



# **WATLOW®**

*Powered by Possibility*



**Welcome to Watlow®**

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# A Message From Rob...

Watlow® was founded in 1922 and was built on an enduring commitment to “be the best.” This dedication created a steady stream of new products, technologies and a talented workforce fostering steady growth.

Today, 100 years later, we continue to strive to “be the best” by following the principles of Lean, an organizational philosophy that promotes continuous improvement. We call it the **Watlow Way**. The **Watlow Way** takes us back to our roots because it is a people-centric strategy that drives us toward stronger technical capabilities and continuous improvement, with the ultimate goal of creating superior thermal solutions for our customers.

We are a growing industrial technology leader in the field of thermal sciences, engineering and world-class manufacturing. Watlow’s talented team members use their strong technical capabilities to build innovative products, and our ultimate goal is to achieve product leadership in targeted areas. For Watlow, no challenge is too big. Our important work is changing the world for the better by enriching lives through inspired innovation.



Rob Gilmore  
Chief Executive Officer



1924 Watlow's first factory



1951 Watlow's second factory



1995 Watlow headquarters following two expansions



2016 Watlow's headquarters and Advanced Technology Center following a complete renovation

# Watlow's Thermal Solutions

## Watlow® at a glance

Watlow is a global industrial technology company that uses its world-class engineering expertise, advanced thermal systems and manufacturing excellence to enrich everyday life. Many of the world's leading companies leverage our technology in vital applications such as front-end semiconductor processing, environmentally friendly energy solutions and lifesaving medical and clinical equipment, to name a few. Watlow's culture is driven by our purpose of "Enriching Lives Through Inspired Innovation," enabling us to deliver high-impact solutions that improve our customers' competitive advantage.

Watlow manufactures thermal solutions for the following industries:

- Semiconductor processing
- Energy and environmental technologies
- Diesel emissions
- Foodservice equipment
- Medical, clinical and analytical equipment
- Aerospace and defense

3



Advanced technology centers

12



World class manufacturing centers



>4000

Team members worldwide

178



Sales offices in 57 countries

625+



Engineers and technical specialists

>1000



Patents (and counting)



EZ-ZONE® RMZ  
Fiber Optic Temperature  
Measurement System



F4T® Process Controller



FLUENT®  
In-Line Heater



HYDROSAFE®  
Electric Heat Exchanger



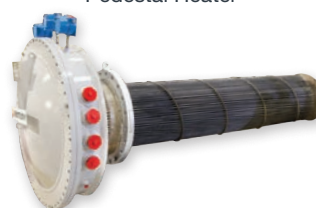
ASPYPE® Power  
Controllers



WATCONNECT®  
Control Panel



Pedestal Heater



HELIMAX™  
Heat Exchanger



EXACTSENSE®  
Temperature Sensor



# Watlow Products Make An Impact

## ASPYPE® Power Controllers

The ASPYPE® family of power controllers more precisely controls the temperature in environmental chambers to develop life-saving medical therapies. By intelligently controlling the amount of energy delivered to an application, ASPYPE can dramatically improve system performance compared to open loop temperature sensing.



## ULTRAMIC® Heaters

Watlow® designed an ULTRAMIC® advanced ceramic heater to meet the challenging requirements of a high flow oxygen therapy device. By safely providing warm, moist air, high flows can be delivered comfortably through nasal cannula versus traditional masks.



## Polyimide Heater for Electrostatic Chucks

Electrostatic chucks (ESC) are used extensively in the manufacture of integrated circuits to securely support and clamp the silicon substrate during processing. Watlow's polyimide heaters are used in many of the electrostatic chucks to help optimize the thermal performance of the process tools.

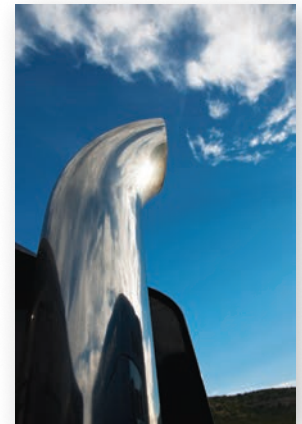


## Silicone Rubber Heaters

Helicopters use Watlow's silicone rubber heaters under the foot pedals in the cockpit to help keep the pilot's feet warm.

## EXACTSENSE® Sensors

Today, it takes a total of 65 trucks to emit the same amount of pollution as one truck did in 1988. Watlow's EXACTSENSE® active thermocouple sensors are used to measure engine temperatures, which are critical to the performance of the emissions aftertreatment systems that reduce pollution.



## Electric Heat Exchangers

Watlow's energy and environmental technologies business unit helps market leaders develop innovative solutions for renewable fuels production. Electric heat exchangers are used in the hydrotreating process to charge the reactor to convert waste plastics to green crude oil.



## Strip Heaters

Large wind turbines must operate reliably in remote locations and under harsh conditions. Watlow's 375 strip heaters are mounted to the gearbox to keep the lubricants fluid during cold start ups. Watlow's 375 finned strip heaters heat the air in the electronics enclosures to prevent condensation and keep electronics at operating temperature.



### Flexible Heaters

Reliable test results to accurately diagnose a patient's illness often require a precise thermal solution in clinical diagnostic equipment. Watlow's wire-wound flexible heaters offer the precision needed to produce consistently accurate test results.

### Direct Electric Heat Exchangers

Watlow's OPTIMAX® and HELIMAX™ ultra-efficient heat exchangers provide electrification and decarbonization solutions that replace traditional gas-fired equipment.



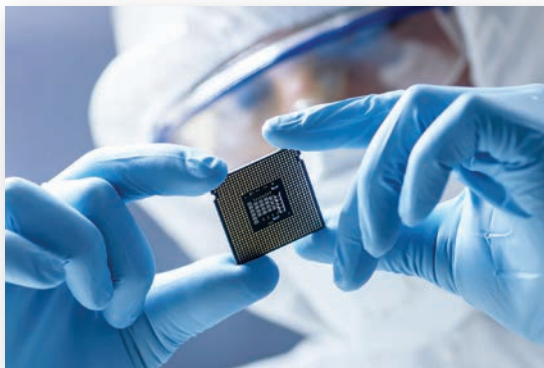
### FIREROD® Cartridge and Cable Heaters

Computer chips are made with the help of a parallel cable heater and FIREROD® cartridge heaters. The parallel cable heater helps to maintain a uniform temperature across an aluminum plate, which then supports a wafer in the process of manufacturing computer chips. FIREROD cartridge heaters play a role in this process by defrosting gases in cryogenic vacuum pumps.



### Formed Tubular Heater

Watlow's MULTICELL™ insertion heaters are used in superplastic forming presses, which are used to manufacture aircraft and aerospace components.



### F4T® Temperature and Process Controller

The F4T® process controller installed in high end vacuum chambers reduces costs by eliminating hardware devices, replacing them with digital switches and math functions that are part of the F4T firmware.



### Circulation Heaters

Watlow's rugged, high temperature MULTICELL heaters provide an effective solution in soil remediation.



### FIREBAR® Tubular Heater

Many of the largest fast food restaurants in the world use Watlow's FIREBAR® heaters in their deep fryers to prepare chicken, french fries and other fried foods.



# Quality Products that Perform

## High quality

At Watlow, quality means providing products that improve the overall performance of our customers' applications providing them with a competitive advantage. Our products are so well made that many of our customers request ship-to-stock without inspecting the incoming products... because they know we control our processes through every step.

This confidence is a result of Watlow's strong quality programs:

- Acquiring an extensive list of agency approvals that require quality system auditing throughout our company, worldwide.
- Organizing our company into functional teams and strategic business units for greater creativity and productivity.
- Training team members on company goals and values, participative management and the use of Lean methodologies.
- Empowering those teams to make operating improvements to eliminate waste and improve cycle times.
- Establishing measurements to chart our progress toward our four key operational objectives:
  - Quality
  - Cost
  - Service
  - Innovation
- Developing process standards to assure the production and on-time delivery of high-quality products.



## Technical compliance and agency approvals

Safety is embedded into every aspect of our organization, from our team members to our operations to the products and systems we manufacture. Watlow is proud that many of our components, systems and facilities comply with industry regulations ensuring that our products are safe to use and can be incorporated into your application without worry.

We maintain compliance with the following agencies, to name a few:



Korea Gas Safety Corporation



SEMI<sup>®</sup>  
International  
Standards



# Expert Technical and Global Application Support

## We ask the right questions

It is important to know how applications relate to temperature, watt density requirements, temperature sensing, control systems and the process environment. We provide dedicated technical support throughout the project to optimize performance.

Watlow has over 100 years of thermal expertise. Leveraging this knowledge we solve the world's toughest thermal problems by asking the right questions. No matter how complex or challenging, Watlow excels in thermal problem solving.

## Complete thermal provider

Unlike most suppliers that sell discrete thermal components, Watlow designs and manufactures all parts of the thermal loop providing fully-integrated thermal systems. Watlow's expertise is designing, recommending, building and delivering a complete thermal solution. Choosing a single source supplier allows one-stop access to expert design, products and engineering services for all thermal system needs.

## Complete solutions with subassemblies

A subassembly can be as simple as attaching a special connector with a lead wire to develop a complex integration of heaters, sensors and controllers. Watlow partners with customers throughout the process to develop a fully functional, complete thermal subassembly into a modular unit that can be easily integrated with the application or process.

## Engineering expertise with scalable models and prototypes

Our computational engineering team can quickly develop concepts into predictive models and simulated designs that accelerate the time to market. This can eliminate the need to test multiple prototypes that may not fit specific application requirements.

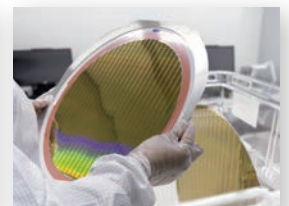


Watlow utilizes the latest computational and finite element analysis (FEA) modeling techniques to measure system performance prior to production start up. Design revisions can be easily incorporated into a model, resulting in a significant reduction in the lead time and cost to develop new products.

## Product leadership

Watlow was founded on innovation and we continue this tradition through the work we do every day. Our team members are encouraged to use their strengths to provide break-through products and world-class customer service.

Watlow is an industrial technology company, backed by operational excellence. We understand that being the best requires consistently doing things that our customers value and doing them with excellence. Partnering with Watlow provides the competitive edge needed to get products to market first. We work with our customers and aggressively develop solutions that far exceed any competitive offerings.



# Respect for People

## STEM outreach

At Watlow, we are passionate about fostering STEM (science, technology, engineering and mathematics) in our local Watlow families and communities.



We are inspiring future generations of technical talent through our STEM outreach efforts by:

- Encouraging individuals at young ages to consider engineering and technical arts
- Providing support to those in college who are striving to earn their engineering and technical arts degrees
- Attracting technical talent to Watlow

Career fairs, college scholarships, summer camps, co-ops and job shadowing are just a few of the Watlow programs offered to students in the community as we develop a pipeline of future engineers, technicians and vocational talent.

## Diversity

Each day at Watlow we are guided by our value of “Respect Everyone.” Watlow embraces diversity and it is an integral part of who we are as a company, how we operate and how we see our future. As a global and multicultural organization, we work diligently to provide all our team members with equal access to information, resources, personal development, job growth and opportunities. Our diverse work teams deliver high value to our



customers with their rich and varied backgrounds, experiences, talents and ideas. In turn, that diversity of thought and creativity ensures diverse ways of looking at problems and helping each other every day. At Watlow, by respecting individual and cultural differences, we are creating a competitive edge that will ensure Watlow’s long-term health and allow our team members to be their best.



## Community

Watlow believes in helping people improve the quality of life in their communities. Each year we partner with a variety of civic organizations, educational institutions and other businesses to help support programs in the communities where we live and work. We try to offer people the tools they will need to make a difference, both today as well as tomorrow.



Watlow also encourages our team members to get involved in community activities. Each year, Watlow team members donate their time, talent and treasure to a wide variety of charitable organizations around the world.



# Working At Watlow

## The Watlow Way

At Watlow, we are guided by the behaviors, values and principles defined in The Watlow Way, which is our business philosophy that guides us toward the never-ending pursuit of excellence.

We set high standards for our team members at all levels of the organization and strive to consistently meet or exceed our customers' expectations. We aspire for all team members to have an unwavering commitment to honesty and integrity in business operations and strive to achieve the highest level of ethical and moral standards. Watlow's success in the marketplace is a result of the high standards we employ, and we take pride in the solid reputation Watlow enjoys as a result.

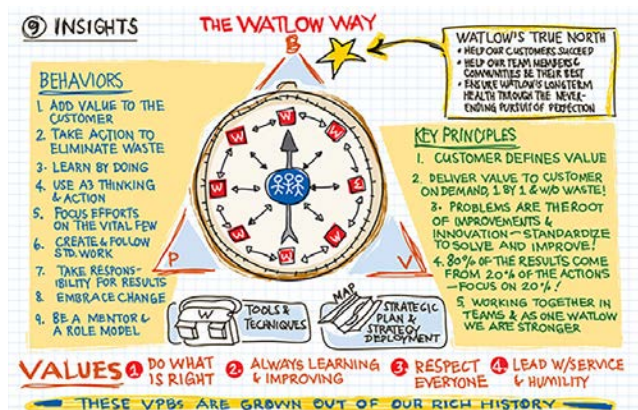
All of us in the Watlow family are expected to "Do What is Right," to use our common sense and best judgment in conducting business and to seek guidance if the best course of action is not clear.

We regularly review our internal systems to ensure that we are always striving to achieve internationally-recognized best practices.

## Watlow's advantage

- Industry leader in thermal sciences, engineering and manufacturing
- Privately-owned, financially strong and stable
- Global business focused on long-term strategic growth
- Culture of continuous improvement
- High-quality learning and development programs
- Passion and discipline to be the best

Watlow is an Equal Opportunity Employer, including Individuals with Disabilities and Protected Veterans.



The Watlow Way, established in 2007



**ANGELL**  
Human Resources Manager

"Helping people succeed is a passion of mine. I also love serving our broader community and Watlow encourages team members to get involved in community outreach. Through these partnerships I have been able to assist people with disabilities to find employment, including right here at Watlow."



**CHELSEA**  
Engineer II

"Watlow has supported my development in many ways. The rotational program gave me tools to learn and grow into my current role. Participating on the STEM outreach team has allowed me to stay connected in the community. But the best part of Watlow is people I work with, who inspire me every day in my personal and professional development."



**BRYAN**  
Production Team Leader

"I started as an operator in 2010. Since then I have been able to advance my manufacturing career through a variety of roles and experiences. Today I serve as a production team leader."



## Headquarters and Advanced Technology Center

**St. Louis, Missouri, USA**

Watlow's world headquarters is located in St. Louis, Missouri, co-located with our St. Louis operations and our Advanced Technology Center. Our headquarters' staff has worked at this location since 1961. In addition to the executive team, it includes such corporate functions as accounts payable, finance, information technology, human resources, marketing and sales support.



**Austin, Texas**

Watlow Austin is a premier facility focused on the semiconductor fab services. Watlow's suite of capabilities serve customers through the entire semiconductor fabrication process to ensure thermal optimization of the complete system.



**Hannibal, Missouri**

The Hannibal facility is where we produce our larger direct electric heat exchangers and is home to our energy and environmental technologies and foodservice equipment business. The facility manufactures tubular heaters, WATROD™ and FIREBAR tubular heaters, MULTICELL heaters and thick film heaters. Those products support customers in foodservice equipment, energy and semiconductor.



**Cebu, Philippines**

Watlow Cebu provides support in advanced circulation heater design, application engineering and technical proposals for renewable energy, oil and gas and petrochemical refining industries.



**Houston, Texas**

In 2016 Watlow opened its Houston, TX facility to manufacture control panels. WATCONNECT® control panels, featuring Watlow temperature and power controllers, are engineered, designed, manufactured and delivered within two weeks.



**Columbia, Missouri**

The facility in Columbia, opened in 1979, currently manufactures silicone rubber, polyimide and ceramic fiber heaters. These products are used in a variety of industries. Columbia also provides solutions for semiconductor OEMs and houses a state-of-the-art cleanroom.



**Kuchl, Austria**

Watlow's thermal spray heater technology moved into the current Kuchl, Austria facility in late 2010. This facility is focused on new product development of layered heaters and also serves as an advanced technology center. Current applications span a range of markets such as semiconductor and medical devices.





# Watlow Worldwide



Watlow's Advanced Technology Center in St. Louis, Missouri U.S.A



## Queretaro, Mexico

Watlow first began manufacturing in Mexico in 1996. Today, Queretaro is home to our largest manufacturing center spanning multiple buildings producing a wide range of heaters and sensors.



## Shanghai, China

The Shanghai facility was opened in 2006 to support some of Watlow's current customers in Asia. Watlow's facility in China assembles circulation heaters and other products for industrial process heating and the foodservice equipment industry across Asia.



## San Jose, California

Watlow's San Jose location provides high-precision bonding and cleaning capabilities, which are critical to achieving optimum temperature uniformity in semiconductor processing applications. The San Jose facility houses about 70 team members and provides support to customers headquartered in Silicon Valley.



## Singapore

In 1991, Watlow opened a sales office and manufacturing facility in Singapore. Currently, the Singapore facility manufactures cartridge heaters, silicone rubber heaters, thermocouples and some controller assemblies. Watlow's facility in Singapore also has an engineering design department to help solve tough customer application problems and is the regional headquarters for Asia.



## Santa Clara, California

Watlow Santa Clara is home to our high temperature bonding technology enabling repair and replacement of semiconductor pedestals and ESCs used to produce microprocessors and memory chips.



## Winona, Minnesota

Watlow in Winona, Minnesota, manufactures several types of single and multi-loop temperature controllers, the F4T temperature process controller, the EZ-ZONE® family of integrated controllers, safety limits and custom-board controllers.







Find out more about Watlow and how we can provide thermal solutions for your company:

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E-mail: [inquiry@watlow.com](mailto:inquiry@watlow.com)

Website: [www.watlow.com](http://www.watlow.com)

*Powered by Possibility*



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