

Paper Mill Reduces Cost of Production, and Operations and Maintenance Costs with Robust Super Duplex 2507 Diaphragm Seal

RESULTS

- Lowered cost of production
- Lowered maintenance costs
- Elimination of re-engineering for reduced project cost



APPLICATION

Measure static pressure at the refiner outlets to insure proper preparation of pulp for the paper making process

CUSTOMER

A North America mill of a global paper manufacturer

CHALLENGE

Pulp refiners are used to assure that fibers derived from recycled pulp are present in acceptable ranges of length and coarseness, and are uniformly distributed in the effluent. These properties are important to the quality of the paper. Static pressure measurements at the inlet and outlet of the double disk refiner are used to assure a strong and smooth paper product. Cavitation from the refiner and debris such as ground up wire and staples in the recycled pulp create a process environment that is extremely harsh for the isolator diaphragms on the gage pressure transmitters. This resulted in isolator failures and undetected on-scale failures of the pressure reading. 304 and 316 SST and ceramic isolators were tried. None had sufficient mechanical strength to survive the combined effects of cavitation and debris.

If an on-scale failure occurred, the incorrect pressure reading could lead to reduced use of recycled pulp, and higher use of virgin pulp. This increased the cost of the paper. In addition, since many failures were undetected, the isolators needed to be checked for failures every 6 weeks when the paper machines were shot down for maintenance. The cost of inspections and short service life, frequently 6 weeks or less, increased maintenance cost. Solutions that involved moving the location of the pressure reading would involve additional engineering cost and potentially increase the length of the shutdown.

The elimination of on-scale measurement failures has allowed the mill to optimize the use of recycled pulp leading to lower paper manufacturing costs.



Figure 1. Installed Rosemount 1199 Gage Pressure Transmitter with Super Duplex 2507 material.

SOLUTION

A Rosemount 1199 remote diaphragm seal was constructed of a material called Super Duplex 2507. This material has 2-3 times the yield strength, and twice the hardness of more typical materials such as 304L and 316L stainless steel. This higher yield strength and hardness is able to resist the mechanical damage from both cavitation caused by the double disk refiner, and debris in the pulp. The result is an increase in diaphragm seal life from just a few weeks to over two years.

The increased life of the diaphragm seals has had a number of positive business results. First, on-scale failures have been eliminated leading to reduced use of virgin pulp, and a reduction in the feedstock cost. Second, diaphragm seal inspection frequency has been reduced leading to reduced maintenance costs. In addition, the longer service life of the Super Duplex seals has eliminated most replacements further reducing maintenance costs. Finally, the problem was solved without the need to reengineer the measurement points to locations further from the pulp refiner. This eliminated the need for engineering costs to solve the problem.

RESOURCES

Emerson Process Management Pulp & Paper Industry

<http://www.emersonprocess.com/solutions/paper/>

Rosemount 1199 Diaphragm Seal Systems

<http://www2.emersonprocess.com/en-US/brands/rosemount/Level/Differential-Pressure-Level/1199-Remote-Seals/Pages/index.aspx>

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