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Applicationbrief

Eclipse Product: Metalic SER Burners

Submitted by: Ken Biggers, M.W. Nelson and Assoc. (Milwaukee, WI)

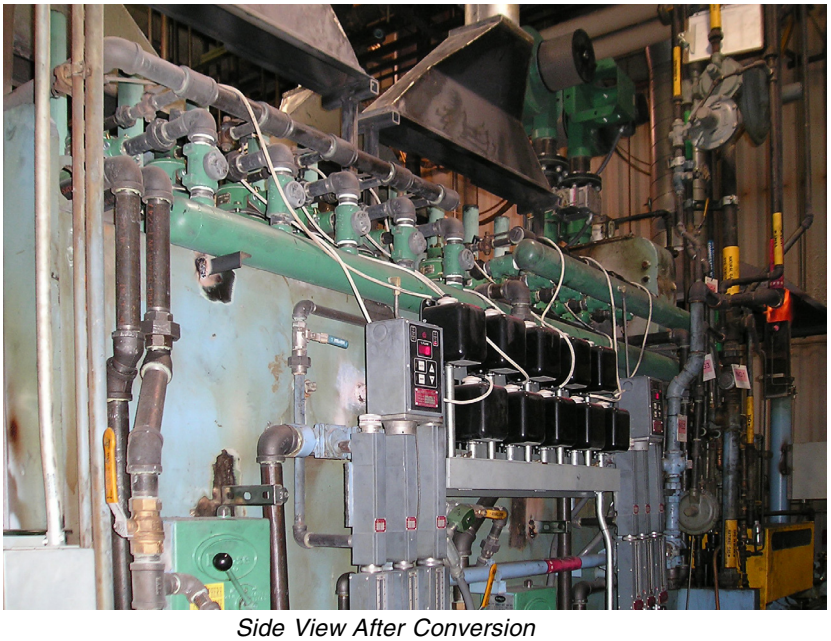
Application: Furnace Conversion

Description: Over the last 2 years we have worked with the premier manufacturer of American motorcycles, here in Milwaukee. We have been converting their old Pacific Scientific single and double zone furnaces, from straight through tubes with EH burners, to the metallic SERs using the model 1814AR-45 single ended recuperative radiant tubes.

With 10 tubes per zone, we have converted, 1 single zone and five twin zone furnaces. That is 110 tubes. Before this year is out we will add another 50 tubes to that total.

Yes, fuel savings was an important consideration in the purchase. However, It was far from the only one. We were lucky in that we had previous conversions on similar furnaces. Those were in the captive heat treat department, of a gear plant. We arranged a visit, and it turned out to be a major boost to our success. Some of the customer comments were:

- They were standing between the two running furnaces and having a normal conversation. With straight tubes and EH burners, it is more like shouting. It seems that straight pipes are great, out on the street, but not inside the heat treat department.
- The gear manufacturer had 12 tube furnaces of the same make, and was able to share his service history. He stated that the benefits include:
  - Better temperature uniformity
  - Longer tube life
  - Cooler ambient temperatures around the furnace
  - Longer life from roof mounting circulating fan motors and belts



Side View After Conversion

That visit resulted in the first conversion, and more followed. Our biggest boosters are the maintenance and operation personnel working in the heat treat department.

We had several discussions with the customer regarding their goals for the conversion. The goals were:

- Energy conservation
- Uniformity improvement
- Make the furnace easier to maintain
- Reductions in noise and temperature in the facility

Too achieve these goals, we replaced the existing small diameter straight through tubes with 4.5" single ended recuperative radiant tubes. As well as being much more energy efficient, these tubes also have much better uniformity of radiation than the straight through models.
We further enhanced uniformity by addressing the burner adjustability issues on the existing furnace. The customer complained of difficulty in balancing the existing burners, especially on the two zone furnaces. We found that the existing combustion air blower and air supply manifold were marginally sized. After discussing this with the customer, it was decided to treat each 10-tube zone as a separate entity. This then allows a standard piping scheme to be applied to single or double zone furnaces. We now have one combustion air blower per zone. The blowers are mounted above the ends of the furnace, feeding down into the center of a U shaped air manifold. Even though our total firing rate is lower that before, our air manifold is larger. This makes the burners extremely easy to balance and adjust.

The converted furnaces in Milwaukee went from temperature uniformity readings of 10-13 degrees deviation, to a converted deviation of 1 to 2 degrees! The heat treat department is definitely quieter and a more comfortable environments due to the changes.

Our customer also redesigned the exhaust hoods over the furnace. They were able to make them smaller, and easier to work with. Dilution air is required to cool the furnace exhaust gases a temperature that can safely penetrate the roof. Our conversion dropped exhaust gas temperatures from approximately 1,800°F to 1,000°F, allowing our customer to reduce the exhaust flow rate through the roof. This has reduced the amount of air make up required. That fuel savings is over and above those shown in the furnace gas consumption chart.

ITM	QTY	PART #	DESCRIPTION
1	10	1814AR45	SINGLE END RECUP RADIANT TUBE, 4.5X45"
2	1	501230	BV, AUTO, 16BV-ABD, 4",
3	1	100099	PARTS MOUNTING GROUP,
4	1	SMJ4412-3/4	BLOWER, 3/4 HP, 14000 SCFH @ 10" W.C., FLGD IN & OUT
5	2	D226459	FRG 707/6 FRG, 3/4" NPT. ZERO GOVERNOR/ PROPORTIONATOR
6	10	I1-AO6SA6	XFMR, IGN, 120/6000V, #12178,
7	10	I1-RSN	TERMINAL, RING, HIGH VOLTAGE,
8	10	I1-90 DEG	CONNECTOR, RAJAH, #AEBF, 13564,
9	50	I1-734708	WIRE IGNITION, HIGH TEMP,
10	1	H1-M4185B1058	ACTUATOR, 90 DEG 10-SEC STROKE, SPRING RETURN
11	1	H1-221455A	CRANK ARM, (REPLACES 7616BR)

They have charted the gas consumption on side by side furnaces (one with SERs and one with the old Even Heats). Our customer has charted savings over a six month period and our average fuel reduction has been 55-60%.

New Manifolds

Old EH Burners

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