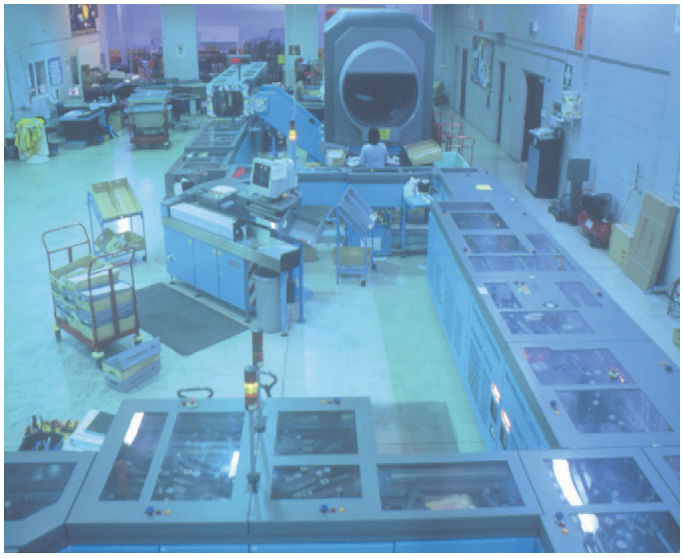
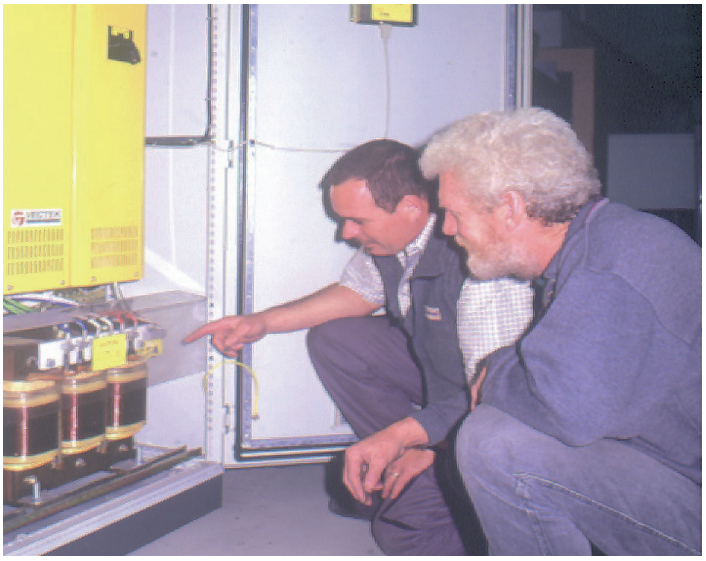
Power Protection Solutions

Case Study
PCS80 Active Voltage Conditioner

ABB voltage conditioner helps the mail go through



NSMC Mail Sorting Machine



NZ Post Technicians Peter Rogers and Neil Tulloch

"Since installing a PCS80 Active Voltage Conditioner (AVC) in our South Auckland and North Shore Mail Centres we have had no problems at all with our mail sorters," says Peter Rogers, Operations Technical Support Manager for New Zealand Post.

"Before we installed the AVC, power fluctuations cost us $45,000 over two years at North Shore, and more than twice that in South Auckland. Voltage dips regularly caused machine shutdowns, and we had two stoppages in three days at the worst point."

PCS80 AVC's maintain constant voltage output to plant and machinery, correcting for voltage sags, unbalance and harmonic voltage distortions. The inverter controlled sag correction works well within a single AC cycle, ensuring a smooth output, and a static bypass feature gives added overload protection.

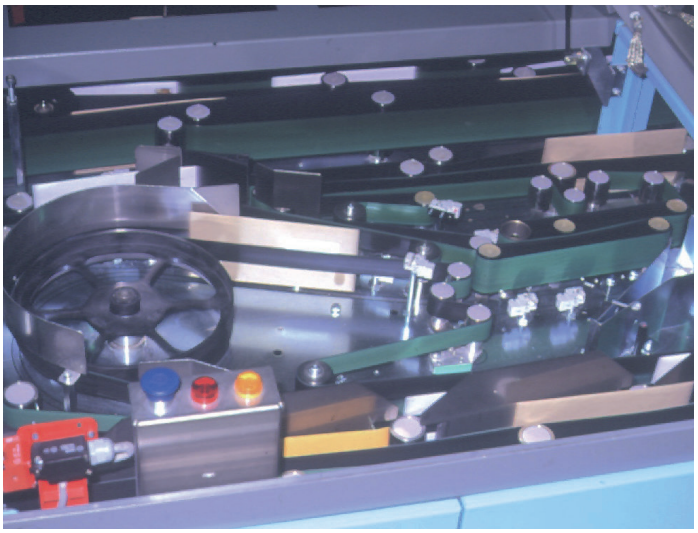
New Zealand Post uses ABB PCS80 AVC's for maintaining the power supply to its sophisticated mail sorting machines. The $5.5 million sorting machines were supplied by a German manufacturer who at the same time was supplying the Royal Mail in the UK with 150 similar machines. Although they are not identical in specification they have similar operating characteristics and that extends to their low tolerance of voltage fluctuations.

"If the voltage drops 10 per cent, the sorting machine stops," says Peter Rogers. "And when the machine goes down it takes an hour and a half to bring it back to life," explains Neil Tulloch, a service technician. "With 30 or 40 people standing around, the cost can run up to $10,000 an hour."

The problem is particularly bad in New Zealand because we have large distances from generation source to user, with some of our power coming from the South Island hydro lakes through the Cook Strait cable," Peter explains.

"The power companies here have a consumer guarantee of 230 volts plus or minus 5 per cent. Here in the North Shore we're at the end of the line which comes all the way across Auckland and through the Wairau Road industrial area, all this making NZ Post more susceptible to voltage dips and brownouts." This is aggravated at certain times of the year when the possibility of lightening strike is much higher. Even though the strike may be a long way from the plant, the automatic network protection systems can cause voltage sags through adjacent areas as the system reconfigures itself.

The North Shore Mail Centre PCS80 AVC, an 100 kVA unit rated for 30 per cent sags, has logged 12 events in the past four months. Nine of those were voltage drops between 10 per cent and 20 per cent, with the remaining three up to 30 per cent but none over that figure. A dip of 10 per cent or more is enough to trip the high-pressure gas discharge lighting used to light the mail sorting area, effectively throwing it into darkness, but the machine itself keeps going thanks to the AVC.



NSMC Mail Sorting Machine

Technical Specifications

Date of Installation	October 1999
Power Rating	100kVA
Voltage	400V 3 Phase
Frequency	50Hz
Maximum sag voltage correction	32% 3 Phase
Response to sag event	Sub cycle
Load	Mail sorting machine
Product	Sorted mail
Reason for installation	Voltage sags were causing excessive stoppages with corresponding high costs
Availability since installation	100%

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Each mail sorting machine has two separate power supplies. The seven computers which control the entire process are critical and so have a ABB Uninterruptible Power Supply (UPS), while the mechanical machinery's essential power is conditioned by the PCS80 AVC which stands unobtrusively against the wall. A UPS would solve all brownout and power cut problems, but at considerably more capital cost plus maintenance and regular replacement of batteries.

At 33 metres long, the mail sorting machine occupies a very large floor space. Letter mail is deposited into a large rotating section at one end, inevitably dubbed the "concrete mixer," from where it tumbles into the start of the sorting process.

Reversible belts take care of reversed or inverted envelopes, and each address is scanned and its information collected into a 12-digit machine directory code which is applied to the envelope as a bar code. In this way each piece of mail is tracked at each stage through the machine, either to one of the reject bins or sorted into final destinations.

A metal detector ejects those envelopes containing staples, paper clips and coins, while other criteria such as illegibility, inflexibility or size over 200mm high or 6mm thick are also cause for rejection. Rejected mail is hand sorted, but Peter says the majority of handwritten addresses can be read by the machine.

Over 33,000 items of mail go through the sorter every hour, close to the maximum rate of 37,000, and all moving at a rate of 3 metres/second or 10.8 kilometres/hour. Automatic cutouts, with their operation marked by flashing lights, are located at numerous points, and any blockage or raising of cabinet covers will bring the entire operation to a temporary halt.

The additional stoppages caused by voltage sags made the situation even worse. "The biggest problem in fault finding is the sheer size of the equipment," says Neil Tulloch, "you have to walk all around it to get anywhere, and we end up walking miles every day." But his task, and that of Peter Rogers, is greatly simplified by the PCS80 AVC, providing clean and consistent power.