The Contract Heat Treatment Association Newsletter

HOTLINE

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Inside . . .

CHTA Secretariat

Items for inclusion in *Hotline* and enquiries about CHTA activities should be addressed to:

Contract Heat Treatment Association
c/o SEA / BATF,
Federation House, 10 Vyse Street,
Birmingham B18 6LT
Tel: 0121 329 2970 (or 0121 237 1123)
Fax: 0121 237 1124
E-mail: mail@chta.co.uk
Website: **www.chta.co.uk**

CHTA Secretary and *Hotline* Editor:
Alan J. Hick B.Sc., C. Eng., FIMMM

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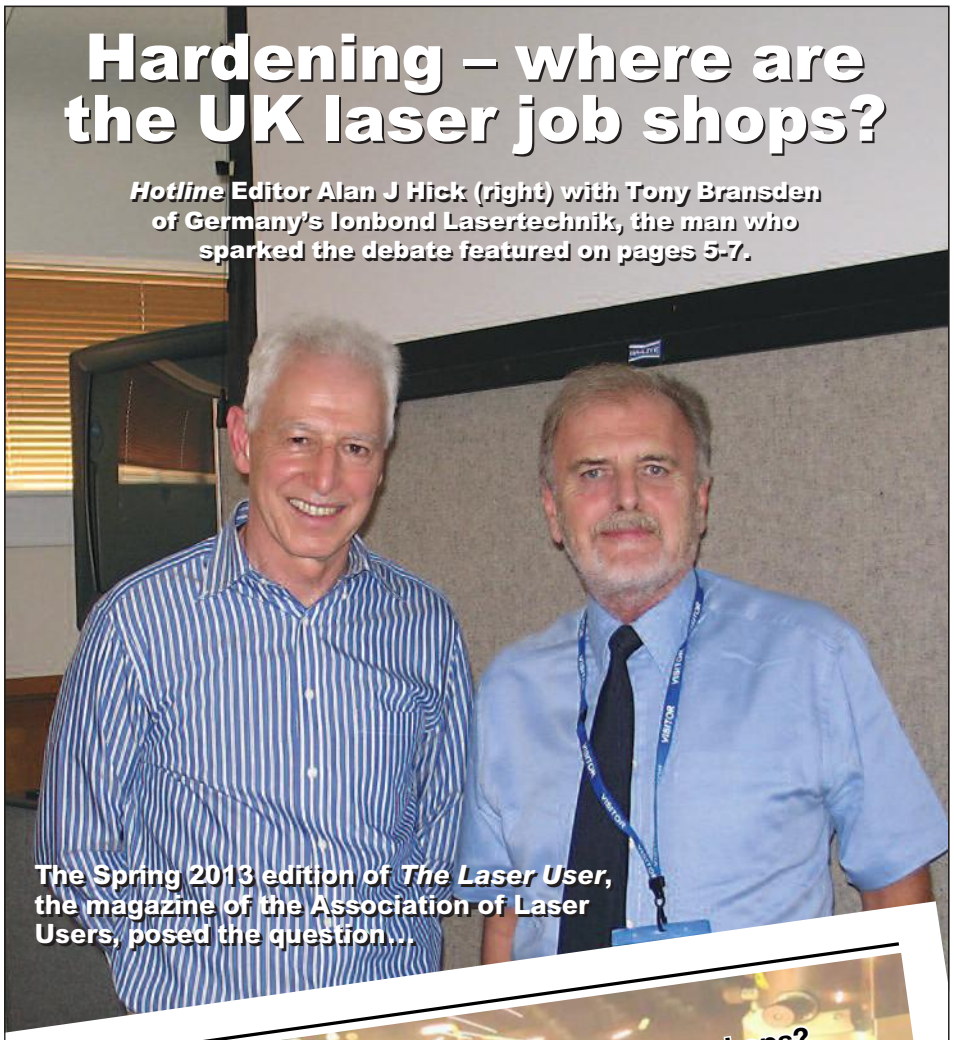
Hardening – where are the UK laser job shops?

***Hotline* Editor Alan J Hick (right) with Tony Bransden of Germany's Ionbond Lasertechnik, the man who sparked the debate featured on pages 5-7.**



The Spring 2013 edition of *The Laser User*, the magazine of the Association of Laser Users, posed the question...

EDITORIAL

HARDENING: Where are the UK laser jobshops?

Antony Bransden, Plant Manager of Ionbond Lasertechnik, a small (five employee) laser surface hardening job shop based in Nürnberg, Germany, can't understand why there is so little job shop activity in laser hardening in the UK. "There is typically a laser harden-ing job shop in every big city," he told

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Comparing the laser beam to that of a

Comparison with Germany

Estimates of the number of German laser jobshops offering different laser process services shown in column '1' in Table 2 was provided by Antony Bransden [1]. AILU estimates of the number of job-shops offering laser cutting in the UK is about 45% of the 898 claimed for Germany (whose manufacturing output is ~3 times the UK's). However, a com-parison of columns '2' and '3' shows that relative to the number of cutting jobshops in the two countries, the numbers under-

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LASER TRANSFORMATION HARDENING

The Spring 2013 edition of* The Laser User *(TLU), the magazine of the Association of Laser Users (AILU), focuses on laser hardening and asks why the process, utilised on an industrial scale for forty years, appears to be unavailable from UK contract heat treaters. With AILU's kind permission, the following edited contributions, drawn from some of the TLU articles, provide a basis for comment.

THE PROCESS: An introduction to laser hardening and its industrial applications

*Dr **Antony Bransden**, Plant Manager of Ionbond Lasertechnik, part of Ionbond Germany GmbH, provides a brief overview…*

The field of laser surface heat treatment is large and covers all materials such as plastics, glass, ceramics and metals. The depth of treatment areas ranges from microns (e.g. etching, micro-machining, marking) through to millimetres (e.g. transformation hardening, alloying, surface cladding).

In a typical arrangement for laser transformation hardening, the heat source, the beam of a high-power laser, is optically formed to match the size of area required to be hardened; see *Fig.1*.

Careful selection of process parameters (e.g. laser power, heating pattern and treatment speed) brings a surface layer up to the austenitising temperature (the heating phase). The austenitising temperature is held for a short time (the soaking phase) to allow temperature diffusion to the required depth.

Due to the rapid nature of heating, a steep temperature gradient is created which results in fast cooling (self-quenching) by conduction of heat into the component's bulk (the cooling phase). With appropriate steels, a transformation to martensite occurs on removal of the beam, with an associated increase in hardness.

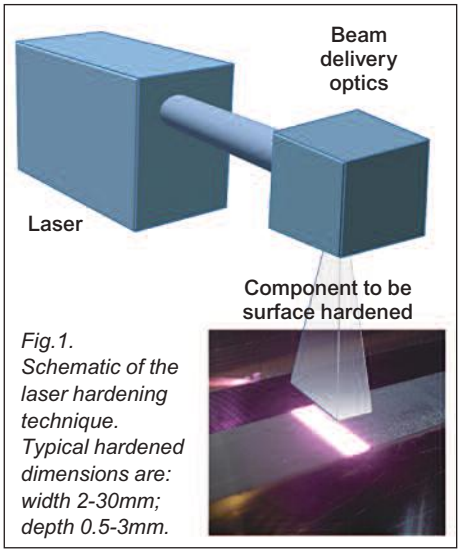

Fig.1. Schematic of the laser hardening technique. Typical hardened dimensions are: width 2-30mm; depth 0.5-3mm.

In general, martensitic transformation causes an expansion of the material's lattice structure, resulting in a beneficial compressive stress in the hardened area. The principle requirement is the improvement of wear resistance. Abrasive wear is reduced due to the laser-hardened surface exhibiting higher hardness than the abrasive medium, while adhesive wear can also be influenced due to a reduction in the coefficient of friction. Laser hardening can also improve the fatigue characteristics of surfaces.

Applications

The applications of laser surface hardening are many and widespread: e.g. in the tool, automotive and power-generation industries. Examples are found such as press and cutting tools, collet chucks, drive shafts, pump and gear parts. A selection is shown in *Fig.2*.

A classic application is the hardening of the sealing edges on plastic-injection moulds. During service, the high injection pressures can result in high wear, particularly when the plastic contains abrasive media (e.g. glass fibre). Wear of these regions results in parts with burrs, often requiring tedious removal by hand. The requirement for an ever-increasing service life demands hardening of these edges. Many suppliers employ flame, although this does not always bring the desired results and, for difficult geometries, is limited. Laser beam hardening results in uniform heating and good temperature control, as well as flexible and rapid processing of complex geometries.

Folding tools are another good example. All contact surfaces with the sheet materials can suffer from wear due to high contact pressures and sliding. Laser hardening is ideally suited to the hardening of these surfaces, where the precise application and fast treatment times lead to a minimum heat input, reducing distortion. The flexibility of laser hardening allows a wide variety of tool shapes to be hardened.

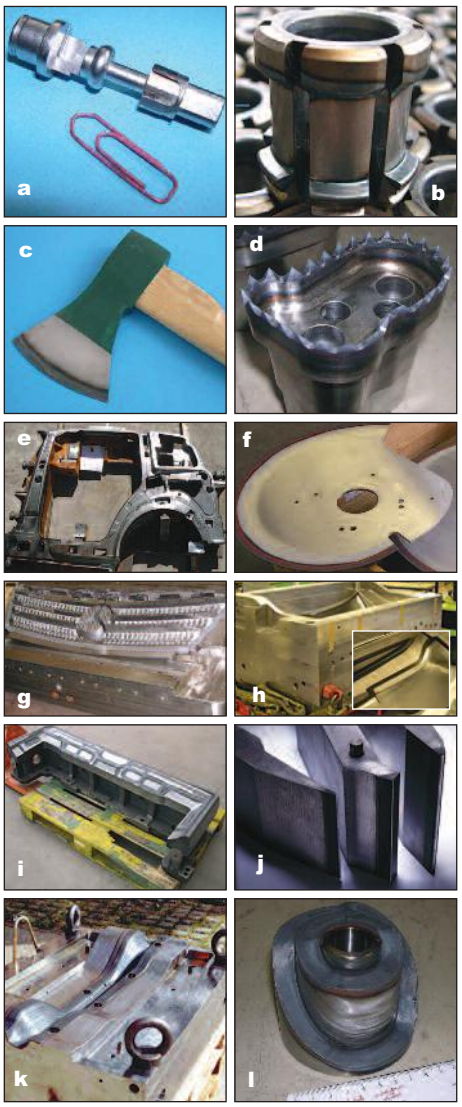

Fig.2. A selection of laser-hardened components: (a) lock parts; (b) collet chuck; (c-e) cutting/stamping tools (notionally including Tony's axe); (f) rotary knife; (g,h) plastic injection moulds; (i-k) forming tools; (l) control cam.

Major press tool manufacturers are now offering laser-hardened tools as standard items. For smaller tool suppliers, the purchase of laser hardening equipment is uneconomic and the use of a contract heat treater provides a cost-effective alternative to in-house hardening.

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THE QUESTION: Hardening - where are the UK laser job shops?

*…asks AILU Secretary **Mike Green** in his TLU editorial…*

Antony Bransden of Ionbond Lasertechnik, a small (five-employee) laser surface hardening job shop based in Nuremberg, Germany, can't understand why there is so little job shop activity in laser hardening in the UK. "There is typically a laser hardening job shop in every big city (in Germany)," he told me at March's ILAS 2013 (Industrial Laser Application Symposium). "As well as the home market we have customers from The Netherlands, Italy, Austria, France and the UK."

There may well be in-house laser surface hardening going on somewhere in the UK, probably within the revitalised automotive sector. What is almost certainly the case is that there are no subcontract engineering companies currently offering the service.

Why use a laser for hardening?

To put hardening into context, *Table 1* summarises a range of beneficial laser surface treatments. The hardening process we are considering here is martensitic transformation, a treatment that is effective for most but not all steel alloys. As described in Tony's laser hardening presentation at ILAS 2013, a summary of which appears here on a previous page, there are three phases to the process: heating a surface layer to the austenitising temperature (heating phase); holding this temperature for a short time (soaking phase) to allow temperature diffusion to the required depth; then rapid self-quenching (cooling phase).

Comparing the laser beam with flame, its main competitor for surface hardening, we can make the following points:

- The laser beam provides heat only to a well-defined surface area, so removal of the beam results in self-quenching; making for a fast one-step process. Fast local cooling is not possible with flame heating.
- The highly-responsive control of laser power, in conjunction with a pyrometer, ensures that the surface temperature can be held within tight tolerances during the soaking phase. Such control is just not available for flame heating.
- The remote delivery of power allows the laser beam to reach into corners and other areas that are hard to access for a flame.
- Local heating by laser means that hardening can be localised, opening up new design opportunities and avoiding potential deleterious heating effects on other parts of the workpiece.
- Only the laser route offers the combination of controlled application of heat, maintenance of the optimum magnitude and duration of temperature, and rapid self-quenching. As such, it is a reliable highly-controlled process that meets modern manufacturing requirements. So it is that car manufacturer Volkswagen has decreed that "All press tools should be laser hardened".

Table 1. Laser surface treatments of metals.

Process	Surface	Depth, micron	Application
Annealing	Doped Si	0.1-1	Removal of implantation damage
Splat quenching	Amorphous	1-10	Modification of properties
LCVD	Au, Ag, Ni, Cu	‹10	Electronics
Sputtering	Au, Ag, Ni, Cu	‹10	Electronics
Melting	Ledeburite Amorphous	‹50	Corrosion, wear
Shock hardening	Twinned micro-structure	‹500	Fatigue
Texturing	Steel, ceramic	‹500	Improvement of properties
Trans-formation hardening	**Martensite**	**≤ 3000**	**Wear, fatigue**
Alloying	Metal alloys, carbides, nitrides	≤2000	Wear, corrosion
Dispersion	Metal alloys, carbides, nitrides	≤2000	Wear
Cladding	Metal alloys, carbides	≤5000	Wear, corrosion

Application areas

Laser hardening job shops deal with a wide range of components, weighing from ten gram up to five tonne and more. The main industrial application areas are in enhancing the performance of moulds and folding and forming tools used by the sheet metal industry but, as with all job shop work, there are many lucrative areas waiting to be found.

Comparison with Germany

Estimates of the number of German job shops offering different laser process services, shown in *Table 2*, were provided by Antony Bransden. AILU estimates of the number of job shops offering laser cutting in the UK is about 45% of the 898 claimed for Germany (whose manufacturing output is about three times that of the UK). However, a comparison of the normalised columns in *Table 2* shows that, relative to the number of cutting job shops in the two countries, the numbers undertaking welding and engraving are similar, UK drilling is relatively twice as active as in Germany, but cladding and especially hardening are very weak in the UK. In this simplistic comparison we would expect some twelve UK organisations providing hardening and about 42 providing cladding.

Table 2. Comparison of laser job shops by process.

Process	Number of German job shops offering the process	German numbers normalised to laser cutting value	Normalised number of UK AILU member job shops
Hardening	**28**	**0.03**	**0**
Welding	377	0.42	0.39
Cladding	95	0.11	0.02
Cutting	898	1	1
Engraving	379	0.42	0.33
Drilling	73	0.08	0.19
Alloying	4	0.004	NA*
Soldering	11	0.01	NA*

**Alloying and soldering are not in the AILU classification scheme for job shops.*

Conclusion

There should be an excellent market for subcontract laser hardening and cladding in the UK. It is clear that the laser source and process technology is mature and offers great benefits over conventional processes, and its success in Germany is proof that the commercial case is sound.

COMMENT:

UK experience

*Former CHTA member Inductoheat (Tewkesbury) Ltd used to offer laser hardening. The company's **Ian Hawkes** commented in the TLU feature...*

We were, I believe, the first to develop the laser process for body-in-white tooling for Ford Dagenham in 1985, starting with clinch (or hemming) dies made from SG iron castings, several tonnes in weight.

This led to monthly lorry loads from Ford Cologne.

We went on to work for GM with suites of tooling for tri-axial (LTP) press lines for the Astra (amongst others) and also for large draw and punch sets for Jaguar Land Rover, Coventry Motor Panels and other European car manufacturers.

I think Tony's article is thorough on the technical advantages, but the commercial history can also be revealing. The decline of the British tooling industry and demographics certainly reflected on our trading in this field.

I like the point about soak (austenisation). This is important in short-heat-cycle treatments (induction/laser/flame) and the presence of chromium carbide, with its slow diffusion/dissolution rates, means some steels, particularly those designed for vacuum hardening, can be problematic to treat. We also developed extended line heating techniques for stainless cutting edges.

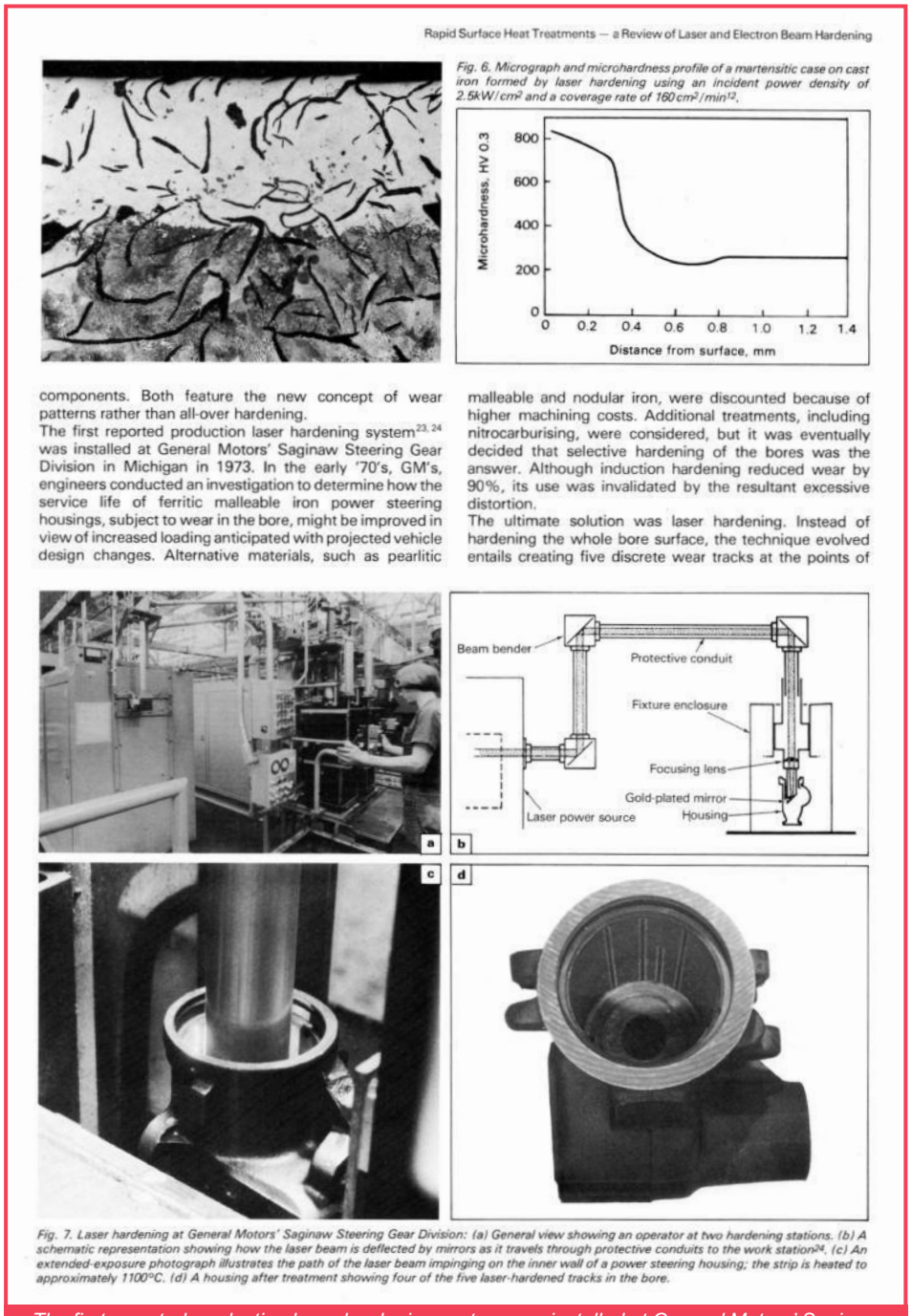
The flame method was the traditional mainstay for car body tooling, but the skills are being lost and modern steels need better control of temperature and cooling rate. I have seen many intricate tool-steel castings that had succumbed to a 'Krakatoa moment' under the flame which were then sent to me, repaired with porous weld, with the instruction 'please harden'.

Now I would say there is as much development in induction hardening these large expensive tools as there is in laser, given the improvements in induction power supplies, tooling heads and robotics.

I do not think that flame hardening is the main competitor to laser in most industry sectors. The turnover in conventional steel heat treatment shows induction heating a poor cousin to furnace treatments (used largely because they are more cost-effective); one could say that laser is induction's lost love child!

There are many potential applications for laser hardening other than car body tooling. We used to harden 5000 precision-cast hydraulic actuators per month for the mining industry and were involved in turbine blade hardening for the UK power generation industry. The laser is more flexible but not as power/cost efficient as induction for larger hardened areas and quantities; so applications must exploit its unique advantages.

The first application that inspired me was at Saginaw Steering Works in the USA. It culminated, in 1983, with 15 lasers hardening 33000 power steering castings a day. This metallurgical solution to hardening castings with virtually no pearlite content was unique. The beam treatment caused incipient melting of the bore surface layer with no distortion. This induction could not do.



Rapid Surface Heat Treatments — a Review of Laser and Electron Beam Hardening

Fig. 6. Micrograph and microhardness profile of a martensitic case on cast iron formed by laser hardening using an incident power density of 2.5kW/cm² and a coverage rate of 160cm²/min[12].

components. Both feature the new concept of wear patterns rather than all-over hardening.

The first reported production laser hardening system[23, 24] was installed at General Motors' Saginaw Steering Gear Division in Michigan in 1973. In the early '70's, GM's, engineers conducted an investigation to determine how the service life of ferritic malleable iron power steering housings, subject to wear in the bore, might be improved in view of increased loading anticipated with projected vehicle design changes. Alternative materials, such as pearlitic malleable and nodular iron, were discounted because of higher machining costs. Additional treatments, including nitrocarburising, were considered, but it was eventually decided that selective hardening of the bores was the answer. Although induction hardening reduced wear by 90%, its use was invalidated by the resultant excessive distortion.

The ultimate solution was laser hardening. Instead of hardening the whole bore surface, the technique evolved entails creating five discrete wear tracks at the points of

Fig. 7. Laser hardening at General Motors' Saginaw Steering Gear Division: (a) General view showing an operator at two hardening stations. (b) A schematic representation showing how the laser beam is deflected by mirrors as it travels through protective conduits to the work station[24]. (c) An extended-exposure photograph illustrates the path of the laser beam impinging on the inner wall of a power steering housing; the strip is heated to approximately 1100°C. (d) A housing after treatment showing four of the five laser-hardened tracks in the bore.

The first reported production laser-hardening system was installed at General Motors' Saginaw Steering Gear Division in Michigan in 1973. (From: A J Hick "Rapid Surface Treatments – a Review of Laser and Electron Beam Hardening", Heat Treatment of Metals, *Vol. 10, 1983.1, 3-11)*

Merits and drawbacks

***Chris Kenward** (Ajax Tocco International) considers reasons for the lack of UK interest in the laser process…*

I first became aware of laser hardening around 15 years ago when I was approached by a manufacturer of camshafts who wanted to change from laser to induction hardening of a small bearing diameter. I am not sure whether one or several reasons were behind this move, but I suspect it was primarily cost.

I did examine a sample I was given and it showed a marked spiral effect, with both surface hardness and depth variation. While the hardness was within specification, variation can cause problems with surface finish after grinding; so this may have been a factor.

Until recently, this was the only enquiry I received relating to laser hardening, but I have been contacted by an existing customer for whom we induction-harden a Caterpillar part that is made from SG iron. Caterpillar had asked them to look into the possibility of laser-hardening a thrust face. This may tie in with Ian Hawkes' comments re the Saginaw castings that had

the surface melted by laser to achieve hardening.

This lack of enquiries over a very extended period of time indicates to me that the market is very limited in this country. Looking at the requirements for laser hardening gives some clues as to its absence from our marketplace:

- It generally requires a higher grade of steel with fine microstructures, due to the shorter transformation times, whereas there has been a move over the years by customers to cheaper grades, where possible, to lower the cost .
- As a surface heating process, it is limited in its depth of hardening and needs a large mass-to-heated-depth ratio to achieve self-quenching. There may also be health and safety issues from residual heat in the part presenting a risk to personnel handling the treated parts.
- Probably the two most significant reasons for its absence are the need for highly-skilled people to program the robots, required to handle the laser, and the capital cost of equipment.

There are merits and drawbacks to all three hardening methods mentioned (i.e. flame, induction and laser) and all have areas where they are particularly strong. Laser hardening appears to have advantages where complex shapes and low-volume parts need to be hardened but, for the majority of parts that are currently being manufactured by British industry, I think that induction and flame hardening are still the logical choices.

Supply and demand

Roger Haw *of Flame Hardeners Ltd maintains that there are no UK contract laser hardeners because there is little requirement…*

Economics

It all comes down to the economics of business; we sell our expertise and experience by offering heat treatment services to the engineering industry. The prime motive in any business is to make money. If we are looking for diversification, we examine probable markets, look at the investment required and consider the likely return on the investment.

Demand?

The basic question is "what is the level of demand?" It is reasonable to assume that laser treatment is a process close to our existing primary activities of induction and flame hardening. Between January 2010 and July 2013, we have been asked twice if we undertake laser hardening; in the same period we have received 14,500 new enquiries for our other services.

Areas of opportunity

Surveying the available literature, I note that the laser process is ideal for:

- high throughput;
- consistency of treatment;
- treating difficult profiles and shapes (press tools etc);
- customised system solutions.

Considering these, three areas of opportunity become apparent:

High throughput implies highly-automated equipment with a minimum of flexibility involving high capital costs and low labour costs. A contract heat treatment provider would be looking for a reasonably secure long-term contract for this to be attractive. Companies requiring this rate of production are probably processing in-house.

Medium batch sizes imply flexible equipment with high capital cost and high labour cost (set-ups by a CNC technician?). Moulds and forming tools, as mentioned in the foregoing articles, will fit into this category. I also suspect that they could very easily fit into the next category; always noting that the smaller the batch the higher the piece price

Bespoke treatment on one-off or very small batches. Items fitting into this category are automotive press tools and large components requiring a minimum amount of surface hardening over a small area on a very large workpiece (say less than 5% of the total surface). This implies high capital and labour costs, with the added high-cost support facilities such as handling units and cranes.

The market for such objects is relatively small and they run at 35% capacity at the best of times. We have had components sent from Germany, Denmark, Norway, Finland and Sweden over the years, not because of lack of provision in those geographical areas. The total market does not support the existing capacity.

Summarising:

Mike Green's *TLU* editorial concludes: "There should be an excellent market for subcontract laser hardening and cladding in the UK". As in all things in life, there is a big difference between what should be and what actually exists.

Members of the CHTA are not fools. If there was sufficient market demand, one or more of us would be investigating how to satisfy the demand and make a turn on it. We are providers of services; the only way we can create demand is by inventing even better processes and then convincing the engineering industry of their benefits, I would get good odds on betting that most of us are looking at this one way or another. None of us is going to buy a bit of kit and then try to sell the process.

Flame and induction hardening techniques provide a proven service for surface hardening and a range of hardened depths from 0.2mm to over 30mm for suitable materials. Over the years, we have employed gas and combustion technologists, engineers and metallurgists to develop tools and closely-controlled defined heating patterns to access difficult areas or heat complex shapes with adequate rates of quenching. "Fast" local cooling is not always the best approach on some sections of material and can often lead to cracking.

Reading the literature available, the maximum total case depth that I can find mentioned for laser hardening is 2mm.

Flame and induction hardening, combined with modern methods of tool development, give accurate and repeatable processes. Most providers of flame and induction hardening services have a range of versatile equipment to give capacity to meet varying demands.

We have always held the opinion that there is strength in flexibility and have looked a few times towards the use of robots to process flame- and induction-hardened components, We have, to date, not found a robot, suitable for carrying a workhead transformer for induction hardening, which is also suitable to carry and manipulate a high-velocity gas burner for flame hardening. It may well be that, once we have overcome this problem, we will move on to buying a laser which could be mounted on the same equipment (if there was a sufficient market to justify this).

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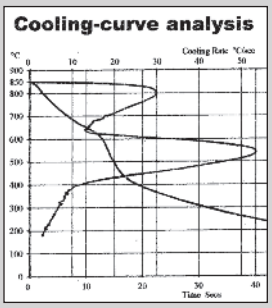

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ROUND SHANK TOOL COATING SERVICES FROM TECVAC

Following the signing of an exclusive licence agreement, Tecvac is now providing the complete line of CemeCon resilient coatings to UK tool manufacturers and users.

Tecvac is able to replicate CemeCon processes and is fully authorised to market these branded coatings and give users technical support with assured rapid turnaround. This follows on from an investment of £1.2million in their Cambridge coating plant by the parent company, the Wallwork Group.

Tecvac will use the high-capacity CemeCon 800/9XL magnetron sputtering system for coating round shank tooling and carbide inserts.

Ian Haggan, Tecvac business development manager, explained: "In aerospace and other areas of engineering, the cutting of carbon fibre composites or hardened alloys requires frequent tool changes to sustain quality standards. Highly-resilient CemeCon coatings ensure rotational tooling stays sharp for longer and runs cooler to reduce the frequency of tool changes. This improves productivity and return on investment. Importantly, the coatings also safeguard quality, even in the most arduous applications."

To follow the CemeCon process, Tecvac has installed an automatic wet process system for component preparation prior to coating. This is integrated with the high-capacity CemeCon *800/9 XL* magnetron sputtering system for coating of round shank tooling and carbide inserts. The process produces a super-smooth thin film, free from droplets and pinholes. This finish can be further enhanced by post-coat wet processing if required.

CemeCon coatings available from Tecvac include *TinALOX SN², Hyperlox, ALOX SN², CCAluspeed* and *HSN²*. In addition, the company provides *CemeCon's* complete line of *CarbonSpeed, FiberSpeed* and *MultiSpeed* pure diamond coatings.

With a dedicated in-house fleet of over 35 vehicles, covering every part of the UK, Tecvac guarantee a 48 to 72-hour turnaround service for UK tool manufacturers, tooling contractors and end-users.

Tecvac's Cambridge factory works with aerospace majors, engineering component suppliers and universities. The facility is Nadcap approved, operates under AS9001 quality assurance systems and has multiple company approvals. Processes are backed by on-site metallurgical laboratories, equal to those of leading universities, to provide coating characterisation, compliance verification and documentation.

Ian Haggan concluded: "We have a strong relationship with CemeCon who recognise that, as an independent coating specialist, with no links to tool producers, we bring both expertise and a quality of service that is not commercially compromised. We are confident that we can grow the tool-coating business in the UK and have the full commitment of our directors to expand capacity further as demand rises."

£1.6MILLION INVESTMENT FOR HOWCO IN SHEFFIELD

Howco Group plc, the leading distributor of raw materials and manufactured components for wellhead and down-hole safety valves and completion equipment to the international oil and gas industry, has invested over £3m in new equipment and machinery at three of its UK plants.

With £1.6m spent at its facility in Sheffield, Howco's capital expenditure increases the plant's overall capacity/capability and will help to secure future growth. It sees Sheffield invest in two purpose-built batch heat treatment furnaces along with a new CNC milling machine.

Explains Andrew Marwood, European operations director: "Our two new aerospace-standard heat treatment furnaces feature the latest technology in pulse-fired burner control. Each offers precise temperature control throughout the operating range and, along with a dedicated rapid charger for loading and unloading products, they exceed the demanding standards required by our clients.

"Both furnaces have access to the multiple quench media of water, polymer and oil, making the entire treatment process more cost-efficient and effective. They complement our existing range, of 30-ton and 10-ton-capacity furnaces, to form our centre of excellence for processing the high-integrity nickel and duplex parts used extensively throughout the global oil and gas industry."

Continues Andrew: "The demand for quality, precision and accuracy is the core ethos of our business – everything we do is designed to give our customers a competitive edge. This latest round of investment underlines our objective of delivering optimum cost and quality for our customers by facilitating quicker deliveries and tighter control on specification, resulting in improved performance."

Please alert your suppliers

The newly-added "Suppliers" page, at *www.chta.co.uk/suppliers/46/*, provides links from CHTA's website to the websites of those that supply heat treaters with equipment, consumables and services. Series advertisers in *Hotline* feature at no extra cost; other participants will be charged a modest annual fee.

Member staff who liaise with suppliers are asked to encourage them to be included on the page: please refer them to CHTA's Secretary.

For the best in subcontract heat treatment services, go to . . .

www.chta.co.uk

. . . your guide to sourcing from over 60 UK-wide heat treatment specialists

The Contract Heat Treatment Association

LOOKING FOR SPECIFIC HEAT TREATMENT CAPACITY?

Where a job is proving difficult to source, the "Ask the Members" page on CHTA's website allows the visitor to ask all CHTA members if they have appropriate capacity. Once submitted, such an enquiry is e-forwarded to members instantly; any able to help reply directly.

Vacuum & Atmosphere Services become Ipsen's UK agent

*VAS's **Mike Long** reports another major link-up for the new* Hotline *advertiser.*

West Bromwich-based Vacuum & Atmosphere Services Ltd (VAS), an established name in the heat treatment service industry, are pleased to announce the signing of an exclusive agency agreement, covering the UK and Ireland, with world-class furnace manufacturers Ipsen.

The agreement covers new equipment, spares and service. The new partnership is a major coup for VAS, who have vast experience of the Ipsen product and knowledge of the UK/Ireland heat treatment markets.

Ipsen's product range covers every aspect of the heat treatment furnace supply market, with manufacturing facilities in four continents. The partnership had an immediate impact with sales totalling £3.2 million for the UK market, both atmosphere and vacuum equipment.

VAS will also now have access to the full range of OEM spares for all Ipsen furnaces, at competitive prices and with quick delivery, either from the VAS or Ipsen International GmbH facilities. After Market Manager Mark Smith has streamlined the spares department, carrying high consumable stock including, sealings, catalyst, radiant tubes (ceramic and silicon carbide), thermocouples, oxygen probes, inner doors, mantle tubes, retorts, chains, fans and fan motors. Vacuum stock includes graphite board, molybdenum fixings, molybdenum elements, seals, O-rings, ceramics and graphite components.

Our service team, headed by Service Manager Nick Houghton, will offer support throughout the UK and Ireland, as well as supporting Ipsen worldwide when and where needed. Our eleven-strong service team, all qualified electrical or mechanical engineers, travel extensively supporting all different industries.

The new Ipsen partnership will not detract from VAS's continued support of all manufacturers' equipment, with spares, service and refurbishments, in the UK, Ireland and worldwide.

The Ipsen agency complements the VAS new furnace supply range. The long-standing partnership with pulsed plasma nitriding furnace manufacturers Plateg, Germany, is still in place. Plateg also offer plasma oxidation, *PulsPlasma* CVD coating, plasma fine cleaning, plasma activation, plasma polymerisation and plasma sterilisation.

The new venture JLS Furnaces UK, in partnership with JLS Redditch Ltd, offers new air-circulation furnaces and laboratory furnaces. All sizes and designs are manufactured, to the tried-and-tested original JLS designs as well as more modern designs, utilising energy-efficient linings, heating elements and energy-optimisation systems (only for use with two or more furnaces).

The VAS management team have been keen to offer a broad base of services, covering all areas of the heat treatment industry. In the last three years, VAS have purchased Aabco Ltd and acquired all the shares in Furnace Fabrications Ltd.

Aabco Ltd, the former ABA Handling Ltd, who have supplied furnace loading and conveyor systems for many major heat treatment subcontract companies, continue to offer new systems and support of the older installations.

Furnace Fabrications Ltd are suppliers of radiant tubes, mantle tubes, work baskets, retorts, muffles, jigs and fixtures etc, all manufactured at our West Bromwich facility. Furnace Fabrications carry a wide range of alloy stock to meet our customers' requirements, in a quick turnaround time when needed.

Vacuum & Atmosphere Services Ltd have enjoyed 13 years of growth, developing our business to ensure complete customer support and satisfaction. For further information please visit our website: *www.vacat.co.uk.*

Coming soon...

SURFACE ENGINEERING INDUSTRY CONFERENCE

CHTA members are encouraged to support SEA's *Surface Engineering Industry Conference, Exhibition & Dinner* scheduled for 18 October this year at the Marriott Forest of Arden Hotel, Meriden, Warwickshire.

The conference will encompass the following presentations:

- **Directors' Duties under Health and Safety Law / REACH and Environmental Law Update**. *Rob Elvin & Dave Gordon (Squire Sanders).*
- **Effective Use of IT for Our Industry.** *Su Chadda (Sumari Business Systems).*
- **HSE Biological Monitoring Update.** *Paul Smith (Health & Safety Executive).*
- **A Review of the Energy Markets and the Energy Procurement Options Available.** *Adam Baker (EIC).*
- **ISO 9001, 14001 and Your Business.** *Blake Neville (National Business Standards).*
- **Dealing with the Unthinkable; a Major Workplace Incident and HSE Prosecution.** *Richard Burslem (Wallwork Heat Treatment).*
- **Risk Management Protects Your Business.** *Natalie Albert & Steve Haines (Caunce Nano).*
- **Diamond Technology.** *Anssi Westerlund (Carbodeon Ltd Oy).*
- **Skills Gap and Training for the Future.** *Chris Kenward (CHTA) & SEA.*
- **E-Learning in Germany.** *Charlotte Schade & Herbert Käszmann (WOTech GbR).*
- **REACH Update.**

A range of different packages is available, from just the day sessions to the complete package also including the gala dinner, with keynote speaker, and overnight stay.

For full details and booking forms, contact SEA's Diana Blair (tel: 0121 237 1123; e-mail: *diana.blair@sea.org.uk;* website: *www.sea.org.uk).*

HEAT TREATMENT: THE LATEST TECHNIQUES

The National Metals Technology Centre (NAMTEC) has scheduled a half-day event, *Heat Treatment: the Latest Techniques*, for 23 October this year at the Nuclear AMRC in Rotherham. Attendance is free for CHTA members.

For details, go to: *www.namtec.co.uk/events-and-networking/heat-treatment-the-latest-techniques.*

Spread the word by proclaiming your CHTA membership

For use on company letterheads, literature, websites and advertisements, members can download CHTA's logo from the Members Area of the Association's website.

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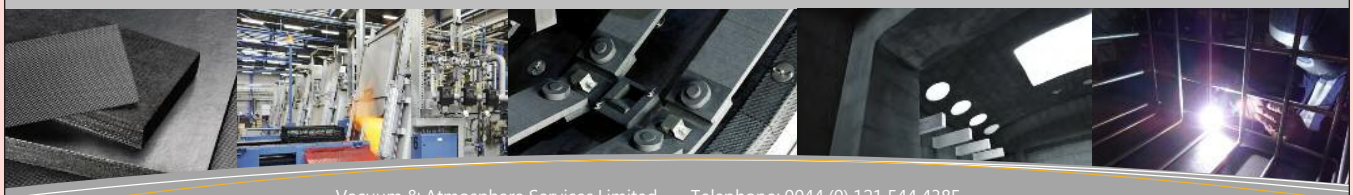
Furnace Fans
Graphites Ceramics
Furnace Sealings
Pump Spares
Various CFC Products
Radiant Tubes



Vacuum & Atmosphere Services Limited
Unit 13, Credenda Road,
West Bromwich
B70 7JE

Telephone: 0044 (0) 121 544 4385
Fax: 0044 (0) 121 544 3874
Email: Enquries@vacat.co.uk
Website: www.vacat.co.uk

UK & Ireland Agents for:

Ipsen International GmbH
Flutstr 78
D-47533
Kleve

Telephone: +49 (0)2821/804-0
Fax: +49 (0)2821/804-324
Email: info@ipsen.de
Website: www.ipsen.de

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TOP & BOTTOM LOADING FURNACES

JLS Furnaces UK, a subsidiary of the original JLS Redditch Ltd, offers industrial furnaces. The product range will include a new standard product line and all the existing JLS designs. Access to the original drawings will enable JLS Furnaces UK to offer in excess of 50 different designs in many different sizes.

West Midlands Manufacturing
Unit 13 Credenda Road
West Bromwich
West Midlands
B70 7JE

☏: 0121 552 2787
✉: Sales@jlsfurnacesuk.com
💻: www.jlsfurnacesuk.com

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FORTHCOMING EVENTS

Diary

October 9-11 2013
69TH HÄRTEREIKONGRESS
Wiesbaden, Germany
Heat treatment conference plus exhibition, with simultaneous German/English translation: *www.hk-awt.de*

October 15-17 2013
UNDERSTANDING HEAT TREATMENT
Birmingham, England
78th repeat of Wolfson Heat Treatment Centre's course. Details from Derek Close: tel: 0121 237 1122; e-mail: derek.close@sea.org.uk; www.sea.org.uk/whtc

October 16 2013
BIFCA course: FURNACE & BURNER CONTROLS
West Bromwich, England *www.bifca.org.uk*

October 17-18 2013
NATIONAL HEAT TREATMENT CONVENTION
Piacenza, Italy
Heat treatment conference/exhibition:
www.aimnet.it/allhtml/24tt/SCOPE.htm

October 18 2013
SURFACE ENGINEERING INDUSTRY CONFERENCE 2013
Meriden, England *See page 10*

October 23 2013
HEAT TREATMENT: THE LATEST TECHNIQUES
Rotherham, England
www.namtec.co.uk/events-and-networking/heat-treatment-the-latest-techniques

October 24 2013
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England

November 7 2013
CHTA MANAGEMENT COMMITTEE*
Birmingham, England

November 13-14 2013
BIFCA course: INDUSTRIAL FURNACE TECHNOLOGY
West Bromwich, England *www.bifca.org.uk*

November 14-15 2013
NITRIDING SYMPOSIUM 3
Las Vegas, NV, USA *www.nitriding.info/*

December 2-3 2013
INTRODUCTION TO PYROMETRY
Sheffield, England *www.equalearn.com/*

January 30 2014
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England

February 11 2014
BIFCA course:
INTRODUCTION TO INDUCTION HARDENING
West Bromwich, England *www.bifca.org.uk*

February 13 2014
CHTA MANAGEMENT COMMITTEE*
Birmingham, England

March 11 2014
BIFCA course: BURNER TECHNOLOGY
West Bromwich, England *www.bifca.org.uk*

April 24 2014
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England

May 8 2014
CHTA MANAGEMENT COMMITTEE/ AGM*
Birmingham, England

May 12-15 2014
21ST IFHTSE CONGRESS / EUROPEAN CONFERENCE ON HEAT TREATMENT & SURFACE ENGINEERING
Munich, Germany
www.awt-online.org/awt_seminare_und_veranstaltungen/muenchen_2014.html

Members wishing issues to be raised at CHTA meetings should notify CHTA's Secretary, well beforehand, at mail@chta.co.uk

Market Movements

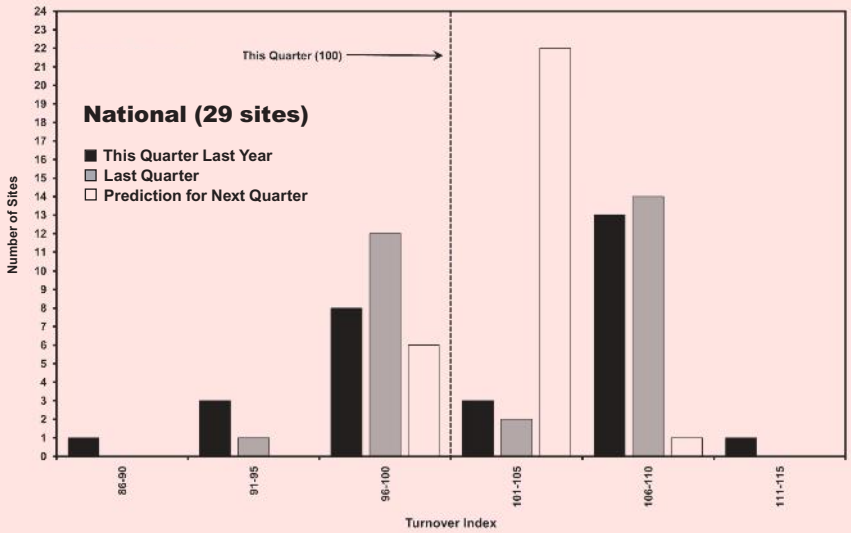
ANALYSIS OF QUESTIONNAIRE REPLIES RELATING TO 29 CHTA MEMBER SITES

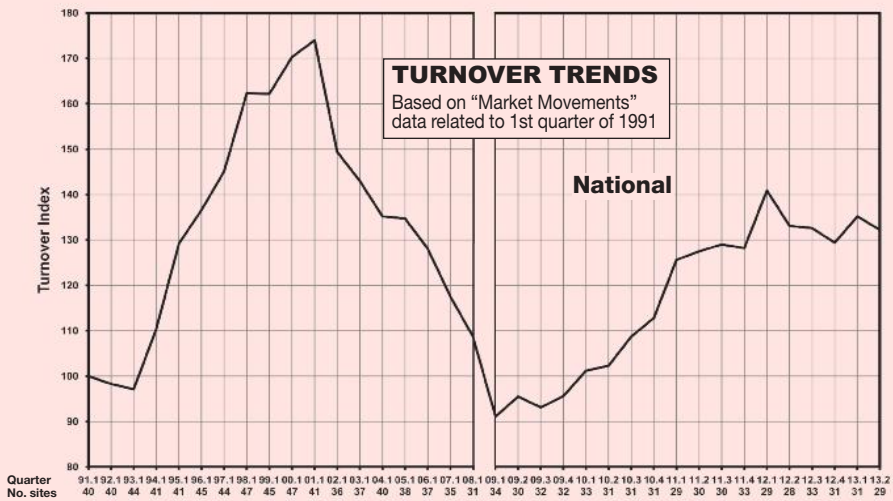
"THIS QUARTER" =

1 APRIL – 30 JUNE 2013

= TURNOVER INDEX 100

OVERALL ANALYSIS (29 SITES)	Mean index
This quarter last year	**101.6**
Last quarter	**102.3**
Predicted next quarter	**102.8**





STATESIDE STATS

NORTH AMERICAN HALF-YEAR SALES DOWN 6.6%

CHTA counterparts participating in the Metal Treating Institute's Monthly Sales Statistics Program reported year-to-date heat-treating sales to June 2013 of $459.1million, a drop of 6.6% from the $491.6million recorded for the January-June period of 2012. June billings amounted to $75.2million, a decrease of 6.7% compared with June 2012's $80.6million.

The latest returns indicate July sales of $72.5million, falling 2.2% from July last year when billings reached $74.1million.

NICKEL PRICE (US$/lb)

Please send comment and news items for December's *Hotline* 134 to: *mail@chta.co.uk*
Deadline: November 20th