

Professor Veena Sahajwalla is determined to revolutionise the manufacturing industry. Her work (below) looks at new ways to use waste materials.



# Waste Warrior

*Inspired by her childhood in Mumbai, Professor Veena Sahajwalla is re-thinking the way we look at waste and manufacturing, to help create a more sustainable future.*

WORDS BY ROSAMUND BURTON

Since China's 2018 ban on imports of foreign waste, and both the Indonesian and Indian governments tightening their restrictions on the types of recycling waste they'll accept, there has been a growing waste issue in this country.

Professor Veena Sahajwalla – the director of the Centre for Sustainable Materials Research and Technology (SMaRT) at the University of New South Wales, with its team of 30 personnel – is creating ways to divert toxic waste from landfill, and develop a new, green manufacturing sector.

Fifteen years ago, Sahajwalla invented 'green steel' – a process adopted by steel makers around the world – which uses the carbon from old rubber tyres, rather than coal-based coke, in its production. "The tyres react more efficiently inside the steel-making furnace, leaving less residue than coke, so not only does it make a positive impact on the environment, but it works better," Sahajwalla says.

Sahajwalla grew up in Mumbai, and she claims it was the city that ignited her interest in sustainability. As a young child, she was fascinated by how objects were created – from furniture to buildings and even shoes – but she was also intrigued by the people who earned an income collecting waste, like paper or glass.

"That's what inspired me to focus on recycling," she explains.

Her father was an engineer, and she followed in his footsteps. She was accepted into the Indian Institute of Technology, Kanpur: known to be an excellent college academically, but being in India's north, it meant four years' study away from her home and family.

There were also very few women studying engineering, and she was the only female in her material science and engineering class.

"Sometimes it was – to put it mildly – a little isolating," she admits, saying initially she found it difficult and missed her family.

In 2018, with funding from the Australian Research Council as part of her Laureate Fellowship, Sahajwalla set up Science 50:50 – Inspiring Young Women into Science. The initiative is targeted at girls in high school, and aims to help them understand how collaboration works between industry and science.

"We take girls to visit industries such as Sydney Water and Cochlear, and they can see why the role of science is so important to everyday life."

Sahajwalla's ideas on how to make use of waste materials, in addition to her desire to deliver the science that could benefit the environment as well as businesses and communities, resulted in the founding of the SMaRT Centre in 2008. In the last five years alone, the centre has developed the technology to make building materials out of waste.

Sahajwalla points out a coffee table with a tile top made from glass and waste coffee, and a selection of tiles made of glass and textiles. Sahajwalla and the SMaRT team are also developing high-quality benchtops and wall panels, which are load-bearing as well as fire and water resistant.

In 2017, the SMaRT Centre opened the world's first e-waste micro factory, which turns old computers, mobile phones and printers into new and reusable products. There are already established markets for the metals in the components, but the SMaRT team developed a revolutionary process to break the plastic down into a filament, which is fed into a 3D printer to create a new object.

The micro factory's first piece of manufacturing was a replica of Mahatma Gandhi's spectacles.

"I wanted the first product to be really memorable. To say, 'I can do this.' Gandhi was known for the revolution he started in India – encouraging people to spin cotton and manufacture products," Sahajwalla recounts.

The SMaRT Centre is now working with the revolutionary eyewear retailer Dresden Optics to make prescription spectacles and sunglasses out of recycled plastics. "We are a part of the programme looking at the plastic frames for the company, because

we understand the complex reforming and transformation process of recycled plastic," Sahajwalla explains.

She stresses the importance of working in collaboration with companies, and helping develop products that fit their purposes. Tes-Amm, an international electronic waste recycler, has been working with the SMaRT Centre for four years to develop a better solution for its plastic waste – and next year, Tes-Amm is setting up a micro factory to make plastic filaments used in 3D printing.

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In 2017, Sahajwalla became the first woman to be awarded the Jubilee Chair and Professorship by the Indian Academy of Science since its inception in the 1930s. Last year she was elected Fellow of the Australian Academy of Science, in recognition by her peers of her groundbreaking research and its impact.

Sahajwalla's vision is that micro factories, which have far lower set-up costs than larger-sized traditional factories, will be businesses, providing what she refers to as "economies of purpose", which cater to a local community.

"A micro factory enables waste to be recycled locally, treated locally and used locally," she says. It's a way forward that can transform a region's waste materials into new products, and also create employment prospects. "That's why micro factories are so unique," she explains. "They can provide a win-win outcome." 

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