Krishnan Suthanthiran, founder and president of Best Theratronics Ltd. Photo by Mark Holleron

Accelerating particle profits

Best Theratronics's plan to be 'dominant force'

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After his father died of cancer, Krishnan Suthanthiran devoted his life to building companies that battle the disease using innovative treatments.

Ottawa's Best Theratronics is one of those companies. About 180 employees work out of its 150,000-square-foot Kanata office developing various medical technologies.

Thanks to a recent $20-million investment by Mr. Suthanthiran, Best Theratronics now manufactures cyclotrons of varying sizes and capabilities that produce medical isotopes used to treat cancer.

Best Cyclotron Systems – a sister firm sharing Best Theratronics's facilities – was launched three years ago when Mr. Suthanthiran's company won an international tender to build a large cyclotron for Italy's National Institute for Nuclear Physics – without ever having built one. The Ottawa company's low price and unique features led to the signing of the contract in the fall of 2010.

PROJECT DELIVERY

Walking through the firm's office in Kanata, visitors can view the 70-megaelectron-volt cyclotron destined for the Italian lab; a pickup truck-sized, hockey puck-shaped mass weighing 200 tons and measuring 16 feet in diameter. The firm kicked manufacturing into high gear at the beginning of 2013 when the magnets required to create it arrived, and the last six months have been spent building the product that will soon be shipped to Italy.

WHAT IS A CYCLOTRON?

A cyclotron is a particle accelerator in which charged particles are spun very quickly. Those particles are sped up by an electric field and held in place by a static magnetic field. This generates high energies, which transforms them into radioactive compounds.

Next to the giant device sits a 14-MeV cyclotron, small enough to fit in a hospital where isotopes can be created on demand. Mr. Suthanthiran is focused on creating a variety of cyclotrons for different applications.

"We're in a global race," Mr. Suthanthiran said. "By the end of next year, we're going to be the dominant force. We're going to be cheaper than anyone else."

The firm already has approximately $20 million worth of orders for cyclotrons, and is marketing internationally to hit its target of an additional $50 million worth of orders this year.

NORDION'S SIDE

The words "medical isotope" are often paired with "shortage."

Local life sciences firm Nordion's contract with the National Research Universal reactor in Chalk River expires in 2015. That nuclear reactor is currently Nordion's only method of manufacturing molybdenum-99, the most popular isotope for medical purposes.

Many people don't realize that Nordion also uses three cyclotrons in Vancouver to produce isotopes, said Tom Burnett, general manager of the firm's medical isotope division. The machines are housed at the University of British Columbia and owned by TRIUMF, Canada's national laboratory for nuclear and particle physics.

THE DOWNSIDE OF CYCLOTRONS

"An important thing to note is that there definitely are advantages to reactor-based production," Mr. Burnett said.

Cyclotron isotopes have a shorter half-life than those from nuclear reactors. Iodine-123, for example, has a half-life of 13.2 hours, meaning half of the isotope's radioactivity will fade, or "decay," in that amount of time. In comparison, moly-99's half-life is 66 hours.

That forces firms using cyclotrons to process and ship products quickly, which may limit companies geographically.

A cyclotron also requires a lot of energy to run, meaning the firm must produce large batches to make the most of its resources.

"The thing about cyclotron isotopes, with their half-lives that tend to be shorter, you tend to only be able to support a certain region," Mr. Burnett said.

But having enough business in that region, paired with the logistics of preparing the isotopes promptly as well as ensuring the patient is ready and waiting, all complicate the process.

ONE-STOP SHOP

Mr. Suthanthiran is aware of the short life of his cyclotron's isotopes. But that's why he envisions a small machine in every hospital.

"By having the cyclotron right there, I can produce it as I need," he said. "We can eliminate the middle layers."

WILL NORDION TURN TO CYCLOTRONS WHEN THE NRU CLOSES?

"We believe the technology is viable but the health-care infrastructure to support this technology and the ability to commercialize this technology is still to be proven ... What is uncertain at this time is how this technology can be scaled to commercially viable levels across Canada."

- E-mailed statement from Nordion

The goal, Mr. Suthanthiran said, is to have enough technology by 2015 to produce a turnkey oncology treatment centre model that it can replicate in cities around the world.

Features would include Best Theratronics's external beam gamma teletherapy system, a Canadian invention using radiation to treat cancer. Best Theratronics even manufactures couches for patients to lie on beneath the machine.

These devices and furniture are manufactured in Ottawa. Machining, milling, welding and large sheet metal work all goes on in the 100,000 square feet of warehouse space in Kanata.

"We can build the entire solution with products from our own companies," Mr. Suthanthiran said.

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