Industrial Energy Stewardship
Save Energy, Reduce Air Pollution

Energy Stewardship is an important political and social issue. It means reducing the energy a building consumes to provide a safe and productive environment. Every company wants to save energy and get a little bit greener. Converting to a more energy efficient and environmentally friendly heating/ventilating system is an easy way to make a big impact in this area. The Durr Industries, North American headquarters and manufacturing plant in Plymouth, Michigan is a perfect example of practicing industrial energy stewardship.

Durr decommissioned their steam boiler heating system during 2006. They replaced it with Cambridge direct gas-fired Blow-Thru® space heaters for the plant and a Raypak hydronic boiler system for the office. After this conversion, the average annual natural gas consumption for this plant was reduced by 6697 MCF (66,970 Therms). From an environmental standpoint, this means annual CO_2 emissions were reduced by 393 tons. The annual reduction in fossil fuel usage and reduced emissions will have the same impact as planting over 1180 new trees each year or taking 72 cars off the road.

Decision to Replace Existing Steam Boiler

Durr is a global supplier of painting systems and air pollution control equipment for the automotive, aerospace and other industrial markets. Gordon Harbison is a Certified Energy Manager and leader of the Durr project development team. His normal job is to reduce energy consumption and the cost of operations for their customers. So Durr management, said, “if you can do it for them, then do it for us.”

In the spring of 2005, Gordon launched a plan to decommission the gas-fired steam boiler at their 240,000 sq. ft. facility. The 20-year-old boiler had a steam capacity of 10,350 lbs/hr and was in good working order. However it was inefficient and expensive to operate due to rising energy and maintenance costs. The boiler was used to heat a large manufacturing area with a combination of fan coil and unit heaters distributed around the plant. The office had hydronic heating coils, hydronic baseboard radiation, a hydronic snow melting system and a combination of air handlers both hydronic and indirect gas-fired. All of this had to be replaced with more energy efficient heating/ventilating equipment. Durr also wanted to address cold dock door areas, achieve more even temperatures throughout the building and provide more ventilation with outside air to address a negative air pressure problem. Their ultimate goal was to reduce energy and operating costs enough to eventually pay for the new heating equipment.

Heating Plant with Blow-Thru® Space Heaters

The 180,000 sq ft. production area with 25 ft. ceilings was a challenge to heat because of its uneven roofline, mixture of high bay and low bay areas, lots of hanging lights, many windows and hard to heat dock door area. An infrared heating system was briefly considered but Durr soon realized it would be too expensive, difficult to install and would

not solve the negative air problem. Roof mounted, Blow-Thru® Industrial Space Heaters manufactured by Cambridge Engineering became the obvious choice. This direct gas-fired heating equipment has a 100% combustion efficiency (E_c) because there are no flue or heat exchanger losses. 100% of the available heat is delivered to the heated/ventilated space. The equivalent AFUE rating, or thermal efficiency (E_t) is 92%. John McGraw, the Cambridge Territory Manager who handled this project said "Cambridge Blow-Thru® heaters have the highest certified dual temperature rise/outlet temperature ratings of 160°F, which differentiates our design from less efficient direct gas-fired, draw-thru type heaters." The crucial 160°F max ratings result in smaller but more powerful units and the highest BTU/CFM rating. John went on to explain, " The Cambridge technology with its patented burner is also more energy efficient because the high temperature rise capability allows it to heat just the right amount of fresh outside air to address the building's combined air infiltration, make-up air and space heating needs. That means more heat, when and where Durr needs it, like at cold dock door areas."

Heating Office with Hydronic Boilers

With the old steam system, the 60,000 sq ft office space was prone to overheating in the afternoon affecting worker productivity. Performance Engineering Group, a Michigan based company, was selected to provide the new heating equipment. Alan Deal, President of Performance Engineering, said "The challenge for upgrading the office heating system was finding a new location for the gas-fired hydronic boilers, and figuring out a way to vent the products of combustion." The final solution was to install three, Raypak boilers outdoors. Two 1800 MBH boilers were put on the roof and one 500 MBH boiler was located on grade level. The boilers have an 87% combustion efficiency which is the highest available for this application. 120°F minimum inlet water temperature allowed for greater energy savings. The system was also part of a separate snow-melt application that required the use of glycol.

Goals Accomplished

The new heating systems were installed during January 2006. The facility was occupied at the time, but the conversion went so well that no temporary heating was required. Dave Williams is with Kropf Service Co., the local contractor used by Durr to service their HVAC equipment. Dave confirmed "The new heating system improved ventilation for the plant, solved the negative air problem and provided more even temperatures with increased comfort levels throughout the plant and office areas." Improved productivity was noted in the office and plant because of more effective temperature control. Best of all, a significant reduction in natural gas was documented during the first year of operation. This was determined by a Heating Degree Day (HDD) annual gas consumption analysis that accounts for year-to-year changes in the weather. Before the conversion, this Durr facility averaged 4.48 MCF/HDD annual gas consumption for the steam boiler system. After the conversion, gas consumption was reduced by 23% to 3.44 MCF/HDD. Gordon Harbison said "The energy savings and reduced maintenance costs enabled us to meet our payback goal for the conversion."