

## A Case Study in Engineering, Experience and Expertise

### ProFlame™ and Entergy: Cleaner Power to the People

#### The Situation

Entergy Corporation owns and operates power plants across the Gulf States and Arkansas, generating 30,000 megawatts of electricity to its more than 2.8 million utility customers. The company has advanced its clean generation strategy in part by boosting the energy supplied with clean, efficient, natural gas-fired combined cycle units. In 2012, Entergy looked to replace the capacity of retired Units 1 and 2 and operational Unit 3 at its Ninemile 6 facility in Westwego, Louisiana, with a state-of-the-art combined cycle gas turbine (CCGT).

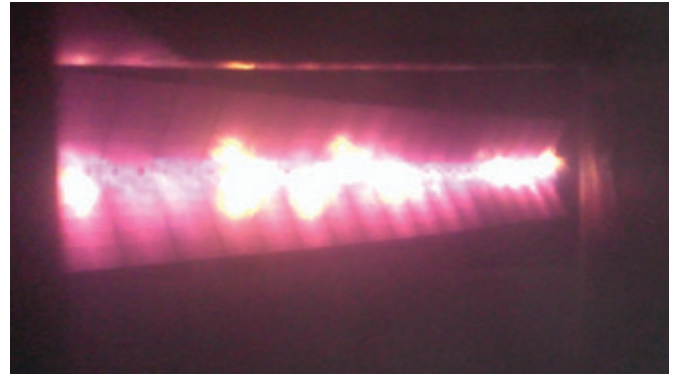


*Entergy Ninemile Units 6 A & B*

## The Challenge

Entergy teamed up with CCGT industry leaders General Electric, Vogt Power and Zeeco to engineer the key components for the plant. These included the gas turbines to provide direct electrical power; heat recovery steam generators (HRSG), where steam is produced from the turbine exhaust gas then is used to turn the steam turbine, adding more electricity to the grid; and finally, Zeeco's duct burners which provide supplemental heat to the HRSG and minimize emissions from the turbine exhaust gas.

Construction of the plant was completed in late 2014; however, during commissioning, concerns were raised over the reliability of the duct burners when they would mysteriously shut off during low-load firing conditions. What lay behind the shut offs? Was it the turbine exhaust gas flow distribution across the duct burner? Fuel delivery to the duct burner? Flame stability of the duct burner? The shut-offs occurred just below 30% of the maximum rated capacity, where the low-load firing was supposed to operate at 25%.



*Low-low firing at 18% MCR*

## The Solution

Zeeco's engineers went straight to work deconstructing the problem facing Entergy's Ninemile 6 plant and the unusual shut-off of Zeeco's duct burners during low-load firing conditions. They quickly determined that Zeeco's duct burners were performing as designed, but the existing flame scanners caused the duct burners to trip prematurely at low-load firing conditions, even after properly tuning them for worst case conditions.

Zeeco replaced the existing flame scanners with its own ProFlame™ integrated flame scanners, which provide proven, reliable flame detection across the turndown of the duct burner. The difference between ProFlame and other competitor flame scanners lies in the ProFlame state-of-the-art signal processing and the ease in which to tune the scanner. The ProFlame display provides instant feedback on whether the scanner settings are correct or need adjustment. Zeeco's Pro-Flame scanners provided reliable flame detection for a low-low firing condition at 18% maximum rated capacity. Almost immediately, Zeeco engineers discovered that the ProFlame scanners not only detected the flames over turndown, but also safely discriminated the target burner element's flame from adjacent burner element flames within the duct burner array.



*ProFlame Scanners*

## The Results

With Zeeco's ProFlame integrated flame scanners, the Ninemile 6 plant no longer experiences unexpected shut offs at low-load firing conditions. Improvement of the turn down capability of the duct burner also resulted in improved fuel savings. ProFlame enables each burner element to safely operate in full redundancy mode where the plant now runs with two scanners on each burner element to safely detect the flame and reliably keep Zeeco's duct burner operating when the flame is present.

Improved reliability. Enhanced turndown. Increased safety. Full redundancy. Zeeco's ProFlame integrated flame scanners not only energized Entergy's Ninemile 6 plant but southeast Louisiana utility customers can now reliably benefit from clean, efficient, uninterrupted power.



*ProFlame Scanner*

## **The World Leader in Combustion and Environmental Systems**

For more than 35 years, Zeeco and its full complement of combustion and environmental systems and services, has taken on the world's most challenging products to help industries operate cleaner and more energy efficiently.

### **With thousands of installations to our name on virtually every continent, Zeeco offers:**

- An incomparable brain trust of the most talented engineers on Earth
- A wealth of resources to design, test, model, manufacture, install, consult and respond
- A unique style of doing business in person, independently, with integrity and passion, and without the usual layers of management that impede progress
- A well-earned reputation for doing what we'll say we'll do, every time
- A drive to innovate and reinvigorate aging processes
- The only true full-line supplier on the planet

### **Zeeco Products**

- Process, power/steam, and packaged burners
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- Ancillary equipment, including pilots, ignition systems, and burner, flare, and thermal oxidizer components
- Parts for every OEM's combustion and environmental system
- Fast, onsite response, including troubleshooting, training, commissioning and startup, repair, retrofits and more
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