OMEGA Productive Services, Inc.
2100 Coe Ct.
Auburn Hills, MI 48326
Tel: (248) 409-1062 Fax: (248) 409-0001

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Editor: Max Carthew Associate Editor: Julie Wallis

? Ask Dr. Brush

Contributed by:
Max Carthew
C.E.O.

How Paint Oven Technology Has Changed

The other day I was reading an article I had written for *Industrial Finishing Magazine* in the early 1980's. It was about controlling faint fume emissions, from curing ovens. The first thing that struck me was that the reprint had a header with a telex number. I thought about how quickly we had moved from Telex to Fax to Overnight Mail to Email all in 25 years.

This started me thinking of the developments that have taken place to control fume emissions in that short time.

Typical TARR Incinerator

Typical 3 Chamber RTO

In the 1980's catalytic heater boxes were popular for providing oven zone heating as well as cleaning the exhaust gases by about 90% before going outside. The catalyst allowed combustion temperatures of 800 Deg F so the heat recovery to the oven zone was fairly simple being either direct or indirect. We were able to achieve stack temperatures approaching oven bake temperature plus about 50 DegF.

Over time the regulations became more stringent and customers were looking for designs which required little or no maintenance. The catalysts needed frequent burn off, chemical cleaning or replacement. Thermal incineration was employed with combustion temperatures reaching 1500 DegF, The oven fume was essentially 100% cleaned but the heat recovery became much more sophisticated. Some manufacturers designed central oven incineration systems where the excess incinerator heat was used for 100% of the oven needs. This became known as the TARR system, an abbreviation from the German name for this method, widely used in that country.

A well designed TARR system could achieve stack temperatures approaching oven bake temperature plus 100 Deg F so long as the oven was on load. During conveyor stoppages the stack temperature could reach 800 DegF. Recuperative heat exchangers are used to reduce fuel consumption. These systems are still in use today but are complicated to operate and maintain. Because the heating system is tightly woven into the oven design there is less flexibility for reducing or extending the oven length.

Sometime in the 1990's the independent Regenerative Incinerator (known as RTO) became popular. A self contained incinerator was added to the exhaust of a conventional oven which itself had direct or indirect heated oven zones using gas burners. The incinerator used a novel regenerative heat recovery system with refractory materials where the fume is alternatively heated to 1500 DegF and then cooled to oven bake temperature plus 50 to 100 DegF.

The RTO solution allows a lot of flexibility in the design, length and arrangement of the oven itself as there is normally no heat recovery back to the oven from the incinerator. Oven fume is ducted to the incinerator which is generally mounted outside the building at ground level. The oven heaters are relatively easy to maintain and the RTO requires only periodic service by the manufacturer.

Before long I had outlined a series of developments spanning 20 plus years. What a long way we have come. We have been able to combine fuel efficiency with very clean stack exhaust gases, and have come to a design which allows the oven itself to be modified and optimized for best product curing and lowest energy.

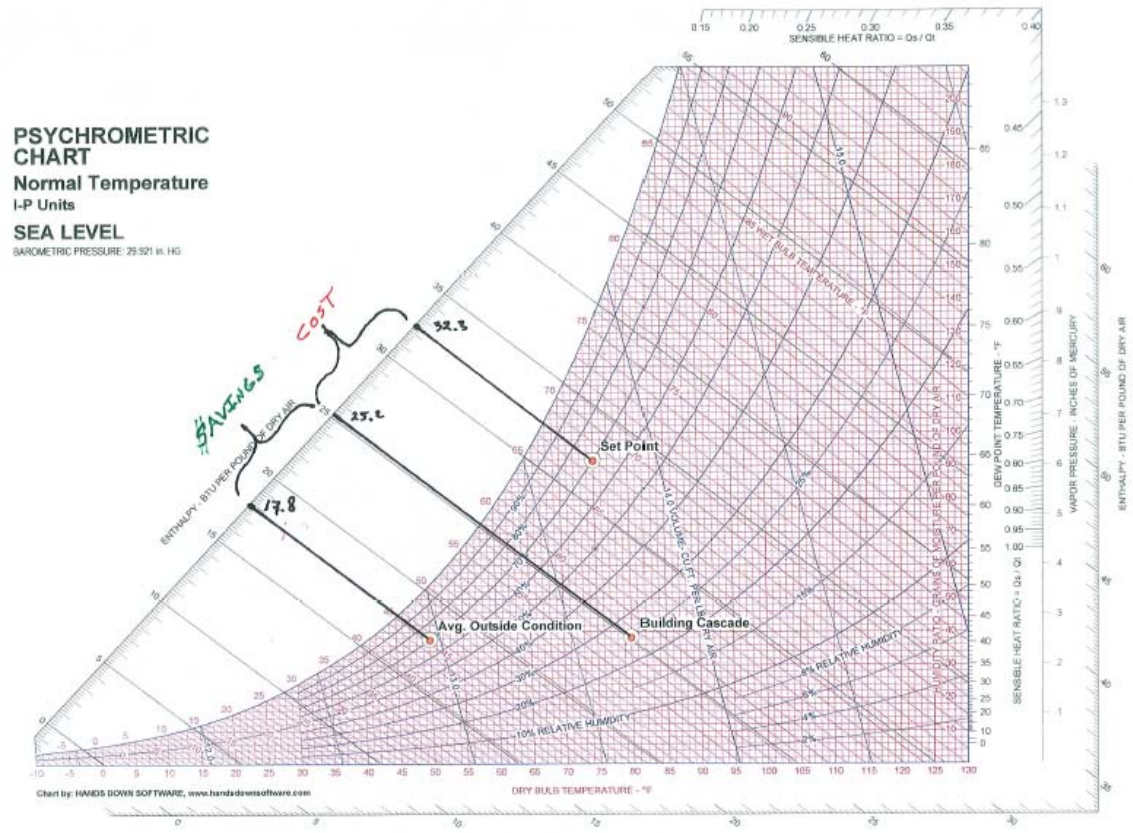
Designers are still searching for the ultimate production coatings which require none of these expensive oven systems but they seem as far away today as they did 25 years ago.

INSIDE THIS ISSUE:

Energy Saving Ideas – Cascade Plant Exhaust Air to Spray booths

One of the energy efficiency ideas we propose at various plants during an energy audit, involves reusing building ventilation air which would be otherwise exhausted. This air has already been conditioned to plant space set point conditions by the building ventilation units. If a spray booth is currently using 100% outside air, this method will reduce the amount of heat energy required. The same concept can be applied to process ovens by using from an excessively warm area of the plant, as combustion & fresh air to the oven heater boxes

Here is an example to show the energy savings potential by this initiative. Refer to the Psychrometric Chart below which shows the plotted enthalpy points of outside air, building air, and the set point of the spray booth. The enthalpy differences of these 3 points of reference results in the amount of energy saved.



Per the chart shown above, the following can be calculated. As an example, let's assume a spraybooth has an ASH unit supplying 100,000 CFM, Utility Cost of $10.00/MMBTU, and 5,760 annual operating hours.

- Existing energy cost to heat outside air to the spray booth set point:
  32.3 btu/lb. (Booth Set point) – 17.8 btu/lb. (Outside Airflow) = 14.5 btu/lb.
  14.5 btu/lb.x 0.075 lb/CF x 60 min/hr x 100,000 CFM x $10/MMBTU x 5,760 hrs =$375,800

- New energy cost to heat cascaded building air to the spray booth set point:
  32.3 btu/lb. (Booth Setpoint) – 25.2 btu/lb. (Building Airflow) = 7.1 btu/lb.
  7.1 btu/lb.x 0.075 lb/CF x 60 min/hr x 100,000 CFM x $10/MMBTU x 5,760 hrs =$184,000

We have a net annual energy saving is $191,800, by reusing air that has already been heated by the building ventilation units. Of course, there are limitations to how much exhaust air can be reused. We have to consider if the building air is contaminated and how much how much building ventilation exhaust air is available to be cascaded while maintaining proper building balance and dirt contamination control.

Contributed By: Eric Gifford, Engineering Manager

BRAGGING CORNER

New Arrival

Jeff and Julie Wallis are happy to introduce their new little grandson, Brady Wallis Hefner. Brady was born on Dec. 5th, 2008 (great timing since Mom & Dad were both suffering with the flu before and after delivery). Brady is growing by leaps and bounds and Connor is happy to be a big brother.

Max and Annick Carthew are proud grandparents, a normal state for most of us who have grandchildren. We think that these little darlings are beautiful and budding geniuses, well, for the Carthews' it's TRUE!

Mary, eight-year old, won two first places for her pastel artwork at Holy Family School; John, five, better known as "the soccer scoring machine", scored ten goals out of his team total of eleven.

Little Siena, seven-month-old, is practicing her screaming and standing. According to her father, her "dadadada" are perfect . . .

Mich-Again

"JIFFY" mix
CHELSEA MILLING COMPANY, CHELSEA MICHIGAN

Biscuits in a "Jiffy"

On day, in 1930, Mabel White Holmes' son brought home two motherless friends for lunch. As the brothers opened their lunches, horrified, Mabel saw them pull out a few hard, flat and unappetizing biscuits that looked very much like hockey pucks. Poor boys!

Mabel had been raised with good wholesome food served with piping hot fluffy biscuits baked by Gulla, the family cook, but by 1930 America had been hit by the Great Depression and only a few people could afford a cook, the rest lurched from one job to another to make ends meet. How could she help these poor harried Americans to eat properly and cheaply?

Both she and her husband came from several generations in the flour-milling business. After operating mills in several states they bought the Chelsea Milling Company which produced excellent quality flour, something Mabel insisted for an idea she formed to develop a new product: a low-cost baking mix. The mix was created and all Mabel needed was a name for her package. The family story says that one day, Mabel was reminiscing how her father loved hot biscuits, and their cook used to announce that they would be "ready in a jiffy," when she exclaimed, "I've got it!"

The Jiffy Company has been holding its own ever since against such giants as Pillsbury, Betty Crocker, and General Mills.

Contributed By: Annick Hivert-Carthew

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WINTER'S LAST STORM

Spring is on her way; but no colors do I see from my window
save a bit of green on my spruce as it shivers 'neath its crystal blanket.

Tonight, my world is being mantled silently, so silently in white,
as Winter in her waning weeps cold tears.

Alas! Enticed by haughty Spring, so many wish for her demise.
Wail not!

I shall remember you in your resplendency
long after Spring has faded into Summer.

Joyce Ilene Hosmer Turner