



"Eddy's Boilerhouse News"
By Eddy Emerson, Emerson Boiler

NEWSLETTER – Energy Savings - Letter 12

OPTIMIZATION OF BOILER PLANT – Rifle Barrel Boiler Tubes

GREEN! GREEN! GREEN! Make it green. Make it more efficient. Save energy. Save money. Make the world a better place to live. Good idea. So what can we do in the boiler plant to save cash and some fuel along the way, while cleaning up the environment? That is what everyone is talking about and it will be our subject for the next several new letters.

TEKtube™ has come out with the X-ID tubing for fire tube boilers. This is a break through in fire tube boiler efficiency. That is true efficiency or thermal efficiency. Thermal (true) efficiency is not the same as combustion efficiency. Combustion efficiency tells how well we are burning our fuel and has the greatest effect on thermal (true) efficiency. But, thermal (true) efficiency is calculated in btu's of input verses btu's of output. In large steam plants this is very easy to measure, because of gas flow meters and steam flow meters. We know how many btu's are being used up by the combustion process and how much steam is being produced. That is thermal (true) efficiency and it is affected by things like combustion and heat transfer.

Heat transfer is how effective we are at getting the heat out of the gases of combustion and into the boiler water. The rifle barrel boiler tube improves heat transfer. These tubes are internally augmented tubes that significantly increase the heat transfer for gas flowing inside the tube, as opposed to equivalent bare tubing. The helical (spiral) ribs embossed on the inside of the tube increases the heating surface. The heat transfer is 85% greater than a plain tube, thus reducing fuel consumption.

Unlike a rifle barrel, the rib pattern is not cut into the tube but added to the tube and does not reduce tube thickness.

Rifle barrel tubes are ideal for re-tubing and in fact make it worth re-tubing that scotch marine boiler. These tubes were developed and tested beginning in 1990 and have been successfully used on boilers ranging from 60 HP to 2200 HP.

HOW IT WORKS

According to TEKtube™, in a typical 4-pass boiler, the fourth pass has about 27% of the total area of the tube passes, but only removes about 5% of the heat in the tube passes. In 3-pass boilers, the third pass has about 45% of the total area of the tube passes, yet removes only about 15% of the heat in the tube passes. The most incremental benefit is obtained by re-tubing just the second boiler pass (first tube pass), where the bulk of the connective heat transfer takes place. So a 2-pass X-ID boiler can have boiler efficiency greater than a 3-pass and close to a 4-pass design. By re-tubing an existing boiler with X-ID tubes, the boiler can generate more steam, all the while still maintaining high boiler efficiencies.

FUEL SAVINGS BY REPLACING TUBES IN A 2-PASS 600 HP DRYBACK BOILER

	PLAIN TUBES	X-ID TUBES
BOILER HP	600	600
OPERATING PRESSURE	100	100
MORRISON TUBE DIAMETER (IN.)	46	46
NUMBER OF TUBES	290	290
BOILER EXIT TEMPERATURE (F)	560.2	392.6
BOILER EFFICIENCY	76.7%	80.8%
TOTAL BTU/HR LOST	6,091,643	4,777.990

NATURAL GAS SAVINGS (SCFH) 1,355.10

AT \$10.00/MCF – SAVINGS \$ 13.55 PER HOUR / \$ 325.20 PER DAY / \$ 9,756.00 PER MONTH

This looks like a no brainer. If your boiler already has tabulators in the tubes, the savings will not be as great as the above example. But, if it is time to re-tube, consider a little extra cost up front for considerable savings year after year and save the environment.

Be Safe.

TRAINING CLASSES STILL AVAILABLE:

PHOENIX, AZ (APRIL 5-9, 2010) 40 HOUR BIA RECERTIFICATION

PHOENIX, AZ (APRIL 12-16, 2010) 40 HOUR BIA RECERTIFICATION

PHOENIX, AZ (MAY 10-21, 2010) 80 HOUR BIA CERTIFICATION