MeeFog™ System Boosts Power, Reduces Fuel Usage, and Lowers Emissions in Chinese Compressor Station

THE BENEFITS OF MEEFOG™ TECHNOLOGY
• 2.9 MW additional output
• Fuel flow reduction of 5.3 kg/minute
• NOx emissions down by 27.4 ppm

CHALLENGE
Due to China’s burgeoning domestic demand for gas, PetroChina requires large numbers of compressor stations to push the gas along extensive pipelines and they are experiencing summer shortages.

SOLUTION
Implement a MeeFog system on a GE LM2500 turbocompressor on China’s Western Pipeline to increase output, reduce fuel consumption and lower NOx emissions.

PETRO CHINA OF BEIJING
The Lianmuqin compressor station is situated in the vicinity of the city of Shanshan, Turpan Region in the Xinjiang Province of Northwestern China. It lies east of Kyrgyzstan and Kazakhstan, and southwest of Mongolia. Gas is transported from Shanshan, thousands of miles to Shanghai and other eastern destinations.

The compressor station lies in a dry region. During summer, temperature increases curtail compressor output and slow the supply of gas to industrial centers in the east.

INSTALLATION
The Lianmuqin compressor station consists of three GE LM2500 turbocompressors. As fog systems were new to Petro China, a MeeFog system was installed in one unit to determine its effectiveness. The MeeFog system consists of a programmable logic controller (PLC), a series of pumps, a supply of demineralized water, stainless steel piping and hundreds of MeeFog nozzles. Mee Industries utilizes impact-pin type fog nozzles as droplet size is the single most important factor governing performance. Smaller droplets mean faster and more efficient cooling, minimal wetting of duct surfaces, and greatly reduced water usage.
Each MeeFog impaction-pin nozzle is made from high-grade stainless steel. It features a 0.006-inch (150 micrometer) diameter opening which produces billions of ultra-fine droplets per second. The average droplet size is far below 10 microns, or one tenth the diameter of a single strand of human hair. The resulting fog cools the inlet air temperature rapidly.

The fog system can be controlled granularly from the PLC. In total, eight stages of cooling are available. As temperature rises, each stage comes online providing a greater level of cooling.

ANALYSIS OF RESULTS

Petro China and its local equipment supplier Circuit Powertek of Shanghai, tested the MeeFog system while the compressor operated at three different compressor speeds: 4,505 rpm, 4,826 rpm and 5,105 rpm.

The test at 4,505 rpm recorded a temperature drop of more than 7 °C, a fuel flow reduction of almost 3 kg/min, and a turbine power increase of almost 3 MW. NOx emissions were brought down by 27.4 ppm.

The test at 4,826 rpm recorded a temperature drop of around 7 °C, a fuel flow reduction of just over 5 kg/min, and a turbine power increase of almost 3 MW. NOx emissions were brought down by 13.6 ppm.

The test at 5,105 rpm recorded a temperature drop of around 7 °C, a fuel flow reduction of just over 5 kg/min, and a turbine power increase of almost 3 MW. NOx emissions were brought down by 8 ppm.

"In summer, the use of the MeeFog system significantly increases output, reduces fuel consumption, and lowers NOx emissions," said Xiao Wang, Technical Supervisor at Circuit Powertek. “As the fog system increases output at the station, Petro China can more easily take one turbine offline and only run two turbines instead of three. This heightens station efficiency and makes equipment maintenance much simpler.”

About Mee Industries Inc.

For over 50 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.

“In summer, the use of the MeeFog system significantly increases output, reduces fuel consumption, and lowers NOx emissions”

- Xiao Wang - Technical Supervisor at Circuit Powertek