The Contract Heat Treatment Association Newsletter

HOTLINE

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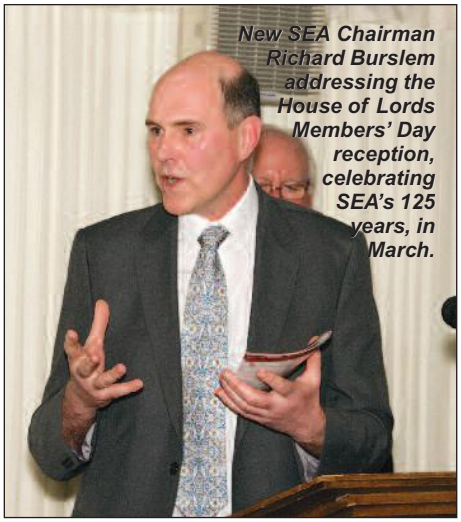
CHTA is affiliated to the Surface Engineering Association

CHTA Vice-Chairman becomes SEA Chairman

*At its BGM on March 16th, the Surface Engineering Association elected **Richard Burslem** (Wallwork Heat Treatment Ltd) as its new Chairman. Also Senior Vice-Chairman of CHTA, Richard comments…*



New SEA Chairman Richard Burslem addressing the House of Lords Members' Day reception, celebrating SEA's 125 years, in March.

CHTA has been a member organisation of SEA for more than ten years and, over this period, has enjoyed the benefits that the larger organisation can bring.

The relationship with SEA has always been cordial thanks to two major factors: the foresight of previous CHTA Chairmen Ian Brown, Terry Littlewood and David Wilkins in fashioning the affiliation in such a way that CHTA keeps a good deal of independence, whilst participating fully in SEA; and secondly, the drive, professionalism and warmth that SEA Chief Executive David Elliott and his team constantly exhibit and demonstrate to CHTA.

CHTA has a right to at least two seats on the SEA National Committee of some 18 people; these are filled by the current CHTA Chairman and Secretary. We have also had an elected member on the committee for several years in the person of Paul Handley, whom I have now joined as a second elected member.

SEA is an organisation that draws members from a wide variety of businesses within the broad spectrum of surface engineering. As a consequence, committee meetings can sometimes address problems that only affect a small number of members. It is usual for a topic to generate lively discussion and, often, members who are not directly affected can offer the 'birds-eye' view, as they are somewhat removed from the problem.

On the other hand, there are issues that affect all members, such as industrial legislation, training and Government policy. It is here that the strength of SEA, from its combined membership, really comes into play.

SEA provides very effective representation and advocacy services for its members. Without SEA intervention, it is most unlikely that CHTA members would have been able to achieve their climate change agreements.

Whilst CHTA Chairman, I was flattered and surprised to be elected to the position of SEA Vice-Chairman, two years ago, and am now honoured to take up the Chairmanship, particularly in this 125th anniversary year.

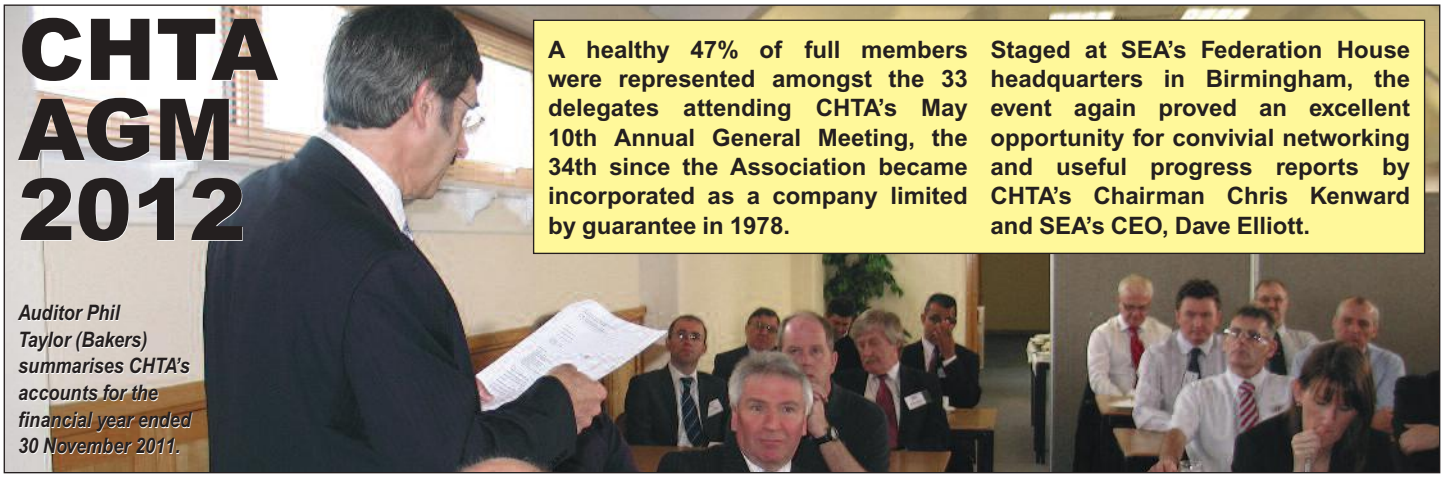
SEA exists to serve its members. One of my tasks is to establish what SEA members want from their trade association (not an easy mission, bearing in mind their diversity) and then try to provide it. I am aided by an excellent and hard-working committee, an outstanding organisation and, of course, the patronage of Lord Hoyle.

Those of you who have visited SEA headquarters in Federation House will have seen the board on the wall listing the previous SEA Chairmen. It is my intention that my name earns its place on that board and is not just recorded there.

CHTA AGM 2012

A healthy 47% of full members were represented amongst the 33 delegates attending CHTA's May 10th Annual General Meeting, the 34th since the Association became incorporated as a company limited by guarantee in 1978.

Staged at SEA's Federation House headquarters in Birmingham, the event again proved an excellent opportunity for convivial networking and useful progress reports by CHTA's Chairman Chris Kenward and SEA's CEO, Dave Elliott.



Auditor Phil Taylor (Bakers) summarises CHTA's accounts for the financial year ended 30 November 2011.

L. to r: speakers Paul Bartlett, Rolls-Royce's Global Purchasing Programme Manager, CHTA Chairman Chris Kenward and SEA's Dave Elliott.

Phil Brothers and Shaun Rowlands of Heat Treatments (Northampton) with Alan McLauchlan for Techniques Surfaces (UK).

Darren Marsh (Special Steels), Geoff Windas and Nigel Dyson (both Meltham Thermal Engineers) and Special Steels' Matthew Brand.

Paul Bartlett flanked by Alpha-Rowen's Mike Leach (left) and Frank Butler of Alloy Heat Treatment.

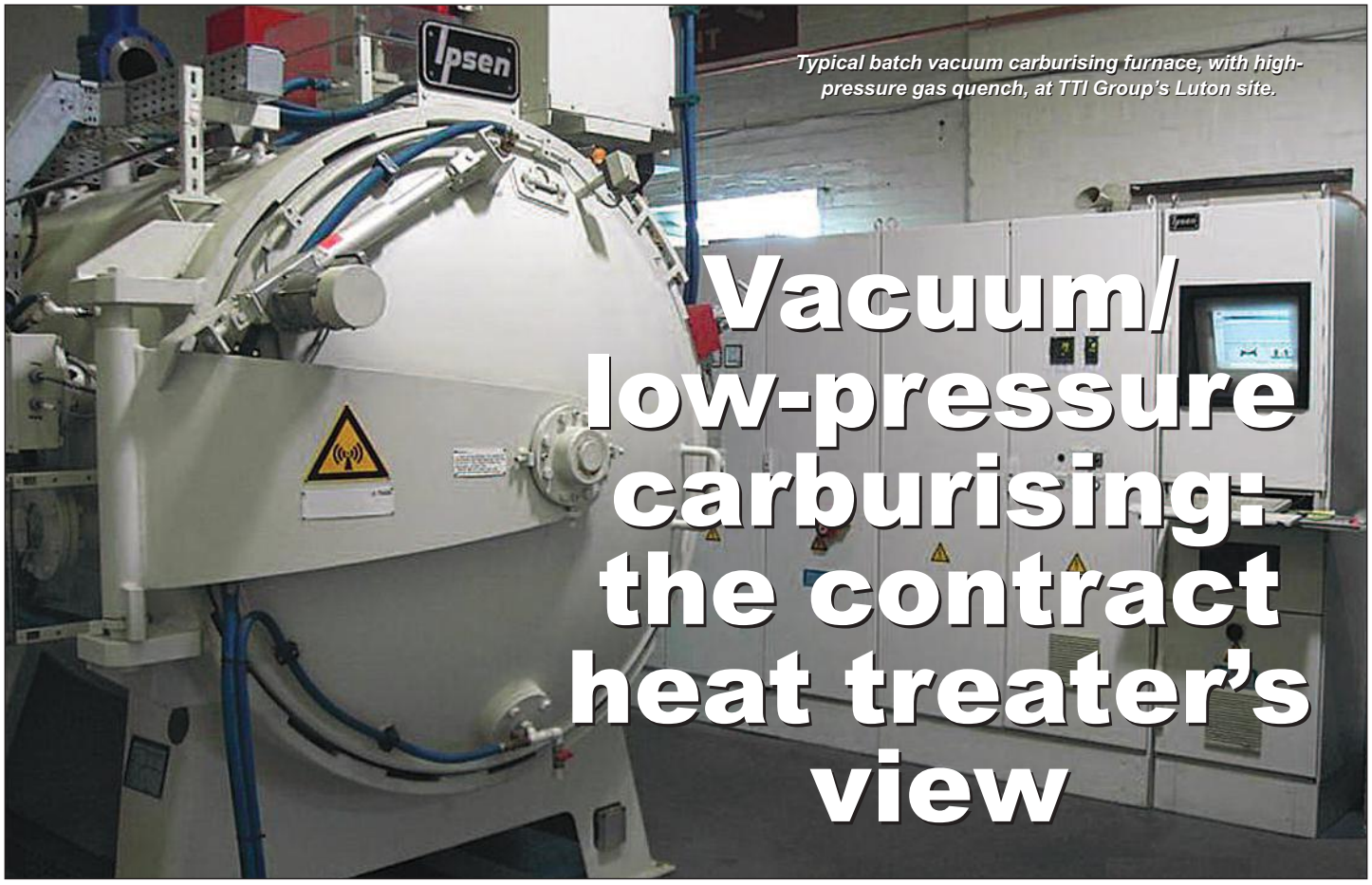
Rob Kirk (Beta Heat Treatment) and Steve Plumb (Nitrotec Services / TTI Group) with ADI Treatments' Paul Ingram and Simon Day.

Kevin Langston (Tamworth Heat Treatment), Deryk Law and Peter Cox (both Beta Heat Treatment) and Tamworth's Kevin Bannister.

Guest Paul Bartlett speaking on "Modern Manufacturing and Collaboration".

Andy Corless (Bodycote Heat Treatments), guest Brian Birch, Chris Kenward (AjaxTOCCO International) and Bodycote's Simon Blantern (CHTA Junior V-C).

Paul Handley (Heat Treatment 2000), Simeon Collins (Wallwork Heat Treatment), Keith Laing (TTI Group) and Wallwork's Richard Burslem (CHTA Senior V-C).



Typical batch vacuum carburising furnace, with high-pressure gas quench, at TTI Group's Luton site.

Vacuum/ low-pressure carburising: the contract heat treater's view

Global reports suggest that the adoption of the vacuum/low-pressure carburising process is proliferating world-wide. **Hotline** ***asked CHTA members operating the process for their views on this relatively-new technology…***

Vacuum carburising – the way forward?

In reviewing the process and its benefits, TTI Group's ***Keith Laing*** *identifies factors currently restricting its uptake on a subcontract basis.*

The process of hardening metal has evolved from being inconsistent and unreliable to being consistent, reliable and 'clean'. For modern products, the engineering design specification requires much greater precision of material, commonly demanding less material (thickness and cut-out), greater external and internal hardness plus other design factors which often require very low final size tolerances. Couple with this the sensitive price pressures, which exert the necessity for the lowest overall component manufacturing cost, and you really do have to match material and process very carefully.

Vacuum carburising (also known as low-pressure carburising) has proven itself to be a very reliable, clean, environmentally-friendly process, with many advantages over conventional carburising. The process has been established for well over a decade and there are many large in-house systems (supplied by furnace manufacturers such as ECM, ALD, Seco/Warwick and Ipsen) installed directly onto the shop floor within the larger gear-manufacturing corporations, for example.

Contrary to this in-house expansion of vacuum carburising, commercial heat treatment is not currently seeing the same growth in demand.

There may be many reasons for the slow uptake, the most common being perhaps that, in many instances, vacuum carburising should not be simply looked at as a direct modern replacement for conventional gas carburising. Vacuum carburising quite rightly carries a premium price, which sometimes can make the process unattractive initially; however, it will often result in an overall reduction in costs as well as a better product.

The correct choice of steel, component design and manufacturing route all need to be carefully considered before one can make the jump from gas to vacuum carburising. Changing from an oil-quench situation, in gas carburising, to high-pressure gas quenching in a vacuum carburising process can be a step too far in some applications.

To get the best productivity from vacuum carburising, an easily-expandable system with multiple vacuum chambers connected together would ideally be used. Such multi-cell vacuum carburising installations can reduce overall treatment time as well as facilitating the choice of high-pressure gas quenching or oil quenching. These fit well into the requirements of large end-users who require repeatable homogeneous production, on high-volume components, with minimal scrap. Due to the high volume of parts treated, they are also affordable. In-house heat treatment operations often have more influence on design of products they manufacture; they deal directly with the end-customer and therefore the design authority.

Process overview

As the name implies, vacuum carburising involves supplying a source of carbon, commonly from acetylene (C_2H_2) or

propane (C_3H_8), into a vacuum furnace in short pulses, usually referred to as boost/diffuse cycles. Quenching is carried out under high-pressure gas such as nitrogen, although some systems also use an integral oil quench. In situations where the steel cross-section is large, or the steel has low hardenability, the only way to achieve the desired properties is to oil quench.

Benefits of vacuum carburising

The advantages offered by the process include:

- dramatically-improved cleanliness;
- no surface/intergranular oxidation;
- significantly-reduced level of distortion;
- greater carburising uniformity: e.g. improved penetration into holes;
- faster turnaround;
- excellent process repeatability.

The ability to operate large carburising installations, which are clean, reliable, faster, more energy-efficient and easy to use, within a manufacturing plant is an attractive step forward, and one that many large manufacturers have embraced to date worldwide.

The improved case-depth uniformity, deeper high hardness and zero inter-granular oxidation (IGO) are all key factors making vacuum carburising superior to conventional gas carburising. One product which has benefited particularly from these enhancements is the injector nozzle; in this case, the control software allows treatment parameters such as pressure to change during the process and promotes excellent penetration inside the nozzle.

Quenching after carburising is obviously a key part of the process. Compared with conventional oil quenching, high-pressure gas quenching is a significantly more controlled process. Directional quenching (together with a good loading pattern) in the furnace and step quenching (rapidly cooling to a temperature, holding the load to equalise for a period of time and then cooling again) are features of gas quenching which will minimise component distortion.

Commercial uptake

Vacuum carburising offers significant advantages over conventional carburising but should not be considered as a simple swop. In order to get the best out of vacuum carburising, the treatment should be looked at as one part of the overall manufacturing route.

Customers have found that, by combining careful material selection with an optimised manufacturing route, vacuum carburising can be substantially beneficial. Lower total cost of component production is likely; smaller quantities of metal can be used; fewer engineering operations are often required; production hours can reduce; time to deliver is normally brought forward; the final product often has a higher degree of uniformity of hardness through the case profile; and, commonly, the final component can virtually be used straight from furnace.

Steel selection and component design are two very important aspects. Traditional materials such as 8620 (difficult to fully through-harden thicker sections by vacuum carburising with gas quench) may be replaced by newly-developed steel grades more suited to vacuum carburising.

The more technically-demanding markets, such as motorsport, aerospace and precision engineering, are pursuing the benefits which vacuum carburising can offer. As developments transfer from these markets, more components are expected to be treated in this way, rather than by conventional carburising. Contract heat treatment will follow the trend already seen in those large end-users with in-house treatment.

Reconsideration of manufacturing route required

*Wallwork's **Richard Burslem** concurs that customers for vacuum/ low-pressure carburising need to take steel-selection issues on board.*

Then: steel change evolved

In the early 1980s, Wallwork Heat Treatment Ltd installed our first small vacuum furnace to meet customer demand. We thought that, metallurgically and for efficiency, a salt-bath line was much better: you could water quench, oil quench, austemper, martemper and, over-night, run through all the tool-steel hardening temperatures, starting with W1 material at 780°C up to H13 at 1020°C, and drop down for annealing. More to the point, all this work could be completed for the morning lorry.

Comparing the limited quench rates available, suitable materials for treatment and the possibility of completing one or maybe two loads overnight, vacuum seemed a poor choice. However, if the customer wanted vacuum heat treatment, then the customer could now have vacuum heat treatment.

What we noticed, over a year or so, was a steady drift away from D3 material, which could not then be hardened in vacuum, to D2 which could; it was the clean finish that customers liked. The customer had driven our process to vacuum and the process had then driven the material choice.

Now: customer-driven steel change necessary

Fast-forward to 2000, when we needed to buy another new large vacuum furnace because of capacity limitations. We decided to add on the module for low-pressure carburising (LPC) or vacuum carburising as it is sometimes called.

From a metallurgical and production point of view, this made perfect sense compared with gas carburising: case composition can be accurately controlled, there is no intergranular oxidation, distortion is minimised. More importantly, results are predictable, load after load, and process time is greatly reduced because of the higher operating temperatures. The ability to carburise down deep holes, and for the case to accurately follow a surface contour, is also better with LPC than with traditional gas carburising.

The problem with the process, which we were fully aware of, was that good core and case hardness could not be developed in low-alloy material, such as AISI 8620 or even En36, and mild steels would not case-harden at all.

We reasoned that the way to develop the market would be to engage some major manufacturers by promoting the benefits of the process, acknowledging that they would have to change their material to a deep-hardening option such as En39 or one of the new excellent materials designed specifically for LPC. These customers would provide the base load required to run the process economically. Then we would repeat the education exercise with the smaller jobbing customers, whose work could then be added to the base load.

Whilst we received a great deal of interest in LPC from our customers, the required change of material seemed to be a real stumbling block and few were willing to commit to trials. As time went on, the furnace filled with traditional (non-carburising) work and we became less enthusiastic about promoting the benefits of LPC. It is an excellent process but I think there is insufficient customer demand in the UK to make it widely commercially viable.

Where LPC should come into its own is with a new product, where the process is integral with material choice, machining methods and heat treatment route, rather than trying to retrofit it to an existing manufacturing method.

It seems to me that the heat treater is unable to drive the process to bring about the change of material choice; it has to be the customer.

LPC processing in the UK: the story so far...

Bodycote's ***Simon Blantern*** *considers if LPC is a success or failure in subcontract heat treatment.*

Shortly after the turn of the millennium, LPC (low-pressure carburising) arrived in the UK subcontract heat treatment industry as the technology that would replace conventional gas carburising in a sealed-quench unit.

The UK's three largest subcontractors all invested in LPC capacity with similarly-designed single-chamber furnaces from two different furnace manufacturers.

The main benefits of the process over conventional carburising seemed to be significant: gears, injectors and valves were cleaner after processing than they were on entry; components had better dimensional stability; no intergranular oxidation; better gas penetration on very-small-bore components, particularly injectors; and a more environmentally-friendly process. In short, a long list of benefits which, we all believed, could be sold to the UK manufacturing industry and would enable subcontract heat treatment to secure higher niche prices.

UK LPC market

So why, in 2012, do we find ourselves with a relatively small specialised LPC market within the UK, mainly supporting the automotive industry on small parts?

It is my belief that, to realise the benefits of LPC, you need to be involved with new gear and injector development at the design stage. This allows design engineers to select the appropriate material (which is, incidentally, usually more expensive than standard carburising steels) so that core properties can be achieved using a 15-20bar gas quench, and the manufacturer can finish the parts to a very tight tolerance prior to heat treatment.

As with nitriding, in some instances only a lapping or light grinding operation is needed on parts following LPC. Whilst this is advantageous to the manufacturer, it is not to the heat treater. This is primarily because, unlike conventional gas carburising, which more often than not allows you the chance to reprocess if you do not meet the metallurgical requirements or have a furnace failure, it renders the LPC process a one-shot operation. On conventional gas-carburised parts, manufacturers typically leave a greater machining allowance.

This exposes the subcontractor to significant financial liability if a load fails. As we know, on average the heat treatment cost as a proportion of the value of parts can range from 1.5% to 2.5%. Yet injector loads, for example, can contain 4000 to 5000 parts at any one time; this can result in a significant liability claim from the manufacturer upon failure if limited liability is not secured during negotiation of terms and conditions. This is difficult to achieve in our industry, particularly with automotive suppliers.

Another possible reason why LPC has not been the success story we all believed it would be is the improvement in more cost-effective advanced grinding techniques. These can remove any grinding allowance post-carburising from gears very efficiently, which in turn negates one of the biggest advantages of LPC.

Overseas experience

In other geographies, LPC has been a greater success. In parts of Europe, for example, where the differential in the size of the automotive market can vary significantly, much of the unit capacity is multi-chamber, rather than single-chamber. More often than not, these are integral with the manufacturing line and CNC manufacturing machines, giving a very clean operation, unlike conventional batch sealed-quench furnaces.

There are a number of these multi-chamber units available in overseas sub-contract heat treatment. They have distinct advantages over single-chamber units; one being that they can process a larger range of materials due to their better cooling rates (they have a separate cooling chamber, therefore avoiding cooling the entire furnace hot zone); and secondly, they reduce the time in the heating and carburising chamber.

The majority of the LPC market is automotive-related, with the exception of France which has a greater number of vacuum oil-quench furnaces servicing the aerospace industry and processing aerospace bearings and gearbox components.

Success or failure?

So, is the LPC process a success or failure in the UK?

Well, probably not so much a failure but more an opportunity of which full advantage has not been taken. The process can deliver excellent benefits to manufacturers and to the heat treatment industry. However, closer co-operation is needed on both sides, at the development stage, before the introduction of LPC to the UK can be considered a true success.

Apprenticeship an option to degree, says Keighley Labs

Enjoying an excellent start to 2012 and scheduled to begin work on a new factory extension this summer, Keighley Laboratories is keen to recruit and train its next generation of skilled heat treatment technicians and metallurgists to pave the way for further growth.

THE APPRENTICESHIP ROUTE

With many of its qualified staff approaching retirement age over the next decade, succession planning is now a priority for identifying and developing personnel with the potential to fill future leadership positions. Two of Keighley's bright young prospects are enrolled on the new BTEC Diploma in Manufacturing Engineering at Bradford College, while the company is currently training a cohort of three apprentices and maintains an in-house programme of skills training and career development.

But Debbie Mellor, MD of Keighley Labs and one of relatively few female chief executives in the engineering industry, is concerned that today's young men and women, and their families, believe that university is the only career path open to them. Yet vocational training, like an engineering apprenticeship, still leads to a qualification, involves hands-on learning that suits many people better and results in a real job, with established career prospects.

"According to a recent report, an estimated 55% of this year's university graduates will fail to land a job that requires a degree, becoming either under-employed or unemployed. So, with increased course fees and students running up debts of up to £27,000, many young people will now be wondering whether it's worthwhile going to university," says Debbie. "Whereas, with an apprenticeship or a BTEC diploma course, you learn while you earn and have the opportunity to study for a foundation degree or higher qualification, as your career progresses.

Keighley Labs MD Debbie Mellor is a member of CHTA's Management Committee.

"Apprenticeship is also an area of education and training that has not been affected by budget cuts, with the Government pledging to create 75,000 new places over the next three years. Skills Minister John Hayes is even considering the option of being able to study apprenticeships at university, to improve the status of vocational training," she adds.

Bradford course

Debbie is an enthusiastic supporter of the new BTEC Level 3 Diploma in Manufacturing Engineering, being delivered by the largest provider of higher education outside the university sector, Bradford College.

Redesigned in collaboration with members of the Contract Heat Treatment Association and revised to fit the new Qualifications & Credit Framework, which cumulatively awards credits for individual learning units, the course now encompasses modules relevant to metallurgy and heat treatment, including the structure and properties of metals, mechanical and thermal treatment, and metallurgical techniques.

Keighley Labs has enrolled one trainee from induction hardening and another from its inspection department on the two-year programme, in the pilot intake of a dozen sponsored students, and expects to fund another two people each year.

PROMOTING VOCATIONAL TRAINING

Although some of the thermal heat treatment processes are still physically demanding, Keighley Laboratories' work involves a growing number of high-technology roles that would appeal to today's computer generation. These include the application of spectroscopy to the analysis of metal components, the use of metallographic microscopes for examining the microstructure of specimens, the programming of PLC-controlled furnace processing routines, the skilled operation of non-destructive testing and inspection instruments and, when the new factory building comes on stream, the introduction of 'cleaner' heat treatment processes.

A recent study found that 56% of teachers said their knowledge of apprenticeships is poor. Debbie Mellor is worried that schools are pushing their students toward university education because they are not aware of vocational training opportunities.

She is also dismayed by the Government's recent decision to downgrade the Diploma in Engineering from its current value of five GCSEs to just one, undermining industry efforts to create a new generation of apprentices and technicians. She joins leading industry names in calling for more effort to be put into developing appropriate technical training and promoting the engineering profession more effectively.

When its new production facility is up and running and the company can present a more modern face to young visitors, Keighley Labs plans to continue arranging familiarisation trips for schools across the region, aiming particularly at 13-14 year olds who have yet to commit fully to university. In this way, it hopes to put forward the learning and career prospects of apprenticeships to undecided youngsters.

"Work-based training is a viable option for young people to consider," says Debbie. "Getting into employment earlier, not running up student debts and earning proper money, means young apprentices definitely have an edge. They also have an opportunity to go on and gain a diploma or degree, at the expense of the employer.

"Since we work with advanced industries like aerospace, automotive, energy, defence and petrochemicals, Keighley Labs and the heat treatment sector generally need the skilled technicians, metallurgists and managers of tomorrow and can offer properly-defined career paths," she concludes.

"Nowadays, apprenticeships are not about training people to do a single job for life; they are about unlocking their full personal potential. After all, I started as an office junior and progressed to become Managing Director."

Holt Brothers (Halifax) Ltd

Managing Director ***Peter Fletcher*** *traces the development of one of CHTA's oldest members.*

Holt Bros recently celebrated its 150th anniversary, the company having started in 1860 as engineers and blacksmiths supplying the local textile-machinery manufacturers.

The modern company was created by the engineer Herbert Buckley, before the Second World War, when he saw the demand for wear-resistant components from local machine-tool manufacturers for application in their higher-performance machines. Demand for these services grew throughout the 39-45 war.

Herbert Buckley worked with and was then succeeded by his daughter Brenda, a highly-regarded professional metallurgist in her own right and a woman years ahead of her time. MD of a thriving business in a very male-orientated world, Brenda remained in control from 1981 to her retirement in 1992.

Thereafter, the business passed to the then technical director Vladimir Murawa who installed the first commercial ceramic coating plant in the UK, took the company into vacuum heat treatment while continuing to expand capacity, and remains a stalwart of the UK heat treatment community.

In late 2010, a new chapter in the history and development of Holt Bros opened when it was bought by another Halifax company, KT Hydraulics. The company continues to be managed independently, with me joining as MD in 2011 and Vladimir continuing his wholehearted commitment to the company and its customers.

Peter Fletcher (left) and Vladimir Murawa at CHTA's recent AGM

Holt Brothers has always been a technically-driven company, whether pioneering quality standards through joining British Standards in 1939 (40 years before BS 5750 saw the light of day) to today, developing bespoke specifications and treatments in conjunction with our customers.

The company aims to offer our customers the best possible complete heat treatment service; from advising on material specification, assisting in process design and performing the optimum combination of treatments, to deliver the required performance in the finished product. In order to achieve this, Holts are able to provide a powerful combination of knowledge, experience and versatile plant capacity.

Holt's core values remain the same for all components entrusted to us, whether prototypes or production:

- to perform that service in the most economical and efficient manner to the highest standard;
- to deliver a genuine, economical total cost of acquisition to our customers through "Care, Control and Right-first-time principles".

These principles have made Holt's the first choice for ultra-low-distortion work, dimensionally-awkward shapes, precision treatment of, not only, very large components but also bespoke treatments and prototyping.

Holt's technical abilities are supported with rigorous quality standards that originate with Herbert Buckley and The British Engineering Standards Association (the precursor of BSI) in the 1930s. Naturally Holt's have continued membership of BSI but also progressed to meet the modern demands of Nadcap accreditation across a range of processes including: vacuum heat treatments; carburising; carbonitriding; heat treating carbon steels; heat treating and precipitation hardening of stainless steels.

Holts have steadily reinvested in increased capabilities and, in addition to the largest pit carburising furnace operating in the contract heat treatment industry, have comprehensive vertical heat treatment facilities for long components. With these, the company offers an integrated stress-relieving and straightening service for steel and superalloy bar and finished shafts.

Some of Holt's work goes into machinery destined for extreme environments (mining, offshore, aerospace, power) where in-service failure is not an option when downtime is measured in £100000s per hour. In these environments, customers trust the company to deliver absolute quality every time. In addition, Holts have long been entrusted to take over and deliver results when customers' in-house capacities fall short, either because of size or the complexity of the task in hand.

To help sustain service levels to all our industry's customers, Holts joined with other heat treaters across the M62 corridor and had a course for metallurgical technicians redeveloped and reinstated at Bradford College for 2011 and 2012. We are again sponsoring the course for 2012-13 to ensure continuation of the highest technical standards.

NEWS

Member news

WALLWORK INVESTS £500K AND EXTENDS AEROSPACE APPROVALS

An investment of over £500,000 in a new vacuum furnace has increased Wallwork Heat Treatment's capacity significantly.

Reflecting the growing demand from manufacturers of high-performance components, the new furnace enables the company to heat treat a wider range, including single items of up to 1.5m in length and 1.5 tonnes in weight, as well as bulk batch processing of smaller components.

Wallwork's new £500K vacuum furnace.

Manufactured by Seco/Warwick, the new furnace can achieve temperatures of up to 1250ºC to AMS 2750. With computerised control, temperatures will be held to within ±5ºC for the precise duration necessary in the component treatment specification.

In addition to premium aerospace components, vacuum heat treatment has many applications, improving component performance and working life in general engineering, nuclear, automotive, marine, tool-making and other industries.

Wallwork holds numerous current approvals from prime aerospace manufacturers and operates under an ISO 9000 quality

assurance system and Nadcap standards. The company has also announced recent additions to its approval portfolio with new accreditations from helicopter manufacturer Augusta Westland and Goodrich Actuation Systems, a supplier of systems and components to all branches of aviation. The new endorsements sit alongside existing approvals from Airbus, APPH, BAe, Bombardier and Rolls-Royce.

The new process certifications are for the case hardening to vacuum heat treatment of aerospace and engineering components. All aspects of the Wallwork service were audited to ensure compliance with the highest standards of product preparation, treatment and quality assurance. Many of the items the company process are safety-critical elements, of the engine, landing gear, actuators or airframe, that work under stress or harsh conditions and where certified performance is essential.

Wallwork operate from three UK sites, in Manchester, Birmingham and Cambridge, making them well placed to service aerospace manufacturers anywhere in the country.

"We are investing continuously in plant and skilling-up our workforce to meet the growing demands of UK aerospace and engineering companies. It is encouraging to win new approvals and to be able to extend our services to new clients and markets," commented sales director Simeon Collins.

KEIGHLEY LABS INVESTS IN AUTOMATIC HARDNESS TESTING

Maintaining its policy of continuous investment in technology and facilities, Keighley Laboratories has added a Zwick/Roell ZHV-10 automatic micro and macro hardness tester to its test-house resources.

Featuring fully-automatic Vickers indentation measurement and dedicated hardness-testing software, the new equipment will bring about measurable improvements in accuracy, repeatability and productivity, to the benefit of the company's heat treatment division and clients of its technical services department. Used for the precise measurement of surface hardness and case depth, it will introduce considerable time savings over previously manual routines, freeing up highly-skilled operators for other analytical duties.

The new equipment was supplied by Indentec of Stourbridge, part of Zwick/Roell AG and a worldwide centre of excellence for hardness-testing machines,

Keighley's new hardness tester.

which has a business relationship with Keighley Labs that dates back many years. A UKAS-accredited calibration laboratory, Indentec has been contracted additionally to service and recalibrate this and other hardness-testing equipment on a long-term basis. The work will be carried out at the West Yorkshire site by trained UK-based engineers to ISO 6508-2 and ASTM E384 standards.

FORTHCOMING EVENTS

Diary

July 4-5 2012
HEAT TREATMENT FOR HEAT TREATMENT PROFESSIONALS
West Bromwich, England *www.namtec.co.uk*

July 9-13 2012
FARNBOROUGH INTERNATIONAL AIRSHOW
Farnborough, England *www.farnborough.com*

July 19 2012
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England

July 26 2012
CHTA MANAGEMENT COMMITTEE*
Birmingham, England

August 22-24 2012
THE 9TH CHINA (BEIJING) INTERNATIONAL HEAT TREATMENT / INDUSTRIAL FURNACE EXPO 2012
Beijing, China *www.htifexpo.com/en/*

September 4 2012
INTRODUCTION TO HEAT TREATMENT
Rotherham, England *www.namtec.co.uk*

September10-13 2012
6TH INTERNATIONAL QUENCHING AND CONTROL OF DISTORTION CONFERENCE / 4TH INTERNATIONAL DISTORTION ENGINEERING CONFERENCE
Chicago, Illinois, USA
www.asminternational.org/content/Events/qcd/

September 25 2012
BIFCA Technical Series:
BURNER TECHNOLOGY
West Bromwich, England *www.bifca.org.uk*

October 2-3 2012
FURNACES NORTH AMERICA 2012
Nashville, TN, USA
The Metal Treating Institute's conference and exposition: *www.furnacesnorthamerica.com*

October 9-11 2012
UNDERSTANDING HEAT TREATMENT
Birmingham, England
77th 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 9-11 2012
ALUMINIUM 2012
Düsseldorf, Germany *www.aluminium-messe.com*

October 10-12 2012
68TH HÄRTEREI-KOLLOQUIUM
Wiesbaden, Germany
German-language heat treatment conference and exhibition: *www.awt-online.org*

October 18 2012
BIFCA Technical Series:
FURNACE AND BURNER CONTROLS
West Bromwich, England *www.bifca.org.uk*

October 19 2012
SEA AWARDS
London, England *www.sea.org.uk*

October 23-24 2012
HEAT TREATMENT FOR PROFESSIONALS
Rotherham, England *www.namtec.co.uk*

October 23-25 2012
20TH IFHTSE CONGRESS
Beijing, China *www.20ifhtse.org/dct/page/1*

October 25 2012
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England
November 8 2012

November 8 2012
CHTA MANAGEMENT COMMITTEE*
Birmingham, England

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

Market Movements

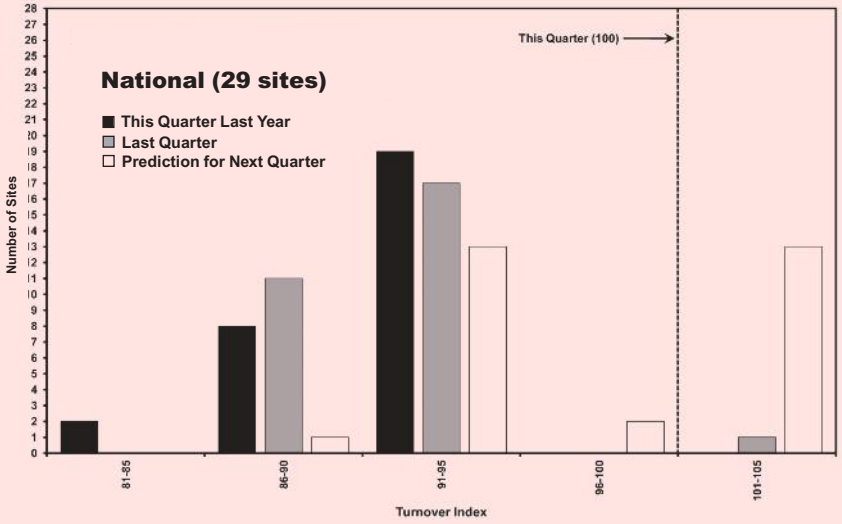
ANALYSIS OF QUESTIONNAIRE REPLIES RELATING TO 29 CHTA MEMBER SITES

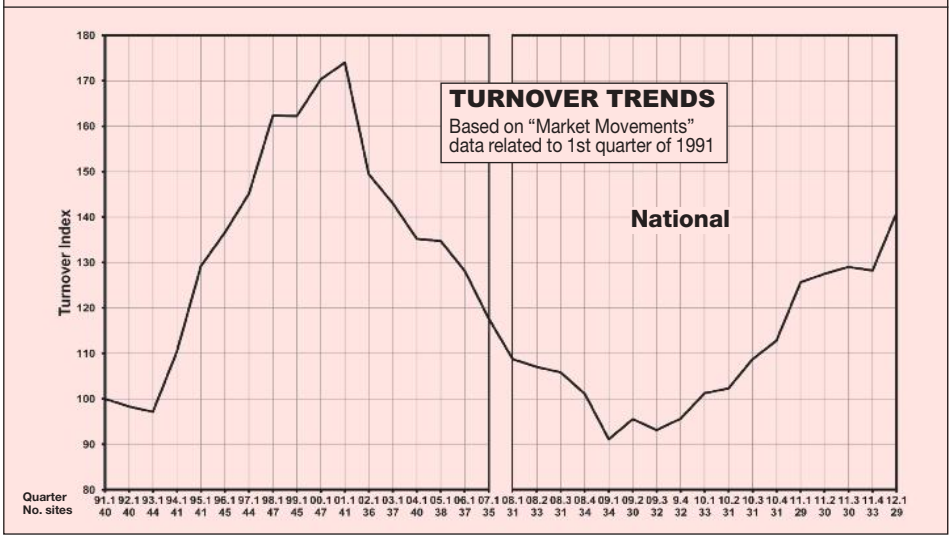
"THIS QUARTER" =

1 JANUARY – 31 MARCH 2012

= TURNOVER INDEX 100

OVERALL ANALYSIS (29 SITES)	Mean index
This quarter last year	**90.4**
Last quarter	**91.0**
Predicted next quarter	**97.9**





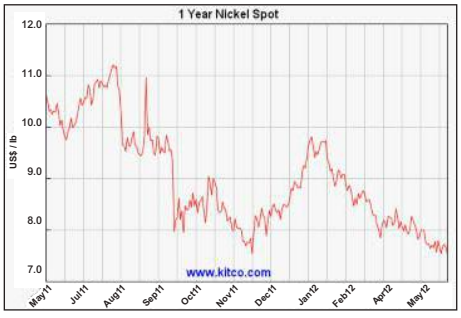
STATESIDE STATS

NORTH AMERICAN FIRST-QUARTER SALES UP BY 17.1%

CHTA counterparts participating in the Metal Treating Institute's Monthly Sales Statistics Program reported year-to-date heat-treating sales for March 2012 of $276.4million, a rise of 17.1% from the $236million recorded for the January-March period of 2011. March billings amounted to $97.5million, an increase of 9.3% compared with March 2011's $89.2million.

The latest returns indicate April sales of $89.8million, a gain of 12.3% over April last year when billings amounted to $79.9million.

NICKEL PRICE (US$/lb)



Please send comment and news items for September's *Hotline* 129 to: *mail@chta.co.uk*
Deadline: August 23rd