

## A Heated Retreat for African Lions

A famous 70s song goes, “in the jungle, the mighty jungle, the lion sleeps tonight.” It’s a little hard for African lions to sleep in the state of Michigan, where temperatures dip well below what they’re used to. But with some creative design work, intelligent engineering and speedy manufacturing, two large rocks, warmed by Delta-Therm M.I. cables, are now a wonderful napping area for six resident lions.

### CLIENT

Based in Royal Oak, Michigan the lions’ habitat at the Detroit Zoo got a \$1 million makeover this year. The original space had a moat, which has been filled in, and the new home is more than double its original size. Instead of standing behind bars, animal lovers can view the furry friends through glass walls, 17 feet high. For the ideal public encounter, zoo officials decided they wanted two large warming rocks to ensure the lions would remain near those glass walls and to make them feel comfortable in their dwelling. That’s where Delta-Therm came in.

### TIGHT DEADLINES

One might say the whole project put Delta-Therm’s engineering team “between a rock and a hard place,” but sales engineer Peter Goldberg of Garrett Burgess, Inc. of Brighton, Mich., felt it was just business as usual for them.

“Delta-Therm is amazing at getting stuff done when we have to fast track a project,” said Goldberg. “I was told we had to have cables there on site for installation within one or two weeks.”

Goldberg said there was a big push to finish the project in time for Labor

Day weekend when zoo officials wanted to unveil the updated space.



“By the end of July we got the go ahead to release the materials,” Goldberg explained. “It ended up being well over 500 feet of cable, but Delta-Therm came through as usual with making sure that we met the schedule for construction.”

### ENGINEERING/MANUFACTURING

Key people involved with the project were Mark Rosario, Bill Keyes and Ed Witte who engineered the design and figured out how to attach Delta-Therm’s warming cables to a three-dimensional reinforced steel structure.

The two rocks were treated with seamless copper jacketed, single conductor M.I. cable covered with a high density polyethylene overjacket. Later, the skeletal structures with attached cables were solidified with gunite (cement, sand and water applied through a pressure hose) to create a rock-like surface. One rock is 133 square feet; the other is 144 square feet.

The zoo’s main objective for the rocks was meeting a certain temperature - yet to be determined - that is warm enough for the lions.

“Even if the sun is not shining, they’ll be able to sit on top of these rocks and feel like they’re in their home environment,” said Goldberg.

A second objective was placing the rocks near the glass viewing wall so that when the lions relax on them, the public can get a close view.

Ron Kagan, executive director of the Detroit Zoological Society, which operates the zoo, said, “the ability to get closer to the lions will be exciting for our guests, and the increased proximity to visitors might prove to be a

source of curiosity for the lions.”

#### TESTING

Zoo officials are conducting an experiment to see which rock temperature is best for the lions. Since there are separate controls for the rocks, they are able to do this. Presently, one rock is set at 75 degrees while the other is at 80. They'll raise or lower the temperatures based on their findings, or start again with different temperatures if neither rock draws the lions.

Embedded in each rock are two sensors inside metal conduit. A primary sensor controls the primary temperature, and an override sensor keeps the rock from going over 100 degrees in the event of a failure in the primary sensor. There's no way of leaving the system on manually; it's set with an adjustable thermostat control to be managed by zookeepers.

“They've been trained to make the adjustments,” said Goldberg.

#### COST

If the system was running 24/7/365, the annual electrical cost breaks down to 63 cents per hour for the smaller rock, 75 cents per hour for the larger one. Zoo personnel won't be turning on the system when it's warm enough outside, so the cost will be even lower.

#### PUTTING IT TOGETHER

At the start of the project, contracted architects Ehresman Associates, Inc. put senior project manager Rick Evans of Turner Construction in Detroit in touch with Garrett Burgess, Inc. Evans said initially he feared Delta-Therm's M.I. cable would get damaged.

“I was a little worried when we sprayed the gunite over the system, but it didn't damage it,” said Evans. “[After spraying] we went back, checked the lines and everything worked out.

The power was upgraded to accommodate the system, said Goldberg, and Delta-Therm's engineers custom designed the UL Listed panel that houses the control components.

“The control panel had to be built from scratch by Delta-Therm,” Goldberg explained. “They ordered components, built everything, put the panel together and tested it. We had the panel shipped and completed on August 26. We were just at the general contractor's deadline.”

#### DETAILS

Garrett Burgess, Inc. provided field assistance, conducted warranty testing and communicated with the architect, electrician, general contractor and zookeepers.

“The electrician actually installed it and Peter was out there and assisted with the dos and don'ts of the cable,” said Evans. “Everything went smoothly and hopefully when it gets colder, the lions will lay up by the glass near the public.”

#### RESULTS

Since the zoo reopened Labor Day weekend, it is too soon to assess the system's success, Goldberg said. However, everything is fully functional and he is confident that zookeepers know how to make fine adjustments. “We'll visit and follow-up with the people at the zoo,” he said.

## Zoo Den Heating Design Tip



**Q: What do I need to know when heating hot rocks in a zoo exhibit?**

**A:** Verify if the zoo has a precise temperature range for the hot rocks. If not, we have found a nominal 30-35 watts per s.f. works well. Cables are usually installed in shotcrete or gunite to warm the surface. Most hot rocks are hollow and the volume of rocks will not matter as much as the square footage of the surface area.

M.I. cable is the safest cable to use around animals. It doesn't degrade, won't contribute to a fire, and custom lead lengths eliminate exposed outdoor junction boxes.

Each rock is to be powered on its own dedicated circuit, and controlled with two A419 thermostats located inside of a custom NEMA 4 or 4X panel enclosure with LED status indicator lights. One A419 will be the control thermostat and the other will be the high temp. cut-off thermostat. The cut-off thermostat will disable the heating cable if the control thermostat fails “closed”.