

High availability and reliability in a Colombian power plant

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A gas engine power plant which provides electricity to Cementos Diamante in Ibagué, Colombia, establishes a remarkable track record of high availability and reliability.

The Cementos Diamante cement plant, with an annual production capacity of about 2 million tons, is considered the largest and most modern cement factory in South America. The owner Cemex Group, a multinational Mexican company, had the vision to recognize the value of using natural gas to produce their own electricity.

The 24.7 MW power plant, equipped with five Wärtsilä 18V34SG gas engines, was designed to supply electricity working in parallel with the grid. But it also has the ability to run independently and automatically when there is a grid problem.

The power plant meets the consumption requirements of the cement factory. If load

fluctuates heavily, the power plant adapts accordingly.

Wärtsilä has operated the plant under an operations and maintenance (O&M) agreement through Colombia Energy Operators S.A. (CEOSA), a wholly-owned Wärtsilä company, since it was commissioned in 1998. Maintenance work on both the cement and power plant is performed simultaneously to reduce imported energy from the grid to a minimum. This is because nowadays the cost of the imported energy is higher than the cost of energy produced by the power plant.

Vision proved by experience

Since the start of operation, various unexpected situations have demonstrated the importance of the vision and decision taken by Cemex. During the six and a half years of operation, the power plant's

reliability has provided significant cost savings.

Up to May 2004, the power plant had operated 574 times in island mode due to disturbances in the electricity grid caused by different factors. One of these has been the weakening of the public grid due to acts of terrorism that have destroyed distribution towers, causing innumerable voltage fluctuations. Another factor has been strong rainy seasons, causing heavy thunderstorms that disturb and trip the grid.

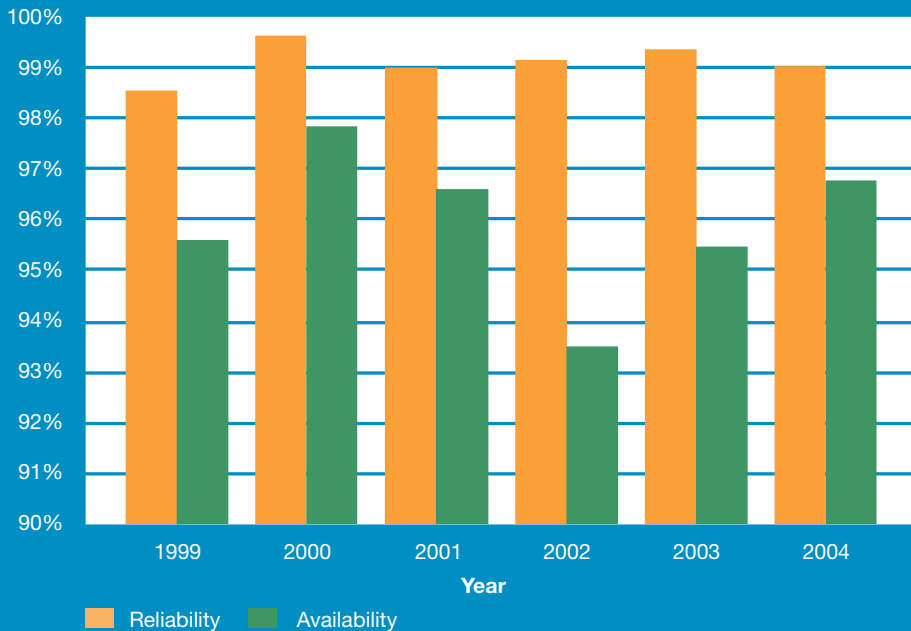
Such variations trigger the electrical protections of the interconnection to the public grid, tripping the system to work in island mode. In this condition the power plant feeds the cement factory's rotary kilns and other critical equipment that must not be allowed to stop suddenly. The power plant therefore protects the cement factory by maintaining its uninterrupted operation.

24 MW cogeneration plant for Milan airport

Wärtsilä and Commissioning Italia SpA have jointly won a turnkey contract to supply a 24 MW cogeneration power plant for Linate airport, Milan in Italy. The plant is to be built for Malpensa Energia Srl, whose shareholders are the Milan airport management company SEA Aeroporti Milano, and the Milan multi-utilities company AEM Milano. The plant will be equipped with three Wärtsilä 20V34SG gas-fuelled generating sets, together with their ancillary equipment, exhaust heat recovery economizers and two gas-fired boilers. The engines and boilers will burn natural gas. The boiler plant will begin operation in September 2005 and the generating sets in February 2006, with the plant contracted to be handed over in March 2006. The plant will be located inside Linate airport. Operating in baseload, the plant will be flexible in operation, economically meeting the variations in heat demand in summer and winter for both heating and air conditioning. The heat output of the plant will be a total of 81.7 MW_{th} in winter and 74.8 MW_{th} in summer, with a year-round electrical power output of 24 MW_e.

The heat recovery system for the three engines has been designed for maximum heat recovery for heating services and the air conditioning of airport buildings. This full climate control system, which may be needed in the future, is typically referred to as a trigeneration installation. Trigeneration is generally understood to mean simultaneous conversion of a fuel into three useful energy products: electricity, hot water for heating and chilled water for cooling.

The heat will thus be delivered as superheated water at 125 °C and hot water at 70 °C to the airport buildings and also a residential area close to the airport. The plant will also deliver electricity to the Italian national grid. Normally the generating sets will run in parallel with the grid but they will also serve as emergency sets to maintain airport services in the event of a break in the grid supply. ■



Reliability and availability of the Cementos Diamante plant.

General features of the power plant

Location:	25 km from Ibagué, Colombia
Height above sea level:	1050 metres
Average temperature:	Day 28 – 36 °C, Night 15 – 22 °C
Plant configuration:	5 x Wärtsilä 18V34SG spark-ignited gas engines
Commercial operating date:	1 September 1998
Building time:	Seven months
Contract type:	Full O&M with a term of 15 years
Total running hours to 31 December 2004:	209,880 h (average 42,000 hrs/engine)
Availability in 2004:	96.83%
Reliability in 2004:	99.05%

CEOSA has implemented high standards of operation & maintenance and certified this work under the ISO:9000, ISO:14000 and OHSAS:18000 international standards. These certificates assure the customer that the power plant is being operated and maintained to internationally recognized standards.

Advantage of a multi-engine installation

A multi-engine installation easily meets varying power demand. A power plant with five generating sets allows greater flexibility than a plant with only one generating unit. In the latter case efficiency is lower, especially when the generating unit is a turbine operated at low loads. And shutting this one unit down for maintenance would make it necessary to purchase an enormous amount of power from the grid at heavy cost. ■

