Q&A ABOUT INFRARED

IS ELECTRIC IR MORE EXPENSIVE TO OPERATE THAN GAS IR OR CONVECTION?

Due to the power and thermal efficiencies of the equipment, electric IR can be very competitive. In fact, electric may appear to be 4 times higher per KW or BTU and still have competitive operating costs.

WHEN COMPARING GAS CONVECTION AND ELECTRIC IR, WHICH IS THE MOST COST EFFECTIVE CAPITAL INVESTMENT?

Electric IR is the most cost effective capital investment. The typical electric IR oven is 10% to 20% less than a comparable gas convection oven.

WHAT IS THE PAYBACK PERIOD FOR AN IR OVEN?

Typically the payback period is one year.

HOW SHOULD I EVALUATE THE "REAL" COST OF AN INFRARED OVEN?

In order to get a "real" picture of the impact of an infrared oven, one must evaluate the purchase based on what it costs to produce each part. Capital equipment price, energy costs, down time, maintenance, labor, overhead, floorspace, and so on must be figured for each technology being considered and then divide that total by how many parts can be produced in a given time frame. The results can be astounding!

ARE ELECTRIC INFRARED OVENS SAFE?

Yes. There is no chance of fuel explosions. There is no production of CO, SOx or NOx on site. While short wave ovens are extremely hot, medium and long wave length ovens are as safe as your electric space heater at home. Most of the heat is contained within the oven so workers are more comfortable working near the oven.

WHAT INFORMATION WILL I NEED TO PROVIDE TO DETERMINE IF MY PROCESS IS A GOOD CANDIDATE FOR INFRARED?

Your Blasdel representative will need to know: part configurations, mass, type of substrate, temperature required, and the type of process. The available voltage, production rates, line speed and intended location for the oven will also be required. Upon receipt of this information and testing materials, our engineering team will compile a report and quotation for evaluation.

WHAT WAS THE FIRST INDUSTRIAL APPLICATION OF ELECTRIC IR HEATING?

In the 1930's Ford Motor Company pioneered the use of electric IR for curing automobile paint. Over the past 70 years tremendous advances have been made in emitters, application technology and controls. Computer controlled closed loop systems are commonplace for superior quality control.

CAN I PUT IR SECTIONS INSIDE OF MY CONVECTION OVEN FOR A BOOSTER SECTION?

Generally this is not recommended. They should be placed outside of the oven in the vestibule area. Blasdel IR sections need to be accessed from behind for element replacement. Good ambient air flow is important for maintaining an appropriate ambient air temperature for electrical components. Each case should be examined separately.

AS A JOB SHOP, I NEVER KNOW WHAT PARTS I WILL BE COATING. IS INFRARED FLEXIBLE?

Blasdel's adjustable infrared ovens are the most flexible you can buy. They have precise zoning controls that allow the user to turn rows off when not needed or have multiple temperature settings throughout the oven. The sides of the oven move in and out for varying widths of parts or racks. It is also possible to change the angle on the horizontal rows of this type of oven.

IF I JOB SHOP PAINT PARTS AND THE NEXT PART I BID IS TOTALLY DIFFERENT THAN WHAT THE OVEN WAS DESIGNED FOR, CAN THE OVEN BE USED?

This is one of the advantages of electric infrared ovens. If an Adjustable Width IR oven isn't flexible enough, the oven can easily be taken apart and reconfigured or added to so that the design is always right for the part. If the production requirements are increased, another length of oven can be positioned right next to the original oven.

IS IT TRUE THAT I CAN ONLY BAKE FLAT PARTS IN AN INFRARED OVEN?

Absolutely not. Especially in the case of a Blasdel infrared oven, complex shapes can be evenly cured due to the reflector design and containment of convection heat. Much of the heat transfer in a convection oven is due to conduction of heat through the part. The same principle applies to infrared.

CAN I ONLY USE IR AS A PREHEAT OR BOOSTER FOR CURING POWDER COATING?

Infrared may be used as a booster prior to a convection oven or for a full cure on many parts. Process testing can determine how much time would be required for a full cure compared to the convection specifications listed on the powder technical specifications.

ARE POWDER COATING QUALITY STANDARDS ON ADHESION, IMPACT RESISTANCE, CURE LEVEL, COLOR STABILITY AND HARDNESS CHANGED IF I CURE THEM WITH AN ELECTRIC IR OVEN VERSUS THE GAS CONVECTION OVEN I AM USING NOW?

The use of electric infrared ovens often improves quality. Impact resistance and hardness are often improved with no adverse effects on adhesion. Cure is achieved in much less time. Colors are likely to be more stable in the electric IR oven since the SOx and NOx found in a gas oven are not present in the electric oven to build up and yellow the powder. Gas infrared ovens are usually not recommended for powder coating because of lower operational temperatures.

HOW IS THE WAVELENGTH OF AN INFRARED EMITTER ADJUSTED TO BE MOST EFFICIENT FOR A PARTICULAR MATERIAL?

The wavelength is adjusted by controlling the emitter temperature. This is accomplished in electric infrared by controlling the voltage supplied to the emitter or by controlling the amount of time the emitter is on. Electric IR ovens have the highest degree of controllability compared to gas convection or gas IR ovens. As the temperature is increased, the wavelength is shortened, therefore every emitter has a wide range of wavelengths that it can produce.

WHEN COMPARING ELECTRIC IR AND GAS IR HEAT EMITTERS, WHICH OPERATE OVER A WIDER RANGE OF WAVELENGTHS AND TEMPERATURES?

Electric IR operates over a wider range of temperatures and wavelengths. Due to the construction of a gas emitter and the physics of burning gas, gas IR can only attain temperatures in the medium and long wave ranges. Electric IR emitters can produce short, medium or long wavelengths. It is important to use the correct emitter for the job to be cost competitive in buying the capital equipment.

WHAT IS THE AVERAGE LIFE OF AN ELEMENT?

Both the ceramic and COR generators are noted for exceptionally long service life. On average, one can expect about 10,000 hours, however much longer is not uncommon. Ceramic panel heaters with a higher thermal mass can achieve 20,000 hours under proper conditions. Quartz tubes and bulbs have a service life of approximately 5,000 hours. Proper temperature controls must be used to achieve good performance with any style of emitter. To operate with only an on/off switch is inefficient and causes tremendous thermal shock which dramatically reduces the element life.

HOW MUCH MAINTENANCE IS REQUIRED FOR A BLASDEL INFRARED OVEN? WHEN IS IT REQUIRED?

Maintenance for an infrared oven is no more involved than the care of a convection oven. Because it is simple, it is also easily overlooked. BEI recommends adding oven maintenance to the normal plant preventative maintenance plan with at least a complete annual checkup.

Control panel and oven terminal block connections should be tightened. Exhausts should be cleaned and checked for broken fan blades or other hazards. Make sure safety devices are present and working correctly.

Ceramic panel emitters require minimal maintenance since there are no reflectors to clean. They need to be checked for operation. Simply run at a setting high enough to see the internal coils glowing red. Non-operational areas will be black.

Very little maintenance is required for ceramic generators or COR generators as well. As above, check for operation by turning the oven on at a moderately high setting. Reflectors will need to be rebuffed, cleaned or dusted. Depending on the level of accumulated dirt and dust in your plant environment, the frequency may be more than annually. Accumulated dirt absorbs the IR heat and reduces radiant efficiency.

Quality problems that are attributed to the cure oven may be disguised in a convection oven due to daily fluctuations in performance whereas they would be easily identified and corrected in an infrared oven by following the simple maintenance checklist.

WHAT IS THE NORMAL DELIVERY FOR AN INFRARED OVEN?

Generally, the delivery is quoted as 6 to 8 weeks for "standard" ovens. Extremely large ovens are usually 8 to 10 weeks. Blasdel Enterprises works closely with their customers to coordinate shipping dates with customer's installation crews. We are also able to expedite orders for customers that need an oven in as little as a few weeks.