



Surface Combustion

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Editor – Thermal Processing



The Allcase® vertical radiant tube furnace.



For more than a century, Surface Combustion has shown a constant commitment to develop innovative technology, while nurturing long-standing relationships with heat treaters who trust its equipment.

SURFACE COMBUSTION CONSIDERS ITSELF MORE THAN JUST a company that was founded on a patented heating concept, although it certainly is that.

The employees who make up the private U.S.-based company take a long view.

Surface Combustion President B.J. Bernard explains:

“Continuous improvement is in our culture,” he said. “We want to foster a culture of creative thinking, imagination, ingenuity, and teamwork. Surface will devote resources to all markets (both domestic and international) to provide best-in-class support to our customers no matter where they conduct business around the globe.”

With that philosophy at the forefront of everything it does, Surface Combustion has continued to redefine its performance limits while introducing a variety of advancements in thermal-processing equipment.

“From our initial product lines of small oven furnaces, pot-hardening furnaces, aluminum-melting furnaces, rivet heaters, and small forge furnaces, to the first continuous billet heating furnace, to the development of the industry standard Allcase® batch integral quench furnace, to the metal parts furnace designed for the destruction of chemical weapons, Surface showcases our continuous commitment to innovation and technology as a means of meeting the needs of our customers,” B.J. Bernard said.

That dedication shines through with Surface Combustion’s 675 U.S. patents and more than 75 industry-recognized trademarks.

“By our 100th anniversary in 2015, there were over 250,000 Surface thermal systems installed worldwide, many having been in operation for over 40 years,” said Ben Bernard, vice president of Global Sales and Marketing.

SERVING DIVERSE INDUSTRIES

And those thousands of systems can be found in a myriad of industries that include automotive, off road, gears, mining, oil exploration, solar, tool and die, electronics, aerospace, commercial heat treating, government

ordnance, incineration/thermal destruction, hand tools, defense, wind, natural gas, agricultural, and bearings.

“At Surface Combustion, we develop long-standing relationships with heat treaters who trust our equipment,” Ben Bernard said. “They know that a quality Surface furnace, generator, or accessory will afford them lower, predictable operational expenses, and that our aftermarket services will work to ensure less down-time and longer product life.”

In order to make that happen, Surface Combustion has a customer service department to back up those claims, according to Alex Kominek, business unit manager, Standard Products.

“The customer service staff can provide immediate answers and quickly schedule on-site support,” he said. “Feedback from our customers has often resulted in the development of new items of maintenance-friendly features resulting in a better product. Our customers know that they are not just purchasing a piece of equipment but entering into a partnership.”

TECHNICAL EXPERTISE

And as an engineering company, Surface Combustion places a high value on the technical expertise of its people, said John Gottschalk, business unit manager, Engineered Products.

“Extensive technical and engineering education, combined with a mature professional staff, make our employees highly effective in serving our customers,” he said. “At Surface Combustion, we keep informed of the latest developments and techniques in technical fields. We add new engineering graduates to our staff every year. Recent graduates contribute their technical abilities while working with senior engineers, building new relationships, and adding value to the service we provide to our customers. Our engineers and designers are dedicated to expanding capabilities and developing better thermal-processing systems and equipment.”

And the equipment that Surface Combustion offers is extensive:

Standard equipment: A variety of batch furnace designs and atmosphere generators that perform a range of heat-treating processes make up Surface's standard offerings.

Allcase® batch integral quench furnace: The Allcase has been the industry standard for more than 65 years, according to Kominek, with more than 3,000 units installed worldwide. Continued product improvements and ease-of-maintenance enhancements have maintained the Allcase as an industry leader for batch processes, including hardening, annealing, normalizing, gas carburizing, carbon restoration, carbonitriding, and ferritic nitro-carburizing (Triniding™).

Ion nitriding equipment: Ion nitriding is a plasma process performed under a vacuum in the presence of an electrical charge and certain gas mixtures. The process imparts uniform single-phase metallurgical properties to materials. Surface offers bottom load, bell, pit, and horizontal loading configurations for ion nitriding.

Vacuum equipment: Surface has manufactured vacuum furnace equipment for more than 50 years, Kominek said. This expanding product line includes the Power Convection® single chamber vacuum furnace with 2- and 6-bar quenching capability. The multi-chamber furnace family includes 2-chamber, 3-chamber, and cloverleaf (6-chamber) configurations. The multiple-chamber configuration allows for higher production with separate high-heat, low-pressure carburizing, and high pressure quench (up to 20-bar) chambers. The VacuDraw® vacuum temper furnace completes the line and includes sizes ranging from 36-48-36 to 60-90-60. Surface's patented gas-fired vacuum furnaces have been in use for more than 30 years as well.

Atmosphere generators: Surface offers reliable, easy-to-maintain, and economical on-site atmosphere generation equipment that includes RX® endothermic gas generators, DX® exothermic gas, NX® nitrogen, and HNX® hydrogen generators.

Engineered products: Engineered equipment encompasses a wide variety of batch and continuous designs engineered to order to meet customer-specified thermal processing and production requirements. Surface helps customers select the right furnace based on the process and product mix, according to Gottschalk.

ENGINEERED TO ORDER

Surface can provide many engineered-to-order designs including: pit, rotary retort,



A 2-chamber vacuum furnace.

rotary hearth, pusher tray, mesh belt, cast belt, roller hearth, screw conveyor, box, car bottom, strip lines, sucker rod, snap hearth, and rotating finger furnaces. Furnace type is selected based on the material processed. Designs are available for steel, cast iron, aluminum, copper, stainless steel, titanium, brass, silicon, and glass, Gottschalk said. All the designs can be either controlled-atmosphere or direct-fire, and they can be engineered to meet industry specific quality standards.

Processes performed include pre-heat for forge, normalizing, annealing, tempering, solution treatments, T5 and T6 aging for die-cast components, and a number of custom atmosphere processes including carburizing, nitriding, ferritic nitrocarburizing, and blackening performed on wrought, cast, and forged products, he said.

Advanced combustion products: A selection of thermal-processing systems are offered, such as hazardous and toxic waste disposal systems, thermal cleaning, mineral and resource recovery, chemical weapons/munitions demilitarization, carbon, graphite, and processing end-of-life tires and other waste products.

Process controls: Surface Combustion's

process control systems are designed to work with all types of heat-treat equipment. The company maintains and develops its own process and mechanical motion controls and O₂ sensors to meet industry standards such as CQI-9, AMS, and API.

Surface can incorporate other commercially available control systems per request, too, Kominek said.

SERVICE, PARTS SUPPORT

With its large inventory coupled with a knowledgeable engineering and customer support staff, it's not hard to see why Surface Combustion is a success in the heat-treating industry, but it offers even more with its service and parts support, as well as its ability to rebuild and retrofit existing equipment, according to Dave Dzierwa, business unit manager — Manufacturing, Rebuild and Retrofit, Customer Service.

"Our experienced field-service engineers, product managers, and controls experts frequently remotely troubleshoot customer problems," he said. "Therefore, on-site visits are often avoided, reducing customer downtime and expenses. When telephone support can't solve the issue, Surface Combustion will dispatch a customer-service engineer to



The cast belt furnace line. (Photos courtesy: Surface Combustion)

a plant location to inspect, test, troubleshoot, or assist in the timely maintenance and restart of equipment. Surface Combustion’s service support is backed by one of the largest replacement parts inventories in the industry. Critical parts and components are often shipped within 24 hours.”

RETROFIT PACKAGES

Surface Combustion offers a broad range of retrofit packages, as well, according to Dzierwa.

“When extensive equipment modifications are necessary, our rebuilding and construction services can provide an alternative to new equipment regardless of the original furnace manufacturer,” he said.

Maintenance and rebuilding services include: replacement of refractory lining, updating control and combustion systems, installing burner equipment, adding direct- and indirect-fired burners, electric/gas heating conversions, energy-efficient process improvements, and increased productivity modifications.

PAST, PRESENT, AND FUTURE

Surface Combustion was founded in 1915 and is headquartered in Maumee, Ohio. The building, designed specifically for the company, houses all the engineering, sales, and administrative offices. It also includes a production-oriented research and development laboratory, B.J. Bernard said.

Its manufacturing facility in nearby Waterville, Ohio, was expanded to 66,000 square feet in 2014.

“With over 90 years of experience and a multi-million-dollar inventory at their disposal, our aftermarket parts (AMP) department can provide the right part the first time,” said Annette Gadt, team

leader, Aftermarket Parts. “Our AMP specialists develop personal relationships with their customers to help anticipate needs and possess the knowledge to recommend the correct alloy for every application. Surface’s Waterville facility houses only first-quality parts and is able to ship most stock parts same-day.”

But Surface Combustion is not content to rest on its decades of accomplishments. The long view has — and will continue to be — a part of its ongoing focus.

“Surface will keep pace with changing materials, technologies, and quality requirements,” B.J. Bernard said. “Our ability to adapt to market and technological changes has been a key to our longevity. Surface is committed to the evolution of the heat-treat industry and always gives back by supporting educational and professional organizations.” 🔥



The RX® endothermic gas generator.