

## IR CURING SHOPTALK

### Infrared Equipment Division of IHEA

*This column is provided to you by members of the Infrared Equipment Division (IRED) of the Industrial Heating Equipment Association (IHEA). The group includes infrared (IR) curing equipment suppliers from throughout North America. We publish the column three times a year to give you the latest information about IR curing techniques and equipment. Contact information is at the end of the column. Most IR manufacturers offer testing for free or for a fee. Any IRED member can assist you in finding solutions to curing problems and best practices for finishing of coatings. This issue's column was submitted by IRED member Robert G. Beattie, president of Process Thermal Dynamics, 801 Central Ave. N., Brandon, MN 56315.*

# How IR works and what to consider when installing an oven

Much has been written about installations of infrared (IR) equipment on powder coating lines extolling the benefits that were derived from the installations. What needs to be discussed are the many things to be aware of when considering an installation and the advantages of IR heating equipment for powder coating processes.

Let's look at how IR energy works. It heats from the source (IR heater or emitter) to the target (customer product)—it doesn't heat the air in between. This allows for a much higher transfer of energy than that of convection, or heated air. Because most metals, especially coated metals, readily absorb IR energy, one can assume that IR will deliver a more rapid temperature rise in the product compared with convection heating. The advantages of IR are several: a) higher energy efficiency; b) faster throughput; c) less space required.

Infrared heating has long been considered line-of-sight heating, that is, it heats only what it "sees." What needs to be understood is that the heat radiated to a part will also conduct into "unseen" areas of the part.

Three-dimensional parts are easily heated when attention is paid to how the part is presented to the heater

banks, and if possible, by rotating the parts. Zoning of heater banks can also assist in delivering energy to the parts when higher temperature heaters are used to "look" at heavier sections of the part.

It's also important to consider the proximity of the heater banks to the products to be heated. For light, flat sheet metal parts, two vertical banks of heaters will do an excellent job. If part thickness is fairly consistent, arranging the heater banks to be 6 inches away from the parts will make the most efficient use of energy. If part thickness varies widely and parts can be batched, moveable heater banks can be used. These can be positioned either manually or automatically.

If parts are large, heavy irregular shapes, it's best to surround the parts with heaters, and in some cases, use higher temperature heaters looking at heavier sections of the parts.

**Booster IR ovens.** Some consider that using IR heating equipment complicates the process. This isn't so. When used in a powder coating line, IR is generally used as a booster, or pregel, oven shortly after the powder is applied. Depending on the length of the IR oven (generally designed for exposure times ranging from 30

seconds to 3 minutes), the temperature rise on the product stays within safe limits below cure temperature. The advantage here is that a short section of IR will raise part temperatures so that the convection oven can be reduced in size or length by 30 to 50 percent! A further advantage is the possible reduction of carbon emissions.

Add to the above the controllability of IR for purposes of temperature output or zoning, and the customer ends up with a versatile system that is adaptable to future needs.

### Considering an IR oven

Not all the areas to be considered have been mentioned, but all would be covered when discussing an application and installation with a reputable IR vendor. The short list of items to be considered follows:

- Part geometry and thickness
- Part orientation when hanging
- Distance from the source of the product
- Arrangement and zoning of heaters
- Temperature output of heat source
- Type of control to be used

- Line loading and batching possibilities

The advantages and benefits of using IR in powder coating lines are many:

- Increased line speed or throughput
- Reduced utility costs — energy savings
- Shorter overall cure times
- Less work in process
- Shorter conveyor length
- Less floor space required
- Lower carbon emissions

Finally, if there is any question about the product being receptive to IR, have your IR vendor test your product to be sure the solution offered is the correct one. **PC**

*For more information or to submit a question, contact Anne Goyer, executive director of IRED, at 859/356-1575; e-mail [aygoyer@one.net]. See also [www.IHEA.org]. Click on the IRED link.*

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