

# CLEAN MACHINES

**Need to purify water or reclaim an acid? Eco-Tec has the answer.**

By John G. Smith \_\_\_\_\_


Nuclear reactors can best be described as complex plumbing projects. Say what you will about the power of fission, but it's the power of water that actually generates the electricity at Ontario Power Generation's Pickering operation. Heavy water flows through the reactor's fuel channels to heat a boiler, while a supply of water from Lake Ontario is transformed into the steam that moves a turbine.

Granted, the lake doesn't exactly offer the level of purity required by the boiler and its related plumbing. The water needs to be treated by several layers of technology - all of which was developed a short distance up the road.

Pickering-based Eco-Tec is behind the Spectrum Micro Media Filters that remove an array of solids; a reverse osmosis membrane collecting salts that would otherwise form a scale on the inside of the boiler; and the Recoflo ion exchange system that uses a bed of resin to capture remaining salts such as calcium and silica. In the event any problems occur, an alarm automatically calls a technician who can take the helm of the control room with nothing more than an Internet connection.

Eco-Tec has been treating water supplies for boilers since the 1980s, and it's easy to see some of the reasons

• continued on page 18



**RESIN RESOURCE:** One of the secrets to Eco-Tec's success comes in the form of resins manufactured as very small beads. The larger surface areas are capable of capturing more of the unwanted salts. (Photo: John G. Smith)



**POWERFUL SOLUTION:** Eco-Tec's water treatment installation for Ontario Power Generation's reactors in Pickering, Ontario. (Photo: Eco-Tec)

• continued from page 16

behind its success. The designs need as little as one-third of the space required for traditional ion exchange systems that incorporate massive storage tanks. The Recoflo resins can also be washed clean while units remain online, rather than a traditional process that regularly has to be shut down for hours on end.

It's only one example of technology that the company has developed since it first established a new use for ion exchange systems.

### The Acid Test

Metal processors have long used mineral acids to extract, finish and treat their goods, but the process presents a challenge in the form of the waste. University of Toronto PhD student Bob Hunter, for example, was trying to address the chromic acid that was a byproduct of Stelco's tinning process in nearby Hamilton – and he suggested in the late 1960s

that an ion exchange system could be used to recover the chromic acid from the process waste water.

A team of engineers began to work on a potential solution, and one of them eventually brought the idea to Eco-Tec's original parent company, WIX Corporation.

The Recoflo chromic acid recovery system was born. Industrial Electroplating became the first customer to buy a unit, reclaiming the acids used to chrome the wheels on wheelchairs. A team led by Dr. Phillip (Rocky) Simmons quickly saw an opportunity to address other mixtures of acids and metals.

"We learned that before you put chrome on a part, you actually have to put nickel on a part, and quite often even copper has to go on before that," explains Kevin Munns, Eco-Tec's Vice-President of Operations. The first Nickel Recovery Unit was introduced in 1973. The company was then approached by aluminum

anodizers who wanted to purify acids and eliminate the need to dispose of contaminated acid. A process was developed and launched in 1976, and became known as the Acid Purification Unit (the basis of today's APU designs).

By 1977, Eco-Tec had established itself in the automotive business by installing a Nickel Recovery System at a Ford plant in Saline, Michigan. The systems that addressed copper offered an opportunity to reclaim the metal that would otherwise be wasted during the printing of circuit boards. Related work with Hewlett-Packard led to the Canada Award for Business Excellence.

While they addressed different materials, all the APUs shared a pair of common traits. Each contained a bed of resin capable of capturing acid salt that could later be washed free, and they also shared a common business model.

"All these systems were designed to pay for themselves in 2 years based on the chemicals they would save," Munns says.

Within a decade, the company had 50 employees and installations in 16 countries that served applications including lithoplate coating, electroplating, capacitor foil manufacturing, aluminum etching and stainless steel pickling. With a management buyout led by Simmons, Eco-Tec was soon charting its own course.

One of the secrets to Eco-Tec's success comes in the form of resins that are manufactured as very small beads, featuring the larger surface areas that are capable of capturing more salts. This all-important ion exchange resin is packed between a pair of plates, to ensure the beads do not move or degrade.

The company also pays particular attention to the way its equipment fits into production lines.

"The first thing we look to understand

• continued on page 20



**HAMMER HOME:** An Eco-Tec employee fixes grommets in place. (Photo: John G. Smith)

• continued from page 18

is the customer's process. We also look at how various components of our system are going to impact their system," says Glenn Caven, Manager of Technical Solutions. An APU, for example, can be integrated into any series of electronic controls.

Related components and supplies are evaluated on a regular basis, and samples of resins are analyzed upon the arrival of every shipment.

### New Markets

More than 1,500 Recoflo systems are now being used in 52 countries, serving markets as varied as coal bed methane and metal processing. They've become a standard fixture in applications such as aluminum finishing, and the list of business opportunities continues to grow.

Five years ago, Eco-Tec introduced its AmiPur units to regenerate the amines needed to capture sulfur generated during the refining of fuel and carbon dioxide sequestrations.

These processes are particularly important as governments mandate ever-lower sulfur levels in a bid to combat acid rain – and present a real challenge for refiners dealing with lower-grade oil reserves.

The harsh operating environments presented production issues of their own.

"One of the big challenges is to ensure the systems are welded properly," says Manager of Production and Quality Bob Moore, referring to the AmiPur Units. Welds, for example, must be X-rayed to identify any potential leaks.

The commitment to high-quality welding can be seen throughout the Eco-Tec manufacturing process. The ISO 9001 company is registered with the Ontario Technical Standards and Safety Authority (TSSA) for the manufacture of pressure vessels and piping systems. All Eco-Tec welders are certified, and Eco-Tec's carbon steel welding stations have been isolated from stainless steel welding areas to avoid conditions that could lead to surface rust.

Competitors may buff welded areas of finished products, but Eco-Tec completely blasts each unit with glass beads, to create a gleaming end

• continued on page 22

**FINISHING TOUCHES:** Gleaming end products are created by blasting with glass beads, and applying a two-part epoxy coating. (Photo: Eco-Tec)





• continued from page 20

product. A two-part epoxy coating protects other pieces.

A customer's maintenance crews are simply more likely to look after equipment that looks professional, Moore suggests.

Eco-Tec purchasers also specify tried and tested components, including Wilden diaphragm pumps, Keystone butterfly valves and Allen-Bradley instrumentation. And they've partnered with a shortened list of suppliers such as Kinecor (which delivers components such as centrifugal, diaphragm and gear pumps) to reduce carrying costs.

"We've dealt with Kinecor a long time. They understand our business," says Ambro Fitzpatrick, Manager of Materials. "We look for partners that can handle more than one product line."

The \$800,000 inventory housed on site also represents half of the amount that existed 1-1/2 years ago. Suppliers

have shouldered the requirement for quicker deliveries.

### The Future

The refined approach to production is also helping the company prepare to tackle another market altogether.

“Most of the chemical recovery that we’ve done has been water-based chemistry, whether it’s acid and even amines,” Dejak says as an example. “It comes into contact with the treatment of gases, so it was in some ways natural for us to expand our activities into purifying gases as well.”

By partnering with Dr. James Smith, inventor of the BioGas Purification System (BgPur), Eco-Tec can now leverage its experience in decarbonators, evaporation and crystallization.

The BgPur system, for example, is able to remove hydrogen sulfide from the methane that’s generated by

anaerobic digesters found in landfill sites, water treatment facilities and food processing plants. The methane that remains could be used as a fuel without any worry of corroding burners.

“Carbon credits make the use of bio-gas more attractive as an alternative fuel,” explains Michael Dejak, President and CEO of Eco-Tec. “We provided a tool that allows for sustainable development.”

“It’s not a huge leap,” Caven says of the approach to capturing gases, “but this is something you’re not seeing in the textbooks.”

Eco-Tec is already working with Fluor Corporation to remove carbon dioxide from a small power unit in Spain, collecting a gas that’s pure enough to be used in the beverage industry. A large power plant in Scandinavia is expected to be next.

It seems there are plenty of additional clean machines to come.

