

Denka Advantech – Singapore

Denka Advantech is a Japanese chemical company that manufactures crushed and spherical fused silica filler for the electronic industry. The parent company is the Denka group of companies with an annual turnover of US\$2.62 billion with 4,700 employees worldwide.

Problem No.1 – 10” pipe cooling tower system

Denka Advantech had a problem with water quality in the new cooling tower system for several months. Their rust in the cooling tower water became very pronounced. They tried flushing out the rust into the drain and topping up clean make-up water into the cooling tower system. They were also unable to dose excessive chemicals into the system due to the nature of the piping system. The plant has copper, mild steel and stainless steel piping in the same cooling loop. Excessive dosage of any one sort of water treatment chemicals will corrode one or the other of the piping material. Initially they tried to use magnets to solve the problem but there was no difference to the water quality.

The Solution

On the 6th of Dec 2006 a 10” MERUS Industrial Bioring was installed. Within 1 week there was a clear difference in the water quality in the cooling tower sump. The water became clearer and there was very little rust in the water. Samples were collected in clear plastic bottles and the difference was more pronounced.



**6th Dec 2006 – Before Merus
Water is very rusty**



**13th Dec 2006 – 8 days after Merus installed later
Water is very much clearer**



MERUS 10” Industrial Bio ring



Pipe where MERUS ring is to be installed



10" Industrial Bioring protected with plastic



Water collected 4/12/06 & 8/12/06

Problem No.2 – 6" pipe cooling tower system

A cooling loop system consisting of a cooling tower which is used to cool several furnaces for making silica powder was found to have bad scaling, rust and bio-fouling problems. Even though there was a chemical water treatment program using rust & scale inhibitors and biocides, the fouling problem still persist. Even magnets were installed at the water supply pipe hoping it can solve the scaling problems. The furnace is cooled by a water film that falls along the side walls of the furnace. Due to the calcium carbonate deposits and rust along the walls of the furnace – maintenance became a constant headache for the plant operators.

The Solution

On the 25th of Sept 2006 a 6" MERUS Industrial Bioring was installed. Over a 2 month period, weekly water samples were taken and send for analysis. To make it an independent trial, the water sample analysis was done not by one but by two of Denka's in-house chemical water treatment contractors (Kurita & ALS). This was to ensure that we did not manipulate the water analysis data.

Constant checks were done on the furnace external walls and over several weeks – chunks of calcium carbonate begins to fall off without any human intervention. Algae & biofilm in the flow sight glass begins to die.

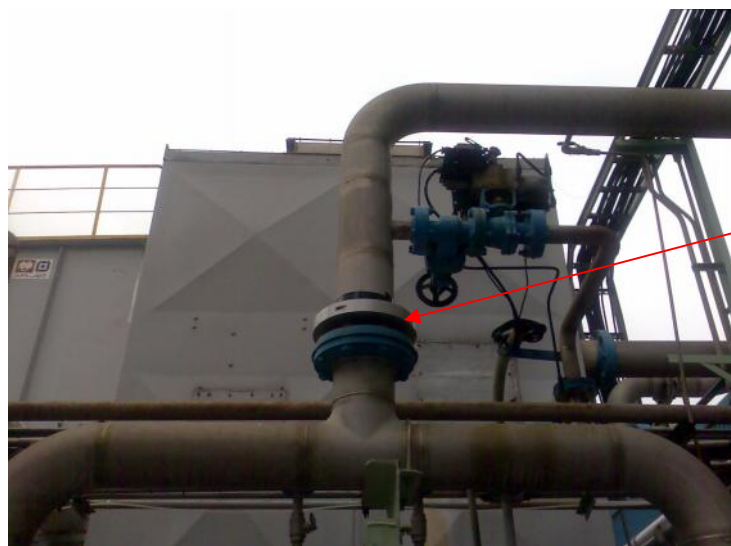
Furthermore the standard plate count (bacteria count) has fallen by 9 times from 9400 cfu/ml (colony forming unit per millilitre) to 1710 cfu/ml and even less.



Calcium Carbonate deposits crumbling any brushing or cleaning



Chunks of calcium carbonate fallen off from the external without furnace wall.



6" Industrial Bioring for cooling tower to furnace.

| Tests | Date (year 2006) | | | | | | | | | | | | Remarks |
|-------------------------------|------------------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|------|-----------|
| | 8/9 | 21/09 | 25/09 | 6/10 | 11/10 | 20/10 | 26/10 | 1/11 | 10/11 | 22/11 | 24/11 | 8/12 | |
| pH (at 25 °C) | 8.9 | 9 | | 9 | | 8.9 | | 9 | | 8.9 | | 8.8 | BY KURITA |
| Electrical Conductivity | 2130 | 2250 | | 2180 | | 2000 | | 1900 | | 2460 | | 2650 | BY KURITA |
| M-Alkalinity (as CaCO3) | 238 | 212 | | 181 | | 161 | | 216 | | 209 | | 141 | BY KURITA |
| Calcium Hardness (as CaCO3) | 632 | 573 | | 647 | | 582 | | 470 | | 952 | | 751 | BY KURITA |
| Chloride Ion (as Cl) | 347 | 422 | | 45 | | 319 | | 278 | | 306 | | 483 | BY KURITA |
| Silica (as SiO2) | 8.5 | 12.9 | | 11.5 | | 12.1 | | 5.5 | | 19 | | 11 | BY KURITA |
| Total Phosphate (as PO3/4) | 5.9 | 5.6 | | 1.6 | | 8.1 | | 8 | | 5.8 | | 7.8 | BY KURITA |
| Total Iron (Fe) | 0.9 | 0.7 | | 0.6 | | 0.3 | | 0.5 | | 1.5 | | 0.4 | BY KURITA |
| Turbidity (Related to TSS) | 9.3 | 6.2 | | 7.8 | | 2.7 | | 7.2 | | 15 | | 6.3 | BY KURITA |
| Chemical Oxygen Demand | | | 117 | | 42 | | 62 | | 69 | | 53 | | BY ALS |
| Biochemical Oxygen Demand | | | 2 | | <1 | | 3 | | <1 | | <1 | | BY ALS |
| Total Dissolved Solid | | | 2145 | | 1818 | | 1540 | | 1915 | | 1846 | | BY ALS |
| Total Suspended Solid | | | <5 | | 14 | | 29 | | 16 | | 22 | | BY ALS |
| Sulphate (as SO4) | | | 559 | | 701 | | 343 | | 632 | | 574 | | BY ALS |
| Sulphide (as SO2-) | | | <0.02 | | <0.02 | | <0.02 | | <0.02 | | <0.02 | | BY ALS |
| Free Chlorine (as Cl2) | | | 0.15 | | <0.1 | | <0.1 | | <0.1 | | <0.1 | | BY ALS |
| Standard Plate Count | | | 9400 | 180 | 1710 | | 290 | | 510 | | 77 | | BY ALS |
| Legionella Pneumophila SG1 | | | ND | | ND | | ND | | ND | | ND | | BY ALS |
| Legionella Pneumophila SG2-14 | | | ND | | ND | | ND | | ND | | ND | | BY ALS |
| Other Legionella spp | | | ND | | ND | | ND | | ND | | ND | | BY ALS |
| Total Legionella Count | | | ND | | ND | | ND | | ND | | ND | | BY ALS |

ND – not detectable