Emergency Compressor Repair Restores Paper Mill Production in Record Time

Customer:

Paper and packaging manufacturing plant, Savannah, Georgia

Equipment:

Three-stage, high-vacuum blower

Challenge:

Minimize downtime caused by a damaged rotor in a critical high-vacuum blower

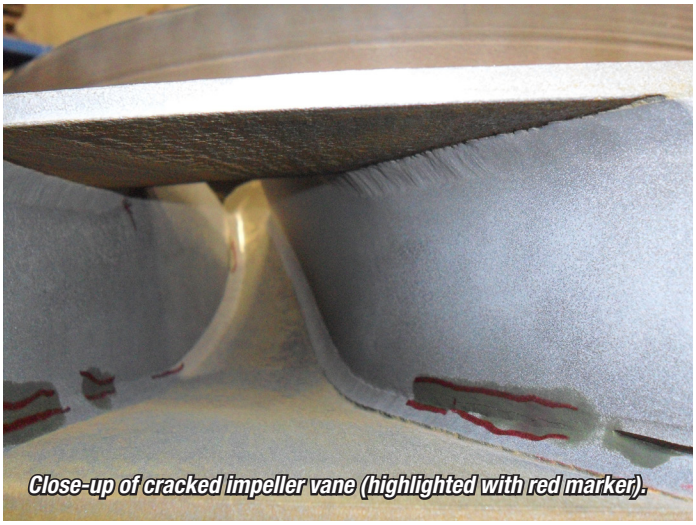
Solution:

Elliott's emergency repairs to the non-Elliott rotor quickly restored production while a new rotor was manufactured.

One of the most productive paper mills in the world had a damaged rotor in its high-vacuum blower. This critical piece of machinery is used to remove moisture from the pulp mixture when manufacturing paper. Without a spare rotor on hand, the customer was desperate to have repairs made immediately. Although Elliott was not the original equipment manufacturer (OEM) of the blower, the customer turned to Elliott based on its experience and reputation for solving difficult problems.

During a routine maintenance inspection in February 2013, the OEM discovered several cracks in the first-stage impeller vanes and determined that the rotor could not be repaired. The OEM proposed a new impeller, which would require 10 weeks to manufacture. With the hope of curtailing this outage and minimizing the significant financial impact on the company, the customer contacted Elliott in search of an alternative solution.

Damaged first stage impeller, as received by Elliott's Jacksonville service center.



Close-up of cracked impeller vane (highlighted with red marker).

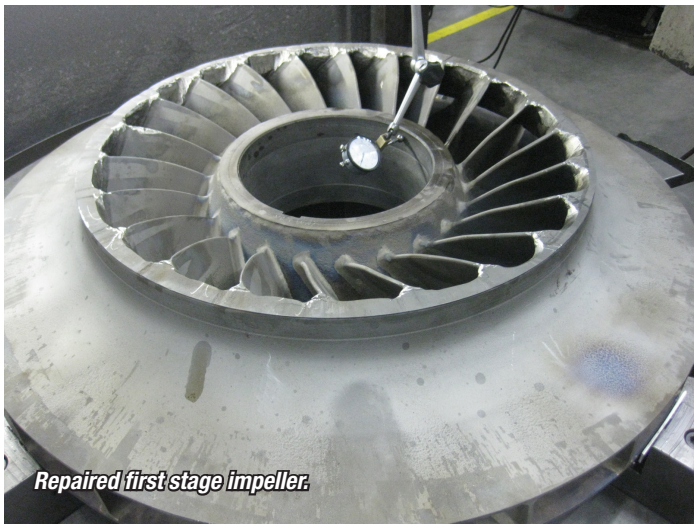
Elliott evaluated the damaged rotor and committed to making emergency repairs to the rotor assembly at Elliott's Jacksonville service center. The scope of the repairs included:

- Excavation of cracks
- Weld repair
- Pre- and post-weld heat treatments
- Impeller balancing
- Shaft machining
- Overspeed spin test
- Dynamic rotor balancing

This emergency repair was only a temporary solution to make the unit operational while a new rotor was being designed and manufactured. Such complex impeller repairs generally take at least four weeks; Elliott completed the project in 10 days. The service center received the components on February 17, 2013 and returned them to the customer on February 26th. Elliott assembled specialized teams and worked around the clock to expedite the repair without sacrificing quality or safety, minimizing the impact to the customer.

Rotor Repair

Metallurgical experts from Elliott's Materials Engineering group specified the proper weld repair procedure for the first-stage impeller. A pre-weld heat treatment prepared the metal for the welding procedure. Elliott's skilled welders worked extra shifts to ensure quality workmanship. A post-weld heat treatment normalized the molecular structure of the weld, reducing the stresses in the metal.



Repaired first stage impeller.

Elliott's engineering expertise also enabled the machinists to modify the shaft to expedite the rotor reassembly process. The alterations improved the production schedule by three days.

Modified shaft after machining.


Final rotor assembly.

An overspeed spin test was required before final rotor assembly to verify the integrity of the repaired impeller. To minimize the turnaround time, Elliott transported the impeller by private airplane to the test facility 800 miles away. After successful testing, the impeller was returned to Jacksonville for rotor assembly, balance, and shipment to the customer for installation. Once the high-vacuum blower was back in service, the repaired rotor operated for a year without incident.

New Rotor Proposal

Concurrent with the repairs to the damaged rotor, Elliott sent an engineering team to Jacksonville to analyze the blower requirements and prepare a detailed proposal for a new rotor. The Elliott team recommended an upgraded rotor design which included:

- Changing the impellers from a 3-piece construction to a 2-piece design, to eliminate weld areas and the potential for corrosion-induced cracks;
- Using 17-4ph stainless steel which is more resistant to corrosion than the original bi-metal constructed impellers.

These improvements would also minimize foulant build-up on the rotor, which was an issue that the paper mill had experienced prior to the emergency repairs.

Based on Elliott's engineering expertise and responsiveness to the unexpected crisis, the customer immediately accepted most of Elliott's recommendations. They chose to make the material and design modifications to the first stage impeller, but did not alter the original materials and construction method of the second and third impellers. Elliott began the manufacturing process immediately, and the rotor was completed in October, 2013 – four months before the paper mill's targeted installation date.


Final rotor assembly, shipping from Jacksonville service center.

Rotor Replacement

After operating with the repaired rotor for one year, the paper mill installed the new rotor during a planned outage in February 2014. Elliott's upgraded rotor design fit the non-Elliott blower perfectly. To avoid a similar future emergency, Elliott's Jacksonville service center revitalized the repaired rotor that was removed from the machine with a new first stage impeller and additional minor repairs to create a reliable spare rotor.

One year after the new rotor was installed, a service inspection by Elliott showed that the three-stage vacuum blower was running smoothly and efficiently. The rotor was in excellent condition with no evidence of foulant build-up. The customer was entirely satisfied with the equipment and with Elliott's overall performance with the rotor repair and replacement.

Elliott Group is committed to meeting each customer's unique needs and schedules, without sacrificing safety or quality. With over 100 years of turbomachinery experience, Elliott manufactures the highest quality products for customers around the world. The world turns to Elliott for repairs, upgrades, and unmatched customer service.

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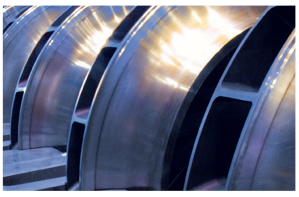
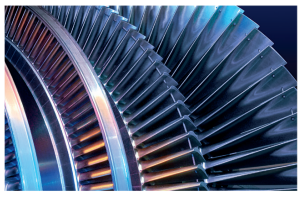


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