TIP SHEET:
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Restore Boiler Efficiency by Replacing the Burner

Most of the time, boiler systems in operation for 20 years or more are only 60- to 70-percent efficient, which wastes unnecessary energy and money every day. After about 20 years of service, a typical burner loses its effectiveness. Linkage joints, cams and other moving parts wear out, and the burner's ability to keep tight control on the fuel-air ratio becomes degraded.

The result is commonly referred to as hysteresis, or the inability of the burner to repeat desired excess air levels across the firing range for optimum combustion. Higher excess air means lower combustion efficiency. And, a legacy burner can suffer from a whole host of other issues, including plugged or deteriorated nozzles and gas orifices, and deterioration of other combustion head components responsible for proper fuel and air mixing. All of this results in unburned fuel and higher-than-required excess air levels, leading to poor performance and a reduction in overall efficiency and increased operating costs.

One of the best upgrades a facility can make is to replace a legacy burner with a new burner that has a high turndown capability. While older burners typically operate in a narrow turndown range, high turndown burners continue to operate at lower firing rates, which cuts down on cycling occurrences and related expenses.

The importance of matching the burner to boiler can't be underestimated. A burner's flame shape and length, or flame envelope, must be matched to the furnace or combustion chamber to transfer the most heat, yet not impinge on the furnace walls in a manner that could be detrimental to the furnace or convection pass materials.

Another key aspect to matching the burner to the boiler or heat exchanger deals with a phenomenon known as combustion noise, combustion vibration or what is often referred to as "combustion rumble." Every boiler assembly has its own resonant frequency, so you have to ensure that the burner's combustion characteristics integrate well acoustically with the boiler and its acoustical nature. Since most burners are not custom-designed for each application, the burner must be flexible in design so that during the commissioning process, any undesirable combustion noise can be "tuned out" for smooth operation throughout the firing range.

In addition, the burner should be constructed of castings or heavy gage materials and "spinnings" that afford strength to the burner surfaces, thereby reducing unwanted high-frequency vibrations. Otherwise, at certain loads, the whole package may vibrate causing unacceptable noise and vibration — not to mention undue wear and tear on the system. Burners constructed of light gage sheet metals and large flimsy surfaces may be less expensive up front, but are noisier for the environment and those exposed to that (vibration) noise have a much shorter life expectancy, and generally end up being more expensive to the owner over time.

Lastly, ensure the new burner is easy to inspect and maintain on a regular basis. You shouldn't have to pull the burner off the vessel, or worse, crawl through the furnace to get to the burner, particularly for the larger sizes.

Remember, even with all the latest technology incorporated into a state-of-the-art burner, regular maintenance is still necessary to ensure optimal fuel-air ratio throughout a boiler's firing range and equipment life. Properly servicing a boiler system on a consistent basis will maintain its efficiency and lower fuel costs for years to come.

For more information about properly integrating a burner into an existing boiler system for improved efficiency and reduced emissions, visit **cleaverbrooks.com**.