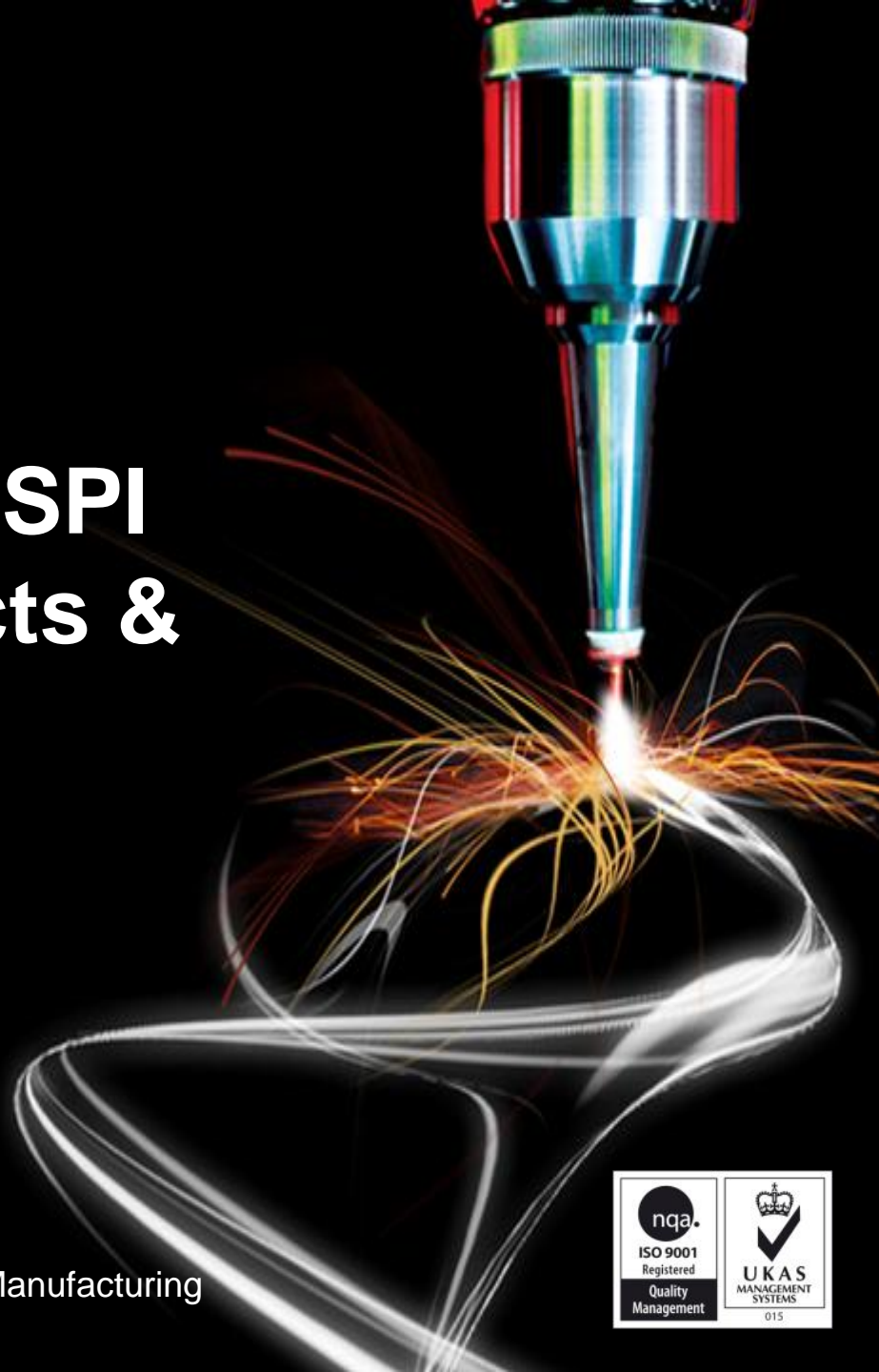




Moving into 2018, SPI Lasers new products & developments.

March 2018

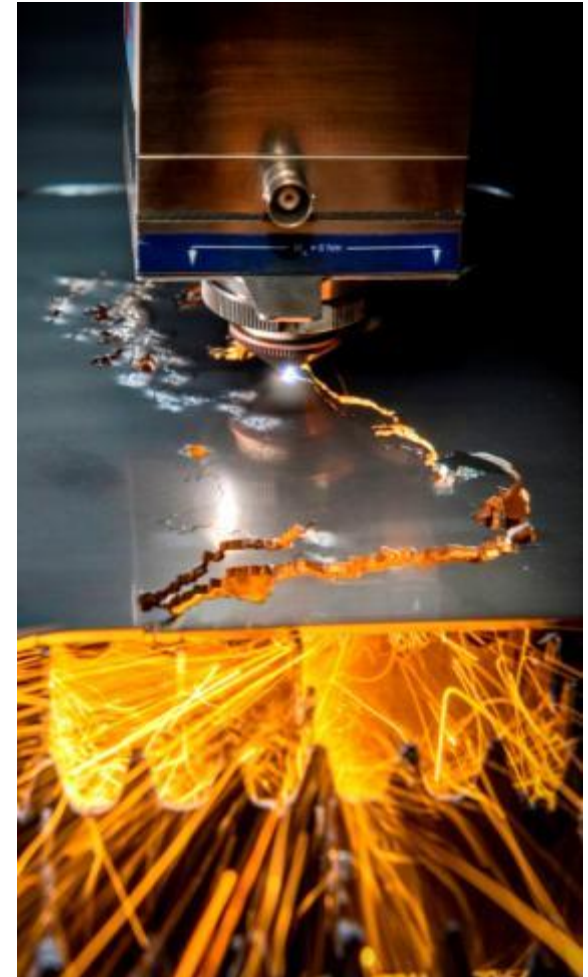
Marking | Cutting | Welding | Micro Machining | Additive Manufacturing



- SPI is a UK based leader in fiber laser technology.
- We offer innovative laser solutions for industrial material processing, marking, and micro applications.

Our strengths:

- R&D in lasers, fiber technology and applications
- Lean production and vertical integration:
 - Optical fiber & key components, high volume production of lasers
 - Global 'Sales & Service' presence
- Customer focus: We enable the success of our customers and build lasting business relationships.



redENERGY® G4

Flexibility & speed for marking & pulsed micro-machining.

20W - 200W

Pulsed Fiber Laser

3 to 2000 ns pulse duration

1 kHz to 4 MHz repetition rate

Selection of mode profiles from $M^2 = 1.1$ to 3.5

Pulse energy >1mJ, peak power >20kW

Pulse-to-pulse tunable temporal shapes and cw-mode



- Easily integrated, compact and robust
- Common interfaces for all lasers
- Enhanced connectivity
- Improved controllability
- Air-cooled, maintenance-free
- 3 years standard warranty

Applications range from marking & engraving to advanced micro-machining tasks, serving industries from automotive, battery, jewellery, solar, to consumer electronics.



Engraving / Cutting
Sterling silver



Welding
Dissimilar metal



Marking
Plastic



Drilling
Stainless steel



Ablation
Anodised aluminum



Marking
Stainless steel

The new air-cooled 100W EP-Z

- ✓ **Wavelength**
 - 1060 nm as standard
- ✓ **Beam Quality**
 - $M^2 < 1.6$
- ✓ **Pulse Energy**
 - Up to 1.25 mJ
- ✓ **Pulse Duration**
 - 4 ns – 2000 ns
- ✓ **Peak Power**
 - In excess of 10 kW
- ✓ **Pulse Repetition Frequency**
 - From single shot to 4 MHz
- ✓ **Divergent output of 100 mrad**
 - Optional collimators to provide 3, 5, 7.5 and 10 mm beam diameters
- ✓ **Visible pilot laser**



The new air-cooled 200W EP-Z

- ✓ **Wavelength**
 - 1060 nm as standard
- ✓ **Beam Quality**
 - $M^2 < 1.6$
- ✓ **Pulse Energy**
 - Up to 1.50 mJ
- ✓ **Pulse Duration**
 - 10 ns – 2000 ns
- ✓ **Peak Power**
 - In excess of 10 kW
- ✓ **Pulse Repetition Frequency**
 - From single shot to 4 MHz
- ✓ **Collimated output**
 - With nominally 10 mm diameter
- ✓ **Visible pilot laser**





Micro-joining

• **Faster processing**

- Can produce lap, butt and fillet welds
- Pulse energy >1.5mJ allows high speed joining
- Speed of up to 0.3-1.5 seconds per spot join

• **Able to join thicker materials**

- Joins broad range of materials
- Able to join a top layers of <800µm,

• **High quality micro-welding**

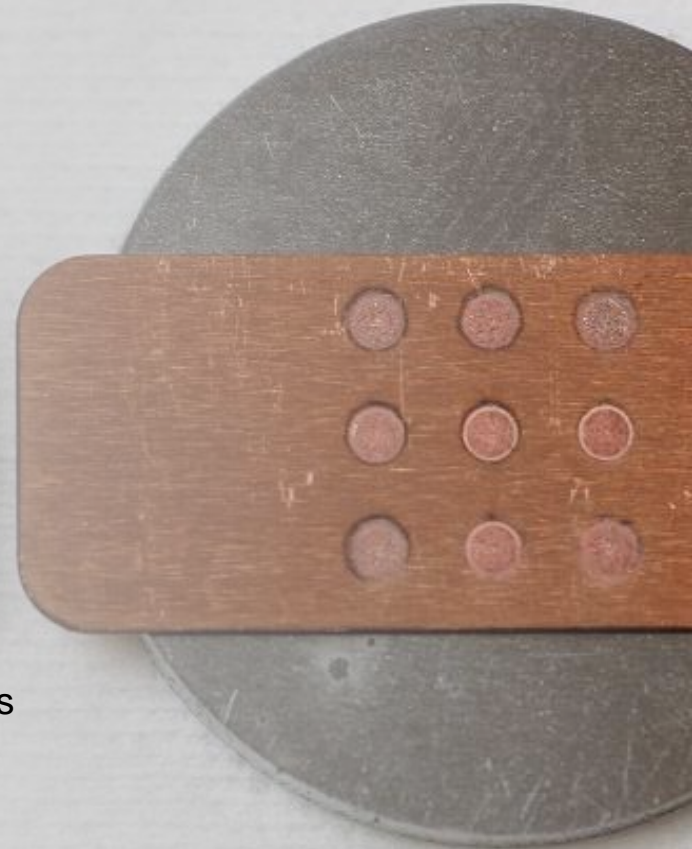
- Strong welds with peel strength
- Extremely low levels of thermal distortion

• **Dissimilar metal joining**

- Can make joins which cannot readily be achieved by other lasers
- Able to join even the most 'difficult' combinations

• **SPI Innovation**

- SPI patented process (WO2016128704, WO2016128705)
- China patents: (CN205764438U CN105855706)



Micro-joining Dissimilar Metals



Foil Cutting

- **High levels of accuracy and repeatability**
 - Even on reflective metals!
- **Faster than traditional techniques**
 - Foil cutting at $>1\text{m/s}$
 - No need for costly tooling changes
- **Able to cut varying thicknesses**
 - 10 μm thick foils with high edge quality...
 - ...to in excess of 1 mm with low heat affected zone
- **Energy efficient**
 - Reducing waste and environmental impact
- **Ideal for cutting battery foil material**
 - With associated coatings



Cutting Aluminium and Copper

redPOWER® QUBE

Power & control for cutting, welding & micro-machining.

300W – 2kW

CW Fiber Laser



Single mode and multi-mode output beam options

Modulation speed up to 100 kHz, < 5 μ s rise/fall

- CW or modulated operation
- High reliability and power stability
- Pulse Shape Equalisation (PSE)
- Dynamic pulse shape control
- Air and water cooling available
- 2 years standard warranty

redPOWER® PRISM

Efficiency & flexibility for macro materials processing.

300W – 2kW

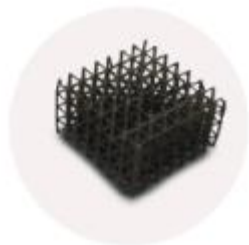
CW kW Fiber Laser



Single mode and multi-mode output beam options

Core functionality for optimum value added

- Compact design for OEM integration
- Single and multi-mode delivery fiber
- High back reflection protection
- Integrated power & temperature monitoring



3D Printing / Additive Manufacturing
Metal Powders



Cutting
Brass, Aluminium,
Copper, Mild Steel &
Stainless Steel



Thick Metal Cutting
Mild Steel, Stainless
Steel, Aluminium



Cutting
Fine Metallic



Flat Sheet Cutting
Stainless Steel



3D Printing / Additive Manufacturing
Metal Powders



CW Fiber Lasers > 3kW

redPOWER® QUBE Multi-kW

Providing exceptional levels of power & control.

3kW – 8kW

CW kW Fiber Laser

Stand-alone systems with full safety and control functionality



- Pierce Detection
- Easily automated
- Patented back reflection protection
- Multiple fiber delivery options
- Integral pulse shaping capability
- Multi-way beam time share options

redPOWER® PRISM Multi-kW OEM

Building blocks for high power Fiber Lasers..

3kW – 6kW

CW kW Fiber Laser

Optical engines with core functionality for optimum value added

High power fiber combiner with integrated control and monitoring features



- Pierce Detection
- Differentiated products
- Optimised value add
- Rack mount (19") format
- Integral pulse shaping capability
- Optional module for system safety control.



Welding
304 Stainless Steel



Cutting
Brass, Stainless Steel,
Copper, Aluminium



Cutting
Mild Steel



Cutting
Stainless Steel



Cutting
Mild Steel



Cutting
Aluminium

- **Ideal for:**
 - Oscillation welding
 - Remote welding applications
 - High speed foil slitting
- **Class-leading 10m Single Mode delivery fiber (25 μ m, M2=1.2 \pm 0.1):**
 - Also 50 μ m and 100 μ m MM delivery fibres up to 20m long.
- **High speed modulation capability:**
 - up to 50kHz
- **Back Reflection Protection**
 - inherent to PIPA-Q Fiber Termination design.
- **FiberView comprehensive control software:**
 - With integrated pulse shaping



redPOWER QUBE Cabinet Laser



- **New Product at 8kW**
 - Enhances current range from 3kW to 6kW
- **Patented PIPA-Q delivery fibers with back reflection protection**
 - Optimised beam quality options for 100 μ m fibers to match material thickness
 - 50 μ m fibers for lower power levels
- **Features integrated Pierce Detection**
 - an SPI breakthrough invention for increased productivity
 - See separate presentation
- **High speed modulation for precise cutting control.**

- The new air-cooled 100 & 200W EP-Z
 - Battery foil cutting
 - New ns Pulsed Laser Applications incl IP protection for our customers
- QUBE 2kW Cased Laser
 - Oscillation welding
 - Remote welding applications
 - High speed foil slitting
- New Flagship Prism and Qube Product at 8kW