

## Case Study PCS80 Active Voltage Conditioner

### Amcor Flexibles benefit from ABB 1MVA Voltage Conditioner



A blown plastic film line similar to those protected by the ABB AVC

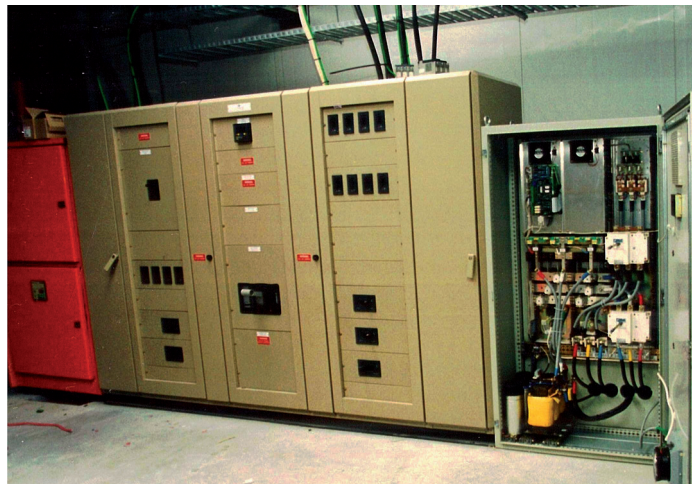
"Installing ABB's Active Voltage Conditioner on our production line power feed was one of the best moves we ever made," says Peter Twort, Production Manager for Amcor Flexibles in Auckland. It's the sort of response you would expect from a company which in former times had more than its share of power sags and brownouts with inevitable negative consequences for its sensitive plastic extrusion machinery.

"Before we installed the PCS80AVC," says Peter, "the slightest flicker of the lights and we'd be in trouble, but now we never worry about it, it just works away quietly in the background. At the end of this financial year we expect our downtime and wastage figures to be right down. In waste alone a stoppage can cost us \$2000 an hour, not to speak of the lost time and frustration it causes the operators. ABB's AVC is helping this plant to achieve its goal of operational excellence."

Modern production lines can be particularly sensitive to voltage fluctuations and ABB Power Quality has developed particular expertise in offering solutions in this critical area. "Power quality has become a hot topic for New Zealand industry over the past few years, with changes in power company structures, planning, and scares like the Auckland CBD blackout," says Keith Valentine, Business Integration Manager for ABB Power Quality.

"Power spikes, surges, sags, and outages cause particular problems with factory process machinery that can result not only in lost time and lost profits but in lost orders from failures in quality and failure to deliver on time.

Of all the applications we've come up with, the ABB PCS80 AVC (Active Voltage Conditioner) is one of the simplest and most cost-effective solutions to the most common power quality



The Amcor main switchboard installation with the PCS100 on the right

problems. With the AVC you can electronically process entire feeds to factories or large buildings for correction of voltage disturbances and distortions such as sags and harmonics while providing voltage regulation as well." Amcor Flexibles out in Auckland's Albany industrial zone is a classic example of the benefits of the AVC technology. Paul Butler, Plant Maintenance Electrician, is in a better position than most to appreciate its advantages. He's on 24-hour call should a production line go down, because once the power falls over, for any reason, he and his team have less than thirty minutes to take emergency action before plastics set hard in the film extruders. He explains the critical areas of the production process that makes the PCS80 AVC such a lifesaver.

"When a production line is shut down for any reason, including regular maintenance, it's normally a carefully planned process. We have to scrupulously flush out the screws, barrels and dies on the machines so that no product is left behind, otherwise we could end up with gel marks and burn spots on the next lot of wrapping to go through, which could mean a whole roll of wrapping being rejected – a very expensive business!

"This gives an idea of what an unplanned stoppage can do to the lines. At the old Porana Road plant Power New Zealand would check with factory management before doing a power switch of any sort and I would have to check out the machines to see if they were in a condition to stop.

The biggest initial problem with a stoppage is that the machines immediately start losing heat, so you get product solidifying inside the vital parts. Nylon is particularly difficult because it can take up to six hours to heat up again. Even an unplanned twenty minute stoppage can mean problems for up to four or five days following the event and a sag in voltage beyond the machine's tolerance range of plus or minus ten percent always meant a stoppage in the old days before the AVC was installed."

Paul has been full-time at Amcor Flexibles since 1973 and has, in his own words, "grown up with the plant," since its original setting up at Porana Road, Glenfield. The present site of Amcor Flexibles at Rideway in the Albany industrial estate was green fields only a few years ago and had a PCS80 AVC installed from day one as a result of Amcor's previous experience with the technology. At the old site at Porana Road, ABB had installed a 300KVA active voltage conditioner in order to demonstrate to Amcor (then known as Transpac) that the device would solve the problem of machine down-time due to voltage fluctuations.

"We used to have a lot of power supply problems at the old site," says Paul. "The AVC was installed on only one production line at the start in order to demonstrate to Transpac that it would work. What happened was that this one production line with the AVC would carry on working while all the others fell over. We put it on the cheese bag line, which was a really critical line because it dealt with seven layers of plastic and had seven extruders, which meant a lot of wastage if a problem occurs. One of the layers, for example, is nylon, which is a particular problem because of the speed with which it solidifies once the line stops; you've only got 20 minutes at the most to deal with it before you're in big trouble."

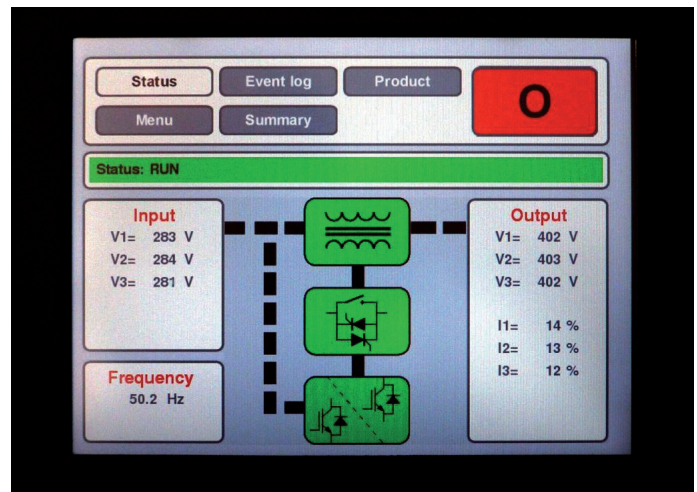
"But it's not just the technical problems with the line itself, it's the fact that the raw material lost in a stoppage can't be recycled, it's just scrap, and when we get the line going again after a stoppage there's further wastage of raw material while we run the extruders up and re-adjust everything. It's not economic to have any stoppages; these lines are meant to operate 24 hours a day."

Amcor Flexibles is in the plastic wrapping business, producing flexible packaging for everything and anything a manufacturer or processor may require from cheese to chocolate. Some packaging requires up to nine layers of various plastic materials chosen for special characteristics like permeability, absorption, moisture proofing, and ink receptivity. Each layer may have its own individual temperature range, ideal micron thickness and working range, which requires careful setting up of the production line and an initial tuning run-up where raw material will be run to waste while adjustments are made. This waste has no market value.

Amcor's customers order wrapping in rolls sized to precise specifications which Amcor has to meet. Undersized rolls resulting from a machine stoppage simply end up as further waste. "If we get a glitch in the power supply," explains Paul, "it's usually the case that the roll is wasted unless we can sell it as a downgrade to another customer. But the economics aren't very good on that sort of deal." A stoppage on a production line for any reason always means wastage and lost profitability.

"When we first moved to the new Albany site in November 1998 we had a lot of problems with the power supply," explains Paul. "There were power surges across the whole Albany area. The AVC has an events log on it which records power surge events at 10, 20 and 30

percent intervals on the 400 volt system. If voltage drops to 280 volts or less on the input side (30 percent) this inevitably results in a blackout, and we logged a few of those in the beginning, but blackout events are now quite rare and brownouts much more prevalent. The AVC will monitor and still control the power and prevent a line shutdown pretty close to 30 percent. The production machine itself will handle a plus or minus 10 percent fluctuation on its own."



The AVC display

John Penny, General Manager of ABB Power Quality explains further, "The AVC we installed at Amcor is rated one megawatt at 18 percent correction, meaning it will correct down to 18 percent then after that the output starts dropping at the same rate as input. Any correction is carried out very, very fast; two milliseconds is the response time so basically nothing escapes the AVC. Research carried out here and overseas shows that 90 percent of voltage disturbances can be mitigated by regulating mains voltage variations of less than 30 percent, which is the AVC's normal working range."

With Amcor Flexibles running its production lines around the clock any blackout condition means that Paul Butler gets called back just like any doctor on emergency call. However, the ABB voltage conditioner has spelled the end to a lot of sleepless nights in the line of duty. "I haven't been called out for a power glitch since March (this interview was in September 1999). Basically the AVC is looking after all events under 30 percent, events which under previous circumstances would have been uncontrolled and would have resulted in all production lines coming to a halt. That has meant a huge saving to Amcor in wastage alone, never mind the downtime and lost production, so the AVC would have paid for itself over and over again in just that short time."

That's a position Amcor Flexibles is more than happy to live with. The company's \$20 million facility out in Albany is one of the most modern plants of its type and its extruded barrier film is aimed at a sophisticated market where standards are very high. Bob Thomas, General Manager for Amcor Flexibles Australasia remarked in a recent copy of the company newspaper, "we believe packaging will play an increasingly critical role in maintaining quality assurance standards and this new facility sets the benchmark for all future new operations." With ABB's proven AVC technology behind them Amcor Flexibles will have no problem maintaining that benchmark position.

**Update:** Paul Butler reports that after 5 years operation the unit was taken out of service for the first time and all the fans were replaced under routine maintenance. Other than this, the unit has been continuously online with 100% reliability. The procurement of a second AVC unit in 2005 after having the first unit for 7 years shows a strong trend amongst ABB AVC clients. Amcor joined a growing list of ABB Power Quality clients purchasing additional units, and there is no greater endorsement of a product than someone who purchases another unit after owning the first for 7 years.

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### Technical Specifications

Date of Installation	December 1998/ December 2005
Power Rating	1MVA
Voltage	400V 3 Phase
Frequency	50Hz
Maximum sag voltage correction	18% / 30%
Response to sag event	Sub cycle
Load	Plastic film extruder plant
Product	9 layer plastic film
Reason for installation	To protect against voltage sags caused by distribution faults
Availability since installation	100%