MeeFog™ Adds 64MW of Power Augmentation to Mexican Power Plant

THE BENEFITS OF MEEFOG™ TECHNOLOGY

- Plant power production boosted by 64MW via wet compression
- Increased efficiency
- Lower emissions

CHALLENGE

New rules for energy have opened up Mexican markets. Previously, power had to be sold through government-owned and operated Comisión Federal de Electricidad (CFE). However, it can now be sold directly to the end user, offering new opportunities to those who can provide the maximum amount of power at the lowest possible cost.

SOLUTION

The 1,000 MW Tuxpan III and IV power plant fitted its four MHPS 501F gas turbines with MeeFog Wet Compression systems, increasing the output per turbine from 164 MW to 180 MW.

TUXPAN POWER PLANT - MEXICO

The Tuxpan III and IV combined cycle power plant is operated by Global Power Generation (GPG), a subsidiary of Gas Natural Fenosa, the second largest private power producer in Mexico. It is located in the Tuxpan municipality in the Mexican State of Veracruz. The city is located on the Gulf of Mexico coast northeast of Mexico City. The plant is in a coastal location 10 meters above sea level and about a kilometer from the gulf of Mexico.

INSTALLATION

The Tuxpan combined cycle plant had media type evaporative coolers installed on each of the Mitsubishi Hitachi Power Systems (MHPS) 501F gas turbines.

The MeeFog systems were installed downstream of the existing evaporative media. The nozzle manifolds provide a few degrees of evaporative cooling because the media-type evaporative coolers are not 100% effective, and additional wet compression spray with a flow rate equal to 1% of the air mass flow of the gas turbines. Mee Industries provided turnkey installation of the wet compression systems including connection to water and electrical supplies. General Electric provided controls modifications with support from Mee’s engineers.
Design Conditions:
Turbine Airflow: 453 kg/sec (ISO)
Ambient dry bulb: 32.85ºC/59.3% RH
Coincident wet bub; 26.1C
Site Altitude: 10m above sea level

MeeFog Wet Compression Systems:
Operation Pressure: 138 bar (2,000 psig)
Fog droplet size: 19 microns (DV90) @12.7 m/s
Nozzle flow rate: 0.3l/min (0.08dgpm)
Maximum water flor: 301l/min (79.5 gpm)
Fog System power requirement: 104.5kW

The Tuxpan Power Plant entered commercial operation on 23 May 2003. It is one of the largest combined cycle plants in Mexico. It comprises two identical power blocks. Each block has two MHPS 501F gas turbines, two heat recovery boilers and one steam turbine. Each block produces a power output of approximately 500 MW.

The project involved the installation of two fog pumps skids at each gas turbine and fog nozzle manifolds in the inlet duct, which are designed to provide 14 equal stages of fog spray output. Each stage consists of 71 fog nozzles for a total of 994 fog nozzles.

The 14 stages of wet compression are tied into the gas turbine controls so the grid authority has control over the amount of power augmentation via the automatic generation signal. This allows for seamless control of the amount of power augmentation above base load as required by the grid authority. Prior to the installation, the MHPS 501F turbines with evaporative coolers produced 164.2 MW each. This was increased to 180 MW with Wet Compression. The systems gave the plant a total of 64 MW of additional power to sell into the Mexican grid. “The system was designed to produce 15.5 MW of power augmentation per turbine,” said Rafael Garcia, technical consultant for GARPE, S.A. de C.V. of Mexico. “However, the actual results exceeded this estimate.”

ABOUT MEE INDUSTRIES
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. Mee Industries is an ISO 9001 certified corporation and manufactures components to meet UL or CE requirements.

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