

# BEHIND THE SEAMS OF THE GLOBAL DENIM INDUSTRY

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## Nothing set in stone

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**Alternatives to pumice for stonewashing processes are emerging, with innovators claiming their ideas offer a wide range of environmental and economic benefits.**

Brands and mills are beginning to call into question traditional methods of using pumice to stonewash denim. Their concerns centre on sludge from worn-down pumice, which comes into contact with, and retains residue of, textile chemicals during interaction with jeans in the stonewashing process. This sludge contributes to manufacturers' waste management burden.

Pumice itself is not toxic. Also in its favour is its abundance, albeit the stones come from a limited number of regions of the world. Turkey, Italy and Mexico are among the best places to source them. Nor are the stones expensive, but they are heavier than many materials in the denim supply chain, with a cubic-metre weighing almost 650 kilos. Bill Curtin, who owns and runs BPD Washhouse, the only full-service, commercial denim wet and dry process facility on the east coast of the US, warns that the transportation costs can easily double the price he has to pay for pumice. Distance

is clearly a factor as well in his case; BPD Washhouse is in Jersey City, just across the river from Manhattan and "basically on the subway". Suppliers of pumice in Mexico have confirmed that this is the furthest north they have to deliver, with most other US customers being in Los Angeles, Texas and other southern states.

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### Another ten years

BPD Washhouse's offering includes a small, pop-up denim trade show and an education resource to help the New York fashion community increase its knowledge of denim. Bill Curtin describes stonewashing as almost a generic term for a whole range of things that happen during wet processing (including washing jeans with water and pumice stones, of course, but also enzyme washing, tinting and dyeing). He explains that it is far from uncommon for people to come to a demonstration and express surprise that stonewashing often involves real stone. He adds that he loves seeing "the joy on people's faces" when they come to this realisation and hearing them say that now they understand.

The effects created by the natural abrasion of the stones hold great appeal, with the results often reminding people of the famous television advertisement in which the late singer Nick Kamen takes off his Levi's 501 jeans in a busy laundromat to wash them. But Mr Curtin says that the difficulties of managing the sludge and also the dust that results from the stones breaking down have increased the appetite for alternatives that offer the same results without the side-effects. His view is that pumice is probably on the way out, but that we are still "in the infancy" of replacing it; it may be ten years or more, in his opinion, before alternatives take over completely. "There is no super urgency to get rid of them [pumice stones]," Mr Curtin says. "They don't harm the workers and the stones themselves don't harm the earth in the way that a bleaching agent would."

### Options emerge

Alternatives are appearing already, though. "Some stone-free enzymes are actually very good," Mr Curtin says, "without getting 100% of the pumice-stone look. They're very close, but you want to give 100%. So the industry came out with synthetic stones made out of rubber. Again, what we found in working with those was that we didn't really get the look we got from the pumice stone." Something that has come across his path in recent times that has delivered results which he likes is Hand Made Stone (HMS) from Turkish technology provider Baytech.

HMS products are stones made from 60% pumice dust, sealed with biodegradable polymers, which the company says offers similar abrasion to traditional stone but breaks down substantially less, meaning the sludge in waste streams is largely eliminated and the stones last longer. This offers savings in transportation, water, waste, time and energy, according to the company.

Baytech is the brainchild of Yavuz Baykan, an experienced manager at a denim garment manufacturer in Turkey. His initial work on HMS took place while he was still working at the jeans factory, years before he set up Baytech up as a company in its own right in 2016, patenting his idea in 2017. His daughter, Beyza Baykan, who is studying mathematics in the US but still finds time to help bring her father's idea to the global denim industry as company spokesperson, says the initiative came from his lifelong commitment to making the lowest possible impact on the environment. On the land surrounding the factory where he worked he began growing fruit and vegetables, which soon made their way into the workers' canteen. Eventually, his home-grown food programme extended to raising animals on the same site. He is an agricultural engineer by training.

"He could see that the contaminated sludge from the pumice stones was capable of causing damage," Ms Baykan says, "not least by reducing the amount of land available for growing food. His first idea was to try to turn the sludge back into pumice stones, but that was difficult and costly. Then he thought of using pumice dust to do this, dust that comes from the mining companies and is, therefore, free from the chemicals that the sludge contains."

### Natural, but not renewable

Turkey is a good place to source this dust. Baytech's figures suggest there is, on average, global production of 18 million tonnes of pumice stones per year, with Turkey contributing 8 million tonnes to the total. "It's a natural resource, but it's neither renewable nor unlimited and we need to avoid using it all up," Beyza Baykan continues. "We need to leave some for future generations and the main HMS idea is to make stones that are more durable so that the industry will use up less of this resource."

Her calculation is that HMS stones are around 80 times more durable than the usual pumice stones. It depends on the quality of the pumice dust, but she has worked out that HMS stones are an average of between 60 and 100 times longer-lasting; 80 is the midpoint of the range. What this means, she explains, is that a denim manufacturer placing an order for 800 tonnes of pumice stones today could achieve what it needs to achieve with just 10 tonnes of HMS. "That's a huge difference," she says. "It would mean reductions in the volume of pumice you'd need to mine or transport. And our stones don't melt the way pumice stones do, so they don't create sludge and this makes wastewater treatment easier and it's easier on the machines in the factory too."

### More sludge than stone

Allowing for variations from country to country and from company to company, Baytech believes it currently takes 700 grammes of pumice stone and 100 litres of water to stonewash a single garment. This means an average enterprise producing 10,000 garments every day will need 7 tonnes of stone every day, or more than 2,000 tonnes of stone annually, if you calculate a working year of roughly 300 days. But this does not produce 2,000 tonnes of sludge; the problem is more acute than that. "One kilo of pumice becomes three kilos of sludge," Beyza Baykan says. "It's like a sponge: it absorbs water and becomes heavier than before. Disposing of this is a great problem. How do you get rid of that volume of sludge? We all know that landfill is coming to an end in some countries and, in my opinion, the sooner that happens, the better."

### Water worries

In terms of water, she says HMS saves between 20% and 30% per load. Further water savings come later in the process. As mentioned, pumice creates dust during stonewashing as well as sludge and it is necessary to rinse that dust off the garment, which requires more water.

"Sometimes companies have to wash garments three times to get rid of all the dust," Ms Baykan continues. "That's hundreds of litres of water. Our stone doesn't leave any dust on the garments. You can probably eliminate 600 litres of water consumption per load by not having to rinse the garments, and that's in addition to the 20% to 30% water saving per load for the stonewashing process. You have to think about after the stonewashing process as well. There are products that require less water, even no water, in the stonewashing process, but do require a lot of rinsing afterwards to get rid of chemicals from the surface of the garments."

The water that garment producers use with HMS can be cold, which means an extra saving from not having to consume energy to heat it. Eliminating the need for rinsing also lowers energy consumption. Ms Baykan identifies time as another area in which HMS offers savings. "It gives you the effects you need in a shorter period of time," she explains, "and because it degrades far more slowly, the workers will not have to stop production and take time to replace the stones anything like as frequently as they do with pumice. Time is money in the denim industry as in any industry," she observes.

Then there is shipping, a hot topic, even hotter even than usual, across all globalised supply chains at the moment. Replacing pumice with HMS will mean a saving in stone shipments. A company that requires logistics service providers to transport 80 containers of pumice stone to it every month would only need one container of HMS, saving costs and considerably reducing the carbon footprint.

### Other motivations

Brands and designers may recognise this, but Bill Curtin believes they are mainly motivated at the moment by the results of any stonewashing process. "And there are other processes that they are looking to eliminate too," he explains, "with water at the top of the pecking order. Also, everyone is looking for an alternative to potassium permanganate as a bleaching agent. We haven't had anything that's successful, aesthetically effective or cost-effective yet, but I think within the next few years we will."

Where he thinks stronger demand for alternatives to pumice may come from is "from the middle, from the manufacturer". He thinks manufacturers who choose to use alternatives to pumice and are able to achieve good stonewashing results will also gain from being able to present these alternatives to their customers as something more sustainable. "If you give them the result they want and then tell them that you're doing something that is leaning into sustainability, they will be happy," he says.

*HMS (Hand Made Stone) from Turkish technology provider Baytech.*

*All Photos: Baytech*

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