Discover WARE
THE GRIME
April and May 2016 Newsletter

Minimizing Boiler Short Cycling Losses

by Alex Taylor
National Account Rep

When a steam or hot water boiler satisfies the high limits of the pressure or temperature demands that have been set on its controls, it will cycle off. The problem is that when this occurs while demand is still present, the boiler will quickly be needed back online; this is known as “short-cycling.” Most process and heating systems do not have a steady load--the load will actually vary based on production schedule, changes in outside air temperatures, or other variable factors. The inefficiencies associated with this cycling process are costly.

A boiler's furnace area typically sees a large volume of fuel introduced during normal operation, and there is always a risk of combustible gases accumulating in the furnace even after the burner has stopped firing. A large amount of fuel in an enclosed space is a recipe for disaster when the burner comes back on, so as a safety precaution, a boiler's operation cycle includes "purge" stages that use the blower to push a large amount of air through the boiler immediately after the burner turns off (post-purge) and then again before it turns back on (pre-purge), just to make sure that any accumulated fuel has been pushed out before a flame is reintroduced. Herein lies the efficiency issue: the air being forced through the boiler to clean out excess fuel is relatively cold, and it forces hot gases out of the boiler. When the boiler fires up again, it will have to make up for that heat loss by firing for a longer time at a higher rate, which means that your fuel cost will be higher, not to mention the time lost waiting for the purge cycles to complete. If you have a batch process that needs constant heat, a short-cycling boiler could put you at risk of losing quality in that batch of product due to the delayed delivery of heat. It can also hurt the lifetime of your equipment by putting more stress on the boiler vessel and any moving parts, causing these components to require maintenance (and therefore boiler downtime) more frequently.

There are several things that can be done to avoid short-cycling. First, rather than using one large boiler that would short-cycle, multiple smaller boilers can be used. They can be configured to run in a lead-lag control system, where one boiler can carry the smaller loads at low fire, and other boilers will be brought online as needed when the load swings and demand increases. Re-engineering an existing system may have a high initial cost, but it can pay for itself several times over during the life of the boilers system.

Set points can be adjusted to help prevent frequent cycling as well. If the set points are so tight that the

continued on pg.2

temperature has to remain within a few degrees or the pressure must stay within just a couple psi, the boiler will likely cycle very often. However, if the heating load or production process can tolerate a wider temperature swing or a larger pressure differential, then the boiler can run longer during operation and stay off longer during low-load conditions. In some cases, it may be critical to hold on a specific value, but if there is room to allow the set point to fluctuate, it will increase your system's efficiency.

Next, burner design can play a huge factor in increasing efficiency—in fact, many facilities with existing boilers have opted to just replace the burner instead of buying and installing a new boiler. A burner with a higher turn-down ratio can drop the boiler's low-fire rate and carry a smaller load without cycling off, and opting for a fully modulating burner will allow more flexibility in the firing rate to handle a wide range of loads in between the typical low and high fire points. Equally important is the transition to a linkage-less system; this type of burner setup allows for tighter combustion control, which gives you added efficiency to reduce fuel costs, but more important is the eliminated problem of hysteresis. This is when the system is unable to repeat a set performance, and it often occurs on a linkage system after combustion is set on low-fire. When the jackshaft drives to high fire and comes back down, the O2 levels can be off by 2% or more. This causes technicians to set the O2 levels too high throughout the firing range, which results in too much air in the combustion and high flue gas losses. By moving to a linkage-less burner control system, O2 levels will stay below 3% throughout the firing range, which can achieve fuel savings of 12-15% over a linkage burner operating at an average 6% O2 level.

Finally, new burner controls can help save time and money by eliminating the need for pre and post-purge cycles. Some of the latest control designs have implemented a "revert to pilot" function. Earlier, it was stated that the accumulation of combustible gas in the furnace while the burner is not firing can cause a safety hazard when the burner reignites, which is why the potential accumulated fuel is flushed out with large amounts of air from the blower fan. However, if the burner simply drops from low-fire to pilot instead of turning completely off, the continued presence of a small flame will prevent any unwanted build-up of fuel from a leaking valve. Any problems should be apparent if there is still a large flame in the furnace when it is supposed to be running on pilot. Without the need to purge the system, the heat loss from expelling hot flue gases can be avoided, and the burner can ramp back up when needed.

Better system design can save thousands of dollars per year in fuel cost alone. If the goal is to save the company money, make it easier and more efficient to run production or heating processes, prolong the life of your equipment and reduce down-time, then eliminating short-cycling should definitely be on the priority list.

Common Corrosion Issues in Boilers and How to Prevent Them

It's probably happened to you at one point in your life. You purchase a vehicle – for the first year or two you take immaculate care of it. As the years go by, you become more comfortable with it going longer between washes. One day you walk to your car and out of the corner of your eye you spot a small rust spot starting to form near the wheel well – immediately a pit forms in your stomach. Now every time you walk out to your car, you see it. Almost as if it's mocking you. You think to yourself, if only I would have washed that salt off sooner, or waxed it a few more times, maybe I could have avoided this!

Like your car or any piece of industrial equipment, steam boilers are subject to wear and tear over time. Corrosion is a common issue as boilers age, however, there are steps you can take now that will slow corrosion and lengthen the usable life of your boiler.
What are the most common types of corrosion in steam boilers?

Caustic corrosion: Caustic corrosion occurs when caustic is concentrated and dissolves the protective magnetite layer of your boiler, causing a loss of base metal and eventual failure. This type of corrosion can occur as a result of steam blanketing (which allows salt to concentrate on boiler metal surfaces) or by localized boiling beneath porous deposits on the tube surface.

Acidic corrosion: Low feed water pH can cause serious acid attack on metal surfaces in the pre-boiler and boiler system. Acidic corrosion can also be caused by chemical cleaning operations (overheating the cleaning solution, excessive exposure of metal to cleaning agent, and the existence of high cleaning agent concentration).

Oxygen attack: Without proper mechanical and chemical deaeration, oxygen in the feed water enters the boiler. Much of the oxygen is flashed off with the steam. However, whatever remains can attack boiler metal. Oxygen in water produces pitting, which is problematic because of its localized nature.

How can it be prevented?
The most effective way to prevent corrosion in your steam boiler is by having an intimate understanding of your feed water makeup. It is also critically important to establish a comprehensive water treatment program by partnering with a qualified expert.

WARE routinely partners with our customers to help them develop a water treatment program specific to impurities found in their feed water. There is no-one-size-fits-all formula to address every feed water stream; it must be tailored to meet the needs of the customer.

Contact WARE today to begin the process of developing a waste water treatment plan that will extend the life of your industrial steam boiler. Taking proactive steps now to establish a water treatment program will pay immeasurable dividends throughout the life of your industrial steam system.

Informative WARE videos

BOILING POINT

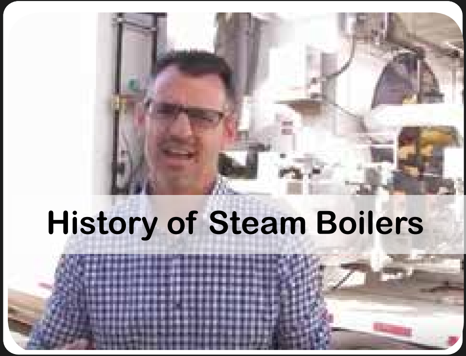
Unhook & Hook Up a Gooseneck Axle

Rolling a Boiler Tube

Inside a Gasket Kit

STEAM CULTURE

Cooking Bread with Steam



History of Steam Boilers

How to break in a Baseball Glove

PRODUCT VIDEOS

HelioJet industrial cleaning technology - water jet

Heat Sponge

CASE STUDIES

Amelin
EKU - 48,000 Coal Boiler Retube
New York City Housing Authority

SUBSCRIBE to WARE youtube channel

youtube.com/user/wareboilers

For more Boiling Point videos: youtube.com/user/wareboilers

NEW VIDEOS UPLOADED ALL THE TIME.

Boiler WAREHOUSE.com

BoilerWAREhouse.com

Over 40,000 parts on-line

AIR PRESSURE SWITCHES

Antunes
Cleveland Controls
Honeywell

BLOWDOWN VALVES

Everlasting
United Brass

BOILER GASKETS

Fire Side
Water Side
CB Aftermarket
York Shipley
Kewanee

BOILER SIGHT GLASS AND VALVES

Red Line
Clark Reliance
United Brass

FLAME SAFEGUARD CONTROLS

Autoflame
Fireye
Honeywell

FUEL OIL VALVES

Asco
Maxon

GAS PRESSURE SWITCHES

Antunes
Honeywell
Siemens

Maxitrol
Sensus

GAS REGULATORS

Honeywell
Siemens

GAS VALVES

Winters

GAUGES AND THERMOMETERS

York Shipley

IGNITORS AND IGNITION TRANSFORMER

Honeywell

MODULATING MOTORS

Boiler WAREHOUSE.com

Your single source for industrial and commercial boiler parts.

MODULATING FEEDWATER VALVES

WARE
Mod-V

BOILER PRESSURE AND TEMPERATURE CONTROLS

Ashcroft
Honeywell

PRESSURE REDUCING AND TEMPERATURE CONTROL VALVES

Spence
Armstrong
Trerice
Spirax Sarco

RELIEF VALVES

Kunkle
Conbraco
Consolidated
Watts

WATER LEVEL CONTROLS

McDonnell and Miller
Warrick

Boiler WAREHOUSE.com

WARE
new and used List

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

Unit	HP/PPH	Year	Manf.	Fuel	Type	PSI	Ctrl.
779	82,500	2013	Victory Energy Limpsfield	G/#2	Steam	350	IRI
767	75,000	2011	Victory Energy	G/#2	Steam/SH	750/750	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
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
496	800	1990	York-Shipley (Low NOx)	G/#2	Steam	200	IRI
634	800	1972	York-Shipley	G/#2	Steam	150	IRI
620	800	1975	York-Shipley	G/#2	Steam	250	IRI
SB139	500	2001	Cleaver Brooks		Steam	150	
SB138	350	1994	Cleaver Brooks		Steam	150	
SB137	250	1994	Cleaver Brooks		Steam	150	
415	250	1980	Eclipse	#2 Oil	HT/HW	954	IRI
SB148	200	1995	Kewanee	Gas	Steam	325	IRI
SB146	200	1995	Kewanee	Gas	Steam	325	IRI
SB216	250XID	2015	York-Shipley(Low NOx)	G/#2	Steam	150	UL/CSD1
SB213	175XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB220	175XID	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB210	175XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB217	150	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB224	150	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
RB769	150	1998	Precision	Electric	Steam	150	UL
SB222	50	2015	York-Shipley	G/#2	Steam	150	UL/CSD1

One hour quote on-line at www.wareinc.com or call 800-228-8861 continued

WARE new and used List

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

Unit	HP/PPH	Year	Manf.	Fuel	Type	PSI	Ctrl.
SSB33	50 hp	2015	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB32	150	2015	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB20	175XID	2012	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB14	300XID	2011	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB15	500XID	2011	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB28	600XID	2012	York Shipley	(Low NOx) G/#2	Steam	250	UL/CSD-1
SSB30	800XID	2014	York Shipley	(Low NOx) G#2	Steam	250	UL/CSD-1

Chillers

Unit	Size	Manf.	Volt.	Type	Year
RC-24	30 ton	Mc Quay	480v	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
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
Two Water Cooled	200 Ton	Trane	480 v	3 ph	2015

THE VALVE SHOP

Contact your local representative (800-228-8861) for Steam Studies

GET SOCIAL WITH US

WARE BOILER UNIVERSITY

Next Available 2016 Classes

Chattanooga, TN	Jeffersonville, IN
July 12 - 14	May 10 - 12
November 8 - 10	September 20 - 22

For more details visit WAREBOILERU.COM

For custom classess call 800-228-8861

INSULATION work

This includes: pipes, tanks, aluminum cladding, ducts, heat trace, blankets and more.

Insulation is the cheapest payback you can get. For more information call WARE, 800-228-8861.

WARE will be hosting their 2016 Partner's Conference on April 22 and 23 in Louisville, KY.

All net proceeds from the sale of SteamWARE T-shirts go to Kosair Charities where health care is provided to children when there is no one else to turn to.

INDUSTRIES, LLC
Honeywell
Algas-SDI
HelioJET CLEANING TECHNOLOGIES
HeatSponge
Smith CAST IRON BOILERS
AUTOFLAME®
MAXON
Allen-Bradley
EVOLV INDUSTRIAL
Limpsfield
IS INDUSTRIAL STEAM
fives
Penn

Discover
WARE
Since1952
4005 Produce Road
Louisville, KY 40218

PRSRT STD
US POSTAGE
PAID
LOUISVILLE KY
PERMIT #1225

WARE
AVAILABLE 24/7
GET SOCIAL WITH US

Member of
ABMA