



Advanced Heating and Hot Water Systems

CASE STUDY:

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CASE STUDY: TRUESDALE CLINIC IN FALL RIVER, MASS.

Switching to High-Efficiency ModCon Boilers Saves Medical Facility Both Money and Space

Replacing five conventional atmospheric boilers with three 94%-efficient, modulating condensing units cuts medical facility's energy usage by 38%. Stackable units take up less than half the space.

Saving money: it's the order of the day. Everyone — business owners and homeowners alike — is searching long and hard for ways to reduce costs. At the same time, we're all learning we need to go green to shrink our carbon footprint. Combine the two — saving money by using less energy — and it's doubly delightful.

Contractor Angelo Sardinha of Sardinha & Sons Plumbing, a second-generation hydronic heating expert, recently helped a long-time customer — the doctor-owners of the Truesdale Clinic in Fall River, Mass. — significantly lower energy usage and heating costs by replacing five 300,000 BTU cast iron atmospheric boilers with three 94%-efficient, ModCon Commercial Condensing Boilers from HTP. The boilers serve the oldest section of the complex: a two-story, 22,000-square-foot structure that was built in 1960 and now consists mainly of doctors' offices and medical examination rooms.

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Following the installation in June 2008, “we immediately noticed a difference at the gas meter,” says building superintendent Gary Thibault. “Our savings have been substantial.” Substantial, to say the least: During their first 10 months of operation, the new ModCon trio cut the clinic’s energy consumption by 42%. During the coldest winter months, gas savings ranged from 15.8% to 39.5% compared with the year-ago period. (See chart on Page 6 for a complete view of the energy savings achieved.)

An added bonus came in the boiler room, where the five older boilers had formerly sat in a row on the floor. Not only did the replacement installation involve two fewer boilers, but Sardinha was also able to save even more space by stacking two of the three units — a built-in convenience of the ModCon. “The room is downright spacious now with the smaller footprint of the stacked units,” Thibault comments. “Everyone wants to know how I’ll fill the space, but for now, I’m enjoying it being empty.”

MODCON BENEFITS

Much of the energy savings achieved to date derive directly from the new ModCon technology itself. Condensing boilers operate at a significantly higher efficiency than their conventional atmospheric counterparts by squeezing a much higher portion of the latent heat energy from the gas-combustion process. This, in turn, results in lower exhaust temperatures, permitting vent runs made of low-cost, installer-friendly plastic piping instead of traditional b-vent metal venting. (More on this benefit later in the article.)

Meanwhile, rather than firing full bore with every call for heat, the gas burners in these modulating boilers match their outputs to the present heating demand. In the case of the three units installed at Truesdale, their outputs range from 100,000 BTU per hour to a maximum 500,000 BTU/h; that is, a 5 to 1 turndown ratio.

“Modulating, condensing technology minimizes energy waste by generating only enough heat to meet immediate demand,” says HTP technical training manager John Sawyer, who worked with Sardinha on the Truesdale Clinic project. “Let’s say our outdoor temperature sensor reads 20°F,” he continues. “We may run the system at 180°F. But with an outdoor reading of 50°F, we can run the system at only 140°F. The system reads the outdoor temperature and automatically adjusts the boiler output temperature according to whatever parameters we have programmed into the system. The result is much more comfortable for the building’s occupants, while also saving energy and costs.”

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Case Study: Truesdale Clinic, *continued*

The 5 to 1 turndown ratio for each boiler actually translates into a combined 15 to 1 ratio for all three units, which use an HTP 926 control to sync their operations and stage their firings to meet the required load. This means the clinic has 1.5 million BTU for the coldest days of winter, but as little as 100,000 BTU for those spring and fall days when far less heat is needed.

As Sawyer notes, running a 1.5 million BTU boiler full tilt to take the edge off a chilly April morning or generate a little domestic hot water for the washrooms squanders huge amounts of energy and money. “Once the full mass of a boiler heats up, it just sits all day. The heat dissipates into the surrounding room where it’s needed the least, and the process repeats itself the next day, wasting more energy.”

NOT JUST SPACE HEATING

Although the system installation took place in early summer, the payoff began immediately. That’s because the three boilers operate year-round, providing more than just wintertime space heating.

- Feeding two 45-gallon HTP SuperStor indirect water heater tanks, one of the ModCons generates domestic hot water daily, with the other two serving as backup.
- During the summer months, the latter pair also supplies a small amount of warm water to the buildings’ outmoded, but still-effective, 1960s-era hydro-air cooling system. Pulling fresh makeup air from the outdoors, two large coils chill this airstream before directing it through ductwork to cool the building. On their own, the chillers produce a steady supply of 50°F air, which over time would leave occupants chilled, even on the hottest of days. Consequently, the boiler hot water loop is periodically used to warm the chiller coils just enough to yield a more comfortable interior temperature.

“Because of the domestic hot water service, we must run at least one of the boilers full-time, so it makes sense to use them to modulate the cooling system as well,” says Thibault. Thanks to the 5 to 1 turndown ratio, the ModCon units operate at a fairly low temperature range of 98°F to 110°F — “so we still are saving money over the old setup.”

During the first three summer months following the boiler room conversion, the clinic consumed 2,780 cubic feet of natural gas. In the same period the previous year, 7,641 cubic feet of natural gas was required to meet the building’s energy needs.

INSTALLATION SAVINGS

Managing the finances of Truesdale Clinic falls to its board of directors, who usually require two years for analysis and approval of large capital expenditures — like new heating systems.

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Case Study: Truesdale Clinic, *continued*

But Truesdale had successfully used HTP boiler products on two previous occasions: both were boiler-room retrofits involving HTP Munchkin condensing boilers installed by Angelo Sardinha. Each time, the clinic experienced reduced energy consumption and lower fuel bills. As a result, approval for this most recent project, involving the three ModCons, required only eight months.

“The energy savings realized from the first two conversions convinced the board to fast-track this third project,” says HTP’s Sawyer. “Nothing convinces a board to spend money like saving money.” For Angelo Sardinha, the Truesdale boiler conversion was also his first experience with the ModCon. Says Thibault of his favorite heating installer: “I have been building superintendent at Truesdale for nine years, but the Sardinha family has been doing plumbing and heating in this facility for three decades. They installed all of the Munchkins here, as well as one in my own home. When HTP recommended this new, larger boiler for our latest retrofit, we were happy to listen because of the success we’ve had to date with their products — and because we knew Angelo would get the job done right.”

Like Thibault, Sardinha was impressed by the larger capacity and smaller footprint of the stackable ModCon units. Particularly appealing to Sardinha was the built-in framework that makes stacking the ModCon units so easy. “The metal cabinet makes it easy to stack the units, so there is no need to build separate racks to save floor space,” says Sardinha. “The higher BTU output of the ModCon versus the Munchkin also makes it a better fit for commercial buildings like this one.”

A third, equally appealing factor was a faster, less costly installation, thanks to the plastic venting permitted by the condensing technology’s dramatically lower flue temperatures: 140°F maximum versus 550°F to 750°F degrees for the previous, five-boiler system. No wonder, then, that “most of the heat those old boilers generated was being lost into the boiler room or going up the chimney,” according to Sawyer.

Sardinha equipped each of the three ModCon boilers with a four-inch concentric venting kit, consisting of a smaller PVC pipe within a slightly larger PVC pipe. Exhaust exits up the inside tube, while fresh makeup air is drawn into the boiler through the larger, encasing pipe. Since the structure was single-story in this part of the building, Sardinha chose to run his vents through three roof penetrations — one for each boiler — rather than running the lines through a nearby chimney that extends fully 40 feet into the air.

The entire replacement installation took just four days. “We kept one of the cast iron units in place for three of those days, so that the clinic would not have to go without hot water for very long,”

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Sardinha recalls. “Then we removed the remaining boiler, reconfigured the piping and made the tie-over to connect the new boilers.”

“I had no real down time,” confirms Thibault. “Since then, we’ve done nothing but watch our gas bills and maintenance costs decline. There is less heat waste in the boiler room, thanks to the lower flue temperatures, and — most importantly for me — I have fewer headaches with this system. It’s a total win.”

ABOUT HTP: Founded in 1974, HTP is a designer and manufacturer of advanced heating and hot water systems. Product categories include: modulating condensing commercial and residential high-efficiency boilers, indirect water heaters, high-efficiency gas-fired water heaters, solar hot water systems, and oil-fired and electric water heaters.

For more information, visit HTP at www.htproducts.com. Or call toll-free: 800-323-9651 (508-763-8071 if calling from Massachusetts).

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GAS CONSUMPTION SAVINGS AT TRUESDALE CLINIC

Previous Atmospheric Boiler System vs. ModCon Condensing System

Measured in Cubic Feet of Gas (CCF), July 2007 – June 2009

BILLING PERIOD	2007	2008	2009	Savings
7-13 to 8-13	2,859	748		73.80%
8-13 to 9-12	2,809	796		71.66%
9-12 to 10-11	1,973	1,236		37.35%
10-11 to 11-13	2,712	1,422		47.57%
11-13 to 12-12	2,699	1,925		28.68%
12-12 to 1-15		2,939	2,342	20.31%
1-15 to 2-11		3,239	2,047	36.80%
2-11 to 3-13		3,064	2,577	15.89%
3-13 to 4-09		3,228	1,953	39.50%
4-09 to 5-15		2,570	1,289	49.84%
5-12 to 6-10		1,636	1,046	36.06%
TOTAL CONSUMPTION		28,092	17,381	38.13%

The above chart compares monthly gas consumption of the five atmospheric boilers that the Truesdale Clinic previously used (July 2007 – June 2008) to that of the three ModCon Condensing Boilers (June 2008 – May 2009). The bottom row compares total consumption of each system over two 11-month periods. With the new ModCon system, the clinic cut its consumption by more than 38% during the second 11-month period.

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