The Contract Heat Treatment Association Newsletter
HOTLINE
Issue No. 121
September 2010

Inside . . .

CHTA Secretariat

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CHTA is affiliated to the Surface Engineering Association

A reminder from SEA's Dave Elliott...

Do you have a half-hourly electricity meter?

If you do, then it is likely that you will need to take some form of action before the 30th September 2010 in order to comply with the CRC Energy Efficiency Scheme (previously known as the Carbon Reduction Commitment).

Relevant members should have received a letter from the Environment Agency informing them that they need to register for this scheme. Details have been published in the last few issues of the SEA's magazine *Surface Matters*, which CHTA members receive.

CRC is a new mandatory energy-saving and carbon-emissions reduction scheme for the UK. It uses 2008 as its starting year, so you will need to examine your 2008 electricity consumption in order to assess if you meet the qualifying criteria.

"The fines for non-compliance are hefty"

There are three forms of action that need to be taken:

- If you have a half-hourly meter and used more than 6,000,000kWh of electricity in 2008, then you need to make a full registration and pay the registration fee of £950.
- If you have a half-hourly meter and used less than 6,000,000kWh but more than 3,000,000KWh of electricity in 2008, then you need to make an information disclosure and give details of your electricity consumption.
- If you have a half-hourly meter and used less than 3,000,000kWh of electricity in 2008 then you need to make a simple information disclosure.

The fines for non-compliance are hefty - £5,000 for failing to register plus £500 per day extra until registration is made.

So make sure that you visit the SEA website *http://www.sea.org.uk* and follow the links from the CRC article in the News section.

CRC and CCAs

In discussions last year, with both the Environment Agency and the Department of Energy & Climate Change (DECC), SEA confirmed that that there are CRC exemptions for companies with Climate Change Agreements. Their previously-published guidance is reproduced on page 5.

New CCAs on hold

The first Budget of the Coalition Government announced that in the autumn it will publish proposals to reform the Climate Change Levy in order to provide more certainty and support to the carbon price.

In light of this announcement, the Climate Change Agreement target negotiations, scheduled to occur this year, have been suspended. It is anticipated that negotiations will resume towards the end of the year.

New *CHTA Guidelines for Conditions of Business* released

CHTA Chairman ***Richard Burslem*** *hails our latest endeavour as another example of the virtues of collective activity by Association members.*

The CHTA offers its members many benefits, not least of all the *Hotline* you are reading now!

The prime reason for the existence of CHTA is to bring together companies who have the same interests so that, collectively, they can champion their cause more successfully than the individual members could on their own. CHTA is that champion.

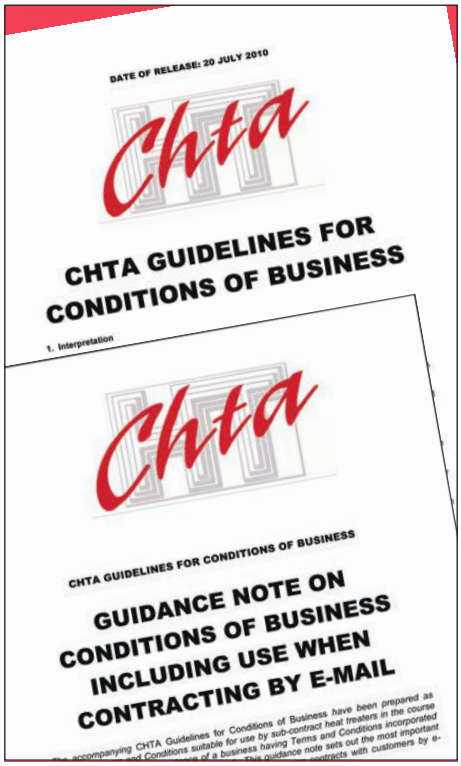
We are affiliated to the Surface Engineering Association for the same reason, but on a larger scale: to bring together industries with similar interests. This has worked very successfully over the years, as evidenced by the securing of our Climate Change Agreements and direct access to the corridors of power through the SEA briefings at The House of Lords.

Comparing our own progress, either through the Benchmarking Club or Market Movements, is also useful, particularly in these difficult trading times. It is comforting to know with precision that our whole industry is suffering – not just your own company.

The highly-acclaimed *Datasheets for Non-heat-treaters,* downloadable from *www.chta.co.uk*, would be of little value without the CHTA. Our members have combined their knowledge to produce these well-established publications, giving them a credibility that would not be possible for an individual company to generate.

So it is with CHTA's *Guidelines for Conditions of Business*; as a collective, we are saying to our customers that this is a reasonable way of transacting business with any heat treater, not just you.

The *Guidelines for Conditions of Business* have recently been reviewed and updated professionally and are available to CHTA members only. They are for our guidance and protection. The fact that they have been developed by CHTA for all members means that they will be more readily accepted not only by our customers but also, if it should come to it, by a court of law.


DATE OF RELEASE: 20 JULY 2010

CHTA GUIDELINES FOR CONDITIONS OF BUSINESS

1. Interpretation

CHTA GUIDELINES FOR CONDITIONS OF BUSINESS

GUIDANCE NOTE ON CONDITIONS OF BUSINESS INCLUDING USE WHEN CONTRACTING BY E-MAIL

An overview

As anticipated in June's Hotline *120, the updated version of* CHTA Guidelines for Conditions of Business *was posted in the Members Area of* www.chta.co.uk *on July 20th. Also now downloadable from the same page is the accompanying* Guidance Note on Conditions of Business Including Use When Contracting by E-mail. *Specialising in commercial law,* ***John Chadaway*** *of CHTA's solicitors, Brindley Twist Tafft & James, provides a brief introduction…*

The majority of the amendments to the terms and conditions in the revised *CHTA Guidelines for Conditions of Business* tighten the drafting of the existing provisions and make the following substantial amendments:

- The period within which a quotation by a member can be accepted by a customer has been reduced from 3 months to 30 days (to minimise the risk of members being caught out by any sudden external price increases); and
- Any disputes relating to a contract which incorporates the terms and conditions are to be heard by the Courts of England & Wales (so that even if a contract is formed by a member with a customer who is based abroad (for example, by e-mail), any disputes that arise in respect of such a contract will be heard in England or Wales).

The *Guidance Note* has been extended to assist members using the terms and conditions and contracting *by way of e-mail.* In particular, the note sets out the technical requirements that need to be met and deals with the practicalities of ensuring that the terms and conditions are incorporated into any orders placed by e-mail.

Please note that the *Guidelines for Conditions of Business* and the *Guidance Note* **must not** be used if a member contracts with consumers and/or if members contract directly through their websites.

(If members do or propose to trade in such a manner, they should contact Samantha Wright at Brindley Twist Tafft & James Solicitors on 02476 531532, or at *samantha.wright@bttj.com*, for advice).

Surface protection of stainless steel against wear whilst maintaining corrosion resistance

***Keith Laing**, Technical Development Manager at TTI Group Ltd, outlines the growing interest in "**S-phase**" processing.*

A large percentage of the stainless steel (>60%) used in the world is austenitic, somewhat less than it used to be due to the high and often variable price of nickel.

Stainless steels are of course chosen primarily because of their excellent resistance to corrosion; however, the austenitic grades are relatively soft and cannot be hardened. Galling, scratching and high wear rates are all problems associated with stainless steels; i.e. they have poor tribological properties - even in lightly-loaded applications.

A lot of time and interest these days is given to sources of renewable energy, many of the applications being marine-related. Obtaining an appropriate material having the right balance of good corrosion resistance, wear resistance and mechanical properties is the holy grail of many engineers. There are of course solutions which partly meet the criteria, such as using super duplex stainless steels; application of a coating such as HVOF or Cr plating can help, but these come at a cost and may not always meet all requirements.

Thermochemical surface treatments

All design engineers should be aware of the latest thermochemical surface treatment possibilities available to improve the tribological properties of stainless steels.

It is relatively widely understood that austenitic stainless steels can be nitrided (normally by plasma or salt-bath processing) to provide a hard wear-resistant surface layer. This, one would think, immediately solves the problem with stainless steels. Nevertheless, the first question I ask anyone who wants to harden the surface their beautifully-machined component by nitriding is: "*are you aware the corrosion resistance will be greatly reduced?*".

Unsurprisingly, often the answer comes back in the negative. The surface hardening which results during conventional nitriding of stainless steel is by the mechanism of formation and dispersion of fine precipitates of chromium nitride. This leaves the steel denuded of chromium in solid solution, the essential element of corrosion resistance, and with little or no corrosion resistance.

However, there is a solution. If austenitic stainless steel has to be used, methods are now available to surface harden this material and *still maintain or even enhance corrosion resistance.* Most of these processes are patented or have tradenames and are becoming more widely recognised. There have even been at least three major international conferences* specifically devoted to this subject in recent years.

S-phase

So, how do you create a hard surface on austenitic stainless steel without reducing the corrosion resistance? Answer: you need to produce what is known as "S-phase".

***S-phase conferences:**

- *Thermochemical Surface Engineering of Stainless Steels.* IFHTSE-sponsored international seminar in Osaka, Japan, November 2000. (See Hick A. J. "Stainless Steel 2000" explores thermochemical surface treatment options. *Heat Treatment of Metals, 2002.2, Vol.29, 48-49)*.
- *International Symposium on Advances in Surface Hardening of Stainless Steels.* 22-23 October 2007 in Cleveland, Ohio, USA. Sponsored by ASM Heat Treating Society and Case Western Reserve University.
- *International Symposium on Surface Hardening of Corrosion-resistant Alloys.* 25-26 May 2010 in Cleveland, Ohio, USA. Sponsored by ASM International and Case Western Reserve University.

S-phase, or supersaturation phase, was first reported by the late Tom Bell and Zhang in the mid '80s and is essentially expanded austenite. There are two forms: carbon S-phase, containing up to 12at%C, and nitrogen S-phase with a content of up to 25at%N. Carbon and/or nitrogen is diffused into the steel at temperatures below the critical temperature of formation of Cr carbides or Cr nitrides, and remains in solution interstitially. The FCC crystal lattice of the austenite is expanded and put under strain, thereby hardening the steel.

The critical factor in producing a carbon or nitrogen S-phase is temperature. Below a certain temperature carbon and nitrogen will diffuse into the steel, albeit very slowly; however carbides or nitrides will not be formed. *Fig.1* illustrates the threshold curves of formation of carbides in two 316 steels having different carbon contents. In this case, carburising an austenitic stainless steel at temperatures below the curve will result in a carbon S-phase and no chromium carbides.

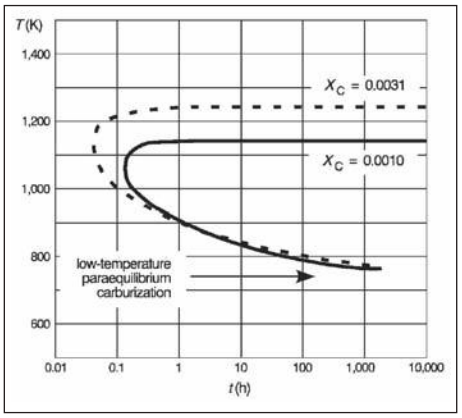


Fig.1: Time-temperature-transformation diagram for carbide formation in two 316 stainless steels with different carbon contents (Weiss & Stickler, 1972).

The other obvious factor which has to be overcome, before diffusion of carbon or nitrogen into the steel can happen, is the removal of the chromium oxide surface layer. It is this passive layer (approximately 50Å thick) which gives steels their stainless properties and prevents corrosion. Carbon and nitrogen cannot penetrate through this layer. The various techniques employed to produce S-phase first remove this layer and, critically, prevent it from reforming during the treatment.

Swagelok have possibly the most well known industrial application for S-phase, in the form of the ferrules in their fittings. The microstructure resulting from their patented *SAT12®* process shows the thin layer of S-phase at the surface (*Fig.2*). It is interesting to note that, unlike the core of the steel, the S-phase does not etch, highlighting the fact that the corrosion

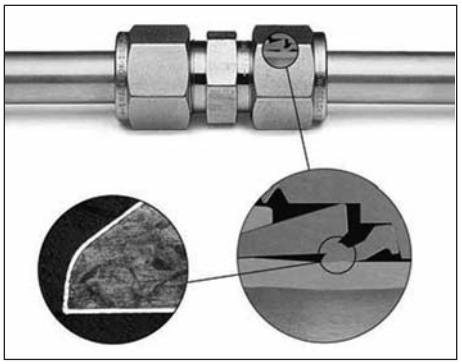


Fig.2: Swagelok fittings (Sunniva Collins & Peter Williams, Swagelok Co).

resistance of the stainless steel is enhanced.
Other processes exist, and are available in the UK, to produce S-phase. *Fig.3* illustrates an ideal situation where imparting S-phase works very well indeed. A simple rod and bush made from stainless steel will gall when used untreated. Processing both parts to produce S-phase eliminates this. Other techniques, such as chrome plating, would not easily overcome the problem and are likely to be more costly.
For non-austenitic stainless steels, such as the precipitation-hardening grades, surface hardness is not a real issue but galling or cold welding of the steel, during operation, can be problematic in some applications. In this situation, cold welding can be prevented by the application of a thin layer of PVD TiN coating.

Fig.3: Stainless steel rod and bush.

So, if you do have to use stainless steels for components, but you also need to have a functional hard-wearing surface which does not cold weld to the mating part, there are many solutions. Producing a hard S-phase on austenitic stainless is one treatment which may overcome an issue.

CRC exemption for companies with Climate Change Agreements

The following guidance first appeared in the Autumn 2009 edition of SEA's Surface Matters:

A participant with emissions included in CCA does not also have to include the same emissions in CRC, but these emissions need to be considered in the footprint-year assessment. In addition to these exclusions, there are three categories of exemption at organisation level based on the proportion of emissions covered by a CCA:

(a) Single entity exemption
If your organisation is not part of a group and has a CCA that covers at least 25% of its energy-use emissions, you will be exempt from the CRC for that entire phase. But if, for any reason, your organisation ceases to be covered by that CCA, you must participate in CRC from the beginning of the next compliance year.

(b) Group member exemption
If your organisation is part of a group and one of your subsidiaries has a CCA, then that subsidiary may qualify for a CCA group member exemption. If a subsidiary has at least 25% of emissions covered by a CCA, 100% of emissions will be exempt from CRC for an entire phase.
The rest of your organisation will still be included in the CRC, with all remaining emissions counting towards your total footprint, unless by excluding your subsidiary, your remaining half-hourly electricity consumption during the footprint year was less than 1,000MWh (see residual group exemption, below). If, for any reason, the subsidiary ceases to be covered by that CCA, its emissions will then have to be included in CRC as part of the organisation's total from the beginning of the next compliance year.

(c) Residual group exemption
If, after exempting a subsidiary or subsidiaries under the procedure covered in (b) above, your organisation's half-hourly electricity consumption in the footprint year is less than 1,000MWh, then your entire organisation would be exempt from that phase of the CRC.
If any part of your organisation is no longer covered by a CCA, its emissions will need to be included in your organisation's CRC emissions. If these then exceed 1,000MWh then you will lose your residual group exemption and you will have to participate in CRC from the next compliance year.

If any of the exemptions above apply in your case, you must:
- register as a participant,
- produce a footprint report detailing all emissions, including those covered by CCAs or EU ETS,
- compile and maintain an evidence pack as appropriate,

and participate in CRC for all parts of your organisation not exempted in the case of the group member exemption. Registration must take place by no later than 30th September 2010.

Full up-to-date details can be found on the Environment Agency website at:
http://www.environment-agency.gov.uk/business/topics/pollution/98263.aspx.

IFHTSE Congress returns to UK

Following this year's 18th event in Rio de Janeiro, Brazil, the 19th Congress of the International Federation for Heat Treatment and Surface Engineering (IFHTSE) is scheduled for Glasgow, Scotland on **17-20 October 2011**.
IFHTSE (*www.ifhtse.org*) is a not-for-profit body founded in Switzerland during 1971-1972. Its members are worldwide scientific and technological societies and associations, groups and companies with main or significant interest in heat treatment and surface engineering.
IFHTSE's central function is to promote and generate international communication on important issues in the science, practice and industrial application of heat treatment and surface engineering. To this end, it holds the regular Congress, organises a programme of specific-theme conferences and, recently, introduced *International Heat Treatment and Surface Engineering* journal; member groups also address particular issues of interest and importance.
Next year's IFHTSE Congress in Glasgow is only the second in this series of global events to be staged in the UK since they were inaugurated in 1981. The other (the 10th) took place in Brighton in 1996.
UK-based IFHTSE Secretary General Bob Wood reports that a call for papers has been issued and there will be wide range of sponsorship opportunities. For further details, contact the congress organiser's e-mail: *IFHTSE@in-conference.org.uk.*

EuP Directive: heat treatment furnaces

Earlier this year, CHTA's Secretariat alerted members that the working plan for the EuP (Energy-using Products) Directive now encompasses "industrial and laboratory ovens and furnaces", including heat treatment furnaces.
Whilst the emphasis seems to be on "Ecodesign", this could eventually impact on users as well as designers/ manufacturers of equipment. (Could those of us operating older furnaces ultimately be penalised?).
A preparatory study is being carried out by Cobham Technical Services (ERA Technology Ltd) in association with Bio Intelligence Service. Based on response to an initial questionnaire, a first draft report, covering "tasks 1-3" (definition and classification of furnaces/ovens to be reviewed / the market / technical requirements of users), was issued for discussion at an EC-arranged June stakeholders meeting in Brussels.
To register as a stakeholder, in order to receive regular updates on the study and/or to participate in the process, go to: *www.eco-furnace.org/register.php.*

Diary

September 28-30 2010
HEAT TREATMENT – 2010
Moscow, Russia
Fourth international specialised exhibition: technologies and equipment for heat treatment.
www.mirexpo.ru/exhibitions/termoobr10.shtml

October 5 2010
INTRODUCTION TO HEAT TREATMENT
Rotherham, England *www.namtec.co.uk*

October 5-6 2010
FURNACES NORTH AMERICA 2010
Orlando, Florida, USA
The Metal Treating Institute's conference and exposition: *www.furnacesnorthamerica.com*

October 6 2010
BIFCA Technical Series:
BURNER TECHNOLOGY
West Bromwich, England *www.bifca.org.uk*

October 7-8 2010
INTRODUCTION TO PYROMETRY
Bristol, England *www.equalearn.com*

October 10-14 2010
PM2010
Florence, Italy
Powder metallurgy world congress and exhibition: *www.epma.com/pm2010*

CHTA's next AGM... 12th May 2011

October 12-13 2010
HEAT TREATMENT FOR HEAT TREATMENT PROFESSIONALS
Rotherham, England *www.namtec.co.uk*

DON'T MISS...

October 12-14 2010
UNDERSTANDING HEAT TREATMENT
Birmingham, England
75th repeat of Wolfson's well-established course.
Details from:
Derek Close, Wolfson Heat Treatment Centre,
Federation House, 10 Vyse Street, Birmingham B18 6LT;
tel: 0121 237 1122; fax: 0121 237 1124;
www.sea.org.uk/whtc;
e-mail: derek.close@sea.org.uk

...PLACES STILL AVAILABLE

October 13-14 2010
MANUFACTURING TECHNOLOGY IRELAND 2010
Dublin, Ireland *www.industry.co.uk*

October 13-15 2010
66TH HÄRTEREI-KOLLOQUIUM
Wiesbaden, Germany
German-language heat treatment conference and exhibition: *www.awt-online.org*

October 14 2010
BIFCA Technical Series:
FURNACE AND BURNER CONTROLS
West Bromwich, England *www.bifca.org.uk*

October 17-21 2010
MATERIALS SCIENCE & TECHNOLOGY 2010
CONFERENCE & EXHIBITION
Houston, Texas, USA
Includes symposium on "Fundamentals, Applications and Innovations in Heat Treatment":
http://matscitech.org

October 22 2010
SEA AWARDS
London, England *www.sea.org.uk*

October 28 2010
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England

November 4-5 2010
REDUCING ENERGY CONSUMPTION IN HEAT AND THERMOCHEMICAL TREATMENT TECHNOLOGIES AND INSTALLATIONS
Poiana Braşov, Romania
Organised by the Romanian Association for Heat Treatment and Surface Engineering (ATTIS) with the support of IFHTSE:
www.attis.ro/docs/secondannouncement.pdf

November 9-10 2010
BIFCA Technical Series:
INDUSTRIAL FURNACE TECHNOLOGY
West Bromwich, England *www.bifca.org.uk*

November 11 2010
BIFCA Technical Series:
FURNACE MODELLING
West Bromwich, England *www.bifca.org.uk*

November 11 2010
CHTA MANAGEMENT COMMITTEE*
Birmingham, England

November 18-19 2010
NITRIDING SYMPOSIUM 2
Las Vegas, USA *www.nitriding.info*

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

ADVERTISER NEWS

FLUIDISED-BED HEAT TREAT FURNACE FOR TAIWAN

Clayton Thermal Processes Limited has shipped what is believed to be the largest fluidised-bed furnace for the quenching and tempering of tool steels.

With usable dimensions of 1300mm diameter by 2000mm deep, the furnace will be capable of quenching dies weighing in excess of 1000kg and has overall dimensions of 3.2m x 2.5m x 2.7m. It will be installed alongside a controlled-atmosphere pit furnace, which will be used for austenitising the large die blocks.

Weighing over eight tonnes, the unit has over four tonnes of aluminium oxide as a heating medium. It is rated at nearly 200kW and will heat up to a temperature of 500°C in about four hours.

The customer recently visited and accepted the unit, which is seen here being loaded onto a low loader prior to packing and shipping to Taiwan. It is expected that the client will be installing similar units at its other factories in the Far East.

Fluidised beds were chosen for their capacity to cool large blocks of tool steel as fast as possible without cracking. Additionally the customer was impressed with the temperature uniformity, fast heat-up time and the overall installation and running costs when compared with alternative technologies.

MEMBER NEWS

Keighley Laboratories invests in cutting-edge technology

CHTA member Keighley Laboratories, a UK technology leader in the analysis, testing and heat treatment of metals, has invested around £100k in upgrading its laboratory test house, in line with ever-more exacting customer requirements.

This is part of a wholesale site modernisation process, which will also see the development of new buildings and facilities over the coming months, with a view to positioning the company at the cutting edge of subcontract heat treatment and metallurgical solutions.

The core of this initial investment phase has seen the installation of new high-tech equipment that enables manual to semi-automated metallographic sample preparation, for handling the latest generation of superalloys, and powerful metallurgical microscopes for examining the microstructure of specimens, as well as digital image capture and analysis.

This laboratory resource will enable the specialised evaluation of the effect of the latest drilling and machining techniques on high-grade components, such as advanced turbine blades used in power plants and jet engines. Other capital investments include a new CNC lathe for manufacturing sample pieces, an X-ray fluorescence analyser, a non-destructive digital ferrite meter, and complete refurbishment of the test house.

Originally established in 1920, and this year celebrating its 90th anniversary, West Yorkshire-based Keighley Laboratories specialises in subcontract heat treatment, including induction hardening, carburising, nitrocarburising, tempering and stress relieving, and in metallurgical testing services, covering such disciplines as non-destructive testing, chemical analysis, metallography and problem and failure investigation.

The company has built successful client partnerships across a broad cross-section of manufacturing industry, such as aerospace, energy, transmission engineering, hydraulics, marine, mining and transportation. Its technical accreditations and approvals meet the requirements of insurance and inspectorate bodies, industrial primes, including aerospace, and major companies at home and overseas.

"Working for today's technically-demanding industry sectors, we have to deliver excellence and innovation across all of our metallurgical services," says Keighley Labs MD, Debbie Mellor. "That's why we have invested in state-of-the-art test house equipment and, in due course, will be redeveloping our South Street site, paving the way for more advanced surface engineering technologies. This will strengthen our overall capabilities and help cement our relationships with customers across all sectors."

The upgraded metallographic sample preparation and analysis facility allows Keighley Laboratories to work to the exacting requirements of leading aviation, gas turbine and other companies, its location on the edge of the North West Aerospace Alliance cluster positioning it well to serve the allied industries.

Please send comment and news items for December's *Hotline* 122 to: *mail@chta.co.uk*
Deadline: November 22nd

Market Movements

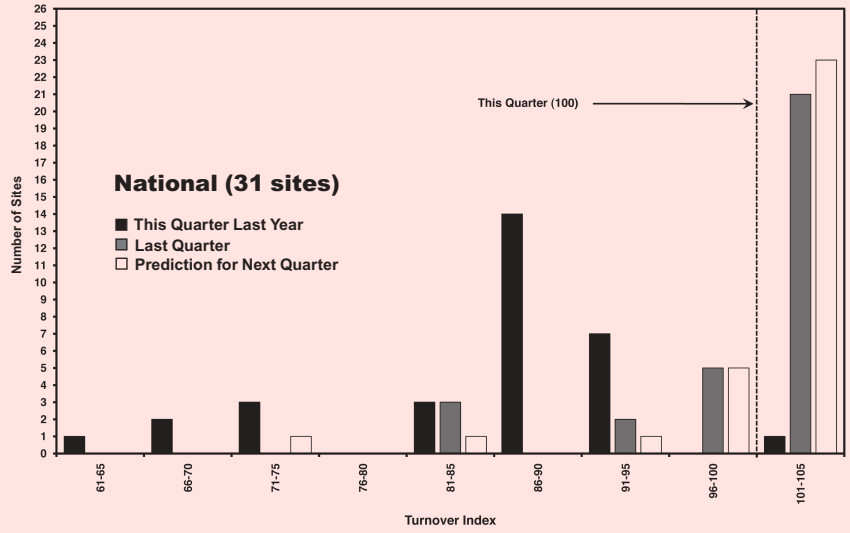
ANALYSIS OF QUESTIONNAIRE REPLIES RELATING TO 31 CHTA MEMBER SITES

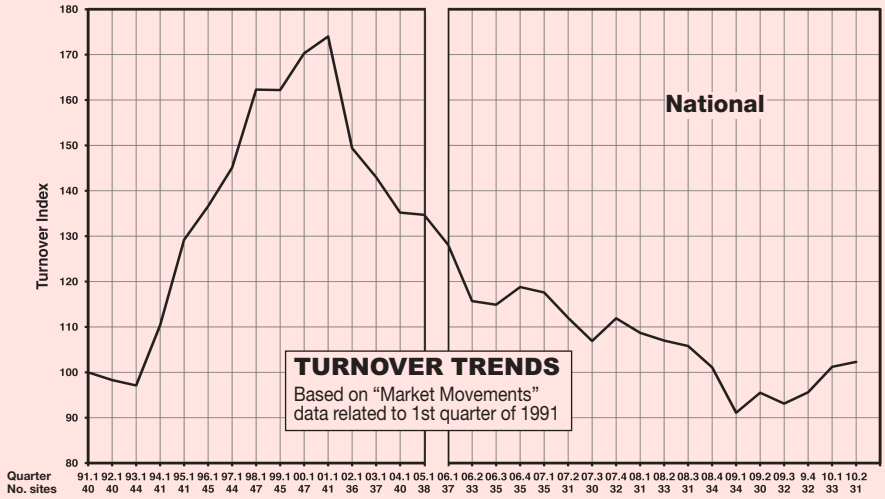
"THIS QUARTER" =

1 APRIL – 30 JUNE 2010

= TURNOVER INDEX 100

OVERALL ANALYSIS (31 SITES)	Mean index
This quarter last year	85.5
Last quarter	98.9
Predicted next quarter	100.0





STATESIDE STATS

HALF-YEAR NORTH AMERICAN SALES UP 17.7%

CHTA counterparts participating in the Metal Treating Institute's Monthly Sales Statistics Program reported heat-treating sales of $374.8million for the first six months of 2010, a gain of 17.7% from the $318.3million posted for the January-June period of 2009. June billings amounted to $68million, an increase of 39.7% compared with June 2009's $48.7million.

The latest returns indicate July sales of $64.3million, an increase of 41.8% over July last year when billings amounted to $45.3million.