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The GRIME

December 2010 / January 2011
Newsletter

Create Quality Steam Using Existing Boiler Efficiencies

Boiler efficiency: The measure of how much combustion energy is converted into steam energy.

Steam Quality: The measure of how much liquid is present in the steam produced.

There are huge benefits to using steam in the heat transfer process. First, there is a large amount of heat released when it condenses into water. With condensation as high as 1,000 BTU per pound, it doesn't take much steam to carry a significant amount of energy. In addition, steam is safe, nontoxic and nonflammable as well as having the ability to deliver heat at a constant, controlled temperature.

Steam is also beneficial because it can be delivered via conventional piping and valve equipment that is readily available, inexpensive, long lasting and is easy to maintain. Other heat delivery and distribution systems cannot compare in price and are not 100 percent recyclable like steam.

Despite the advantages, steam users also have to deal with system safety problems including premature equipment failures and low steam system efficiency. Some examples of specific problems include repeated boiler shutdowns which occur from:

- low-water level
- damaged steam pipes
- damaged valves due to water hammer
- vibration
- corrosion
- erosion
- reduced capacity of steam heaters
- overloaded steam traps

Low steam quality is usually the cause of the problems with repeated boiler shutdowns. Steam quality is measured by the amount of liquid contained in the steam. High velocity steam that contains water droplets can be as grainy as sand particles which can wear away at valve seats. Water allowed to collect in steam pipes will eventually be picked up by the high-velocity steam sped up to near-steam velocity which will increase the chances of it running into elbows, tees and valves. This collision can lead to erosion, vibration and water hammer.

Water hammer will eventually loosen pipe fittings and supports. Since steam is produced by the quick boiling of water in high-heat flux boilers, it can draw in and transport water as it leaks from the water surface. This transport of water, which is damaging to the steam system, is independent of boiler efficiency. While the transport of water cannot be completely avoided, it can be reduced through proper boiler and steam system operation.

Recommendations

Steam quality is the measure of how much liquid is present in the steam produced. It does not depend on the efficiency of the boiler but on the ability of the steam to separate from boiling water without carrying liquid particles with it throughout the entire scope of boiler operations. Studies of internal boiler operations, using video cameras, show that there are several recommendations for preventing poor quality steam:

- Make sure that steam demand does not exceed boiler capacity by controlling steam usage.

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- Regulate changes in steam usage to make sure that quick changes in steam demand will not decrease steam quality.
- Use modulating instead of on/off valves at steam use points to modify steam demand and steam usage.
- Add boiler feedwater with modulating instead of on/off controls.
- Utilize TDS controls in place of time-based blowdown.
- Operate the boiler close to its maximum design pressure.

Reductions in steam quality can be dramatic if any of these recommendations are not followed. A reduction in steam quality can damage steam equipment, control valves and heat exchangers resulting in shortened equipment service life, steam loss, low operating efficiency and even safety problems.

Information for this tip was taken from The National Board of Boiler and Pressure Vessel Inspectors. More information can be found at www.nationalboard.org.

Reduce accidents by keeping proper boiler logs

Keeping adequate boiler logs is an often overlooked practice in boiler operation. It is important to establish and enforce proper record keeping. Reviewing logs over time can help an operator understand trends and diagnose problems.

Proper records also allow operators to schedule maintenance and stay on that schedule so that emergency shut downs can be avoided. For example, an operator could watch for a steady rise in stack temperature at the same boiler load which indicates dirty boiler firesides or waterside scale build up. The operator can then be proactive and shut the unit down for cleaning.

There are two types of logs that should be maintained for each boiler: a daily operations log and a maintenance activity log. Logs can be easily prepared on a computer and customized for the type of installation of a boiler and its unique requirements. Logs are also available through insurance companies.

Avoiding accidents

National Board Incident Reports show that 79 percent of all reported boiler accidents are due to two causes: low water cutoffs and operator error/poor maintenance. Proper record keeping and analysis of boiler logs can help operators to focus on these areas, reducing boiler accidents.

Due to the fact that low water cutoffs alone account for a majority of the incidents - 62 percent - testing and maintaining these devices appropriately can cause a dramatic reduction in boiler accidents.

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Equipment List

All equipment listed is for sale or lease and is subject to availability

Unit	HP/PPH	Year	Manufacturer	Fuel	Type	Pressure	Controls
VE7	150,000	2008	Victory	Gas	Steam	250	IRI
VE8	150,000	2008	Victory	Gas	Steam	250	IRI
VE5	120,000	2008	Victory	Gas	Steam	250	IRI
VE6	120,000	2008	Victory	Gas	Steam	250	IRI
VE1	85,000	2008	Victory	Gas	Steam	350	IRI
VE2	85,000	2008	Victory	Gas	Steam	350	IRI
VE3	85,000	2008	Victory	Gas	Steam	350	IRI
VE9	79,280	2008	Victory	Gas	Steam	550/525SH	IRI
VE10	79,280	2008	Victory	Gas	Steam	550/525SH	IRI
VE11	79,280	2008	Victory	Gas	Steam	550/525SH	IRI
747	75,000	2000	B&W (Low NOx)	G/#2	Steam/SH	750/750	IRI
750	70,000	1996	Nebraska (Low NOx)	G/#2	Steam/SH	750/750	IRI
752	60,000	1980	B&W	G/#2	Steam	750/750	IRI
709	60,000	1979	Zurn (Low NOx)	G/#2	Steam	500	IRI
741	60,000	1979	Zurn	G/#2	Steam	550	IRI
SB79	40,000	1986	Cleaver Brooks	Gas	Steam	260	IRI
SB80	40,000	1986	Cleaver Brooks	Gas	Steam	260	IRI
615	40,000	1975	B&W	G/#2	Steam	325	IRI
SB29	1,200	1990	Johnston (Low NOx)	G/#2	Steam	200	IRI
496	800	1990	York-Shipley (Low NOx)	G/#2	Steam	200	IRI
634	800	1972	York-Shipley	G/#2	Steam	150	IRI
SB123	600	2008	York-Shipley	G/#2	Steam	150	UL/CSD1
SB63	500	1985	Superior	G/#2	Steam	150	IRI
SB18	300	1995	Clayton	G/#2	Steam	200	IRI
SB114	300	2008	Superior	G/#2	Steam	150	IRI
SB46	300	1994	Kewanee	G/#2	Steam	150	IRI
415	250	1980	Eclipse	#2 Oil	HT/HW	954	IRI
719	250	1987	Superior	G/#2	Steam	150	IRI
SB136	250XID	2010	York-Shipley	G/#2	Steam	150	UL/CSD1
SB144	175XID	2010	York-Shipley	G/#2	Steam	150	UL/CSD1
SB142	175XID	2010	York-Shipley	G/#2	Steam	150	UL/CSD1
SB125	150	2008	Superior	G/#2	Steam	150	UL/CSD1
SB76	150	2007	York Shipley (5 of these)	#2Oil	Steam	150	UL/CSD1
SB127	100XID	2009	York Shipley	G/#2	Steam	150	UL/CSD1
SB141	100XID	2010	York Shipley	G/#2	Steam	150	UL/CSD1
SB143	70	2010	York Shipley	G/#2	Steam	150	UL/CSD1
SB112	50	2008	Superior	G/#2	Steam	150	UL/CSD1
SB119	50	2008	York Shipley	G/#2	Steam	150	UL/CSD1
RB753	15	1986	Fulton	Electric	Steam	150	UL
SB65	15	2007	Fulton	Gas	Steam	150	UL

Request a quote on-line at www.wareinc.com or call 800-228-8861

WARE buys used boilers

All equipment listed is for sale or lease and is subject to availability

Chillers

Unit	Size	Manufacturer	Voltage	Type	Year
RC-24	30 Ton	Mc Quay	480 v	3 ph	2000
RC-21	40 Ton	Mc Quay	480 v	3 ph	1999
RC-1	60 Ton	Mc Quay	480 v	3 ph	1995
RC-2	60 Ton	MC Quay	480 v	3 ph	1995
RC-13	60 Ton	Trane	200-230 v	3 ph	1989
RC-5	95 Ton	Mc Quay	480 v	3 ph	1995
DH-01	100 Ton	Trane	480 v	3 ph	2008
DH-02	100 Ton	Trane	480 v	3 ph	2008
RC-6	105 Ton	Mc Quay	480 v	3 ph	1995
RC-8	155 Ton	Mc Quay	480 v	3 ph	1995
RC-10	195 Ton	Mc Quay	480 v	3 ph	1995
RC-11	195 Ton	Mc Quay	480 v	3 ph	1995
RC -25	300 Ton	Mc Quay	480 v	3 ph	2003

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Unit	HP/PPH	Year	Manufacturer	Fuel	Type	Pressure	Controls
SSB1	50 hp	2011	York Shipley	G/#2	Steam	150	UL/CSD-1
SSB2	70 hp	2011	York Shipley	G/#2	Steam	150	UL/CSD-1
SSB3	100XID	2011	York Shipley	G/#2	Steam	150	UL/CSD-1
SSB4	150	2011	York Shipley	G/#2	Steam	150	UL/CSD-1
SSB5	175XID	2011	York Shipley	G/#2	Steam	150	UL/CSD-1
SSB6	250XID	2011	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB7	300XID	2011	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB8	400XID	2011	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB9	500XID	2011	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB10	600XID	2011	York Shipley	(Low NOx) G/#2	Steam	250	UL/CSD-1
SSB11	800XID	2011	York Shipley	(Low NOx) G/#2	Steam	250	UL/CSD-1

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Log suggestions

Each boiler should have its own log sheet. As a suggestion, each log should be for one month and provide for two sets of readings per day. All logs should be kept together so they can be used for future analysis. The sheets should also have an area for recording weekly and monthly checks with dates along with a general comments section where significant events can be recorded like boiler inspections and any incidents/malfunctions. Logs should be kept over time consistent with the life expectancy of the equipment.

High-pressure boilers require additional readings so the logs are similar but provide for at least three readings or one per shift.

The most important concern is to keep the log completely, accurately, and updated regularly. Too often, logs are kept with identical readings for an entire month or with gaps in the readings.

Management must stress the need for complete, accurate logs, and must also explain the need for analysis and its benefits. A properly carried out record-keeping plan will allow both boiler personnel and management to stay focused on proper maintenance to avoid problems before they become an issue.

Information for this tip was taken from The National Board of Boiler and Pressure Vessel Inspectors. More information can be found at www.nationalboard.org.

Avoid typical improper repairs of safety valves

A repair of a safety or safety relief valve is defined as the replacement, re-machining or cleaning of any critical part, lapping of seat and disk or any other operation which may affect the flow passage, capacity, function or pressure retaining integrity. Even the disassembly, reassembly and/or adjustments which affect a valve's function should also be considered a repair. This does not include, however, the testing or adjustments of new valves upon initial installation.

There are many types and designs of safety valves. Even though individual components may vary by design, the basic function of these parts does not change from one valve to the next. This does not mean that all valves are alike and are repaired alike. Each valve design has its own maintenance requirements and specifications, and should be carefully studied before repair is authorized.

In general, safety valves have the following components.

Nozzle: a pressure containing element which constitutes the inlet flow passage.

Seat: a pressure containing component which makes contact between the fixed and moving portions of a valve.

Guide: a guiding surface for the disk to insure proper alignment of the seating surfaces.

Stem: a means to connect the disk to the lifting device.

Spring: used to provide the static force necessary to keep the disk in contact with the seat until the set pressure is reached.

Compression Screw: the external adjustment used to establish the valve's set pressure.

Possible effects of improper repairs to safety valves

The most important effect is a reduction of the valve's relieving capacity. This, after all, is the primary function of a safety valve to relieve at a sufficient capacity to prevent exceeding a certain value above the maximum allowable working pressure of the vessel. Other effects might be a shift in the valve's set pressure or blowdown outside the specified tolerances of the Code.

Operationally the valve's moveable components may hang up, flutter or chatter, and leakage or excessive simmering may be present. The valve's lift might be restricted in some way. All of these items, either individually or collectively, could have an overall effect on the valve's relieving capacity.

Improper repairs to safety valves can be divided into two basic categories.

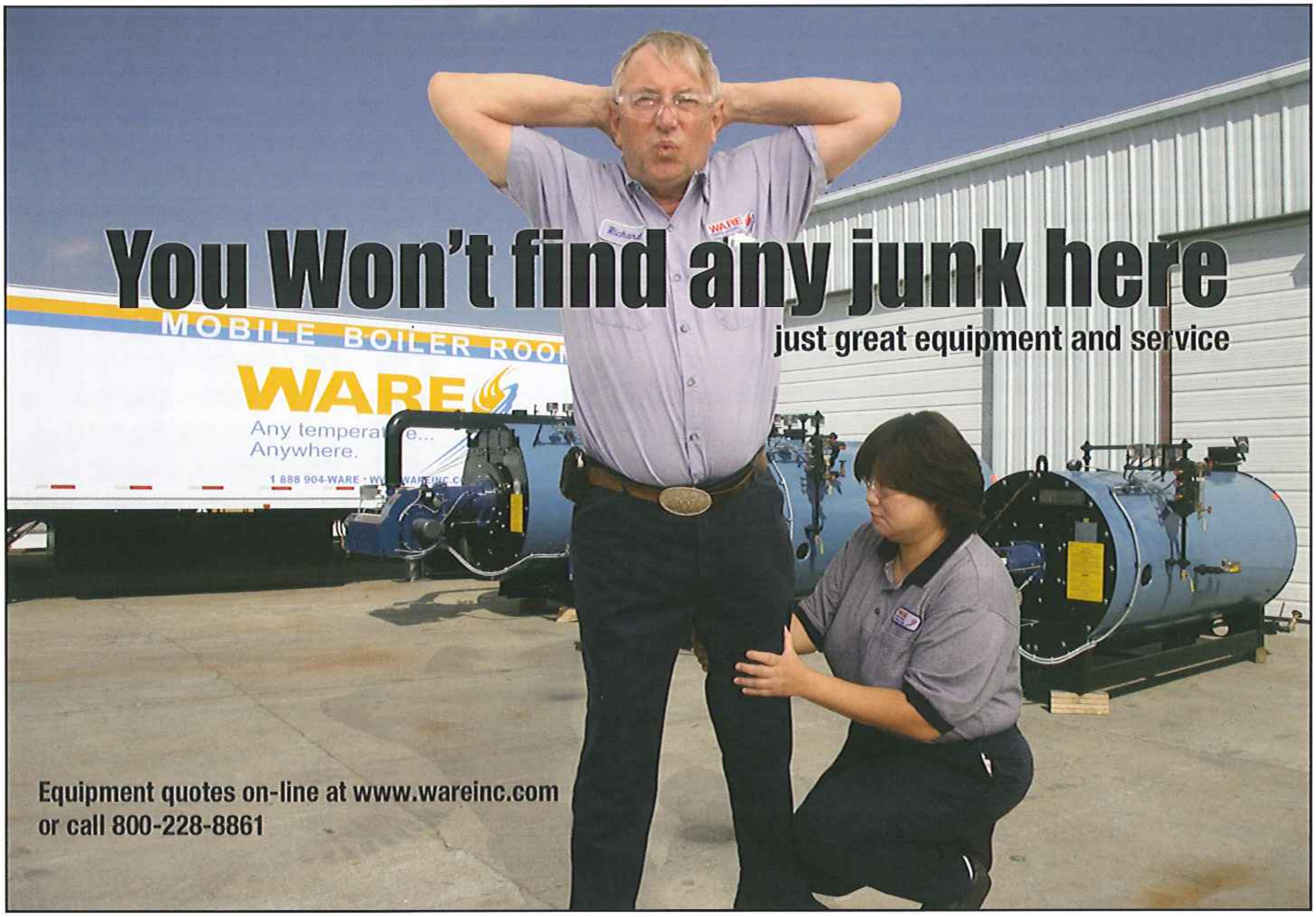
Workmanship: An example of this could be the overtightening of a valve in a vice during its disassembly. This might result in cracking of body or deforming a part which might result in a misalignment or binding once the valve is reassembled.

Miss identifying Problems: One of the most commonly overlooked items of this nature is cracked components. It is imperative that a repair organization incorporates non-destructive examination into their repair procedures to ensure that flaws of this nature do not go undetected.

The bottom line

Each repair organization is required to ensure that their personnel making repairs are knowledgeable and fully qualified. It is essential that each repair organization establish an effective quality control system to ensure that valves repaired have been returned to performance and conditions equivalent to the standards for new valves. By combining the use of competent repair personnel with an effective quality control system, and conducting repairs in accordance with the provisions of the National Board "VR" program, it is possible to overcome the problems of typical improper repairs of safety valves.

Information for this tip was taken from The National Board of Boiler and Pressure Vessel Inspectors. More information can be found at www.nationalboard.org.



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