

## THE BEACH CLEANER *HOOLA ONE* TO REMOVE PLASTIC MARINE DEBRIS IN CANADA

A team of 12 students from Quebec, Canada's University of Sherbrooke has successfully designed and built an innovative prototype of vacuum cleaner called [Hoola One](#) to remove small pieces of plastic marine debris from beaches.

The machine works by sucking up sand on a beach and depositing it into vats of water. The sand sinks to the bottom of the vat, while the microplastics float to the top, allowing for easy separation.

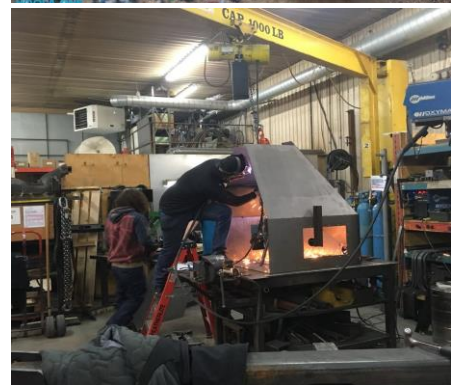
The team of students started the project of designing and manufacturing a prototype able to collect microplastic particles as their final step of the Master degree in mechanical engineering at the University of Sherbrooke in Quebec.

With their invention, the young engineers wanted to make their contribution to the great global challenge of freeing the beaches from the large quantities of plastics that the oceans transport to the shores, damaging the environment. [As they point out on the website](#), due to the over-consumption of plastic as well as the lack of infrastructures to manage it at the end of its life, huge amounts of plastic end up in the environment. Of the large amounts of plastic dumped into the ocean, a significant percentage is redirected to coasts and beaches. In this context, a major problem is represented by the smaller plastic particles called microplastics. Scientists estimate that there are more than [50 million microplastics](#) in the world's oceans and [according to the United Nation](#), plastic waste kills up to 1 million sea birds, 100,000 sea mammals, marine turtles and countless fish each year

At the same time, the clean-up activities realized by environmental organizations in the beaches of many countries show the great difficulty and the great time required to collect small plastic waste. The *Hoola One* project has been designed by the students in collaboration with the [Hawaii Wildlife Fund](#), an environmental organization working for 20 years on cleanups activities and these partners reported that their biggest challenge was cleaning up plastic microparticles. The project was therefore focused on the invention of a machine equipped with filters capable of recovering microparticles that are deposited on the shore.

The result of the design and construction work carried out by the team of students from the University of Sherbrooke was the prototype of a unique machine of its kind.

*Hoola One* is designed to pick up smaller plastic particles that are otherwise difficult to recover. Compared to existing beach cleaning technologies that work with sifters, the machine is able to collect



much smaller particles using a buoyancy separation method which allows to recover plastic particles as small as 50 microns (0,05 mm).

The machine is brought to the beach to be cleaned and an operator then uses the suction pipe to pick up the mixture of sand and plastic, which falls into a storage tank. When this tank is full, it is emptied into a large settling tank which has previously been filled with seawater. By settling, the sand falls to the bottom, the plastic rises to the surface and floats, and in this way, by creating an overflow in the tank, it can recover all the plastic particles which are brought to filters going up to at 50 microns. The clean sand is then thrown back on the beach. The machine can process 15 square meters per hour and needs to be cleaned periodically, due to contact with salt water.

Once the construction process of the machine was completed, in collaboration with the Hawaii Wildlife partners, the team of students organized the test in Kamilo Beach on the big island in Hawaii, known to be heavily covered with litter from the ocean. The testing was a success, demonstrating the effectiveness of the vacuum in cleaning the beach from plastic particles and the good functioning of the technology adopted.

The test also allowed to identify the aspects in which the machine could be improved to make it more functional for its large-scale use. In particular, the team plans to work to reduce the size of the vacuum cleaner, which must be transported on a trailer, to make it available for use around the world. Meanwhile, the team of students has left their invention as a donation to the island so the *Hawaii Wildlife* partners can continue to use it for beach cleans.

In June 2020 *Hoola One* won the first prize of the *Changemaker* category at the *Fowler Global Social Innovation Challenge* organized by the University of San Diego. This prestigious distinction, in front of 40 teams from 25 universities of 12 countries, gave it international visibility. *Hoola One* also won two prizes at the *Canadian Engineering Competition* and was among the first 10 Quebec winners of the *DEC Propulsion Challenge*, organized by Canada Economic Development. They also won the Grand Prize Research at the *Createk Competition* and received the jury's mention at the *EnviroLys Gala*.

The Hoola One web site presents the [main characteristics of the vacuum cleaner](#) and its possible use in different contexts. This experience is also a success story that can inspire other teams of students and Universities to invest in designing and building technologies and machinery useful to face the relevant challenges for a cleaner and more sustainable future world.

#### To know more

[Hoola One website](#)

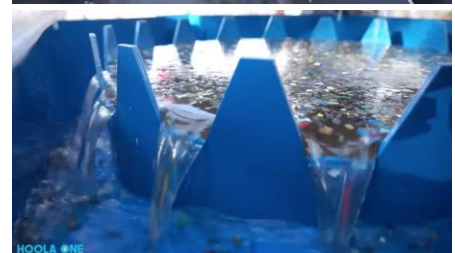
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