A1walls
Insulated Metal Panels
PO Box 5873, Statesville NC 28687 704-682-5325 www.A1walls.com A1walls@att.net

Manufacturing and Shipping
33 B Lewitte Rd, Taylorsville NC 28681

We are pleased to submit the following proposal for your review covering a Turbo-Flo oven that is specifically designed for your application. The design and proper installation of this equipment will provide a high quality, and efficient oven that will deliver the highest level of operating performance and reliability for many years. The system design, materials, and equipment have been selected based on accepted engineering standards, and good industry practice. Specific details and specifications of these materials, and components will covered later in this proposal.

Ovens - Convection ovens, infra-red ovens, conduction heating all have there applications depending on the product, production rates, and coating material. There is no one “universal drying system” or oven choice that meets the needs of all applications. The best oven design is application driven. Energy efficiency is important, but if you can not operate the equipment in a “real life” practical production environment efficiency alone does not count for much. You have to produce the specific product at the most productive production rates, using the most energy efficient process, and this is where the art or science of curing and drying is important.

Turbo-Flo drying and curing ovens are used for the curing of powder coatings and liquid coatings and force drying of evaporative coatings.

Induction heating is very specific and is not normally used in curing powder and liquid coatings.

We can divide the drying and curing processes into two distinct categories:

Low temperature forced drying ovens:
For evaporative coatings where the oven operates at 160 degree F and lower. In this case we are evaporating solvents or water at faster rates than an ambient drying situation would produce. The accelerated drying times provide shorter production lines, and reduce the amount of plant space to produce the products. Low temperature ovens can use less insulation. There are some cost savings on the wall panels, structure and air heating systems.

High temperature thermal set ovens:
For liquid and powder coatings are cured at elevated temperatures normally have a design temperature of 500-degrees F. Higher temperature ovens are available for products like frit that operate in the 1,500-degree range and are a specialized application.

In a convection oven air movement, air volume, and air impingement velocity are important factors in the overall performance of the oven/dryer. Simply stated; BTUs are transferred to the product by pounds of air. You can have a 5-million BTUH burner, but if you do not have the air volume and velocity to transfer it to the part you have a very inefficient “Hot Box”. You can heat a box, and you can dry and cure parts at 140-degrees F to 500-degrees F, but the time and energy consumption can be excessive.

Heat transfer = (CFM X 1.1 X Air Temperature). The 1.1 factor coverts CFM air volume to # or air per hour and the specific heat of air. We can transfer more energy if we increase the CFM or temperature of the air or both. There are practical limits to both CFM and increasing temperature. The application issue is to cure powder coatings and thermoset liquid coatings or force dry evaporative coatings, and not just the transfer of energy. However this provides the relationship between air volume (# of air) and heat transfer in a convection oven. Air volume is important for both curing (heat transfer) and force drying of coatings. High air volume improves oven performance, and the impingement velocity speeds the force drying of evaporative coatings.

When using low temperature ovens to force dry evaporative coatings air impingement over the part speeds the drying process, and minimizes blisters, and "pinholing". Energy is transferred by the pounds of air, and the air impingement over the product breaks down the saturated barrier air that forms on the surfaces as the solvent or water evaporates in an ambient condition.

A simplistic example is the drying of a wet sheet on a clothesline. It can dry quickly on a 45-degree day with a brisk wind blowing, and can take longer on a 90 degree day with no wind. This demonstrates the effect of air volume and impingement velocity for force drying evaporative coatings. In many cases it may be practical to utilize high air volumes and reduce oven temperature.

A1WALLS– has years of experience using our Turbo-Flo ovens for force drying evaporative coatings, and curing powder coatings. Large fans are mounted in the oven roof and/or sides that deliver very high volumes of air. The motors and drives are located outside of the heated area, which provides long-term reliability and minimizes maintenance costs. The size, placement, and number of fans are designed for each project.

A key design element is that the fans and air movement are independent of the oven heating system. On roof mounted models the fans direct very large volumes of air downward over the product to the oven floor. This minimizes any heat stratification from top to bottom of the oven. As the heated air is directed downward a vacuum is formed behind the fan blades, which draws air up the sides of the oven from floor level. This produces a constant and turbulent air mixing in the oven from top to bottom and over the full length to the oven ends. VFD motor controls can be added to the fans if there was a reason to vary the air volume. The Turbo-Flo design provides all of the key features necessary to produce an energy efficient oven, and high speed drying or curing application.

Ultra high air volumes (pounds of air) to transfer energy (BTUh)

Excellent temperature uniformity throughout the oven minimizing top to bottom temperature stratification, and cooler ends ends.

High impingement velocity and volume to transfer heat energy, and break down the saturated barrier air that forms on the product surfaces when force drying evaporative coatings.

Practical features – In addition to the obvious performance benefits of the Turbo-Flo design there is normally lower horse power requirements compared to a convection oven using large high pressure process performance is reduced.

The Turbo-Flo oven design can use less structural components, and by eliminating the conventional air/heat module the capital cost is usually less.

The high performance drying/curing capability can translate to shorter oven lengths which reduce costs for the oven, conveyor, and plant space.

On long ovens the Turbo-Flo oven design can use multiple smaller burners distributed throughout the oven length. This can provide a degree of "temperature zoning" if needed, and burners can be controlled individually if necessary.

Installation time is normally reduced.

Design Flexibility - The Turbo-Flo design provides the flexibility to build almost any shape or design necessary to meet specific building or product applications. Horseshoe shaped ovens can work well in a corner or at the end of the plant and minimize the heat escaping into the work area. Wide ovens can be used for multiple pass conveyors. The air moving equipment and the burners can easily be distributed throughout the oven without having to worry about special duct work and pressure losses.

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