MHPS

Mitsubishi Hitachi Power Systems

Plant Details:

- Ratchaburi Power Plant
- IPP owned by Ratchaburi Power Company Limited (RPCL)
- Near Bangkok, Thailand

Equipment Notes:

- 1400 MW Dual Fuel Gas Turbine Combined Cycle Plant
- 4 MHPS M701F Gas Turbines
- 2 MHPS Triple Pressure HRSGs
- 2 MHPS Steam Turbines
- MHPS DIASYS Netmation® Control Platform
- MHPS-TOMONI™ Solution Installed: 2015, 2018

Turning up the heat brings Ratchaburi's fuel costs down $2.4M U.S. a year.

MHPS-TOMONI™ Solution Used:

IGV Optimization

Digital Solutions
MHPS-TOMONI

CHALLENGE

When the gas turbine combined cycle (GTCC) plant owned by Ratchaburi Power Company Limited (RPCL), an independent power producer near Bangkok, Thailand, entered service, it was optimized for base-load operation. Within a few years, it began to be dispatched a significant amount of time at partial loads and, by 2015, was running 50% of the time below 80% load. This created a need to improve plant heat rate at part loads on the GTCC. RPCL collaborated with Mitsubishi Hitachi Power Systems (MHPS) to find the best solution to improve the efficiency at part loads.

By 2017, RPCL's dispatch profile had changed again. Although still below full load, it was being dispatched at higher loads than before and in governor control mode most of the time. This resulted in frequent load changes that reduced the benefits of the original solution. It was clear that a more flexible and comprehensive approach was needed, so MHPS and RPCL worked together to define the most cost-effective approach.

SOLUTION

Together, MHPS and RPCL found that the IGV Optimization solution would increase operation flexibility and allow RPCL to run more efficiently at part load by tuning the IGV (inlet guide vane) function. The solution, which is part of the MHPS-TOMONI™ Flexible Operation and Performance Improvement suites, was implemented into RPCL's existing control system during a periodic inspection in 2015. It increased Turbine Inlet Temperature (TiT) by tuning the IGV function for IGV close. Adding a function to open IGV temporarily in load change prevented a TiT overshoot in load change.

In 2017, the answer was a more sophisticated digital control strategy that optimized the IGV closure over a wider load range, both at stable loads and during frequent load changes. This new solution was installed during a planned outage in early 2018, and MHPS engineers tuned and optimized the combustion dynamics, ensuring any technical challenges of the IGV closing were addressed before the planned outage was complete.

RESULT

The IGV Optimization solution in 2015 increased the plant's efficiency, which reduced fuel consumption, leading to a savings of 30 million Thai baht per year. The efficiency improved with partial load IGV modulation by about 0.4% during operation at 80% of full load.

The 2018 upgrade greatly expanded the load range where the gas turbine exhaust temperature is optimized and allowed for frequent load changes to meet market demands.

For more information about the MHPS-TOMONI™ suite of digital solutions visit **changeinpower.com/tomoni** or contact your MHPS representative.

The additional flexibility puts RPCL in a better position to increase their profits in today's market while responding to future changes in grid dispatch. **MHPS and RPCL calculate the improved part load efficiency enabled by this digital solution will lead to an average savings of 45 million Thai baht per year ($1.2 million U.S.) on each of the two power blocks.**

"This MHPS-TOMONI™ digital solution improved our bottom line by reducing our fuel costs and helping offset the inevitable changes that take place as a plant ages. Not only did it make our plant more efficient, but it also helps our facility fit the realities of our business in a dynamic energy marketplace without a significant capital investment for new hardware. MHPS' technical support and the overall cost savings we achieved made this a profitable venture for our power plant."

Charus Thaebanpakul
Chief Operating Officer, RPCL

O&M OPTIMIZATION SOLUTIONS | **PERFORMANCE IMPROVEMENT SOLUTIONS** | **FLEXIBLE OPERATION SOLUTIONS**

MHPS-TOMONI™

MHPS is leading the development of the digital power plant of the future with MHPS-TOMONI, a suite of digital solutions enabled by decades of O&M and plant knowledge. Our solutions are driven by customer collaboration and use advanced analytics and adaptive control to lower the cost of electricity and achieve environmental and business goals.