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Newsletter

## Ware catches costly problems for client

Steam survey helps international manufacturer improve operations

One of the most effective services that Ware offers to its customers is a Ware Steam Survey. Unlike a trap study, the Ware Steam Survey evaluates the complete steam system including the boiler room operation. A senior technician from Ware completes the survey and delivers a full report with recommendations and suggested prioritized repairs, according to Bill Fogarty, manager, of Ware's Valve Shop.

The two-day steam survey includes testing of all traps, the steam piping system and condensate system.

The trap test looks for leaking traps and then offers an estimate of the energy cost associated with any leaking traps.

In the review of the steam piping system, the Ware technician looks for incorrect piping installations, for example, insufficient or non-existing drip legs to catch the condensate

that develops in the steam mains as well as steam lines that do not increase in size after a significant pressure drop through a control valve or pressure reducing valve. The survey also includes review of the areas where steam velocity is beyond the recommended limits due to a restriction in the pipe size.

Finally, a thorough review of the condensate system is conducted. During this portion of the survey, the technician is able to find areas that need attention such as improper venting of the condensate pumps or high pressure and low pressure condensate that is being mixed in the same return line which causes condensate in the low pressure applications to back up. The review can also determine if condensate is not being returned to a flash tank or if condensate is being discarded into the drains.

Ware conducted a steam survey last fall at Daramic LLC. Daramic is an industry leader in developing new and innovative technology for the lead acid battery market. Daramic,

a 75-year-old company, supplies more than 50% of the world's demand for high performance polyethylene battery separators to the lead acid battery industry. As a global leader, Daramic operates nine manufacturing facilities with a combined annual capacity of over 350 MM square meters of battery separator products.

Steve Wehmyer, Daramic maintenance planner, worked with Ware for years in a previous position and two years ago, when he joined Daramic, he suggested that they use Ware for a small job. Ware's performance on that job sold Daramic on their capabilities.

According to Weymyer, Daramic went through a change in leadership two years ago that led to a new attitude - a change from "just get it done as quickly as possible" to "let's get it done right".

"We are in a position now of correcting 30 years of mistakes and I knew Ware could help us," said Weymyer. "Everything I know about

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# Proper burner function is crucial to the operation of a boiler

## Upgrading to an energy-efficient burner means guaranteed savings

Maintaining proper burner function is crucial to the operation of a boiler, as a boiler will only run as well as the burner performs. A badly designed boiler with an efficient burner can actually perform better than a well-designed boiler with an inefficient burner.

### Consider these steps to maintain proper performance:

- Do combustion efficiency tests at both full-load and part-load conditions.
- If excess oxygen exceeds three percent or combustion efficiency values are low, consider upgrading the fuel-air control system to include solid-state sensors and controls without linkage.
- Consider investing in enhanced process controls, an oxygen trim system or a new energy-efficient burner.
- Install a smaller burner on a boiler that is oversized relative to its steam load.

Energy savings are guaranteed when upgrading to an energy-efficient burner. An upgrade should be considered if repair costs become extreme and reliability becomes an issue. Companies can also take advantage of utility energy conservation rebates that are available.

An efficient burner provides the

proper air-to-fuel mixture throughout the full range of firing rates, without needing regular adjustments. Burners mix molecules of fuel with molecules of air and are designed to maximize combustion efficiency while minimizing the release of boiler emissions. However, many burners with complex linkage designs do not hold their air-to-fuel settings consistently over time. Many times, burners are adjusted to provide high levels of excess air to make up for the inconsistencies in the burner performance.

Servomotors are becoming increasingly popular on new burners. Servomotors provide an alternative to complex linkage designs by using parallel positioning to independently control the quantities of fuel and air distributed to the burner head. These controls without linkages give an operator accurate, pinpoint control to provide consistent performance and repeatability as the burner adjusts to different firing rates. The more modern controls also make tune-ups and minor adjustments easier.

A single drive or jackshaft is another alternative to electronic controls. However, linkage joints wear and rod-set screws can loosen and cause slippage which will result in a decline in efficiency. For this reason, avoid purchasing standard burners that employ linkages to provide single-point or proportional control.

## Upgrading to an energy-efficient burner

Several steps are required to determine the potential energy saved by replacing an existing burner with an energy-efficient burner.

1. Adjust your boiler and make sure all suggested burner maintenance has been completed.
2. Perform combustion efficiency tests at full-load and part-load firing rates.
3. Evaluate the measured efficiency values with the performance of the new burner. (Most manufacturers will provide guaranteed excess levels of oxygen, carbon monoxide and nitrous oxide).

A new burner is recommended if the current burner is cycling on and off rapidly. Also, consider replacing

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steam, I learned from Ware's Boiler University. Their knowledge is top notch."

One of the first easy improvements that Ware made was to help Daramic with their recovery rate and use of steam for cleaning in their production process. Daramic is now able to use dry steam instead of wet steam to clean and Weymyer calls this a "major plus for our operations".

Daramic's report indicated that certain traps were leaking and there was a venting problem on the condensate pumps. The survey also found that a flash tank was needed. Daramic immediately began the process of correcting the venting problem on the condensate pumps and a program has been implemented to separate the high pressure and low pressure condensate lines and a flash tank is now being installed to collect the condensate.

"We haven't calculated any of the cost savings from the changes yet, because we have so much more to do," said Weymyer. "But Ware has been able to show us how we were causing some of our own problems and get us on the right track quickly."

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rotary-cup oil burners that have been converted to use natural gas as these are often inefficient.

### Potential Savings

Significant savings can be realized even with incremental improvements in burner efficiency. For example, on a 50,000 pound-per-hour process boiler with a combustion efficiency of 79 percent (E1), 500,000 million Btu (MMBtu) of natural gas will be consumed annually. Using the price of \$8/MMBtu, the estimated annual cost would be \$4 million. By improving the combustion efficiency by only two percent, an annual savings of 12,345 MMBtus can be realized, totaling \$98,760 in cost savings. With an installed cost of \$75,000, the new burner will pay for itself in less than a year.

It is also important to note that fan selection is crucial. A backward-curved fan can provide more consistent air control than forward-curved fans. In addition, radial-damper designs seem to provide air control that is easier to replicate at lower firing rates than blade-type damper assemblies.

Finally, always perform burner maintenance at regular intervals. It is crucial to avoid wear and tear on the firing head, diffuser and igniter as this can cause air leakage or mal-

function and cause the boiler not to start. Remember that a change in the weather can result in a change in combustion, so it is recommended that burner maintenance be performed quarterly or at the change in seasons.

This information was adapted from material supplied by the U.S. Department of Energy. For more information, visit the DOE's Best Practices Web site at [www.eere.energy.gov/industry/bestpractices](http://www.eere.energy.gov/industry/bestpractices).



**"Boiler and Pressure Vessel incidents, which can have devastating consequences, are usually the result of human error."**

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