WARE
Powerful solutions...
Extraordinary results.

The GRIME

February and March 2015 Newsletter

MINIMIZING BOILER SHORT CYCLING LOSSES CAN SAVE THOUSANDS ANNUALLY

A boiler cycle includes a firing interval, a post-purge, an idle period, a pre-purge and a return to firing. Boiler short cycling takes place when an oversized boiler quickly fulfills process or space heating demands and then shuts down until heat is required again.

Boiler efficiency can be calculated over the cycle duration by taking the useful heat provided by the boiler and dividing it by the useful heat plus losses. Boiler efficiency is reduced when short cycling occurs or when several boilers are operating at low firing rates.

Boilers can be too large for the required processes for several reasons. It could be that process heating demands fluctuate over time or additional capacity was added to restart a facility quickly after being closed overnight. Boilers may have been installed based on plans for additions and expansions to a facility that never happened. In addition, concessions may not have been made for heat contributions from other sources such as lights and equipment.

If a facility has installed energy conservation or is employing heat recovery methods, the heat demand can be reduced and therefore a facility could have multiple boilers operating at several times the maximum expected capacity.

Suggestions

•Determine the efficiency and operating cost of each boiler

•Adopt a control strategy for maximizing boiler operations

•Avoid short cycling by purchasing a burner with a high turndown ratio or by adding a small boiler to the boilerhouse to provide better flexibility and high efficiency at all loads

A facility can realize fuel savings by installing a smaller boiler to meet the average loads or by re-engineering the power plant to consist of several small boilers. Utilizing several small boilers can give operators the reliability and flexibility to follow load swings without over-firing or short cycling. Facilities with large seasonal variations in steam use can utilize small boilers when demand drops rather than operating large boilers all year round.

Example

If a 1,500 horsepower (hp) boiler (1 hp = 33,475 Btu/hr) that has a cycle efficiency of 72.7% is replaced with a 600 horsepower boiler with a cycle efficiency of 78.8%, a facility can see a fractional fuel savings of 7.7% annually. If the 1,500 horsepower boiler used 200,000 MMBtu of fuel annually, the savings from switching to the smaller boiler (assuming a fuel cost of $8 per MMBtu) would be $123,200.

Operating multiple boilers

When operating multiple boilers, the most efficient ones should be brought online as loads increase and the less-efficient boilers should be taken offline first as the loads decrease. Shift loads from one boiler to another as emissions, operations or firing rate limits change, using boilers where steam production is less costly.

Automatic controllers can be used to calculate the incremental costs of a change in load for each boiler in the facility. This shifting of loads can optimize the efficiency of boiler operations and reduce energy costs. When it is possible, loads should be scheduled to help maximize the performance of the entire boiler system.

A powerhouse that operates multiple boilers that are simultaneously operating at low-fire conditions can realize energy savings opportunities for utilizing these proper boiler allocation strategies.

Information for this tip was taken from the U.S. Department of Energy's (DOE) Best Practices Web site at www.eere.energy.gov

STEAM IN CINEMA PART 2

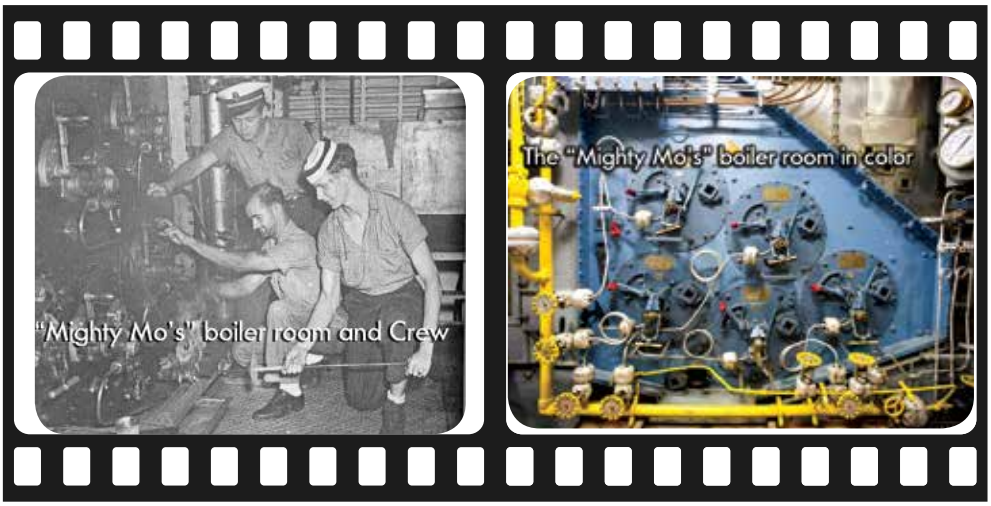
Hollywood is notorious for factual inaccuracies in films, and in all reality, it simply comes with the territory. Heck, if they were to get everything correct down to the finest detail, the production cost would be so high that it would no longer be practical to finance movies. Besides that, the audience is often simply there to be entertained—who cares about some small details that don't impact the story, right? The only time a factual error really raises a stir is when it seems so outlandish or impossible that it removes us from our immersion in the movie. Just think: if you saw a guy jump the Grand Canyon on a bicycle, wouldn't your instinct tell you that what you were watching was a bit farfetched? The mind can only take in so much before our "willful suspension of disbelief" is overruled by our logic.

For those of us who have chosen to establish our careers in the boiler industry, one movie that causes us to experience this phenomenon is Battleship. The 2012 Blockbuster starring famed singer, Rihanna, follows several Navy sailors that encounter an alien armada while running an international war games exercise in the Pacific Ocean. Ultimately our heroes return to Pearl Harbor and are forced to team up with some veterans to re-commission the USS Missouri, the last battleship ever produced by the USA, in order to fight the invaders. With a window of under 3 hours to stop the aliens before they trigger an event that would destroy any hope of success, they manage to get the vessel underway...that's right, they supposedly are able to take a warship that was decommissioned and converted into a museum in 1992 and get it underway in THREE HOURS. Yeah, we don't think so either.

A quick bit of information about the behemoth known as the "Mighty Mo": she served during World War II until the end of the Korean War, at which time she was placed in the Pacific Reserve Fleet awaiting decommissioning. Plans changed with President Reagan, and by 1986, the ship was refitted with modern missiles and defense systems. She would eventually see conflict in the Gulf War before being sent to Pearl Harbor for final decommissioning in 1992. Physically, this ship is imposing: she is almost two and a half football fields long and displaces 58,000 tons when fully loaded. Her nine main guns could fire 16" armor-piercing shells that weighed 2,700 pounds each, and she could hit targets 23 miles away. Moving such an enormous vessel was no easy feat, and required carrying 2.5 million gallons of fuel

oil. This fueled eight, three story 600 psi Babcock & Wilcox boilers and gave steam to four GE turbines, which in turn delivered 212,000 shaft horsepower to four propellers (each propeller was more than 17' wide!). How fast would that kind of power allow the ship to go? About 35 miles per hour (30 knots)—the ship is just that massive.

So back to the movie: it is hard to believe that a ship of that size could be taken from a decommissioned status to full operation if given a month, let alone a few hours. Even if they pumped in enough fuel and fresh water, brought the controls online, loaded the ammunition, and had the ~1500 crew it would take to fully operate the vessel, one thing that could not be done is to have the boilers online in such a short time. In its heyday, it's possible that a well-trained crew could have had the USS Missouri moving in short order, but in this case they were trying to light off



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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	
SB200	400	2014	York-Shipley (Low NOx)	G/#2	Steam	150	UL/CSD1
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
SB170	250XID	2012	York-Shipley(Low NOx)	G/#2	Steam	150	UL/CSD1
SB213	175XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB194	175XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB210	175XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB204	150	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB214	150	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB209	150	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
RB769	150	1998	Precision	Electric	Steam	150	UL
SB212	100XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB202	100XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB208	100XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB206	70	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB207	50	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB211	50	2014	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

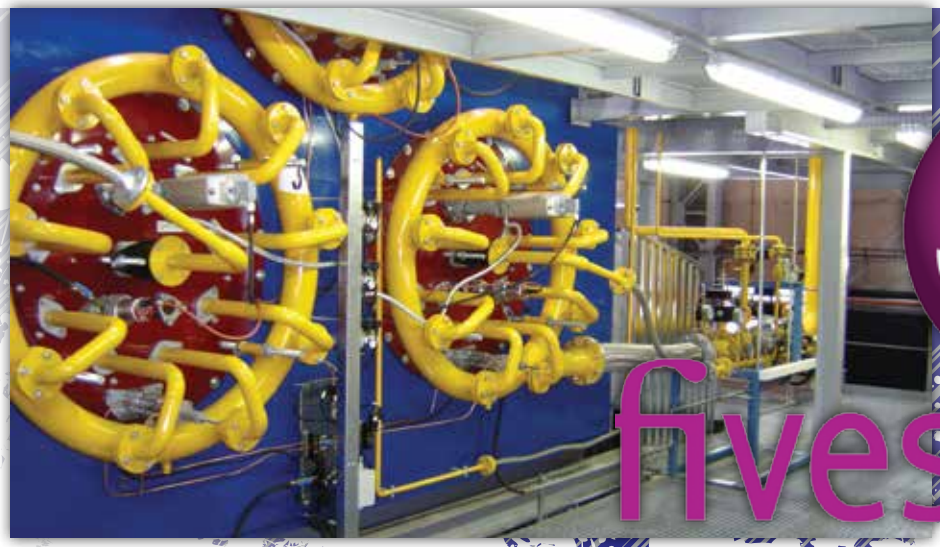
All equipment listed is for sale or lease and subject to availability

Unit	HP/PPH	Year	Manf.	Fuel	Type	PSI	Ctrl.
SSB23	50 hp	2012	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB21	70 hp	2012	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB31	100XID	2014	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
SSB25	250XID	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
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		

Chillers

WARE HAS A PARTS STORE ON-LINE

follow the arrow for all your boiler part needs

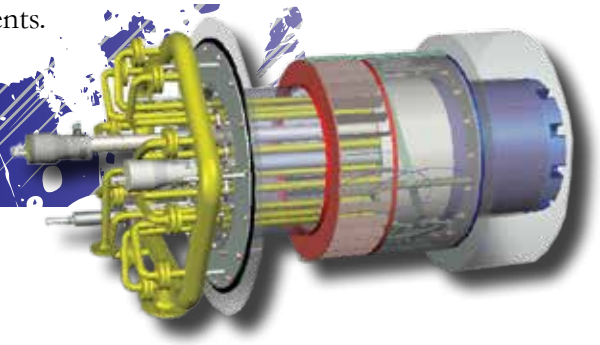


North American Combustion

We at WARE are excited to announce our new relationship with Fives North American.

WARE is the exclusive representative of Fives boiler combustion group for its regional area covering 6 states from Ohio to Alabama. We were approached by Fives North American because of our boiler and retrofit expertise. After taking the time to do our home work on both Fives and their technology, it was clear that the product and their culture was a great fit for us at WARE. As we have done for so many years, we look for the best of breed in every product that we represent. Fives North American fits that criteria.

We will be pursuing large boiler retrofits and coal to gas conversion projects. Single burner capacities are up to 350 MM BTU/HR. Fives also provides sophisticated control technology and gas train systems for multiple burner applications. Emissions range from single digits to 50 ppm while maintaining high efficiencies due to lower O2 operation and minimal to no FGR requirements.



Informative WARE videos

BOILING POINT

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Rental Boiler Installation


Steam Study

Peek at WARE's Tradeshow Booth

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Heat Sponge

CASE STUDIES

Amelin

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NEW VIDEOS UPLOADED ALL THE TIME.

Steam in Cinema Part 2 continued

units that had not been fully maintained for the better part of a decade. When you consider the electrical & mechanical complexity of such a system, there are a host of problems that would likely surface during startup. Bringing 8 cold boilers online is not like starting up a car and then stomping on the gas pedal; getting any gas or oil-fueled boiler to capacity is a slow process which requires patience and normally takes several hours or even days, should problems arise.

Similarly in industrial applications, a rental or replacement boiler will take time to be set, connected to utilities and steam lines, fired up, and tuned. If your operation is at risk of having an emergency outage and you would need steam quickly, it would be prudent to have your connections already run to a convenient, easily accessible location. It is probably safe to assume that the US Navy doesn't currently anticipate an alien invasion for which a battleship would need to immediately re-enter service; but for you, regular maintenance shutdowns can be anticipated, and outages can have planned contingencies. Estimate what size unit(s) you will need, how long it will take to hook the unit(s) up, and how long it will take to get online, and get a contingency plan in place. If you don't know exactly what equipment or logistical considerations you would need, WARE can help you be prepared to fight off a crisis.

Fun facts: if you take "The Heart of The Missouri" tour, they will show you hands-on how one of the boilers is lit. Also, the main gun turrets were designed to sit on rollers instead of being fastened to the ship, so that if the vessel capsized, they would fall out and allow the ship to remain afloat; their massive weight kept them secured while the ship was upright.

TEE SHIRTS FOR SALE

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.

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