


POWER SMART[®]

PROFILES



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Prairie Forest Products Saves with New VSD Compressor



A 75 HP air compressor, controlled by a built-in variable speed drive, saves energy, maintenance, and downtime at Prairie Forest Products.

Prairie Forest Products in Neepawa recently replaced five small conventional air compressors with a larger single unit controlled by a built-in variable speed drive—the first compressor of its kind in the province.

They also added a large air storage receiver and a flow control valve to complement the efficiency of the company's compressed air system.

These refinements have reduced energy consumption by \$11,500 a year over the base case and saved substantially on maintenance and downtime.

Prairie Forest Products produces fence panels and treated wood products. They use compressed air to drive nail guns, pneumatic cylinders and other air loads critical to production.

Even with five compressors to do the job, the plant's compressed air system often suffered pressure drops that halted production. Water in the

compressed air lines also created a maintenance headache.

"We knew we had to do something to cut downtime," says Rick Knechtel, Plant Manager, "particularly for those times when we needed to run seven days a week, 24 hours a day."

VSD Option Weighed

When Atlas Copco offered the company an integral variable speed drive compressor, two of the staff at Prairie Forest Products performed a preliminary feasibility study of the new option.

Rey Mack, Maintenance Supervisor, and Steve Obsniuk, Stores and Purchasing, found significant potential for reducing energy consumption, maintenance costs, and demand charges. They also checked with users back East, who confirmed their findings and praised VSD compressors for problem-free performance.

Prairie Forest Products then turned to Manitoba Hydro's energy efficiency

experts to evaluate the new compressor in light of other options.

The company had used Manitoba Hydro's compressed air expertise in the past, as well as its power quality services, to reduce energy costs more than \$8,000 a year.

"We installed data loggers on their compressed air system to track what was happening," says Ron Marshall, an Industrial Systems Officer at Manitoba Hydro.

"Our loggers showed pressure drops of up to 40 psi when large loads such as the fence panel machine's pneumatic cylinders came on. The plant was simply running out of air. An upgrade of compressor and receiver capacity was required."

The loggers also showed long periods of mid- to low-loads, with only brief periods at full load—ideal for a compressor controlled by a variable speed drive.

Marshall then compared the feasibility of adding another smaller



The new VSD compressor has virtually eliminated production downtime on the air nailers used to assemble fence panels. Nail placement is also more uniform.

compressor or replacing all five old compressors with one of three options:

- a typical modulating compressor
- a unit running in load/unload mode
- a variable speed drive model.

He also compared the costs of operating with or without a 2000-gallon air storage reservoir and flow control valve.

Although the VSD compressor could have operated adequately without the air storage reservoir, Marshall recommended installing the reservoir/flow valve for three reasons: 1) It would stabilize the system during large air events, 2) reduce electrical

demand, and 3) spare the compressor the wear and tear of too frequent shut-down and start-up cycles.

Calculations showed that compared with a standard modulating compressor, a stand-alone VSD/reservoir/flow valve would cut operating and energy costs by at least 35 per cent.

Once the system was in place, Manitoba Hydro verified the installation and helped adjust settings for optimum performance.

Setting a Precedent

Rick Knechtel says the new system has surpassed expectations.

“Payback was 1.5 years, and we now have capacity to expand our operations if we need to.

“The storage tank has eliminated pressure drops, for a much smoother operation. It has also reduced demand charges by avoiding large surges in consumption to meet high-demand events.

“Water in the lines has been eliminated by the integral dryer in the compressor, and we’re saving on maintenance and downtime.

“We’ve even set a precedent,” he adds.

“Some of our affiliated

manufacturing operations with similar compressed air systems may well be following in our footsteps!”

Rob Armstrong, Manager of Hydro’s Business Engineering Solutions Group, says the project is typical of those supported by Manitoba Hydro’s Power Smart® Performance Optimization Program.

“Our program encourages a systems analysis approach to solving production problems in an energy efficient way.

“With compressed air, it involves analyzing end uses, improving distribution and storage, and optimizing supply equipment and controls.

“In that way, companies can better understand their systems, setting the stage for energy efficient solutions.”

Total electrical savings to date have been verified at 312,000 kWh and 18 kVa peak for a 43 per cent savings in operating costs over the base case.



*Manitoba Hydro is a licensee of the registered Official Mark

Why A VSD Compressor?

A compressor controlled by a variable speed drive draws power in almost direct proportion to the load, with energy consumption dropping to near zero at no-load.

In contrast, conventional compressors are less efficient because at no-load they consume between 13 and 85 per cent of their full-load consumption, depending on the manufacturer and operating mode.

“That is the main key to the efficiency of a VSD compressor like the one installed at Prairie Forest Products,” says Ron Marshall, an Industrial Systems Officer at Manitoba Hydro and compressed air specialist.

“Because most plants operate well under their peak compressed air production capacity most of the time, a VSD compressor can save significant amounts of energy.”

At full-load, however, energy consumption by a VSD system is typically slightly higher than standard compressors because of power losses in the inverter.

As a result, the best energy savings with a VSD system are when the compressor runs for long periods at low- or mid-load range, with only brief periods of full-load operation. This coincides with most industrial operations, where the compressed air load fluctuates between 50 and 90 per cent of compressor capacity.

Another energy efficient strategy is to use a VSD compressor as a trim unit in a multiple compressor system.

At 100 cfm, Prairie Forest Product’s average operating condition, the VSD compressor consumes only 19 kW while the other two compressors consume 37 kW and 54 kW.

