

Chemical-free Clean Water

Water used in cooling towers, gland water and dust suppression on mines and certain pump applications has to be kept pure otherwise scale builds up that not only causes damage to the equipment, but seriously reduces the performance. Purification is achieved with chemicals as well as the constant addition of costly potable water.

A totally chemical-free process that prevents scale corrosion and bio life, is now available in South Africa from Water Engineering Systems Unlimited (Wesu). "SA Mechanical Engineer" meets with Zvi Wagner to talk about the principle behind their purifying process that is already saving South African industry a fortune.

"Typical problems in the mining industry are pipes, heat exchangers and cooling towers that block up with scale, fouling, sludge or an excess of bio life that leads to corrosion which dramatically reduces plant performance," he says. "Our Wesu machines remove excess dissolved solids before they deposit as scale in a water system. Simultaneously, the Wesu machines disinfect the water by killing micro organisms, bacteria and viruses."



Zvi Wagner of Wesu

How it works

The system basically consists of a pump that takes 'dirty' water, for example, slime dam water or effluent from a sewerage works, and pumps it through to large cylindrical reactors where a partial electrolysis process removes the scale and impurities from the water. This purified cooling water needs no further chemical treatment whatsoever because the scale has been extracted and the biolife killed leaving your cooling water system cleaner than when using potable water.

We do what nature does, but we just do it faster

"Our system actually produces scale which we physically remove from the water," explains Zvi. "We do what nature does, but we just do it faster. Nature naturally deposits scale and so do we, but we do it a 1000 times faster as the water flows through our system's circuit so that nothing is left for nature to deposit in the plant's water system. In this way, we're balancing the water and bringing it into its kinetic equilibrium."

Added advantage

And the Wesu system can be used on plant equipment that has already been clogged with scale. "Our treated water is now in fact 'starved' of scale and because this is unnatural and nature wants to balance things out, the scale already in a plant's water circuit will dissolve to the treated 'starved' water in order to correct the imbalance, thereby actually removing existing scale in the system," explains Zvi. "This is due to the Le Châtelier's Principle which states that if a chemical system at equilibrium experiences a change in concentration, then the equilibrium shifts to counteract the imposed change."

Cooling towers

This principle was tested at a steel mill where previously the honeycomb filling media in two cooling towers had to be replaced every three years because of scale. "One of the towers was given to us to prove that our





The system installed on a gold mine

The scale that had been in our tower was nowhere to be seen



system works while the other one kept on using a chemical de-scaling process," says Zvi.

"At the time of installation, our tower's honeycomb filters already had a significant build-up of scale, but wasn't blocking yet. When they opened the towers up after a year, the scale that had been in our tower was nowhere to be seen while the other was completely blocked up, and had to be replaced."

Applications

This technology has solved water problems in a variety of applications ranging from mining to breweries, smelter furnaces, hot water boilers, chillers, even to removing iron and manganese, scale, bio life and corrosion potential from salinated borehole water.

"At a mine, treated slime dam water is pumped back into their slimes dam in order to produce a balanced mix from which the mine then draws. Our system slowly dissolves the historical scale that blocks the delivery pipe to the processing plant" Zvi adds. "In fact, returning to the dam a month later, we found that where we pump our water back into the dam, the water had cleared to the extent that we could see the bottom of the pond."

Pumps

Good news for pump users is that Wesu's treated water will also bring about a saving in terms of using potable water as gland water, which cools and lubricates the interface between the glands and the pump shaft and between the moving surfaces of gland seals in pumps handling liquids loaded with suspended solids, such as slurry pumps. "In many cases mines have an excess of water sourced from the mine, or purchased from the local municipality's effluent treatment plant," says Zvi. "This water

is much harder than potable water and contains suspended solids as well as dissolved solids resulting in damage to the pumps. We offer a gland water treatment technology that will do the job in an economical and eco-friendly fusion, with a fast payback period of less than 12 months.

Zvi says in conclusion. "You can now turn any water, whether it is acid mine water or even city effluent, into usable make-up water that equals potable water. Not only do you save on the cost of potable water, in Rand value, you save twice as much on energy costs, and the systems will run more efficiently with less wear on equipment."

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