GAS TURBINE INLET AIR COOLING & WET COMPRESSION

Boost power with the cost-effective MeeFog™ System.
Over 1,000 gas turbines worldwide have increased power output using MeeFog™ Systems have been approved by every major gas turbine manufacturer in the world.

MeeFog™ Systems have been approved by every major gas turbine manufacturer in the world.

The MeeFog™ pump skid provides high pressure water to fog manifolds located at turbine inlet.

The MeeFog™ pump skid provides high pressure water to fog manifolds located at turbine inlet.

Up to 25% power boost

10% more with wet compression overspray fogging

Evaporative cooling is effective in all climates, from areas with cool summers to the high heat and humidity of the Tropics. MeeFog™ gas turbine inlet air cooling utilizes the most effective and economical technology available. Wet compression overspray fogging gives an additional 10% power boost.

The chart below shows estimated degrees of cooling per hour that is achievable with MeeFog™. To receive a report detailing the benefits of using MeeFog™ Systems for your gas turbines, contact Mee Industries. The provided report will give an accurate prediction of annual power gains, monthly power gains, and peak/average water consumption.

MeeFog™ customers

AEP • AES Argentina • Alstom Power • Alumina Bahrain • Amata • American Electric • BP Colombia • Bechtel • Black & Veatch • British Petroleum Colombia • Commission Federal de Electricidad • Deacero Power • Darby Power • Dominion Power • Dubai Electricity • Duke Energy • Dynegy • Empresa Energia Campeche • Energy Australia • Energy Control • ENI Venice Refinery • GASCOCOL • General Electric • Gila River Power • Glee IFP Company • Gujarat Refinery • Gulf Cogeneration • Hays Energy • Indian Oil Corporation • Ingredion Mexico • Ital • JFE Steel • Kawasaki • Korea Electric & Power • Korea Electric & Power • Kimberly Thermal • Kobe Steel • Korea Western Power • Linden CoGen • LG Chemical • Ma Gang Steel • Midbed • Massachusetts Municipal • Mitsubishi Heavy Industries • Midbed Cogeneration • Midbed Energy • Myanmar Lighting • Ministry of Electricity Iraq • Montepar Generating • MTBE Petroleum • MTBE Malaysia • Natural Gas Bermuda • Nevada Power • Nippon Shikken • North Carolina Electric • Northwestern Energy • Dioxon State Power • PDVSA • Petro China • PetroVietnam Power • Petrosam • Port Lincoln • Portland Gas & Electric • Pratt & Whitney • Procter & Gamble • Public Power Greece • PTGSC Thailand • Quali Run • Raffineria di Milazzo • Reliance Energy • Reliance Energy • SECOO Malaysia • Sha Steel ShangHai • Cooper Power • Shell Refinery • Shukter Energy • Solar Turbines • Sanctuary Power • Texel Electric • Tenaga Nasional • TC Power • Thai National Power • Thai Oil • Tenon General • U.S. Borax • Unidad Electrica de Guayaquil • Universal Episcopal Victoria • Vietnam Electricity • Watson CoGen • Wellhead Electric • Wisconsin Public Service • XCEL Energy

"When Venice becomes very humid, we still achieve up to 5°C of cooling on average. The turbine presents benefits of up to 100 KW per degree Celsius."

— Massimiliano Bettin, Downstream and Industrial Operations Manager, ENI Venice Refinery.
"MeeFog™ is a relatively inexpensive way to get additional MW, and to be able to quickly respond to pricing changes. It also appears from the boroscopes that the wet compression keeps the compressor clean so intervals between water washes can be extended."

- Jeff Zelik, Plant Manager, Eagle Point Power Generation, LLC.

**Cool down, power up, with MeeFog™**

**Evaporative Cooling**
- Fog nozzle manifold
  - Nozzles wired for FOD avoidance

**Small Droplets**
- Faster evaporation
- Less fallout, less pooling
- No compressor blade contact

**Drains, Dams & Gutters**
- Removes pooled water to prevent un-atomized water from entering compressor

**Windows & Lights**
- Visual monitoring

**Evaporative Cooling Fog Nozzle Manifold**
- Nozzles wired for FOD avoidance

**Evaporative Efficiency**
- High

**Wet Compression**
- Liquid water droplets enter the compressor
- Droplets evaporate inside compressor to give an evaporative intercooling effect
- Spraying 2% of the air mass flow gives about 10% power boost

**Evaporative Cooling**
- Droplets evaporate prior to entering compressor
- Cools to wet bulb temperature

**Comparison of cooling technologies**

<table>
<thead>
<tr>
<th></th>
<th>Fog</th>
<th>Chiller</th>
<th>Media Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Cost</td>
<td>$500</td>
<td>$5000</td>
<td>$50</td>
</tr>
<tr>
<td>Maintenance Cost</td>
<td>$500</td>
<td>$5000</td>
<td>$50</td>
</tr>
<tr>
<td>Fuel Costs</td>
<td>$500</td>
<td>$5000</td>
<td>$50</td>
</tr>
<tr>
<td>Parasitic Load</td>
<td>$500</td>
<td>$5000</td>
<td>$50</td>
</tr>
<tr>
<td>Inlet Pressure Drop</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Evaporative Efficiency</td>
<td>100%</td>
<td>N/A</td>
<td>85%</td>
</tr>
</tbody>
</table>

**Operational benefits of MeeFog™**

- Increase existing generating capacity
- Improve heat rate up to 5%
- Approach 100% saturation with virtually zero inlet pressure drop
- Significant fuel savings compared to other systems
- Reduction in NOx emissions by up to 30%
- Reduced emissions per kW of power
- Lowest capital costs and fastest payback compared to other cooling technologies

**Fast project execution**

Pre-engineered skids, small enough to be air-freighted. Skids and feedlines can be installed while the gas turbine is in operation. Nozzle manifold installation requires outage of 1 to 7 days. Mee Industries can provide turnkey installation or supervision for your installation team.
10 micron droplets
Micro in size. Macro in benefits.

The tiny droplets from a MeeFog™ nozzle evaporate quickly, and 100% efficient evaporative cooling can be accomplished in just a few seconds. Air pressure drop through the nozzle manifolds is negligible.

The average droplet produced by a MeeFog™ nozzle is less than 10 microns, about one tenth the diameter of a single strand of hair. Typical operating pressure is 2000 psi (138 bar).

The MeeFog™ nozzle has been shown to consistently outperform other high-pressure nozzles. They have a useful life of more than 30 years when used with properly treated water.

MeeFog™ high pressure pump skid

Pump skid
- Stainless steel welded frame – easy access for maintenance
- Oversized inlet water filter, with 0.35-micron cartridge filters
- Discharge water filters (10 micron)
- All wetted parts are non-corrosive material

Controls
- Weather station for automatic operation
- Programmable logic controller (PLC) with interface panel
- Easy to use, open-source software
- Easy connectivity to DCS and/or PC in control room

“We are probably the longest running wet compression user in the world in terms of total hours, having successfully used wet compression for more than twenty years. We run the MeeFog™ Systems round the clock during the peak period of electricity generation from June to September and anytime the ambient temperature is as above 50° F.”

— Steve Ingistov, Principal Engineer, Watson Cogeneration (Fog systems installed in 1998.)
For over 50 years Mee Industries Inc. has been the leader of innovative water fog technology. MeeFog™ Systems are used to humidify and cool industrial, commercial, and agricultural processes and to create dynamic special effects.

Thomas Mee Jr. started his career as a Cornell University research scientist who founded Mee Industries in 1969. The company originally manufactured high-tech, meteorological instruments. The first MeeFog™ Systems were used to study natural cloud phenomena. By the early 1980’s, high-pressure water fogging had become the company’s main focus. Our active research & development group ensures that we are continually improving our technology.

Today the company is owned and operated by Thomas Mee III and D’Arcy Mee Sloane, who continue their father’s tradition of running an innovative and ethical company for the benefit of customers and team members.

The MeeFog™ team looks forward to discussing your project with you.