

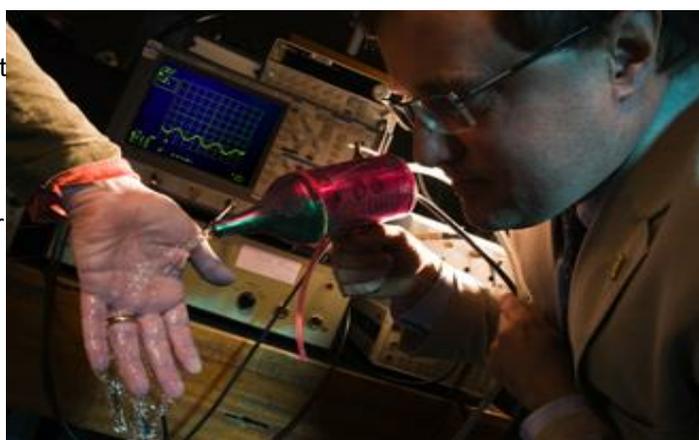
Revolutionary ultrasonic nozzle changes the way water cleans

02 May 2012 by Brian Bell, London Press Service

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Scientists in the United Kingdom have developed a revolutionary ultrasonic attachment for taps that massively enhances the ability of water to clean.

Currently, industry uses excessive water, power and additives for cleaning. For example, it can take up to 100 tonnes of water to produce one tonne of clean wool after shearing. Many industrial processes also generate large quantities of contaminated run-off.



The water from hosing down an abattoir represents a real health risk and cannot be allowed to enter the water supply. Purifying run-off is costly - each cubic metre of water used for cleaning in the nuclear industry can cost about 10,000 pounds to treat.

Professor Tim Leighton and Dr Peter Birkin of the University of [Southampton](#), southern England have developed a device that works with cold water, minimal additives and consumes as much electrical power as a light bulb.

Its [application](#) will be wide - licences have already been sold to a number of industries to look at cleaning in food preparation, hospitals, manufacturing and the home. The technology consumes less water and power than the established competitor technologies.

Talking about the need for such a technology, Professor Leighton said: "Society runs on its ability to clean. Ineffective cleaning leads to food poisoning, [failure](#) of manufactured products such as precision watches and microchips, and poor construction - from shipbuilding to space shuttles - since dirty surfaces do not bond.

"The impact in healthcare is huge - hospital-acquired infections, from instruments that are not properly cleaned, cost the National Health Service one billion pounds [per](#) year. There's a very obvious need for technologies that improve our ability to clean while saving on our most important resources, water and energy."

In recognition of their invention, Professor Leighton and Dr Birkin were awarded the Royal Society Brian Mercer Award for Innovation in 2011.

Using the 250,000 pounds award from the Royal Society, the team is developing products based on an ultrasonic nozzle that can fit on the end of a tap or hose. The device uses less water and power than the equivalent pressure washer - about 2 litres/minute compared with 20 litres/minute and less than 200W compared to 2kW).

It is also far less damaging because the stream pressure is less than 1/100th that of a pressure washer. Another advantage is that it generates far less run-off and aerosol (tiny atmospheric particles of water that can carry contaminants into the air to then settle and contaminate other surfaces). Because it is able to use cold water, energy is saved on heating water.

Power washing generates large volumes of contaminated run-off and aerosols, presenting a hazard when used, such as cleaning sewage systems or nuclear contamination.

One of the main pieces of equipment currently used for industrial cleaning, ultrasonic cleaning baths, can only clean objects small enough to fit in them and the devices to be cleaned sit in a soup of contaminated liquid.

Neither power washing (high-power pressure washing) nor ultrasonic cleaning baths can easily be scaled up and neither can be used on delicate materials such as hands or salad.

The new nozzle generates bubbles and ultrasound. Both **travel** down the water stream to the dirty surface and there the bubbles act as microscopic "smart scrubbers", seeking and entering crevices to remove dirt there using shear forces in the same way that currents in a babbling brook can strip off riverbank soil. The device can be used at a high-power and a low-power setting - the latter being suitable for delicate products such as hands and foodstuffs.

Licences to enable companies to bring the technology into their product lines have been negotiated with several companies to explore cleaning products for hospital hygiene, dentistry, food preparation, manufacturing and the power industries.

Dr Birkin said: "The award represents a significant milestone for the development of this technology and its possible exploitation. There is a clear gap in the funding system with ground-breaking technology produced by universities [that is] unexploited by industry. It is also difficult to find other suitable sources to take the technology further. It is in this situation that our invention found itself.

"In these trying times for innovative research, the foresight of the Royal Society to regularly sponsor and support these initiatives, should be congratulated. It is also pleasing that a significant 'blue sky' research effort within our team, over the last 10 to 15-year period, has led to an understanding of the basic physical and chemical processes that underpin this technology."

Professor Leighton added: "Support for step-changing innovation is vital if we are to have marketable technology to address the problems that will face society on the 10-50 year timescale, rather than just responding to today's problems."

The Brian Mercer Awards for Innovation were established by the Royal Society in 2001 following a bequest from the late Dr Brian Mercer, an enthusiastic inventor and entrepreneur.

The awards aim to encourage these qualities in the next generation of scientists and provide a grant of 250,000 pounds to develop an already proven concept or prototype into a near-market product.

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