

Bass Pro Shops Realizes Hybrid System Benefits

When Bass Pro Shops purchased their 1.3 million square foot Springfield, Missouri world headquarters, warehouse and distribution center in 1984, the heating system in place was a low-pressure steam system. The large boilers generated steam that was then used to heat water for the building's heating loop. It was discovered that after 40 years in service, the boilers were very inefficient, used large amounts of fuel and the steam system had become a maintenance nightmare.

Bass Pro Shops decided it was time to make a change, so they contacted the P1 Group. A group of mechanical contractors in Lenexa, KS, which in turn contacted Hughes Machinery Company (Tim Powell and Jason Funk) for design ideas. Bass Pro, like most customers, wanted a heating system with low initial cost, high operating efficiencies and low operating costs. The perfect opportunity for a hybrid boiler system!

Because the only job of the existing steam system was to create hot water, it was decided early in the process to implement hot water boilers as a replacement. Condensing boilers were an obvious choice because of their high efficiency, as high as 99%. As great as that sounds, there can be some concerns with condensing boilers. They have a high initial cost (typically 30-50% more expensive than conventional boilers), small size (Only available to 3000 MBH maximum), inability to run on fuel oil, and most importantly, they don't always operate at their advertised efficiency!

How can this be? Condensing boilers are designed to operate best with low entering water temperatures and at partial loads. When entering water temperature exceeds 150° F, a condensing boiler is no more efficient than a conventional boiler. Condensing boilers are at their best when the building can be heated with cooler water on mild days. On frigid winter nights when 180-200° F water is needed to heat the building, condensing boilers drop back down to conventional boiler efficiencies. However, these efficiencies are still in the mid 80's, and far greater than the 70-75% of the old steam boilers.

With that said, how can we design a system that maximizes the efficiency of condensing boilers, minimizes initial cost, has redundancy and allows for alternate fuel back up? Sounds like a tough job, but with a properly designed hybrid system utilizing the right mix of condensing and conventional boilers, we can easily meet all of this criteria.

Our Bass Pro hybrid system includes (2) Unilux Model ZF1200 flexible water tube boilers and (3) Patterson-Kelley 'Mach' Model C2000 condensing boilers. The Unilux boilers are equipped with dual-fuel burners to fire either gas or fuel oil with an output of 10,200 MBH each at 85% efficiency. The PK boilers have an output of 1920 MBH each, at efficiencies as high as 99%. The condensing and conventional boilers are set up on separate outdoor air curves, where the Unilux boilers start running at a lower outdoor temperature than the PK's. The ability of the condensing boiler to operate at low

temperatures also allows them to protect the conventional boilers from damage associated with cold start-ups.

Bass Pro Shops is very happy with the installation and the initial fuel savings estimates are in excess of 30% over the old steam system!

Contact Hughes Machinery today to discuss hybrid system options for your facility!



Patterson-Kelley Mach C2000's installed at Bass Pro Shops



Unilux ZF1200's installed at Bass Pro Shops