

The

LASER USER

ISSUE 73
SPRING 2015

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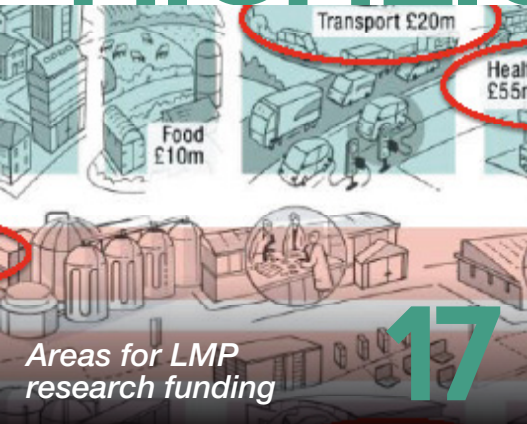
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FROM LMP
LABORATORY TO
PRODUCTION LINE:
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five stages to a story:

- This is a problem/ opportunity.
- Its big enough to care about (see the data).
- State-of-the-art fails to provide a solution.
- We have an idea:
 - But we need some help to overcome barriers.
 - We have partners but we also need leveraged finance which the grant will help provide.
- The benefits will be significant to the economy/society and us (data)

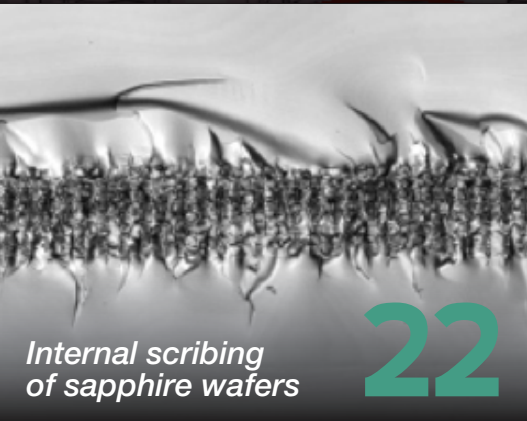
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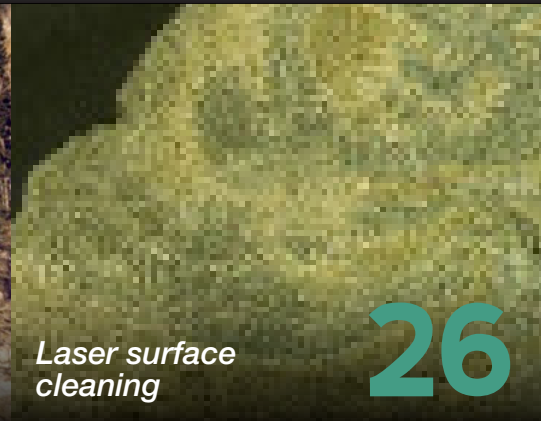
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THE TRANSITION FROM INDUSTRY TO ACADEMIA



AN INTERVIEW WITH STEWART WILLIAMS

DIRECTOR OF THE WELDING ENGINEERING
AND LASER PROCESSING CENTRE

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Q. What do you see as the role of the Welding Engineering and Laser Processing Centre at Cranfield University in supporting the laser material processing community?

We have three principal roles. First is provision of a steady supply of high quality trained researchers and engineers for deployment in industry and other research institutions. Secondly we need to research into the fundamental science and understanding of laser material processing so that we can develop innovative ideas and robust industrial processes. Our third role is taking innovative ideas and developing them through to a level of maturity where exploiters can assess the potential benefits. These ideas can then be taken forward through a variety of routes including directly with industry or through the Catapults or similar.

Q. How would you describe your interests and activities in Laser Materials Processing (LMP) at Cranfield University?

Our interests are mainly focused on fusion based processes. This of course includes welding, through very large structures such as ships to micro devices needed for consumer goods and medical applications. Often welding is divided into micro and macro and this always surprises me. The basic physics and chemistry is the same, whatever the length scale. Other LMP activities include additive manufacture; cutting; and (just beginning) low cost laser peening.

Q. In terms of facilities, staff and student support how do you think your ability to conduct LMP at Cranfield University without undergraduates, compares to that of your colleagues in more traditional universities?

I believe our facilities are excellent. We have three laser laboratories containing lasers ranging from an 8 kW fibre laser through too small pulsed systems. These laser are supported by various robotic or gantry motion systems, enclosures and analysis equipment. These facilities are supported by donations or loans from industry and this is much appreciated. I think the absence of undergraduates is a real benefit: it allows us to concentrate on research. I am sure many of my contemporaries would envy our position. The main downside is that we do not get a direct feed of high quality UK students.

Q. What is your assessment of the current state of health of the LMP community in the UK?

In terms of the research community it is quite robust but I would say significantly smaller than it was 10 to 15 years ago. I believe this is

because lasers are not as fashionable (with funding bodies and industry) as they once were and have been superseded by other fads such as nano and now additive. As we know, the industrial LMP community is much smaller than we would like it to be. I also think it has an extremely low profile, which does not help our situation.

The Technology Strategy Board supports a number of Catapults, including one in High Value Manufacturing with a significant LMP content; and the EPSRC has recently launched a Centre for Innovative Manufacturing in Laser-based Production Processes. Should UK universities in LMP research feel threatened or comforted by these developments?

I think we should be comforted by these developments. Despite LMP not being fashionable at least the funding bodies and industry are supporting the field.

Q. How much one-to-one assistance does your Centre provide to UK industry, including SMEs? Are you able to meet the low costs and short timescales that industry demands?

I do not see direct industry support as our main role and there are other organisations where this is a primary activity. However we do and have provided this when requested. We would prefer to engage with companies through the EPSRC Centre for Innovative Manufacturing in Laser Based Production. Going through the Centre means we can respond in a timely manner as we have research staff available for short term studies. It also means we may be able to support the industry requirements with government funding. Indeed, for SMEs there is funding set aside for direct support at no cost to the industrial partner.

Q. From what you see of UK laser use in manufacturing, do you see it growing? Do you foresee the UK ever approach Germany in its industrial use of lasers?

One of the main goals for the CIM is to increase the uptake of lasers in UK manufacturing industry so I would say yes I expect it to grow. However I think we need to consider why there is such a poor uptake. The main reason I believe is the short term financially-based thinking of many managers in UK companies. My experience of working in industry was a very frustrating one. Whilst we came up with many innovative ideas and technical solutions to problems the response of those in the business units was always to find reasons why we couldn't adopt them or investigate them further. This was especially the case if it involved some significant investment.

Q. With your background at BAE Systems before taking up your position at Cranfield, you are in a unique



I think there will be many other opportunities for LMP in the aerospace sector. This is especially in the metals field.



BEAM DELIVERY, SOFTWARE AND POSITIONING

INTEGRATED POLYGONAL SCANNER

Scanlab AG has recently introduced an integrated hybrid polygon laser scan system solution. It is especially well-suited for line-by-line processing of surfaces (e.g. silicon wafers) using high-repetition USP (ultra-short-pulse) lasers. The hybrid system also demonstrated a significant reduction in material processing times.

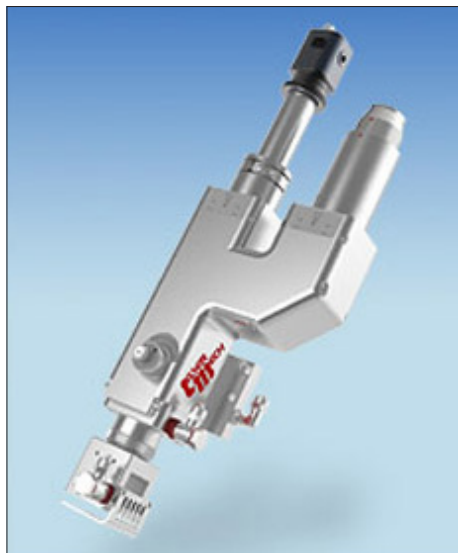


USP lasers are ideal for high-precision micro-processing. The hybrid polygon scanner system combining the dynamic superiority of polygon scanners with the high precision of galvanometers. "Our many years of galvo expertise led to the idea of combining the systems. Two galvanometer scan axes now correct typical deviations and imperfections in polygon wheel symmetry to achieve the flexibility necessary for pixel-accurate processing," explained Scanlab CEO Georg Hofner.

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LASER MECHS' NEW FIBERMINI® WELD

At only 55 mm square around its central core, Laser Mechanisms' FiberMINI® Weld is an ultra-compact, lightweight welding head for all fibre-delivered, solid-state laser systems up to 6kW.



The simple, yet flexible design allows Laser Mech to optimise the processing head to the end user's requirements. Offered with either straight or right angle fibre inputs, FiberMINI Weld delivers both user-friendly operation and reliable performance at an attractive price.

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RAYLASE SCANNING UP TO 200 M/SEC

Companies in the micro-machining sector increasingly use ultra-short pulse lasers. In order to make full use of the associated high laser frequencies, they require scanners with higher deflection speeds than have been available to date.

By combining a precision polygon with two galvanometer scanners the Raylase ultra-high-speed scanner (UHSS) offers speeds of 200 m/sec, scanning several times faster than conventional deflection units used with galvanometer scanners, and claims to be the only system that enables companies to scan their usual work areas (e.g. using a F-theta lens of focal length 254 mm to scan a field measuring 160mm x 160mm) ultra-fast and very precisely.

These capabilities open up new application areas for ultra-short pulse lasers, including perforation, cutting and scribing at unprecedented speeds. The Raylase UHSS significantly reduces production time, enabling firms to benefit from huge cost savings.

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SOFTWARE

SIGMANEST® VERSION 10.1

SigmaTEK Systems new Version 10.1 of SigmaNEST contains a number of new features and enhancements making cutting machine programming even more effective and easy. These include laser destruct, centre of gravity tabbing, conditional tabbing for drop doors and quick search in parts, sheets, and work order list.

SigmaTEK Director of Product Management, James Lindsey comments, "SigmaNEST version 10.1 offers a range of new features benefitting novice and advanced users alike. As cutting machines continue to offer more advanced features; it's important for software to keep pace."

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SOFTWARE

LINEAR PIEZO NANOPOSITIONERS

Aerotech's QNP-L series linear piezo stages give nanometer-level performance in a compact, high-stiffness package. A variety of travel and feedback options make these stages ideal for applications ranging from microscopy to optics alignment.

The stages are guided by precision flexures optimised using finite element analysis to ensure high-stiffness and long life. The design provides unparalleled geometric performance (straightness and angular errors) while minimizing overall stage package size. All QNP-L piezo stages offer closed-loop feedback using a capacitive sensor design that yields sub-nanometer positioning resolution and high-positioning accuracy (linearity). When coupled with Aerotech's Q-series controllers and drives, QNP-L piezo nano-positioning stages demonstrate sub-nanometer positioning resolution and in-position stability (jitter), and high-positioning bandwidth.

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MATERIALS PROCESSING

HIGH SPEED LASER CUTTING AUTOMATION

LVD has announced its latest in laser cutting automation, designed for flexibility and speed. Handling sheet sizes from 1000 x 1000 mm up to 3050 x 1525 mm, the Flexible Automation for Lasers (FA-L) is now available on Sirius Plus and Electra laser cutting machines. The FA-L unloads a finished sheet and loads the next sheet on the table within 40 s.



The FA-L can be fully integrated with an existing warehouse and an optional second loading pallet for night shift work.

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LASER SOLUTIONS FOR JEWELLERY MANUFACTURING

ROFIN offers a suite of laser solutions for jewellery manufacturing. The product line-up comprises compact desktop manual laser welding systems for the goldsmith as well as solutions for large scale industrial production. These include the Desktop, Performance Basic, Performance and Easy Jewel.

Desktop

High technology delivered in an attractive package with a small footprint - smaller than ever and yet equipped with more power! Computer-controlled laser pulses and monitored cooling make it a very reliable tool. The modern housing design is tailor-made for workshops with limited space available and at the same time provides a large working chamber.

Performance Basic

The entry-level Performance workstation has a touch panel display and industry-proven laser technology.

Performance

The Performance manual laser welding system is an ideal tool for jewellers. The newly designed, compact and mobile housing provides easy access to a spacious working chamber. Advanced laser functions offer maximum control over the laser weld. The dynamic foot switch offers sensitive control of a selected laser parameter.

*Desktop: the smallest of
Rofin's manual welders*



EasyJewel

The compact laser marking and engraving system is specifically designed for the jewellery industry. Besides the most common tasks like interior, exterior and front-side engraving of rings, the EasyJewel is suitable for various other applications and can cut sheet metal with a thickness of up to 1.5 mm.

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VW SELECT WIRE STRIPPING SYSTEM



Spectrum Technologies has announced that Volkswagen AG is the launch customer for its SIENNA™ 900 laser magnet wire stripping system.

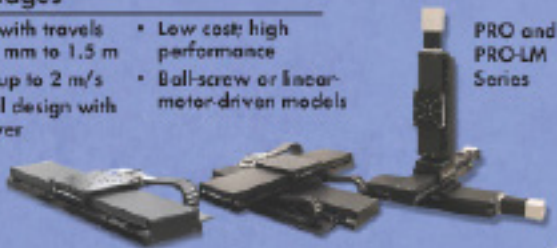
The patented technology has been selected by Volkswagen for integration into its new stator production line in Kassel, Germany. SIENNA 900 is a new modular laser system that employs Spectrum's innovative, patented laser magnet wire stripping (MWS) technology for the rapid and clean removal of hard enamel insulations from magnet wire used in wound electrical components, such as alternators, motors and transformers

Contact: Peter Dickinson

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Linear Stages

- Models with travels from 50 mm to 1.5 m
- Speeds up to 2 m/s
- Side-seal design with hard-cover
- Low cost; high performance
- Ball-screw or linear-motor-driven models



Integrated Servo/Scanner Systems

- Wide range of focal lengths and apertures
- Industry-best 24+ bits of scanner resolution
- Laser firing based on real-time scanner/servo position

Micromachining shouldn't be a giant task

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Cylindrical Laser Machining Systems

- Integrated linear/rotary motion platform
- Advanced control architecture
- Single- or dual-spindle configurations



Linear Motor Gantry Systems

- Velocity to 3 m/s and acceleration to 5 g
- Exceptional accuracy and performance for improved throughput and yield
- "Sealed" versions and custom options to suit your application



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Q. How do you see things at the present time?

Clearly the main area of interest is additive manufacture. However I think there will be many other opportunities for LMP in the aerospace sector. This is especially in the metals field where there is an acceptance that new developments are required.

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RESEARCH FUNDING

Applying for a grant can be an exciting and sociable process. The team arrange a meeting and gather together: the more imaginative will meet in a restaurant or pub. Heads of agreements are made, the income 'pie' is sliced up, the grant application is put together, and as it matures everyone becomes excited by the prospect of success.

Then the decision is made and announced by the awarding body. If successful, several congratulatory e-mails are exchanged and the date for the first project meeting is set. If not; the feedback is drawn down and it seems almost inevitable that, like those job interview rejections we've all experienced, the project scored very high, but regrettably only achieved a good 'second place'.

The best action for a company is to regularly review the website www.innovateuk.gov.uk/funding-competitions and see if there is anything of interest. Companies with ideas that match these themes are invited to submit a grant application. The process is simple. First of all comes registration: the deadline for that must be met. Innovate will respond with your applicant name and a password for a dedicated portal. The password is likely to be bizarre so it's best to change it. If you are a regular submitter then a good idea is to adopt a personal password convention or use the same one in all cases.

Then for large or 'collaborative' projects (the latter is where university or Catapults are expected to participate but not lead the project) there is a shorter application form to submit, with only guideline costs. This is for a first stage evaluation. If the project passes Stage 1, then typically there are 5 working days until the deadline for submitting the full proposal. This is

applications. Some techniques to get the highest score are discussed below.

1.2 SMART Awards

InnovateUK runs a programme of bimonthly awards, not linked to any particular technology theme. This is called SMART. Calls in 2014 will be 25 September, 27 November, 29 January 2015 and 26 March. Unlike the theme-based calls, it is exclusive for SMEs and there are three stages:

- Proof of Market: grant 60% maximum grant £25,000.
- Proof of Concept SME 60%, maximum grant level £100,000.
- Development of Prototype, 35% grant for medium sized enterprises (50+ employees), 45% for small and micro. The maximum grant is £250,000.

HOW TO FUND YOUR NEW PRODUCT IDEAS WITH PUBLIC MONEY

ROGER HARDACRE

In this article I will inform you about the sources of industry led grants for R & D projects, but I hope through passing on some tips from my personal experience, I can help to improve your own chances of winning a grant for your R & D project. Any comments on the latter and of the application process are strictly my own opinion, which can be changed at a moment's notice when a notification letter drops into my e-mail box.

1. Sources of UK industry grants

1.1 Innovate UK (formally and still legally The Technology Strategy Board.)

Innovate UK is the new brand for the Technology Strategy Board and is the main organisation for funding industry-led non-educational grants in the UK.

On the website www.innovateuk.gov.uk there are periodic calls for ideas that fit within Innovate's strategy for developing technology themes. For the laser industry the themes of interest would be High Value Manufacturing, Health and Care, Space, Resource Efficiency, Enabling and Emerging technologies.

not a bad as it appears as much of the work will have already been done for Stage 1.

For smaller or purely industry led projects, there may be only one submission deadline. It is best to check this. Grants are 60 -75% for SMEs, 50% for large companies and 100% for Universities or 'Catapults', which are industry-led research centres.

Proposals are uploaded via your own personal web portal to the TSB programme. This is where it's best to have your own password code; you do not want to be frantically searching for the password with just minutes to go for uploading a submission. However, experienced grant applicants will not be uploading minutes before the deadline because if you are experienced in Windows, the internet and your PC you will be uploading the day before, just in case there are any IT issues, such as the seemingly 18,000+ upgrades of Windows that Microsoft seems to make a habit of issuing at the worst possible times. (Remember:- turning off your computer doesn't stop them either!)

All applications to InnovateUK are competitive. They are evaluated by a panel who score the

1.3 University and Catapult-based grants

A Catapult is a physical centre where the very best of the UK's businesses, scientists and engineers work side by side on late-stage research and development, transforming 'high potential' ideas into new products and services to generate economic growth. They work with industry and alongside the more industry linked universities. Companies wanting to use the research services of these institutions can:

- Use a small grant called the Innovation Voucher. These are designed to encourage businesses to look outside their current network for new knowledge that can help them to grow and develop. Start-ups and small and medium-sized businesses from across the UK can apply for an Innovation Voucher. Themes for each round are available on the Innovation Vouchers site. <https://www.innovateuk.org/-/innovation-vouchers>.
- Use a university-sourced and managed Knowledge Transfer Partnership (KTP) <https://www.innovateuk.org/-/knowledge-transfer-partnerships>. KTPs offer businesses the opportunity to work in partnership with an academic institution to obtain knowledge and

expertise to which they currently have no access, to address their business challenges and embed sustainable innovation. The knowledge sought is embedded into the company through a project or projects undertaken by a recently qualified person (known as a KTP associate) recruited specifically to work on that project. KTPs can vary in length from six months to three years, depending on the needs of the organisation and the desired outcomes. All sizes of company can apply for a KTP.

2. EU grants

This year 2014, the EU finally started its long-awaited replacement for the Framework Programmes. The new European Framework now goes by the name of Horizon 2020 (<http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020Innovation>) and covers grant finance for projects up to 2020. The programme is the biggest EU Research and programme so far with over € 80bn of funding available over 7 years. It exists to leverage private investment for Research and Development.

Horizon 2020 is open to everyone, with a new simplified structure for application that reduces red tape and time so participants can focus on what is really important. This approach makes sure new projects get off the ground quickly – and achieve results faster.

It emphasises excellent in science, industrial leadership and tackling societal challenges. For companies in the laser industry the emphasis on Industrial Leadership is most relevant. Industrial Leadership covers the following themes:

- Leadership in enabling and industrial technologies.
- Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology.
- Access to risk finance.
- Information and Communication Technologies.
- Space Technology.
- Special measures for innovation in SMEs.

This is a programme that is subject to calls for many proposals and it is worth doing regular checks to see what is coming up. However some of the calls may have long lead times allowing interested companies time to build up their consortia.

To review calls from Horizon 2020 you need to register your organisation under the ECAS system: European Commission Authentication System. When you submit an application you will need a PIP number. The good news is that once you have one you will be saved a lot of time from constantly re-entering the same data: which is 'one up' on InnovateUK. The bad news is that for first timers the application process can take

up to a few hours while you weave among the various web pages to reach the issuing of your PIP number. Despite their best attempts, the EU system designers have not thought through the various interpretations and misunderstandings a first time user can make.

3. Tips on improving the chances of a successful grant application

3.1 Make sure that your application is relevant to the call.

Both InnovateUK and Horizon 2020 require the applicants to write a short section to prove that the application is relevant to the scope of the call. These are binary assessments, the application either fits or not. Marginal applications or ones where you really have to try hard to make it relevant are going to appear as square pegs in round holes and will be rejected.

3.2 Control your application with a compliance matrix.

This is a tool for your own discipline. The matrix should record basic requirements, such as submission dates (24 hours ahead of the actual deadline to take into account unexpected uploading issues). The structure of the programme: grant available, scope, objectives, timescales and other key indicators mentioned in the call. The application can then be read when it is near completion against the Compliance Matrix to check that it meets all compulsory requirements.

3.3 Answer the questions

The InnovateUK application forms have 10 questions, the Horizon 2020 forms have 4 or 5. Subtlety is not recommended in answering



Roger Hardacre is MD of Advanced Laser Technology Ltd, a position he has held since 2012. From 2010 - 2012 he worked at the Laser Processing Research Centre at Manchester University.

these questions. For example InnovateUK asks for how a proposed project is Innovative. The answer should be specific, mentioning how advanced the idea is over state of the art and it should home in on innovative points: IPR, plans for overcoming failures, and for meeting un-met industry needs etc. Never assume that the reader - who is the assessor - can read between your lines.

3.4 Back up claims with data

It is not enough just to say: we can save energy or increase jobs or enhance profits etc. Claims must be supported by data. Sometimes the data is a very broad estimate: but at least it shows the evaluators that you have thought about the subject and have some market knowledge.

3.5 Establish responsibility for authorship and editing.

Writing a proposal or grant application is not a democratic process. One editor-in-chief must be appointed/agreed and given full responsibility for the document. Other companies in the consortia need to send in their data early and should review the document as it develops, but they should have no say over rewrites and major changes, especially as the deadline approaches. A reviewer should be appointed a few days before the deadline and, armed with the compliance matrix (see above), should critique the proposal for understandability, good English and compliance with the needs of the call. The review and any subsequent corrections and alterations can take up to a day.

3.6 Make the application interesting

Evaluators read hundreds of applications. It can become a mind numbing task. So make your application interesting and let your passion shine through. There are five stages to a story:

- This is a problem/ opportunity.
- Its big enough to care about (see the data).
- State-of-the-art fails to provide a solution.
- We have an idea:
 - But we need some help to overcome barriers.
 - We have partners but we also need leveraged finance which the grant will help provide.
- The benefits will be significant to the economy/society and us (see data).

SEE OBSERVATIONS P29

It takes around 10 writing days to put together a quality application and success rates seem to be around 20% for well subscribed calls. However, with some of the monies on offer it's a good way to develop new products and move your company to the front of the technology levels. It is definitely a strategy I would recommend.

The author is with Advanced Laser Technology Ltd, Piccadilly Trading Estate, Giddings Road, Manchester M1 2NP

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JOB SHOP CORNER

CARRS WELDING ACHIEVE AS9100

In May 2013 Carrs' Welding Technologies, set up a separate production company. The new operation welds assemblies, carries out testing operations and has facilities for laser marking of components. It welds a diverse range of products, from closing electronic assemblies for space programmes to precision industrial plumbing fittings, and from lithium-ion battery modules for performance cars to high speed rotors.

Now, barely one year from incorporation, Carrs' Welding Products has achieved certification to AS/EN9100 Aerospace Quality Management through the United Kingdom Accreditation Service, the sole national body recognised by government to assess organisations providing certification, testing, inspection and calibration services. As Carrs' Welding Products operates only to this one exacting standard, all of its customers will benefit from the precise attention to detail required by the demanding aerospace industry.

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NEW WEBSITE FOR FIMARK LTD

Fimark have developed a new website, www.fimark.co.uk. More user friendly it contains greater content about laser marking and technical spray painting. Fimark can also be found on LinkedIn.

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MORE ACHIEVEMENTS FROM HUTCHINSONS

Investing in People Award

Hutchinson Engineering has been named as a top organisation for people management practice in the UK, having been awarded the Best Newcomer in the first Investors in People Awards. The Awards, which received over 500 entries from all over the UK, celebrated the best people management practices amongst Investors in People accredited businesses.

The Best Newcomer category recognises a newcomer to the framework that has achieved immediate tangible benefits since being accredited, and can demonstrate a clear strategy for future growth.

Hutchinson AeroTech joins supply chain development programme

Hutchinson AeroTech, a Northern Ireland laser-cutting component manufacturer has recently joined Bombardier Aerospace's Supply Chain Programme SC21. SC21 is an ADS supply chain excellence programme, which encourages best practice and helps increase the competitiveness of aerospace and defence companies operating in the supply chain. Invest Northern Ireland plays a key role in supporting the local companies participating in the programme.

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THE LASER CUTTING CO ADDS CAPACITY

Sheffield-based The Laser Cutting Co has invested almost £1 million in the latest Adige Lasertube processing system from BLM Group. It will provide customers with greater production security and also cost-effective manufacture of complex tube components.

The Laser Cutting Co offers sub contract laser cutting service delivering tubular, open sections and flat metal parts on a daily basis to customers throughout the UK. The Adige LT8 replaces a competitor's tube laser and will complement the two existing Adige Lasertube machines, two flatbed lasers and one six-axis tube laser already on-site.

Managing Director, Jon Day, said "We are convinced that there are major cost savings that customers can make by switching their production to make use of our Adige Tubelaser machines which allows complex joints to be welded easily and consistently."

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www.ailu.org.uk

DOUBLE CELEBRATION FOR SUBCON

Nuneaton based Subcon Laser Cutting Ltd, has celebrated two landmark events this year. It has made a £1M investment in the latest cutting technology, plus it is 25 years since the company was formed in 1989.



The major investment is a 5kW Trumpf Brightline fibre laser cutting machine and a state of the art nitrogen generating system, the first of its kind in the UK.

Tom Mongan General Manager at Subcon said "A major part of the company's success is down to its staff, many of whom have been at Subcon for at least 15 years".

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CHAIRMAN'S REPORT

AN OPPORTUNITY NOT TO BE MISSED



We are approaching the end of 2014 but first we have Job Shop 14: don't forget October 16th at Amada Kidderminster!

I don't know about at your workplace but I guess that, like at Midtherm, the holiday season caused some problems with key personnel taking time off to go on holiday with family and friends. Indeed, I seem to have spent all year on holiday so far and still have some time booked off at the end of October to top up the suntan. There are some here that will tell you I've been on holiday since I arrived some 13 years ago. Nevertheless, a number of employees have been with us for many years now, which in itself is very encouraging.

This year we have been trying to increase the work force to improve production and fill capacity on our new machines; it's part of a long term business plan that is now coming to fruition. Having now gone through a factory expansion and survived (just) the hardest job is trying to find additional employees: some

applicants didn't even turn up for the interview and some who were offered jobs didn't bother to turn up on the start date. From what I can gather from colleagues in the Job Shop Group this has been a regular occurrence lately.

Some good news I am happy to pass on is that funding is still available from a few finance sources to help with capital expenditure, which helped us considerably in the purchasing a new machine in the last couple of months. I hope you too are taking advantage while these grants are still available. There will be some useful information on grants at JS 2014: another reason not to miss out on this event!

Don't forget that if there is a subject that you feel should be covered at JS 2014 you can always post on the forum or bring it up during the afternoon question and answer session. The event is being held at Amada's newly refurbished premises in Kidderminster and I look forward to seeing you there.

Chairman: Dean Cockanye
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