

Heat Treat Today

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

Aerospace
Automotive
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Heat Treat Buyers Guide

a service of Heat Treat Today

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3rd Annual Edition

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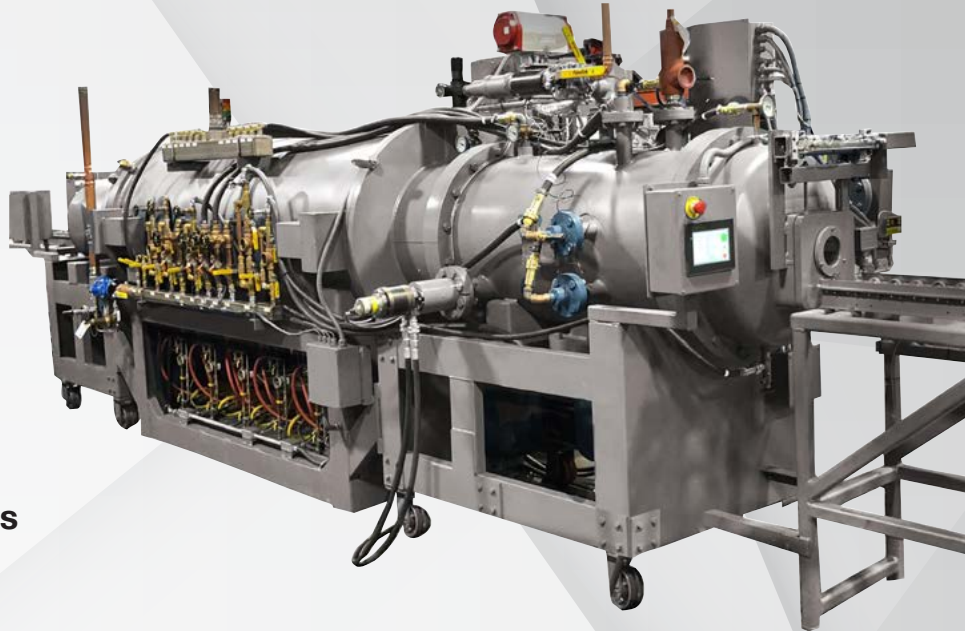
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Heat Treat Today

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PURPOSE/VISION/MISSION

"We believe people are happier and make better decisions when they are well informed."

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The Lord's loving kindness indeed never ceases,
 For His compassions never fail.
 They are new every morning;
 Great is Your faithfulness.
Holy Bible, Lamentations 3:22-23

Columns

P6 COMBUSTION CORNER

Checking Your System's Logic

We're breaking from radiant tubes systems and addressing problems our readers operating older equipment face: Does your safety logic measure up?

By John Clarke, Technical Director,
Helios Electric Corporation



P7 Conserve Electric Power and Save Dollars in Vacuum Processing

Generally, electric power consumption is insidious, because it is not seen and is not considered enough by operating personnel. Uncover sources of power consumption at a typical heat treat plant and ways to conserve it.

By William Jones, CEO and Founder/Owner of Solar Atmospheres Group of Companies, and Roger A. Jones, CEO Emeritus at Solar Atmospheres, Souderton, PA

P90 Meet the Consultant

The brain drain is real. As new professionals enter the industry, **Heat Treat Today** is helping to ensure that young and old inquiring minds can connect with and grow from the experiences of high-value industry experts. Get to know three **Heat Treat Consultants**: Thomas Wingens, Jon Tirpak, and Dan Kay.

By **Heat Treat Today** Editorial Team

P94 SUSTAINABILITY INSIGHTS

Sustainability Corner: NEW Sustainability and Decarbonization Webinar Series

Four webinars on steps heat treaters can take to decrease carbon emissions? Learn all about it.

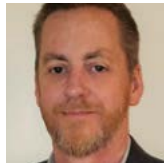
By IHEA Editorial Team

P95 CYBERSECURITY DESK

Work-from-Home Cybersecurity Tips and Best Practices

Work-from-home benefits and challenges extend to work-from-travel occasions! Access corporate networks and systems with 8 cybersecurity best practices.

By Joe Coleman, Cybersecurity Officer, Bluestreak Consulting™



P96 News from Abroad

In this issue, it's about the "new" international news: new equipment, new investment, a new association member, and a new report.



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The latest in equipment, personnel, company updates, and kudos from around the industry.

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Get to know fellow heat treat manufacturers in MTI.



2023 Heat Treat Buyers Guide Industry Directory

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See this list of companies in alphabetical order.

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P26 Heat Treat Furnaces, Ovens & Induction Equipment

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P45 Heat Treat Components, Supplies & Materials

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P58 Heat Treat Controls, Instrumentation & Sensors

If you're in the market for controllers, flow meters, gauges, pyrometers, thermocouples, software, and more, be sure to look through these pages.

P66 Heat Treat Auxiliary, Sub-Systems, Ancillary Equipment & Services

Chillers, oxidizers, and parts cleaning equipment are found here.

P71 Heat Treat Lab, Testing & Materials Characterization Equipment

Look here for creep testing, all varieties of hardness testers, microscopes, and tensile testing devices.

P72 Heat Treat Gases & Atmosphere Generation Equipment

This is the place to find various gases, endo and exo generators, as well as hydrogen generators.

P76 Commercial Heat Treating Company Directory

Flip through this section to find commercial heaters and their processes and services.





Letter from the Publisher

It's All About Buying & Selling

The magazine you're holding in your hands (or reading digitally) represents the 3rd annual buyers guide that **Heat Treat Today** has put together. And while this edition is OBVIOUSLY targeted toward helping buyers of heat treat equipment, components, supplies, materials, and services find suppliers of those items, matching buyers with sellers is at the very heart of why **Heat Treat Today** exists.

We believe people are happier and make better decisions when they are well informed. That is our mantra, our oft-repeated "Why Statement," and the guiding light which informs everything we do.

With the publication of a buyers guide — and the industry's BEST buyers guide in my humble opinion — it is pretty obvious that we are helping buyers stay well informed. But there is a litany of other things we do month-in and month-out that help keep users of heat treat equipment well informed . . . and happier.

You might not be aware that...

1. At least one new piece of heat treat related information publishes EVERY WEEKDAY on www.heattreattoday.com. If you'd like to receive that daily dose in your email inbox, subscribe to receive the **Heat Treat Daily** e-newsletter.
2. Every Tuesday is "Technical Tuesday," where our editors pick an especially interesting technical article to feature on the website website and in the **Heat Treat Daily**.
3. Eight times a year, we publish and distribute a print magazine with a corresponding "digital replica." You can see all 29 of our past editions at www.heattreattoday.com/

digitaledition. Seven of those eight times, the magazine is packed with helpful technical and commercial content that is intended to keep our audience well informed so they can make better decisions. The eighth edition, this buyers guide, is a less technical resource to help you find heat treat equipment and service providers.

4. Besides eight print/digital editions each year, we regularly deploy over six different types of e-newsletters. In addition to the **Heat Treat Daily** mentioned earlier, four other e-newsletters target the heat treatment in specific industries: aerospace, automotive, medical, and energy (oil and gas, nuclear, wind, etc.). The monthly **Heat Treat Shop** e-newsletter highlights components, parts, services, and supplies for those involved with heat treating. A monthly e-newsletter announces each print/digital edition. Additionally, numerous companies contract with us to send marketing e-blasts.

5. Twice-monthly, we produce the industry-leading podcast called **Heat Treat Radio**; it is available in video, audio-only, or transcribed. Access the episodes at www.heattreattoday.com/radio or on your favorite popular podcast platform, as well as Vimeo and, if you must, YouTube!
6. Returning to Pittsburgh, PA, this year, we present **Heat Treat Boot Camp**, an annual event that introduces beginners to the North American heat treat industry. This year, it will be held on September 18–20. More at www.heattreatbootcamp.com. Would love to see you there.



By The Numbers

You might also find it interesting to know the following numbers:

- 16** — the number of full-time or part-time employees or dedicated partners who produce all aspects of **Heat Treat Today** — the *most* in the industry
- 10** — the number of editors preparing content each month, four of which are heat treat industry consultants, which is, again, the *most* in the industry
- 4** — the number of client-centered salespeople whose sole mission is to help suppliers to the industry find the best way to reach YOU: primarily, heat treat professionals working for North American manufacturers with in-house heat treat
- 22,000** — the number of database contact records. Not all of you receive every e-newsletter or magazine we produce, but you have ALL recently engaged with us in some way
- 7,000** — the average number of monthly visitors to our website
- 12,000-15,000** — the number of magazine subscribers

It's All About Buying & Selling

We're happy to be playing the critical role of keeping you well informed — and hopefully happier because you can make better decisions. If you think of a way that we can be MORE helpful, please let us know. Enjoy this 3rd annual edition of the **Heat Treat Buyers Guide**. Happy shopping! **HTT**

Contact Doug Glenn at
doug@heattreattoday.com



Message from the Editor

Take a Bike Break

A bike frame caught my eye the other day. It has a lot going for it: athletic (not me), hardcore (not me), and outdoorsy (not me). But the most important feature? "The Soma Jawbone is built on a Tange Prestige heat-treated double-butted CrMo steel frame with clearance for up to 29" x 2.25" and 27.5 x 2.6" tires (with good mud clearance)"; now, I have a pressing desire to analyze the quality of my bike shuffled back in the shed.

There is something essential about the experience of biking which forces the rider to accept silence. Take different modes of travel: I can busy myself while driving along highways by calling my Maryland tribe, listen to a podcast while walking, and fill any moment of silence at home with squirrel feeder obstacle course videos. But on a bike, the continuous physical and mental engagement distances me from riding companions and focuses my mind on the scenery or a lingering thought in my mind.

These opportunities to transition and think, these "bike breaks" — real bike or not — are necessary to allow thoughts

to reside, untangle, and spring forth with clarity. One time as a tree-watching car passenger, I started thinking about prime numbers: *Was there a method to find them? Surely. With all being odd numbers, let's start with a relevant, small, odd number 3. . . well, any number that is a multiple of three and not divisible by 2. Ok, but let's get rid of the divisibility by "3" . . . add or subtract 2 to any multiple of three . . . 21+2 is 23, yes! 21-2 is 19, yes! 27-2 is 25, no!! Well . . . how about: "To find a prime number, add or subtract '2' to any odd number which is a multiple of three. If the number does not end in a '5,' that is (very likely) a prime number!"* Based on some wandering thoughts on a car drive, I was able to create a "prime number finder" method. (And, no, this is not completely accurate. It doesn't account for most 7s and higher primes.)

But beyond the joys of mental gymnastics, bike breaks should be taken in the midst of mundane or mega work concerns. Rather than getting sucked into the course of work, when have you taken a bike break to consider any of

these questions freely: *What preventative maintenance plan should have been installed yesterday? Where can safety be improved for furnace operators? Do we have the right people, and how are we bringing newcomers — future leaders in North American heat treat — into the fold? Should we incorporate laser heating or leverage plasma nitriding processing?*

Poll: The last bike break I had was . . .

- a. In my dreams — I don't have time to think!**
- b. Sitting down in my office/home**
- c. On a walk the other day**
- d. Car/bus/train ride**

There is such joy to work and to being alive, as well as hardships. Accessing the joys and unravelling the hardships may be just a bike break away. **HTT**

Contact Bethany Leone at bethany@heatreattoday.com



The advertisement of the Soma Jawbone notes heat treated steel frame as key to its design. (Source: Bikepacking.com)



Checking Your System's Logic

This month we will break temporarily from our discussion of radiant tubes systems to address a problem faced by our readers who operate older equipment. Does your safety logic measure up? Have you availed yourself of the latest thoughts about how to best construct a safe system?

The National Fire Protection Association (NFPA) publishes various codes and standards to guide the design of heat process equipment. These codes and standards are under constant review by experts in the field and are updated regularly. The latest versions of NFPA 85, 86, 87, and others are readily available for download at [nfpa.org/Codes-and-Standards](https://www.nfpa.org/Codes-and-Standards) for about a hundred dollars. The investment in reviewing new versions of critical standards provides valuable insight into the thinking of experienced professionals who apply their ongoing experience as they seek to make our combustion equipment ever safer.

The standards above are generally prescriptive — in that they specify devices and locations, but they also teach the reason behind specific requirements if the reader slows down and thinks logically. An example of this is the requirement in NFPA 86 that states the motor starter which

drives the combustion air blower (or other critical devices) be included in the interlock string. If the blower motor pulls too much current, the motor starter's overload relays trip, shutting off the combustion air blower. A fuel rich condition is prevented because as soon as the blower trips, the interlock string is interrupted and the shutoff valves close, preventing any further fuel gas from being introduced to the system. The code also specifies that a low combustion air pressure switch (or draft switch) be applied; but these devices take time to react to the failure, and with safety logic, the sooner a system is rendered safe, the better.

Monitoring the motor starter and the combustion air pressure switch are on the prescriptive side of the standard, but let us think a bit more about this requirement. Loss of the combustion blower is a critical failure. Are there

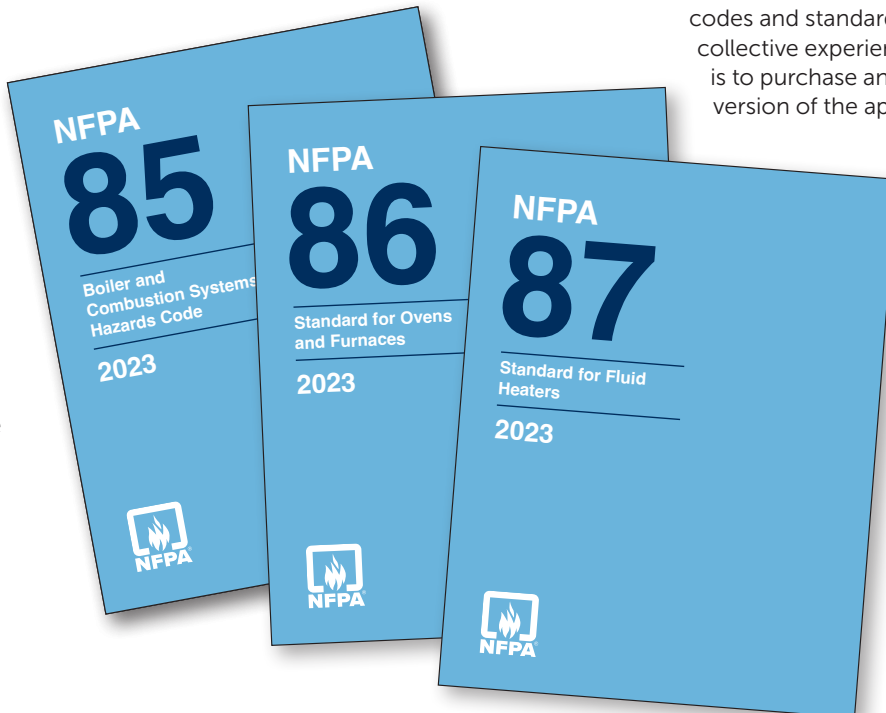
other failures that can shut off the blower that would not be indicated by the auxiliary contact on the motor starter? If the motor fuses were to blow, or a line of sight disconnect were to be opened, would the interlock detect this failure? What can I do to detect these conditions? Perhaps it would be appropriate to monitor not only the contact on the starter, but the current pulled by the motor using some type of current relay?

The safeties that were installed on my system were good enough when it was manufactured in 1990, why upgrade them now? That is a fair question, but one of those questions that is best answered with another question. Has technology advanced in the last 30 years? Have we gained experience, learned from our mistakes and successes? The answer is yes.

So why not avail yourself of the experience learned by the professionals that volunteer their time to ensure our codes and standards encompass their collective experience? Your assignment is to purchase and download the latest version of the applicable codes or

standards and take the time to review them. The reading is pretty dry, but the payoff can be extremely beneficial. **HTT**

Contact John Clarke at jclarke@helios-corp.com



Conserve Electric Power and Save Dollars in Vacuum Processing

Generally, electric power consumption is insidious, because it is not seen and is not considered enough by operating personnel. The following is a summary of power consumed in a typical heat treat plant along with several ways to conserve power (and money) in operating costs.

Electric Motors

Electric motors are prolific throughout a heat treat plant. Some areas where they would be found include:

- Water recirculation pumps for cooling purposes
- Vacuum pumps
- Circulation pumps for oil used in quench tanks
- Fans
- Quench motors

High Vacuum Diffusion Pumps

High vacuum diffusion pumps operate with no noise, which adds to the insidious nature of their power consumption; operating costs for these pumps are more or less "out of

sight." To ensure diffusion pumps are not increasing costs, confirm that all diffusion pumps are set to run on the ConserVac® settings with full power (all three phases on) during high vacuum cycle and partial pressure cycles running on half power

(one or two phases off). When possible, turn off/shut down the diffusion pump.

Gas Blowers

Variable speeds of gas blowers can decrease power consumption, especially at the end of a cooling cycle when the heat of compression is noticeable. To do this, program all quench cycles to shut down the blower at the lower temperature as required on the work thermocouples (i.e., 125°F) and do not run blowers for excess time.

Building/Office Lighting, AC, and Heating

There's more to saving than just focusing on vacuum equipment. Consider the following list of ways to reduce everyday power consumption:

- Turn off all office and shop lights when not needed, except for night lights. Make sure all office lights are off during non-working hours and weekends.
- Use newer, high efficiency type building lights.



Roger A. Jones, CEO Emeritus, Solar Atmospheres, Souderton, PA



William Jones, CEO and Founder/Owner, Solar Atmospheres

Operating Costs for Diffusion Pumps, Varian Diffusion Pumps

Size, In. (Power, kW)	\$/Hour	\$/Day	\$/Week	\$/Month	\$/Year
16" (8.1)	0.81	19.44	136.08	583.20	6,998.40
20" (12.0)	1.20	28.80	201.60	864.00	10,368.00
35" (24.0)	2.40	57.60	403.20	1728.00	20,736.00

Table 2

- Program office heating and air conditioning for setback, like office lighting.

Lesson to be learned: turn off any electric motor or light whenever it is not in operation.

Furnace Heating Rate

No furnace should be heated any faster than 15°F to 30°F/minute or 900°F to 1800°F/hour, unless specific instructions mandate otherwise.

Scheduling and Power Demand

Understanding the utility company, peak times for electricity usage, and scheduling appropriately can decrease energy consumption and cost. The following are a few suggestions to direct thinking around scheduling and power demand:

- Utility company provides an electric power meter for kWh and demand kVA
- Meter contains a power demand register
 - Record of electric power usage over a specific time increment
 - Instantaneous demand peak recorded each month
 - Result is the total kW hours registered in one part of the bill and the second part of the bill is kW electrical power demand
- Ideal situation: instantaneous power demand would be flat with no demand peaks for the month, but this is not the norm
- Batch type electric furnaces can produce major demand peaks:
 - Major electric power savings are possible if equipment can be



"... electric power consumption is insidious, because it is not seen..." (Source: Solar Atmospheres)

Costs of Running Electric Motors @ 10 cents / KWh

Motor HP (application)	KVA*	\$/Hour	\$/Day	\$/Month	\$/Year
1/4 (shop fan)	0.34	.034	.82	30	300
5 (vacuum pump or water pump)	6.0	.60	14.40	521	5,250
10 (vacuum pump or water pump)	11.2	1.12	26.88	821	9,700
20 (water pump or gas fan)	20.8	2.08	49.92	1,520	18,000
30 (water pump or gas fan)	31.2	3.12	74.88	2,281	27,000
50 (water pump or gas fan)	50.4	5.04	121.00	3,680	43,600
100 (quench blower)	98.4	9.84	236.00		
200 (quench blower)	192.0	19.20	461.00		
300 (quench blower)	300.0	30.00	720.00		

* kVA rating is based on operating currents (amps). Note: efficiency of small motors is approximately 60%, increasing to 80% for larger motors, based on 746 watts/hp. Source: Glover Pocket Reference Book, October 1996 edition.

Table 1

Continued on Page 93

Heat Treat Today News Chatter

Business briefs from around the industry

A Few Dozen Quick Heat Treat News Items To Keep You Current

Heat Treat Today is pleased to highlight the announcements of heat treat-related growth and achievement throughout the industry by sharing them in **News Chatter**, where we feature representatives, transactions, moves, and kudos from aerospace, automotive, medical, energy, and other sectors of manufacturing. Here are just a few of the news items that appeared in the **Heat Treat Daily** during the past few months as well as "new" news items.

Subscribe to the **Heat Treat Daily** e-newsletter at heattreattoday.com/subscribe and receive one to two news items from around the heat treat industry five days a week. Submit your news items to editor@heattreattoday.com.

EQUIPMENT CHATTER

➤ The **Korea Institute of Materials Science**, a government-funded research institute under the Ministry of Science and ICT (Information and Communication Technologies), has invested in a new vacuum furnace from **Nitrex**.



New vacuum furnace for Korea Institute of Materials Science

➤ An **L&L Special Furnace Co., Inc.** front-loading box furnace was delivered to a northeastern U.S. supplier of titanium castings to expand the manufacturer's aerospace and gas turbine castings heat treat abilities.



Box furnace for aerospace and gas turbine castings

➤ A manufacturer ordered three **Vector®** vacuum furnaces to braze circuit breakers from **SECO/WARWICK**.



Circuit breaker manufacturer with 3 new vacuum furnaces

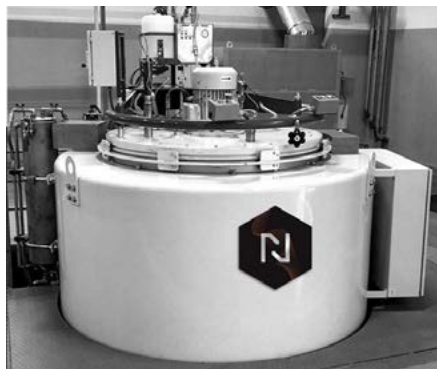
➤ **Nutec Bickley** will provide five lift-up (two for tempering and three for austenitizing) furnaces to a manufacturer of closed-die forgings.



One of five lift-up furnaces for closed-die forgings

➤ **Aalberts surface technologies – HIP | braze | heat treatment** announces expansion of its austempering capabilities and capacity with three atmosphere-to-salt furnaces to be added at the existing facility in Canton, OH.

➤ By adding a turnkey system from **Nitrex**, **Saglam Metal** now offers controlled nitriding, nitrocarburizing, and post-oxidation treatments for a wide range of metal applications.



Turnkey system for Saglam Metal

➤ **Solar Atmospheres of California** installed a new 14 foot long car bottom air furnace to temper large tool steel components, age harden 15-5 PH, 17-4 PH, 13-8 PH, and nickel-based alloys, and anneal titanium forgings.



14 foot long car bottom air furnace

➤ A vacuum aluminum brazing furnace from **PVT, Inc.** was shipped to a North American company that produces complex heat exchangers, cold plates, and avionic enclosures.



Vacuum aluminum brazing furnace for aerospace industry

➤ A U.S.-based international manufacturer of dies will expand their operation with a high-pressure gas quench furnace from **SECO/VACUUM**.



Gas quench furnace for precisely heat treating large dies

> **Arslan Aluminio** recently added a new nitriding NX-1015 pit furnace from **Nitrex**.



Team from Arslan Aluminio during addition of pit furnace

> **PWR Advanced Cooling Technology** will have furnaces from **SECO/WARWICK Group** delivered. Two furnaces, a continuous CAB line and a Universal Batch CAB Furnace, will be delivered to production plants in Australia. A second chamber furnace will be delivered to the American branch of PWR, **C&R Racing, Inc.**



3 furnaces on 2 continents for PWR Advanced Cooling Technology

> A forging tool manufacturer will receive an **L&L Special Furnace Co., Inc.** small model QTO1224 heated oil quench tank to be used post-heat treatment in order to set hardness.



A heated oil quench tank for a forging tool manufacturer

> **Jiuli** has awarded the final acceptance certificate for a hydraulic radial forging line to **SMS group**.



Hydraulic radial forging line for aerospace materials

> **Solar Atmospheres of Michigan** took delivery of a new vacuum furnace this week, at its Chesterfield location, which will be used primarily for aerospace applications.



Vacuum furnace in preparation for fall, 2023 use

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› **YK Steel** in Korea has commissioned **SMS group** to supply a new minimill with integrated melting, casting, and rolling and including all electrical and automation systems.

PERSONNEL AND COMPANY CHATTER

› **DANTE Solutions** welcomes the newest members to the team: **Vinayak Mathur** (aka "Vini"; software engineer) and **Jay Grzep** (intern).



Noel Rutherford, Supply Chain Manager

› **Thermal Processes Carbon Footprint** on May 11, was the first webinar offered in IHEA's free Sustainability and Decarbonization Webinar Series.

› **Ipsen** in Pecatonica, Illinois (formerly **Ipsen Ceramics**) is being repurposed for vacuum furnace hot zone assembly.



Ipsen vacuum furnace hot zone assembly in Illinois

› **William Disler**, president and CEO at **AFC-Holcroft**, has announced that he is stepping down from the company after more than 35 years, effective March 30, 2023. **Tracy Dougherty** and **Ronald Waligora** will share senior leadership with Dougherty named chief operating officer for Sales, Applications, Marketing, and Aftermarket Sales and Waligora named chief operating officer for Project Management, Engineering, Manufacturing, and Field Services.



John Terman with JUMO

› **Hubbard-Hall** welcomes **Noel Rutherford** as supply chain manager to work out of the Waterbury, CT, facility.

› **IHEA** recently announced its 2023–2024 Board of Directors and Executive Officers: President is **Brian Kelly** of **Honeywell Thermal Solutions**; Vice President is **Jeff Rafter** of **Selas Heat Technology Co. LLC.**; Treasurer is **Gary Berwick** of **Dry Coolers, Inc.**; and **Jeff Valuck** of **Surface Combustion, Inc.** assumes the Past President position.



IHEA 2023–2024 Board of Directors and Executive Officers



Jay Cole with new position at Nitrex

› **Jay Cole** started a new position as inside sales/customer service lead at **Nitrex**.



Brett Wenger, vice president of sales, Lucifer Furnaces

› **Lucifer Furnaces** in Warrington, PA, a manufacturer of heat treating furnaces and ovens for the last 80 years, has added **Brett Wenger** to its leadership team as vice president of sales.



Bjorn Eldar Petersen, CFO, ENRX

› **Bjorn Eldar Petersen** is starting a new position as chief executive officer at **ENRX Group**.

KUDOS CHATTER



Helen Tuttle, first woman on Board of Directors for IHEA

› **IHEA** welcomes a new face to the Board of Directors, **Helen Tuttle**, who is the first woman to serve on the board.

› **Bodycote's** Hebron facility recently underwent its AS9100 audit and passed with zero findings.

› After 48 years with **Cincinnati Steel Treating Co.**, **Mike Reichling** has retired.



Mike Reichling, 48 years with Cincinnati Steel Treating Co.

› **Trevor Jones**, president of **Solar Manufacturing**, has been named Delaware Valley Materials Person of the Year by the ASM Philadelphia Liberty Bell Chapter.



Delaware Valley Materials Person of the Year Award – Trevor Jones

› The **Solar Atmospheres** Greenville, SC, facility announced that it has been awarded **Northrop Grumman** approval.

› **Paulo Cleveland Division** has received **Pratt & Whitney** approval for Hot Isostatic Pressing of Castings.



Paulo's HIP unit, newly Pratt & Whitney approved

A

Abbott Furnace Company
1068 Trout Run Road
Saint Marys, PA 15857
Web: www.abbottfurnace.com

- * Access Combustion LLC
- * Ace Industrial Manufacturing
- * Across International LLC
Web: www.acrosscc.com
- * Advanced Energy
- * Advanced Vacuum Systems, Inc.



Aerospace Testing & Pyrometry, Inc.

2020 Dayton Drive
Easton, PA 18040
Web: www.atp-cal.com
(844) 828-7225
Sales: abassetatp-cal.com

See our ad on page 59



AFC-Holcroft

49630 Pontiac Trail
Wixom, MI 48393
Web: www.afc-holcroft.com
(248) 624-8191
Sales: sales@afc-holcroft.com

See our ad on page 33



Agilent Technologies

121 Hartwell Ave
Lexington, MA 02421
Web: www.agilent.com/en/product/
vacuum-technologies
(978) 835-7297

- * Air & Energy Systems Inc.
Web: www.airandenergyinc.com

Air Products

1940 Air Products Boulevard
Allentown, PA 18106
Web: airproducts.com/mp



Ajax Electric Co.

60 Tomlinson Rd
Huntingdon Valley, PA 19006
Web: www.ajaxelectric.com
Sales: CWatkins@ajaxelectric.com

See our ad on page 25



Ajax TOCCO Magnethermic

1745 Overland Ave NE
Warren, OH 44483
Web: www.ajaxtocco.com
(800) 547-1527

- * Alcon
Web:alcontool.com/services/heat-treat



ALD Vacuum Technologies North America Inc.

18 Thompson Road
East Windsor, CT 06088
Web: www.ald-vt.com
(860) 463-5698
Sales: achan@ald-usa.com

See our ad on page 44

- * Alfin Corporation



Algas-SDI

20224 66th Avenue South
Kent, WA 98032
Web: algas-sdi.com
(206) 789-5410
Sales: adepijper@algas-sdi.com

See our ad on page 48

- * Alhern-Martin Indl. Furnace Co
Web: www.alhern-martin.com

- * Allied High Tech Products Inc.
Web: www.alliedhightech.com

- * Allied Mineral Products
Web: www.alliedmineral.com



Alloy Engineering

844 Thacker St
Berea, OH 44017
Web: www.alloyengineering.com
(440) 243-6800

Alpha 1 Induction Service Center

1525 Old Alum Creek Drive
Columbus, OH 43209
Web: www.alpha1induction.com

- * Ambrell Induction Heating Solutions
Web: www.ambrell.com
- * AMECO USA (American Manufacturing & Engineering Co.)
Web: www.ameco-usa.com

- * American Isostatic Presses, Inc.
Web: www.aiphp.com

- * Andritz Metals Inc.
Web: andritz.com/metals

- * Applied Test Systems
Web: www.atspa.com

- * AQI Engineering Co.
Web: www.aqieng.com

- * Armil CFS
Web: www.armilcfs.com

- * Athena Controls
Web: www.athenacontrols.com

A-VAC Industries
1845 S Lewis St
Anaheim, CA 92805
Web: www.avac.com

- * Avatar Instruments Inc.



AVION Manufacturing

2950 Westway Dr
Suite 106
Brunswick, OH 44212
Web: www.avionmfg.com
(330) 220-2779

- * AVS, Inc.
- * Axim Mica
Web: aximmica.com

* Check www.heat treatbuyersguide.com for the latest on this company. As of the date of publication, this listing had not yet been reviewed and verified by the company.

Azbil North America, Inc.
9033 N 24th Ave
Phoenix, AZ 85021
Web: us.azbil.com

B

* *Blasdel Enterprises*
Web: www.blasdel.net

* *Benko Products Inc.*
Web: www.benkoproducts.com

Bloom Engineering Company
5460 Horning Rd
Pittsburgh, PA 15236
Web: www.bloomeng.com

**Bluestreak | Bright AM**

3215 Golf Rd.
#189
Delafield, WI 53018
Web: www.go-bluestreak.com
(262) 955-5662
Sales: ron.beltz@go-bluestreak.com

See our ad on page 68

* *BTU International, Inc.*

* *Buehler An ITW Company*
Web: www.buehler.com

* *Burns Engineering*
Web: www.burnsengineering.com

* *Busch Vacuum Solutions*
Web: www.buschvacuum.com/us/en

C

**C3 Data**

Indianapolis, IN
Web: www.c3data.com
(317) 402-0021
Sales: nwright@c3data.com

See our ad on page 61

Cactus Materials Inc.
7700 S River Pkwy
Tempe, AZ 85284
Web: www.cactusmaterials.com/ceramic-materials--components.html

**CAN-ENG Furnaces International Ltd.**

6800 Montrose Rd
P.O. Box 628
Niagara Falls, ON L2E 6V5
Web: www.can-eng.com
(905) 356-1327
Sales: furnaces@can-eng.com

See our ad on page 31

* *Capital Induction*
Web: www.capitalinduction.com

* *Carbolite Gero, part of Verder Scientific*
Web: www.verder-scientific.com

* *Carbon Composites, Inc.*

Cashvac Inc. /Certified Vacuum Pumps
1019 Rail Drive
Woodstock, IL 60098
Web: www.certifiedvacuumpumps.com

* *Casso-Solar Technologies LLC*
Web: www.cassosolartechnologies.com

* *Cast Aluminum Solutions*
Web: www.castaluminumsolutions.com



Castalloy Corp.
1701 Industrial Ln
PO Box 827
Waukesha, WI 53189
Web: www.castalloygroup.com
(800) 211-0900

* *CEC Furnaces*

* *CEIA USA Induction Heating Systems*
Web: www.ceia-usa.com

* *CENOS*
Web: www.cenos-platform.com

Centorr Vacuum Industries
55 Northeastern Blvd
Nashua, NH 03062
Web: vacuum-furnaces.com

CeraMaterials
525 Silver Lake Rd
Dingmans Ferry, PA 18328
Web: www.ceramaterials.com

CG Thermal
8950 Dutton Dr
Twinsburg, OH 44087
Web: cgthermal.com

Chicago Blower Corporation
1675 Glen Ellyn Rd
Glendale Heights, IL 60139
Web: www.chicagoblower.com

**Chiz Bros**

2117 Lincoln Blvd
Elizabeth, PA 15037
Web: www.chizbros.com
(412) 384-5220
Sales: mrhoajr@chizbros.com

See our ad on page 46

Chiz Bros - Detroit

36082 Industrial Rd
Livonia, MI 48150
Web: www.chizbros.com
(734) 793-8556
Sales: mklauk@chizbros.com

See our ad on page 46

* *Chromalox*
Web: www.chromalox.com

* *Cincinnati Sub-Zero Products*
Web: cszproducts.com

* *Clark Power Systems*
Web: www.clarkpowersystems.com



Cleveland Electric Laboratories

1776 Enterprise Pkwy
Twinsburg, OH 44087
Web: clevelandelectriclabs.com
(330) 425-4747
Sales: SPuhalsky@cel-tcg.com

See our ad on page 63

CODINA

444 W Laskey Rd
Toledo, OH 43612
Web: www.codinametal.com



Combustion 911

600 Mogadore Rd
Kent, OH 44240
Web: www.combustion911.com
(330) 678-4328
Sales: marketing@olstrad.com

See our ad on page 57

* *Conrad Kacsik Instrument Systems, Inc.*
Web: www.kacsik.com

* *Consarc*
Web: consarc.com

Consolidated Engineering Company
1971 McCollum Pkwy NW
Kennesaw, GA 30144
(770) 422-5100
Web: www.cecfurnaces.com



Control Concepts, Inc.
8077 Century Blvd
Chanassen, MN 55317
Web: ccipower.com
(952) 474-6200

* *Control Instruments Corp.*
Web: www.controlinstruments.com



Controls Service, Inc.
32027 Industrial Rd
Livonia, MI 48150
Web: www.controlsservice.com
(313) 565-4200

* *Convectronics Inc.*
Web: www.convectronics.com

* *CoorsTek*

* *Cotronics Corp.*
Web: www.cotronics.com

Criterion NDT Inc.
3702 W Valley Hwy N
Auburn, WA 98001
Web: www.criterionndt.com

* *Cyprium Induction, LLC*
Web: www.cypriuminduction.com

D

* *Dalton Electric Heating Co. Inc.*
Web: www.daltonelectric.com

* *Daniels Fans*
Web: www.danielsfans.com

* *David Weisman LLC*
Web: www.daveweisman.com

* *Deep Cryogenics International*

* *DeKalb Blower Inc.*
Web: dekalbblower.com

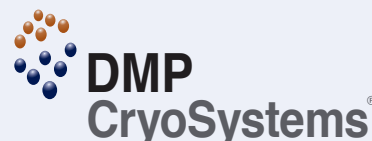


DELTA H
62 High St
Carroll, OH 43112
Web: delta-h.com
(740) 756-7676

Despatch - ITW EAE
8860 207th St W
Lakeville, MN 55044
Web: www.despatch.com

dibalog USA Inc.
222 Ladean Ct
Suite A
Simpsonville, SC 29680
Web: www.dibalog.com

DixiTech CNC
845 Todhunter Rd
Monroe, OH 45050
(513) 360-0091
Web: dixitechcnc.com



DMP CryoSystems, Inc.

2010 Bassett Ave
El Paso, TX 79901
Web: www.cryosystems.com
(800) 851-7302
Sales: ailene@cryosystems.com

See our ad on page 65

* *DOWA THT America Inc.*
Web: www.dowatht.com



Dry Coolers, Inc.

575 S Glaspie St
Oxford, MI 48371
Web: drycoolers.com
(248) 969-3400
Sales: margy@drycoolers.com

See our ad on page 67

* *Du-Co Ceramics Co.*
Web: www.du-co.com

The Duffy Co., Inc.
283 E Helen Rd
Palatine, IL 60067
Web: www.duffycompany.com

* *Duralite*
Web: www.duralite.com

* *Dura-Pack Inc.*
Web: dura-pack.com

* Check www.heat treatbuyersguide.com for the latest on this company. As of the date of publication, this listing had not yet been reviewed and verified by the company.

* *Durex Industries*
Web: www.durexindustries.com

* *Durr Systems Inc.*
Web: www.durr-megtec.com

E

* *EBNER Furnaces, Inc.*
Web: www.ebner.cc/en/ebner-usa

* *ECCO - Equipment Controls Company*



ECM USA, Inc.
9505 72nd Ave
Suite 400
Pleasant Prairie, WI 53158
Web: www.ecm-usa.com
(262) 605-4810

* *EcoClean*

Ed Fagan
769 Susquehanna Ave
Franklin Lakes, NJ 07417
Web: www.edfagan.com

* *EFD Induction Inc.*
Web: www.efd-induction.com

eldec LLC
3355 Bald Mountain Rd
Unit 30
Auburn Hills, MI 48326
Web: www.inductionheatingexperts.com

* *ELECTROHEAT*
Web: www.electroheatllc.com



Elektrogas
600 Mogadore Rd
Kent, OH 44240
Web: combustion911.com
(330) 678-4328
Sales: marketing@olstrad.com

* *Emerson*
Web: www.emerson.com

* *EMSCO*
Web: [emsco.com](http://www.emsco.com)

* *ENGINEERED PRODUCT SALES CORP.*
Web: www.epsovens.com

Epcon Industrial Systems
17777 I-45
Conroe, TX 77385
Web: www.epconlp.com



ESA S.p.A.
600 Mogadore Rd
Kent, OH 44240
Web: www.combustion911.com
(330) 678-4328
Sales: marketing@olstrad.com
See our ad on page 57

Life Is On

Eurotherm.
by **Schneider Electric**

Eurotherm
44621 Guilford Dr
Suite 100
Ashburn, VA 20147
Web: www.eurotherm.com/us
(703) 724-7300

F

* *Fire Brick Engine*
Web: firebrickengineers.com

* *Fireye Inc.*
* *Fives North American Combustion Inc.*
Web: combustion.fivesgroup.com

Fluid Cooling Systems
2441 E Bristol Rd
Burton, MI 48529
Web: www.fluidcoolingsystems.com

* *Fluxtrol, Inc.*
Web: fluxtrol.com

FOUNDRAx

Foundrax Engineering Products
Wessex Park
Somerton, England TA11 6SB
Web: foundrax.co.uk
+44 (0) 1458 274 888

Frigel North America, Inc. - Process Cooling & Temperature Control Technologies
150 Prairie Lake Rd
East Dundee, IL 60118
Web: www.frigel.com



Furnacare Inc.
100 Corporate Dr
Suite 100
Spartanburg, SC 29303
Web: furna.care/en
(864) 913-0603

* *Furnace Brokers International*
Web: www.fcebr.com
* *Furnaces, Ovens & Bath, Inc.*

G



Gasbarre Thermal Processing Systems
310 State St
Saint Marys, PA 15857
Web: www.gasbarre.com
(814) 834-2200
Sales: ben.gasbarre@gasbarre.com
See our ad on the inside front cover



Gefran
400 Willow St
North Andover, MA 01845
Web: www.gefran.com/en/us
(390) 309-8881



GeoCorp, Inc.

9010 River Rd
Huron, OH 44839

Web: www.geocorpinc.com
+1 (419) 433-1101

Sales: jlafollette@geocorpinc.com
See our ad on the back cover



Global Thermal Solutions

Santiago de Querétaro, Qro.
Mexico

Web: globalthermalsolutions.com
+01 (52) 442-352-2833

Grammer Vacuum Technologies Inc.

Coeur d'Alene, ID

Web: www.gvtinc.com

* *Graphite Machining Inc.*

Web: www.graphitemachininginc.com

Graphite Metallizing Corporation

1050 Nepperhan Ave
Yonkers, NY 10703

Web: www.graphalloy.com

H

H.C. Starck Solutions

45 Industrial Pl
Newton, MA 02461

Web: www.hcstarcksolutions.com

* *HarbisonWalker International*

Web: thinkhwi.com

* *Harbridge Systems LLC*

Web: www.harbridge.com

* *Harper International*

Web: www.harperintl.com

* *Harrop Industries Inc.*

Web: www.harropusa.com

Heat Treat Equipment Co.

42056 Michigan Ave
Canton, MI 48188

Web: heattreatequip.com



Heat Treat Furnaces

1155 S Neenah Ave
Sturgeon Bay, WI 54235

Web: www.heattreatfurnaces.com
(920) 743-6568

Sales: lbjarnarson@txinc.com

See our ad on page 42



Heat Treating Services Unlimited, Inc

210 Ladean Ct
Simpsonville, SC 29680

Web: www.htsu.com
(864) 289-0644

HeatTek | Never Settle

W1285 Industrial Dr
Ixonia, WI 53036

Web: heattek.com

* *Heavy Carbon Co.*

Web: www.heavycarbon.com

* *HEITRONICS*

Web: heitronics.com/en/infrarot-messtechnik

* *Heraeus Nexensos USA*

Web: www.heraeus-nexensos.com

High Temperature Concept

8388 S. Tamiami Trail
#127

Sarasota, FL 34238

Web: www.high-temperature-concept.com

* *Hiperbaric*

Web: www.hiperbaric.com/en

Hi-Tech Furnace Systems Inc.

13179 W Star Dr

Shelby Twp., MI 48315

Web: www.hi-techfurnace.com

* *Hi-Temp Products Corp.*

Web: hi-tempproducts.com

* *Holland Manufacturing Corp.*

Web: www.refractoryshape.com

* *Honeywell Process Solutions*

Web: process.honeywell.com/us/en/home

Hubbard-Hall, Inc.

563 S Leonard St
Waterbury, CT 06708

Web: www.hubbardhall.com

HydroThrift Corp.

1301 Sanders Ave SW
Massillon, OH 44647

Web: www.hydrothrift.com

* *Hyndman Industrial Products Inc.*

Web: www.resistancewire.com



I Squared R Co., Inc.

12600 Clarence Center Rd
Akron, NY 14001

Web: isquaredrelement.com
(716) 542-5511

Sales: christina.clowes@isquaredrelement.com

See our ad on page 45

* *ibg NDT Systems Corp.*

Web: www.ibgndt.com

IBS Industrial Burner Systems

Delsterner Str. 100 a
Germany

Hagen, NRW 58091

Web: www.ibsbrener.com

Idemitsu Lubricants America Co
3000 Town Center
Suite 2820
Southfield, MI 48075
Web: www.ilacorp.com

Induction Tooling, Inc.
12510 York-Delta Dr
North Royalton, OH 44133
Web: inductiontooling.com

Inductoheat Inc.
32251 North Avis Drive
Madison Heights, MI 48071
Web: www.inductoheat.com

Industrial Furnace Interiors, Inc. (IFI Inc.)
35160 Stanley Dr
Sterling Heights, MI 48312
Web: www.ifi-inc.com

Industrial Gas Engineering
130 E Quincy St
Westmont, IL 60559
Web: www.igefans.com



INEX Inc.

9229 Olean Rd
Holland, NY 14080
Web: inexinc.net
(716) 537-2270
Sales: mrumfola@inexinc.net

See our ad on page 51

* *Infosight Corp.*
Web: www.infosight.com

Innovative Sensor Technology, USA Div.
9516 W Flamingo Rd
Suite 210
Las Vegas, NV 89147
Web: www.ist-ag.com/en-us

* *International Thermal Systems LLC*
Web: www.internationalthermalsystems.com

Interpower Induction
3578 S Van Dyke Rd
Almont, MI 48003
Web: www.interpowerinduction.com



ION HEAT

Zona Franca de Rionegro
| Basement 41
Rionegro, Antioquia 54047
Columbia
Web: www.ionheat.com
+ 57 310 426 13344843

* *Ipsen USA*
Web: www.ipsenusa.com

* *Irwin Car and Equipment*
Web: www.irwincar.com

* *ITC Coatings*
Web: www.itccoatings.com

J



Quality Magnetic Products

Jackson Transformer Co.

6800 Benjamin Road
Tampa, FL 33634
Web: www.jacksontransformer.com
(813) 879-5811
Sales: customerservice@jacksontransformer.com

See our ad on page 47

* *Jayco Enterprises*
* *Jefferson Solenoid Valves USA Inc.*
Web: www.jeffersonvalves.com

* *Johnson Bros. Roll Forming Co.*
Web: www.johnsonrollforming.com

* *JPW Industrial Ovens & Furnaces*
Web: www.jpwdesign.com

JUMO Process Control, Inc.
6724 Joy Rd
East Syracuse, NY 13057
Web: www.jumousa.com

* *JUNKER Inc., USA, A div. of OTTO JUNKER GmbH*
Web: www.otto-junker.com

K

* *Kanthal*
Web: www.kanthal.com/en

Karl Dungs Inc.
3890 Pheasant Ridge Dr. NE Suite 150
Blaine 55449
Web: www.dungs.com

* *KING Tester Corporation*
Web: www.kingtester.com



Kolene Corporation
12890 Westwood St
Detroit, MI 48223
Web: www.kolene.com
(313) 273-9220

L



L&L Special Furnace

20 Kent Rd
Aston, PA 19014
Web: llfurnace.com
(877) 846-7628
Sales: nancy@llfurnace.com
See our ad on page 30

* *Lanly Co.*
Web: www.lanly.com

* *LCR Hallcrest*
* *LECO Corp.*
Web: www.leco.com

* *Leister Technologies, Process Heat*
Web: www.leister.com

* *Lenox Instrument Co. Inc.*
Web: www.lenoxinst.com

* *LEWCO Inc., Industrial Ovens*
Web: www.lewcoinc.com

* *Leybold*
Web: www.leybold.com/us/en



Lindberg/MPH

3827 Riverside Rd
Riverside, MI 49084

Web: www.lindbergmph.com
(269) 849-2700

Sales: lindbergmph@lindbergmph.com

See our ad on page 40

Web: marlinmfg.com

* *McDanel Advanced Ceramic Technologies*

Web: www.mcdanelceramics.com

McLaughlin Furnace Group

150 Eagle Dr
Avilla, IN 46710

Web: www.mclaughlinsvc.com

Mercer Technologies

1600 Savannah Ave
Terre Haute, IN 47804

Web: www.mercer-tech.com

Web: www.mpcombustion.com

N

* *Nabertherm, Inc.*

* *Nanmac*

Web: www.nanmac.com

* *Neftec Corp.*

Web: www.neftec.jp

Nel Hydrogen

10 Technology Dr
Wallingford, CT 06492

Web: www.nelhydrogen.com

* *Newage Testing Instruments Inc.*

Web: www.hardnesstesters.com

Nitrex

6724 South 13th Street
Oak Creek, WI 53154

Web: www.nitrex.com

Nitrex - Furnaces & Technologies

3474 Boulevard Poirier
Montréal, QC H4R 2J5

Web: www.nitrex.com

* *Noble Industrial Furnace Co. Inc.*

Web: www.noblefurnace.com

* *North American Cronite Inc., Cronite Group*

Web: www.cronite-group.com

Nutec Bickley

100 Carr. Monterrey
- Saltillo km 62.5
Santa Catarina, N.L. 66359
Mexico

Web: www.nutecbickley.com

O

* *Oil Skimmers, Inc.*



Linde

7000 High Grove Blvd
Burr Ridge, IL 60527

Web: www.lindeus.com
(630) 320-4145

Sales: eduardo.cardoso@linde.com

See our ad on page 72



Messer

200 Somerset Corporate Blvd
Bridgewater Township, NJ 08807

Web: www.messer-us.com/metals
(800) 755-9277

* *Metallurgical High Vacuum Corp.*

Web: www.methivac.com

* *Mid-Mountain Materials Inc.*

Web: www.mid-mountain.com

Midwest Vacuum Pumps

1600 Savannah Ave
Terre Haute, IN 47804

Web: www.midwestvacuumpumps.com



Mokon

2150 Elmwood Ave
Buffalo, NY 14207

Web: www.mokon.com
(716) 876-9951

Mountain Rep

Jacqueline Dr
Parma, OH 44134

Web: www.mtnrep.net

* *Mowry Enterprises Inc.*

Web: www.mowryenterprises.com

* *MP Combustion*

* *Lone Star Induction*



Lucifer Furnaces, Inc.

2048 Bunnell Rd
Warrington, PA 18976

Web: www.luciferfurnaces.com
(215) 343-0411

M



Magnetic Specialties Inc.

174 Keystone Dr
Telford, PA 18969

Web: www.magspecinc.com
(267) 384-5231

Sales: keith@solaratm.com

* *Marlin Manufacturing Corporation*



OLSTRÄD
ENGINEERING

Olsträd Engineering Corporation

600 Mogadore Rd
Kent, OH 44240

Web: www.combustion911.com
(330) 678-4328

Sales: marketing@olstrad.com

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Optris Infrared Sensing

200 International Dr
Portsmouth, NH 03801

Web: www.optris.com

* Orton Ceramic Foundation, TempTAB

Web: www.temptab.com

* Oxy-Gon Industries Inc.

Web: www.oxy-gon.com

P

* Park Thermal International Corp.

Web: www.parkthermal.com

* PCE Instruments, PCE Americas Inc.

Web: www.pce-instruments.com

* PEER Energy

Web: www.peerenergy.de



Pelican Wire

3650 Shaw Blvd
Naples, FL 34117

Web: pelicanwire.com
(239) 597-8555

* Performance Industrial Products LLC

Web: www.performance-castings.com

* Pfeiffer Vacuum Inc.

Web: www.pfeiffer-vacuum.com

* Phoenix Induction Corp.

Web: www.phoenixinduction.com

PhoenixTM LLC

4600 140th Ave N
Clearwater, FL 33762

Web: www.phoenixtm.com

* Pillar Induction

Web: www.pillar.com

* Plansee USA LLC

Web: www.plansee.com/en

* Plastometrex

Web: plastometrex.com



Plibrico Company

1935 Techny Road
Northbrook, IL 60062

Web: plibrico.com
(312) 337-9000

Sales: pgaul@plibrico.com

See our ad on page 49

* Powerblanket

Web: www.powerblanket.com



Premier Furnace Specialists, Inc

23850 Freeway Park Dr
Farmington Hills, MI 48335

Web: www.premierfurnace.com
(248) 596-9000



ProTech Thermal Services

1954 Tandem Way
Norco, CA 92860

Web: www.protechthermal.com
(951) 272-5808

* Protection Controls, Inc.

Web: www.protectioncontrolsinc.com

PSNERGY

152 W 12th St
Erie, PA 16501

Web: www.psnergy.com



PVA Industrial Vacuum Systems GmbH, PlaTeG - PulsPlasmaNitriding Systems

251 Corporate Terrace
Corona, CA 92879

Web: www.pvateplaamerica.com
(951) 741-7365

PVT

100 Indel Ave
Rancocas, NJ 08073

Web: www.pvt-vf.com



Pyradia Inc

5125 Rue J,-A,- Bombardier
Longueuil, QC J3Z 1G4
Canada

Web: www.pyradia.com
(450) 463-3344

Pyromation Inc.

5211 Industrial Rd
Fort Wayne, IN 46825

Web: www.pyromation.com

Q

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Web: home.quakerhoughton.com



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Web: qual-fab.net
(440) 327-5000

Sales: horst@qual-fab.net

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* *Quintus Technologies*
Web: quintustechnologies.com

R

Radyne Corporation
211 W Boden St.
Milwaukee, WI 53207
Web: radyne.com

* *Ramboll (formerly O'Brien & Gere or OBG)*
Web: www.ramboll.com

* *Retech Systems LLC*
Web: www.retechsystemsllc.com

* *RISE IVF AB, Materials and Production*
Web: www.ivfsmartquench.com

Rockford Combustion
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* *Rohde*
Web: rohdetherm.de

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* *Russells Technical Products Inc.*
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S

* *SAET*
* *Saint-Gobain Performance Ceramics & Refractories, Ceramics*
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* *Sentry Equipment Corp.*
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* *SGL Carbon, Graphite Materials & Systems*
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* *Sheler Corporation*
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Faaborg, DE 05600
Denmark
Web: www.skako.com

* *SMS Elotherm North America LLC*
Web: www.sms-elotherm.com



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1500 E Clymer Ave
Sellersville, PA 18960
Web: solararmfg.com
(267) 384-5040
Sales: keith@solaratm.com

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* *SSHC Inc.*
Web: www.sshcinc.com
* *Starrett Co.*
Web: www.starrett.com
* *Steelhead Technologies*

* Check www.heat treatbuyersguide.com for the latest on this company. As of the date of publication, this listing had not yet been reviewed and verified by the company.

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Sales: mwilhelm@thermcraftinc.com
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McMurray, PA 15317
Web: thermocalc.com

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* *Tuthill Springfield*
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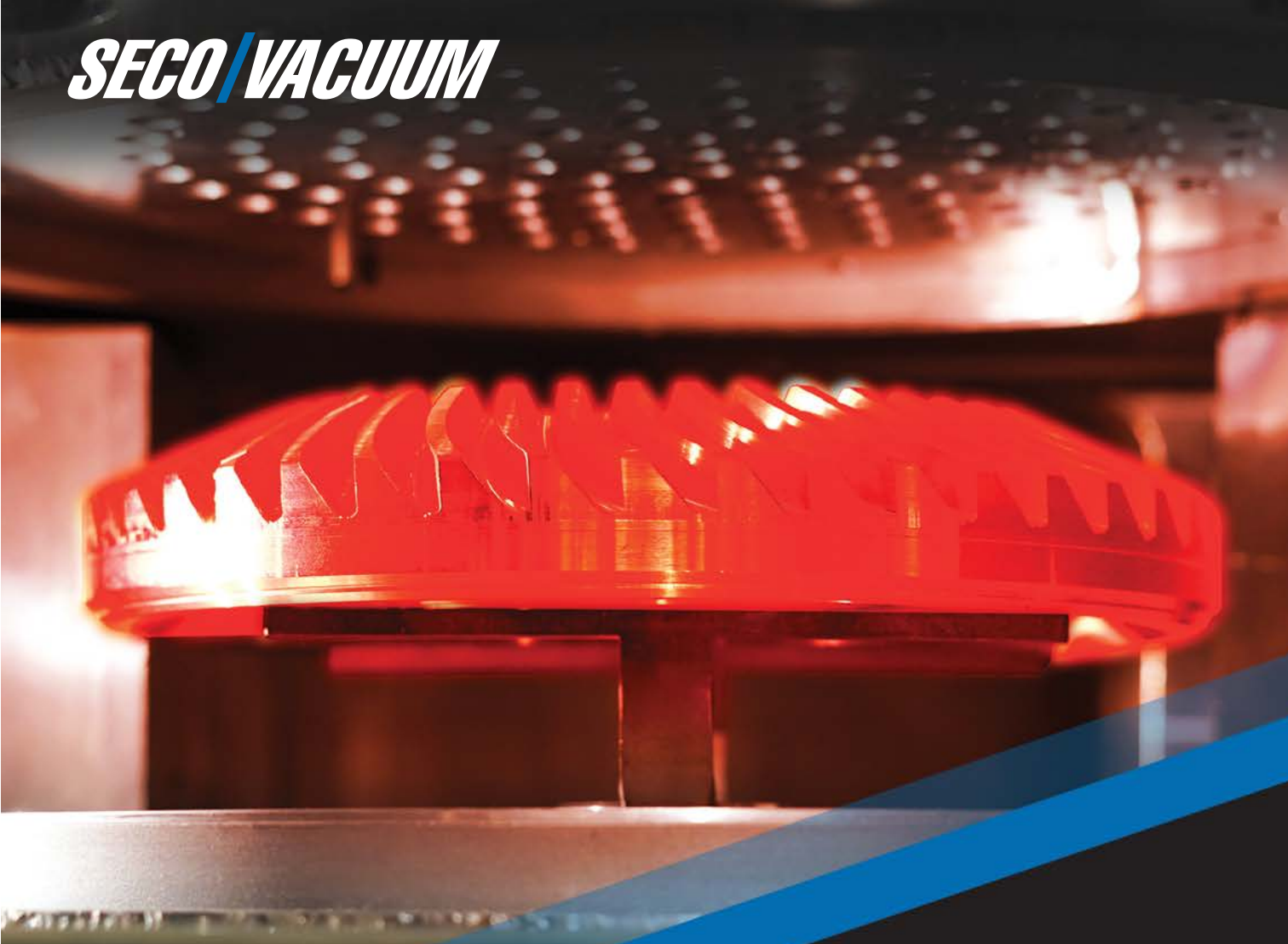
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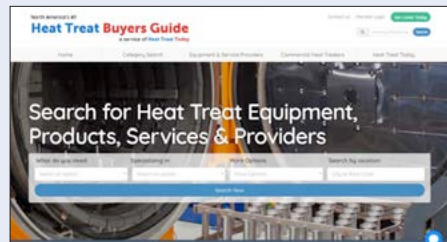
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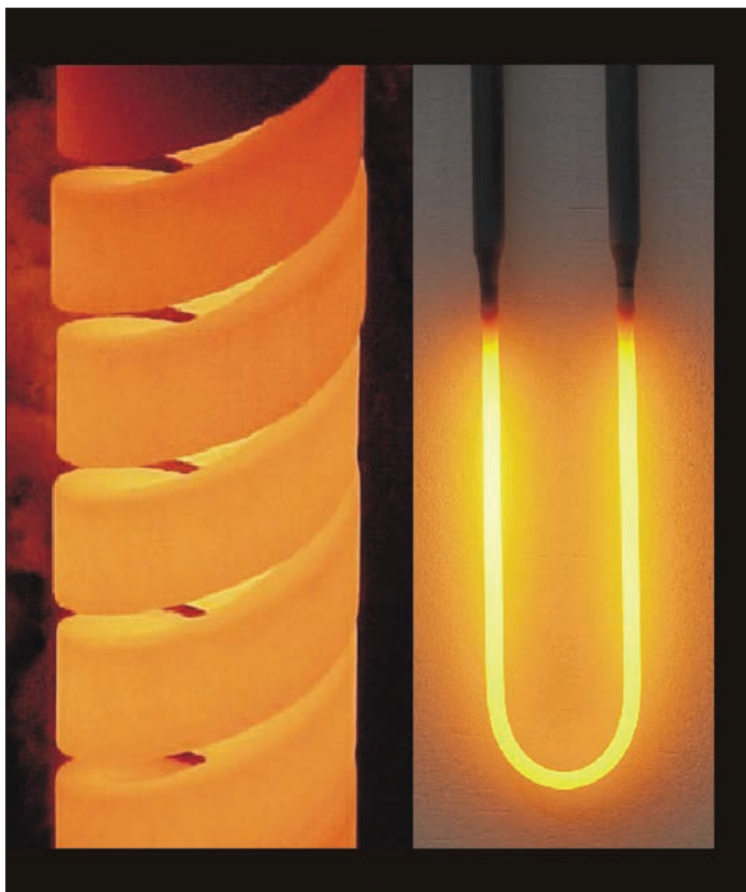
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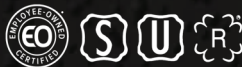
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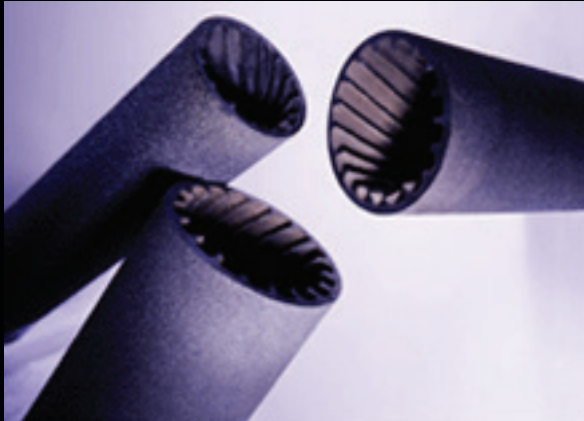


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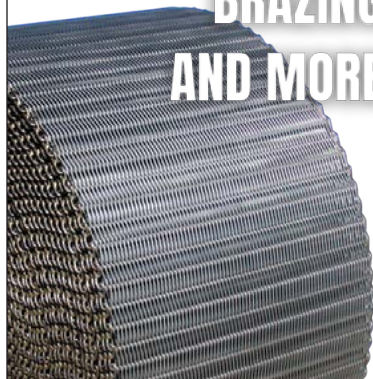
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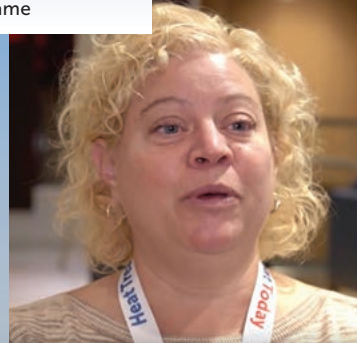
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3611 Detroit Avenue
Cleveland, OH 44113
Web: www.khtheat.com
(216) 631-4411

L

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* *Laser Hard Inc.*
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Web: www.magnuminduction.com
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* *Modern Industries-Kersey Division*
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Canada

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(905) 827-4171



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Web: solaratm.com/locations/michigan/
(586) 264-8100

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Web: www.vmtreating.com

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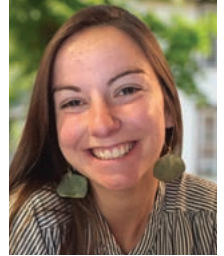
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Temperature Processing Company, Inc. (NJ)

Texas Heat Treating, Inc.
 Texas Heat Treating, Inc. - Fort Worth
Thermal Metal Treating, Inc.
 Thermal-Vac Technology, Inc.
 ThermoFusion, Inc.
 Vac-Met, Inc.

INDUCTION

Accurate Brazing-Greenville
 Cook Induction Heating Company
 Induction Heat Treating Corporation
 National Metal Processing, Inc.
 Texas Heat Treating, Inc.
 Texas Heat Treating, Inc. - Fort Worth
 Thermal-Vac Technology, Inc.
 Zion Industries (MI)
 Zion Industries, Inc.
 Zion Industries, Inc. (NC)

TORCH

Accurate Brazing-Greenville
 Braddock Metallurgical - Bridgewater
 Cook Induction Heating Company
 Modern Metal Processing, Inc.
 Southwest Specialty Heat Treat
 Texas Heat Treating, Inc.
 Texas Heat Treating, Inc. - Fort Worth
 Thermal-Vac Technology, Inc.

VACUUM

Accurate Brazing-Greenville
 Accurate Brazing-Manchester
 Advanced Heat Treating Solutions
 California Brazing
 Certified Metal Craft, Inc
 East Carolina Metal Treating, Inc.
 Lark Heat Treating, Inc.
 Modern Metal Processing, Inc.
 National Metal Processing, Inc.
 Nevada Heat Treating

Nitrex - Heat Treat Services
 Paulo
 ★ **Solar Atmospheres - California**
 ★ **Solar Atmospheres - Eastern PA**
 ★ **Solar Atmospheres - Southeast**
 ★ **Solar Atmospheres - Western PA**
 Spectrum Thermal Processing
 Texas Heat Treating, Inc.
 Texas Heat Treating, Inc. - Fort Worth
 Thermal-Vac Technology, Inc.
 ThermoFusion, Inc.
 Vac Aero International, Inc. (Ont.)
 ★ **Vac-Met, a Solar Atmospheres Company**
 Vac-Met, Inc.

Carbonitriding

FLUID BED

Texas Heat Treating, Inc.
 Texas Heat Treating, Inc. - Fort Worth

GAS

Accurate Steel Treating, Inc.
 Advanced Heat Treating Solutions
Akron Steel Treating Company
 Cambridge Heat Treating, Inc.
 Certified Metal Craft, Inc
 Continental Heat Treating, Inc.
 Dayton Forging & Heat Treating

★ **FPM Heat Treating**

H & S Heat Treating
 Heat Treating Technologies, Inc.
 HI TecMetal Group, Inc.
 HT-MX Heat Treat & HIPing
 Industrial Steel Treating Company
 J. F. Heat Treating, Inc.

Jasco Heat Treating Inc.
 Lark Heat Treating, Inc.
 Magnum Metal Treating, Inc.
 Metals Technology
 Metex Heat Treating Ltd.
 Metlab
 Mid South Metallurgical
 Morgan Ohare, Inc.
 MT Heat Treat, Inc.
 National Metal Processing, Inc.
 Nevada Heat Treating
 Ohio Metallurgical Service Inc.
 Parker Trutec, Inc.
 Paulo - Murfreesboro
 Paulo - Nashville
 Paulo - St. Louis
 Phoenix Heat Treating
 Precision Heat Treating Corp.
 Precision Thermal Processing

★ **Solar Atmospheres - Western PA**

Specialty Steel Treating
 Superior Metal Treating & Equip., Inc.
 Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

Thermal Metal Treating, Inc.

Thermal Specialties Heat Treating - OKC
 ThermoFusion, Inc.

★ **ThermTech**

Tri-City Heat Treat Company
 Winston Heat Treating, Inc.

VACUUM

Braddock Metallurgical - Bridgewater
 Braddock Metallurgical - Charlotte
 Braddock Metallurgical - Georgia
 Braddock Metallurgical - Jacksonville
 Braddock Metallurgical - Tampa/Riverview
 Midwest Thermal-Vac, Inc.
 Nitrex - Heat Treat Services

Peters' Heat Treating, Inc.
 ★ **Solar Atmospheres - California**
 ★ **Solar Atmospheres - Southeast**
 ★ **Solar Atmospheres - Western PA**
 ★ **Vac-Met, a Solar Atmospheres Company**

Carburizing

FLUID BED

Peters' Heat Treating, Inc.

GAS

Advanced Heat Treating Solutions
Akron Steel Treating Company
 Byington Steel Treating
 Cambridge Heat Treating, Inc.
 Certified Metal Craft, Inc
 Cincinnati Steel Treating
 Continental Heat Treating, Inc.
 Controlled Thermal Technology, Inc.
 Dayton Forging & Heat Treating
 Donohoo Steel Treating Company
 East-Lind Heat Treat, Inc.
 Engineered Heat Treat, LLC

★ **FPM Heat Treating**

H & S Heat Treating
 Heat Treating Technologies, Inc.
 HT-MX Heat Treat & HIPing
 Industrial Steel Treating Company
 Lark Heat Treating, Inc.
 Magnum Metal Treating, Inc.
 Metals Technology
 Metlab
 Mid South Metallurgical
 MT Heat Treat, Inc.
 National Metal Processing, Inc.
 Nevada Heat Treating
 Nitrex - Heat Treat Services
 Parker Trutec, Inc.
 Paulo - Kansas City
 Paulo - Murfreesboro

Paulo - Nashville
 Paulo - St. Louis
 Phoenix Heat Treating
 Precision Heat Treating Corp.
 Precision Heat Treating, Inc.
 Precision Thermal Processing
 Q-Tech Heat Treat, LLC.
 Rex Heat Treat - Alabama Inc.
 Salto Heat Treating
 Scientific Metal Treating

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

Southwest Metal Treating Corporation

Southwest Specialty Heat Treat
 Specialty Heat Treat, Inc.
 Specialty Steel Treating
 Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

Thermal Metal Treating, Inc.

Thermal Specialties Heat Treating - OKC
 ThermoFusion, Inc.

★ **ThermTech**

Tri-City Heat Treat Company
 Wyatt Services Inc.

PACK

Keystone Metallurgy

SALT

Rex Heat Treat - Alabama Inc.

VACUUM

Braddock Metallurgical - Bridgewater
 Braddock Metallurgical - Charlotte
 Braddock Metallurgical - Daytona
 Braddock Metallurgical - Georgia
 Braddock Metallurgical - Jacksonville
 Braddock Metallurgical - Tampa/Riverview
 Midwest Thermal-Vac, Inc.
 Nitrex - Heat Treat Services

Peters' Heat Treating, Inc.

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Southeast**

★ **Solar Atmospheres - Western PA**

Specialty Steel Treating
 Spectrum Thermal Processing
 Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

★ **Vac-Met, a Solar Atmospheres Company**

Certifications

AZLA

Texas Heat Treating, Inc. - Fort Worth

AS9100

Advanced Nitriding Solutions
 Braddock Metallurgical - Charlotte
 Braddock Metallurgical - Daytona
 Braddock Metallurgical - Georgia
 Braddock Metallurgical - Jacksonville
 Braddock Metallurgical - Tampa/Riverview

Braddock Metallurgical Aerospace Services

California Brazing

Controlled Thermal Technology, Inc.

East Carolina Metal Treating, Inc.

Engineered Heat Treat, LLC

Franklin Brazing & Metal Treating

HT-MX Heat Treat & HIPing

Midwest Thermal-Vac, Inc.

Modern Metal Processing, Inc.

Paulo

Paulo - Kansas City

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Western PA**

Southwest Metal Treating Corporation

Specialty Steel Treating
 Spectrum Thermal Processing

Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

★ **ThermTech**

Vac Aero International, Inc. (Ont.)

Vac-Met, Inc.

Winston Heat Treating, Inc.

CQI-9

Contour Hardening, Inc.

Derrick Co., Inc.

Engineered Heat Treat, LLC

Heat Treating Services

Heat Treating Technologies, Inc.

Industrial Steel Treating Company

Kowalski Heat Treating

Modern Metal Processing, Inc.

Morgan Ohare, Inc.

Ohio Metallurgical Service Inc.

Paulo - Monterrey

Paulo - Murfreesboro

Paulo - Nashville

Specialty Steel Treating

Thermal Metal Treating, Inc.

★ **ThermTech**

Zion Industries (MI)

Zion Industries, Inc.

Zion Industries, Inc. (NC)

ISO 14001

Thermal Metal Treating, Inc.

ISO 17025

Metex Heat Treating Ltd.

Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

ISO 9000

Controlled Thermal Technology, Inc.
 Specialty Steel Treating

ISO 9001

Akron Steel Treating Company

California Brazing
 Cambridge Heat Treating, Inc.
 Dayton Forging & Heat Treating
 Derrick Co., Inc.
 Dynamic Surface Technologies International
 East Carolina Metal Treating, Inc.
 Heat Treating Technologies, Inc.

Induction Heat Treating Corporation

Industrial Steel Treating Company

Kowalski Heat Treating

Magnum Metal Treating, Inc.

Mid South Metallurgical

Midwest Thermal-Vac, Inc.

Missouri Heat Treat, Inc.

Modern Metal Processing, Inc.

Morgan Ohare, Inc.

National Metal Processing, Inc.

Ohio Metallurgical Service Inc.

Parker Trutech, Inc.

Peters' Heat Treating, Inc.

Precision Heat Treating Corp.

Premier Thermal

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Western PA**

Southwest Metal Treating Corporation

Southwest Specialty Heat Treat
 Specialty Heat Treat, Inc.
 Specialty Steel Treating
 Spectrum Thermal Processing
 Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

Thermal Metal Treating, Inc.

★ **ThermTech**

Tri-City Heat Treat Company
Turbocam Enhanced Surfaces
Winston Heat Treating, Inc.
Zion Industries (MI)
Zion Industries, Inc.
Zion Industries, Inc. (NC)

ISO-TS 16949

Advanced Nitriding Solutions
Contour Hardening, Inc.
Franklin Brazing & Metal Treating
Heat Treating Services
Metex Heat Treating Ltd.
Paulo - Monterrey
Paulo - Murfreesboro
Paulo - Nashville
Paulo - St. Louis
Premier Thermal
Specialty Steel Treating
Zion Industries (MI)
Zion Industries, Inc.
Zion Industries, Inc. (NC)

ITAR

Accurate Brazing-Greenville
Advanced Nitriding Solutions
Akron Steel Treating Company
California Brazing
Cook Induction Heating Company
East Carolina Metal Treating, Inc.
Engineered Heat Treat, LLC
Hy-Vac Technologies, Inc.
Midwest Thermal-Vac, Inc.
Ohio Metallurgical Service Inc.
Paulo
Paulo - Kansas City
Paulo - Murfreesboro
Paulo - Nashville
Phoenix Heat Treating
Specialty Steel Treating

★ **ThermTech**

Vac-Met, Inc.
Winston Heat Treating, Inc.

MEDACCRED

Hansen Balk Steel Treating

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Western PA**

NADCAP

Accurate Brazing-Greenville
Accurate Brazing-Manchester
Accurate Steel Treating, Inc.
Advanced Nitriding Solutions

Akron Steel Treating Company

Braddock Metallurgical - Bridgewater
Braddock Metallurgical - Daytona
Braddock Metallurgical - Jacksonville
Braddock Metallurgical - Tampa/Riverview
Certified Metal Craft, Inc
Continental Heat Treating, Inc.
Cook Induction Heating Company
East Carolina Metal Treating, Inc.
Engineered Heat Treat, LLC

★ **FPM Heat Treating**

Hansen Balk Steel Treating
HT-MX Heat Treat & HIPing
Hy-Vac Technologies, Inc.
Midwest Thermal-Vac, Inc.
Nevada Heat Treating
Ohio Metallurgical Service Inc.
Paulo
Paulo - Kansas City
Peters' Heat Treating, Inc.
Phoenix Heat Treating
Premier Thermal

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Western PA**

Specialty Steel Treating
Spectrum Thermal Processing
Thermal-Vac Technology, Inc.

ThermoFusion, Inc.
Vac Aero International, Inc. (Ont.)
Vac-Met, Inc.
Winston Heat Treating, Inc.

Ferritic Nitrocarburizing (FNC)

FLUID BED

Dynamic Surface Technologies International

GAS

Advanced Nitriding Solutions
Braddock Metallurgical - Daytona
Braddock Metallurgical - Tampa/Riverview
Cincinnati Steel Treating
Contour Hardening, Inc.
Dynamic Surface Technologies International

★ **FPM Heat Treating**

HI TecMetal Group, Inc.
Metex Heat Treating Ltd.
Metlab
Nitrex - Heat Treat Services
Parker Trutec, Inc.
Paulo - Kansas City
Paulo - Monterrey
Paulo - Nashville
Paulo - St. Louis
Premier Thermal
Specialty Steel Treating
ThermoFusion, Inc.

ION

Advanced Nitriding Solutions
HI TecMetal Group, Inc.
Temperature Processing Company, Inc. (NJ)

SALT

Controlled Thermal Technology, Inc.
Parker Trutec - MMI Inc. Arkansas
Parker Trutec, Inc.
Turbocam Enhanced Surfaces

Harden, Quench & Temper

FLAME

Braddock Metallurgical - Georgia
Calumet Surface Hardening Company, Inc.
Chicago Flame Hardening Company
Hansen Balk Steel Treating
Keystone Metallurgy

★ **Penna Flame Industries**

Texas Heat Treating, Inc.

★ **ThermTech**

FLUID BED

★ **Solar Atmospheres - Western PA**

Specialty Steel Treating

FURNACE

Accurate Brazing-Greenville
Accurate Steel Treating, Inc.
Akron Steel Treating Company
Braddock Metallurgical - Daytona
Braddock Metallurgical Aerospace Services
Controlled Thermal Technology, Inc.
Dayton Forging & Heat Treating
Donohoo Steel Treating Company
East-Lind Heat Treat, Inc.
H & S Heat Treating
Hansen Balk Steel Treating Heat Treating Services
Heat Treating Technologies, Inc.
Industrial Steel Treating Company
Lark Heat Treating, Inc.
Magnum Metal Treating, Inc.
Metals Technology
Metex Heat Treating Ltd.
Mid South Metallurgical
Missouri Heat Treat, Inc.
Morgan Ohare, Inc.
Nevada Heat Treating
Ohio Metallurgical Service Inc.

Parker Trutec, Inc.
Paulo - Kansas City
Paulo - Murfreesboro
Paulo - Nashville
Paulo - St. Louis
Precision Heat Treating Corp.
Precision Heat Treating, Inc.
Precision Thermal Processing
Q-Tech Heat Treat, LLC.
Salto Heat Treating

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Southeast**

Southwest Metal Treating Corporation

Specialty Heat Treat, Inc.
Specialty Steel Treating
Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

Thermal Metal Treating, Inc.

★ **ThermTech**

Tri-City Heat Treat Company
Vac Aero International, Inc. (Ont.)
Wyatt Services Inc.

INDUCTION

Accurate Brazing-Manchester
Advanced Heat Treating Solutions
American Metal Treating Company
Calumet Surface Hardening Company, Inc.
Contour Hardening, Inc.
Cook Induction Heating Company
Donohoo Steel Treating Company
Heat Treating Technologies, Inc.
Induction Heat Treating Corporation
Industrial Steel Treating Company
Jasco Heat Treating Inc.
Keystone Metallurgy

Lark Heat Treating, Inc.
Metals Technology
Metex Heat Treating Ltd.
Ohio Metallurgical Service Inc.

★ **Penna Flame Industries**

Precision Heat Treating, Inc.
Precision Thermal Processing
Salto Heat Treating
Texas Heat Treating, Inc.
Texas Heat Treating, Inc. - Fort Worth

Thermal Metal Treating, Inc.

Zion Industries (MI)
Zion Industries, Inc.
Zion Industries, Inc. (NC)

INTENSIVE QUENCHING

Akron Steel Treating Company

NEUTRAL SALTS

Akron Steel Treating Company

Jasco Heat Treating Inc.
Texas Heat Treating, Inc.
Texas Heat Treating, Inc. - Fort Worth

★ **ThermTech**

PRECIPITATION

Accurate Brazing-Manchester
Accurate Steel Treating, Inc.
Byington Steel Treating
Dayton Forging & Heat Treating
Derrick Co., Inc.
Donohoo Steel Treating Company
East-Lind Heat Treat, Inc.
Jasco Heat Treating Inc.
Magnum Metal Treating, Inc.
Mid South Metallurgical
Nitrex - Heat Treat Services
Precision Thermal Processing
Premier Thermal
Q-Tech Heat Treat, LLC.

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Southeast**

★ **Solar Atmospheres - Western PA**

Southwest Metal Treating Corporation

Specialty Steel Treating
Texas Heat Treating, Inc.
Texas Heat Treating, Inc. - Fort Worth

Thermal Metal Treating, Inc.

★ **ThermTech**

Vac Aero International, Inc. (Ont.)
Vac-Met, Inc.
Winston Heat Treating, Inc.

PRESS QUENCHING

Derrick Co., Inc.
Specialty Steel Treating

★ **ThermTech**

VACUUM

Accurate Brazing-Greenville
Accurate Brazing-Manchester
Accurate Steel Treating, Inc.
Advanced Heat Treating Solutions

Akron Steel Treating Company

Byington Steel Treating
Cambridge Heat Treating, Inc.
Certified Metal Craft, Inc.
Continental Heat Treating, Inc.
Controlled Thermal Technology, Inc.
Dynamic Surface Technologies International
East-Lind Heat Treat, Inc.
Hansen Balk Steel Treating
Hy-Vac Technologies, Inc.
Jasco Heat Treating Inc.
Keystone Metallurgy
Lark Heat Treating, Inc.
Magnum Metal Treating, Inc.
Metals Technology
Mid South Metallurgical
Midwest Thermal-Vac, Inc.
Nevada Heat Treating
Nitrex - Heat Treat Services

P&L Heat Treating & Grinding, Inc.
Pacific Heat Treating Co.

Paulo
Paulo - Kansas City
Paulo - Monterrey
Paulo - St. Louis
Precision Thermal Processing
Premier Thermal

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Southeast**

★ **Solar Atmospheres - Western PA**

Southwest Metal Treating Corporation

Specialty Steel Treating
Spectrum Thermal Processing
Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

Thermal-Vac Technology, Inc.

★ **ThermTech**

Tri-City Heat Treat Company
Vac Aero International, Inc. (Ont.)

★ **Vac-Met, a Solar Atmospheres Company**

Vac-Met, Inc.
Winston Heat Treating, Inc.

Nitriding

FLUID BED

Dynamic Surface Technologies International
Texas Heat Treating, Inc.
Texas Heat Treating, Inc. - Fort Worth

GAS

Accurate Steel Treating, Inc.
Advanced Heat Treating Solutions
Advanced Nitriding Solutions
Byington Steel Treating
Cambridge Heat Treating, Inc.
Cincinnati Steel Treating

Continental Heat Treating, Inc.
Contour Hardening, Inc.
Controlled Thermal Technology, Inc.
Dynamic Surface Technologies International
Engineered Heat Treat, LLC

★ **FPM Heat Treating**

Hansen Balk Steel Treating
HT-MX Heat Treat & HIPing
Lark Heat Treating, Inc.
Metals Technology
Metex Heat Treating Ltd.
Metlab
Nitrex - Heat Treat Services
P&L Heat Treating & Grinding, Inc
Paulo - St. Louis

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Southeast**

★ **Solar Atmospheres - Western PA**

Southwest Metal Treating Corporation

Specialty Steel Treating
Temperature Processing Company, Inc. (NJ)
Texas Heat Treating, Inc.
Texas Heat Treating, Inc. - Fort Worth

Thermal Metal Treating, Inc.

Thermal Specialties Heat Treating - OKC
Thermal-Vac Technology, Inc.

★ **ThermTech**

Winston Heat Treating, Inc.
Wyatt Services Inc.

ION

Accurate Steel Treating, Inc.
Advanced Nitriding Solutions
Cambridge Heat Treating, Inc.
Hansen Balk Steel Treating
HI TecMetal Group, Inc.
Kowalski Heat Treating

Mid South Metallurgical
Peters' Heat Treating, Inc.

Southwest Metal Treating Corporation

Temperature Processing Company, Inc. (NJ)
Thermal Specialties Heat Treating - OKC

SALT

Controlled Thermal Technology, Inc.
L&M Heat Treating, Inc.

VACUUM

Advanced Nitriding Solutions
Braddock Metallurgical - Bridgewater
Braddock Metallurgical - Charlotte
Braddock Metallurgical - Daytona
Braddock Metallurgical - Georgia
Braddock Metallurgical - Jacksonville
Contour Hardening, Inc.
Paulo - Nashville

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Southeast**

★ **Solar Atmospheres - Western PA**

★ **Vac-Met, a Solar Atmospheres Company**

Tool Steels-High Speed Steels

FURNACE

Akron Steel Treating Company

Braddock Metallurgical Aerospace Services
Certified Metal Craft, Inc
Contour Hardening, Inc.
Donohoo Steel Treating Company
HI TecMetal Group, Inc.
HT-MX Heat Treat & HIPing
Nevada Heat Treating

P&L Heat Treating & Grinding, Inc
Precision Heat Treating Corp.
Precision Heat Treating, Inc.
Salto Heat Treating

Southwest Metal Treating Corporation

Southwest Specialty Heat Treat
Temperature Processing Company, Inc. (NJ)

Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

Thermal Metal Treating, Inc.

Wyatt Services Inc.

SALT

Accurate Steel Treating, Inc.
Engineered Heat Treat, LLC

VACUUM

Accurate Steel Treating, Inc.

Akron Steel Treating Company

Cambridge Heat Treating, Inc.
Certified Metal Craft, Inc
Controlled Thermal Technology, Inc.
HI TecMetal Group, Inc.
Hy-Vac Technologies, Inc.
Keystone Metallurgy
Kowalski Heat Treating
L&M Heat Treating, Inc.
Magnum Metal Treating, Inc.

Metals Technology
Metlab

Mid South Metallurgical

Nevada Heat Treating

P&L Heat Treating & Grinding, Inc

Pacific Heat Treating Co.

Paulo - Kansas City

Paulo - St. Louis

Peters' Heat Treating, Inc.

Precision Heat Treating Corp.

Scientific Metal Treating

★ **Solar Atmospheres - California**

★ **Solar Atmospheres - Eastern PA**

★ **Solar Atmospheres - Southeast**

★ **Solar Atmospheres - Western PA**

Southwest Metal Treating Corporation

Superior Metal Treating & Equip., Inc.
Temperature Process Company, Inc. (NJ)

Texas Heat Treating, Inc.

Texas Heat Treating, Inc. - Fort Worth

Thermal Specialties Heat Treating - OKC

Thermal-Vac Technology, Inc.

★ **ThermTech**

Tri-City Heat Treat Company
Vac Aero International, Inc. (Ont.)

★ **Vac-Met, a Solar Atmospheres Company**

Get to know three Heat Treat Consultants

The brain drain is real, so as heat treat professionals navigate the changing industry landscape, **Heat Treat Today** wants to ensure that young and old inquiring minds can learn from high-value experts. As we launch this periodic profile, get to know three consultants listed as **Heat Treat Consultants** on www.heatreattoday.com and www.heatreatbuyersguide.com.



Meet the Consultant: Thomas Wingens



Thomas Wingens, President, WIIC - Wingens LLC International Industry Consultancy

I am Thomas Wingens, masters in material science, MBA. During my over 35 years in the heat treat industry, I have worked with Bodycote, Ipsen, SECO/WARWICK, Tenova, and IHI-Group in executive positions. Since 2011, I have been president of WIIC - Wingens LLC International Industry Consultancy in Pittsburgh, PA.

Thomas Wingens began his career in heat treat in 1987 as a metallurgist, heat treater, and consultant. Today, Thomas is an executive manager, experienced metallurgist, and hands-on heat treater with a knack for improving sales, solving technical problems, giving furnace advice, doing his due diligence, and advising executives. If it weren't for NDAs, Thomas would love to share stories about the many exciting projects he has been fortunate enough to work on, but Thomas is able to share about his experience in developing novel processes for clients in the semiconductor, battery, rare earth magnet, and rocket industries.

At Wingens LLC International Industry Consultancy, Thomas' strengths are

on full display. Thomas describes himself as a "hands-on" heat treater, as he consults 100% of the time on heat treating, leveraging his background as a metallurgist. His key assets strengths are his deep thermal processing knowledge and his perfect furnace selection abilities.

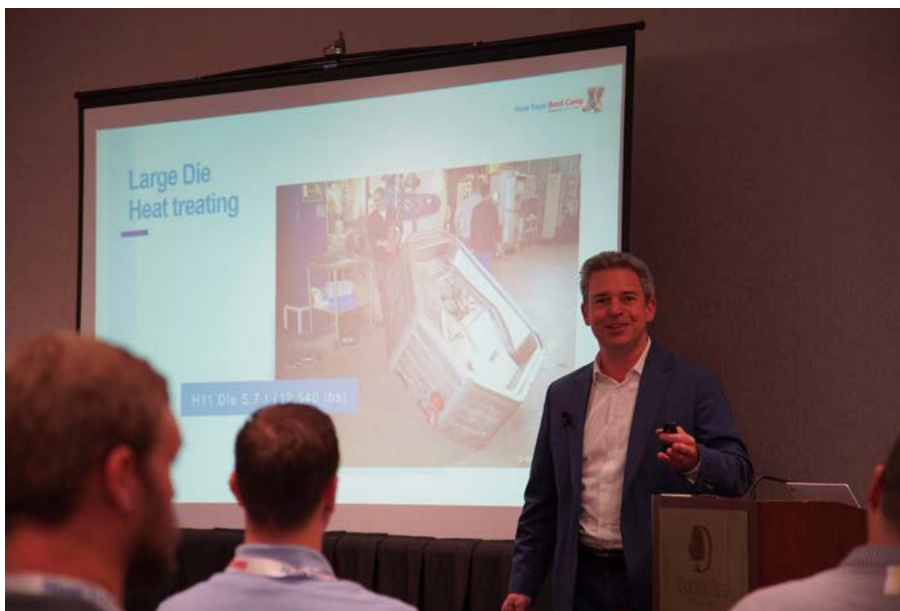
Powder metallurgy and thermal processing of specialty materials are areas of expertise for Thomas. These specialty materials include: titanium, tantalum, niobium, neodymium, and rare earth elements. Along with these specialty materials, Thomas has an extensive knowledge of brazing, metal cleaning, hydriding/dehydriding, tool and die heat treatment, high speed heat treating, brazing heat exchangers, and debinding/sintering, as well as sputter targets and reduction and diffusion processes. Thomas has served the medical and aerospace industries, working with medical components and heat treatment of landing gears.

Thomas agrees with Elon Musk's opinion on what comes next: "making stuff"

is the future. In the U.S., 50 years of offshoring industrial manufacturing is finally coming to an end, and America is reindustrializing. Mines are reopening, raw material processing is becoming a trend, however, a large portion of intellectual property and practical skillsets have been lost. State of the art, environmentally friendly, safe, and automated equipment is needed to meet today's technical and economical standards.

Thomas was also one of two keynote speakers at **Heat Treat Today's Heat Treat Boot Camp**. Thomas' lectures centered on the processes and materials of the North American heat treat industry; he shared some of his vast knowledge of heat treating for attendees, speaking on common processes, various alloys used in heat treating, and exciting new developments in the future of heat treating.

See www.wingens.com for further info or visit Thomas' consultants page at HeatTreatToday.com. **HTT**



Thomas at Heat Treat Boot Camp (Source: Heat Treat Today)



Meet the Consultant: Jon Tirpak



Jon Tirpak, Chief Engineer, Sabattis, LLC

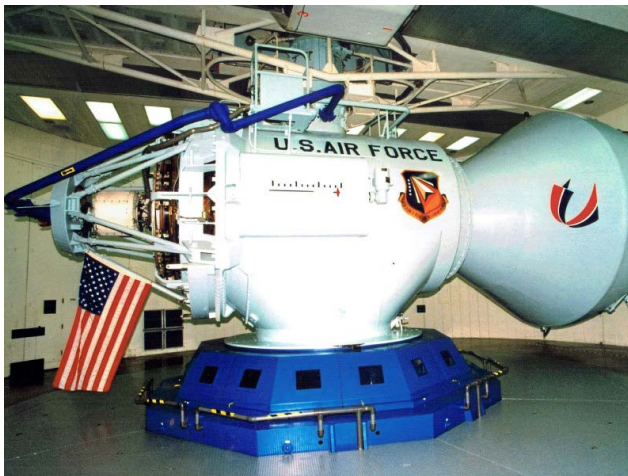
I am Jon Tirpak, professional metallurgical engineer, fellow and past president of ASM International, chief engineer of Sabattis, LLC, and managing partner of Value Selling Associates. I have decades of metallurgical engineering experience, especially with respect to manufacturing technology research and development in the federal and commercial sectors. I excel at building cross functional teams, establishing lean, sustainable processes, navigating the federal marketplace, and thinking outside of the box. Currently, I am located in Mount Pleasant, SC, but "have ticket, will travel!" I am also available through Zoom and Microsoft Teams, and I would welcome a call.

Jon's focus is all about creating teams that focus on client-centric processes. He is more than willing to guide clients towards making the necessary, hard choices based on predetermined criteria, all while using a sane selection process. Once, Jon was noted as being the only "adult" in a room of technologists during an investment strategy session. He considers this to be the biggest compliment paid to him.

With over 40 years of experience in metallurgical engineering, Jon has some fantastic stories shrouded in NDAs. But he can share one of his taglines: "You can't have the alloy without the heat treatment."

In addition to being a consultant in the heat treat industry, Jon is also an Air Force Veteran. Beginning in 1982, he launched his career at the Air Force Materials Laboratory. His seminal research on fatigue, fatigue crack growth, and fracture toughness testing coupled with other programs promoted the use of aluminum castings in aircraft. Eventually, future research and the continuous improvement of casting alloys and processes coupled with heat treating led to the elimination of the casting factor. His technical reports published in the mid-1980s are still referenced today by researchers around the world.

Jon served as an executive officer within Project Forecast II and focused his expertise on advanced materials and manufacturing in the Plans and Programs Office of the Air Force Materials Laboratory. In addition to



Air Force's Dynamic Environment Simulator ("Centrifuge") (Source: United States Air Force)

his regular duties, Jon served as a test subject in the Air Force's Dynamic Environment Simulator (DES) or "centrifuge."

With over 40 test and proficiency runs, Jon was a research subject to evaluate new systems battling a phenomenon called G-Induced Loss



Lieutenant Tirpak suited up for an aeromedical research study. (Source: Jon Tirpak)

of Consciousness (G-LOC). This effect occurs when pilots experience the rapid on-set of acceleration (high g forces) causing a pilot to black out. 8.5 g's was the maximum g force he experienced in the simulator. Watching Top Gun: Maverick reminded Jon of the graying and blacking out of a pilot subject to these extreme forces. The above photo shows Jon getting suited up for related DES studies and the DES itself which was decommissioned and replaced by the Air Force several years ago.

His second assignment at the Ballistic Missile Office availed Jon to work at the Nevada Test Site conducting underground nuclear tests. All in all, his short tours with the Air Force propelled him into the balance of his civilian, industrial career revolving around different metal forming processes and heat treating. Today, he actively supports a client deploying thermal processing technology to replace carburizing.

The future of heat treat lies in two things: passionate people and cybersecurity. Without passionate professionals who see the whole picture and who are willing to contribute and serve clients, business will languish. And don't underestimate the importance of cybersecurity! An enterprise needs to "build moats," train employees, and upgrade software and hardware — and then train again! **HTT**



Know a military veteran serving in heat treat? Let us know so they can join the growing list of **Heat Treat Veterans**. www.heatreattoday.com/veterans-nomination-page

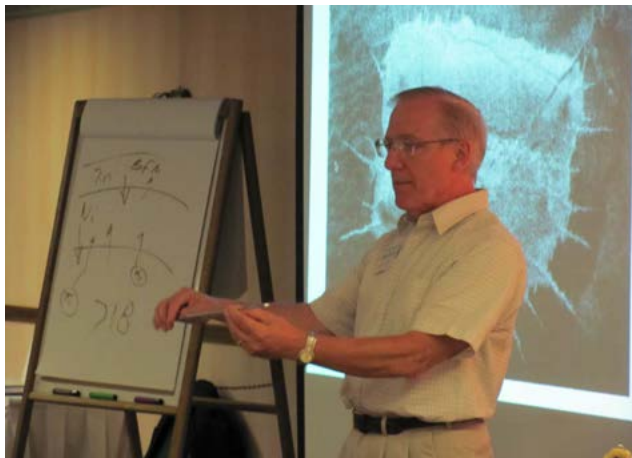


Meet the Consultant: Dan Kay



Daniel Kay, Owner, Kay & Associates

I am Dan Kay (which is a shortened form of my birth name: William Daniel Kay). Although I was born in Ohio, I grew up in New Jersey, went to college (Rensselaer Polytechnic Institute) in New York State, and graduated with a degree in Metallurgical Engineering. I grew up in a wonderful family, as the third child out of six children that my parents had. They were both strong spiritual leaders, too, shaping our Christian faith and helping us to make it a strong foundation in our lives. I am married to a wonderful woman, and we'll be celebrating our 55th wedding anniversary together in June. She continues to be a real blessing to me in so many ways. My home is in Simsbury, CT, where we have now lived for the past 25 years.



Dan Kay's biggest strength is teaching and training. (Source: Kay & Associates)

Dan Kay's biggest strength is teaching and training. Being able to effectively communicate to others, verbally and in writing, to bring about positive change in others is not easy in today's world, but it is something Dan believes he has learned to do well. Currently, Dan uses his teaching skills at brazing seminars that help to increase productivity and reduce scrap and rework.

For almost 60 years, Dan has been involved in the heat treating industry. His specialty is brazing: the joining of metal parts together to form complex assemblies, using a brazing filler metal (BFM) that melts and flows by capillary action into joints between the component parts making up that complex assembly. Out of these 60 years, Dan has many stories, but one stands out: discovering the cause of a mushy joint in tweezers used in the medical industry. After carefully studying the manufacturer's operations, Dan suggested waiting several seconds after brazing by



Dan Kay lectures at one of his popular seminars on brazing. (Source: Kay & Associates)

induction heating and before quenching, allowing the filler metal to solidify completely. After this, the tweezers no longer broke when doctors used them to stitch up patients. In Dan's opinion,

brazing and heat treating need to form a stronger partnership in the years ahead. Increasingly more metals require heat treating to obtain optimal properties for end-use service conditions. Brazing is also a growing industry, enabling more and more complex parts to be created, many of which need enhanced properties for successful use in the field. This will typically require more and more vacuum brazing/heat treat

to be done, and heat treat personnel need to become familiar with brazing and its requirements, so that mistakes will not occur. Vacuum furnaces need to have additional complex internal heat treat and quench capabilities for a wide variety of metals, including aluminum, to allow such parts to be brazed, and then heat treated and quenched in multi-bar furnaces. To learn more from Dan, visit his website kaybrazing.com/seminars to attend his next seminar. **HTT**



Go to

www.heattreatbuyersguide.com

to explore other

Heat Treat Consultants

to assist you with heat treat operation needs.

Continued from Page 7

controlled so the peak demands can be staged, i.e., over several furnaces

- Schedule heavy production cycles to “off peak hours” usually during the evening, i.e., after 6 pm to 8 pm.
- Some utility companies will not penalize for the demand factor during “off peak hours”
- Electric furnaces that operate with “on/off” control using electric contactors are offenders
 - The furnace will call for full power in the “on mode”
 - When temperature reaches the set point, power will be completely turned off
 - Electric power can easily be peaked if several batch furnaces operate in this mode together
 - Solution: replace the electric on/off contactors with SCR (silicon controlled rectifier) power supplies
 - SCR controllers will provide a proportional power control, minimizing peaked power demand

Power Factor Conclusions

It is important to be aware that:

- Power factor can significantly affect the electric power bill if the electric utility charges a penalty for operating at power factor less than unity or bills in kVA rather than kW.

Power factor penalty, simplified.

Power factor can best be understood as consumed power that does no work. This is usually the result of electric motor loads or reactive magnetic loads like transformers. Phase angle fired SCRs also fall into this category.

It can be measured or calculated as:

$$\text{Power factor} = \frac{kW \text{ (real power)}}{kVA \text{ (apparent power)}}$$

- Electric furnaces that operate with resistance heating elements connected directly across the power line, or incandescent lighting in the plant operate at near unity power factor.
- Utility companies penalize users in different ways for power factor and penalties vary by location.

- Motors will have an average power factor of 0.8%.
- Furnace power supplies will have variable power factor depending on loading, averaging about 0.65.

In Summary

There are many ways to conserve dollars in any ongoing manufacturing or heat treating plant. Knowing what — and how — power is consumed in heat treat departments helps operators identify areas to conserve energy in vacuum processing and also in day-to-day operations. Other than “turning off the lights,” many other opportunities are available to operating personnel as outlined above. **HTT**

References

William R. Jones, “Conserving Electric Power: Part 1 and Part 2,” Solar Manufacturing, April 2002, <https://solarmfg.com/tech-downloads/conserving-electric-power-part-i/> and <https://solarmfg.com/tech-downloads/conserving-electric-power-part-ii/>.

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NEW Sustainability and Decarbonization Webinar Series

By IHEA Editorial Team

Over the past several years, process heating energy markets have shifted in response to significant global pressures. The need to understand the impact of greenhouse gases (GHGs), especially carbon-based emissions, on climate change is gaining much more interest from organizations that have industrial heating processes. By far, most industrial heating processes are fueled by carbon-based fossil fuels such as natural gas, propane, fuel oil, diesel, or coal. In basic terms, if you have a combustion process on your site, you are emitting carbon. Climate change effects due to these carbon emissions have prompted government and corporate actions that create unique new opportunities for more sustainable and lower carbon process heating methods.

The Industrial Heating Equipment Association (IHEA) member companies provide a significant amount of process heating equipment to a wide variety of market segments. To support the need for understanding sustainability and decarbonization across process heating industries, IHEA is planning a four-part webinar series on this topic.

Webinar 1, May 11:

Heat Treat Carbon Footprint

More and more industrial sites are interested in understanding their greenhouse gas/carbon footprints. This presentation will focus on how to determine the carbon footprint of a heat treat process site. We will review the technical details of greenhouse gases involved in the heat treat process

and how to use your electrical and natural gas invoices to determine your carbon footprint. Process gases for heat treat and fuels for site vehicles will also be considered and included. After this presentation, you will have a good understanding of the relationship between energy and carbon/GHGs, and how to use your energy data to evaluate your carbon (GHG) footprint.

Webinar 2, June 15:

Defining Greenhouse Gas (GHG) Emissions to Target NET-ZERO

Greenhouse gases come in several forms. One of the most common is carbon, which will be the focus. Carbon emissions fall into several categories known as "scopes." This presentation will define scope 1, 2, and 3 carbon emissions. Scope 1 is basically on-site combustion. Scope 2 is your electrical consumption that has an upstream component of carbon emissions related to the generation of the electricity and varies in amount based on your local utility's generation portfolio. Scope 3 is all carbon emissions related to your supply chain and delivery chain for raw materials and products. Scope 3 can be quite complex and we will review 15 segments of scope 3 emissions. Additionally, we will cover methods and approaches to target all three of these carbon emission scopes to help get your site to a net-zero carbon emission status.

Webinar 3, July 20:

DOE Tools and Programs for GHG Reduction

There are many options available to help determine carbon emissions for equipment, processes, sites, and organizations. This presentation will review some of these available tools and how to apply them to different situations. Carbon emissions are directly tied to energy consumption, so it is very important to understand how all your energy is consumed on site by energy type. This presentation will provide tools and programs to understand your energy consumption and thereby understand your carbon emissions. Additionally, energy improvement projects are also carbon emissions reduction projects. This session will help you understand how to determine the impact of energy projects on your carbon footprint.

Webinar 4, August 24:

Ongoing Sustainability: Industry Best Practices for Continual Improvement

Carbon reduction is not a project, it is an ongoing process. Earlier sessions that help you determine your carbon footprint and understand ways to track and impact it prepare you for this presentation: a review of methods and programs to ensure your continual improvement of carbon reduction efforts. Following the plan, do, check, act method used in many continual improvement programs, we will review the steps that keep your momentum moving in the right direction. We will also plan to have industry case studies for success in ongoing and improving carbon reduction programs.

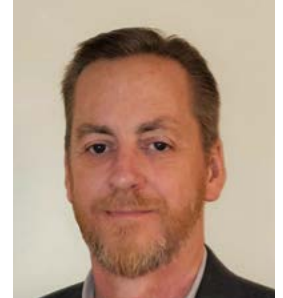
Go to the "Events" page on www.iheda.org and register for these complimentary webinars to learn more about your carbon footprint and how to measure and reduce it. **HTT**





Work-From-Home Cybersecurity Tips and Best Practices

Joe Coleman
Cybersecurity Officer
Bluestreak Consulting™



Introduction

In this eighth Cybersecurity Desk installment, understand the benefits and challenges associated with working from home or accessing corporate networks and systems while traveling.

Why Are So Many People Working from Home?

The COVID pandemic forced many companies to adapt to remote working and work-from-home (WFH) policies. Even though these policies have provided employees with more flexibility, they have also highlighted cyber risks that companies must consider. As of March 2022, work-from-home and working remotely have increased by 238% compared to pre-pandemic numbers. Although that number has reduced somewhat recently, it has changed the way companies operate and view WFH.

Several benefits of WFH include:

1. Increased employee retention and productivity
2. Reduced distractions and interruptions by coworkers
3. Reduced company overhead costs
4. Increased family time by eliminating commute

One of the first challenges most companies face when shifting to a WFH model is ensuring every employee has high-speed internet access. Most employees will use home Wi-Fi network or cell phone/wireless carrier as an internet "hot spot." The first common sense rule of thumb is always try to avoid public Wi-Fi and public charging stations. Any way you choose to access high-speed internet, it must be secure. By now, most companies should have WFH or remote work policies and procedures in place, with employee awareness and training, because they MUST be followed to reduce cybersecurity risks.

Cybersecurity Best-Practices for Securing Remote Workers

If your company has employees that

work from home and you're wondering what cybersecurity measures you should put in place, here are some best practices to help you:

1. **Secure your work sessions:** Using a single room that has a door that can lock is the ideal situation when possible. Many WFH employees are either sitting at their kitchen table or in the living room. In those cases, make sure to have your monitor facing a wall to prevent family or guests from viewing your work session and lock your computer when you're away.
2. **Separate your home and business networks:** Separate your Wi-Fi network so company-approved devices will be separate. Even better, use a secure network and a company-issued Virtual Private Network (VPN) to access your business accounts. You can also use BeyondTrust for secure remote access. Home routers should always be updated to the current software version when it becomes available.
3. **Separate work and personal devices:** When accessing your corporate network, only use company-approved devices. Unless your company allows Bring-Your-Own-Device (BYOD), never use an unapproved device to access your company network.
4. **Think before you click:** Hackers use phishing and other social engineering methods to target employees with legitimate-looking emails and social media messages. These can trick users into providing confidential data, such as usernames, passwords, credit card numbers, social security numbers, account numbers, etc. SLOW DOWN Don't click on links sent from an unknown or untrusted source. Resist the urge to click links in a suspicious email. You can hold your cursor over a link, and it will show you (in the bottom left corner of your screen) the website that it will go to if you click on it. If it's an unknown or suspicious site, DO NOT click on it.

5. **Antivirus with real-time scanning:** Antivirus software detects the presence of malware on your computer. A dynamic scanning feature repeatedly checks for computer infiltration by a malicious threat. Always keep your antivirus up to date and active.
6. **Update programs, applications, and operating systems:** Vulnerabilities in applications and operating systems are continually being found and exploited. Cybercriminals often use these vulnerabilities to exploit data and infiltrate devices and networks. Application vulnerabilities are a cybersecurity challenge of remote working. Make sure you are regularly performing updates as they are released.
7. **Use 2-Factor Authentication (2FA) or Multi-Factor Authentication (MFA):** If you're not using 2FA or MFA, you are NOT secure. You should use 2FA or MFA wherever it's available. Your company should have this requirement in its policies and procedures.
8. **Use strong PINs/passwords on your devices:** Strong passwords should contain a good mixture of upper/lowercase letters, numbers, and symbols (or special characters). Passwords should also not be based on dictionary words and should contain at least twelve characters (the longer the better). Never use the same password for multiple accounts and use a password generator and a password manager.

Remote working has many benefits, but it also has its share of cyber risks. Companies must take a proactive approach to ensure the security of their remote workers, including cybersecurity training, strong security policies and protocols, and access to secure networks. [HTT](#)

Contact Joe Coleman at joe.coleman@go-throughput.com

Heat Treat Today partners with two international publications: **heat processing**, a Vulkan-Verlag GmbH publication that serves mostly the European and Asian heat treat markets, and **Furnaces International**, a Quartz Business Media publication that primarily serves the English-speaking globe. Through these partnerships, we are sharing the latest news, tech tips, and cutting-edge articles that will serve our audience — manufacturers with in-house heat treat.

*In this issue: new equipment, new investment, a new association member, and a new report.
A fresh start for spring must be happening!*



German steelmaker awarded government funds. (Source: Salzgitter)

Hydrogen-based Steel Production Project, SALCOS, Receives Gov't Funding

"Salzgitter, Germany's second-largest steelmaker, has been awarded almost €1 billion in government funding for its hydrogen-based steel production project, SALCOS . . . The project will produce around 1.9Mt of raw steel and cut more than 2.5Mt of carbon emissions a year, according to Germany's economy ministry."

Read More: "[Salzgitter awarded €1b for hydrogen-based production](#)" at [furnaces-international.com](#)

Specialty Steel Provider Joins Steel Manufacturers Association

"TimkenSteel has joined the Steel Manufacturers Association (SMA) – the largest steel industry trade association in the United States and is the primary trade association representing North American EAF steel producers. Timken's president and chief executive officer, Mike Williams, has joined the SMA's board of directors."



Mike Williams, President/CEO, TimkenSteel (Source: TimkenSteel)

Read More: "[TimkenSteel Corporation joins Steel Manufacturers Association](#)" at [furnaces-international.com](#)

Foundry Group BIRN Released Its First Sustainability Report

"As one of the first in its industry, the foundry group BIRN Group has just released its first sustainability report. The report is an initial step towards a more sustainable business model."



Sustainability Report for BIRN Group (Source: BIRN)

Read More: "[Foundry Group launches first sustainability report](#)" at [heat-processing.com](#)

New Pyrometer for Foundry and Liquid Metal Applications

"Liquid steel and metal foundry and tapping operators can now benefit from improved and smart temperature measurements for process control and product quality improvements with the new smart SPOT Meltmaster (MM) application pyrometer from AMETEK Land. The SPOT MM offers a single-sensor solution for liquid metal temperature measurements in foundry and tapping applications. This smart application pyrometer accurately measures tapping stream and liquid steel and metal temperatures independent of surface and condition changes during the process."



SPOT MM smart application pyrometer (Source: AMETEK Land)

Read More: "[New SPOT MM Smart Application Pyrometer from AMETEK Land](#)" at [furnaces-international.com](#)



Nucor Steel Berkeley has ordered a new plant for its steelworks from Primetals Technologies. (Source: Nucor Steel Berkeley)

Nucor Steel Orders Hot-Dip Galvanizing Line

"Primetals Technologies has received an order from Nucor Steel Berkeley, a division of US steelmaker Nucor Corporation, for a new hot-dip galvanizing (FVZ) line for the automotive industry. The line will be installed at Nucor's plant in Huger, South Carolina. Nucor Corporation is the largest steel producer in North America and the largest recycler of materials in the Americas."

Read More: "[Primetals: Nucor Steel orders hot-dip galvanising line](#)" at [heat-processing.com](#)

Southwest Metal Treating Corp.

For Southwest Metal Treating Corp., evolution is the name of the game. A family-owned and run company, they have been evolving since 1985. Located in the center of Texas's booming oil and gas industry, they are constantly being given the opportunity to grow and change with its demands, and so they are proud to call themselves "Texas' Premier Choice for Heat Treating." Staying ahead of the industry's curve means continually developing their diverse processing capabilities to serve clients.

In an ever-changing industry, the client benefits from efficiency, high-quality heat treat, consistency, and repeatability, and SWMT is

ready to adapt to deliver quality in both cases.

End-users must change and refine their goals to meet precise standards. Because of this, SWMT provides hardness and microhardness testing to evaluate strength, ductility, and wear resistance. An example of their heat treat expertise was on display in the Manhattan Bridge project, for which the company was tasked with heat treating the fasteners.

Evolving with client expectations of the heat treating industry has taken SWMT through a transformation. In 1985, the company began as a service provider to the fastener industry with Ipsen T4 model furnaces. Back then, making parts was the focus. But serving clients with excellence means always staying up to date. The 47 employees were and still are committed to keeping equipment in tip-top shape, which includes maintaining the ISO 9001:2015/AS9100D standards. Today — long since having outgrown their original furnaces — they are a full-service heat treat shop with some of the largest batch-style IQ furnaces available. These furnaces are used to serve not only the fastener industry, but also the oil and gas, aerospace, agricultural, military, mining, and industrial industries.

Where will the changing needs of the industry take them now? Whatever comes next, SWMT is ready to change with the industry.



Plasma nitriding at SWMT (Source: Southwest Metal Treating, Inc.)

focused on delivering on all these fronts. Along with all their heat treating services, they provide quality and integrity. The company has gained a body of thermal processing knowledge and experience as their services and capabilities. Blasting, carburizing, stress relieving, as well as plasma and gas nitriding are on their list of quality services provided. Project needs differ for both large and small-scale manufacturing, and they are



For more information, contact

Southwest Metal Treating Corp.

9516 Lynwood St.

Fort Worth, TX 76134

United States

Phone: (817) 551-1295

southwestmetaltreating.com

ryanf@swmt.net

Heat Treat Shop

Heat Treat Today believes that people are happier and make better decisions when they are well informed. To get a sense of what options the market has for you, check out some of the heat treat components, parts, services, and supplies listed below. These products have been featured in our monthly e-newsletter called **Heat Treat Shop**, where manufacturers with in-house heat treat departments — especially in the aerospace, automotive, medical, energy, and general manufacturing sectors — can easily share this information.

Want to see your product listed here? Contact Michelle Ritenour at michelle@heattreattoday.com.

C3 Data

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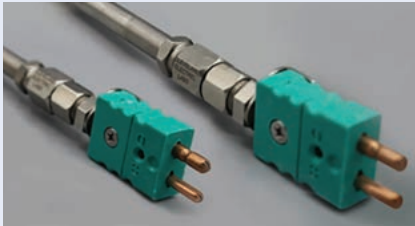
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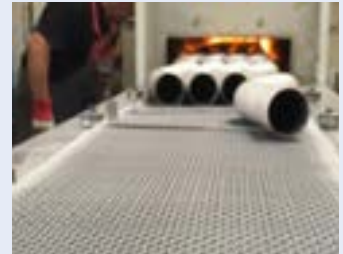
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Heat Treat Classified

In this section you will find classified advertisements for Used Equipment, Employment, and Aftermarket products and services. Each ad is clearly marked with one of those categories. Employment/Help Wanted ads tend to be toward the front of the section and Used Equipment ads tend to be toward the back with Aftermarket sprinkled throughout.

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If you have employment needs, aftermarket parts or services to promote, or used equipment to sell, please contact Eunice Pearce at (616) 401-4723 or eunice@heattreattoday.com for pricing and availability. All classified ads appearing in the print version are also listed online at no extra charge.

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Whatever information provided will help us honor the many men and women who have served the U.S.

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**Heated/Max Demand:** Natural Gas (3175 CFH - 1,000 BTU/cuft)**Max Temp:** 1800°F**Power:** 460 V, 3-phase, 60 Hz, 70 KW**Working Dim's:** 36" wide x 48" deep x 30" high**Waukee Flow Meters:** (5) air, ammonia, natural gas, endo, nitrogen**Controls:** Honeywell High Limit & Quench High Limit
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Abar Ipsen U-3579 HR-50 Vacuum Furnace

**Model:** HR 50x48, 2-Bar**Load Area:** 36" wide x 48" deep x 30" high**Max Load:** 2,500 pounds**Voltage:** 460V / 3-Phase / 60Hz**Maximum Temp:** 2500°F**Atmosphere:** Nitrogen or Argon**Controls:** Honeywell DCP 700 and Honeywell
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Help Wanted! Centorr looking for Field Service Technician

Job Responsibilities:

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- Provide customer training both on site in Nashua and at customer facility
- Prepare field service reports with technical detail on equipment after each customer visit
- Communicate in a professional manner with customers in person and in writing
- Promote sales and service on company equipment

Qualifications:

- 1-5 years minimum experience in any of the following: electrical/mechanical technician, pipe fitting or electrical journeyman or a combination of work experience and the successful completion vocational school
- Ability to travel extensively, approximately 70% is required
- Experience with Commercial HVAC/ Refrigeration systems and components is a plus
- Electro-mechanical troubleshooting skills a must.
- PLC controls knowledge highly preferred
- Strong written and verbal communications skills
- Ability to read electrical schematics
- Proficient with Microsoft applications



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Job Duties

- Specify Electrical and Controls Engineering aspects of vacuum and controlled atmosphere furnaces that operate to 3000°C
- Analyzes equipment specifications and performance requirements to determine the lowest cost and lowest technical risk
- Analyzing equipment specifications and performance requirements and designing Electrical Engineering aspects of vacuum and controlled atmosphere furnaces
- Coordinating efforts with Mechanical Engineering, creating bills of materials, preparing design modifications if required, preparation of manuals, and analyzing and cataloging test procedure results
- Electrical equipment and controls configuration conceptualization, design layout, and programming.
- Preparation of detailed drawings and schematics
- Preparation and configuration of PLC and HMI code
- Completion of "as built" drawings, schematics, and other documentation



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Qualifications:

- Bachelor's degree and at least four (4) years related experience and/or training
- Knowledge of AutoCAD, MS Excel, VBA
- Proven experience configuring and testing PLC and HMI configurations.
- Experience with at least some of the following programs is a must: Allen Bradley: Micrologix, SLC500, Control Logix, Factory Talk View ME/SE, Kinetix & PowerFlex Drives; GE – Proficy IFix, Mitsubishi – FX PLC's, Specview, Honeywell – HC900, Siemens – S7 PLC and Yokogawa and Eurotherm instruments
- Familiarity with NFPA 70 (NEC), NFPA79, UL 508A, desired with NFPA 86 a plus
- Controls trouble shooting skills
- Ability to manage productively and efficiently your own time in dealing with multiple priorities
- Excellent written and oral communication skills, with Manufacturing, Field Service and customers.
- Ability to respond to common inquiries or comments from customers
- Ability to effectively present information during design reviews
- Vacuum furnace or vacuum experience preferred



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Furnaces, Ovens & Baths, Inc.

EQUIPMENT FOR SALE

ATMOSPHERE GENERATORS

- 3000 CFH Endo, Gas Fired, 2000°F, Lindberg, Air Cooled
- 3000 CFH Endo, Electric, 1950°F, Gasbarre, Water Cooled
- 3000 CFH Endo, AFC, 1950°F, Gas - 2 Available
- 5600 CFH Endo, Gas Fired, 1950°F, Rogers Engineering
- 6000 CFH Gas Atmospheres Exothermic, Gas Fired, 1950°F

BOX FURNACES

- 30"W x 30"H x 48"L, J.L. Becker/Surface, 1400°F, Gas Fired
- 30"W x 30"H x 48"L, 1750°F, Electric, Surface Combustion
- 10'6"W x 6'H x 35'L, Gas Fired, 1650°F, Drever, Atmosphere
- 36"W x 36"H x 72"L, Surface Combustion, 1750°F, Gas Fired
- 30"W x 30"H x 48"L, Selas, 1450°F, Gas
- 30"W x 30"H x 48"L, Surface, 1450°F, Gas
- 30"W x 30"H x 48"L, Surface, 1400°F, Gas
- 30"W x 20"H x 48"L, Surface, 1250°F, Gas
- 30"W x 20"H x 48"L, Surface, 1250°F, Gas
- 60"W x 60"H x 60"L, Lindberg, 1250°F, Gas
- 72"W x 42"H x 78"L, Grieve, 1250°F, Inert Atmosphere

BELT OVENS

- 30"W x 15"H x 10'L, Grieve, 400°F, Electric
- 18"W x 23"H x 12'L, Jensen, 550°F, Gas Fired
- 24"W x 20"H EACH, Wisconsin Oven, 2 Lane Belt Oven, 650°F, Gas

INTEGRAL QUENCH FURNACES

- 36"W x 36"H x 48"L, Surface, Electric, 1750°F
- 24"W x 18"H x 48"L, 1850°F, Gas Fired, Ipsen T-8, 2 Zones
- 36"W x 36"H x 48"L, AFC, Gas, 1750°F

ROTARY HEARTH FURNACES

- 50" Dia, 18"W x 9"H Door, Electric, 1600°F
- 96" Diameter Hearth, 28"W x 19"H Door Opening, 32"L, Seco Warwick, 1800°F, Electric, Atmosphere

INDUCTION HEATING/MELTING

- 125 kW, 3 kHz, 300 Lb. VIM Melter
- 200 kW, 3 kHz Pillar w/Scanner
- 100 kW, 30-50 kHz Inducto-Heat
- 150 kW, 30 kHz, Inducto-Heat
- 100 kW, 10 kHz Inducto-Heat
- 300 kW, 3/10 kHz Inducto-Heat BSP5
- 100 kW, 3/10 kHz Inducto-Heat BSP
- 150 kW, 3/10 kHz Tocco Inductron II
- 100 kW, 10 kHz Ajax/Tocco, 48" Scanner
- 150 kW, 3/10 kHz Ajax/Tocco, 60" Scanner

WALK-IN OVENS

- 55"W x 60"H x 30"L, 350°F, Electric, Precision Quincy
- 48"W x 72"H x 60"L, Grieve, 500°F, Gas
- 36"W x 60"H x 48"L, Grieve, 350°F, Electric
- 36"W x 72"H x 48"L, Gruenberg, 300°F, Electric
- 36"W x 72"H x 68"L, Gruenberg, 500°F (140°F w/Solvents), Class A
- 72"W x 72"H x 72"L, JPW, 500°F, Gas Fired
- 36"W x 72"H x 36"L, DIS, 550°F, Gas Fired, 4 Compartments (NEW)

CABINET OVENS

- 25"W x 20"H x 20"L, Electric, 650°F, Inert Gas, Blue M
- 48"W x 36"H x 24"L, Electric, 500°F, Inert Gas, Blue-M
- 20"W x 20"H x 18"L, Blue M, 1100°F, Electric, Atmosphere
- 48"W x 72"H x 48"L, Despatch, Electric, 500°F
- 25"W x 20"H x 20"L, Blue M, 1100°F, Inert Gas
- 66"W x 42"H x 53"L, Grieve, 500°F, Gas

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PIT TEMPERS/NITRIDERS

- 28" Dia x 48"Deep, L & N, 1200°F, Electric, NITRIDER
- 28" Dia x 28"Deep, Lindberg, 1250°F, Gas
- 38" Dia x 48"Deep, Wisconsin, 1250°F, Electric, 2 Avail.
- 38" Dia x 48"Deep, Lindberg, 1250°F, Electric, 3 Avail.

WASHERS CONVEYOR & BATCH

- 24"W x 10"H, SS Belt Washer, Electric, Wash & Blow-Off
- 12"W x 12"H, SS Belt Washer, Electric, W/R and Blow-Off
- 36"W x 18"H, SS Belt Washer, Gas, W/R/Blow-Off
- 24"W x 18"H, SS Belt Washer, Electric, W/R/Blow-Off
- 30" Diameter Rotary Drum Wash, Gas Fired, Stainless Steel
- 24"W x 24"H x 24"L, Ipsen, Dunk & Spray, Gas
- 30"W x 30"H x 48"L, Surface Combustion, Spray, Gas
- 30"W x 20"H x 48"L, Surface Combustion, Spray, Electric

SHOT BLAST

- Pangborn 8LK 96" Diameter Table Blast w/Dust Collector
- Pangborn 4LK 48" Diameter Table Blast w/Dust Collector

MISCELLANEOUS

- 48"W x 36"H 48"L, Despatch Quick Quench Drop Bottom, Electric 1000°F
- 36 x 48 AFC Charge Car, Double Ended, 2 Available
- Several 36 x 48 scissors lift tables and stationery tables
- 30 x 48 Surface Combustion System 1 Charge Car
- 30 x 48 Lindberg Pacemaker Charge Car

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Batch Temper Furnaces

C0189	Williams Industrial Batch Temper Furnace (30"W x 48"D x 30"H, 1250°F, gas)
U3697	B&W Temper Furnace (36"W x 72"D x 36"H, 1400°F, gas)
U3737	Wisconsin Oven Batch Temper Furnace (24"W x 48"D x 24"H, 1250°F, elect, 48kw, 66amp)
U3764	Lindberg Batch Temper Furnace (33"W x 65"D x 36"H, 1400°F, gas)
U3765	Sunbeam Batch Temper Furnace (30"W x 57"D x 34"H, 1200°F, gas)
U3782	Williams Batch Temper Furnace (36"W x 72"D x 36"H, 1450°F, gas)
U3785	Unique Batch Temper Furnace (40"W x 40"D x 51"H, 1200°F, gas)
U3810	Surface Combustion Temper Furnace (36"W x 48"D x 36"H, 900°F, gas)
U3837	Surface Combustion Temper Furnace (36"W x 54"D x 30"H, 1250°F, elect)
U3838	Surface Combustion Temper Furnace (30"W x 48"D x 30"H, 1250°F, elect)
V1170	Grieve Batch Temper Furnace (48"W x 48"D x 48"H, 1100°F, gas)
V1182	Wisconsin Oven Temper Furnace (24"W x 18"D x 36"H, 1250°F, gas)
V1196	Surface Combustion Temper Furnace (36"W x 72"D x 36"H, 1600°F, gas)

Batch High-Temp Furnaces

UV1130	Onspec High-Temp Batch Furnace (72"W x 96"D x 48"H, 2400°F, gas)
V1185	Cooley High Temperature Batch Furnace (12"W x 32"D x 16"H, 2000°F, elect)

Car Bottom Furnaces

V1166	Rockwell Car Bottom Furnace (60"W x 121"D x 72"H, 1000°F, gas)
V1179	Tilt-Up Car Bottom Furnace (8"W x 16"D x 8"H, 1600°F, gas)

Internal Quench Furnaces

C0187	Pacific Scientific Straight-Thru Furnace (24"W x 36"D x 18"H, 1750°F, gas)
C0193	Surface Combustion IQ Furnace (30"W x 48"D x 30"H, 1850°F, gas)
U3687	Surface Combustion IQ Furnace with Top Cool (36"W x 72"D x 36"H, 1750°F, gas)
U3718	Surface Combustion IQ Furnace (36"W x 48"D x 36"H, 1750°F, gas)
U3770	AFC IQ Furnace with Top Cool (36"W x 48"D x 36"H, 1800°F, gas)
U3807	Surface Combustion IQ Furnace (36"W x 48"D x 36"H, 1800°F, gas)
UV1082	Holcroft IQ Furnace with Top Cool (36"W x 48"D x 30"H, 1850°F, gas)
V1173	AFC IQ Furnace with Top Cool (36"W x 48"D x 36"H, 1800°F, gas)
V1193	Surface Combustion IQ Furnace (36"W x 48"D x 30"H, 1800°F, gas)

Oil Quench Furnaces

C0201	Abar Ipsen Vacuum OQ Furnace (36"W x 48"L x 30"H, 2300°F, elect)
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Vacuum Furnaces

C0170	Seco Warwick Vacuum Carburizer Furnace (36"W x 48"D x 32"H, 2300°F, elect)
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C0179	Vacuum Industries Vacuum Furnace (24"W x 36"D x 24"H, 2100°F, elect, 171kw)
C0201	Abar Ipsen Vacuum OQ Furnace (36"W x 48"L x 30"H, 2300°F, elect)
U3759	Abar Ipsen Vacuum Furnace (36"W x 48"D x 30"H, 2500°F, elect)
U3831	Surface Combustion Vacuum Furnace 2-Bar (36"W x 48"L x 36"H, 2400°F)
V1131	Abar Vacuum Furnace 2-Bar (24"W x 60"D x 24"H, 2450°F, elect, 150kw)
V1138	Ipsen Vacuum Furnace 5-Bar (24"W x 36"L x 14"H, 2400°F, elect, 112.5kw)

Mesh Belt Brazing Furnaces

UV1035	Seco Warwick Mesh Belt Brazing Furnace (18"W x 12"H x 10' heated, 2100°F, elect)
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Pit Nitriding Furnaces

U3727	Surface Combustion Nitriding Pit Furnace (27"Dia x 35"D, 1050°F, electric, 90KW)
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Steam Tempering Furnace

U3616	Degussa Durferrit Steam Tempering Furnace (24"Dia x 48"D, 1200°F, electric)
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Heat Treat Lines

U3687	Surface Combustion IQ Furnace Line (36"W x 72"D x 36"H, 1750°F, gas)
UV1082	Holcroft IQ Furnace Line with Top Cool (36"W x 48"D x 30"H, 1850°F, gas)

Scissors Lifts, Holding Tables, Conveyors

U3690	Surface Combustion Scissors Lift (36"W x 72"D)
U3825	Abar Ipsen Scissors Lift (36"W x 48"L, 18K lbs)
U3826	Abar Ipsen Double Holding Station (36"W x 96"L)
UV1086	Holcroft Scissors Lift & (2) Holding Tables (36"W x 48"D)

Ovens - Cabinet & Batch

U3699	Wisconsin Cabinet Oven (25"W x 24"D x 25"H, 650°F, elect, 12kw)
U3752	Precision Quincy Batch Oven (36"W x 36"D x 36"H, 500°F, gas)
U3753	Blue M Batch Oven (24"W x 20"D x 20"H, 1300°F, elect, 25amps)
U3754	Blue M Batch Oven (16.5"W x 16"D x 20"H, 482°F, elect, 3kw)
U3792	Grieve Batch Oven (24"W x 24"D x 24"H, 1250°F, elect)

Ovens - Walk-In

U3788	Wisconsin Walk-In Oven (96"W x 240"D x 96"H, 650°F, gas)
U3791	Jensen Walk-In Oven (72"W x 72"D x 72"H, 600°F, gas)
U3799	Walk-In Oven (72"W x 72"D x 72"H, 800°F)
U3802	Sahara Walk-In Oven (48"W x 60"D x 55"H, 500°F, elect)
U3834	TPS Walk-In Oven (68"W x 72"L x 65"H, 842°F, elect)
V1181	Grieve Walk-In Oven (52"W x 76"D x 72"H, 750°F, elect)

Charge Cars

U3688	Surface Combustion DE Charge Car (36"W x 72"D)
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U3762	Surface Combustion Charge Car DE/DP (36"W x 72"D)
U3763	JL Becker Charge Car DE (30"W x 48"D)
U3820	Abar Ipsen Charge Car (36"W x 48"D)
UV1085	Holcroft Charge Car DE/DP (36"W x 48"D)

Washers

C0134	Surface Combustion Washer SDA (60"W x 60"D x 48"H, 180°F, gas)
U3689	Surface Combustion Washer - spray only (36"W x 72"D x 36"H, elect) with holding station
U3711	AFC Holcroft Washer SD (24"W x 36"D x 24"H, gas)
U3800	Ipsen - Spray/Dunk Washer (36"W x 48"D x 24"H, elect)
V1177	AFC Washer SDA (36"W x 48"D x 36"H, 190°F, gas)
UV1084	Holcroft Washer SD (36"W x 48"D x 30"H, 190°F, elect)

Endothermic Gas Generators

C0194	Lindberg Endothermic Gas Generator (1500 CFH, 1950°F, gas)
C0199	Lindberg Endothermic Gas Generator (1500 CFH, 1950°F, gas)
U3594	Atmosphere Furnace Endothermic Gas Generator (3000 CFH, gas)
U3635	Lindberg Hydryzing Endothermic Gas Generator (6000 CFH, gas)
U3836	Sunbeam Endothermic Gas Generator (1,000 CFH, gas)

Exothermic Gas Generators

U3652	Surface Combustion Exothermic Gas Generator (10,000 CFH, gas)
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Salt Bath Furnace

C0173	Upton Salt Bath Furnace (60"W x 96"D x 72"H, 1100°F, gas)
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Ammonia Dissociators

U3767	Nitrex Ammonia Dissociator 500cf
V1180	Cl Hayes Ammonia Dissociator (500 cfh)

Heat Exchanger Systems

U3787	SBS Air-Cooled Heat Exchanger, 2 fans
U3801	MRM/SBS Heat Exchanger, 1 fan
U3833	Dalkin Heat Exchanger - 7.5 Ton
V1197	SBS Oil Cooler

Water Chiller

U3710	Koolant Coolers Chiller (HCR 20,000 PR-MB)
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Water Cooling Systems

U3565	Hytrol Conveyor - Roller (48"W x 10'D each)
U3646	HydroThrift, Duplex Pump Base, Water Cooling System

Holding & Cooling Stations

Many other holding & cooling stations - ask for details

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BELT FURNACES/OVENS

6' x 48' x 3'	Hayes (Atmos)	Elec 2100°F
32' x 24' x 12'	OSI Slat Belt	Gas 450°F
24' x 16' x 12'	Lewco	Elec 350°F
48' x 20' x 48'	Thermation	Gas 500°F
2000 #/HR	AFC Pusher Hardening (Atmos)	Gas 1750°F

MISCELLANEOUS

Combustion Air Blowers (All sizes)		
12" Diam. x 48" Mellen Tube FCE.	Elec 2300°F	
24' x 36" Lindberg Charge Car (Manual)		
36' x 48" Surface Scissor Lift (2)		
24' x 36' x 24" Ipsen D&S Washer Gas		
36" Diam. Viking Rotary Table Washer Elec		
Garden City Alloy "Plug" Fans (2) - 1350°F		
30" x 48' x 36" Surface Washer Gas		
30" x 48' x 30" Surface Washer (2) Gas		
(2) Bell & Gossett "Shell & Tube" Heat Exchangers		
30" x 30' x 30" Subzero -105 to 375°F Elec.		
30" x 48" Surface Charge Car (System 1)		
30" x 48" Lindberg Charge Car (2)		
30" x 48' x 30" Surface D&S Washer Gas		
AFC Pusher Line (Atmos.) Gas 1750°F		
36" x 48" AFC Scissor Lift(6) Elec		
36" x 48" Charge Car(DE) AFC - Elec (2)		
48" x 53" x 48" Guyson Spindle Blaster Elec		
36" Wide Table- Rotary Hearth (Atmos.) Elec 1850°F		
36" x 48" Holcroft Charge Car (DE)		
24" Wide Table Surface Rotary Hearth Gas 1750°F		
SBS Air/Oil Coolers (8)		

OVENS/BOX TEMPERING

8' x 18" x 8"	Lucifer	Elec 1250°F
12' x 16" x 18"	Lindberg (3)	Elec 1250°F
14" x 14" x 14"	Blue-M	Elec 1050°F
14" x 14" x 14"	Blue-M	Elec 650°F
14" x 14" x 14"	Gruenberg (solvent)	Elec 450°F
19" x 19" x 19"	Despatch	Elec 850°F
20" x 18" x 20"	Blue-M	Elec 400°F
20" x 18" x 20"	Despatch	Elec 650°F
20" x 18" x 20"	Blue-M	Elec 650°F
20" x 18" x 20"	Blue-M (2)	Elec 800°F
20" x 20" x 20"	Grieve	Elec 1000°F
22" x 42" x 22"	TM (Vacuum)	Elec 750°F
24" x 24" x 36"	New England	Elec 800°F
24" x 24" x 48"	Blue-M	Elec 600°F
24" x 36" x 24"	Demtec (N2)	Elec 500°F
24" x 36" x 24"	Grieve	Elec 1000°F
24" x 42" x 24"	Pacific	Elec 1450°F
25" x 20" x 20"	Blue-M	Elec 650°F
24" x 36" x 48"	Gruenberg	Elec 500°F
25" x 20" x 20"	Blue-M	Elec 1300°F
25" x 20" x 20"	Blue-M (Inert)	Elec 1100°F

OVENS/BOX TEMPERING (CONT.)

26" x 26" x 38"	Grieve (2)	Elec 850°F
30" x 30" x 48"	Process Heat	Elec 650°F
30" x 38" x 48"	Gruenberg (Inert) (2)	Elec 450°F
30" x 48" x 20"	Surface (2)	Gas 1250°F
30" x 48" x 24"	Selas	Elec 1450°F
30" x 48" x 30"	Surface (2)	Gas 1400°F
30" x 48" x 30"	Surface (2)	Elec 1400°F
30" x 48" x 24"	Ipsen	Gas 1250°F
30" x 48" x 30"	Selas	Gas 1450°F
36" x 36" x 36"	Blue M Environment Chamber	(-18°C to +93°C)
36" x 36" x 60"	P-Quincy	Gas 500°F
36" x 48" x 30"	Lindberg	Elec 1250°F
36" x 48" x 36"	Grieve (Inert)	Elec 1250°F
36" x 48" x 36"	TPS (Environmental)	Elec -40°C to +200°C
36" x 48" x 60"	Blue M	Elec 600°F
36" x 60" x 36"	CEC (2)	Elec 650°F
36" x 108" x 36"	Wisconsin	Elec 1250°F
37" x 25" x 37"	Despatch	Elec 500°F
37" x 25" x 37"	Despatch	Elec 1000°F
38" x 20" x 26"	Grieve	Elec 500°F
48" x 48" x 20"	Lindberg (Hyd. Press)	Elec 1250°F
48" x 48" x 72"	Blue-M	Elec 600°F
48" x 34" x 52"	Heat Mach. (2)	Elec 350°F
48" x 48" x 48"	L+L (Atmos)	Elec 1200°F
48" x 48" x 60"	Blue-M	Elec 400°F
48" x 48" x 72"	Grieve	Gas 650°F
40" x 52" x 63"	Despatch	Gas 650°F
48" x 52" x 72"	Despatch	Elec 850°F
60" x 60" x 60"	Lindberg	Gas 1250°F
60" x 60" x 60"	P-Quincy	Gas 500°F
60" x 96" x 72"	Grieve	Elec 450°F
60" x 96" x 72"	P-Quincy	Elec 650°F
60" x 120" x 72"	P-Quincy	Elec 450°F
72" x 78" x 42"	Grieve (Inert)	Elec 1250°F
96" x 192" x 96"	Despatch	Gas 650°F
96" x 360" x 48"	Sauder Car Bottom	Elec 1400°F

ATMOSPHERE GENERATORS

500CFH	Ammonia Dissoc. Drever	Elec
500CFH	Endothermic Lindberg	Gas
750CFH	Endothermic Ipsen	Gas
800CFH	Endothermic Surface	Gas
1,000CFH	Exothermic Gas Atmos.	Gas
1,500CFH	Endothermic Lindberg (Air)	Gas
3,000CFH	AFC - (2) Air Cooled	Gas
3,000CFH	Endothermic Lindberg (4) - Air	Gas
3,600CFH	Endothermic Surface	Gas (2)
6,000CFH	Exothermic Modern Equipment	Gas

BOX FURNACES

12" x 24" x 10"	Lindberg (Atmos.)	Elec 2000°F
13" x 24" x 12"	Electra Up/Down	Elec 2000°F
12" x 24" x 10"	Lindberg (Atmos.)	Elec 2500°F
12" x 24" x 12"	Hevi Duty (2)	Elec 1950°F
17" x 14.5" x 12"	L&L (New)	Elec 2350°F
18" x 36" x 18"	Lindberg (Atmos)	Elec 2500°F
18" x 36" x 18"	Lindberg (Fan)	Elec 1850°F
20" x 48" x 12"	Hoskins	Elec 2000°F
30" x 48" x 30"	Surface (RTB)	Elec 1750°F
48" x 168" x 60"	Ohio (Car)	Gas 2300°F
60" x 216" x 48"	IFSI (Car Bottom)	Gas 2400°F
96" x 360" x 48"	Sauder Car Bottom	Elec 1400°F
108" x 156" x 84"	American (Car)	Gas 2300°F
126" x 420" x 72"	Drever "Lift-Off" (2) (Atmos.)	Gas 1450°F

PIT FURNACES

22" Dia x 26"D	L + N (2)	Elec 1200°F
22" Dia x 36"D	L + N	Elec 1400°F
28" Dia x 48"D	L + N Nitrider	Elec 1200°F
38" Dia x 48"D	Wisc Oven (2)	Elec 1250°F
38" Dia x 48"D	Lindberg (3)	Elec 1250°F
72" Dia x 72"D	Flynn + Dreffein (2) (Atmos.)	Elec 1400°F

VACUUM FURNACES

12" x 20" x 12"	Abar	Elec 2400°F
24" x 36" x 18"	Hayes (Oil Quench)	Elec 2400°F
48" x 48" x 24"	Surface (2-Bar)	Elec 2400°F

INTEGRAL QUENCH FURNACES

24" x 48" x 18"	Ipsen T-8 (2 Zone)	Gas 1850°F
30" x 48" x 20"	Surface	Gas 1750°F
30" x 48" x 24"	Surface	Gas 1750°F
30" x 48" x 30"	Ipsen T-9	Gas 1750°F
30" x 48" x 30"	Surface "Top Cool"	Elec 1750°F
30" x 48" x 30"	Surface	Elec 1750°F
36" x 48" x 36"	Surface	Elec 1750°F
36" x 48" x 36"	AFC	Gas 1850°F



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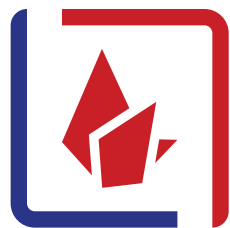
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