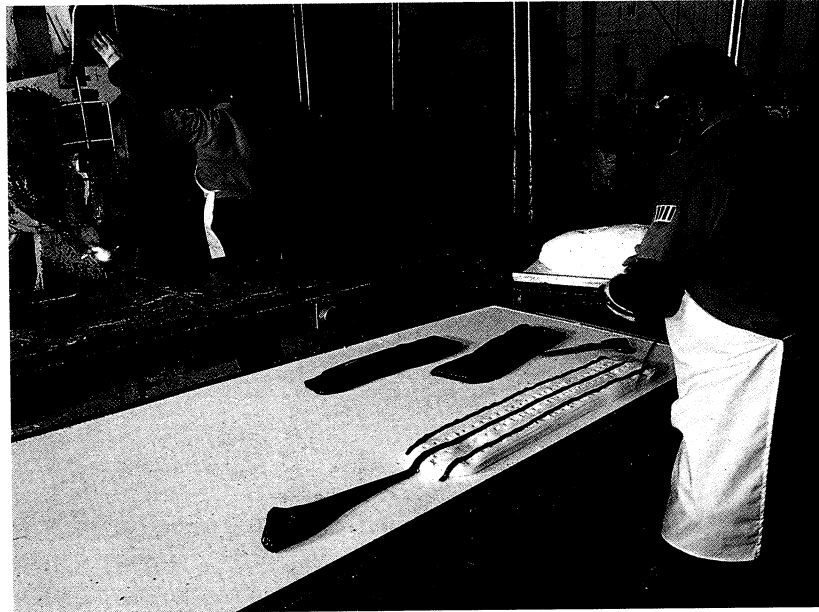


Heat Pipes

Bobs Candies, Inc., Albany, Georgia produces some 24 million pounds of candy a year in more than 200 different varieties, much of it "Christmas candy"—striped peppermint sticks, canes and balls. At right, kitchen workers pull the hot liquid sugar, add peppermint extract and red coloring to make stripes; below, candy canes moving very rapidly along a conveyor belt are just as rapidly bundled into hand-packaged boxes of 12.



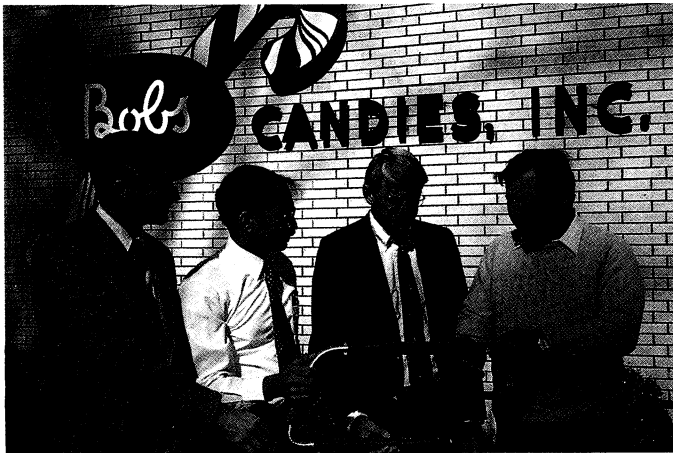
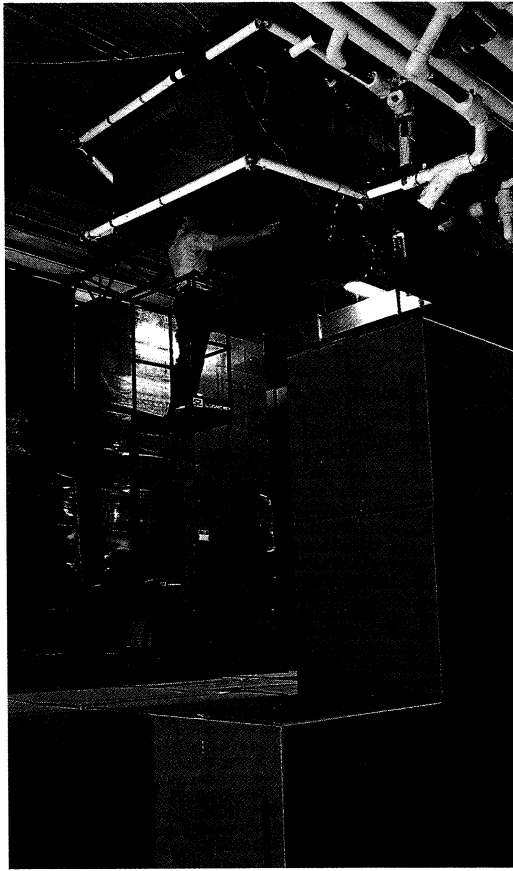
The company makes 75-80 percent of its sales during the Christmas season, but to meet Christmas demand it must produce year-round. That means that thousands of cases of candy must be stored a good part of the year in two huge warehouses. The candy, of course, is very sensitive to temperature, for example, heat and humidity make the candy canes and sticks soft and runny, causing the red stripes to bleed into the white.

To bar that possibility, the warehouses must be maintained at temperatures of 78-80 degrees Fahrenheit with relative humidities of 38-42 percent. Such precise climate control of enormous buildings covering acres of floor space can be very expensive. In 1985, energy costs for the single warehouse then operated ran to more than \$57,000 for the year and Bobs vice president-operations Don Bravaldo decided to do something about it.

Bravaldo learned of a cooperative project wherein NASA and the Florida Solar Energy Center (FSEC) were adapting heat pipe technology—originally developed for temperature control of sensitive space electronic systems—to control of humidity in building environments. FSEC was investigating ways to curb the high energy losses incurred in extracting excess moisture from superinsulated buildings in very humid climates.

In moderately humid climates, a conventional air conditioner cools air and lowers humidity with normal cooling coil operation. In a highly humid environment, however, the same air conditioner must operate longer and use more energy to lower humidity to an acceptable level.





Then, in the process of lowering humidity, it overcools the room air; that necessitates reheating the air to get it back to a comfortable temperature—and that takes additional energy.

The NASA/FSEC approach to the problem involves use of heat pipes, which transfer heat without expenditure of energy, to precool the air before it reaches the air conditioner's cooling coil. The coil removes the remaining heat and humidity, then the heat pipes reheat the overcooled air to proper temperature. In other words, the heat pipes handle the jobs of precooling and reheating without using energy,

leaving the air conditioner free to operate for a shorter period of time. This approach obviously affords significant energy savings.

Bobs felt that this technique might be the answer to his warehouse control problem. The company contacted FSEC systems engineer Mukesh Khattar and from that contact there eventually emerged a cooperative test project to install a heat pipe system at Bobs' warehouses, operate it for a period of time sufficient to determine accurately the cost benefits, and gather data applicable to development of future heat pipe systems potentially beneficial to a wide range of users. At left, a warehouse engineer is servicing a roof-level air conditioning unit. Below, a Bobs/FSEC conference with, left to right, Bravaldo, Khattar, FSEC director Dr. David Block and Bob McCormack, Jr., Bobs chairman of the board.

The installation was completed in mid-1987 and data collection is still in progress. Costs of the project are shared by Bobs Candies, Kennedy Space Center, FSEC and Georgia Power Company.

Bobs Candies is more than pleased with the results so far. Using 1985 as a control year, energy costs for that year are estimated at \$115,000 (only one of two warehouses was then operating so the figure represents a doubling of the actual energy cost of that year). In 1989, total energy cost for the *two* warehouses, with the heat pipes complementing the air conditioning system, was \$28,706—and that figures out to an effective cost reduction from the control year of more than 75 percent. Bobs Candies is adding another 98,000 square feet of warehouse space and, needless to say, the new building will be heat-pipe controlled.