

# TECHNOLOGY FOR ICE RINKS

An icemaking system derived from NASA solar heating research highlights spinoffs for home, consumer and recreational use

At the Texas State Fair in Dallas, Ron Urban's International Ice Shows set up a portable rink-stage in a single day, then managed to keep the ice hard through four shows a day for 22 days—despite the fact that temperatures ran 90 to 95 degrees. That was a tough job, but assignments like that are routine to Urban's crew, thanks to a

use ranging from the size of a large room to a hockey rink. It takes as little as one day to set up a small rink, a week for the largest. The key to enhanced rink portability, fast freezing and maintaining ice consistency is a mat of flexible tubing called ICEMAT®, an offshoot of a solar heating system developed by Calmac Manufacturing Corporation, Englewood, New Jersey, under contract with Marshall Space Flight Center. The project was part of the Department of Energy's solar energy program, in which Marshall was responsible for developing advanced technology.

Most solar collectors distribute heat by a network of metal pipes through which Sun-heated water flows. In his work for Marshall, Calmac president Calvin McCracken came up with an innovative energy absorber made of flexible tubing rather than pipes; the tubing is made of synthetic material, a rubber-like elastomer called EPDM.

Called SUNMAT®, the flexible tube system offers a number of advantages. Delivered in rolls four and a half inches wide, the tubing can be cut to any length and zipped together, which allows tailoring a solar collector to any desired size or shape. It is easily spliced for repairs and the formulation of the plasticized rubber eliminates cracking due to ozone attack or the stress of repeated expansion and contraction. Originally designed as a solar collector for home, pool or hot water heating, it can also be used as a heat distribution system for fuel-powered energy sources; it can be employed for radiant floor heating in homes or offices or, in such outdoor installations as driveways, patios and parking lots, for surface heating to prevent ice and snow buildup.



*An International Ice Shows troupe performs on a temporary rink built atop a theater stage by means of a spinoff icemaking system called ICEMAT.*

highly efficient icemaking system derived from technology developed under NASA sponsorship.

Located at Palos Heights, Illinois, International Ice Shows operates several touring troupes performing on temporary rinks at amusement parks, sports arenas, dinner theaters, shopping malls and civic centers; on one occasion they put on a show at the White House. The company also provides completely installed rental ice rinks, offering portable units for indoor or outdoor

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*Based on a mat of flexible tubing for freezing water, the ICEMAT system allows quick freeze and permits rink construction in any size or shape. This one, measuring 50 by 80 feet, is a public skating rink at Indianapolis' Monument Circle set up each winter by International Ice Shows.*



*This rink, built by International Ice Shows for the Texas State Fair at Dallas, withstood 90-plus temperatures for the 22-day run of the show.*

Calmac sold the SUNMAT line to the Besicorp Group, Ellenville, New York, which markets the system in two variations: SUNMAT for solar energy collection and SolaRoll for radiant heating applications. More than 10,000 systems with some five million square feet of tubing have been sold.

Calmac, meanwhile, developed a second derivative based in part on the Marshall/DoE work and partly on other Calmac technology—the ICEMAT system, now produced under license from Calmac by ITT Marlow Division, Midland Park, New Jersey. Like SUNMAT, ICEMAT is a mat of tubing used to distribute a working fluid, but instead of hot water the fluid is an antifreeze, such as glycol, refrigerated to a temperature of zero degrees Fahrenheit. The rink builder lays a floor of plastic tubing, covers it with water, then pumps chilled glycol through the tubes. It works something like the home refrigerator: the cold glycol draws

warmth from the water, thereby freezing it. A complete icemaking system, such as that used by International Ice Shows, includes a refrigeration module to chill the coolant, pumps to circulate it and the requisite amount of tubing.

International Ice Shows' Ron Urban cites some of the advantages of the ICEMAT system: a rink can be set up in less than half the time it would take if metal pipes were used; the tubing is non-corrodible and its low temperature toughness means high reliability. Perhaps the most important advantage for portable rink construction is the ease of transportability afforded by the fact that the tubing comes in compact spools containing hundreds of linear feet, as opposed to lengths of rigid metal tubing. Transportability is a very big factor when you consider the tubing requirements for large rinks: last year International Ice Shows built a 200-foot ICEMAT rink that needed more than 32 miles of tubing.



Normally a water-filled reflecting pool, the Royal Fountain (top) at Kings Island amusement park near Cincinnati, Ohio has been drained and covered with a wood base, first step in creating a public skating rink for last year's month-long "Winterfest" at Christmastime. The International Ice Shows' trailer being craned into position contains an icemaking system that includes a refrigeration unit, pumps and spools of flexible tubing, the latter a spinoff of NASA solar heating research. At left, the plastic tubing is rolled out to cover the wooden base; the tubes are shown in closeup below. Next, the field of tubing is covered with water (above right); in this case, several tons of crushed ice were added. Then compressors in the trailer pump glycol chilled to zero Fahrenheit through the 32 miles of tubing; the glycol draws warmth from the water, thus freezing it and (right) the Royal Fountain becomes a 200-foot public skating rink with three inches of solid ice.



