi AB. This, combined with the modular controls, means SMARTSPLICER™ offers more versatile processing and parameters compared to competing products on the market today.

Precise optics – based on patented Axicon Splicing™ technology – shape the laser beam into an adjustable ring matching the width of the fibre or optical component being processed. The ring's diameter and other vital parameters are controlled by software, helping to deliver uniform optical

power through a completely contaminant-free heating process.

"This finely-tuned approach doesn't require additional heat sources and consumables like gas, filaments and electrodes, which translates into cost-savings and environmental benefits as well," notes Böttcher who coordinated the Eurostars Smart Splice project to build demonstrator units in order to test the novel CO₂ splicing and tapering methods.

Crystal clear

Despite its complex workings, the whole system is relatively easy to configure for different fibre and glass-processing operations and techniques such as photonic crystal to fibre or fibre to end-cap splicing and fiber to fiber tapering. This contributes to manufacturing high-power fibre laser components.

Böttcher credits the invaluable support from Smart Splice partners, the Fraunhofer IOF and CeramOptec GmbH of Germany, for this strong outcome: "The Fraunhofer team in Jena designed the optical system around patented and proprietary optical technology, which combined with CeramOptec's application and market expertise, really helped NYFORS deliver an innovative platform that's truly superior in many aspects," he says.

Gravity-defying result

"We also put extra research into perfecting

a system, called Gravity Splicing™, which gives SMARTSPLICER™ the ability to work equally well horizontally and vertically – we found that the force of gravity in the vertical position actually helps tapering and lensing operations," Böttcher explains.

A smart system of built-in tool holders, which were also tested during the project, provided additional customisation options

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to the SMARTSPLICER™. It can be used, for example, on very specific jobs like bulk production of lenses – such as ball lens manufacturing.

"The final product we're now selling is so advanced and unique thanks to the collaboration with top scientists brought together through Smart Splice. We're still talking regularly and the collaboration with Fraunhofer will continue in a new Eurostars project," concludes Böttcher.

This project has received funding from the Eurostars-2 joint programme with co-funding from the European Union Horizon 2020 research and innovation programme



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€ 1.2 M

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COUNTRIES AND NATIONAL FUNDING BODIES INVOLVED



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