How Do You Differentiate Pin Oven Technology?

Note: This article appeared in the CanTech International December 2011/January 2012 issue.

To be "Original" is to be defined as A) the first: the first creation that is not copied or derived from anything else; B) not traditional: representing a departure from conventional or previous practice; C) source for copies: relating to or being something from which a copy or alternative version has been made. An iconic presence occurs when the "Original" comes to symbolize and is recognized either by idea, technology or image it authentically generated. In today's Metal Packing Industry, specifically the manufacture of aluminum two-piece cans, differentiating technology between one pin oven and the next can become blurred. Here, we attempt to identify the operational aspects, challenges and differentiating technology in how a pin oven should perform.

Not so original is the concept that time has become a major competitive weapon in answering the demand for high volume can making. Operating at maximum output with minimum cost per can is what aluminum can making efficiency is all about.

Operational Aspects to Identify in a Pin Oven

The purpose of a pin oven is to set the over-varnish and inks on the cans so that the coatings are not damaged as the cans are conveyed to the Inside Spray Machine and Internal Bake Oven (IBO).

Line speeds and production rates in can manufacturing plants are continually increasing. In the past, 1600-1800 cans per minutes (CPM) were atypical speed but most lines now are being designed for 2000+ CPM. As the production rates are increasing, the can weight is also being reduced to produce more cans with less material. These two factors place greater demand on can handling to avoid damage. When we look at a pin oven designed for 2000 CPM, the older conventionally designed pin ovens required a 26 pass with a cumulative centrifugal force of 5.72# versus the current 12 pass configuration of the Sigma Six® Pin Oven which has a cumulative centrifugal force of 2.59#.

Meeting modern industry standards, International Thermal Systems developed the Sigma Six® Pin Oven. The main objective was to increase heat transfer efficiency thereby decreasing the oven footprint and increasing oven production rates. After a year of development, lab testing and field testing, the Sigma Six® Pin Oven achieved results that are currently accepted in the industry for "setting" the inks and over-vanish on an aluminum beverage can. The technology behind the patented Sigma Six® Pin Oven – the authentic original - has become the industry standard unto which all others aspire.

The ABCs of Pin Oven Design and it's Challenges

A. Can Stability - The obvious stated challenge is to keep the can on the pin during conveyance throughout the oven.

B. Material Handing - Use the lowest amount of centrifugal force on conveyance of the cans.

C. Minimize Spoilage - Can spoilage results from not achieving and holding peak metal temperature while minimizing centrifugal forces to the can, stability of the can on the pin chain and higher centrifugal forces.

D. Achieve Desired Ramp Up Temperature – Peak meal temperature is achieved by the following; 1) time at temperature, 2) more time at temperature or 3) increasing heat transfer efficiencies.

E. Operating Process Temperature - Inks and over-vanish cross link when the can reaches a peak metal temperature (PMT) of 365°F and is held at that temperature for at least 1 second or longer.

F. Temperature Uniformity - The industry standard temperature uniformity of the can is +/- 5°F at the peak metal temperature across the entire can surface.

Differentiating Factors

Currently, most pin oven designs supply air to the bottom as well as the sides of the can, the air pressure acts to cushion the can and provide stability on the pin. Conventional pin oven designs generally use three sided perforated indirect air transfer. (Conventional pin ovens typically supply air to only the bottom of the can and they do use directional nozzles. ITS was the first to supply air to both the bottom and the sides.) Sigma Six® Pin Oven technology uses directional flow nozzles in conjunction with two sided perforated air transfer allowing direct heat transfer to the can with greater air stability. An added benefit of this nozzle design is a higher mass flow rate which transfers BTUs more efficiently.

Proper heat up and temperature uniformity is directly affected by air management. Generally speaking, conventional pin ovens do not utilize directional air flow. Absent of directional air flow, heat up and ramp up times increase because it cannot bring the can up to 365°F as quick as the direct impingement design. The direct impingement design is authentic technology of the Sigma Six® Pin Oven.

INTERNATIONAL THERMAL SYSTEMS

PRODUCT BULLETIN

Due to the unique air delivery system, which circulates with the high mass flow rate, the Sigma Six® Pin Oven utilizes less passes yielding a smaller operating footprint. In each pass, centrifugal forces are imposed on the can side wall by the chain pin. These forces are cumulative and by reducing the amount of passes needed, minimize chances for can damage. A conventional 14 pass pin oven rated at 2400 CPM has a cumulative force up to 30% greater on the can's side wall when compared to the industry standard 12 pass Sigma Six® Pin Oven.

Summary

In today's Metal Packing Industry, differentiating technology between one pin oven and the next can become blurred. Here, we have identified the major operational aspects, design challenges and differentiating technology in how a pin oven should perform.

The cost savings efficiencies gained through the smaller footprint of the Sigma Six® Pin Oven starts with a better duct design transferring energy more efficiently, utilizing less passes resulting in extended pin chain life, lowering centrifugal forces to the can resulting in reduced spoilage. For information on differentiation of conventional ovens from the Sigma Six Pin® Oven, contact sales@itsllcusa.com

About International Thermal Systems

International Thermal Systems was established with the merging of three well-known and well-respected names in heat processing, finishing and metal decorating industries; Industrial Heat Enterprises International (IHEI), Oven Systems Incorporated (OSI), and LTG Technologies, Inc. Headquartered in Milwaukee, Wisconsin, USA with locations in Europe and Asia, International Thermal Systems is a global original equipment manufacturer of industrial process ovens, furnaces, washers and associated material handling equipment for applications in automotive, aerospace, power generation, battery manufacturing, building products, foundry and metal packaging industries.

Sigma Six®

The Sigma Six® 12 pass pin oven thermally cross links the exterior coatings on aluminum or steel 2 piece beverage cans for base coat or decorating applications.

The World's Most Popular Pin Oven is the patented Sigma Six® that is designed to produce product faster and more efficiently than any other Pin Oven on the market today. The patented design incorporates 60% fewer chain passes with 30% reduction in fuel consumption compared to a conventional pin oven at rates up to 2400 cans per minute (CPM) capacity.

The patented air delivery system on the Sigma Six® Pin Oven provides the shortest time to achieve peak metal temperature while eliminating can spoilage.

Cleaning and Heat Processing Technology for the Metal Packaging Industry.

Partner with ITS for your cleaning, drying and curing needs. Contact a representative today to arrange for an on-site consultation to learn how we can maximize production efficiencies and minimize energy consumption.