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Applicationbrief

Eclipse Product: Spin Works Silicon Graphite Inserts

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Application: Monitor fuel savings in relation to pounds of production.

Furnace Type: 48” Mesh Belt with Oil Quench

Results:

BodyCote Thermal Processing, located in Cleveland, OH is a large commercial heat treater that specializes in high volume continuous (belt) heat treating. The plant has two two 36" cast link belts with oil quench, 48" mesh belt with oil quench, four rotary retorts with oil quench, two 48" austemper mesh belts with salt quench. The field test of the Spinworks inserts was performed in the 48"mesh belt with oil quench shown in Figure 1.

Figure 1

3 zone, 48” mesh belt with oil quench. Furnace rating is 3.5 MM Btu/hr.

The test consisted of installing three, 4" diameter inserts in the U-tubes in first zone of the furnace. The furnace was tuned to maximum efficiency (3 % O_2 in the exhaust). Fuel consumption rates and production rates were recorded prior to installation of and after installation of the inserts. Installation was completed with the furnace “running hot” in less than one hour.

Figure 2 compares the history of fuel use and production rates for the high rate production days Monday thru Friday. Gas usage was reduced in all cases except for Wednesday. However, the production rate was increased during that day thus, also resulting in a lower gas use per pound of metal treated. Gas use per pound of metal produced is shown in Figure 3. The average of high volume days (Tue, Wed, Thur) is 2.3 ft^3 of natural gas per pound of metal treated without the inserts and 1.85 ft^3/lb with the inserts resulting in a fuel reduction of 20%.

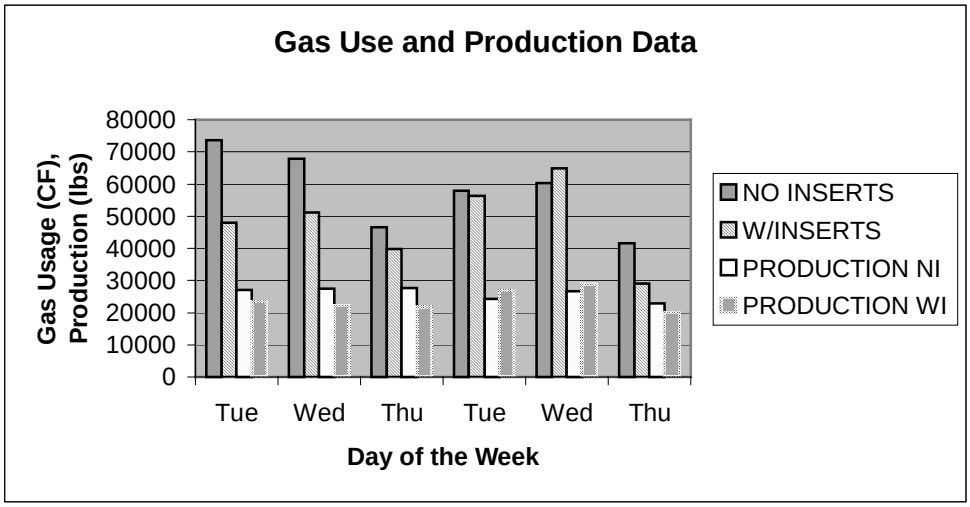

Figure 2

Gas use and production before and after the installation of Spin Works inserts during high volume days of Tuesday, Wednesday and Thursday.

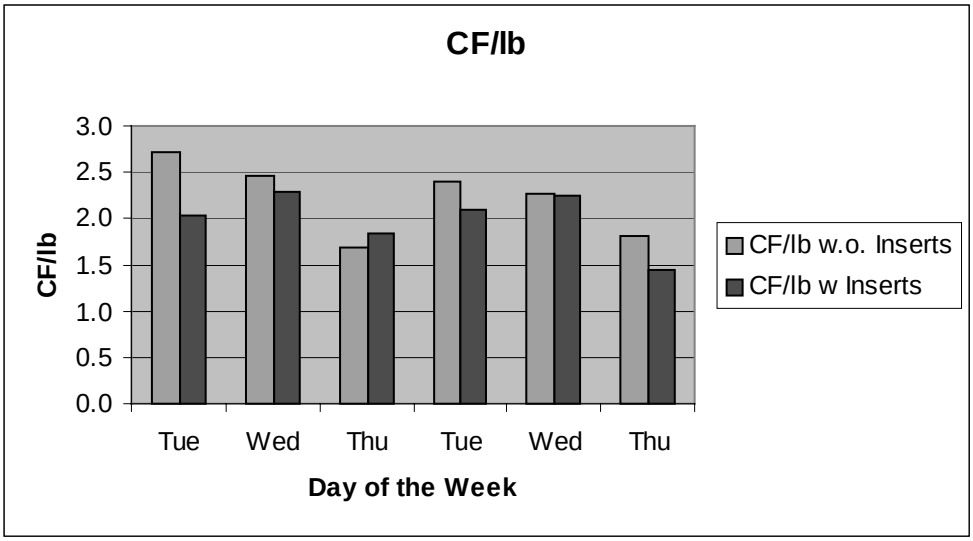

Figure 3

Natural gas usage per pound of metal treated in high volume belt furnace. The average rating without inserts is 2.3 ft^3/lb and with the inserts is 1.85 ft^3/lb resulting in a 20% fuel reduction per pound of metal treated.

A 12 day running average which includes one weekend of the furnace running idle resulted in a 2.49 ft^3/lb of metal treated vs. 2.22 ft^3/lb or an 11% reduction. The higher values are a result of the furnace running idle without production running through the furnace.
On November 30, 2000, five of the remaining six U-tubes in the furnace were fitted with inserts for a total of 9 out of 10 U-tubes with inserts. Figure 4 compares the fuel reduction (CF/lb) for 7 day trials that include a weekend idle and Monday, Tuesday, Wednesday high production days for the furnace. The high production days result in a fuel savings of 20% with inserts in zones 1, 2, and 3. The savings is 19% when weekend idles are included. Zone 1 only inserts shows significantly better results during the high production days since zone 1 is the "workhorse" zone and is on high fire for most of the cycle. During the weekend idle period, this zone cycles often resulting in a savings reduction from 9% to 5%.

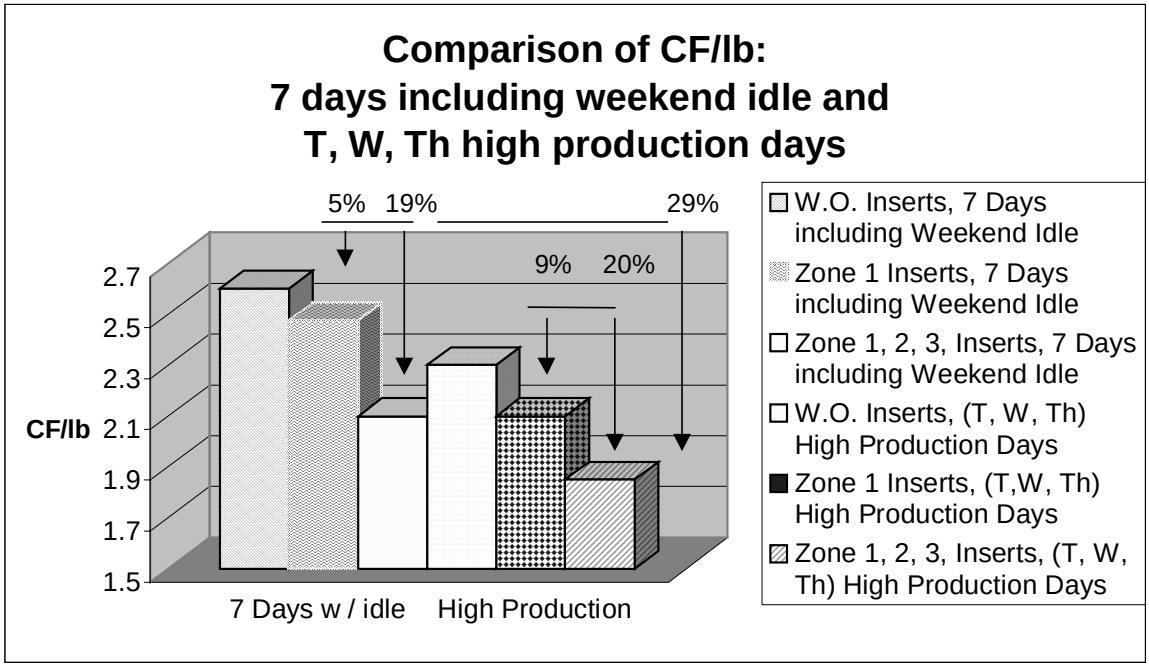

Figure 4

Savings comparison of 7 day furnace trials without inserts, inserts in zone 1 and inserts in zones 1,2 and 3. High production runs of Tuesday, Wednesday and Thursday are also shown for furnace without inserts, inserts in zone 1 and inserts in zones 1,2 and 3.

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