

## Solutions

- **Allen-Bradley PowerFlex 4 AC Drive Upgrade**
  - Variable control for gradual speed changes
  - Simple Interface provides ease of use for operators
  - Technicians are less busy with maintenance and equipment changes

## Results

- **More precise control**
  - Increased separation of swab packs on sorting belt reduced over-pack by over 2 percent
  - Over-pack reduction translates into hundreds of cases of finished product a year
- **Reduced waste**
  - Less efficient mechanical arm and photo eye eliminated, achieving a 50 percent reduction in waste
- **Improved training, less downtime**
  - AC drives allow for gradual speed changes for new operators
  - 20- to-40 minute periods of downtime for swab material changes eliminated

## Solon Manufacturing Increases Production by 10% and Reduces Waste by 50% With AC Drives

Cotton swab manufacturer streamlines packaging process and eliminates costly downtime



### Background

The medical and industrial electronics industries demand a steady and reliable supply of sterile swabs to clean everything from throats and feet to computer keyboards and disk drives. Because these swabs could be rendered useless if they are even a millimeter too large or small for some medical or electronic tests, Solon Manufacturing must produce applicators with tips that are sterile, precisely configured, and made of diverse foam and cotton fibers.

Solon also produces a variety of wood-based products including wooden ice cream spoons, and sticks for corn dogs, ice cream, paint and crafts. The production requirements for all lines are similar, regardless of industry application: ultra clean products must be made to precise specifications as quickly as possible while minimizing waste.

To ensure it could consistently meet its production requirements, Solon partnered with Horizon Solutions Corp., a Rockwell Automation distributor of automation products and services.

Horizon Solutions determined Solon could use Allen-Bradley® variable frequency drives to reduce over-packing by approximately two percent in the sorting and packaging stage of its cotton-tipped applicator line and more precisely control the tipping equipment for different fibers and configurations.

In the end, Solon increased production by 10 percent and reduced waste by 50 percent on the cotton tipped applicator line, far exceeding expectations.

### Challenge

To attach a swath of fiber to the swab, Solon Manufacturing's cotton tip applicator machines feed sticks through a hopper and then send them to a pickup wheel to be separated. The separated sticks are fed into a glue wheel and passed to the next wheel so fiber can be spun around the stick. This fiber is fed from a continuous rope, which is unwound from a large coil located next to the machine. The swabs go through a forming rail to give each tip its desired shape. Finally, the spun tips of the swabs have a binding agent applied to prevent the material from fraying. The swabs then leave the machine to be sorted and prepared for packing.



Previously, the sorting stage consisted of a mechanical collection arm, photo eye and counter that separated swabs into groups of 100 and launched them onto a sorting conveyor belt. The jerky motion of the mechanical method caused a considerable amount of waste by scattering cotton swabs onto the machinery. In addition, there was no clear distinction between segments of swabs, forcing machine operators to over-pack the swab containers by one to two percent.

Machine technicians also had to shut down the line to manually change gears, sprockets or sheaves. The process normally took 20 to 40 minutes – a considerable amount of downtime for machines that can produce thousands of swabs in that time frame.

“We realized the mechanical sorting process was resulting in cases of wasted product each day,” explains Peter Martell, process engineer, Solon Manufacturing. “To be flexible enough to meet our customers’ needs and produce the optimum product, we also realized that we needed variable speed control on the machine for some of the specialty fiber swabs.”

After evaluating a selection of AC drives, Solon decided that the Allen-Bradley PowerFlex 4 drives would provide the performance it needed at a cost that made sense for its budget.

### Solution

The PowerFlex 4 upgrade permits Solon technicians to increase the sorting belt motor speed up to 40 hertz for one second, and then slow it back down to 2 hertz for about 10 seconds.

This speed change creates a clear distinction between sets of swabs so machine operators can easily determine the correct number of swabs for packing. The mechanical arm and air cylinder were eliminated from the process, resulting in an immediate reduction in swab debris on the floor and machinery.

The drives also ease maintenance and help operators easily adjust the speed of the machines for different product configurations and fibers.

The ability to vary the conveyor speed also allows new machine operators to gradually speed up the process as they learn. Before installing the PowerFlex 4 drives, operators had to shut down the line if the product was being released faster than they could handle. The improved speed control also saved the swab machines from the extensive wear and tear they endure as a result of several shutdowns per shift.

### Results

After eight months of PowerFlex 4 usage, Solon was able to report significant progress toward the goals they established in 2001.

“The results were surprising,” Martell said. “We actually exceeded our goal of two percent reduction of over-pack, which translates into hundreds of cases of finished product. In addition, on the first machine we installed the PowerFlex 4 drive, we achieved a 50 percent reduction in waste, and an average of 10 percent increase in overall production.”

Pleased with the improvement in his swab packaging line, Martell decided to introduce PowerFlex 4 drives in the Skowhegan facility’s food and paint paddle divisions. Production in these areas has risen 15 to 20 percent since the upgrades. Solon was able to save \$7,500 to \$9,000 on three paint paddle machines using the PowerFlex 4.

Martell and his technicians continue to find machinery throughout the Skowhegan plant that would benefit from control upgrades. He credits Solon’s success to the drive’s ease of use, as well as the consistent service of the Rockwell Automation distributor. “The PowerFlex 4 drives were easy to install and program. They also enabled us to run the paint paddle lines with half the labor, greatly reducing operating costs. We can’t make changes fast enough to upgrade all of our swab, paint paddle and ice cream spoon equipment with PowerFlex 4 drives.”

The PowerFlex drives give Solon more ability to provide custom swab products to diagnostic and industrial accounts. “If there is a special request for a size, shape or particular fiber, we are willing to work with the customers to suit their needs.”

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