The Contract Heat Treatment Association Newsletter

HOTLINE

Issue No. 160
June 2020

Inside . . .

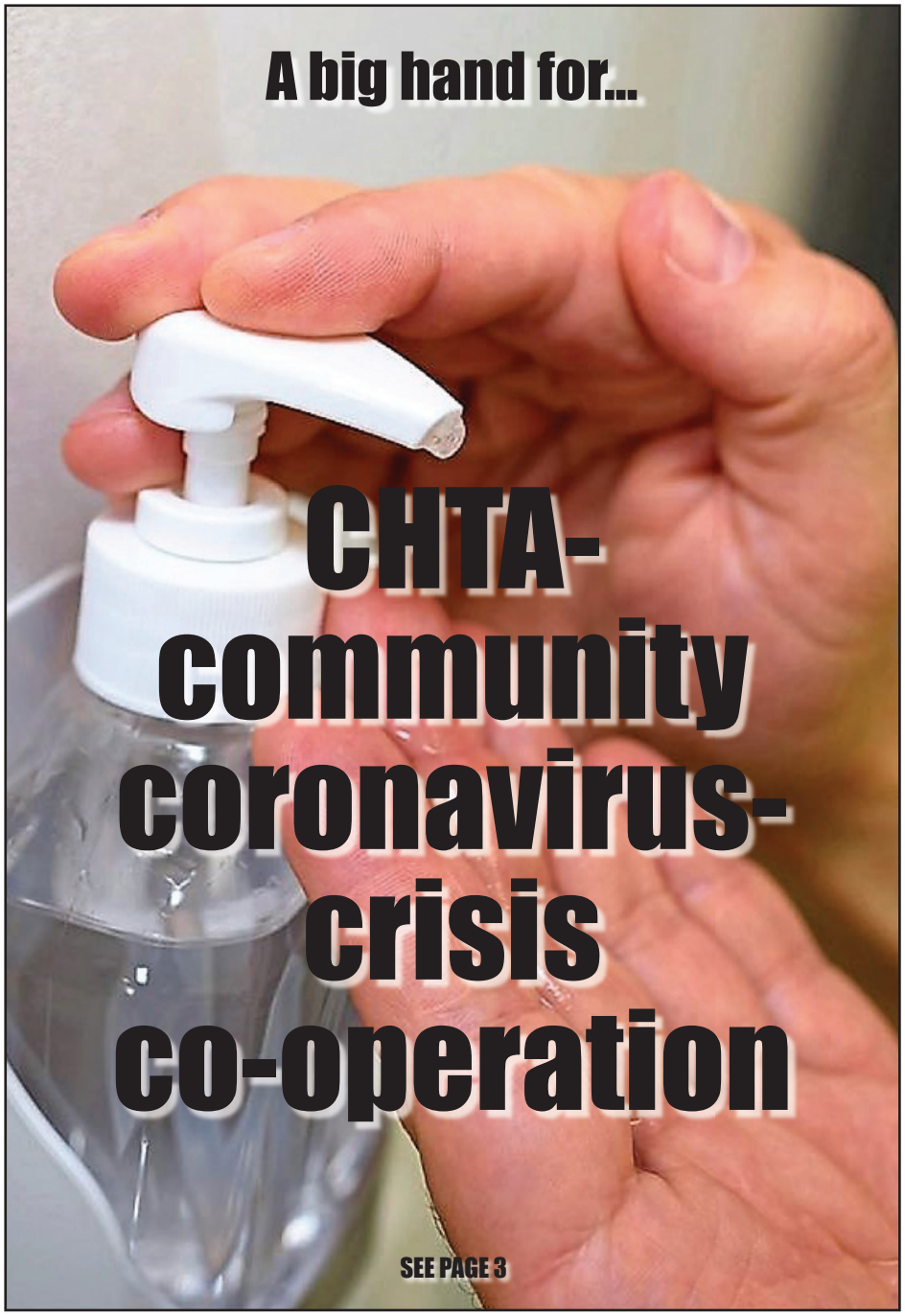
CHTA Secretariat

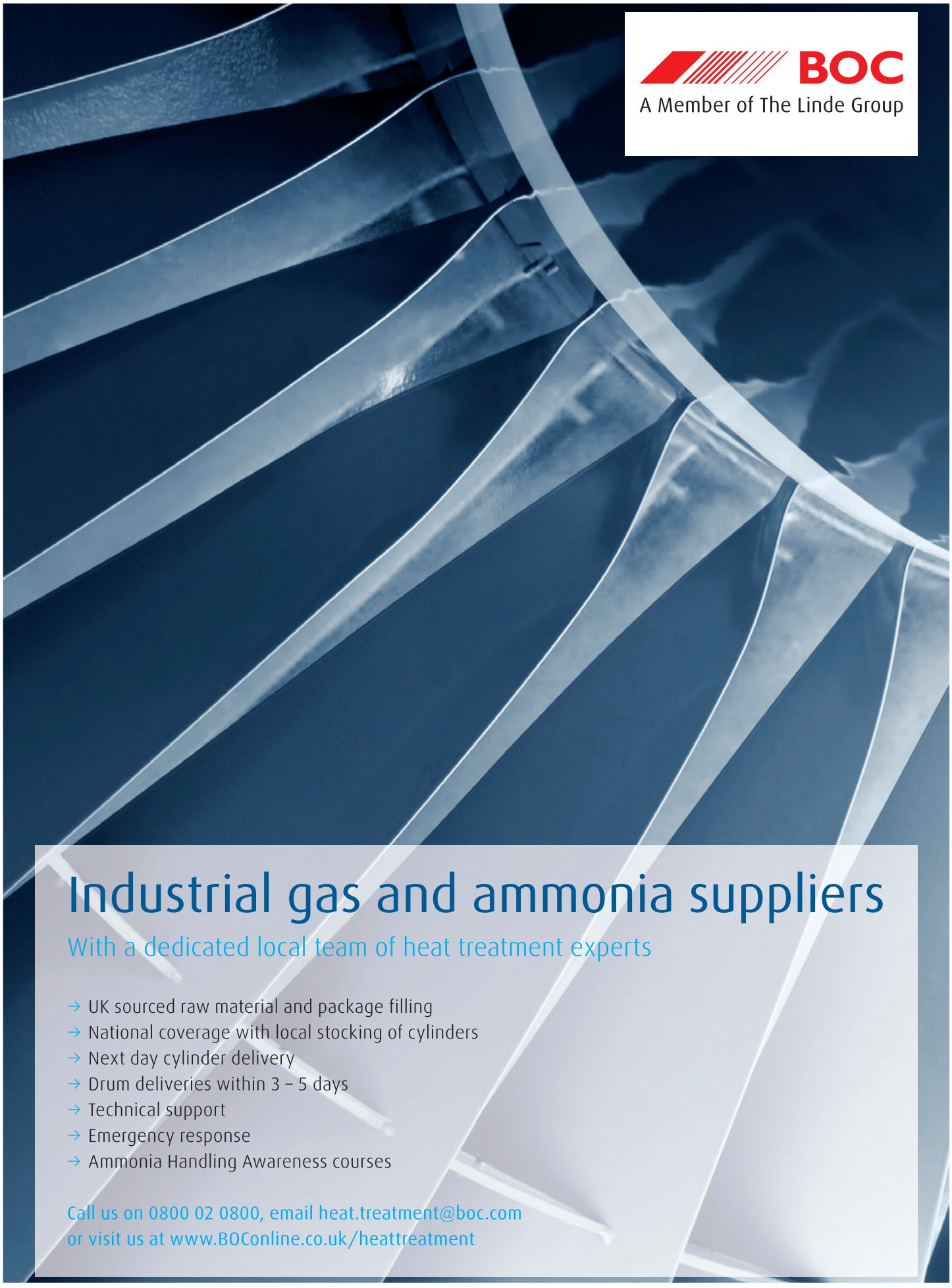
Items for inclusion in *Hotline* and enquiries about CHTA activities should be addressed to:

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

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

CHTA is affiliated to the Surface Engineering Association

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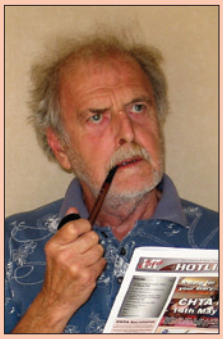
The CHTA community spirit



CHTA Secretary and Hotline *Editor* ***Alan J Hick*** *acknowledges member co-operation during testing times.*

In the different world of February, the month of my last haircut, I was busy putting together the previous edition of *Hotline*. At that seemingly far-off time, words and phrases like social distancing, sanitiser, furloughing and skeleton staff were not in the heat treater's vocabulary. Since then, they have come to dominate as the coronavirus crisis impacted.

What has become evident, meantime, is the emergence of a new-found community spirit amongst CHTA members, who have responded to the call to share experiences, following initial feedback from the Management Committee, on the basis that "we're all in it together". Since mid-March, with some justifiable exceptions, senior representatives of some 77% of member companies have participated helpfully in regular e-mail reports, entitled "CHTA Members Coping with the Coronavirus Crisis", to the benefit of all.

Our colleagues at SEA have also made valuable contributions, with Covid-19 updates on government guidance, business support, the job retention and loan schemes and invitations to partner-organisation webinars examining the questions raised.

MARCH

"We seem to be in limbo at the moment – some customers closing, others staying open and anxious that we do the same" was a typical early comment from members expressing concern for the future and noting high workforce anxiety, adoption of government/WHO guidelines and *"a reluctance of customers to settle overdue accounts"*.

There was also discomfort about unjust media pronouncements. As one of our members observed: *"I'm getting a bit fed up that the media are saying that only those "essential" businesses should be open but fail to follow the whole supply chain. The lack of information regarding engineering manufacturing sectors is not so good in my opinion and makes it look like we are being irresponsible. Does anyone share this view or did I miss something?"*

It was a shared impression, answered by a government update from the Department for Business, Energy & Industrial Strategy (BEIS), relayed by SEA's Dave Elliott as *"clearly showing that members can remain open and continue to provide their vital services to UK manufacturing"*. This reassurance was reinforced in subsequent messages from the Rt Hon Alok Sharma MP, Secretary of State at the BEIS, which we highlighted in the member reports:

- His 30 March article in *The Daily Telegraph* declaring: *"It's been disheartening to witness the sniping at firms who have every right to continue operating"…"These are difficult times for business. We cannot allow those who hate the private sector to use this crisis as an excuse to pile unfair criticism on them. We should stand up for those that are correctly following the rules. They are the same companies we will need to help fund our recovery when we finally get through this".*

Department for Business, Energy & Industrial Strategy

The Rt Hon Alok Sharma MP
Secretary of State
Department for Business, Energy & Industrial Strategy
1 Victoria Street
London
SW1H 0ET

T +44 (0) 20 7215 5000
E enquiries@beis.gov.uk
W www.gov.uk

8 April 2020

To those working in manufacturing and industry in the UK

At this unprecedented time for the UK I want to pay tribute to you for the work you are doing to keep the UK economy going.

As you know, the Government's priority is saving lives and we have advised that where possible, people should stay at home and work from home. However, our country needs your support to keep supply chains moving and key workers mobile, as well as to protect the economy as much as possible. Every business has a role to play in helping the country defeat coronavirus.

- His follow-up letter paying tribute to the manufacturing sector and the work it was doing to keep the economy going.

The month concluded with CHTA's new sponsor offering support:

A message to members from **CHTA Chairman Mike Leach**
(14 May 2020)

Our Secretary Alan here documents the sharing of information and experiences from CHTA companies over the last three months.

His report highlights a common theme, throughout that time, of how we have dealt with the threat of coronavirus and the need to take necessary precautions. The timeline also indicates how quickly the actions taken by our customers have dealt us all a second challenge of coping with reduced workloads and future cash flow.

It is always reassuring to know others share your experiences and it never hurts to hear how similar businesses are dealing with the same problems. We can all learn from each other.

As time moves on, I would think that most of us will be grateful for the swift action taken by the Chancellor Rishi Sunak, with his support to protect jobs and businesses. Not everyone has been as protected as manufacturing. The furlough scheme is buying several of our colleagues time for the situation to come back to some sort of normality. We face tough times but this support is far ahead of anything we received back in 2008/2009.

The hundreds of heat treatment workers throughout the CHTA community are now either at home (isolating or on furlough) or continuing to work. I hope that they all stay safe and well, over however long it takes to put this viral threat behind us, and that our heat treatment industry comes back stronger and able to continue into the future.

APRIL

"We have been identified as a key supplier by a number of customers, due to the markets they operate in, and intend on staying open, but at a level that meets the demand as long as this can be done safely".

Alongside reduced staff and working hours, furloughing, the (ir)relevance of business insurance policies and plans for Easter shutdowns, the impact on trading levels was now becoming the major topic of member input:

- *"We were very busy leading up to the*

shutdown and expect to be busy upon our return, with orders awaiting our attention from the get go. Beyond the next couple of weeks, the future is obviously as uncertain for us as it is for our competitors." This member caution echoed another's: *"Speaking to some of our customers, the order books are now slowing. A recession will hit us all, that I have no doubt. Let's hope that our customer base is not too badly affected".*

- *"Demand in March was the best March we have had for two years. Early April sales were high but dropped off over each side of the Easter holiday weekend (usually do when customers are coming up to a holiday); demand is now starting to increase again but has not yet reached previous levels".*
- *"Some industries are coping very well and we have seen little or no negative impact, as yet, whereas the likes of the already-struggling automotive customers were impacted very early into this crisis. In particular, motorsport (F1) is a complete disaster".*
- *"We have seen volumes drop to a third and we have over half our employees furloughed. We are still keeping a reduced capacity going and think this may continue for a few more weeks yet. There are signs that platers who were closed are reopening some capacity and some customers are looking to return this week or next".*
- *"The level of business seems to be bucking the trend in some areas, which leads me to believe that there are solid order books in certain market sectors and a tail-off in others".*
- *"We don't see any reason to think there will be an early return to normality once the lockdown is over. Accordingly, we are planning for long-term survival by satisfying any demand that is in existence and, at the same time, cutting all costs as hard as we can".*
- *"We have furloughed the majority of our workforce. However some of our customers are working and therefore product is still arriving; with our limited resources we are keeping on top".*
- *"Looking forward, working with the imperfect information we currently have, I can't see any recovery in business activity until at least mid-July and, thereafter, the "new normal" will be nothing like the old one. I can't even begin to imagine what the aerospace industry is going to look like and I've a great deal of sympathy for anyone whose business revolves around this sector".*

However, some reports of "unfurloughing" later in the month gave cause for a little more optimism.

Via SEA, we heralded the 20 April launch of the online claim service of the Coronavirus Job Retention Scheme, member experience of which has been positive:

- *"The CJRS scheme is very useful and I'm grateful for it".*
- *"We are now in the second period of furlough, having received the first payment within a week of submission."*
- *HMRC have rolled out and delivered an efficient and relatively straightforward scheme, and questions raised were promptly answered. Rolling out so quickly meant there were always areas that were slightly unclear. Those areas were addressed quite quickly".*

MAY

"Cannot believe it's been five weeks since we furloughed half our production team, office staff working from home, reducing shift patterns to suit processes, adhering to government and NHS guidelines with social distancing and hand sanitisers. Has been a bit of a blur and a bit surreal.

April figures show us 37% down on sales, glass half full, not bad for bodies left on the shop floor and a happy customer base, those who are still open. From Monday, we plan to open up the night shift (skeleton staff); this will bolster sales during May. Looking further ahead, who knows?"

Who knows? Perhaps the CHTA report preview of *Hotline*'s Market Movements (no.113) sheds some light on the overall picture. In these very difficult times for predictions, estimates of second-quarter turnover from almost half of CHTA-member sites, varying widely between 63 and 98%, average **81.2%** compared with the first quarter of 2020:

Market Movements

ANALYSIS OF QUESTIONNAIRE REPLIES RELATING TO 24 CHTA MEMBER SITES

"THIS QUARTER" = 1 JANUARY – 31 MARCH 2020 = TURNOVER INDEX 100

OVERALL ANALYSIS (24 SITES)	Mean index
This quarter last year (1 January – 31 March 2019)	**107.9**
Last quarter (October – 31 December 2019)	**98.1**
Predicted next quarter (1 April – 30 June 2020)	**81.2**

I write this in the week after the Prime Minister's roadmap urged a safe return to work where possible, whilst the Coronavirus Job Retention Scheme has been extended, and major engineering companies, such as JCB, JLR, Vauxhall and Ford, are about to resume production cautiously. These are amongst the multitude of factors that will influence what Market Movements no.114 will reveal about the state of our industry sector. That'll be interesting!

Sincere thanks to all CHTA members who have shared their coronavirus-crisis experiences and, if you will permit a pandemic cliché…**please stay safe**.

Now, when can I get to see my barber?

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Heat Treat Today
Technology, Tips & News for Manufacturers with In-House Heat Treat

...the USA's source of heat treatment news and information at *www.heattreattoday.com*

Carburizing trends in the automotive heat treating world

Bill Disler *brings his familiarity with big atmosphere carburizing systems and LPC automotive cell carburizing systems and looks at how the evolution of equipment and process requests says a lot about the trends we see today in automotive heat treating.*

Although many components undergo heat treatment processes, the powertrain - specifically, gears - typically requires more carburizing time than other automotive parts. Not surprisingly, the powertrain has also seen many changes in heat treatment trends.

Not only have powertrain designs gone through tremendous transformations, but so has the equipment being used to process those evolved components. Having spent years on the supplier side of atmosphere furnaces, vacuum carburizing and gas quench, as well as induction systems, I find it interesting to look back at some of the drivers that have helped morph this industry's heat treat needs.

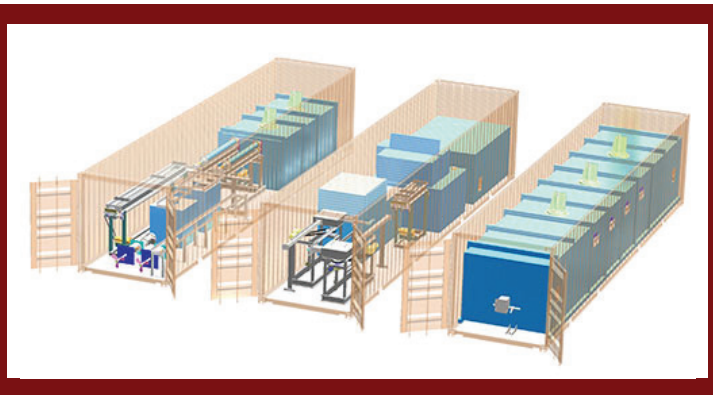
Large atmosphere pusher furnaces produced nearly all of the powertrain gears 20+ years ago. Today, cellular low-pressure carburizing (LPC) and gas quench systems carry the load, although the results have not been cost saving. Moving from high-volume gas-heated carburizing equipment to small-batch carburizing in electrically-heated furnaces did not reduce utility costs per part; instead, other areas adjusted to compensate. Eliminating the expense of hard grinding transmission gears was an acceptable rationale for this increase in both capital expense and operating costs. Eventually, streamlining the overall gear manufacturing process, combined with locating heat treat within machining lines, produced positive measurable results.

Plant traffic decreased, minimizing safety risks. Cooler and cleaner furnace systems were designed. And installations were made easier. Many agreed the changes were justified.

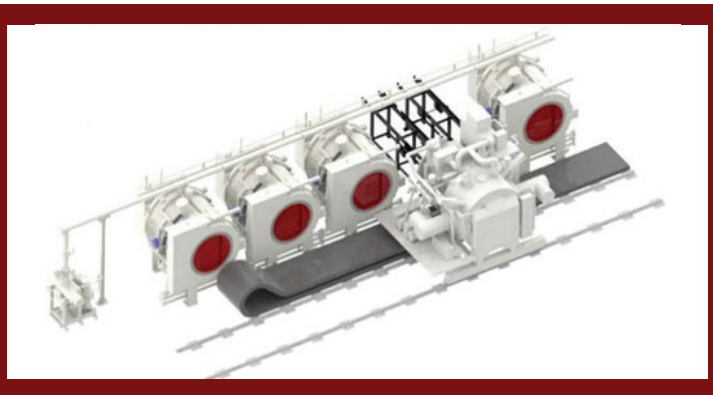
As we look back, many of these drivers for change proved valid. Others, not so much. In most cases, consumer preference for quiet powertrains necessitates hard grinding of gears. Green is in and talk of the absolute need for zero intergranular oxidation (IGO) in carburized gears has slowed. LPC/gas post-quenched parts are perceived as cleaner and leaner; however, it is often difficult to differentiate green parts from processed parts, so it has become a best practice to add part marking, after carburizing and hardening, to avoid even the remote risk of sending soft parts down the line to the next stage of manufacturing. Shot peening is still common for strength reasons. The ability to nest large cellular LPC systems within machining has been a success, but rarely

> "Eventually, streamlining the overall gear manufacturing process, combined with locating heat treat within machining lines, produced positive measurable results."

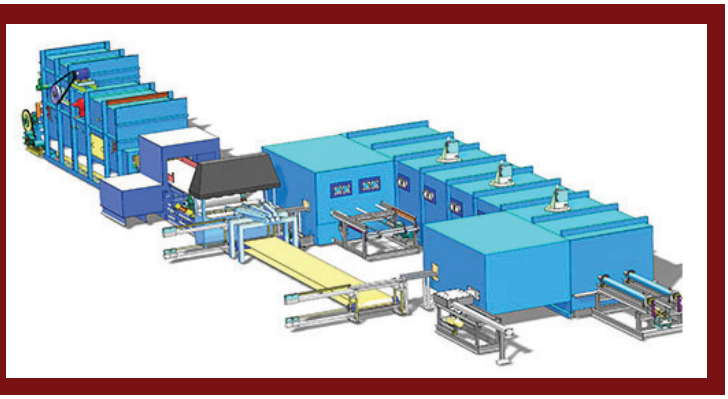
Traditional continuous atmosphere furnace



Integrated vacuum heat treat cells



Hybrid furnace concepts



"It is my observation that the automotive market is anticipating the next iteration of heat treat equipment."

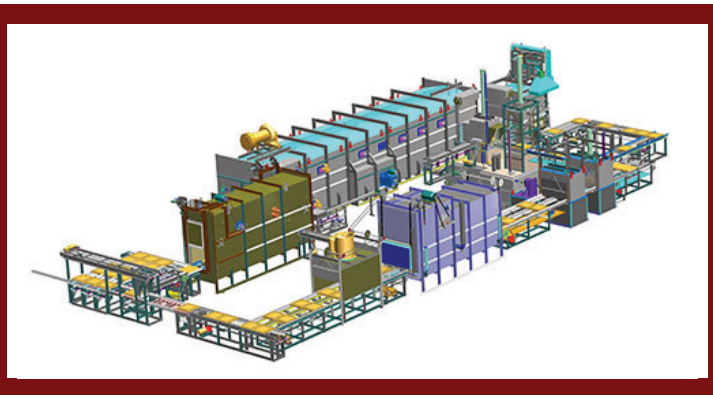
are the installations as quick and easy as promised.

Conventional atmosphere-furnace technology has advanced as well, although at a slower pace, in step with a renewed interest in energy efficiency, particularly in the USA where gas is cheap and electric is not. Combustion systems operate cleaner and at much higher efficiency than in the past. Having said that, it is curious how little interest end users have in trading cost-saving gas-heated systems for the easier to install, neater-looking electric-heating options. In addition, it is no longer common to use water for cooling conventional atmosphere-furnace systems as end users do not want to deal with the cost and complications that accompany this option. The market is polarized over this. LPC systems rely on large water volumes for cooling, and they are small-batch electrically-heated systems. At the same time, gas-quench systems consume huge quantities of water and require giant 300HP-plus motors that are tough to manage in plant power systems.

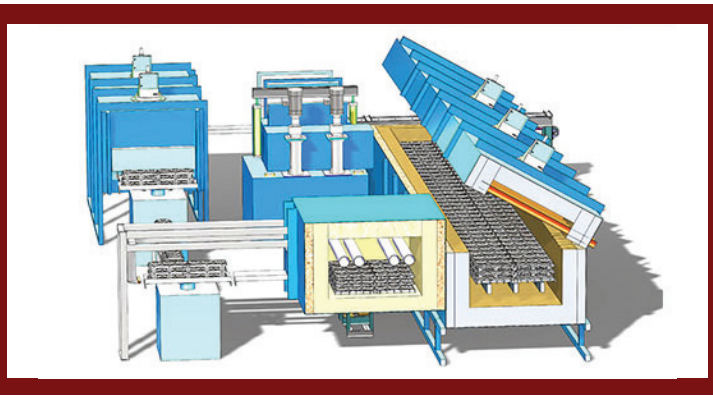
It is my observation that the automotive market is anticipating the next iteration of heat treat equipment. One type of process or equipment style will not fit all needs, yet all hope for the perfect single part flow solution - an elusive dream due to physics. The cost/time equation still does not balance, and carburizing offers the benefits many manufacturers are looking for, despite the desire to design the process out of practice. Many automotive transmission parts that were originally processed in LPC and gas quenched now use gas nitriding instead, even though gas nitriding is another long process, and nitriding introduces ammonia back into the process - something most automotive plants are not enthusiastic to have in their plants. Two steps forward and one step back.

With the widening range of processes and solutions under exploration, as well as ever-changing powertrain systems designed to accommodate supplemental electric

Flexible and re-deployable heat treat systems



Repackaging continuous furnace systems



motors, lighter weights, smaller cars and larger SUVs, all we can be certain of is ongoing change. I believe that we have witnessed major adjustments in automotive heat treat processing as the pendulum has swung from big multi-row atmosphere pushers with salt or oil quench to electric-heated cellular LPC and gas-quench units. One surprising result has been the resurgence of salt quenching, which controls distortion like high-pressure gas at a much lower cost with less complexity. Salt, like gas, is a single-phase quench medium: It does not boil in these processes like oil does, and it can be used at temperatures that support martensitic quench with far less thermal shock and much higher heat transfer than the options.

"Today's automation, process control technology and innovation can provide the foundation for brand new concepts, repackaging of older ideas, and hybrids of multiple technologies."

Older processes carry the baggage of tarnished past reputations, but I no longer count them out. Today's automation, process control technology and innovation can provide the foundation for brand new concepts, repackaging of older ideas, and hybrids of multiple technologies. Together, these create building blocks that heat treat equipment suppliers will use to meet changing trends in automotive carburizing and heat treatment. It will be interesting to be involved in the journey as these changes take place.

About the author:
Bill Disler is president and CEO of AFC-Holcroft, part of the Aichelin Group located in Vienna Austria. He is a member of the Board of Trustees, Metal Treating Institute (MTI), and a member of the Board of Advisors at Lawrence Technical University, College of Engineering in Southfield, Michigan.

Industrial mentor training within metallurgy and the broader spectrum

Offering support for industrial mentoring, M&C Educational Training Services Ltd review the benefits of this approach to employee training.

In essence, a mentor is there to guide mentees, to provide counsel when required and to aid them when assistance is needed. There are so many advantages to mentoring in the workplace and it is a major factor in having employees successfully gain awards and qualifications.

A well-structured mentoring program enables employees to thrive, advance and develop, whilst assisting employers with the retention of the talent they have nurtured and cultivated. Employees also feel valued for their skill sets and the organisation as a whole enjoys a sense of connectedness that many other programs fail to encourage.

In the eyes of potential candidates, offering a reputable and successful industrial mentoring program can make you a promising employer. This becomes essential when competing for top talent and trying to ensure that they come to you.

With someone 'in-house', that they can go to if they should struggle, means that there is a much higher success rate of course completion than if an employee was completing a course on their own.

A solid mentoring program can also increase retention of existing employees, ensuring that they feel supported, confident and understand that there are opportunities provided for them to develop within their organisation. The opportunities that are presented to the employee also strengthen the bond of trust for the company.

Steve Roberts, the Quality Director from Alloy Heat Treatment, gave his take on the importance of the industrial mentor: "A successful mentor should gain a sense of fulfilment and personal growth, whilst developing guidance qualities. The mentor should be willing to teach what he/she knows and accept mentees where they currently are in their development. Good mentors can remember what it was like just starting out in the field, therefore not taking the mentoring relationship lightly. They understand that worthwhile mentoring requires time as well as commitment and are willing to continually share information along with their ongoing support to the mentee".

Productivity in the workplace can also be boosted by mentoring. As employees develop their skills, and become more efficient from the additional guidance and training provided by an Industrial mentor, their confidence, understanding and abilities improve.

During the process it is not only the mentees who develop. The industrial mentors can also learn about their own work style and leadership capacity as they hold up a mirror to their own approach. Thomas Whiskin, of ASAMS, has been an industrial mentor. He states: "During this process, I have been introduced to Bloom's taxonomy of learning; I can see how effective mentoring can encourage students to learn at a higher level than they may otherwise be inclined. This can take the form of probing questions or asking the student to apply, analyse and evaluate their learning. This should encourage a much deeper level of learning and understanding of the material."

When employees join a programme of education with institutions such as M&C Educational Training Services Ltd, it is going to fall into the 'part-time' bracket. This means added stress on the employee due to the need to not only complete work tasks, but also meet assignment deadlines with the chosen course, making sure that the lesson programme is completed as well. This is where industrial mentors again prove themselves to be worth the small investment to the company. The industrial mentor can aid the employee with time-management skills, can act as a go-between with the company and the training provider, and relay vital information back regarding the employee's stress levels. The mentor can also liaise with the employee's HR manager to enable additional time during work hours if required to complete any work. This small set of actions can make the difference of an employee passing the course or dropping it.

Richard Brown of M&C Educational Training Services Ltd states: "Past experience of industrial mentor training with regards to retention, achievement and success is enhanced by an industrial mentor in the workplace. Current mentor training has been widely successful and engagement with companies is much stronger when this is in place".

Once a company has invested in a chosen person to be an industrial mentor and a structured scheme, to external organisations it clearly demonstrates the employer puts resources into its company, places value on its workforce, is committed to its company's staff career progression and success, and that it ensures the output of its workforce is to the highest standard.

So, in summary, the industrial mentor is the integral cog in enabling success for all. This is why M&C have decided to run a Level 5 Industrial Mentor qualification so all companies have access to inserting this asset into their company.

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Go to... *www.chta.co.uk*

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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 to each of the above charges.

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.

2020 DEADLINES

Issue	Publication month	Order deadline	Copy deadline
Hotline 160	June	8 May	15 May
Hotline 161	September	7 August	14 August
Hotline 162	December	6 November	13 November

For further details, contact *Hotline* Editor Alan J. Hick.
Tel: 0121 329 2970; e-mail: *mail@chta.co.uk*

Finally getting started

They say 'time flies' but not if you are trying to build...

A brand-new aluminium heat treatment facility

Heat Treatment 2000 *Directors* ***Paul Barber*** *and* ***Adrian Ordidge*** *report completion of the CHTA member's much-delayed project…*

Due to high demand for our services, continuous improvement activity, more stringent controls and quality demands, Heat Treatment 2000 Ltd decided, way back in 2017, to build a new factory for aluminium-alloy processing. The hurdles that we faced to please the Council, Coal Board, Canals Trust and Severn Trent were numerous, and 18 long months were lost before we even started the footings! Western Power also had to upgrade the supply in the street to cope with our anticipated electricity demand.

Three years later, the company finally emerged triumphant, with a bespoke-built facility which includes four rapid-quench ovens, each capable of a 3-ton charge and quenching into hot water, cold water or polymer, all of which are temperature controlled and on a moving bogie weighing in at 80ton. A combination of electric and gas-fired ovens, with the tightest controls, will satisfy the ever more demanding requirements of the automotive and aerospace industries.

A new agitated-rinse and power-washing facility was added to ensure polymer is removed from the smallest of ports on more complex castings. A setting facility and new walk-in freezer have also been incorporated, along with five new precipitation ovens, with automatic door opening, to finish the suite.

All customer product is computer tracked using a bar-coded system. A new Brinell test machine and Foundrax measuring instruments ensure accurate test results are achieved every time. The addition of a 'lift assist' lifting arm, for the larger/heavier castings, ensures customer product is handled correctly and eliminates the risk of damage, not to mention the health and safety benefits for employees.

In summary, capacity has trebled as we continue to invest, despite the pandemic and its economic impact.

HT2000 was amongst the first 0.2% in the world to achieve IATF 16949, showing quality is at the forefront of our operation. We always use an external body to carry out CQI-9 audits, which gives customers greater confidence as a result of the independent scrutiny of the standard.

The £2.5million investment demonstrates our commitment to existing customers and our goal of meeting increasing demands for quality and speed of service, all at a competitive price. A *YouTube* video is available; just search for Heat Treatment 2000 and see what has been achieved or access via our website at *www.ht2000.co.uk*. For more info, contact *sales@ht2000.co.uk* or call 0121 526 2000.

Commissioned at last

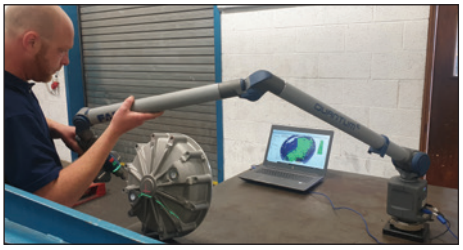
Providing precision when the 'heat' is on

When Alloy Heat Treatment (AHT) was established in 1974, it became the first UK company dedicated to the heat treatment of aluminium alloys. To satisfy ever-increasing demands for its wide range of services, the Dudley, West Midlands-based subcontractor has continuously expanded its facilities, invested in the best available heat treatment plant and increased its skilled workforce.

The busy CHTA member now operates 19 furnaces that provide the capacity to keep pace with customer demand. It has the ability to heat-treat a wide variety of aluminium products, from sheet metal to large sand castings, ranging in weight from just a few grams to over 2.5tonne.

The business operates a setting department that removes quench-process distortion in the treated condition whilst products remain ductile. To increase the setting department's precision capabilities, and to speed-up the throughput of its important work, an advanced Quantum E ScanArm was recently purchased from FARO UK.

AHT Director Sales & New Projects Manager, Ian Perks explained: "After considering several FARO models, we chose the Quantum E ScanArm due to its speed, ease of use and impressive accuracy specification. Also, given that it will be used in a working environment, it helped our decision that the Quantum E has an impressive IP rating and is resistant to the ingress of dust and fluids".



AHT specified a FARO Quantum E ScanArm fitted with a Prizm Colour Laser Line Probe – the world's only colour laser line probe for portable measurement arms. When used in combination with this, the Quantum E delivers uncompromising levels of performance across all applications that require accurate colour point cloud data capture.

Matching the Quantum E's impressive speed of operation, the ScanArm's sophisticated new electronic design guarantees optimal wireless operation for scanning and probing, allowing gathered data to be transmitted, via high-speed wireless methods, across the entire manufacturing floor.

FORTHCOMING EVENTS

Diary

Subject to pandemic postponement/cancellation:

June 16 2020
PRI WEBINAR: HEAT TREATMENT OF ALUMINIUM ALLOYS *https://p-r-i.org/pri-training/*

June 25 2020
PRI WEBINAR: HEAT TREATMENT IN BRAZING
https://p-r-i.org/pri-training/

July 28 2020
PRI WEBINAR: HEAT TREAT CONTROL & INSPECTION
https://p-r-i.org/pri-training/

July 30 2020
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England

August 13 2020
CHTA MANAGEMENT COMMITTEE*
Birmingham, England

August 19 2020
PRI WEBINAR: BASIC METALLURGY OF HEAT TREATMENT *https://p-r-i.org/pri-training/*

September 8-12 2020
5TH INTERNATIONAL CONFERENCE ON THERMAL PROCESS MODELLING AND SIMULATION (ICTPMS)
Cavtat, Croatia *https://hdtoip.fsb.hr/*

September 14-15 2020
INTRODUCTION TO PYROMETRY
Manchester, England *https://p-r-i.org/pri-training/*

September 15-17 2020
HEAT TREATMENT 2020
Moscow, Russia
14th annual international exhibition, the only one on thermal equipment and technologies in Russia.
www.htexporus.com/

September 22-24 2020 (New date)
21ST CHINA (GUANGZHOU) INTERNATIONAL HEAT TREATMENT & INDUSTRIAL FURNACE EXHIBITION
Guangzhou, China
www.julang.com.cn/english/reculi/index.asp

September 23 2020
SPAIN HEAT TREATMENT CONGRESS
Bilbao, Spain *http://metalspain.com/heat-treatment.htm*

September 23-26 2020
THERMPROCESS CHINA
Shanghai, China
www.tubechina.net/en/exhibition/TPChina.html

September 24 2020
PRI WEBINAR: HEAT TREATMENT IN BRAZING
https://p-r-i.org/pri-training/

September 29 2020
PRI WEBINAR: BASIC HEAT TREATMENT
https://p-r-i.org/pri-training/

September 30 – October 2 2020
FURNACES NORTH AMERICA 2020
Louisville, USA
14th FNA conference and exposition produced by the Metal Treating Institute and its media partner, *Industrial Heating* magazine. *www.furnacesnorthamerica.com*

October 2 2020
SURFACE ENGINEERING GALA DINNER & AWARDS
Birmingham, England *www.sea.org.uk/2020-awards/*

October 6-8 2020
EUROPEAN MODERN FURNACE BRAZING SCHOOL
Pontardawe, Wales
www.wallcolmonoy.com/products-capabilities/brazing-alloys/brazing-school/

October 13-15 2020
14TH HEAT TREAT SHOW – 2020
Mumbai, India
India's largest exhibition/conference on heat treatment.
www.htsindiaexpo.com/

October 14 2020 (New date)
MEXICO HEAT TREATMENT CONGRESS
Queretaro, Mexico
http://metalspain.com/mexico-HT.htm

October 20-22 2020
76TH HÄRTEREIKONGRESS
Cologne, Germany
Heat treatment congress, including exhibition:
https://www.hk-awt.de/

October 19-20 2020
INTRODUCTION TO PYROMETRY
Derby, England *https://p-r-i.org/pri-training/*

October 21-22 2020
PRI SPECIAL PROCESS COURSE: HEAT TREATING (OWNER)
Derby, England *https://p-r-i.org/pri-training/*

October 22 2020
CHTA PUBLICITY SUBCOMMITTEE*
Birmingham, England

November 4-5 2020
ADVANCED ENGINEERING 2020
Birmingham, England *www.advancedengineeringuk.com*

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

Market Movements

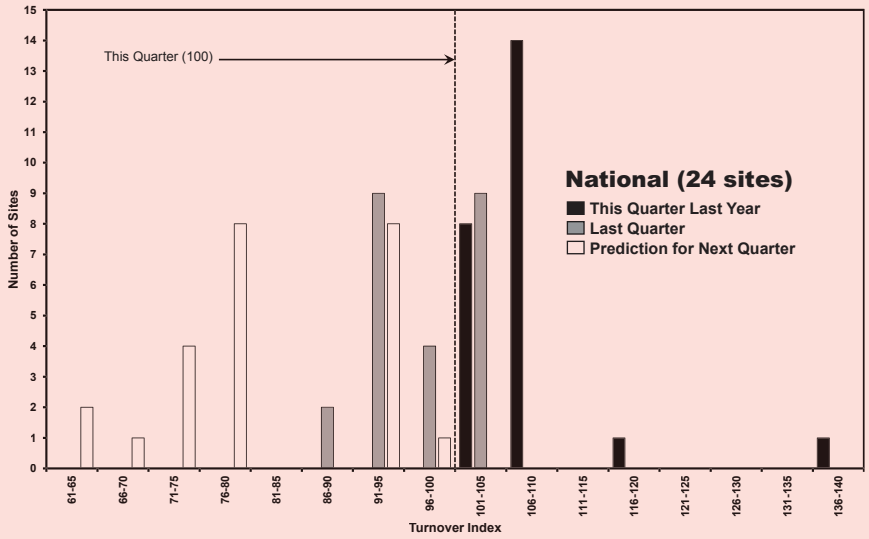
ANALYSIS OF QUESTIONNAIRE REPLIES RELATING TO 24 CHTA MEMBER SITES

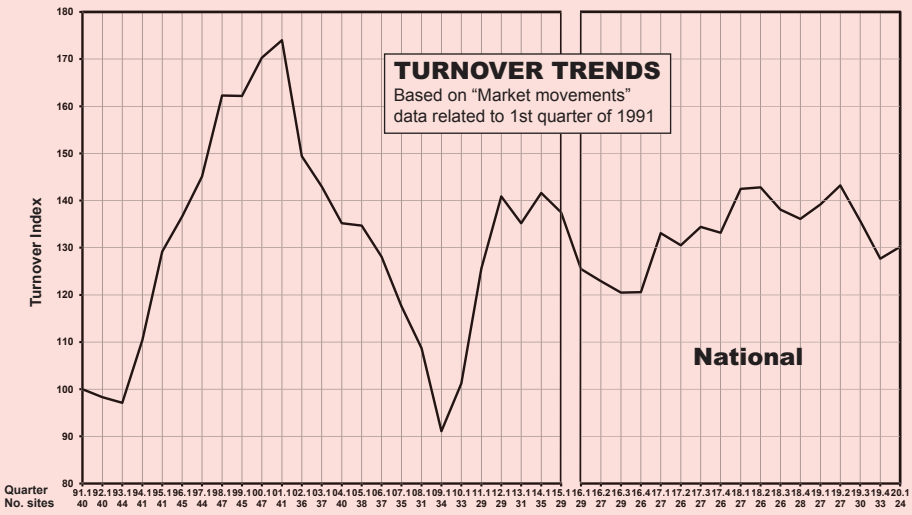
"THIS QUARTER" =

1 JANUARY - 31 MARCH 2020

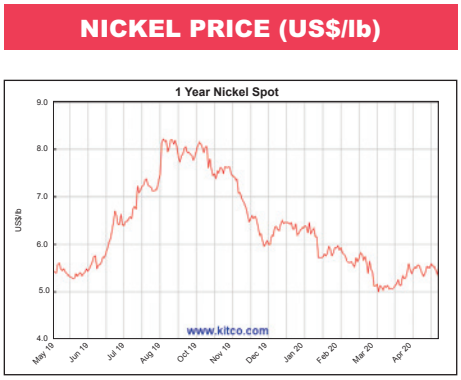
= TURNOVER INDEX 100

OVERALL ANALYSIS (24 SITES)	Mean index
This quarter last year	107.9
Last quarter	98.1
Predicted next quarter	81.2





NICKEL PRICE (US$/lb)



Please send comment and news items for September's *Hotline* 161 to: *mail@chta.co.uk*
Deadline: August 14th