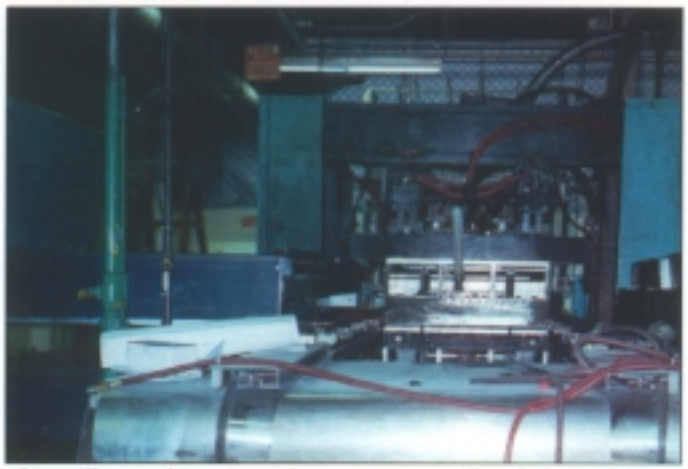
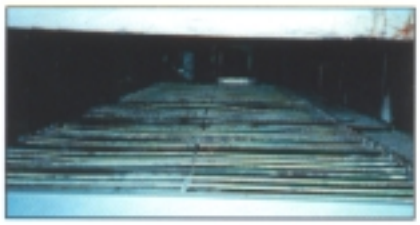
MACHINE RETROFIT

Brown in-line equipment

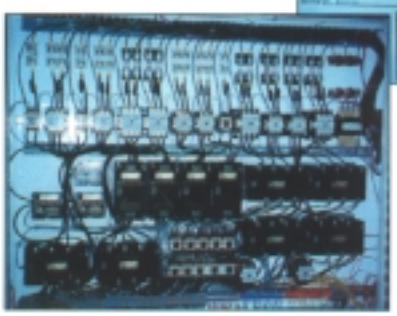


Above: The machine. Oven dimensions are 50" wide by 144" long. The machine is designed for deep draws (cups) and shallow draws (dinnerware.)



Top: old calrod heaters before retrofit.

Bottom: new Solar Products panel heaters after retrofit.



Right and below: Control panels supplied by Steve Benjamin, Inc.

THE COMPANY:

- A manufacturer of paper and plastic cups and plates
- A multitude of Brown roll-fed thermoforming machines
- In business since the early 1900's

THE PROBLEM:

- The cost of operating the thermoforming equipment was dragging down profits.
- Several machines were retrofitted with gas catalytic heaters in an effort to reduce energy costs.

Why the gas catalytic retrofit didn't work

While gas catalytic heaters realized substantial energy savings over the existing calrod heaters, the increased cycle times and loss of quality control quickly gobbled up the savings. Product consistency was poor leading to a decrease in quality control and a 10-15% increase in the reject rate. The company was left with machines that had a slow output and were limited in use for the product line.

THE SOLUTION:

- Retrofit with Solar Products electric panel heaters.
- Energy consumption was reduced by 35%.
  (The increase in line speed was not included in this savings).
- Line speed has been increased by 17%. (In fact, the line speed could be increased even more based on the heater output, but is limited by an in-line proprietary process that completes the product.)
- On a second machine retrofit, the energy savings was 50% while maintaining the same line speed.
- Product quality improved over the old calrod heaters.
- The reject rate has been lowered as compared to the original calrod heaters.
- Due to an increase in zoning, there is better control over the sheet temperature. The operators find the machine easier to control. The temperature uniformity is so good that the company is experimenting with a thinner gauge material (styrene) which will offer increased material savings.
- The outer heaters can be shut off when running a smaller mold. This increases energy savings.
- Due to Solar Products' ability to offer custom size heaters (without the custom price), zoning was designed to precisely match the specific requirements of the company's machinery. Zoning was increased from 6 to 13 zones, increasing product quality while maximizing energy efficiency.
- A lunch button was added to reduce the electrical consumption during the break time by reducing the heater temperature.
- The oven control system was designed in a co-operative effort between Steve Benjamin, Inc. and the customer to produce an oven that can hold a tolerance of 1°F in an open air environment.

SOLAR PRODUCTS, INC.
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