Heat Recovery

(Something for nothing, in coating?)

You know the saying “If it looks too good to be true, it usually is”, well consider this.

The coating process is talked about as being highly efficient, in fact 95% to 98%, but this only refers to the process efficiency (coating efficiency of applied solution). If you look at it from a green point of view, most installations are really very inefficient - or to put it into a running cost perspective, very wasteful.

The following figures are not estimates; the figures in Green are actual readings from site with the Blue figures calculated using standard tables.

The result was a surprise to us, and should send questions around the industry as to why, in the 21st century, we still install equipment with such environmental inefficiencies and high running costs.

The figures obtained from site were taken in the spring and demonstrate how much energy can be saved from a typical installation with industry standard running conditions. Your site conditions could give more or less of a saving than the example, but significant savings are possible.

The process was a standard aqueous film coating process, with an inlet temperature to the drum of 60°C and airflow of 5500m3/hr. The exhaust temperature when the process was running was typically 47°C. The inlet air was drawn from outside and on the day the ambient was 14°C.

If we use the calculation for heating air (Sensible Heat), we see that to lift 5500m3/hr of air by 46°C (60-14) it would require 85 kW of energy.

In this installation, a heat reclaim unit was installed in the inlet air handler, linked to the exhaust, and as the system was electrically heated, it was easy for us to read the value of the amount of energy being used, as a direct kW value.

The process was started and run for about 2 hours with stable readings. The energy input was measured at 34 kW, therefore there was a calculated 51kW of energy being added by heat recovery. To confirm this, if we look at the inlet air temperature and the temperature immediately after the heat recovery, we get a temperature change of 26°C (40-14). According to tables for sensible heat, this temperature rise would require 48kW. The calculated value is not exactly the 51kW expected, but the 3 kW error is insignificant compared with the 50 kW saving, which can be seen to be a reduction of 60% of the running cost.

It is important to point out that this is not theoretical; it is an actual energy saving for this customer.

There are a number of minor disadvantages:

1. Small initial cost of installation
2. Slightly longer cool down time

If the machine operates two batches a day, 5 days a week, that would be a saving of 510 kW/hr per week or 25,500 kW/hr per year (50 weeks).