

How to Choose the Right Induction Heat Treating Company



Executive Summary

Engineers and parts designers focused on metal componentry in industries from Automotive, Aerospace and Energy Production to Construction, Manufacturing and Rail have long-valued and trusted the efficiency, durability and strength rendered to metal parts via induction heat treating processes, such as Hardening, Tempering, and Annealing.

Choosing the right induction heat treating company to partner with – one possessing the industry knowledge and experience, professional staff, and modern heat treating equipment – is critical in today’s ultra-competitive manufacturing environment. Every bearing, gear, rod, axle, engine component or other metal part must do its job well or its entire system can fail and can spell disaster for its manufacturer.

We created this guide to assist decision makers in selecting the right commercial induction heat treating provider for their needs. While Zion Industries is offering this guide, we seek to represent the entire induction heat treatment industry fairly and objectively. Readers will:

- Find out about various induction heat treating processes
- Learn what to look for in a provider in terms of history, staff and certifications
- Gain insights on superior companies based on competitive advantages, turnaround times and locales
- Recognize a provider’s vision for the future based on their equipment, quality control and diversity of services.

As always, individual questions on induction heat treating services can be answered in-person (see our *Contact Us* page on our website).

Induction Heat Treating Processes

Induction heating allows *very targeted* heating of metals by electromagnetic induction within the material to produce localized heat for various effects. **Most metals require heat treating to achieve their optimum physical properties.** The process relies on induced electrical currents within the metal – through the highly controllable use of an electrically heated coil – that allow you to select the best physical characteristics for not only each metal part, but for each section on that metal part. It is the **preferred method** used to bond, harden or soften metals or other conductive materials.

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In modern manufacturing processes, induction heating

offers a **beneficial combination of speed, consistency and control**. Induction heating gives you tight control of the heating pattern, and allows you to select specific physical characteristics down to each section on a metal part. Heat treating processes include:

- **Induction Hardening** – favored for parts that are subject to heavy loading. The controllable and localized method of heat without contact to the metal part is used to surface-harden steel, but can be used with other materials as well.
- **Induction Tempering** – a low-temperature process normally performed after induction hardening to reach a desired hardness or toughness range. It uses low-frequency induction coils to produce results parallel to furnace tempering applications that typically take hours.
- **Induction Annealing** – a heat treatment in which metal material is exposed to elevated temperature for an extended time and then slowly cooled, reducing the hardness of the metal and improving its ductility.
- **Induction Brazing** – a process where two or more like or unlike materials are joined together by means of another metal alloy with a lower melting point.
- **Furnace Tempering** – while not an induction process, furnace tempering uses a controllable gas/electric oven that "soaks" a part at elevated temperatures for extended periods of time, or batch-processes many parts in one shot for a reduced production time.

As commercial induction heat treating has become more popular over the years due to its many efficiencies and short turnaround times, more companies have begun to offer heat treating services. However, not all businesses involved with induction heating focus **singularly** on this technology in terms of experience or facilities, and the “jack of all trades, master of none” epithet applies here strongly. Some questions to ask potential heat treating vendors include:

- Does your equipment allow for treating **unique** part configurations and **extreme** part diameters and lengths?
- What is the range of your power supply and frequency?
- Can you handle **prototyping** and **process development** work or strictly basic production runs?
- What integrated induction solutions do you offer, if any?
- Where did you acquire your equipment? Is it dependable?
- Are you **ISO**-compliant?

Years of Experience

In the manufacturing and production arena, experience is the product of hard work and the pursuit of innovation and superior customer service.

You should consider a commercial heat treating company that has **extensive** experience with high-volume heat treating, whether that's 20 years, 25 years, 30 years or more. Sometimes established businesses focus on other manufacturing services and later expand into heat treating. In that case, they would have a limited track record with innovation and best practices. How long has the company you're considering been

involved with heat treating? Is it a core production service or was it an add-on several years ago?

Staff

The staff of any company is its backbone and in manufacturing settings, doubly so. Leaders must be mindful of innovations in the industry, while workers should be trained using the best equipment and have a **thorough understanding of the engineering and physical science** behind heat treating. How a company regards its employees also says volumes about how it will approach customers.

How deeply embedded in the industry are its leaders and engineers? Is there a training program in place to offer new employees education and safety practices? How many employees are available to work on your order? Remember, each worker entering the facility may be involved with treating and handling your company's valuable assets.

Certifications

Industry certifications signify that a vendor is compliant with manufacturing best practices and protocols for safety, production uniformity, and quality. A commercial vendor lacking certifications should be avoided, either because they are not interested in following best in-class procedures or because they are not capable of earning the certifications.

Commercial heat treaters should have **ISO** certification. The ISO technical specification is aimed at the development of a **quality management system** that provides for continual improvement, emphasizes defect prevention, and reduces variation and waste in the **supply chain**.

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Industry Knowledge

No matter how your company utilizes metal parts, there's vast value in partnering with a induction heat treating company that has the expertise to engage and service **multiple industries**. The breadth and depth of knowledge that comes from creating solutions and processes for multiple industries – with differing componentry shapes, sizes and metal

performance characteristics – should ensure that your vendor possesses the know-how and skills to handle your induction project professionally the first time, and every time.

Turnaround Time

Given today's supply chain dynamics and niche industrial specializations as well as the advent of the “smart factory” and its wired interdependence with other vendors, it's possible for numerous companies to be involved in the production of a finished product. Turnaround times become incredibly important not only for final deliverables but also to keep the entire supply chain moving efficiently.

The heat treating vendor should provide a **stable and dependable** turnaround time that is **predictable per project** because induction heat treating is fast and consistent. Professional companies will have no trouble providing a basic schedule for your deliverables.

Key Competitive Advantages

Every company you consider for your induction heat treating provider should supply key competitive advantages.

Does your candidate specialize in **high-volume** heat treatment? How **many facilities** do they have and what **regions** can they serve? Can they work with you to develop **new processes via personalized consulting**? Is their equipment and technology **leading-edge** or behind the times? What is the staff size, which indicates the **order volume** they can manage and the turnaround times they can honor?

Locations

The location(s) of your heat treating vendor are important for many logistic reasons, including **shipping costs**, **ease of access** for induction services, **equipment availability** in multiple facilities, and manpower, among others.

When considering who you will trust to heat-treat your products and components, learning where their facilities are located as well as the **major highways** nearby will provide insights into the efficiencies you may or may not experience when partnering with them.

Reputation

While the occasional production error is bound to happen in almost any manufacturing setting due to uncontrollable elements such as inclement weather, power outages or equipment malfunctions, consistent quality, on-time delivery and reliable processes **should always be expected** from your commercial induction partner. It's a **gold standard** that

makes or breaks many businesses. What can you learn about your prospective heat treating resource from the Internet or social media or even the Better Business Bureau? What does your partner have to say about their quality and responsiveness?

When considering your induction heat treating provider, ask about the core values they champion for their **production quality** and **turnaround times**. Legitimate companies will have no problem standing behind their word to you.

Testimonials

Testimonials from delighted customers are the **direct by-product** of companies that provide exceptional value and follow-through on commitments to their customers.

While it is considered normative today to find testimonials on a company's website, some businesses are more protective of their customers and will provide you with their testimonials only if you request them. **Contacting these past customers** by phone or email is certainly acceptable and happy customers will be more than pleased to tell you of the excellent service they have received from their trusted induction heat treating partner. Ask for testimonials from the induction provider you are considering.

Equipment

The machinery used for induction heat treating is basically “where the rubber meets the road” in the industry. Excellent staff and consultative prowess can do little without the **powerful induction technology** housed in facilities, since it is the heat-treat technology that gives metals their greater durability, hardness, ductility, and performance capabilities.

For example, Zion Industries designed and built our own proprietary induction equipment and have custom-tooled our scanners to optimize the induction process for faster turnaround times and better control.

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What **capabilities** does your induction candidate's equipment offer? How many pieces of equipment does their facility feature and what kinds of equipment are they utilizing? The answers to these questions will inform you on their capacities.

Quality Control

Quality control should never be an “after-thought” in the induction heat treating process, as your important components are on-the-line during each and every induction process and

complications *can* arise. Asking your potential induction partner about their Quality control processes is an **essential step** in selecting the right induction heat treating vendor for your business.

Does your candidate inspect **select** metal pieces during the induction process? Do they inspect components at various **time slots** during the heat treating process? What types of monitors and sensors do they utilize to maintain consistency day-in and day-out for induction heat treating?

At Zion for example, we provide **first and last piece inspections** for all characteristics required on the part-specific blue prints and applicable specifications. We also complete **two-hour** heat treating inspections that include as-quench surface hardness, induction hardness pattern location, and magnetic particle evaluations. We also do inspections every **eight hours**, repeating all the two-hour inspection routines plus an evaluation for case depth. We use the latest pressure, flow and temperature sensors that help assure consistent quality on all parts that are heat treated or tempered. These sensors along with our monitoring instruments allow repeatability in all aspects of manufacturing.

Partnerships and Affiliations

Lastly, ask about the collaborative nature of the company you are considering. Is the business well-connected and does it keep up with industry developments that could help you in the long run?

For the induction heat treating industry, a partnership with **MTI** should be expected. The **Metal Treating Institute** is a 501(c)(6) non-profit trade association that was established in 1933. MTI represents the largest network of commercial heat treaters in the world and you should find this organization represented somewhere on your candidate's website.

About Zion Industries

Zion specializes in high-volume, commercial heat treating induction services and offers unparalleled customer service. With over four decades of experience as a leading heat treating company, our vision is to meet the outsourcing needs of the manufacturing industry by delivering unmatched customer service. Our multiple locations in three states allow us to provide a variety of metal heat treatments, while enhancing value for all stakeholders. We also offer personalized consulting for each of our customers!

Contact us at **(330) 483-4650** or **request a quote online** to learn more about how we can meet your specific heat treating needs with our advanced induction services, equipment, technology, and expertise. Thank you.