

Case Stora Enso Pulp pumping





The pulp and paper mill uses hundreds of motors, and the pulp pumps are one target of Stora Enso's energy savings goals.



The energy comparisons were made using the new IE4 synchronous reluctance motor (left) and an older ABB motor (right).

For Stora Enso, when it comes to finding ways to save energy, everything counts.

| Customer benefits | |
|-------------------------------------|---|
| IE4 motor and drive | Motor runs cooler, reduces energy use and maintenance needs |
| More energy savings | Helps Stora Enso with their ambitious energy saving goals |
| Based on familiar technology | No rare earth magnets, based on familiar technology |

Pulp and paper mills are big consumers of energy. Stora Enso's mill in Nymölla, Sweden, for example, uses 60 MW annually and the plan is to reduce that by 0.5 MW per year.

With hundreds of motors pumping millions of tons of water and pulp, the mill is convinced that if it can gain efficiencies in electrical energy that its motors consume, it will make a big total impact on energy demands and costs for the entire operation.

As part of its drive to systematically cut out big chunks of energy consumption, Stora Enso recently has been undertaking very successful tests with ABB's new synchronous reluctance (SynRM) motor and drive technology. This motor-drive package offers super-premium IE4 efficiency, with the main benefits being big energy and money savings, reduced carbon emissions and a cooler running motor.

To test the technology, last year the mill replaced an old pulp pump motor and drive with ABB's IE4 SynRM motor and ACS850 drive package. It then ran side-by-side comparisons for which the mill engineers measured a dramatic reduction in energy consumption in the range of 15 to 25 percent.

Too good to be true?

While this at first seems almost too good to be true, following numerous tests (and a fair bit of skepticism), the results have been reconfirmed via thousands of data points. Sedy Zigon, Automation Engineer in the mill, explains:

"We liked the new SynRM motor and drive technology since it promised energy savings of 5-10 percent. So to make a valid test comparison we chose a position in the pulp mill where there are two motors and pumps sitting side-by-side pumping the same thick pulp solution."

Side-by-side for valid comparison

In February 2013 the new package was put on one of the pumps, while the other kept the old motor and drive, both about 10 years old. It was a perfect location to do these tests.

"We measured the new motor and drive versus the old setup, using a standard Dranetz PX5 power monitor to measure the power consumption. We made sure that the process conditions were similar as far as pressure head, tank levels, and pulp consistency. In our mind the process conditions are very similar. I'm not saying this is rocket science but we made a pretty valid comparison."



Looks the same. The new IE4 synchronous reluctance motor (foreground) has the same footprint and frame size as the older ABB motor it replaced.



The new ACS850 variable speed drive (left) replaced an older ABB Sami GS drive, similar to the one on the right.

25% less energy consumption

The results are almost too good to believe, but there is no logical explanation for why they should not be valid. The highest mean value measured was 32.0 kW for the new SynRM motor, while for the old motor the lowest mean value was 43.6 kW. This gives a saving of more than 25 percent in energy consumption. Sedy admits that the results seem very high.

“We were very skeptical in the beginning as well. And when we spoke with our process engineer colleagues they said it was impossible to save so much. So we went through the exercise numerous times, with a very long series of data collection, and got essentially the same result. I have an Excel document with thousands of measurement points and the fact is these are the numbers we have for comparing the two motors.”

The only thing that is not exactly the same for the side-by-side pumps is the slightly different pipe geometry. The old pump feeds into a T-joint, while the new one feeds into a more rounded pipe elbow. Otherwise the testing conditions were extremely similar, with the same pulp and tank levels, at the same temperature and consistency. So the process condition differences are very small, and it's hard to believe that T-joint pipe geometry could cause such energy losses.

100% certain SynRM is better

Concluding the discussion, Sedy Zigon smiles and says: “We don't know for sure how much energy saving we are getting from the new motor technology. Maybe it's 25 percent. Even if it is 10 or 15 percent it is big. But I am 100 percent certain that we can conclude that it is much better than the old one!”



Stora Enso, Nymölla Mill

Operating since 1962 in Nymölla, Sweden, the Nymölla Mill produces office and digital paper for documents, brochures, preprint, offset and envelopes. The MutiCopy paper produced here is one of the most well-known brands in this segment. The mill has about 700 employees.

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