

Inside . . .

Page

- **Surface Engineering and Heat Treatment Industry Conference** 3
- **CHTA's new Chairman** 5
- **Making it clear** 5
- **How to best communicate your needs to the heat treater** 7
- **Making it clear: a CHTA member comments** 10
- **Book review** 12
- **News** 14
- **Diary** 16
- **Market movements** 16

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

The Contract Heat Treatment Association is not responsible for the statements made or opinions expressed by contributors to *Hotline*.



CHTA is affiliated to the Surface Engineering Association

A date for your diary...



CHTA AGM 7th May 2015

Members will again be able to update and network at this year's Annual General Meeting, to be staged at SEA's Birmingham headquarters. Full details will be circulated in April.



Chairman Andy Borg will present the latest CHTA progress report.



CEO Dave Elliott will update on Surface Engineering Association activities.



Guest Richard Lowe will speak about the new Business Growth Service.



Guido Plicht
Industry Manager,
Metals Processing

Ask the expert

Q How can I avoid intergranular oxidation during the gas carburising process?

A In order to avoid surface oxidation you will need a carburising atmosphere without CO and other oxidising components (oxygen-free). With Air Products' new plasma injector you can introduce an oxygen-free N₂/hydrocarbon blend to the atmosphere that enables more effective carburising without intergranular oxidation. Using a new atmosphere control system, the technology allows operators to fully automate and repeat the process, thus avoiding the typical "sooting" problem.

tell me more

www.airproducts.co.uk/metals T +44(0)1270 614314; E apbulkuk@airproducts.com

Air Products are sponsors of Hotline



View Calibration Certificates on your mobile device!

With Eurotherm's eCAT Calibrations you can

Eurotherm's eCAT calibration labels include a QR Code

Try this for yourself (Scan Label and Enter **PL12**)



Calibrated		Eurotherm	
	by Schneider Electric		
	Cert No.:	UK-A14-00113	
	Tag:	PL1217000556	
	Cal Date:	08 December 2014	
	Cal Due:	08 March 2015	
Engineer:	David Mitchell		
Serial No.:	PL1217000556-1712-PL3		



Select your favourite QR reader Eurotherm recommends "QR Reader"

Scan the QR code on the label

EOS will then prompt as follows. Enter the first four characters of the serial number from the calibration label and then select **Submit**

EOS will then display your calibration certificate on your phone or tablet

Let Eurotherm take care of your accreditation status with EOS and eCAT

For further information contact Kevin Robinson
 kevin.robinson@schneider-electric.com
 Mobile: +44 7771 885986

Eurotherm Limited
 Faraday Close, Durrington
 Worthing, West Sussex
 Phone: +44 (01903) 268500
 Fax: +44 (01903) 265982
 www.eurotherm.com/worldwide

Eurotherm®
 by Schneider Electric

Surface Engineering and Heat Treatment Industry Conference

**16 October 2015
Stratford-upon-Avon, UK**

Co-sponsored by...



First national heat treatment event in England for twelve years shaping up

Plans for October's Surface Engineering and Heat Treatment Industry Conference at Stratford Manor Hotel, first announced in Hotline 138, are now well advanced. Co-sponsored by the Surface Engineering Association, CHTA and Wolfson Heat

Treatment Centre, the event will be open to members and non-members and will comprise a dual-session conference accompanied by table-top displays and followed, in the evening, with a drinks reception and dinner.

Delegate fees (excluding VAT):

Package	Member	Non-member
Conference only	£150	£250
Conference and dinner only	£200	£300
Conference, dinner and B&B	£275	£375
Dinner only	£50	£75

Member rates apply to members of CHTA, SEA and subscribers to Wolfson.

Table-top displays

Including conference registration and dinner for one delegate, fees (excluding VAT) are:

Package	Member	Non-member
Exhibitor	£400	£500

Delegates can register online at:

www.sea.org.uk/events/index.htm/surface-engineering-heat-treatment-industry-conference

Conference

The conference will encompass a short plenary session on themes of common interest followed by two separate streams, one on heat treatment and the other on surface engineering / metal finishing.

For the **heat treatment stream**, CHTA Secretary Alan J Hick is compiling a programme of presentations on **advances in industrial practice**. Full details will be announced shortly.

Exhibits

SEA is inviting applications from those interested in having a table-top display at the event. Rates appear in the table below.

Industry sponsorship

SEA is also promoting company sponsorship of this prestigious event. Details of the options, benefits and charges are listed below.

Hotline is pleased to announce that the first companies to support the event with industry sponsorship are:



For further information about delegate registration, table-top displays and industry sponsorship, contact SEA's Diana Blair, event administrator, at diana.blair@sea.org.uk; tel: 0121 237 1123.

Industry sponsorship

Benefits	Package 1	Package 2
Complimentary conference registrations (conference and dinner only)	Up to 4	
Complimentary conference registrations (conference, dinner and accommodation)		Up to 6
Table top exhibit	✓	✓
Company logo and mention on conference homepage	✓	✓
Company logo included in pre- and post-marketing (print)	✓	✓
Company logo included in e-mail newsletter promotion		✓
Social media plugs	✓	✓
Colour print in conference electronic pack (usb programme)	Half page	Full page
Named in press releases	✓	✓
Listed on website as event sponsor		✓
SEA website banner (rolling banner)	3 months	1 year
Company logo included on signage		✓
Rate (excluding VAT)	£2150	£3550



SuperSystems

Europe



control

Hi-res touchscreen programmers with onboard charting for Atmosphere, Vacuum, and Nitriding.



sensors

Oxygen probes, IR cells, dewpoint & H₂ sensors delivering precision in harsh environments.



software

SCADA, portable data acquisition & chart recorders compliant with AMS 2750 D & CQI-9.

Super Systems develops and manufactures oxygen probes, gas analysers, touchscreen instrumentation, datalogging equipment & control panels. Our innovative technology helps heat treaters produce better quality products with increased efficiency and reduced cost. Visit our new website to view the range.

FURNACE CONTROL PANELS WITH TOUCHSCREEN INTERFACE

We design, build, and install unique and complete control systems for all applications:

- Nitriding/nitrocarburising
- Vacuum
- Annealing
- Carburising
- Pusher
- Rotary
- Mesh belt
- Pit
- Sealed quench



www.supersystemseurope.com
+44 (0)121 329 2627



PREMIUM-GRADE ANHYDROUS AMMONIA

Competitive Pricing & UK-Wide Delivery
Same-Day, Next-Day & Three-Day "Standard" Service

56kg Cylinders, 530kg Drums & Bulk Deliveries up to 18 ton

AN ISO:9001 SUPPLIER

Call 01652 680555
Or visit www.BlendedProducts.co.uk

Elsham Wold Ind Est, Brigg, Nth Lincolnshire, DN20 0SP



CHTA's new Chairman: a profile



*At February's CHTA Management Committee meeting, **Andy Borg** of TTI Group succeeded Simon Blantern who had completed his excellent two-year tenure as CHTA Chairman. Here Andy summarises his professional career, so far encompassing over 30 years in many heat treatment roles.*

In the summer of 1983, I left school with almost no idea what to do next (I say almost, because I did know that I wanted to pursue something related to metalworking). I took up a placement, via my school careers officer, at a local technical college in Watford on a youth training scheme to study mechanical engineering. After a few weeks, a work-experience placement at local engineering company Wild Barfield came up and, after meeting with the company personnel officer, I was put to work in the heat treatment shop.

Wild Barfield

Wild Barfield, I was later to learn, were a manufacturer of heat treatment furnaces and machinery. Often being called upon to test the equipment for the customer prior to installation, the company had developed a small heat treatment service. By the time of my arrival, they had established a contract heat treatment business with locations in the South of England, the Midlands and South Wales.

The work was hard, at least for a 16-year-old fresh out of school, and the new industrial environment was not so pleasant compared with the relative safety of the classroom. I remember, very well, the smell of burning-oil fumes from the tempering furnaces, hanging about 10 feet from the floor before mixing with the much more obnoxious ammonia fumes that constantly wafted around (despite attempts to burn off, or saturate in buckets of water) from the expelled gases of the nitriding process. In my first few weeks, this odour was also blended with the sickening fumes of masking large gears with carburising stop-off compound - one of my 'safer' undertakings, not helped by the fact that my painting skills were not very good; I ended up with as much on my hands and overalls as I did on the gears themselves.

In February 1984, having finished my placement at Wild Barfield, I was somehow persuaded to apply for a full-time position. I guess I must have made a reasonable impression, as I was given a job as a trainee, and allowed to continue with my mechanical

engineering certificate on a day-release basis.

Senior Heat Treatment

Shortly thereafter, Wild Barfield ceased manufacturing, probably as a result of fierce competition from mainland Europe, and sold off the heat treatment division to Senior Engineering Group to form Senior Heat Treatment Ltd. During this era, 1984-1999, Senior Heat Treatment flourished and grew, by acquisition, to a group of eleven heat treatment sites in the UK, plus another three in Spain.

This all passed me by without really too much concern and/or realisation of what was going on outside of my own workplace. I was busy learning the art and craft from a practitioner's viewpoint (in other words, as the general dogsbody). As with all aspiring "apprentices", mentors and shapers were very important to my development and I was fortunate to work alongside some very capable and practical heat treaters.

Of course, for the main part, our industry in the 80s and 90s was much less controlled by computers and precision instruments than it is today, so the onus was firmly in the hands of individual skill. This skill was normally imparted in the form of "hand-me-down knowledge" which, if you were keen and attentive enough, meant that you didn't burn your hands from picking up hot work, singe your hair or eyebrows from getting too close to pilot and burn-off flames, gas yourself (or your colleagues) by opening a retort prior to purging properly or, worse still, destroy a job - after all, customer satisfaction was, and still is, the reason we did what we did.

As I still have skin on my hands, most of my hair (what I do not have is the result of age and not improper heat treatment practice), correctly functioning lungs and a clear conscience (at least, relative to the above points), I consider my basic training to have been a success!

In the time that I had learnt to interpret a customer order and transfer the knowledge into a suitable heat treatment process, operate sealed-quench, vacuum and nitriding furnaces and induction machines, maintain furnaces and other equipment, perform final inspection details as an aerospace signatory and collect/deliver work in the company van, I had also married and had children.

For fear of leaving them all out of this short biography altogether, I should say that my wife, Libby, and I have recently celebrated 25 years of marriage and now find ourselves with three grown-up children, none of whom share my interest in heat treatment, or engineering of any description for that matter. Daniel is an English teacher at a secondary

school in Watford, Jamie works in St Albans as an IT support technician for Sky's Cloud and Christina is about to embark on a one-year worldwide travel experience.

TTI Group

By late 1999, more business changes were afoot as Senior Engineering decided to sell off the heat treatment company to Aalberts Industries NV, a Dutch company with core interests in heat and surface treatments, and we were renamed TTI Group Ltd.

This started a new chapter in my career as some major investment changes began to unfold and, for me as well as for the business, some rapid organisational changes quickly followed. I took a new position as Operations Manager at our site in Letchworth, followed by a period as General Manager and then, finally, as the General Manager at our Luton factory.

As investment in change continued, I was encouraged to focus on my personal career development and embarked on a Diploma in Management Studies. Having been away from formal education for more than 20 years, this was somewhat of a shock to my system; however, thanks to the support of work colleagues and family, I completed the course successfully and also found an additional support mechanism, that of my fellow students.

Following completion of the DMS, together with a few of my study partners, I decided to continue along this education path and enrolled at the University of Hertfordshire on a Masters in Business Administration - a huge personal challenge but one which, despite the mental and physical demands when coupled with managing a very busy 24-hour factory, was a very rewarding experience.

In 2009, at the age of 42, I proudly graduated with an MBA and, in January 2010, my career development was brought up to date when I was appointed as Managing Director of TTI Group Ltd.

After 31 years building up my experiences in this industry, I consider myself fortunate that I can say, with honesty, that whether in roles in administration, sales, operations, quality or management, there have only ever been very rare moments of "dullness". I am also very grateful to those colleagues who I used to work under in my earlier days, and who are still working with me now, for their discretion when it comes to recalling factory memories from the 1980s, allowing me to retain my dignity and professionalism!

CHTA

Having been a member of CHTA's Management Committee for five years, I'm looking forward to the challenge of upholding the reputation of the Association as its new Chairman. I hope that I can fulfil the obligations ahead by helping to create new opportunities for our industry.



A Member of The Linde Group

Industrial gas & ammonia suppliers

With a dedicated local team of heat treatment experts

- National coverage
- 24/7 emergency support
- Special process capabilities

Call us on **0800 02 0800**, email heat.treatment@boc.com,
or visit us at www.BOOnline.co.uk/heattreatment

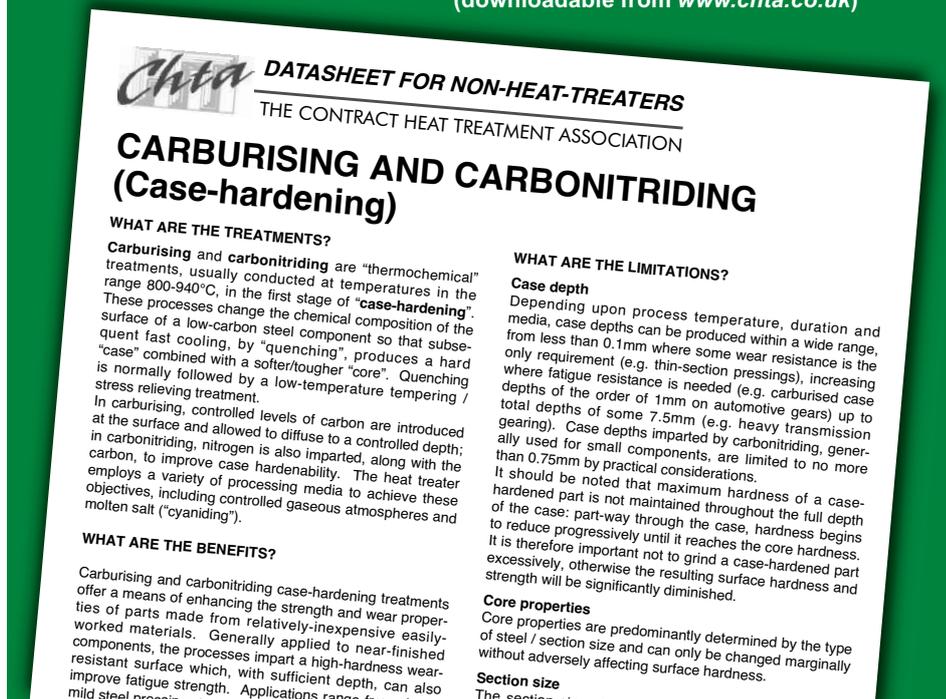
Making it clear

In *Heat Treatment of Metals* 1974.3, CHTA Management Committee member Don Pool published his classic article "Problems of Communication in Commercial Heat Treatment". In it he catalogued the ways in which the contract heat treater's life was made difficult by customers' lack of awareness of factors that help ensure satisfactory processing.

In order to counter the problem, CHTA's series of *Datasheets for Non-heat-treaters*, encouraging sensible specification of contract heat treatment, were issued subsequently.

The USA's *Industrial Heating* magazine recently revisited its 2010 article on the same theme, which we reprint here with kind permission....

One of CHTA's series of seven *Datasheets for Non-heat-treaters* (downloadable from www.chta.co.uk)



How to best communicate your needs to the heat treater

By **Craig Darragh** (AgFox LLC), **Daniel H. Herring** (The Herring Group), and **Patrick McKenna** (Nevada Heat Treating, Inc.)

The goal of this article is to provide a structure for communicating your heat-treating requirements to your commercial heat treater. It is written from the viewpoint of the company receiving the raw material stock or components for heat treatment, with the target audience being a manufacturer – big or small – who sends out steel products to be heat treated.

Commercial heat treaters spend much of their time trying to clarify what their customer's expectations are on each order they process. Clearly defining the nature of the materials and the heat-treating requirements is the first step in making sure your heat treater will be able to meet or exceed your expectations.

If possible, these requirements should be discussed with your heat treater before you start manufacturing the parts, not after they are final machined. It is also important to provide written documentation to the heat treater, including a duplicate copy sent with the materials/components, that represents the final agreed-upon treatments and specifications.

Material Grade

The first piece of information you need to supply is the material grade, typically the AISI or SAE number. Examples of these

designations include 4140, 1144, 1095, 52100, H11, M4. Other common material specification systems, such as ASTM, DIN and JIS, are also often used in today's global marketplace. Cross-references to AISI grades should be supplied if possible.

To avoid confusion, listing trade names in place of these designations should be avoided. Examples of material trade names are *Bearcat*[™], *Airkool*[™] and *Shock-Die*[™]. If these are provided, the specific manufacturer's datasheets should be included in the paperwork package.

The next most important document you can provide is the material certification sheet. This is provided to you by your material supplier and includes details such as the exact chemistry of the material being heat treated (including trace elements), grain size, cleanliness of the steel, prior processing and hardenability. These are invaluable aids for the heat treater to understand how to correctly process your material.

Condition Supplied

Most steels are supplied by the mill in the annealed condition. However, the material can also be supplied in other conditions such as normalized, normalized and tempered, or hardened. In addition, the

material may have come to you from the mill as a sheet, bar, rod, forging or casting. It is critical that you notify the heat treater of the condition of the steel you are sending to them. If not, it is possible that the parts may not respond properly to the heat-treating process.

For example, if you send parts made from 17-4PH to a heat treater to be processed to condition H-900 and the material was purchased in condition H-1150, it will not respond properly to the standard H-900 process. Your material supplier should notify you of the "as-supplied" condition in their material certification.

Instructions and Specifications

There are three types of instructions (purchase orders) heat treaters receive from their customers:

- Commercial practices
- Customer specifications
- Industry specifications

Examples of each of these are as follows:

- Commercial: 440C material, heat treat to 58-60 HRC
- Customer: 440C material, process per BPS-4602 (Bell Process Specification)
- Industry: 440C material, process per AMS 2759/5 (Aerospace Material Specification)

For a commercial purchase order, the heat treater is able to choose their own process (process temperatures, equipment type, atmosphere, soak durations, etc.). This often gives heat treaters the ability to combine orders and reduce processing time and cost. It is fair to argue that this type of purchase order gives the heat treater too much freedom.

Purchase orders that call out specific customer or industry specifications are usually much more stringent. They may also bring other specifications and requirements into play as well. It is important for customers to realize that calling out a customer or industry specification on your purchase order may increase your heat-treating cost and lead time significantly.

For example, on a commercial order, 440C may only require two processes (hardening and tempering) in order to meet a given hardness requirement. If the same 440C order is required to be processed per a customer or industry specification, it may require that the parts be subjected to multiple tempers and deep-freeze operations. It may also bring additional requirements into play (backfill gas dewpoint, furnace atmosphere, furnace pyrometry, instrument calibration, intergranular attack, decarburization, surface contamination, special documentation, additional destructive testing, larger hardness-testing sampling sizes, training, cooling rates, process-temperature set-points, soak durations, etc.).

Prints

It is extremely useful for your heat treater to have a copy of the current part drawing so that he can verify dimensions; note critical dimensions; understand the geometry of the part with respect to radii, sharp corners, ruling (thickest) section, the location of thin sections; surface-finish requirements and the like. Many customers also provide copies of their routers so that the heat treater can see how his processing fits into the overall scheme of the part manufacturing process.

It is not uncommon for the heat treater to raise questions based on his experience and what he sees on the print. Remember, your heat treater has seen and dealt with literally thousands of shapes and sizes, and his opinions are invaluable.

Approvals

Customers often require that their work be sent to heat treaters who have certain approvals in place. These approvals may include:

ISO 9001:2000, AS 9100, TS 16949, CQI-9

In order to gain these types of approvals, the heat treater must have an effective quality system in place, and it must be



Heat Treating Purchase Order Checklist

Company Information

Name: _____
 Address: _____
 Phone: _____
 Fax: _____
 E-mail: _____
 Contact Name: _____

Purchase Order Number: _____

Part Description and Part Number: _____

Approvals or Accreditations Required (Circle)

ISO9001:2000 | AS9100 | Nadcap | Other _____

Material Grade

303 | 316 | 410 | 416 | 420 | 440 | 10XX | 1144 | 12L14 | 4130 | 4140 | 4340
 8620 | 9310 | A2 | D2 | H11 | H13 | S7 | M2 | M4 | M42 | Other _____

Condition Supplied

Annealed | Normalized | Normalized and Tempered | Solution Annealed
 Quenched and Tempered | Other _____

Process Required

Age Harden | Anneal | Carbonitride | Carburize | Harden and Temper
 Nitrocarburize | Nitride | Sub-Critical Anneal | Solution and Age Harden
 Stress Relieve | Other _____

Compliance Required

Commercial | AMS _____ | Customer Defined / Other _____

Hardness Range Required

_____ - _____ RC | RA | RB | RE | R15N | Other _____

Hardness Test Sample Size

Commercial Sampling | Mil-Aero Sampling | 100% | Other _____

Straightness or Flatness Required

_____ of an inch per foot | millimeters per meter

Atmosphere Required

Air | Endothermic | Exothermic | Hydrogen | Nitrogen | Vacuum | Other _____

Quenchant Required

Argon | Nitrogen | Oil | Polymer | Salt | Water | Brine | Other _____

Additional Testing Required

Micro-Hardness | Tensile | Charpy | IGO | IGA
 Decarburization | Carbon Content | Other _____

Documentation Required

Shipper | Hardness Certification | Process Certification | Charts | Other _____

Other Requirements

Vacuum Temper | Bead Blast | Stop-off Paint | Copper Plate | Other _____

verified by an outside service. ISO 9001:2000, AS 9100, TS 16949 quality approvals are usually general in nature (quality management system, management responsibility, product realization, etc.) and are not heat-treating process specific.

Nadcap

This aerospace approval is the highest industry-wide accreditation a heat treater can achieve. Not only does it cover the quality systems above, it also includes audits on specific heat-treating processes. A portion of the week-long audit also includes the witnessing of actual heat-treat runs. The process-related portion of the audit confirms compliance with aerospace and aerospace-prime specifications. PRI is the accrediting body for this program. More information on Nadcap can be found at www.pri-network.org.

Prime Approval

Even if a heat treater is ISO 9001 and AS 9100 approved as well as Nadcap accredited, they still may not be able to process work for certain aerospace primes. These include Boeing, Pratt & Whitney, Airbus, etc. These companies also require that your heat treater pass their site audits. If the parts you are sending out are related to the companies above, they can only be processed at heat-treating facilities approved by the aerospace prime.

Testing Requirements

Your purchase order or request for quotation should clearly state your testing requirements. If you are asking the heat treater to process the order to a certain AMS specification, these requirements may already be defined. Otherwise, you need to communicate what your requirements are (or what exceptions you will allow).

A few examples of typical testing requirements include surface hardness, microhardness, tensile strength, surface carbon content, IGO/IGA and microstructure. Be aware that test coupons may

be required to facilitate these types of tests. Also, keep in mind the consequences of the tests. For example, if an order is to be 100% Rockwell hardness tested, all of your parts are going to be returned with hardness dents or indentations on them.

Dimensional Requirements

To some degree, all materials will change size and shape during heat treatment. You need to plan your manufacturing process to accommodate these changes. Stating "Keep Flat" or "Keep Straight" on your purchase order is not realistic. However, there are materials and processes that can be chosen to minimize these changes. Putting a flatness or straightness callout on your purchase order is good practice, but only if it is realistic and achievable. Involving your heat treater early in the project can help in this regard. The heat treater will be able to assist in specifying the most suitable material and process sequence that will get results that meet your expectations.

Cosmetic Requirements

If your parts require special handling, please inform your heat treater of that fact. Keep in mind that individual handling and racking of parts can add significant cost. In most cases, heat treaters will handle your parts with care. However, if you require that a certain surface remain free of hardness indentations, for example, please note that instruction on your purchase order. Other cosmetic requirements may include glass beading after heat treatment, vacuum processing to keep parts clean and bright, and keeping sharp corners of parts free from nicks and dings.

Documentation Requirements

There are several levels of documentation that can be supplied by the heat treater:

- Shipping ticket only
- Product certifications (hardness, microstructure, mechanical properties, etc.)
- Process certifications
- Furnace chart-recorder data

INDUSTRIAL HEATING

This article was first published in *Industrial Heating*, May 2010, Vol. LXXVIII, No.5, pages 60-63. Kind permission to reprint here is gratefully acknowledged.

The shipping ticket is signed by the customer and used as the proof of delivery document. Product certifications typically show the number of parts tested and their range of values. It should also state the specification the testing complied with. The process certification usually shows the process that was run (soak times, temperature setpoints, quenchants used, etc.). It will also state what specifications the process was in compliance with. For commercial work, only the first two are usually supplied. For aerospace work, the first three are typically supplied. The furnace chart-recorder data is usually kept on file by the heat treater for a predetermined number of years. It can be made available to the customer on request. If the heat treater is running a proprietary process, however, he may be unwilling to hand this intellectual property over to the customer.

Summing Up

In conclusion, a true partnership needs to exist between the customer and heat treater in order to optimize the performance of the end-product. Heat treaters have their customer's best interest at heart, but they are not mind readers and have limitations that are best overcome by mutual information flow and good planning combined with knowledge and experience.

For more information: Contact Patrick McKenna, Nevada Heat Treating, Inc.; e-mail: patm@nevadaheattreating.com; web: www.nevadaheattreating.com; or Dan Herring, The Herring Group, Inc.; e-mail: dherring@heat-treat-doctor.com; web: www.heat-treat-doctor.com; or Craig Darragh, AgFox LLC; e-mail: agfox@att.net.

CHTA WEBSITE

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



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.

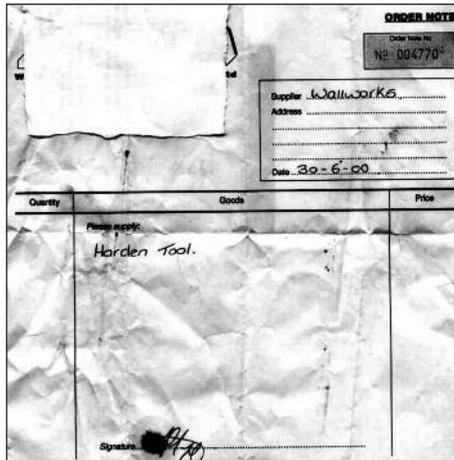
Looking for specific heat treatment capacity? Post your enquiry on "Ask the Members" at www.chta.co.uk

Making it clear: a CHTA member comments

CHTA Management Committee member **Richard Burslem** (Wallwork Heat Treatment) writes...

The very comprehensive foregoing article will strike a chord with all contract heat treaters. Running orders and aerospace work are usually well specified. Some customers rely on quoting a specification number and expect (quite rightly) the heat treater to interpret this specification into a heat treatment process. Others may well specify the treatment as well and, occasionally, this can be at variance with the specification itself, leading to delays whilst clarification is sought.

The most likely source of incomplete orders arises from the 'jobbing' customer, with typical errors being omission of material, hardness or case depth required. More problems arise with unsuitable treatments being specified for the material supplied, such as 'mild steel, nitride' or 'Gauge Plate, vacuum harden'. There are also the few



customers who cause bewilderment such as 'En9 please heat treat to En24T' or 'Temper and Harden'. We have one customer who obviously has little faith in the science of heat treatment and, rather than a purchase order, supplies a 'perchance' order.

There are some excellent innovations however, particularly due to computerised systems and the use of CAD. Some customers helpfully include a small graphic of the part on the order which greatly helps in identification. The standardisation on the use of A4-size paper, whilst seeming to be a trifling thing, makes contract review much easier because there isn't the bewildering

range of sheets of paper from 13"x11" to 8"x6" duplicate order sheets.

Have things improved over the years? I would say yes, most certainly. Whilst the errors remain the same, the quantity of them has certainly reduced in my opinion. A recent straw poll of orders here showed less than 6% were not clear.

In 2000, I gave a presentation to the Gauge and Tool Makers Association, part of which was devoted to the minimum requirement for the detail on a heat treatment order. As an example of how not to do it, I showed them the accompanying genuine order we had received. The customer's identity is hidden for obvious reasons. Things have definitely improved since then!

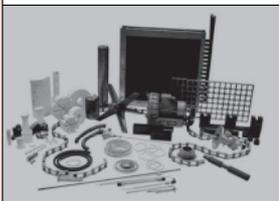
Spread the word by proclaiming your CHTA membership



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



VAS
VACUUM & ATMOSPHERE
SERVICES LTD



New & Used Furnaces / Furnace Relocations Repair & Overhaul / Spares / Service / Calibration / Fabrications / Metal Belts & Roller Conveyors / Furnace Loading Equipment / Gas Generators

Credenda Road, West Bromwich B70 7JE

Tel: **0121 544 4385** Fax: **0121 544 3874**

enquiries@vacat.co.uk www.vacat.co.uk

The VAS Group of Companies



RAMSELL-NABER

Industrial furnaces & ovens

- Batch heat treatment of ferrous and non-ferrous metals
- Heat treatment and thermochemical treatment for metal processing
- Heat treatment for metal-shaping and welding processes

Ramsell-Naber Ltd, Vigo Place,
Aldridge, West Midlands WS9 8YB

T: 01922 455 521 F: 01922 455 277

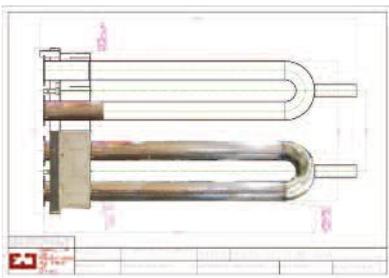
E: info@ramsell-naber.co.uk

W: www.ramsell-naber.co.uk



Fabwell Ltd

Fabrications in Heat and Corrosion resisting Alloys,
Furnace Spares / Repairs and Modifications



Special bespoke jigs and fixtures in a range of stainless/NiCr alloys, retorts, combustion tubes, inners, outers, 'P' tubes and many others, salt pots, salt baths, and new salt pot/bath furnaces, furnace spares (all conceivable spares stocked, sourced or manufactured). Full CAD design including 3D modelling, bespoke furnace/oven design and manufacture of new plant, elements and elementation, new control panels, gas works, full project management, turn key installations and refractory work.

Address: **Gainsford Drive, Halesowen, West Midlands, B62 8BQ**

Tel: **0121 550 5545** www.fabwell.co.uk

Email: sales@fabwell.co.uk



PROFIT

FROM OUR EXPERIENCE

Heat-Resistant Castings



Call the
'experts'
today

☎ **0161 763 7494**

🌐 www.wallworkcastalloys.com



Book review

Atmosphere Heat Treatment: Principles, Applications, Equipment - Volume 1

By Daniel H Herring.

BNP Media II, LLC, Troy MI 48084, USA.

September 2014, pp 714. ISBN

978-0-692-28393-6. \$154.99 See:

www.industrialheating.com/products/

595-atmosphere-heat-treatment-

principles-applications-equipment

Hotline Editor **Alan J Hick** reviews the latest book from the USA's prolific "Heat Treat Doctor" (co-author of page 7's article).

For many years, Derek Close and I have occupied a full afternoon of Wolfson Heat Treatment Centre's three-day *Understanding Heat Treatment* course lecturing on the theory, production, application and control of furnace atmospheres. Such emphasis is justified because the most widely used medium for protecting or enhancing metal surfaces during thermal processing is one of the least understood aspects of industrial heat treatment.

That's why, in the 2004.4 final edition of Wolfson's *Heat Treatment of Metals* journal, I noted the need for an authoritative book that would update 1951's *Controlled Atmospheres for the Heat Treatment of Metals* by Ivor Jenkins (and ASM's theory-light monograph *Furnace Atmospheres and Carbon Control* published in 1964). 1984's *Controlled Atmospheres for Heat Treatment* by Hungary's Nemenyi was not well received by the UK's undoubted expert (see review in *Heat Treatment of Metals* 1984.2, page 48). In this context, Volume 1 of *Atmosphere Heat Treatment: Principles, Applications, Equipment* is not the wished-for book. Its 714 pages and eight chapters touch only fleetingly upon the controlled atmospheres used although, in the forthcoming Volume 2, chapter 9 ("Furnace Atmospheres" incorporating theory and practice, types and control) promises to remedy the apparent paucity comprehensively.

Instead, Volume 1 offers abundant broader information, "to help individuals who work with atmosphere furnaces to operate them more effectively and profitably". The wealth of that information is what would be expected from a well-respected author who has been an active member of the materials and heat-treating community for over 40 years.

Now President of the Herring Group, Daniel H Herring has become well known as "The Heat Treat Doctor" through his regular columns in North America's *Industrial*

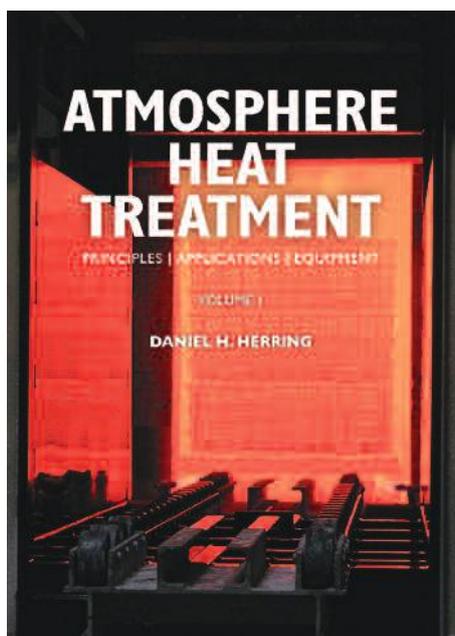
Heating magazine, publisher of this book and of Dan's excellent companion tome *Vacuum Heat Treatment* (2012). The clarity and highly-informative nature of his articles on the practicalities of heat treatment are equally characteristics of his books.

Dan observes that Volume 1 of *Atmosphere Heat Treatment* is "an introduction to the fundamentals of heat treatment and focuses on materials, metallurgy, applications and equipment":

Chapter 1: Introduction to heat treatment

What is heat treatment and why do we do it? / What is good heat treatment? / Heat treatment industry overview / Captive and commercial heat treatment / Improving the heat treatment process / The future of heat treatment.

This introductory chapter includes an interesting analysis of the size of North American and global heat treatment markets, factors influencing the choice between in-house and contract heat treatment, and the importance of industry/academia co-operation.



The reviewed book and its forthcoming Volume 2 are companions to the author's excellent 512-page Vacuum Heat Treatment.

Chapter 2: Metallurgy for the heat treater

Fundamental principles: steel transformations and microstructures / Ferrous alloys: iron / Ferrous alloys: steel / How parts heat and cool / hardness and hardenability / Ideal diameter / Grain size / Banding and segregation in carbon and alloy steels / Toughness / Retained austenite / Martensite / Non-martensitic products / Bauschinger effect / Non-ferrous alloys.

A clear and comprehensive exposition of the metallurgy relevant to heat treatment.

Chapter 3: Materials and materials characterisation

Material certification sheets / Carbon in steel / Manganese in steel / Boron in steel / Other alloying elements in steel / Steel cleanliness / Stainless

steels / Tool steels / Speciality steels / Powder metallurgy / Aluminium and aluminium alloys.

The importance of understanding the influence on heat treatment outcome of factors including material form, prior treatments, chemical composition and hardenability.

Chapter 4: Heat treatment equipment and design

Classification of heat treatment equipment / Types of heat treatment equipment / Combustion systems / Electric heating elements / Furnace insulation / Heat-resistant alloys / Instrumentation and process control.

A wide-ranging review of furnaces used for processing both primary products and semi-finished components, their heating methods, construction materials and regulation.

Chapter 5: Heat treatment of ferrous alloys

Cast iron / Annealing / Normalising / Hardening / Case hardening / Austempering / Stress relief / Tempering / Furnace brazing / Glass-to-metal and ceramic-to-metal sealing / Sintering, sinter hardening and post-sintering heat treatments / Steam treating / Stainless steels / Tool steels.

A chapter in which applicable controlled atmospheres are introduced.

Chapter 6: Heat treatment of non-ferrous alloys

Light metals / Aluminium and aluminium alloys / Titanium and titanium alloys / Copper and copper alloys / Magnesium and magnesium alloys.

A useful summary including processing atmospheres where appropriate; more could have been said about why titanium alloys have special protective needs.

Chapter 7: Ancillary processes

Loading of parts / cleaning of parts / Masking of parts / Cold and cryogenic treatments / Other post-heat-treatment processes / Shot blasting and shot/laser peening.

A helpful overview of the practical considerations.

Chapter 8: Other types of heat treatment

Vacuum heat treatment / Thermal processes run in industrial ovens / Induction heating / Other forms of heat treatment.

An opportunity for a balanced assessment of the relative virtues of gas and low-pressure carburising.

Volume 1 of *Atmosphere Heat Treatment: Principles, Applications, Equipment* is an excellently-written book which will be much valued by those looking for an understanding of the essentials of industrial heat treatment. Those specifically seeking a modern treatise on the theory, production and regulation of controlled atmospheres should probably await publication, later this year, of the concluding Volume 2 (which will also cover quenching and quality control/assurance amongst other topics)



Atmosphere Furnaces
and Ovens
New Vacuum Furnaces
Vacuum Hot Zone Relines

Furnace Fabrications
Alloy Fabrications
Replacement Parts
Site Services



Refractory Work
Maintenance Contracts
Plant Assessment and Refurbishments
Process Controls



Almor Group,
Daleside Road,
Nottingham, NG2 3GJ
tel: 0115 986 8773
email: sales@almor.co.uk



www.almor.co.uk
Further facility in Tipton, West Midlands



Engineering Solutions for the Heat Treatment Industry

With a full 'in-house' facility for bespoke furnace design and manufacture of heat treatment plant and associated equipment, we provide our customers with rapid, practical and cost-effective solutions to their needs.

SERVICES

- DESIGN • CONSULTANCY • COMBUSTION SYSTEMS
- COMMISSIONING • FAULT FINDING
- REFURBISHMENT • ELECTRICAL • INSTALLATION
- REPAIRS/ MAINTENANCE
- IN-HOUSE MACHINING • REFRACTORIES

ALLOY PRODUCTS

- WORK BASKETS • RETORTS • MUFFLES • FANS
- RADIANT TUBES • JIGS & FIXTURES • GRIDS • DRIVE DRUMS & ROLLERS • CAST LINK & MESH BELT • ELEMENTS

With 10-tonne overhead craneage facilities, our factory features mild-steel fabrication and alloy welding workshops and a fully-equipped machine shop

For an in-depth view of our services, visit our new website:

www.furnacespares.com



Tel: +44 (0)1922 458330 Fax: +44 (0)1922 456402
E-mail: furnacespares.maintenance@fsmail.net



L'esprit industriel

HEAT TREATMENT Handling Fixtures

Design and manufacture of cast heat treatment handling fixtures in heat resistant Nickel Chrome alloys.

- Low fixture weight / high component load
- Energy efficiency
- Furnace efficiency



01460 270 300

Cronite Castings Limited, Crewkerne - www.safe-cronite.com

Advertising in Hotline

Hotline welcomes advertising (other than recruitment) from CHTA members and suppliers to the trade.

2015 RATES

Single-insertion charges for black-and-white ads:

Size	Dimensions	Charge
Quarter page	121mm high x 86mm wide	£199+VAT
Half page	121mm high x 178mm wide or 254mm high x 86mm wide	£352+VAT
Full page	254mm high x 178mm wide	£630+VAT

For full-colour ads, add an extra £265+VAT

Advertisers in four consecutive quarterly editions of *Hotline* are entitled to a series rate where all of the above prices are discounted by 20% per insertion.

Series advertisers also feature on the new Suppliers page of CHTA's website at no extra charge.

Booking deadline for June's *Hotline* 140: May 13th
For further details, contact *Hotline* Editor Alan J. Hick
Tel: 0121 329 2970; e-mail: mail@chta.co.uk

Member news

INVESTMENT IN HIGH-VACUUM HEAT TREATMENT BOOSTS RANGE OF SERVICES

With an investment topping £2million, the Wallwork Group has expanded and upgraded the vacuum heat treatment department at its Birmingham facility. Housed in a newly-refurbished building, supported by a grant from Birmingham City Council, the department provides high-vacuum heat treatment, using modern furnaces of different capacities for flexible, cost-effective thermal processing of both high-volume and small-batch components. Seven new positions have been created at the Birmingham site as a direct result of this investment. "We are fortunate in having a good variety of work from different industry sectors, including aerospace, motorsport, power and nuclear suppliers. This gives us the stability to continue to invest for the future, with a new degreasing facility to be installed early in 2015, enabling the company to offer a subcontract service, and plans for a new vacuum temper furnace later in the year. The range of projects allows us to maintain an interesting and balanced workflow and be confident that we can maintain levels of employment into the future," Tim Pelari, site director, explained. There are seven vacuum furnaces on site ranging in load capacity from 250kg to four tonnes. This includes one of the largest furnaces in the UK, accepting loads of four tonnes and over 2.7m³. Each furnace is scheduled at predetermined intervals for temperature uniformity survey (TUS), to ensure that it complies with the relevant system accuracy test (SAT), as part of Wallwork's continuing compliance to specifications in the aerospace and automotive industries.

"We are problem solvers," Tim added. "It is rarely just a case of following a specification; we like to understand how, where and why the component is to be used so we can provide the best technical treatment. This approach may lead to an immediate cost reduction, where a heat treatment has been over-specified, for example, or longer-term savings where a better process improves performance or endurance to reduce life-time component cost. Our on-site laboratory staff, with extensive metallurgical expertise, provide complete documentation for quality assurance and traceability."

The department can handle anything from small pressed or machined parts to large forgings. Operating 24/7 and supported by a company-owned and operated vehicle



Wallwork Birmingham is home to one of the largest vacuum furnaces in the UK, accepting loads of four tonnes and over 2.7m³.

fleet, many orders are turned around in a single shift and returned to customers the day following collection.

Wallwork also operate from locations in Manchester and Cambridge in order to provide a complete nationwide service. In addition to thermal processing, the company also offers advanced surface coatings to Nadcap accreditation. These services are supported by a well-equipped research and development department, staffed by highly-trained scientists and technicians.

CONTINUOUS IMPROVEMENT AND FURTHER INVESTMENT FOR AHT

Alloy Heat Treatment (AHT), based on Grazebrook Industrial Park, Dudley, have made a New Year's resolution to dedicate time and resources to continuous improvement for their staff and customers alike.

After investing heavily in 2014, the heat treatment specialists have committed to a further £500,000 investment, in new plant, training and workshop improvements, in line with their company motto "Learning, Evolving and Growing".

The investment comes in the form of a new drop-bottom oven with water-tank, polymer-tank and rinse-tank line. The semi-automated heat treatment plant is much larger than any of the existing kit that AHT have. This means that their customers can now send products up to 2m x 2m x 2.5m for treatment.

Sales and new projects director Ian Perks said: "This oven will come into its own with orders from the aerospace sector due to its size. With advances in technology across the board in the manufacturing sector, much of the work coming to us from this area means we need to keep up; this new system allows us to

handle bigger clad sheets and larger skins."

AHT's aim is to grow the aircraft department with more capacity, with the overall goal of lowering lead times.

Ian went on to explain: "As a company, we recognise and appreciate the benefits a good organisational culture can bring to both the employee and customer perspective; so it is with that in mind that we planned the improvements to both workshop and office space."

Working with The Black Country Skills Factory and Dudley College, AHT have taken on a further three apprentices, bringing their total workforce to an impressive 55 members of staff. The new starters will be stationed within the quality, maintenance and aircraft departments.

With 40% capacity available for commercial applications, AHT are looking to increase their customer base with short lead times.

Further plans for 2015 include an OMIS report, in association with the UKTI, on heat treatment requirements within Europe, especially in Italy, as well as plans to increase their presence on the Nadcap-approved supplier list.

BETA/CLAYTON NEWS

Clayton Thermal Processes Ltd, the manufacturing sister company of Beta Heat Treatment Ltd, have been manufacturing fluidised-bed furnaces for over 20 years. Early this year they will be supplying a large high-temperature furnace to help the end-user comply with the aerospace demands of AMS2750E. With temperature uniformity being $\pm 3^{\circ}\text{C}$ as standard, fluidised-bed heat treatment equipment was the best solution for the customer.

Beta Heat Treatment Ltd also continue to thrive, with additional capacity being made available due to the purchase of a thermochemical fluidised-bed furnace from Bodycote Heat Treatments, which will increase its current capacity by 10% on processes such as nitrocarburising and nitriding.

For further details, on both equipment and processing, contact Rob Kirk at rk@claytonholdings.com.

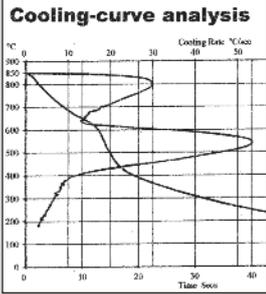


AHT's Sales Director Ian Perks with a heat-treated aerospace component.

Quench oil regeneration

COST-EFFECTIVE / ENVIRONMENTALLY SOUND

- Spent quench oils brought back to original specification by removal of contaminant water/solids and replenishment of additive packages.
- Result: clean, dry and sterilised quench oils, at a fraction of the cost of virgin products.
- Cooling-curve analysis available to confirm quenching performance characteristics.
- Negates disposal problems.
- Unique combination of technical expertise and practical experience gained through over 50 years of oil re-conditioning and recovery.



● Accredited to ISO 9001/2000 and ISO 14001.

MIDLAND OIL REFINERY LTD

Tel: 0121 585 6006

Fax: 0121 585 5405

E-mail: info@midlandoil.co.uk

Shelah Road, Halesowen,

West Midlands B63 3PN

www.midlandoil.co.uk



'Hot Box' Survey Solutions for AMS2750E and CQI-9 TUS

- Customised systems designed for unique applications
- 10 or 20 channel data logger for type K or N thermocouples
- Real time RF telemetry output
- Thermal View Survey software compliant to AMS2750E
- Designed, manufactured, & serviced in the UK
- On site demonstrations available

PhoenixTM Ltd, 8 St. Thomas Place, Cambridgeshire Business Park, Ely CB7 4EX, UK
Tel: +44 (0)1353 223100 E-mail: sales@phoenixtm.com www.phoenixtm.com



www.codere.ch

2942 Alle, Switzerland

T : +41 32 465 10 10

d.howard@codere.ch

BATCH-TYPE FURNACE LINES

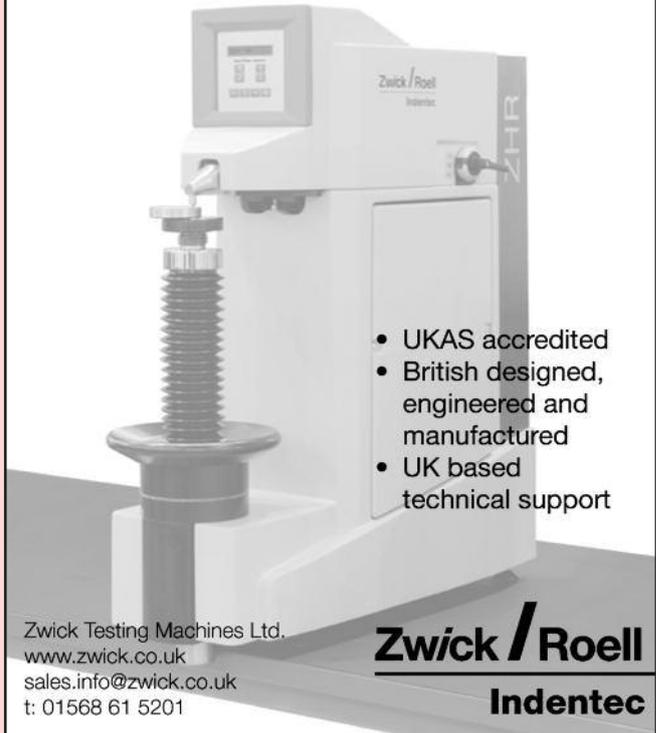
Under controlled atmosphere, in modular construction
No mechanical locking of the charge



- Manual or fully-automated operation (automates + monitoring system)
- System 250 offers solutions from small to multi product series from 7kg up to 5 ton, changing of temperatures and atmosphere within minutes
- Unique patented quench transfer with no intermediate chamber increases security in modular construction (Add one furnace to double production)
- Respecting AMS 2750E, CQI-9 and CE norms for temperature and atmosphere precision
- New range of low-cost laboratory furnaces for stress relieving, hardening, preheating and tempering processes

www.youtube.com/codere123

What's on your "menu" for hardness in 2015?



- UKAS accredited
- British designed, engineered and manufactured
- UK based technical support

Zwick Testing Machines Ltd.
www.zwick.co.uk
sales.info@zwick.co.uk
t: 01568 61 5201

Zwick / Roell
Indentec

Diary

April 8 2015
BIFCA course:
INTRODUCTION TO INDUCTION HARDENING
West Bromwich, England www.bifca.org.uk

April 14 2015
PRINCIPLES OF HEAT TREATMENT
Rotherham, England www.amrctraining.co.uk

April 16 2015
PRINCIPLES OF HEAT TREATMENT
West Midlands, England www.amrctraining.co.uk

April 20-21 2015
INTRODUCTION TO PYROMETRY
Bristol, England www.equalearn.com/learncenter.asp?id=178409

April 21-22 2015 (New date)
EUROPEAN VACUUM CARBURISING SUMMIT 2015
Wrocław, Poland
Conference organised by the Global Heat Treatment Network: www.vacuum-carburizing-summit.com/homepage/

April 21-23 2015
HEAT TREATMENT FORUM
Wrocław, Poland
Conference/exhibition organised by the Global Heat Treatment Network. www.heat-treatment-forum.pl/homepage/

April 23 2015
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England

May 7 2015
CHTA MANAGEMENT COMMITTEE / AGM*
Birmingham, England

May 12 2015
BIFCA course:
FURNACE & BURNER CONTROLS
West Bromwich, England www.bifca.org.uk

May 20-22 2015
22ND IFHTSE CONGRESS / 2015 EUROPEAN
CONFERENCE ON HEAT TREATMENT
Mestre/Venice, Italy www.aimnet.it/ht2015.htm

May 27 2015
HEAT TREATMENT CONGRESS
Querétaro, Mexico www.metalspain.com/mexico.htm

May 28-29 2015
HEAT TREATING: PROCESS OWNER
Sheffield, England
Training course allowing students to interface with PR1/
Nadcap subject matter experts.
www.equalearn.com/learncenter.asp?id=178409

June 2-3 2015
A3TS 2015
Zénith Saint-Etienne, France
42nd congress on heat treatment and surface engineering:
www.a3ts.org/

June 2-4 2015
SUBCON 2015
Birmingham, England
In conjunction with Advanced Manufacturing and The Engineer
Design & Innovation Show: www.subconshow.co.uk

16-20 June 2015
THERMPROCESS 2015
Düsseldorf, Germany
"11th International Trade Fair and Symposium for Thermo
Process Technology":
<http://www.thermprocess-online.com/>

July 2-3 2015
INTRODUCTION TO PYROMETRY
Derby, England
www.equalearn.com/learncenter.asp?id=178409

July 23 2015
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England

August 6 2015
CHTA MANAGEMENT COMMITTEE*
Birmingham, England

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

Market Movements

ANALYSIS OF QUESTIONNAIRE REPLIES RELATING TO 28 CHTA MEMBER SITES

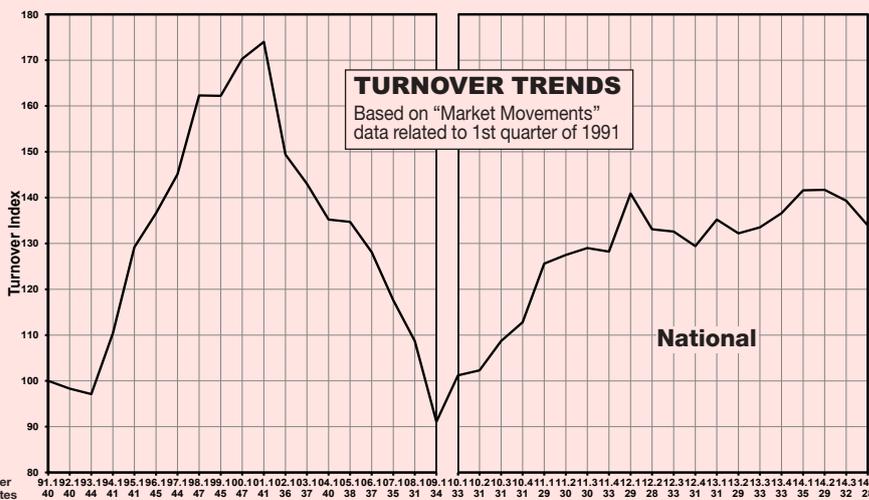
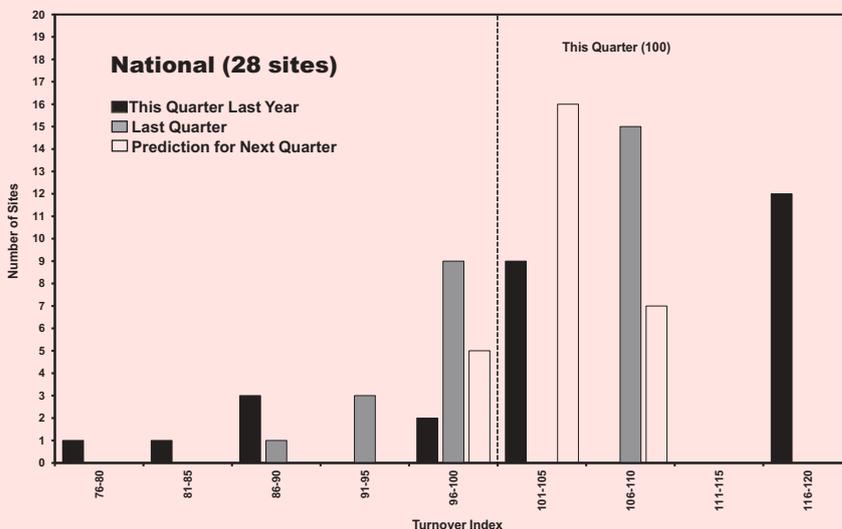
"THIS QUARTER" =

**1 OCTOBER –
31 DECEMBER 2014**

= TURNOVER INDEX 100

**OVERALL ANALYSIS
(28 SITES)**

	Mean index
This quarter last year	105.0
Last quarter	104.0
Predicted next quarter	104.0



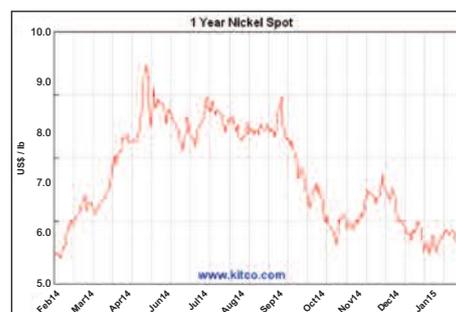
STATESIDE STATS

NORTH AMERICAN 2014 HEAT TREATMENT SALES 5.1% UP ON PREVIOUS YEAR

CHTA counterparts participating in the Metal Treating Institute's Monthly Sales Statistics Program reported total heat-treating sales of \$945.9million in 2014, an increase of 5.1% from the \$900.3million posted for January-December 2013. December billings amounted to \$73.8million, an increase of 10.3% compared with December 2013's \$66.9 million.

The latest returns indicate January 2015 sales of \$72.2million, a rise of 5.0% compared with January last year when billings amounted to \$68.8million

NICKEL PRICE (US\$/lb)



Please send comment and news items for June's Hotline 140 to: mail@chta.co.uk Deadline: May 20th