

Paper Mill Refurbishment Project

Refurbishment plan restores over 30 cell stack assemblies to OEM condition—without losing production time at manufacturing plant

Results

Reduced downtime from failed cell stack modules

- Previous annual downtime approximately 315 hours
- Previous downtime cost approximately \$240k/yr

Avoided \$1.9MM in new equipment costs

- Eliminated cost of buying new drives (\$1.5MM)
- Eliminated cost of buying new cell stacks (\$400K)

Extended life cycle of 30+ drives for customer

- Completed refurbishment of all drives in time to meet critical shutdown schedule

"Not only has the GE Louisville shop delivered on everything we have asked of them, but they have done so promptly and professionally. I would recommend using them to any of the facilities in our company."

— Project engineer, paper mill in Southeast U.S.



Each drive failure resulted in an average downtime of 3.5 hours, with an hourly downtime cost of approximately \$3000. In addition to the downtime costs were the costs of repair or replacement parts. Since the costs for the troubled production line were becoming prohibitive (at approximately \$240,000 per year), the company was looking for a comprehensive solution.

Driving Plant Performance

Improving reliability and extending the life cycle of paper drives—while avoiding the cost of new equipment.

A leading international paper products company based in the Southeast U.S.—with worldwide annual sales greater than \$16 Billion—began experiencing excessive downtime at one of their paper mills due to frequent drive failures.

The main product of this plant is toilet tissue paper, which is produced on two separate production lines that are both dependent upon AC2000 drives for their uptime.

From August 2004 to August 2005, one of the plant's production lines experienced some downtime as a result of 6 drive failures. However, during that same time period, the other production line experienced *fifteen times that amount of downtime* due to 90 drive failures.

High Reliability at Dramatically Lower Cost

To help analyze their drive failure problems, the paper mill's project manager contacted the GE Industrial Services Drives & Controls team to arrange a meeting. He also inquired about the pricing for 30 new DS2020 cell stack assemblies, since the company was considering budgeting for new parts.

At their subsequent August 2005 meeting, the project manager worked with specialists from the Drives and Controls team to identify key concerns about the production line—including PL cable connection problems, GTO stack module failures, parts obsolescence, and capacitor life. In addition to the age of the equipment, the drive cabinets were installed in a harsh caustic environment—which was a factor in some of the failures.

A follow-up meeting was held at GE's Drives & Controls Parts Repair facility in Louisville, Kentucky to review the plant's long term needs and GE's ability to support the AC2000 drives.

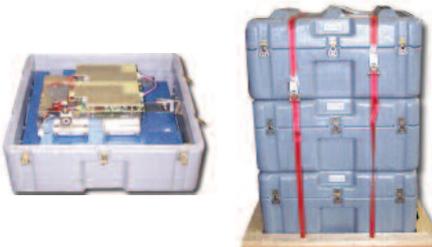




Successful operation of the production line depended upon the reliability and availability of all 30+ paper machine drives that produced the toilet tissue paper. The reason the customer initially considered buying new machines was to avoid the lost production dollars caused by the drive failures—which involved significant costs. However, through close collaboration, GE's repair specialists and the customer were able to develop a more cost-effective but equally reliable alternative: the phased refurbishment of over 30 GTO assemblies to original OEM condition. This alternative was also designed to meet the paper mill's critical shut-down schedule.

"After our meeting and tour of the facility, we were very comfortable in using GE's Louisville service center."

— Project Manager, paper mill in Southeast U.S.



OEM-certified refurbished units in custom packaging for return to customer.

Creative Project Implementation

Pro-active solutions to maintain, optimize, and extend key infrastructure assets.

In order to meet the tight schedule, GE Energy's Drives & Controls Parts and Repair team *provided three seed assemblies on loan to the paper mill*. Once these units were installed at the mill, they served as the anchor for a rotating repair cycle that could refurbish three customer assemblies at a time within a two-week period.

At the end of each two-week cycle, the refurbished cell stack assemblies were shipped to the paper mill in custom packaging for safe shipment. In turn, three more assemblies were sent from the mill to GE's Louisville, Kentucky site for repair.

By following this regimen GE was able to return all of the refurbished units to the customer within the 12-month period required for the paper mill's schedule.

In addition to saving the customer over \$240,000 per year in costs from continued downtime, the refurbished cell stack assemblies were restored to OEM-certified condition. This creative approach—developed with the customer's team—eliminated the expense of buying new cell stack assemblies and drives, for savings of approximately \$1.9 million.

The refurbished AC-2000 drives currently installed at the mill have a dramatically extended life cycle, and with regular pro-active maintenance and inspection, will be able to continue their successful operation.

"The stack module program has helped address one of the major downtime problems that we have seen...a key factor in our choosing to start and continue this program."

— Project engineer, paper mill in Southeast U.S.

For more information about GE Industrial Services and our Drives and Controls offerings, contact your GE representative.

