

# POWER SMART<sup>®</sup> PROFILES



NOVEMBER 1998

INDUSTRIAL BUILDINGS, NO.13

## CN Reaps Annual Savings of \$100 000



*CN's Symington Yard in Winnipeg, setting for energy efficiency projects in compressed air and power factor correction*

Canadian National Railways has completed work on two Power Smart<sup>®</sup> projects that are expected to slash its annual electricity bills by \$100 000.

Savings were achieved with:

- a new compressed air system at Symington Yard—\$55 000
- a complementary power factor correction project—\$45 000.

### Compressed Air

The old compressed air system consisted of eight compressors totalling 750 hp.

Occupying four small buildings throughout the yard, they were linked by a network of buried metal piping that supplied “filling” stations for

pressurizing the braking systems on trains.

The system annually cost more than \$80 000 to operate, even though air to charge the trains was needed only two to three hours a day.

Prompted by the soaring costs of running the compressed air system, CN asked Manitoba Hydro's Business Engineering Services to run a system audit.

The audit revealed that the buried metal piping carrying the compressed air had developed extensive leaks because of lack of cathodic protection.

“Pipes were leaking at the rate of 400 cfm—enough to keep a 100 hp compressor busy round the clock,” says Ron Marshall, an Industrial

Systems Specialist at Manitoba Hydro.

“Some compressors were running full bore to keep up with the leaks. Others were running continuously even though they were hardly ever loaded.

“An air dryer, critical for keeping moisture out of lines and valves to avoid freeze-ups in winter, was consuming air at the rate of 200 cfm. That's about four times the amount of air that needed to be dried.

“Further, because of the isolated layout, three-quarters of the system did not benefit from the air dryer.”

As a result of Hydro's audit, CN shut down 650 hp of compression. It now runs a single 100 hp compressor at one location, with two 50 hp compressors for backup.

The 100 hp compressor feeds a new 10 000 gallon air storage tank that keeps plenty of air on hand for charging the trains.

The old air dryer was replaced with a newer version that serves the entire system yet consumes only 15 per cent of the power of its predecessor.

New plastic piping has been installed to replace the leaky steel pipes and tie all air systems together so that the single compressor can supply the entire yard.

Follow-up tests of the new piping were unable to detect leaks.

The project cost \$180 000, and yields annual electrical savings of \$55 000. With an incentive under Manitoba Hydro's Performance Optimization Program, the project will pay for itself in two years.

It has cut electrical consumption at the yard by 1 500 000 kW·h, for energy savings of more than 70 per cent. Reduction in demand on Hydro's system is 220 kV·A.

Milton Schenk, Maintenance Supervisor, Facility Maintenance, praises the new compressed air system which was designed by UMA Engineering.

"We basically had four compressed air systems working independently.

"By consolidating the four into a single system linked by new piping, we were able to phase out 650 hp of air compressors and cancel plans to buy more air dryers.

"In addition to major savings, we now have an extremely reliable system for pressurizing the braking systems on our trains.

"Given that delays in charging the trains can cost thousands of dollars a minute in late delivery penalties, that kind of reliability spells good business."

### Power Factor Correction

Work on the compressed air system was complemented by installation of a power factor correction system that improves the power factor at the yard.

Power factor is the ratio of the amount of power that a customer actually uses, to the power actually supplied by Hydro.

Typically, it ranges from about 0.7 to more than 0.95, to a maximum of 1.

The higher your power factor, the harder your electricity works for you.

An electrical audit of the yard showed that its power factor sometimes sank as low as 0.8—the equivalent of getting the use of only 8 litres of gas for your car even though you've bought 10 litres.

The low power factor was caused in part by the large number of motors in the yard.

Manitoba Hydro recommended a yard-wide power factor correction system that is expected to save CN \$45 000 a year. With financing by Manitoba Hydro, the project has a simple payback of two years.

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*Compressed air "filling" station, for charging the braking systems on trains. Rails driven into the ground on either side of the risers protect piping from snow removal equipment.*



*Power factor correction circuitry for entire load at the yard. The circuitry has two settings—one for winter and one for summer—for maximum year-round efficiency.*

