

AILU statement of need for a Photonics TIC

The Association of Laser Users (AILU)

The Association of Laser Users (AILU) was formed in 1995 as a technology-driven non-profit making organisation run by and for the UK industrial laser community. It is dedicated to maximising the effectiveness, efficiency and competitiveness of manufacturing industry through appropriate application of laser technology for materials processing.

AILU's core membership comprises nearly 300 organisations and individuals involved in the use of industrial lasers in manufacturing: end users; engineering subcontractors; laser-related equipment suppliers; educators and researchers in the field. In addition to the core membership the association supports a number of laser-related special interest groups whose combined membership exceeds 600 individuals. In total Over 2000 persons in the UK have registered an interest in Laser Materials Processing on the AILU website since 2008.

The UK as a whole currently supports over 350 laser-based engineering subcontractors, over 170 UK-based manufacturers or suppliers of industrial laser sources or embedded laser equipment, and hosts over 15 university groups active in laser materials processing technology.

AILU organises technical workshops, maintains an active internet based network and produces a leading laser magazine, The Laser User, in both printed and electronic formats. The association maintains a products and services directory of its members. The association is widely recognised as a key reference point for the UK laser industry.

The value of laser materials processing to the UK economy

A study carried out by AILU in 2009 [UK Laser Materials Processing statistics 2009] found that an estimated 2500 high value laser materials processing systems were in use in the UK. Approximately 50% were to be found in laser job shops, where they create an estimated income of ~£500M/annum and many times that in the final sale of the laser-manufactured components.

Whilst laser materials processing systems are an important tool in UK manufacturing, the same 2009 study concluded that the use of high value laser materials processing systems in UK manufacturing was only 20% of that in Germany, per unit of manufactured output. Without a significant improvement in these figures the UK industry is likely to fail to fully capitalise on the opportunities presented by laser materials processing in 21st Century manufacturing.

The UK as leaders in the development of new sources, processes and applications

The UK has made significant contributions to the development of industrial laser sources, and laser materials processing. The first high power fast axial flow CO₂ lasers were developed in the UK, along with the oxygen assisted laser cutting process, that has made subcontract laser cutting a ubiquitous process. In recent years high power fibre lasers have been invented and further developed in the UK, leading to the establishment of several globally significant fibre laser manufacturing companies based in this country who export the majority of their products.

This tradition continues and is illustrated in the 2010 updated "Rulardo" report produced in 2008 that identified the UK's capacity and competencies in laser materials processing R&D. This report identified 15+ University based research groups, and 20+ UK companies who were willing to disclose significant R&D activity in laser materials processing (with many more companies known to perform R&D but who chose not to provide details). Much of this work is conducted as basic research in the universities with the development of industrial systems by companies in response to end user purchases.

The Association of Laser Users

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21st Century manufacturing

As a manufacturing tool laser technology offers unique features, including non-contact processing, ultra-fast beam control for high speed processing and high power continuous output through to ultra-short pulses, for a range of processing options from surface melting through to ablative ejection (“cold machining”), and micron-scale resolution. As such, the demands on manufacturing in the 21st Century guarantee an expanding role for lasers, further accelerated by the continued rapid development in laser sources, beam delivery technology and new laser processes.

The AILU report “Exploiting laser technology in 21st century UK manufacturing” produced in 2010 generated over 130 industrial applications of lasers and assessed their potential future importance in the context of: (i) KTN and TSB themes; (ii) key industries; and (iii) key products. A total of 31 laser processes had an immediate and significant number of such links in all three of these categories.

AILU case for a Photonics TIC

AILU believes that an investment in a Photonics TIC centred on laser sources, beam delivery and with a large laser materials processing activity would provide a return on investment from global markets were it to concentrate on the manufacture of key 21st Century components including: solar cells and panels; components for other types of sustainable and renewable energy devices (e.g. fuel cells, nuclear, wind and wave power generation); solid state lighting; microelectronics components; flat panel displays and touch screens; plastic electronics, medical devices; sensors; and micro-systems.

This global market in which the TIC would seek to have impact meets and exceeds the market size required to achieve the necessary return. The presence of a vibrant laser source and materials processing research community in the UK guarantees a supply of pre-competitive knowledge to feed a TIC with exploitable intellectual capital, and the existence of profitable UK registered laser source and system companies provide a route to exploit this capital. What is clearly required is the investment in a national TIC to link these three key elements, and AILU and its members firmly believe that a Photonics TIC operating in this key technology sector is critical to maintaining the UK as one of the leading providers of innovative products and processes for laser materials processing.

It might be argued that since laser materials processing will be needed as a significant part of the activities of a range of the proposed TICs, including especially the High Value Manufacturing TIC already formed, then such TIC activity can be devolved to these various sector TICs. However, without a core Photonics TIC to provide the necessary resource for higher TRL development activity in laser sources and materials processing technology, there is every chance that the same underlying weaknesses in UK manufacturing that have led to the UK falling so far behind Germany in its exploitation on lasers will be perpetuated. We therefore believe that laser materials processing should be both the central activity of at least a Photonics TIC and be represented in other TIC’s activities too. This is surely the only conclusion that can be reached for the technology that provides modern manufacturing with the most flexible and wide-ranging material-processing tool available.

The Association of Laser Users can provide all these TIC’s with the necessary intelligence on UK academic and industrial activity to identify complementary activities, avoid repetition of investment, both capital and resource, between TIC’s and build the business model of the core Photonics based TIC in laser sources and materials processing if such a TIC was to be established.

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