



CENTRAL ALABAMA GENERATING STATION

Tenaska's 885 MW combined-cycle Central Alabama Generating Station in Billingsley, Alabama, entered operation in May 2003 and quickly proved its mettle, achieving a summer availability of 99.04% and a perfect safety record with zero recordable injuries. The 3x1 plant consists of three GE 7FA gas turbines, three Deltak triple-pressure heat recovery steam generators, and a single GE D11 steam turbine. The plant operates under a long-term tolling agreement; the customer supplies the fuel for the plant and markets the power output. Daily cycling is the most common dispatch scenario at Central Alabama.

A key ingredient in Tenaska's approach to power plant ownership and operation is applying lessons learned from elsewhere in the Tenaska fleet. "We call this knowledge leveraging," says Robert Threlkeld, Plant Manager at Central Alabama. "For us, the lessons learned at other Tenaska plants during start-up and their first summer seasons have translated directly into improved performance here, as shown by our availability record."

For example, concerns are often raised at combined-cycle plants concerning cycling and its effects on the HRSG. "When you cycle a lot, you have to be concerned about the thermal stresses on the boiler tubes," says Threlkeld. "A Tenaska task force examined this issue in great detail and developed specific written procedures governing drains and attemperation. Excess attemperation flow, for example, can quench tubes and induce unnecessary stresses, or during shutdown, you might keep a feed pump running for a little while, so you need to guard against any attemperation flow leaking through. Also, cold, warm and hot starts affect the plant in different ways, so you need to carefully control the amount of condensate that gets evacuated from the superheater and reheater drains."

Steam turbine start-up is another area where lessons learned are vital. "The steam turbine needs to get on-line reliably and efficiently every day," says Threlkeld. "By sending our operators to other commercial Tenaska plants for weeks of on-the-job training, we gained the experience of numerous experts at those facilities." One major example that minimized vibrations during startup was ensuring the reheat steam temperature and reheat bowl temperatures were matched as closely as possible during the initial roll-off. This significantly reduced bearing vibrations that are typically caused by thermal shock.

Sharing lessons learned at Tenaska is accomplished through regular channels and through ad hoc communication. Plant managers and other managerial personnel meet frequently to discuss operational issues and to share valuable experiences. Maintenance managers have established an active internal communication network via e-mail to convey lessons learned and maintenance ideas. At the operator level, daily communication with the customer and with other Tenaska operators helps maintain efficient plant performance.

Plant management has used several techniques to focus personnel attention on the needs of the customer. Through tours of the customer's energy trading floor and by coaching staff on Central Alabama's power purchase agreement, the employees gained a better understanding of how their jobs would affect the customer. This understanding, in turn, helps Tenaska, because the power purchase agreement includes financial availability incentives. Additional emphasis on availability is achieved

through friendly contests to see which crews achieve the best startup and most closely meet the dispatch for the day. "These contests are strictly for bragging rights, but they keep everyone focused on the right priorities," says Threlkeld.

Central Alabama relies on a suite of tools to assist in operating the plant as efficiently as possible. Modeling software from Henwood Energy is used to manage work flow for the power offtake agreement. Each day, Tenaska tells the customer how many MW will be available for dispatch the following day. The customer takes this information and creates a dispatch notice, which is then sent back to Tenaska for validation. The Henwood model acts on this data to optimize the power plant configuration based on how many MW are needed and when. The power plant retains control over specific implementation parameters — such as which gas turbine will be brought on-line first and at what ramp rate — but the computer model ensures that the plant is optimized to satisfy the required dispatch orders.

Central Alabama's plant historian system, using OSIsoft's PI software, has been a great aid in troubleshooting, according to Threlkeld. For example, by reviewing data stored in the PI system, the plant could determine that the low-pressure and hot reheat bypass valves may be leaking steam. A simple retuning of the valves quickly would correct the problem.

Tenaska Central Alabama works closely with GE to ensure optimum gas turbine operation and availability. The three 7FA turbines are monitored from GE Energy's maintenance and diagnostic center in Atlanta. The M&D center has functioned as both a predictive tool for Tenaska and as a confirmation source for equipment problems. "On one occasion, GE called to alert us that a thermocouple

on a bearing might be going bad," says Threlkeld. "It turned out the problem was just a voltage spike, but the notification gave us an opportunity to track the spike. On another occasion, combustion failed in one of the gas turbines. We suspected a lean fuel blowout, and GE confirmed our diagnosis."

With a staff of just 27, everyone at Central Alabama is empowered to act in the best interests of Tenaska and the customer. Flexibility is important — as indicated by the Power Augmentation Steam system that enables each CT to pump out 15 MW extra power during high demand periods — but not in all areas. Central Alabama employs a dedicated plant engineer to manage the power purchase agreement, and has decided to keep operations and maintenance personnel functionally separate so they can concentrate on their respective areas of expertise.

Tenaska has effectively leveraged its physical and personnel assets to become a top-notch power plant owner and operator. "From a mechanical and electrical integrity standpoint, Tenaska is best-of-class," says Robert Aslin, Account Engineer for FM Global, one of the world's largest commercial and industrial property insurers. Central Alabama intends to maintain that standing. **PE**



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