The Mirage Resort Elevator Modernization: Geared-to-Gearless Technology Provides the Sustainable Solution

by Jim MacDavid

Considered to be one of the first "mega" resorts in Las Vegas, The Mirage Resort opened in 1989 and is still considered one of the city's major attractions. It features more than 3,000 hotel rooms, 100,000 sq. ft. of gaming space and is renowned for its natural gas volcano, which erupts every 15 min. beginning at dusk. When the original construction of the site began in 1987, MarCor developed the 1.1 million-sq.-ft. public building in just 13 months, and it took only 10 months for Sierra Construction to complete the tower. During this construction phase, ThyssenKrupp Elevator Americas was contracted by Sierra Construction to install 40 elevators in the Mirage and the vertical-transportation project was completed in 1989. In 2008, the elevator manufacturer was awarded a new contract by MGM Resorts International to modernize the Mirage's 40 elevators (24 passenger and 16 service) and the project was completed in October 2011.

Modernization Solution: Geared-to-Gearless Technology

ThyssenKrupp Elevator approached this modernization challenge with its gearless technology solution in an effort to eliminate waste, increase energy efficiency and improve indoor air quality at the Mirage. The company's gearless system uses a high-efficiency motor directly integrated with the drive sheave (eliminating the geared drive assembly), which allows for 95% of an elevator's power to be harnessed. The addition of regenerative

Jim MacDavid is the service and repair operations manager for ThyssenKrupp Elevator Americas in Las Vegas. He joined the company in 1999 and has held various management positions.

drives to the machine allows for the feeding of the harnessed energy back into the building's power grid to achieve energy efficiency and sustainability. To accomplish these modernization goals at the Mirage, 22 of the building's existing GD240 geared machines were retained and updated with AC motors; TAC50M controllers with regenerative drives; new HDLM door operations (associated car and hall components); new hall fixtures; and updated cab interiors. Overall, the three-year modernization project produced 18 new 380-gearless AC machines.

ThyssenKrupp Elevator's gearless modernization process enabled the manufacturer to reduce the environmental impact of the Mirage's existing elevators while benefiting the passengers, the building owner and manager. For example, one of the project's main achievements was working with the local power company to document pre- and post-modernization energy consumption ratings to qualify for incentives programs. And, as a result, the design will enable the Mirage to achieve cost savings for years to come.

The following are some of the potential energy savings as a result of the gearless modernization:

- Geared elevators (22): approximately 103,798 kWh per hour, per elevator
- Gearless elevators (18): approximately 175,701 kWh per year, per elevator
- BTU reduction of up to 45%, which will reduce energy consumption