

**Handheld laser welding technology.
An impartial assessment to support
industrial adoption.**

**JOINT INDUSTRY PROJECT OUTLINE
PROP311304**

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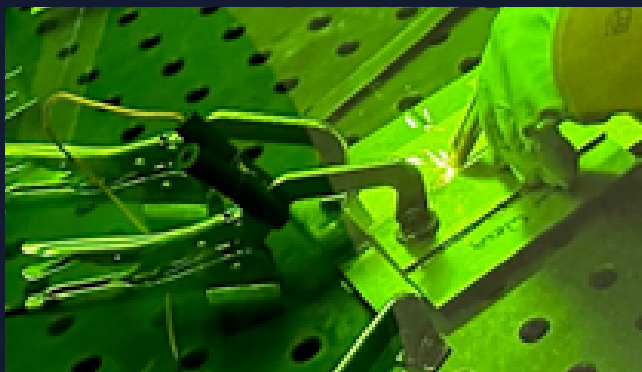
Project Concept

Handheld laser welding is a new emerging technology. The devices promise faster, more versatile, cost effective and consistent welding results than more conventional manual arc welding processes, such as MIG/MAG or TIG welding. Handheld laser welding devices require an operator holding the system to release the beam and are equipped with safety features that shut off the beam as soon as the system moves away from the workpiece, so offer engineered safety control

However, the lack of a standardised assessment methodology and supporting data, and thus independent validation of the technology's claims, could result in industry being hesitant to adopt this potentially disruptive technology, due to absence of independent validation of its performance, robustness, safe operation and capabilities.

The aim of this Joint Industry Project (JIP) is to provide independent third-party assessment and validation of handheld laser welding technology, focusing on demonstration of the ability to make sound welds, health, safety and environmental impacts (eg welding fume and scattered radiation), and tolerance of the process in relation to weld quality and mechanical properties.

The scope of work will include benchmarking against conventional manual arc welding approaches, including MIG/MAG and TIG welding processes.



Objectives

- Develop weld quality/operator protocols and guidelines for handheld laser welding, with the aim of supporting industrial implementation.
- Generate supporting data by investigating laser welding parameters and process tolerance using laser handheld technology, around a range of materials, joint configurations and thicknesses, representative of targeted case studies agreed with Sponsors (e.g. one case study per sponsor).
- Assess joint quality of handheld laser welded specimens by using radiography and transverse cross-sectioning, determining what quality of laser beam welds can be made.
- Gain insight on benefits by demonstrating laser cleaning capability around the joint region prior to welding, as alternative to traditional industrial cleaning methods.
- Provide visibility for process related safety aspects such as secondary emission assessment around weld fume and scattered radiation characterisation, to better understand the impact on health and safety of operations.
- Upskill Sponsors by delivering training and knowledge transfer through a one day practical workshop to demonstrate the technology in action.

Images courtesy of IPG Photonics



Approach

PHASE 1 (8m)

Test plan definition, weld development, quality and performance testing

- Workshop with Sponsors to confirm representative case studies in the work programme (up to five):
 - Discuss and select material grades, thickness ranges and joint configurations.
 - Confirm welding quality and testing requirements, including standards to refer to for technology validation.
- Weld manufacture and testing programme, in line with the requirements confirmed during the workshop.
- Laser cleaning trials around the joint region prior to welding, as alternative to traditional industrial cleaning methods.
- Weld quality assessment and mechanical testing for each specified thickness/ weld type/ material grade.

PHASE 2 (4m)

Secondary emission safety case assessment, practical workshop & Reporting

- To perform welding fume and scattered radiation characterisation measurement based around the industrial case studies selected.
- One day practical workshop to demonstrate technology in action
- Report document summarising findings from Phase 1 and 2

Benefits

The information generated in this JIP programme will provide Sponsors with impartial technical advice during assessment of the new emerging laser handheld technology. This project will deliver data and information to support decisions on whether the technology is robust, safe, fast, versatile and cost effective for the Sponsors' industrial applications. Other overarching benefits to all Sponsors include:

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- Accelerated impact when adopting laser handheld technology with minimal disruptions to industrial implementation.
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- Sound evidence backed results underpinned by authoritative advice to support investment and business decisions.
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- Financial leverage of working through a JIP, bringing together industries to share costs and enhance learnings.
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- Cost benefit of early access to handheld laser welding technology and decision making.

Deliverables

A report summarising findings from:

- Study of key handheld laser welding and cleaning parameters for the thicknesses, materials and joint configurations chosen.
 - Laser weld quality evaluation and mechanical testing for the thicknesses, materials and joint configurations chosen.
 - Secondary emission safety case assessment - weld fume and scattered radiation characterisation.
 - Benchmarking of handheld laser technology with conventional arc welding (e.g. TIG or MIG/MAG as appropriate for the application).
- Practical final workshop to stakeholders involved in the project to demonstrate technology in action.

Price and Duration

The overall estimated price for the work is £250,000 (excluding VAT), which requires £50,000 per company from each of the 5 Sponsors. The estimated project duration is 12 months. It is anticipated that the project will commence with an agreed scope of work with a minimum of 4 Sponsors. If the number of sponsors increase, then the scope of work can increase accordingly.

Further Information

For further information on how a Joint Industry Project (JIP) runs please **visit our JIP section** or scan the QR code.

TWI

Granta Park, Abington, Cambridge CB21 6AL
TWI is the business name of The Welding Institute, a company limited by guarantee.
The Welding Institute - Registered number 405555 England.
TWI - Registered number 03859442 England



JIP Co-ordinator

Sofia Sampethai
Email: jjp@twi.co.uk



Project Leader

Necdet Capar
Email: necdet.capar@twi.co.uk

