

# —POWER SMART® PROFILES

April 2002

Industrial Buildings No. 24

## Loewen Expands Plant Yet Lowers Compressed Air Costs 35%

Loewen Windows, one of Manitoba's leading manufacturers of windows and doors for worldwide markets, recently expanded its operations by 40 per cent.

But instead of a corresponding increase in compressed air operating costs, Loewen succeeded in slashing costs by 35 per cent with the help of state-of-the-art VSD technology, basic Power Smart® measures, and staff involvement.

In fall 2000, Richard Dutchak, Facilities Engineering Manager for Loewen Windows, approached Ron Marshall, Industrial Systems Officer with Manitoba Hydro. He was seeking technical advice on upgrading the company's compressed air system capacity to cope with a planned addition that would increase manufacturing space from 40 000 m<sup>3</sup> to 56 000 m<sup>3</sup>.

Loewen's system was already one of the most efficient in the province following an earlier Power Smart upgrade (see Power Smart Profile "Loewen Makes a Good System Better," November 1998). Yet projections showed that additional capacity would be required to supply new production equipment.

Ron Marshall recommended installing a new Variable Speed Drive (VSD) compressor, tackling air leaks, lowering plant air pressure, and optimizing or replacing selected compressed air equipment.



*Production section at Loewen Windows. Enlisting the involvement of production staff helped lower compressed air costs in spite of a 40 per cent increase in manufacturing space.*

Loewen Windows decided to act on his recommendations, then used the resulting electrical savings to qualify for an attractive financial incentive under Hydro's Power Smart Performance Optimization Program (POP). Hydro's POP program provides commercial and industrial customers with technical and financial support in optimizing the performance of fans, pumps, compressors and other electric motor driven systems.

### Summer Student

To spearhead work on leak and plant pressure reduction, Loewen hired summer student, Randy Martens, who was enrolled in Mechanical Technology at Red River Community College.

After receiving guidance from Manitoba Hydro, Martens set to work with the goals for lowering plant pressure to 90 psi and reducing leaks to 100 cfm.

### Lowering Pressure

In most compressed air systems, lowering system pressure is one of the keys to reducing air consumption. The lower the air pressure supplied, the less air is consumed by unavoidable leaks and unregulated end uses.

Martens began by dropping pressure to the plant a little each day. Problems immediately developed at a critical pressure machine—a Carlson clamp that holds window parts together for stapling.

"The Carlson clamp has air motors that demand fairly high rates of flow," says Martens.

"But because of inadequacies in the machine's supply network, final pressure at the air motors was only 60 psi."

Martens solved the problem by upgrading the undersized supply hose to the Carlson clamp, then continued lowering plant pressure until he reached his goal of 90 psi.

### VSD-Controlled Compressor

Another important element of the upgrade was to replace an aging compressor with a variable speed drive (VSD) unit.

As the flow from a VSD compressor drops, energy consumption drops in proportion, falling to zero at no-load. In contrast, as the flow from a conventional compressor drops, energy consumption falls by only 15-70 per cent, depending on the manufacturer and mode of operation. Worse, at no-load, such a compressor consumes from 30-85 per cent of its rated full-load power. Standard compressors are, however, often more efficient at full load.

Because the average air flow in a typical plant is well under its peak compressed air production capacity, and because plant loading is constantly changing, a partially loaded compressor operating for significant periods is a certainty. Use of a VSD compressor under these conditions saves significant amounts of energy.

In multiple compressor systems, a VSD compressor runs as a "swing unit" to supply a varying plant load while the standard compressors supply the base load. During a light load when only one compressor is required, the VSD operates alone. Typically, to work efficiently in a multiple compressor system, a VSD must be equal to or larger than the largest base unit to limit energy-wasting cycling of the base units.

### Staff Involvement

Although his goal of dropping plant pressure was easy to meet, reducing plant

leaks proved a discouraging process. As soon as Martens repaired leaks in one location, new ones appeared in others.

One of the problems was that production staff were repairing leaky hoses with tape, a temporary fix that eliminated the noise of the leaks but not the leaks themselves. It struck him that his efforts could be multiplied if he could get the staff to fix the leaks themselves.

Martens took it upon himself to inform staff at weekly production meetings that Loewen Windows was spending some \$40 000 a year to produce compressed air, with roughly half of it wasted in supplying leaks.

He asked staff to report leaks and turn in any leaky air hoses. Within days, leaks were reduced to 100 cfm.

### System Upgrades

Other upgrades included a duplex thermal mass dryer and low differential coalescing filter, both sized for extremely low pressure differential.

Loewen also installed a new compressor sequencer to keep the least number of compressors running at any time. The sequencer, a necessity with most multiple compressor systems, also starts a backup

compressor without a pressure glitch should a base compressor fail.

Also installed was an innovative compressor room ventilation system that uses a VSD to pressurize the room, keeping the compressors cool and dust free.

### Avoided Costs

By upgrading its air system and reducing demand instead of expanding it, Loewen gained an estimated 373,000 kWh and 75 kVA, or 35 per cent savings, over pre-expansion levels.

Compared to a business-as-usual upgrade, Loewen reduced consumption and demand by an even more impressive 551,000 kWh and 90 kVA peak, or 50 per cent savings.

"Although Loewen was running an excellent compressed air system, they discovered that renewing efforts to reduce leaks, further lower plant pressure, and apply other basic measures proved extremely effective," said Ron Marshall.

"And by combining this approach with cutting edge technology, they made tremendous gains."

"It was a classic Power Smart compressed air success story!"



Randy Martens repairs leaky compressed air fittings on a radius clamp used to manufacture Loewen's line of arched windows.