

OPTIMIZING FANS FOR THE ESCALANTE GENERATING STATION

A RETROFIT WITH A 12-MONTH ROI

Mike Piazza, Application Engineer for Mechanical Draft Fans, ProcessBarron



SYNOPSIS

ProcessBarron was contracted to retrofit two aging fans at the Tri-State Generation and Transmission Association’s Escalante Generating Station in Prewitt, New Mexico, with more efficient designs, rather than an in-kind swap out. The existing fans needed to be replaced because of age, and in-place tests showed that the “A” fan was running inefficiently. Efficiency was increased by optimizing the blade width and pitch on the new airfoil wheels to fit the existing housings.

Optimizing Fans for the Escalante Generating Station

By Mike Piazza

Application Engineer for Mechanical Draft Fans, *ProcessBarron*

TO REPLACE OR RETROFIT?

Opened for operation on the first day of 1985, the Escalante Generating Station is a 245-megawatt coal-fired plant originally built to provide electrical power to 153,000 homes. It was acquired by Tri-State in 2000, and by 2005 it was serving over 250,000 electric customers in rural New Mexico.

In 2007, the Tri-State Generation and Transmission Association determined that aging fans at their Escalante Generating Station near Prewitt, New Mexico, had to be repaired or replaced, and they contacted ProcessBarron. ProcessBarron already enjoyed a working relationship with Tri-State, having performed maintenance work on their Prewitt facility, as well as on their plants in Nucla, Westminster, and Frederick, Colorado.

Although the usual course of events would have been to do an in-kind replacement, most likely with duplicates from the OEM, Tri-State asked ProcessBarron to run a performance test. ProcessBarron engineers had fan system specialists Cimtec, Inc. evaluate the “A” fan, and the testing showed that the system was performing at 55.2 percent fan efficiency, with 207 horsepower per inch of pressure loss and a corresponding yearly cost of \$82,129 per inch of pressure loss.

There were only two viable options: Do an in-kind replacement with identical fans — which would result in the same inefficiencies and the attendant unnecessarily high operating costs — or have new fans designed, engineered, manufactured, and installed in order to optimize the facility.

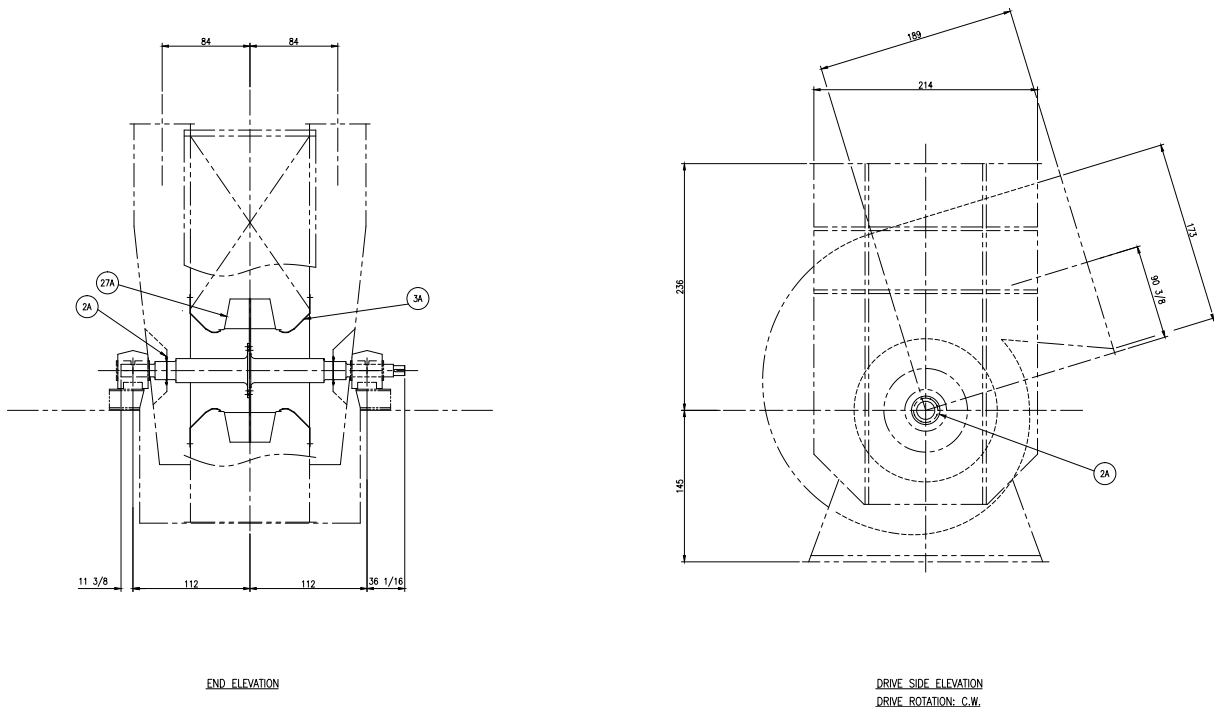


FIGURE 1
Models for the retrofitted Escalante Generating Station “A” fan housings.

**PROCESSBARRON
RAN ITS TESTS ON
THE PERFORMANCE
OF THE ESCALANTE
AIRFOIL FAN AND
FOUND IT HAD BEEN
MISMATCHED TO
THE SYSTEM**

AIRFOIL FANS PROMISE OPTIMIZATION

Over the life of a plant, it sometimes happens that engineers make modifications to the system without modifying the fans accordingly. When ProcessBarron ran its tests on the performance of the Escalante airfoil fan, they found it had been mismatched to the system at some point. As a result, it was using more horsepower than was necessary for the volume and static pressure of the facility, consuming about 23,893 megawatt hours per year.

The fan was fairly large, about 137 inches in diameter. ProcessBarron

sent a field team to take precise measurements and photographs to compare to existing drawings. With the test and measurement data in hand, the ProcessBarron engineers determined that an optimization could be carried out by creating airfoil fans with the same diameter that would use the same housings, but with a different blade width and pitch.

The estimated cost was about the same as an in-kind replacement, but it was projected that the new fans would result in a reduction of 7,714 megawatt hours per year, offering a significant cost savings and better ROI.



FIGURE 2
One of the Escalante Generating Station's "A" fans prior to shipment at ProcessBarron's facility in Pelham, AL.

**PROCESSBARRON
CARRIED OUT
EVERY PHASE
OF ADDITIONAL
TESTING, DESIGN,
ENGINEERING &
MANUFACTURING**

TURNKEY SOLUTION

Tri-State opted to go with ProcessBarron's proposal. ProcessBarron carried out every phase of additional testing, design, engineering, and manufacturing to create an improved rotating assembly for the fans, with cones and shaft seals. ProcessBarron then coordinated with Tri-State to deliver and install the units during the plant's annual maintenance outage.

The installation went without a hitch, and no on-site modifications were necessary.

THE NUMBERS

The retrofit produced significantly improved efficiency in the plant, with an estimated fan energy savings of over \$459,133 per year, meaning that the retrofit paid for itself in less than 12 months. Meanwhile, Tri-State continues to fulfill production at the Escalante facility, meeting or exceeding their performance expectations.