

# Cinemark Theaters



- ▶ **Natural gas-fired desiccant dehumidification**
- ▶ **Energy efficiency and improved customer comfort**
- ▶ **Plano, Webster and Rosenberg, Texas**

## Desiccant Dehumidification Boosts Moviegoers' Comfort While Saving Energy Dollars

When movie patrons carry their coats and sweaters to a Texas cinema in July, it becomes obvious that some theaters are kept too chilly for comfort.

It's tempting for theater managers to crank up the air conditioning too high in attempts to control the extreme humidity so prevalent in the southern United States. But this practice fails to bring humidity to comfortable levels, instead creating clammy, cold conditions that may make customers uncomfortable. It also generates high electricity bills that wreak havoc with the company's bottom line. Meanwhile, uncontrolled moisture can damage the building and furnishings.

The owners of Cinemark, one of the largest motion picture exhibitors in North America with theaters in 43 states, thought there had to be a better way to handle indoor climate control and improve the movie-going experience for their customers.

Through the National Accounts Energy Alliance (NAEA), Dallas-based Cinemark was partnered with Atmos Energy, the largest natural gas-only utility in the United States, and SEMCO, a firm specializing in indoor air quality, energy efficiency and humidity control. SEMCO has conducted extensive research in natural gas-regenerated desiccant dehumidification technology, which removes moisture from air using a rotating wheel coated with a desiccant material that is regenerated using an energy-efficient natural gas burner.

*Using a hybrid active desiccant dehumidification system to precondition outdoor air makes it possible to install smaller conventional rooftop cooling systems in new theaters, says John Fischer, Director of Research and Development for SEMCO. Lower indoor humidity conditions not only improve the movie viewing experience but can also extend the life of seats and large fabric surfaces commonly found in movie theaters.*





“We had been aware of the technology for some time,” says Art Justice, National Energy Manager for Cinemark. “We’ve had humidity problems in some of our buildings in the past, and were looking at different ways of treating outside air and lowering humidity in the space.”

The testing site for SEMCO’s desiccant dehumidification technology was the Cinemark Tinseltown movie complex in Plano, Texas, a Dallas suburb where for seven months a year daytime temperatures climb to more than 95°F during daytime hours and relative humidity often reaches 80% during the evening hours.

“They were looking to provide the best customer comfort and experience,” says Greg Anderson, Commercial Marketing Manager at Atmos Energy.

### **First use of desiccant dehumidification in a movie theater**

This was the first time a SEMCO Revolution™ natural gas-regenerated desiccant dehumidification system was installed in a commercial movie theater. Such systems are increasingly used in supermarkets, schools, ice skating arenas, and indoor swim centers to improve occupant comfort and reduce energy and maintenance costs. Natural gas is the preferred energy source for drying desiccant wheels because it is economical and burns cleanly.

Cinemark decided to test two SEMCO Revolution Integrated Active Desiccant Rooftop (IADR) units in a multiplex theater application. The Cinemark Tinseltown was ideal because it was symmetrical, with seven theaters on the north end and seven on the south, making it possible to use one set as a control group.

The two Revolution units, each supplying approximately 4,500 cfm of cooled and dehumidified outdoor air, were retrofitted to deliver the air to existing rooftop air conditioning units serving the theaters on the south side of the complex. They went online in December 2003.

SEMCO, CDH Energy and Cinemark closely monitored the performance of the units during the trial period and reached the following conclusions:

- Humidity levels stayed between 50% and 60% in the group of theaters with desiccant dehumidification, compared to the other theaters, which sometimes exceeded 70%.
- The south theaters were more comfortable at 75°F and 55% relative humidity (RH), than the north theaters were at 70°F and 70% RH. Maintaining a lower interior temperature in the north theaters significantly increased energy costs.
- Based on modeling completed by CDH Energy (an independent monitoring contractor funded by NAEA), the Revolution units reduced dehumidification energy costs by an estimated 24% when compared to a refrigeration-only-based outdoor air system. Since that comparison, the cost of electricity has increased from approximately \$.075/kWh to \$.10/kWh, which provides further savings.





- Comfort was improved considerably without significantly increasing operating cost.

Justice says customers enjoy the improved temperature and humidity conditions in the theaters.

### **Desiccant systems improve overall bottom line**

Besides providing a more comfortable moviegoing experience, natural gas-regenerated desiccant dehumidification systems can improve a movie theater's profitability.

Using a hybrid active desiccant dehumidification system to precondition outdoor air makes it possible to install smaller conventional rooftop cooling systems in new theaters. More importantly, it allows them to operate in accordance with the ASHRAE 62 ventilation code, accommodating high outdoor air percentages with greater energy efficiency while controlling space humidity, says John Fischer, Director of Research and Development for SEMCO. Lower indoor humidity conditions improve the movie viewing experience and can also extend the life of seats and large fabric surfaces commonly found in movie theaters for additional cost savings, he adds.

Since the initial Tinseltown project, SEMCO has installed Revolution desiccant units at three more Cinemark locations, including movie complex retrofits in Plano and Webster, just west of Houston. Revolution units were installed as part of new construction for a theater in Rosenberg, another Houston suburb.

Justice says Cinemark is still analyzing results at these four locations before deciding whether desiccant dehumidification will become a standard feature in theaters where climate conditions warrant it.

"We've seen significant improvement," Justice says. "We like to look at new technology and stay on the cutting edge."



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