



## Reducing Fuel Costs in Process Ovens and Dryers

### Hot Air Ventilation

Many manufacturing processes must use hot air dryers to evaporate combustible solvents in coatings, laminates, and finishes.

Moving and heating large amounts of air incurs considerable costs. Most think the first approach to cost control is reducing ventilation air to the point which just assures complete drying at the desired production speed. However, this could lead to fire or explosion due to a dangerous build-up of flammable vapors caused by insufficient ventilation.

### Control of Flammable Vapors

To prevent such fires and explosions, the National Fire Protection Association (NFPA) developed a standard for ovens and furnaces - NFPA 86.

Section 11.6.8.1 of the standard states "...the safety ventilation rate shall be designed, maintained and operated to prevent the vapor concentration in the oven exhaust from exceeding 25 percent of the LFL"<sup>1</sup>.

This standard provides a method for either estimating or calculating the minimum amount of ventilation air required to achieve this. In most cases, the estimation method requires the use of 12,000 cu/ft of air per gallon of solvent evaporated.

### Using Solvent Vapor Monitors

The cost of heating large volumes of ventilation air is high. However, NFPA 86 allows a substantial reduction in air in cases "where a continuous solvent vapor concentration indicator and controller is provided..."

When such instruments are installed to continuously sample the exhaust of a drying zone, the vapor concentration in that zone can be twice as high as long as it does not exceed 50% LFL<sup>2</sup>.

This allows the implementation of several money-saving steps:

- A reduction of ventilation air without affecting existing production rates or violating NFPA safety requirements
- An increase in production speed without increasing existing air or fuel costs
- Recirculation of some of the hot exhaust stream back into a drying zone

- Reduction of oven exhaust rates to lower the fuel required to effectively operate a thermal oxidizer

Benefits can range from a simple reduction of heated ventilation air to a combination of both reduced heating and increased production. This can result in dramatic fuel savings.

Some advantages of using analyzers can be overlooked. An analyzer that reduces ventilation in a drying zone can also reduce capital costs for pollution controls. A lower capacity thermal oxidizer can be used, or additional production lines can be added to an existing oxidizer, by adding analyzers to lower the volume of ventilation air that must be handled. In many cases the cost of the solvent vapor analyzers are quickly recouped.

<sup>1</sup> Lower Flammable Limit: the minimum concentration of solvent vapors in air which, given a source of ignition, will sustain combustion.

<sup>2</sup> NFPA 86: 2015 sections 11.6.8.1 and 11.6.10.