TUTCO HEATING SOLUTIONS GROUP

TUTCONNECT

TUTCO FARNAM | TUTCO SUREHEAT | TUTCO CONDUCTIVE | SEPTEMBER 2024

Electrification and Decarbonization

Being Efficient is the Effective Solution

At TUTCO, we design and produce heating solutions with the understanding that efficiency is always the most effective approach. Whether it's helping a customer transition from direct-fired natural gas to electric heat as part of their electrification journey, upgrading from a sheath element to an open coil system, or replacing an existing open coil solution from one of our competitors with a new TUTCO design, our goal is always to enhance efficiency, ensure reliability, and reduce costs.

TUTCO is focused on helping industries in redesigning processes and equipment that offer greater efficiencies and reduce the consumption of fossil fuels. We understand that each project will have its own unique set of challenges and are committed to providing the best solution, regardless of the application. We adapt to the unique needs of each customer, rather than expecting them to adapt to us. Our team takes the time to thoroughly analyze every aspect of the customer's process—whether it's size, operating environment, or integration needs—so that the heating solution we deliver aligns perfectly with their operational demands. By understanding their specific requirements, we provide tailor-made heating solutions that fit seamlessly into complex production lines or specialized equipment.

As industries shift towards decarbonization and embrace electric energy, many are turning to electric heating for its efficiency benefits. At TUTCO, we are at the forefront of providing innovative heating solutions to support this transition. Improving efficiencies, promoting green electrification, and exploring alternative fuels are key components of our mission. As leaders in open coil heating technology, we have consistently pioneered new solutions that enhance both efficiency and sustainability, helping companies meet their energy goals.

Open coil heating technology is inherently efficient. However, what sets TUTCO apart from our competitors is our deep knowledge of heating technology and our commitment to constant innovation. With decades of design expertise, we've learned how to push the boundaries of what's possible, achieving even greater efficiency in our systems. By leveraging our extensive experience and understanding of various industries, we help businesses achieve higher performance, increased reliability, and enhanced cost-effectiveness.

At TUTCO, we take efficiency to the next level by integrating our open coil heating solutions with our line of industrial control panels. This combination allows us to provide customers with a complete, highly efficient system. Our control panels are designed with the customer's perspective in mind, ensuring ease of use and seamless integration. Every detail is carefully considered, from installation requirements to electrical specifications, making it easier for customers to implement and operate the system. Whether a customer is transitioning to electric heating, upgrading an existing system, or looking for a more efficient solution, TUTCO's open coil technology combined with our control panels offers the perfect solution for virtually any industry or application.

AC vs DC Voltage. What's the Difference?

By Ian Renwick

Voltage is the "push" that causes current to flow in an electric circuit. This push drives the flow of electrons in the circuit, which is called current and measured in Amperes (Amps) or Coulombs per second.

DC stands for Direct Current, which is what you get from a battery or solar panel. The voltage associated with direct current is constant, meaning it doesn't fluctuate over time.

AC stands for Alternating Current, which is what you get from a wall outlet or other high-voltage source. As the name suggests, the voltage associated with alternating current fluctuates between upper and lower values, usually alternating between positive and negative and centered around zero volts.

DC voltage is constant while an electrical circuit is functioning (i.e., connected or plugged in). In contrast, AC voltage fluctuates back and forth between high and low values. If you think of the current flow as water in a pipe, it would appear as though the water is rushing back and forth rapidly. If you were to chart perfect AC voltage versus time, it would follow a sinusoidal pattern. The frequency of the AC current and voltage—how often it fluctuates back and forth—is measured in Hertz (Hz), where one Hertz represents one cycle per second. In most of the world, household AC voltage is provided at either 50 Hz or 60 Hz, depending on the country. At 60 Hertz, the current and voltage change direction every 1/60th of a second. The time it takes for one sinusoidal wave to complete is 1/60th of a second.

A DC circuit doesn't have a frequency because there is no change in voltage or current over time.

In the U.S., AC voltage has a frequency of 60 Hz and an ideal voltage of 120V. In Europe, AC voltage has a frequency of 50 Hz and an ideal voltage of 230V. In both cases, the voltage may fluctuate by as much as ±5% from the ideal value. However, the frequency is controlled more tightly, with variations of no more than ±0.5%.

Around the world, AC voltage ranges from 100V to 127V and 220V to 240V. The frequencies are usually 50 Hz or 60 Hz, though there are exceptions. For example, some countries use 16 2/3 Hz for certain railway power networks, like in Germany, Austria, Switzerland, Sweden, and Norway. Commercial airplanes use 400 Hz both on the ground and in the air.

Transmitting electricity via AC is preferred because it's less expensive to produce and more efficient for long-distance transmission, as there are fewer energy losses compared to DC power.

As a side note, power is transmitted at high voltage because this further maintains efficiency and reduces losses through heat. These transmission voltages can be as high as 1.5 million volts! If you're familiar with Ohm's law (see a previous article), this helps keep the amperage low, and lower amperage means less heat production. The AC voltage is stepped down to a more usable level before reaching homes or factories.

Higher voltage is also less expensive to transmit, as it reduces the current, allowing for thinner wires to be used. Thinner wires lower the cost of transmission. This is true for house wiring as well—wires can be thinner at higher voltages because less current flows through them (which determines wire size) while delivering the same power as lower-voltage, higher-current systems.

Lower voltage, like in the U.S., is preferred because it's generally safer, particularly in cases of electrocution.

When it comes to electric heating elements, they don't "care" if they are subjected to AC or DC voltage, and with AC voltage, they don't "care" about the frequency either. It's all the same to them. A heater designed to operate at 230V AC and 60Hz in a U.S. factory will work just as well in Europe at 50Hz. If you could find a source, the heater would also work equally well at 120V DC.

A minuscule amount of inductance is created when an AC source is used, but it's so small that it can generally be ignored.

Many of the different units in science are named after people. Here's a list from today's article.

The Volt (the pushing force in a circuit)
- Alessandro Giuseppe Antonio Anastasio Volta (1745 – 1827)
- Italian physicist and chemist

The Amp or Ampere (the unit of current)
- André-Marie Ampère (1775–1836) - French physicist and mathematician

The Coulomb (the unit of electrical charge)
- Charles-Augustin de Coulomb (1736 – 1806)
- French officer, engineer and physicist

The Hertz (used to measure frequency)
- Heinrich Rudolf Hertz (1857 – 1894) - German physicist

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Feature Application

Bending Rigid Plastic Pipe

Because of its strength, resistance to moisture and electricity, and low cost, plastic piping is a commonly used material with many applications. The process of thermoforming this rigid plastic material involves heating and shaping extruded pipes or hosing using heated compressed air to achieve various shapes for a variety of applications. Bending rigid plastic pipe, regardless of the method used, requires heat and physical bending.

One client in this industry originally came to us seeking a solution for their pipe bending and forming application. Their process involved applying heat to the pipe at key bend points, bending it into the desired shape using a jig, and allowing it to cool so it hardens and retains the contour permanently. Each workstation had a large heater below it that piped heat up to the key bend points needed to create the final product. As hot air was blasted onto the rigid plastic, it became pliable, allowing the operator to bend it to the desired shape at each bend point. However, this solution was very inefficient. The heat delivered through a line from one bend point to the next was inconsistent. At the first station, the heat was excessively hot, causing the plastic to discolor. By the time the heated air reached the last bend point, it had cooled and was insufficiently hot, causing the plastic pipe to shatter when the bend was made.

TUTCO SureHeat replaced this single large, cumbersome heater located below the workstation with a series of small individual Hot Air Tools, located at each bend point in the process. Hot Air Tools are precision electric air heaters with a built-in thermocouple for accurate temperature control. The compact size makes this product perfect for single-phase OEM applications requiring precise high temperatures. Its 304 stainless steel body construction is slotted for flared accessories and is designed to withstand pressures up to 60 psi (4 bar) and temperatures up to 1400°F (760°C). Air is typically supplied through compressed air lines. The lightweight construction and small footprint made the Hot Air Tool a perfect choice for this pipe bending application.

Using TUTCO SureHeat's Hot Air Tools allows the customer to monitor the temperature at each bend point with absolute precision. This level of control, along with the quick heating capability of our heaters, results in less wasted energy and greater efficiency.

LEARN MORE

Feature Video

SureHeat Jet and Max Heaters

In this month's feature video, National Sales Manager, AJ Nidek compares SureHeat's Jet and Max process heaters

This month's feature video looks at TUTCO SureHeat's Jet and Max process air heaters that are designed for high-temperature industrial applications like drying, curing, sterilizing, and converting. Both heaters reach air temperatures up to 1400°F (760°C) and feature two type "K" thermocouples for accurate temperature monitoring, as well as easy wiring via a terminal block. The Jet heater is compact, available in 3.0kW and 8.0kW models with 240V 1ø power, and is ideal for smaller applications. The Max heater, on the other hand, offers more power options, ranging from 6.0kW to 36.0kW, and supports multiple voltage configurations (240V, 380V, 480V, 1ø/3ø). Like the Jet, it has a convenient control panel option for enhanced control and safety, but is better suited for more demanding, energy-intensive operations.

WATCH THE VIDEO

Getting Hot Fast Part 2 – TUTCO HT Mica Strip Heaters

Following up on our story on HT Mica Band Heaters, TUTCO's sister product, the HT Mica Strip Heater brings the same level of versatility, durability, and customizability to flat surface heating applications. Constructed with high-temperature phlogopite mica insulation, a full stainless-steel sheath, and robust termination connections, these heaters are engineered to handle tough industrial environments while maintaining reliable and efficient performance.

Like their band heater counterparts, HT Mica Strip Heaters can handle temperatures up to 900°F (482°C) and are designed for demanding applications across multiple industries. From plastics and polymers to food service, packaging, rubber processing, and even scientific equipment, these heaters are customizable to fit your exact needs. Whether you require specific sizes, voltages, or termination options, TUTCO's HT Mica Strip Heaters are designed to meet any need.

One of the standout features of these heaters is their adaptability. Available in widths from 3/4" to 18", lengths from 2" to 80", and thicknesses from 3/16" to 1/2", the HT Mica Strip Heater can be tailored to suit a wide variety of processes. Watt densities can reach up to 45W/IN², and voltages go up to 480V (AC or DC), making these heaters powerful enough to meet the high demands of modern industrial processes.

The customization options extend to terminations as well. Choose from stainless steel screw terminals, leads with fiberglass sleeving, stainless steel braid, or stainless steel armor, all depending on your application. You can also add ground studs or wires, and select clamping mechanisms that include weld-on strap ends, loose strap clamping, spring clamping, or Belleville washer assemblies.

For industries like chemical processing, textiles, agriculture, and heated press and platens, the HT Mica Strip Heater provides a reliable and affordable heating solution. With a standard thickness of 3/16", it offers flexibility in dimensions and can be manufactured to meet custom thickness requirements if needed.

If your application demands precision heating for flat surfaces with exceptional reliability, TUTCO's HT Mica Strip Heaters are the ideal solution. They bring unparalleled versatility to flat surface heating and are built to withstand the most demanding conditions. Just as with the HT Mica Band Heater, these strip heaters can be UL and/or CSA listed, ensuring compliance with industry standards.

MORE THINKING OUTSIDE THE BOX

SPECIFICATIONS

Operating Temp Capability: 900° F

Holes: Yes

Cutouts: Yes

Expedited Shipping may be available – consult factory

Durability: Good

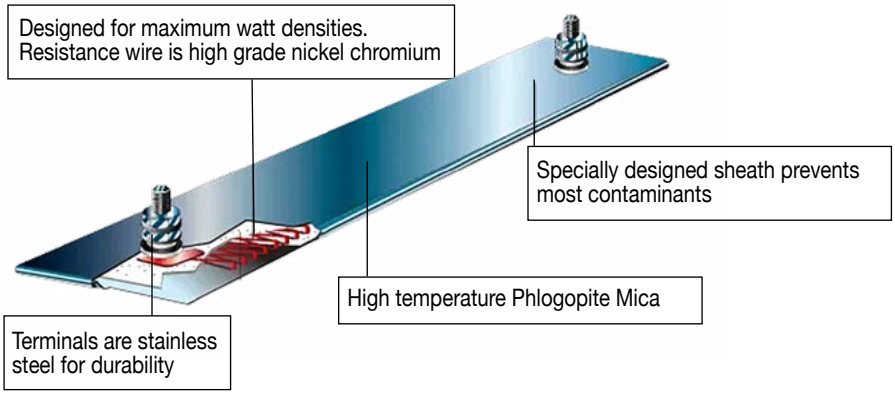
APPLICATIONS

PLASTICS
Platen Heaters
Compression Mold Heaters
Plastic Pellet Dryers

PACKAGING
Sealing Bars
Form Fill Packaging Machines

FOOD SERVICE
Food Grade Sealing/Wrapping
Food Service Warming

PROCESS
Ink Heaters
Textile Processing
Chemical Processing
Laboratory Warmers
Laminating Applications
Scientific Testing Equipment
Tin and Flux Melting
Glass Processing



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