

WE FIND OUT HOW SPI LASERS SPUN OUT OF A UNIVERSITY LABORATORY INTO A THRIVING GLOBAL BUSINESS.

# LASER INSIGHT

**SPI Lasers is a UK based leader in the field of fibre optic laser technology for industrial processing, including physically marking, cutting, welding, drilling and most recently, 3D printing.**

**W**e're a spin-out of Southampton University's Optic Research Centre, which is headed by Professor David Payne, one of the Forbes 500 most influential people in the UK," explains Mark Greenwood, SPI Lasers' CEO. "We're strong in Research and Development, particularly in fibre technology. We have manufacturing operations in Hedge End in Southampton, and Rugby in Berkshire, and most of our products are exported. Our biggest market is China and our second biggest is Europe."

SPI Lasers was one of the first companies in this industry, bringing a unique fibre technology to market known as GT-Wave, something no other manufacturers in this technology space possess.

"We have unique technological advantages that give us better beam quality, more flexibility, and we can closely couple laser development to application solutions," Greenwood says proudly. "We're leaders in key



Dr Mark Greenwood – Chief Executive Officer

technology areas such as black marking lasers on metal, or short pulse lasers used for welding. We have a lot of application laser-based solutions in the market place."

The company has been thriving, with a compound annual growth rate of 23% over the last few years, and recent acquisitions including a company in Rugby that brought its industrial, high power laser capabilities to SPI.

"We've got a good global reach with applications labs in Southampton & Rugby, Chicago, >>

>>

**A CW fiber laser in action, cutting the British Isles in stainless steel**



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## NORTHLAB PHOTONICS AB

NORTHLAB PHOTONICS AB, LOCATED IN STOCKHOLM SWEDEN, IS A COMPETENCE CENTER FOR ADVANCED OPTICAL FIBER PREPARATION, SPLICING AND PROCESSING. THE COMPANY WAS FOUNDED IN 2008 BY THREE ENTREPRENEURS WITH A PASSION FOR FIBER OPTICS.

NorthLab's close cooperation with SPI Lasers in UK is all about relationship and teamwork. NorthLab has been committed to provide products and services for fiber preparation, splicing and processing which are in scope with the high requirements of SPI's state of the art production line of fiber laser products.

NorthLab's expertise and extensive product portfolio is specifically designed for manufacturing and R&D of highly advanced fused optical components used in production of high-power fiber lasers and other photonic applications.

NorthLab has a wide range of in-house developed products but is also a close partner and European master distributor for 3SAE Technologies. 3SAE is a leading manufacturer of fiber processing solutions with innovations enabling new capabilities in the production of optical components. NorthLab is also a close partner and representative for Furukawa/Fitel a manufacturer of advanced fusion splicing equipment.

NorthLab has gained considerable experience working in partnership with customers in clearly defined market segments within the fiber optics industry. Consequently, the company has developed a product and service portfolio that

can satisfy the very demanding quality and technological requirements of its many customers within the fiber optics manufacturing sector.

NorthLab is dedicated to maintain and develop the partnership with SPI and be a close supplier of products and services for their requirements of today and the future.

For more information, visit [www.northlabphotonics.com](http://www.northlabphotonics.com)

“NORTHLAB'S EXPERTISE AND EXTENSIVE PRODUCT PORTFOLIO IS SPECIFICALLY DESIGNED FOR MANUFACTURING AND R&D OF HIGHLY ADVANCED FUSED OPTICAL COMPONENTS USED IN PRODUCTION OF HIGH-POWER FIBER LASERS AND OTHER PHOTONIC APPLICATIONS”

## The 1st of its kind



Apollo 11 was the spaceflight that landed the first humans on the Moon, Neil Armstrong and Buzz Aldrin, on July 20, 1969.

Question:  
How long was the first visit to the moon?

Armstrong spent about two and a half hours outside the spacecraft, Aldrin slightly less.

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LASER BEAM MEASUREMENT ACCELERATES DEVELOPMENT, ENSURES HIGH PRODUCT QUALITY AND SAVES COSTS.

Ophir is a brand within the MKS Instruments Light & Motion division offering a complete line of precision laser and LED measurement equipment. For years, Ophir has worked closely with SPI Lasers. A wide variety of Ophir power and energy meters are used to ensure the high product quality and performance of SPI Lasers. Regularly calibrated, the meters are backed by Ophir's ISO/IEC 17025 compliance, which ensures high accuracy, NIST- and PTB-traceable measurements.

“We are dedicated to delivering superior performance in our fiber lasers, with high beam quality across the entire power range. By using Ophir measurement devices, we know that we can always trust our laser beam parameters. Ophir provides sensors, meters, and software, as well as professional consultation services for best practices and calibration processes”, says Dr. Mark Greenwood, CEO SPI Lasers.

For over 40 years, the Ophir Photonics Group has been designing and manufacturing laser beam measurement devices, leading the industry with such innovations as the award-winning BeamTrack power/position/size meters, and Ultracal™, the baseline correction algorithm that helped establish the ISO 11146-3 standard for beam measurement accuracy. That's why you'll find that Ophir offers such a wide variety of laser measurement systems designed to meet and exceed customer expectations:

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- Laser energy sensors – from 10 pJ to 40 J
- Power meters – to display laser power or energy
- Laser beam profilers – including the non-contact BeamWatch technology
- Power / Position / Size (BeamTrack) sensors to simultaneously measure laser power, position, and size

For more information, visit [www.ophiropt.com](http://www.ophiropt.com)

“WE ARE DEDICATED TO DELIVERING SUPERIOR PERFORMANCE IN OUR FIBER LASERS, WITH HIGH BEAM QUALITY ACROSS THE ENTIRE POWER RANGE. BY USING OPHIR MEASUREMENT DEVICES, WE KNOW THAT WE CAN ALWAYS TRUST OUR LASER BEAM PARAMETERS”

SPI Lasers are proud of their products  
We are just as proud of helping to make them a reality



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Southampton staff gather to celebrate the official opening of the new manufacturing facility

Seoul, Shanghai and Shenzhen. We focus a lot on Research and Development, and spend 10% of our turnover on that," Greenwood says.

However, the company has taken a long journey to get to where it is today.

"We went through a long start-up phase in the early parts of the 2000s. During the telecoms turnaround we needed a lot of investment to get started," Greenwood remembers. "We

were lucky enough to be bought by a company called the TRUMPF Group in 2008, the biggest laser-based machine tool company in the world. That has given us the investment we needed to complete the journey to fully-fledged company."

### LASER SHARP

The other big step SPI has made is in shifting their product from a specialist, bespoke product that had to be calibrated through an agonising process of trial and error, into a reliable, repeatable, mass produced product.

As Greenwood points out, "If you view lasers historically, they were built on a shop floor that went into a lab with a PhD engineer who'd spend a

**"WE HAVE UNIQUE TECHNOLOGICAL ADVANTAGES THAT GIVE US BETTER BEAM QUALITY, MORE FLEXIBILITY, AND WE CAN CLOSELY COUPLE LASER DEVELOPMENT TO APPLICATION SOLUTIONS"**

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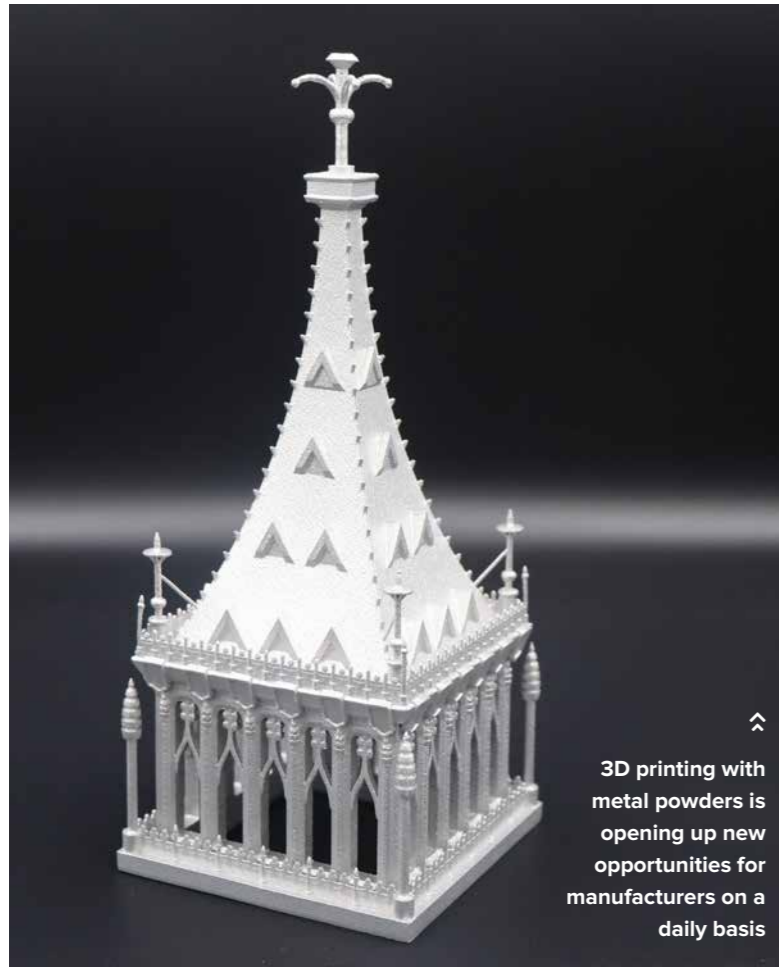


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3D printing with metal powders is opening up new opportunities for manufacturers on a daily basis

“IN THE OLD DAYS THE BLACK ART OF LASERS WAS TO **HAVE A GO AND THEN HAVE ANOTHER GO AND KEEP GOING UNTIL IT WORKED!**”

week setting it until it worked. We've taken the laser built in that way and changed it into something you can make on a lean, slow line, with very high yield and predictability. We can now make a laser every 22 minutes. It's a predictable high yielding part we can make in the thousands.”

Through the application of lean principles, and a long process of reducing and design work, SPI has been able to transform laser manufacturing processes. But it's something they wouldn't have been able to do if they weren't able to first find the talent to make it happen.

“I suppose the seed areas of that talent are our own lab we pay for in the Optic Research Centre, and we've very close

links with the university itself which has always been a good training ground for employees,” Greenwood explains. “We do the same in many other universities around the country, where they have laser or laser applications labs based on their campuses.”

However, while SPI has brought in some extremely skilled and talented graduates and researchers, they've also been undergoing a years long process of simplification, making their manufacturing processes more straight forward and easy to replicate with every step.

“It's a lot of production engineering, a lot of process engineering,” Greenwood adds. “We're continuously improving the quality of the raw ingredients, active and passive fibre,



increasing the repeatability of techniques like splicing between parts. In the old days the black art of lasers was to have a go and then have another go and keep going until it worked!”

That, combined with an internal training programme, is helping the company produce laser products at volumes and speed that allow it to keep up with demand.

Greenwood says, “We have our own internal training school for shop floor people. We can train someone off the street within three or four weeks to work on our production lines, because we've reduced the technology to that point.”

**NEW FRONTIERS**

From this point, the sky is the limit for SPI, with the company

⤴ **Welding of reflective metals is a key part of connecting batteries for the e-mobility industry**

expecting a future of rapid growth and fast-moving technological development.

“In recent years we've had a lot of growth in China with consumer electronics for mobile phone manufacture and other handheld devices where micro engineering and welding are important. 3D printing is one of our biggest growth areas. We're being built into all kinds of manufacturing machines. That's going very strongly,” Greenwood says. “The other big growth area for us is e-mobility. Most electric vehicles start with the battery, and lasers are ideal for cutting up the foils



⤴ **A redENERGY G4 Pulsed fiber laser and a CW QUBE Fiber Laser**

for that in massive volumes. Then when you put the battery in a metal package, lasers are good for sealing up the package.”

Indeed, lasers have a long history with batteries, as one of the first applications of lasers was welding the cans together for Duracell batteries. SPI's

“THROUGHOUT THE WHOLE E-MOBILITY PROCESS LASERS ARE EVERYWHERE. THE OTHER AREA WE'RE DEVELOPING TECHNOLOGY IS IN LASERS WITH A MUCH HIGHER POWER LEVEL”

involvement in electric vehicles doesn't end there, however.

“Then the batteries have to be connected, and lasers are very good at welding reflective materials like copper or copper and aluminium. Then you go into the power electronics side, and finally the electric motors where parts known as hairpins connect the different elements of the motor together,” Greenwood tells us. “Throughout the whole e-mobility process lasers are everywhere. The other area we're developing technology is in lasers with a much higher power level. We're developing lasers in the 10+kW range, and have received a lot of interest in nuclear decommissioning for lasers in that sector.”

We look forward to seeing what they do next. ☺