

## Diary of a veteran eco-innovator: Harbec Plastics Inc. reveals how they did it.

By Candi S. Cross | Feb, 2009

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IT'S A BIRD ... IT'S A PLANE ... IT'S A WIND TURBINE!

Although more than 25,000 of the fascinating machines are in operation across the United States, one of them acquired fame in 2002 because of its unique presence on Route 104 in Rochester, N.Y., and its power to generate 450,000 kilowatt hours annually (about a third of the energy used by the facility it runs for). Back then, this 130-foot-tall wind turbine with blades that stretch 98 feet across on each side, held the kind of star power that caused bottlenecks and drew media attention. Harbec Plastics Inc., a custom-injection molder, caused a commotion with the installation, but both the company and the earth depended on it, insists owner Bob Bechtold.

Having started his career as a toolmaker from the barn in his own backyard with various fixtures, gauges and welding, Bechtold is not discouraged by controversy and welcomes the ups and downs of risk taking. More than a decade ago, he realized that taking chances was easy, but finding allies to accomplish more would prove to be very difficult. Before terms like "green," "sustainability" and "eco-innovation" became acceptable catchphrases or further, common goals in the manufacturing industry, Bechtold faced a business crisis that forced him to think in those terms.

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Soaring electricity rates, manic power shortages or outages and the push to meet the requirements of his plastic injection-molding company, which had left the barn and turned into a multimillion-dollar business fairly quickly, wheeled in a new era for Harbec Plastics. Demanding customers in the automotive, medical equipment and office products industries required different manufacturing processes for thousands of parts and engineering prototypes. And in the 1990s, many factories closed in Rochester as a result of the cost and labor hours that just-in-time sectors ushered in without much warning.

Some companies would never test sustainable practices that would ultimately decrease energy use, minimize material waste, replenish resources, alleviate pollution and provide a better work environment for employees. It comes as no surprise that expense, or what in some cases was perceived as an expense, was a top reason that business leaders dismissed making changes. If you ask Bechtold what was the biggest myth about running a sustainable manufacturing company years later, you'll get a sigh and a simple answer: cost.

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"Along with sustainability goes cost saving because it is all about using things more effectively, more efficiently," said Bechtold. "It's our single recurring thrust to people that come here or that ask me to come and speak. It's not more expensive than not being sustainable."

**Bold leadership**

Becoming an environmentally responsible manufacturer has been a constant effort for more than 10 years for Bechtold, who sums up a lonely process of "searching, banking, pushing, begging and conniving ... all those things that you do day by day to make things happen." Banks that he approached for business loans wanted metrics and had a reasonable amount of expectation for a change to pay for itself. However, Bechtold pitched projects that extended beyond those corporate norms.

"I'm not wealthy and I haven't gotten grants," he said. "Convincing banks that this is something they needed to loan me money

for was the greatest challenge. They didn't have any history in this to compare a model to so it was very hard. I was giving them situations that they couldn't compare it to. Government--or whoever--should have loan guarantees. Loan guarantees would have given me the permission. They don't understand the business, the market, all those related things like the seven or eight years of payback. The norm is so obvious: 'Why don't you just plug it in? The alternative is so simple, why bother?' The assumption is that it works so well, why would you screw with it; but the fact is that it is not working well."

Before Bechtold could implement different manufacturing processes at Harbec, he had to educate people about his existing operations. First, the art of molding parts from plastic is a multifarious process that relies on expertise from several fields. For instance, permanent molds (tooling of a specific product) are created from metal blocks that are structured with engineering diagrams. After the testing phase, the mold is installed onto machinery that injects heated plastic resins to cast each part. After a cooling period, the piece is ejected, the mold refilled and the process repeats itself. In the past, most production facilities involved hydraulic equipment responsible for the heated petroleum products on the shop floor. Heat and humidity levels related to this process alone have taken a toll on workers' health and safety and profits.

In order to cut fuel costs and preserve his work force, Bechtold explored the concept of using a wind turbine as a heat and electricity source. The environment would be a natural beneficiary of the improvement as well. After a complete energy audit at the plant and a few years of persistence, Bechtold acquired the financing to bring in a wind turbine.

"In the beginning days, we did everything without telling our customers. We were careful to hide everything we did because they were concerned that we were less than stable for the sake of passion or hobby," said Bechtold. "It wasn't until we put the wind turbine up--a strong commitment--that we actually came out of the closet, as it were, to talk about the environment. That was my first mistake: talking about the environment to banks. Then I realized after a couple of years of smashing my head against the wall that it was not a good move. I was seen as a tree-hugger, a birkenstocker. After a period of time, I stopped mentioning the environment and then recast the whole thought process into economic reasons. I did not mention the e-word, environment, again! When the wind turbine went up, we had to admit that we cared about the environment."

While the time was right, his management team along with a group of engineering consultants also recommended additional changes including conversion to energy-efficient lighting around the shop floor; purchase of efficient motors, soft starts and inverter drives; and conversion to all-electric molding equipment that would draw power only when needed. This turned out to be a facility redesign from a small business owners perspective, and the undertaking would not be cheap. The electric machines cost 50 percent more than hydraulic ones.

"There is a great versatile advantage for anyone who grasps how to use combined heat and power." said Bechtold. "The general trend is one way only, but that is very expensive. When we first put the wind turbine in, natural gas was \$3.44 a decatherm and our electricity was nine cents a kilowatt hour. We could run the turbine and throw the rest of our heat away, but then seven, eight years later, natural gas was over \$12 a decatherm--an enormous change--and through this, we've changed our operation strategy. The wind turbine makes electricity and it makes heat.

"We took all the electricity we needed but then with expensive gas, you can't throw the heat away or it cost more to make the electricity. When you have a true combined plant like we do, we have to run the turbines no matter what. The good news is that we can change the priority based on the cost relationship. We have a formula that lets us know whether we should go thermal or electrical."

Additionally, by converting to all-electric molding equipment, which again draws power only when needed, Harbec alleviated excess waste heat and excess moisture. The hydraulic oil residue from leaking fittings disappeared from the shop floor and noise was no longer an issue for the workers. Best of all, the company cut its greenhouse gas emissions from the molding operation in half.

#### Present-day Harbec Plastics

Fast-forward a few years and you walk into a manufacturing hub with state-of-the-art systems that ensure clean air and a noise-free work environment. Harbec recently completed building a green warehouse at its manufacturing facility, following the guidelines provided by the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) for sustainable building and architecture. The structure has two times the insulation required by building codes and the exhaust of the micro-turbines supplies the radiant heat in the floor. The building uses daylight gathering to light the interior, switching to electric lights only when a photoelectric device senses a significant decrease in light.

Bechtold's efforts no longer go unnoticed. Harbec seldom has to advertise for new hires in skill trades because the human resources department keeps a list of people looking and waiting for a position. The company has a bright reputation worldwide. Too, Bechtold's greatest challenge in the past--attracting other environmentally responsible companies that want to share

methodology, techniques, lessons learned in innovative ways, cost--has gotten a lot easier. Companies have approached him with their own economic and environmental goals.

"The fact is that the single greatest cost of doing business is energy, especially in the North. Why we keep presenting that potential to everyone who will listen is that we're hoping to strike a nerve to people who want to go in business and co-locate here, then we have more need for thermal and then we can run more turbines; then we help other businesses save money and cost," said Bechtold.

"We put a biodiesel plant next door because it requires process heat, a constant source of heat. Whether it's electrical tool or whatever fuel, it's constantly assumed. That's the cost of doing business. What we're doing is connecting their equipment to our turbine; we put the heat into water and then hot water (at 200 to 210 degrees); we use that in our heating and conditioning at Harbec. An electrical connection enables us to share the wind turbine energy and the thermal with a 3-inch pipe carrying the elements to Harbec. It means producing power for less cost."

Green collaborations don't stop there. Harbec has partnered with a company that makes household goods and is in the near-end stages of releasing a green household product line created with recycled polymer. The company's marketing plan screamed all the things that Harbec stands for, said Bechtold. For example, all product material is green-packaged and delivered in a truck that uses biodiesel fuel.

In just the last year, a large number of business leaders have called Bechtold and asked him how to get in the business of sustainability. Even with all the trials, tribulations and trendsetting, however, he says he doesn't have a good answer other than taking the concept into whatever they're doing and being a huge proponent of the "whatever" and "however" of sustainability.

"It's a passion and lots of late nights. Keep looking, asking and trying. Make a lot of mistakes, learn and start over," he said.

#### RELATED ARTICLE: BOTTLING INDUSTRY MAKES ECO-STRIDES

By Mike Weaver and Bob Reynolds

There is tremendous pressure on bottling companies to be environmentally friendly. The prime movers are unquestionably the beverage segment, led by the bottled water industry, with the carbonated market close on its heels.

Witness recent legislation that has banned the smaller sizes of water bottles in some cities in an attempt to reduce environmental waste. But regardless of the difficulty and expense involved, the insistence on achieving sustainability goes on unabated. Using less material has created a thing that the industry refers to as 'lightweighting' of the bottle, in which the weight of a typical PET (or the raw material, polyethylene terephthalate) bottle is driven down as far as possible. Most water bottles that standard machinery works with are 18 grams of plastic; now, some bottles are down to the 12-gram area, which does have a positive impact on the sustainability front.

There are very few industries where a major modification like decreasing the average weight of a bottle by one-third does not produce a ripple effect on downstream operations. In this case, the ripple effect encompasses the operation of bottling machinery that packages these products.

In virtually all packaging machines--tray packers and loaders, case packers, shrink wrappers and bottle packers--the bottles are moved along on a conveyor belt at a relatively high speed. In order to collect and organize them for packaging, the speed of the machine has to be decreased, which creates a condition called line pressure. It is a phenomenon that the industry has dealt with for quite a while, but it has been exacerbated by the advent of the lighter weight bottles, which are far less tolerant of this pressure.

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As each bottle pushes against an adjacent bottle, it becomes pressurized, which can produce one of two results. First, it can damage the shape, which is obviously undesirable for the end user. Second, and more importantly, it can cause processing problems, as the bottles can become distorted in their shape. As a result, they're harder to divide into lanes and harder to handle and meter.

To combat this problem, companies like Standard-Knapp have developed technology for continuous low-pressure product conveying to eliminate the line pressure at the beginning of a packing machine and allow the packaging machinery to do a better job of handling the bottles. This modification would be ideal for rigid containers like glass or metal containers, but with lightweight, compressible products it's absolutely essential.

The lightweight container world presents additional obstacles to the sustainability movement. There are many large polyethylene-type bottles containing diverse products such as laundry detergent, fruit juice or milk. Those bottles are generally dropped into a corrugated case by a case packer. Sometimes, however, when the bottles land in the case and suddenly stop, significant hydraulic pressure is created by the liquid. In the new lightweight bottles, that shock can be sufficient enough to create holes. These holes typically happen in the bottom, or foot, of the bottle.

Logically, the thickness of that minimum weak spot is going to dictate the weight of the entire bottle. So because of that one little weak spot, the entire bottle has to be heavier in order to provide enough material in that spot to withstand the shock. In other words, to achieve a stronger weak spot, more material must be used in the whole bottle.

There is an alternative: if the bottle can be handled more gently, less material can be used to make the whole bottle. To that end, a soft catch allows users to reduce the shock energy by 80 percent over a conventional drop packer. Taking 80 percent of the shock energy away enables the use of thinner gauge bottles and thinner glass.

Another important directive in the sustainability push is to use less corrugated material in the shrink-wrapped trays that hold the bottled product. To achieve this objective, a U-board that effectively eliminates the end walls of the tray, using less material while offering more support than a pad, should be mandatory. The recyclability and reusability of the U-board makes it extremely environmentally friendly. Too, in a conventional tray, the four sides are glued together with hot melt glue, yet another area of energy consumption. Since the U-board doesn't use glue, energy--and the glue itself--is saved during the production process.

Mike Weaver is president and co-CEO of Standard-Knapp. Bob Reynolds is COO and co-CEO of Standard-Knapp.

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