THE BENEFITS OF MEEFOG TECHNOLOGY
- Less maintenance
- 99% less energy usage
- Cooling rather than heating the data center inlet air

CHALLENGE
A data center facility wanted to cut its energy costs, but still needed a humidification system that would meet its redundancy requirements.

SOLUTION
A fully redundant MeeFog system was designed by Mee Industries’ representative, Masters Building Solutions, which included dual pumps, drives, controllers and piping, and a backup feed from the municipal water supply in case the water filtration system failed.

OneNeck® IT Solutions
Fitchburg, Wisconsin

Colocation facilities need to create an optimum data center infrastructure to efficiently support any hardware or services multi-tenant customers decide to load into the racks, and they have to be ready to cope with shifting loads as customers add and remove equipment.

Data center operator OneNeck IT Solutions, for example, recently expanded its data center in the Madison area, doubling the square footage. But in doing so, OneNeck found ways to significantly cut the power usage through innovations such as installing a fog-based humidification system, changing to a different type of Uninterrupted Power Supply (UPS) battery backup and modifying its building automation system parameters.
The Physical Site

OneNeck IT Solutions has a data center in Fitchburg, Wisconsin, a few miles south of Downtown Madison. The facility is 60,000 square feet with a 14’ ceiling height. It includes six data rooms and 3,350 square feet of space for the Facility Command Center. This is a Tier 3 facility (Tier 4 electrically) with dual UPS, reserve generators with 24 hours of on-site fuel storage, and two diverse path utility feeds from separate carriers. Security officers are on post 24/7 and access is controlled through a multi-level biometric and proximity card system.

The facility was designed in a phased build architecture to allow for rapid expansion. When building Phase II, the company looked for opportunities to significantly reduce its energy costs through using water side free cooling and a MeeFog humidification system instead of the electric steam generator that was used in Phase I.

“Switching from a standard electric heat steam generator to a low-energy MeeFog system resulted in a significant efficiency improvement,” says Eric Patterson, OneNeck data center facilities manager in Wisconsin. “It makes no sense to be injecting hot steam into the cold air ducts when you can add a cool mist instead.”

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Installation Challenges/Specifications

For data centers that use outside air economizers, evaporating fog can cool the outside air down enough to make chillers unnecessary. This approach, however, only works with a steady stream of outside air, otherwise the air inside the building quickly reaches its humidity limit and no more cooling can be obtained. This was the situation with the OneNeck data center in Madison.

The computer rooms need humidification year round, so Mike Gall, a LEED Accredited Professional HVAC engineer at Masters Building Solutions recommended going with a MeeFog system, rather than installing another electric steam generator. A MeeFog system typically uses about 1/100 the energy of an electric steam humidifier, and cools rather then heats the air.

Two computer rooms were each serviced by three air handling units (AHUs), one of which was redundant. Only one air handler fogging system is required to handle all the humidification load for one data room. So, if one of the AHUs went down or one of the fogging units went down, the redundant AHU and redundant fogging unit would provide enough moisture for the data room.

Referring to a closed system without outside air economizers, “steam only hurts you because it penalizes your cooling,” says Gall. “Going to a MeeFog system that essentially was free—other then just one or two horsepower for the pumps—made a lot of sense.” Steam only adds a small amount of heat to the air—the specific heat of the hot water vapor—but fog actually cools the air, which reduces the load on the chilling coils.

The challenge in this case was to design a simple system that would still meet the data center’s redundancy requirements.

Overcoming The Challenges

The MeeFog skid was set up with two independent pumps, two independent variable frequency drives, two independent power connections and two independent mechanical controls. The pumps then feed two sets of 1000 psi supply lines, feeding the water to the fogging nozzle arrays inside the AHUs.

“What this buys us is Tier 3 redundancy,” says Gall. “You can work on any part of the system at any time and still have enough capacity to handle the entire data center.”

The fogging systems normally use water purified by reverse osmosis but rather than installing a second system, it was set up with city water as a temporary backup. The entire air handling and fogging system is controlled by a dual set of control feeds from the Andover building automation system.

“Controls can fail, water can fail, pipes can fail, variable frequency drives can fail, pumps can fail, anything can fail and the MeeFog System can still continue on as if nothing happened,” says Gall.

Continuous Improvement

Patterson says that OneNeck is quite pleased with the efficiency results obtained so far, and those numbers will improve as the data center continues to fill up. He has also noticed that maintenance is easier.

“With the MeeFog system there is less maintenance than our legacy steam humidifiers,” he says. “We don’t have any calcification issues, no elements to burn out, no floats to get fouled or bubble indicators. We just have to change the oil, check the belts, change the filters and we are done.”

With all this in mind, Patterson is still looking for ways to cut energy usage, perhaps retrofitting the Phase I section with the advances made on Phase II.
### ENERGY COST COMPARISON CHART (ANNUAL)

<table>
<thead>
<tr>
<th>System</th>
<th>Cost</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>MeeFog System</td>
<td>$706</td>
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<tr>
<td>Ultrasonic</td>
<td>$8,467</td>
<td>6%</td>
</tr>
<tr>
<td>Compressed Air</td>
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<td>Steam to Steam</td>
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<tr>
<td>Gas to Steam</td>
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<tr>
<td>Electric Steam</td>
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</table>

Assumptions: $.10 per kWh, $1.20 per therm, 3500 hours operation, 1000 lbs. per hour moisture output.

A typical fog system uses one horsepower for every 600 lbs. of water, which is 3% of the energy usage of compressed air-type systems and about 1% of the energy usage of electric steam systems.

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**About Mee Industries Inc.**

For over 45 years Mee Industries has led the world with innovative water fog technology. MeeFog systems are used to humidify and cool many industrial, commercial and agricultural processes and to create interesting and dynamic special effects. Today there are over ten thousand MeeFog systems in use around the world. The MeeFog team looks forward to helping you with your fogging project.

**The Mee Advantage: Experience, Innovation, Performance**

In 1969, Thomas Mee Jr., a former Cornell University research scientist, founded Mee Industries. The company originally manufactured high-tech electro-optical, meteorological instrumentation, but by the early 1980’s, high-pressure water fogging had become the main focus of the company. Today, Mee Industries provides innovative, highly effective, economical fog solutions for many industrial applications including gas turbine inlet-air fogging, commercial and industrial building humidification and cooling, data center humidification, outdoor air conditioning, greenhouse climate control, wine barrel storage humidification, as well as dynamic special effects for the entertainment industry and theme parks.

**Industry Leaders — Focused on Fog Technology**

Mee specializes in providing custom-engineered, turn-key high-pressure fog solutions. We are committed to researching, developing, marketing and supporting the most innovative and reliable fog systems available anywhere in the world.