LISA O'DONOGHUE

VOTECHNIK

Lisa O'Donoghue's passion for the materials that make up the world around us led her to develop a robot-automated machine for recycling LCDs. The University of Limerick PhD graduate is CEO of **Votechnik**, one of eight Irish SMEs awarded European Innovation Council funding earlier this year to develop a fully automated LCD recycling technology for the global market.

WORDS: **RUTH DORIS**

Lisa had completed her doctorate in high-temperature technology for aero gas-turbine engines when she recognised the need for a recycling solution for liquid crystal displays or LCDs. At the time, the use of LCDs was exploding because of consumer demand for flat-screen TVs and high-tech computer monitors.

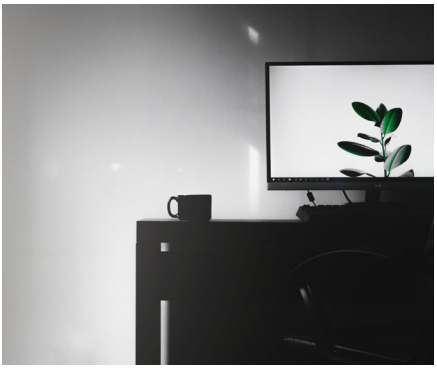
As a materials scientist with a particular interest in metals, Lisa wanted to explore methods of recovering critical metals such as indium, which is used in touchscreens. She says that her metallurgy background led her to the recycling project because, as she explains, "metals are readily recyclable and have good value, which makes the process economically feasible."

Lisa says that she was interested in science and engineering from a young age and credits popular TV show Star Trek as a big influence. Having chosen all science subjects at school, Lisa was sure that her career path lay in that field, though as she deliberated over her choice of studies in either science or engineering, she came across the materials science course at UL.

The course which focused on all of the key materials, "metals, ceramics and polymers, and their engineering applications," seemed to be the perfect fit for Lisa who is interested in "how stuff works and how materials are the building blocks of the world around us, literally the world in which we exist."

Later, she successfully submitted a research proposal to the Environmental Protection Agency, and led a multi-disciplinary team in the university, which included automation engineers and process engineers, to investigate an automated process for recycling LCDs.

Solving a problem of the disposal of environmentally hazardous LCDs and fluorescent tubes, the team developed a machine which uses a robot to recycle the LCDs in TV screens in a safe, efficient process – and one that complies with EU Waste Electrical and Electronic Equipment (WEEE) regulations.



The ALR 3000 was the cumulation of a 10-year journey from concept to operation. The machine began a testing phase early in 2018 and is now up and running at KMK Metals, based in Kilbeggan, Co. Westmeath, which is the main recycler for these types of materials.

Lisa describes the ALR 3000 as "impressive. It's got a huge robot inside of it that lifts the LCD, measures it and brings them through two stations to depollute the hazardous material."

Under European legislation, recyclers must remove the hazardous components as part of the process. However, current manual methods are time-consuming and costly. Recyclers use either manual disassembly or semi-automated processes to cut open the LCD, and the manual labour has to go in and pick out the hazardous materials.

When compared with the manual process of three or four per hour, the ALR 3000 is significantly faster with a rate of approximately 60 LCDs per hour. Lisa says their initial approach was to fully disassemble the LCD and look at the application of automation, but variances in sizes, shapes and types of the LCDs presented challenges. So the team came up with a technique to cut out the liquid crystal panel, measure it and cut it out to gain access to the fluorescent tubes behind it. "At that point, we patented it, and then we spun out the company and licensed the technology."

Shortly after the company was spun out in 2011, Votechnik won the Best High Growth Company InterTrade Ireland Seedcorn competition in 2011. The company subsequently received High Potential Start-Up status and investment from Enterprise Ireland.

In 2015, Votechnik was awarded €1.6 million under the ReVolv project, funded by the European Commission Eco-Innovation programme to enable it to develop the technology. The end result was the ALR 3000, which has since been granted patents in Ireland, Japan, Korea and the USA, with a global patent application pending in Europe.

At the ALR 3000's level of throughput, one machine can service the needs of the entire country, so Votechnik's focus is now on exporting the technology. The company's business model is where recyclers pay a fee to lease the machine and Votechnik provides maintenance and technical support. She says Votechnik operates within the circular economy as the materials liberated within the LCD can be returned to

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smelting houses – typically located across mainland Europe – and then they are generated back into raw material. "Recyclers get paid for it so than the value chain is economically feasible. That's the real circular economy element; you're liberating value out of it."

While developing the ALR 4000 under the current EIC project, Votechnik's team of three, based in Castletroy, Co. Limerick, is also involved in European consortium bids for projects within the area of waste electronics. A co-inventor on six patents to date, among Lisa's accolades are the Frederick A Krehbiel II Innovation Medal in 2010 for her work in the area of LCD recycling and the Young Entrepreneur of the Year in the same year.

Lisa credits the Young Entrepreneur programme with helping her to look at the research from an entrepreneurial perspective. She learned how to write business plans and to look at accounting. "It's what pushed me in the direction of seeing that there was a business in it." Speaking about how more young women can be encouraged to pursue careers in materials science and engineering, Lisa says that seeing other women achieving success and pursuing leadership roles in the field can help aspiring scientists to recognise their own potential.

Exposure to a subject area at a young age is important. She urges young women to get involved in activities that they're passionate about because "any desired career path should be fun and inspiring." Commenting on funding for young entrepreneurs, she believes that while there is a wide variety of financing options available, the Votechnik team has "focused on European funding and Horizon 2020 which aligned well with our goals as a company and circular economy."

So are women entrepreneurs at a disadvantage when it comes to their access to funding? Lisa feels that one's own perception is key. "If you believe in what you're doing and know you're capable then that will be your experience."

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