

# Heating Acrylic with Model 4185 Infrared Strip Heaters and Model 5194 Infrared Line Heaters

## Application

A manufacturer of acrylic developing a method for customers to heat the acrylic prior to bending it into shape.

## Problem

**Poor Quality** - Existing metal tubular heaters were causing distortion and stress at the bend area.

**Delayed Start Up** - The existing metal tubular heaters took too long to reach operating temperature.

**Heat Absorption Characteristics** - Acrylic absorbs energy best at 1.15, 3.2 and 3.5 microns. The existing metal tubular heaters had a peak wavelength emittance of 3.4 microns and a negligible amount of energy at the 1.15 micron level.

**Excessive Energy Consumption** - When production stopped, the existing heat source continued to consume energy at in-production rates.

## Solution

**Heat** - For acrylic thicknesses above .5 inch (13 mm), a Model 4185 Infrared Strip Heater was used to heat the acrylic from the top at the bend point. For acrylic thicknesses less than .5 inch (13 mm), a Model 5194 Infrared Line Heater was used to heat the acrylic from the top at the bend point. To decrease heat up time, additional heaters were added to heat the acrylic from below.

**Power Control** - A Model 664F Phase Angle SCR Power Controller controlled the power to the Infrared Strip Heaters and Infrared Line Heaters.

**Instant On/Off** - The Infrared Strip Heaters and Infrared Line Heaters heated up and cooled down instantly based upon signals received from the SCR Power Controller.

**Peak Wavelength** - Both heater types emitted peak energy at a wavelength of 1.15 microns and emitted high energy levels through 4.0 microns across the electromagnetic spectrum.

**Energy Output** - Both heater types emitted 76 watts of energy per linear inch, compared to 35 watts per linear inch for the metal tubular heaters.

## Benefits

**Improved Energy Absorption** - The acrylic was able to absorb more energy at the wavelengths provided by the Model 4185 Infrared Strip Heaters and Model 5194 Infrared Line Heaters, which greatly reduced heat up times.

**Faster Heating** - The Infrared Strip Heater brought the acrylic to forming temperature in approximately four minutes, less than one-third the time of previous heating cycles. The Infrared Line Heater brought the acrylic to forming temperature in approximately 15 seconds to three minutes, depending upon the thickness of the acrylic.

**Improved Quality** - The heating characteristics of the Infrared Strip Heaters and Infrared Line Heaters eliminated stress and distortion in the bend area.

**Faster Start Up** - The instant on capability of both heater types eliminated long delays in start up.

**Reduced Energy Consumption** - The instant off capability of both heater types drastically reduced energy consumption during production stoppage.