

Induction Heating for the Fastener Industry



Experience the Excellence.™

Introducing a Faster, Better Heating Solution

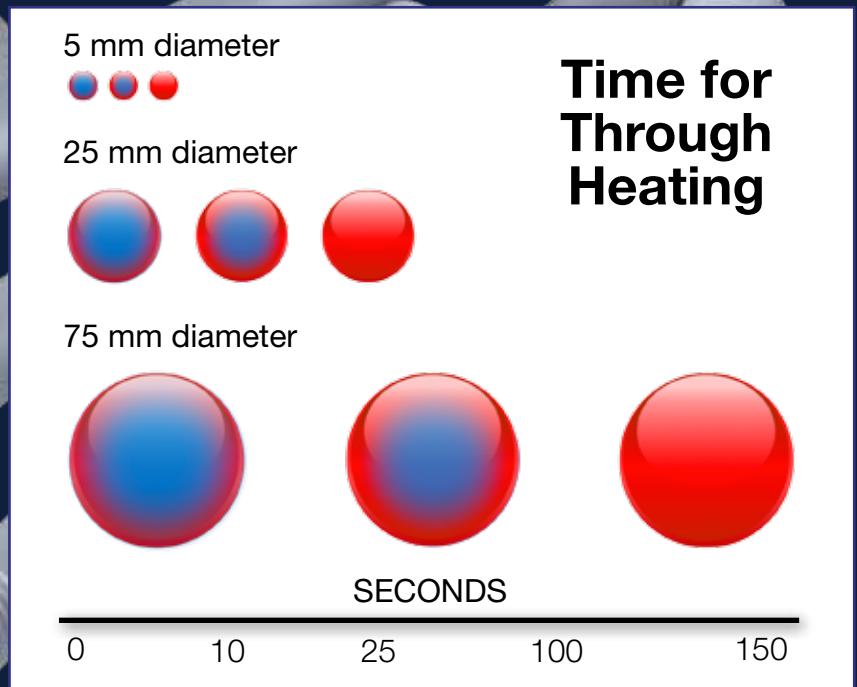
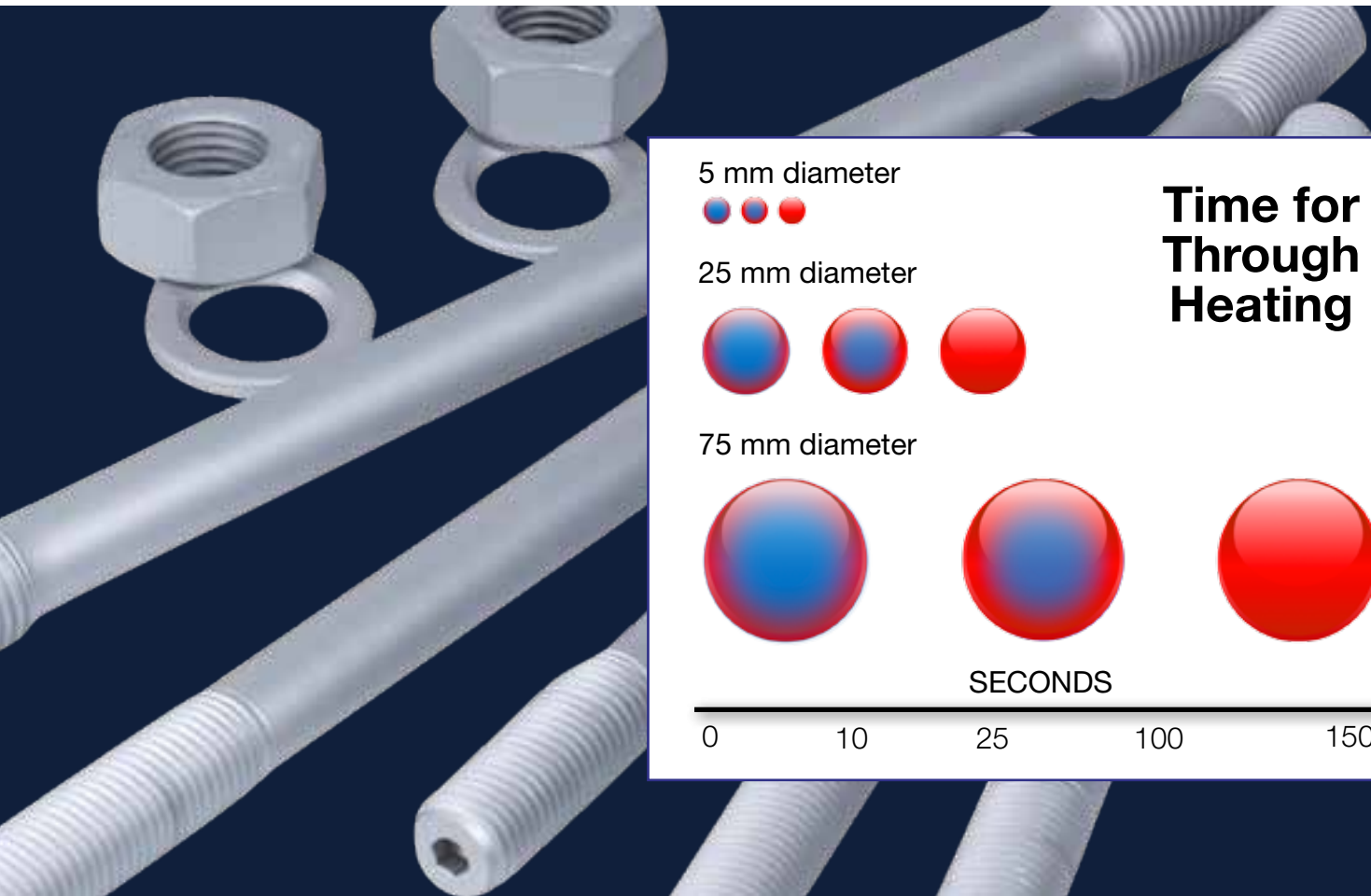
To improve production rates and fastener quality, fastener manufacturers use heat in their heading, threading and patching production processes. With induction heating, fasteners are heated quickly, efficiently, and with maximum repeatability. The features and benefits of induction heating include:

- A rapid heating method for improved productivity and higher volumes
- Precise, even heating of all, or part, of the fastener
- A clean, non-contact method of heating
- Safe and reliable; instant on, instant off heating
- Cost effective, reduces energy consumption compared to other heating methods
- Easy to integrate with remote workheads

Why Ambrell Induction Heating?

Ambrell has over 30 years of expertise and has installed more than 10,000 systems in over 50 countries for many different induction heating applications. Fastener manufacturers already use Ambrell for large (76 mm OD) and small applications (0.5 mm OD) alike. They know they can count on Ambrell for a quick response, superior solutions, quality, versatile equipment and great support after the sale.

Your applications will be tested in Ambrell's Applications Lab at no charge to ensure you get the right solution for your needs. There's no better choice than induction for fastener heating, and there's no better induction heating system provider than Ambrell.



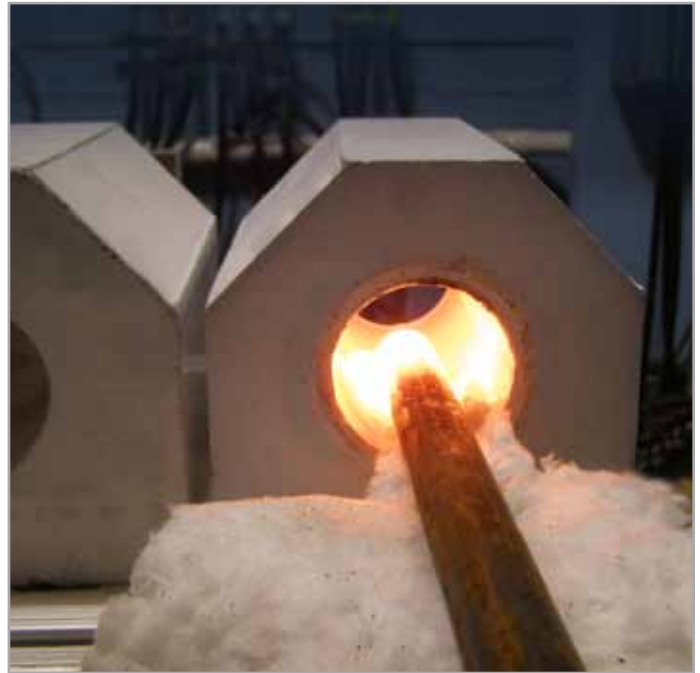
Heading

Induction heating is commonly used for preheating bolt and screw heads prior to forging. Induction heating offers many benefits for the warm or hot heading process, including:

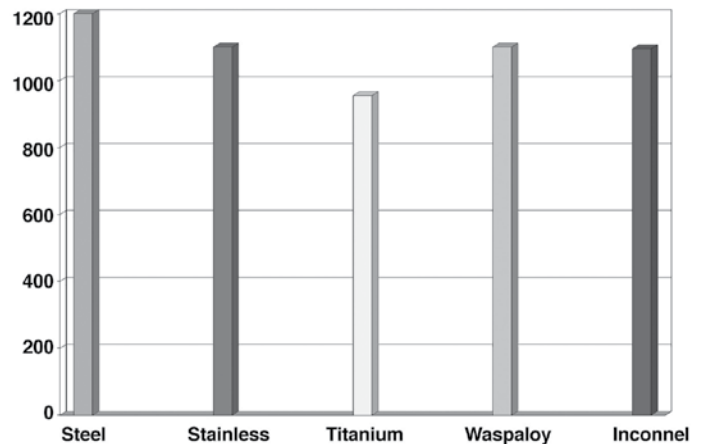
- **Consistency:** direct application of heat for precise, even heating of the part
- **Quality:** elimination of the springback effect for higher quality parts
- **Increased productivity:** reduces need for post-production tempering and heat treating
- **Safe:** Low pressure and minimal residual stress on parts
- **Economical:** reduces pressure on the die and extends die life

For hot heading applications, parts are typically heated to 1,100° C, small parts (6 mm diameter) are heated in just a few seconds, but larger parts (76 mm) will take longer for heat to travel to the center. Typically, fasteners up to 20 mm in diameter will be heated inline with a heading press with cycle times of up to 10 seconds. Fasteners with larger diameters are heated in a multi-position coil that produces one part every 15 to 20 seconds for the heading press.

Ambrell provides an extensive line of induction heating systems for the fastener industry and the heating process experience you need for high volumes of consistent, reliable parts. Our systems will heat to the center of your fastener head in a fast, energy efficient manner.



Required temperature for hot heading fasteners of different materials.



Thread Rolling

Thread rolling – using a thread roll die to form a thread into a heated fastener – has gained popularity over thread cutting. Thread rolling pushes the material into shape against a thread roll die rather than cutting, thus reducing material waste and stress to the fastener. Thread rolling produces a higher quality product than cutting. Induction heating can easily be integrated into the thread rolling production process and has proven to be a more rapid and consistent method of heat that leads to superior repeatability and increased production efficiency in high-volume parts manufacturing. Benefits of using induction heating for thread rolling include:

- **Precise even heating of only the threaded part of the fastener for less material stress**
- **Higher productivity: decreased cycle times mean increased production rates**
- **Higher quality parts: produces stronger, more durable threads**
- **Economical: reduces tool wear for longer tool life**
- **Efficient: instant on/instant off, no oven ramp up time or heating the surrounding space**

For thread rolling applications, fasteners are typically heated to a temperature between 350° C to 600° C in a channel coil that produces a hot part just prior to the thread rolling application. Smaller diameter fasteners (10 mm) may be processed at 13,500 parts/hour, where larger parts (25 mm) will be processed at 9,000 parts/hour.



Ambrell systems can cost-effectively meet the demands of virtually any thread rolling application.



Chart showing practical induction frequency and power requirements for thread rolling applications on Waspaloy or Steel fasteners.

STEEL Waspaloy	3 mm	10 mm	25 mm
Power (kW)	10	30-60	50-100
Throughput	18,000/hour	13,500/hour	9,000/hour
Minimum Frequency (kHz)	>10	>1.5	>1.5

Thread Patching

Induction heating is ideal for curing the paint or powder material used in thread patching. Ambrell products can greatly improve thread patching productivity by rapidly heating fasteners up to 300° C for flowing the paint or powder coating. Benefits of using induction heating for thread patching include:

- **Quality curing: provides a superior re-flow of powder coatings to fastener threads**
- **Precision heating: localized heat directed only to the area that needs heating**
- **Controllable: adjust to precise fastener temperatures, no uneven heating**
- **Economical: no lengthy warm up or cool down cycles**
- **Productive: fast heating leads to improved production rates and higher yields**
- **Quality parts: can be individually monitored for quality**

Typical induction heating systems for patching lines consist of a short channel coil (460 mm long) for pre-heating the fastener prior to patching and a longer channel coil (4300 mm long) for flowing the powder after spraying. When compared to other heating methods, such as oven or IR heating, induction heating heats from the inside out, which enables any outgassing of the patching material.



Chart showing practical induction frequency and power requirements for patching applications for steel fasteners.

STEEL	3 mm	10 mm	25 mm
Power (kW)	10	30-60	50-100
Throughput	36,000/hour	27,000/hour	18,000/hour
Minimum Frequency (kHz)	>10	>1.5	>1.5

Many fastener manufacturers already use Ambrell induction heating systems for their patching lines and process fasteners as small as 0.5 mm OD up to 25 mm OD, with process rates as high as 36,000 parts per hour for 3 mm OD.



The Ambrell Advantage

Committed to Your Business

At Ambrell, we understand that from the smallest parts to the largest parts, your success depends on our success. And, our success is measured in our product quality, innovation, and exceptional customer service. When you choose Ambrell for your fastener application you will get:

- **A team of induction heating experts that will work with your organization to understand your unique fastener requirements**
- **Application feasibility tests, in our labs, to determine the optimal equipment range and settings for your applications**
- **Expert experience combined with science and engineering to design the most efficient coil configurations**
- **Coil fabrication and testing conducted in our labs**
- **A system solution designed, built and tested at our factory in the United States**
- **Worldwide support through Ambrell companies in the USA, Europe, the United Kingdom, and Ambrell distributors**

Ambrell stands by a firm commitment to provide an induction heating solution to your business along with service and support that goes well beyond the sale. The service department is always on-call for preventative maintenance and timely emergency support. Ambrell will be there to maintain operational excellence and be sure our solution continues to meet your needs – now and in the future. With Ambrell, you'll get timely support before and after the sale.



Small or large, Ambrell can build a system that will meet your fastener application needs and exceed your expectations.

Ambrell Induction Heating Systems at a Glance

Systems include:

- **Ambrell workhead technology allowing different parts to be processed without a system change-over**
- **Ease of integration into production processes with a portable workhead – up to 30 m in some systems**
- **Wider frequency ranges allowing heating more fasteners with different specifications with the same power supply**
- **Multiple capacitor and tap transformer configurations for a more versatile system than the competition**
- **Agile frequency tuning for accurate, repeatable fastener heating**
- **Efficient power conversion minimizes energy expenses**
- **Expert coil designs that maximize power delivery and save production time**
- **User-friendly operator interface in five languages (EN, ES, FR, DE, IT)**
- **CE marked and manufactured in an ISO 9001:2008 certified facility**

With an extensive product line of induction heating systems, Ambrell has the best solution for your fastener application. Our EASYHEAT™ systems offer frequencies ranging from 150 kHz to 400 kHz and power ranging from 1.2 kW to 10 kW and our EKOHEAT™ systems are available in low frequency and high power ranges.

For hot heading and thread rolling applications, the EKOHEAT™ systems are often the perfect fit. They're powerful, and deliver lower frequencies, making them ideal for through heating.

When it comes to thread patching, the best Ambrell system choice depends on the material and part size. A small stainless steel fastener (3 mm) will require an EASYHEAT™ system, while a large steel fastener (25 mm) requires an EKOHEAT™ system.





About Ambrell

Founded in 1986, Ambrell is a global leader in the induction heating market renowned for our application and engineering expertise. Exceptional product quality and outstanding service and support are at the core of our commitment to provide the best customer experience in the industry.

We are headquartered in the United States with operations in the United Kingdom, France and the Netherlands. All products are engineered and made at our manufacturing facility in the United States, which is ISO 9001:2008-certified. Over the last three decades we have expanded our global reach through an extensive distribution network and today we have more than 10,000 systems installed in over 50 countries.



Ambrell[®]
INDUCTION HEATING SOLUTIONS

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