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When Steve Kujawa developed a new version of his company's gas hot water booster heater, he had four major goals: "When we designed this product, we wanted it to be efficient. We wanted it to be easy to install. We wanted it to be very easy to work on whenever it needed to be worked on, and we didn't want it to have to be worked on very much," says Kujawa, president of Vanguard Technology, Inc.

Although such goals seem applicable to any product on the market, Vanguard's gas appliance is unique in that its performance directly affects another appliance – the commercial dishwasher – making durability and reliability that much more important.

Typically used with commercial conveyor dishwashers, the PowerMax200™ Gas Booster Heater takes 120°F (48.9°C) water going into the dishwasher and boosts it up to 190°F (87.8°C) for the machine's sanitizing rinse. The high-temperature water is used to sanitize dishware, eliminating the need for harsh cleaning agents.

Kujawa says that hot water booster heaters are popular in larger commercial applications such as hotels because the establishments get a longer life out of their china and dishware, and they get a much cleaner result. "Lower-temperature dishwashers that claim to clean dishes at 120°F or 130°F tend to leave a residual chemical film on the glassware, and you can taste it," he says. "Chlorine is not a great thing to have in your gin and tonic."

Hot Technology

With conveyor dishwashers using anywhere from 250 to 400 gallons of fresh water an hour, Kujawa knew that he needed a robust, efficient burner for the new booster heater design. While researching his options, he came across a patented woven ceramic fabric (WCF) burner from

The PowerMax200™ Gas Booster Heater uses high-quality components to provide hot water to commercial dishwashers as reliably and efficiently as possible. The gas appliance uses a burner from Solaronics, a primary gas valve from Honeywell and an ignition control from Fenwal Controls.



Keeping it CLEAN

by Lisa Bonnema, Senior Editor

A hot water booster heater uses a patented gas burner to keep commercial dishwashers running hot and dishes sanitized.

Rochester, Michigan, U.S.-based Solaronics, Inc. With durability being a key attribute of ceramic fabric, Kujawa thought the burner was an ideal solution. "Dish rooms are not the most gentle of environments," he says. "People throw things around a lot; you have a lot of humidity; you have detergent and chemicals. Residue is all over the

place, and a lot of grease. This burner, being a woven ceramic fiber, takes quite a bit of abuse. It's also cleanable."

According to Solaronics, the burner's ceramic material, which was originally developed in a NASA research lab for use in the shuttle program, offers more than durability. "The excellent thermal properties and corrosion resistance of ceramics combined with flexibility and mechanical impact resistance are ingredients for a reliable, high-efficiency, low-pollutant emission burner," says Farshid Ahmady, vice president of Solaronics.

Kujawa agrees, adding that the burner allows the booster heater to operate at 90-percent efficiency with low emissions. "Because it is an IR burner, your combustion temperatures run quite a bit lower, so that's where we get our low emissions," he explains. "When you

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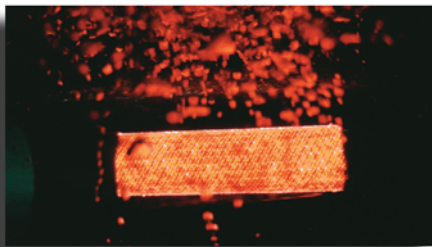
Keeping it CLEAN

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run a high combustion temperature like 2,000°F or 2,500°F, or if you're looking at an atmospheric burner, you have much less control over the air-gas mixture, so you end up running it richer, and you get more emissions. High combustion temperatures also create high NOx levels, and NOx is a major target emission. On that level, the burner makes a big difference."

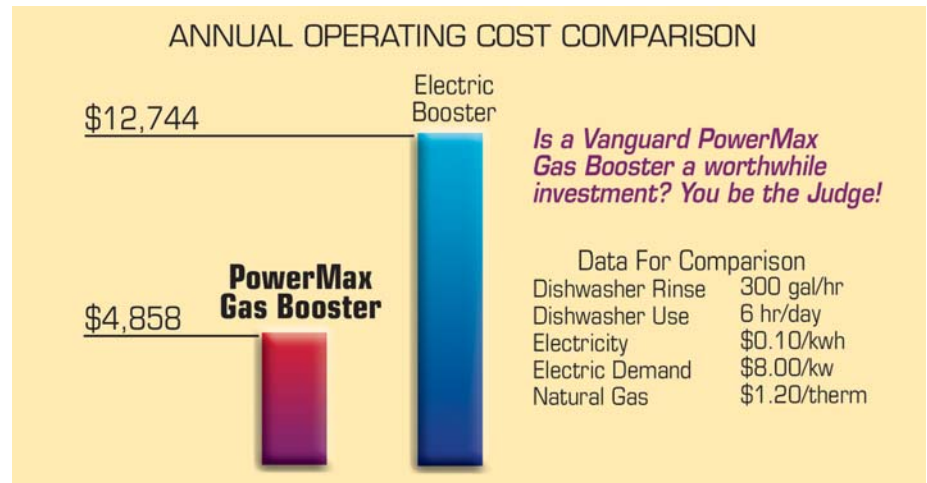
The woven fabric also creates even flame coverage over the surface. "It's actually called a surface burn," Kujawa says. "Part of that is achieved from our method of bringing the air-gas mix into it, but a lot of it has to do with the burner construction itself."

Inside the booster heater, the fan-forced WCF burner is surrounded by a 360-degree cylindrical heat exchanger, which is made out of double-coiled, solid copper finned tube. All of this is contained within a combustion chamber that is also lined with ceramic fabric. Air and gas is blended going into the burner,



Solaronics customized its patented gas-fired burner for Vanguard's water booster heater. The IR burner is constructed of a ceramic woven fabric that is said to offer excellent thermal properties and corrosion resistance.

then exits the burner and ignites. While burning on the surface, radiant and convective heat are produced. The resulting gases travel through the fin tube, where the heat is absorbed into the water, which passes through the other side of the heat exchanger. The exhaust



gases – primarily water vapor and carbon dioxide – then vent up through the dishwasher ventilation system. "Users don't have to vent the unit independently to the outdoors," Kujawa notes. "That simplifies installation."

The burner is also easy to attach, he adds, because it "sort of slides right in and bolts down."

The Right Boost

While the concept behind the WCF burner was a good fit for the booster heater application, it did offer its share of design challenges. "One of the challenges we were facing from the beginning was how to apply the 200,000 Btuh burner in a small, tight combustion chamber required by such a small appliance, which had to fit under the counter," Ahmady of Solaronics says. Accomplishing this, while improving performance, was no easy task.

Ahmady says it was the compact cylindrical design of the burner and the high input capacity of the WCF material (which tested up to 5,000 Btuh per square inch at the time), in addition to the Vanguard's patented heat exchanger, that made the product a success. "We were able to minimize the size of the burner and maintain a short flame profile to avoid impingement, therefore improving efficiency, emissions and

avoiding corrosion for a very reliable system," he explains.

The PowerMax200™ has now been on the market for a little more than 5 years, but both Vanguard and Solaronics continue to work together to perfect the design. With energy becoming an increasingly important issue in the U.S. – Vanguard's target market – Kujawa expects that more commercial establishments will choose gas booster heaters over electrical designs. "In some areas, like California, it ends up being a 4:1 or 5:1 ratio in terms of operating cost," he says. "It would be silly not to consider it."

The booster heater is also finding new applications, providing all of the water heating needs to smaller restaurants and some commercial and residential establishments. "In those situations, we put another temperature control on the unit, still locate it right at the dishwasher, but it will also provide the rest of the hot water for the kitchen at a lower temperature, as well as the sanitizing water for the dishwasher," Kujawa explains. "So now at a small restaurant, where space is at a premium, you don't have to give up 50 or 100 square feet of floor space for a big tank water heater. It's sort of a unique application, but I suspect it's going to be a very popular one."

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Vanguard Technology, Inc. also manufactures high-efficiency production water heaters.