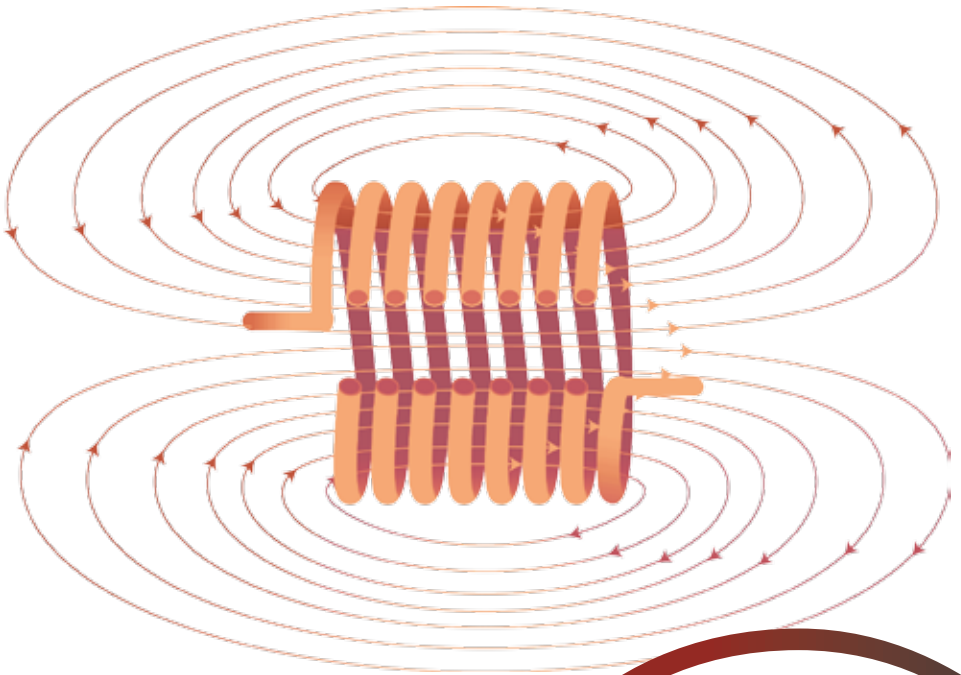


What is Induction?

A Guide on the Basics of Induction Heating



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An Inductotherm Group Company

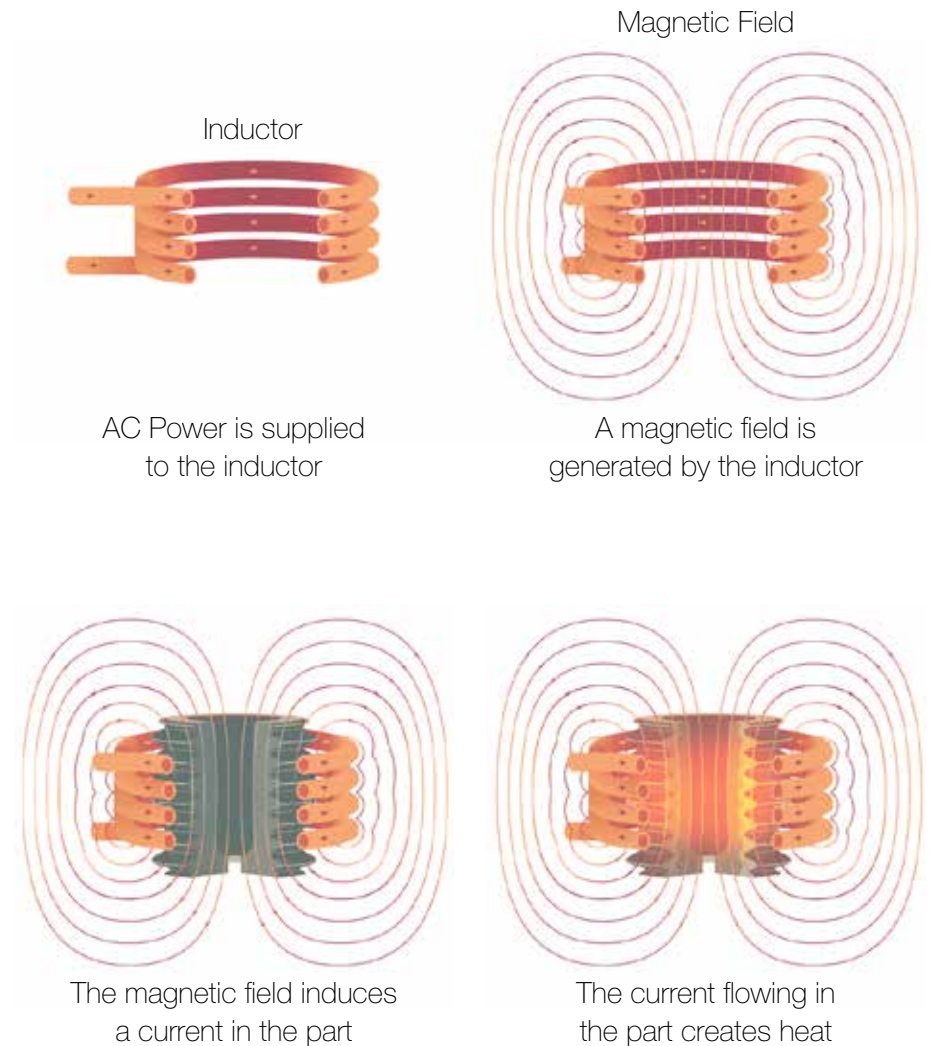
The Basics of Induction Heating

Simply stated, induction heating is the cleanest, most efficient, cost-effective, precise, and repeatable method of material heating available to the industry, today.

Induction heating takes place in an electrically conducting object- not necessarily magnetic steel- when the object is placed in a varying magnetic field. Induction heating is due to the hysteresis and eddy-current losses.

Precisely designed induction coils teamed up with a powerful and flexible induction power supply produce repeatable heating outcomes specific to the desired application. Induction power supplies designed to accurately quantify material heating and respond to a material's property changes during the heating cycle makes achieving diverse heating profiles from a single heating application a reality.

The purpose of induction heating may be to harden a part, and thus to prevent wear; to make the metal plastic for forging or hot-forming into a desired shape; to braze or solder two parts together; to melt and mix the ingredients which go into the high-temperature alloys which make jet engines possible; or for any number of other applications.



History of Induction Heating

Michael Faraday (1791-1867) is generally credited with the discovery of the fundamental principles underlying induction heating in 1831. However, the focus of induction research was on finding methods to reduce the effects of induction heating so that devices like transformers, motors, and generators could become more efficient at first.

Interest in the possibility of melting metals by induction started in 1916. One of the earliest commercial applications was the melting of small charges using spark-gap oscillators. Another early application was heating metallic elements of vacuum tubes to drive off absorbed gas prior to sealing.

For a few years prior to World War II, a number of companies, more or less independently, began to realize that induction heating held the solution to a wide variety of specialized heating applications. Although induction heating had not become an industrial process for long after its theoretical discovery, its growth was rapid during World War II when there arose an immediate need for producing large numbers of parts with minimal labor.

Today, induction heating has taken its place in our industrial economy as a means of speeding part production, reducing production costs, and achieving quality results.



Advantages of Induction Heating

Induction heating is particularly useful where highly repetitive operations are performed. Once an induction heating machine is properly adjusted, part after part is heated with identical results. The ability of induction heating to heat successive parts identically means that the process is adaptable to completely automatic operation, where the workpieces are loaded and unloaded mechanically.

Another advantage of induction heating is its ability to heat only a small portion of a workpiece, critical for maximum strength in essential parts with a few localized high-wear areas or in parts that require annealing for further forming without the loss of strength in the part as a whole.

Radyne's cartridge annealing systems leverage the strengths of induction to create a fully automated system that performs a consistent localized annealing operation on munitions. Because of induction, this system is able to process up to 320 cartridges per minute with consistent results and precise control of the annealed zone. Induction allows for efficient use of power and clean parts.





Induction heating is fast- a properly tuned induction heating machine can process high part volumes per minute by utilizing efficient coil design and part handling.

Since induction heating machines are well suited to automation, they can easily integrate with existing part production lines. Compact machine design allows for more efficient use of production floor space.

Unlike radiant heating solutions, induction heating heats only the part inside the coil without wasting energy.

Induction is a choice for parts that require clean heating, such as in brazing operations. Induction is a contact-less heating source that does not leave behind residue, unlike other heating operations that leave soot or otherwise require cleaning after heating. The magnetic fields used in induction are permeable through glass or other materials, allowing for the possibility of heating parts inside controlled atmosphere to prevent oxidation or other undesirable effects.



The Future of Induction Heating

In the age of highly engineered materials, the unique capabilities of induction offers engineers and designers of the future a fast, efficient, and precise method of heating.

As the technology of choice for rapid, clean heating that is repeatable, accurate, and efficient, induction has established itself firmly in the future of manufacturing as a cornerstone of the industry. Induction's rapid maturity since its discovery has earned it a reputation of pioneering new, cutting edge technology.

Radnye technology is at the forefront of induction heating, innovating in new ways to further develop induction heating techniques and processes. We are a world leading manufacturer and pioneer in the development of advanced induction and controlled atmosphere heating equipment.



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Committed to your success

We believe in building strong relationships.

As part of INDUCTOTHERM GROUP, Radyne Corporation is a world leading manufacturer of advanced induction and controlled atmosphere heating equipment; offering from general purpose, to full-turnkey systems for heat treating, annealing, brazing, bonding, soldering, coating, curing, and crystal growing for almost every industry sector.



Leveraging 68 years of experience, Radyne offers customers industry expertise, process engineering, induction equipment, service, and support all under one roof.

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