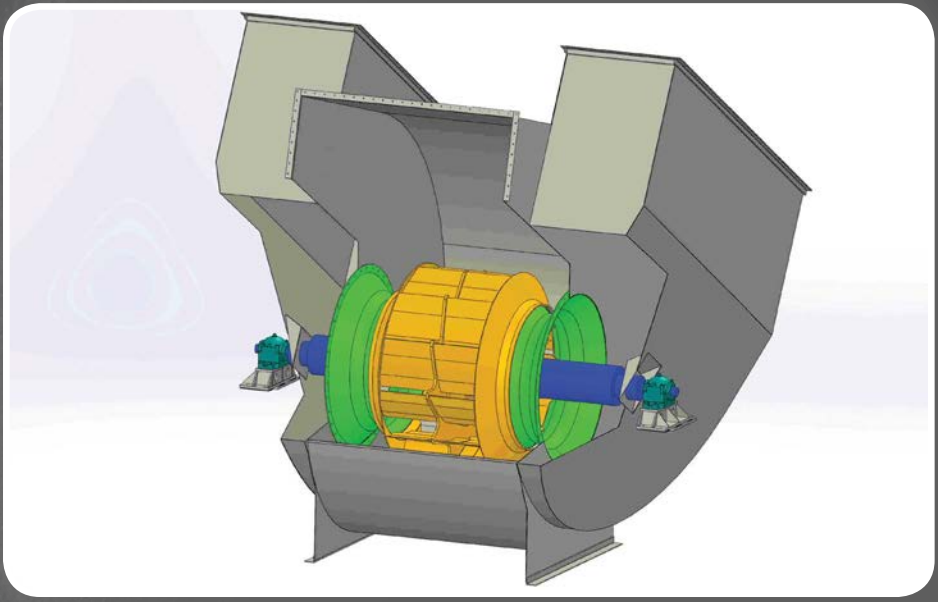
CASE STUDY

REDESIGN OF BACKWARD INCLINED RADIAL TIPPED FAN FOR OPTIMUM EFFICIENCY



IRON ORE MINING

Clarage

QuickFacts

Customer: An iron Ore Mining Company

Location: U.S. Upper Midwest

Industry: Iron ore mining

Application: Process fan associated with iron ore pelletizing

Challenge: Provide energy saving solution by retrofitting process fan impeller

Solution: Designed and fabricate impeller for backward inclined, radial tipped fan and customized it to fit the existing housing.

Project Overview:

Many companies are looking for ways to operate more efficiently. A particular major global corporation specializing in mining coal and iron ore operating several mines in the Midwest is no different.

At one of its mines, the company determined that the existing fans used in their pelletizing process were consuming an unnecessary amount of energy for the work performed. The company was using an oversized, inefficient radial tip fan for the application, and consequently had to operate it at an extreme damper setting. The mining company turned to Clarage for a solution that included fan testing, impeller redesign, improved energy efficiency, and turnkey construction services.

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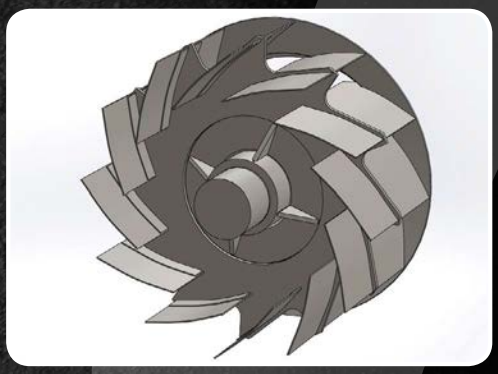

Radial Tipped Wheel
Cross Section

Challenge:

Before a new impeller and associated components could be designed, a new test block condition had to be established. Clarage tested the performance, horsepower consumption, and operating conditions of the original fan to help the mining company establish the new test block condition. But first, a baseline condition had to be determined. The baseline testing resulted in a static pressure rise of 3-in. wc, air flow of 420,000 ACFM, and power usage of 495 kW.

In retrofit situations, the existing fan enclosure limits the space available for a new impeller. Clarage had to design a rotor that would operate efficiently in a competitor's housing, while keeping the bearing centers the same. New inlet cones had to be designed to ensure they would fit into the new rotor.

The Clarage Solution:

Eliminating problem areas, while considering current and future operational requirements, can ensure the long term reliability of a retrofit fan impeller. Fans should be designed to optimize both operational and maintenance issues. The Clarage engineering team designed a smaller rotor and matching inlet cones. To accomplish this and also meet the targeted power usage reduction, the team had to compare and contrast the housing of the existing fan with a Clarage-designed housing. Inlet and outlet box dimensions had to be compared to compensate for the differences between the fan designs. Clarage provided a new backward inclined fan rotor that was customized to fit the existing housing.

The Clarage Retrofit Fan Solution
Enroute To The Customer

Results:

After Clarage installed the new rotor, another field performance test was conducted to measure the energy savings. The results of this test indicated a static pressure rise of 3.05-in. wc, air flow of 418,000 ACFM, and power usage of 278 kW. The new impeller produced approximately the same static pressure and air flow using less than half the energy. The Clarage solution saved the iron ore mining company 217 kW, resulting in energy savings $108,000 above what was expected.

Because of the smaller impeller, the fan system is more efficient, and, therefore consumes less energy. The wider damper opening reduces housing vibrations and the impeller's reduced tip speed reduces the amount of blade wear. At the end of the day, Clarage's experience in designing retrofit fan solutions was paramount in achieving the customer's energy reduction goals.

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