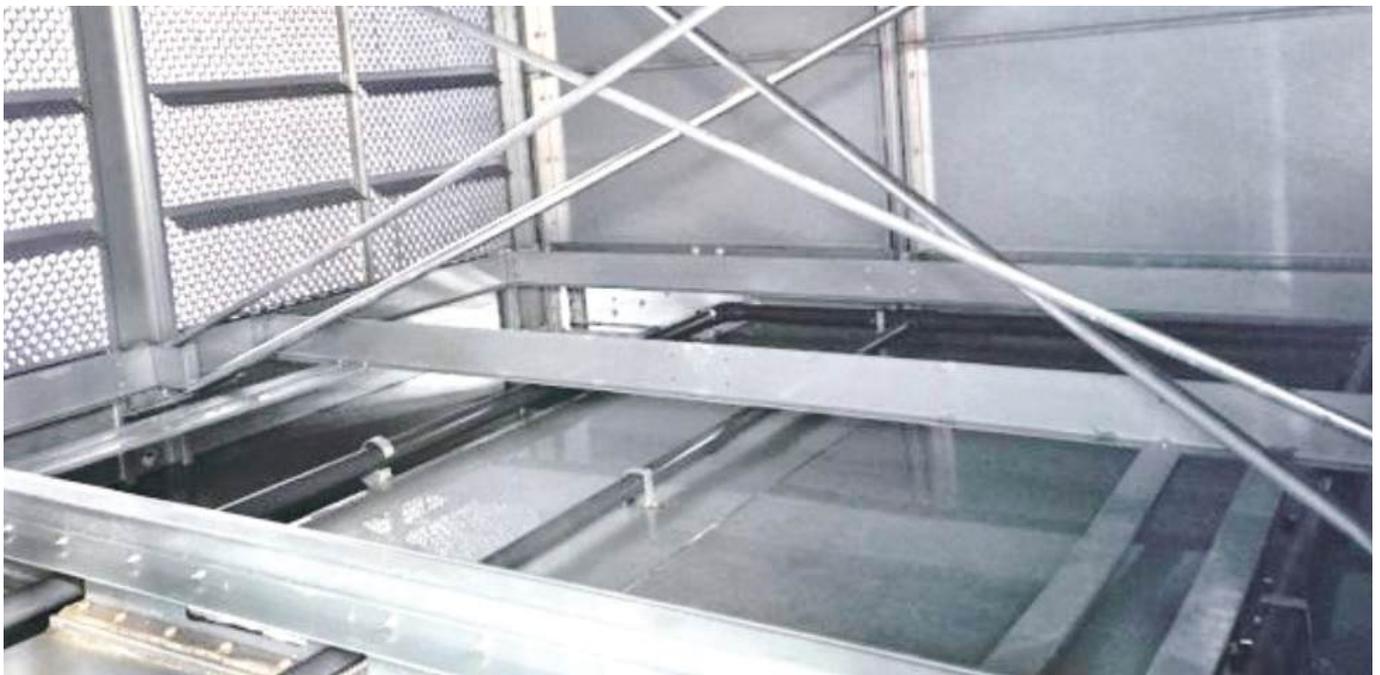


Data Centre Tower Clean Confirms Impressive Passivation Success



The background

One of Australia's largest cloud-based storage providers engaged HydroChem during the early commissioning stage of its latest state-of-the-art, hyperscale data centre in Melbourne five years ago.

The perpetual uptime nature of their business meant that allowing HydroChem adequate time to passivate their galvanised cooling components to avoid costly future downtime was hugely important. The passivation of galvanised equipment during the commissioning phase of a new facility is a critical step. It is an action that cannot be skipped nor inappropriately accelerated. The formation

of a passive metal surface is an important part of extending the service life of galvanised equipment.

When passivation is done correctly a passive and durable layer is formed on the surface of galvanised steel. This layer serves to protect the equipment from corrosion and the onset of white rust.

White rust, a white, chalky substance, forms on galvanised steel if it is not appropriately passivated. This residue is an indicator that the zinc oxide surface coating has failed and will lead to cooling system water making contact with bare steel.

For the passivation process to work effectively, water chemical parameters need to remain within defined ranges for the duration of the specified passivation period.

The client was experiencing an unprecedented demand for its cloud computing services and the pressure to bring additional capacity online was immense. The key for the HydroChem team was to convince the eager customer that a short-term delay in bringing the equipment online while the necessary passivation work was completed, would have a significant long-term

benefit to both the life of the equipment and its future maintenance needs.

HydroChem's purpose-built formulation to aid passivation is called **PASSIVGAL**. The product was designed in collaboration with scientists from one of Australia's top universities. The unique formula, which was the culmination of several years of research, was deployed on the project and greatly aided the successful passivation of the galvanised cooling towers.

The challenge

HydroChem had been contracted to clean and maintain the data centre's cooling towers on a quarterly basis, exceeding the legal requirement for twice yearly cleaning. The scope of these cleans did not extend to chemical cleaning the shell of the cooling towers above the heat exchanger tubes.

After five years of continuous operation this year, the data centre operator asked HydroChem to recommend a chemical cleaning solution for use on these passivated cooling tower shells to remove all dust and debris from the system. The clean itself was a part of the data centre operator's own planned maintenance program.

A competitor had offered a cleaning solution consisting of hydrochloric acid and surfactants. This would have cleaned the galvanised surfaces, but it would also have removed their protective passive film and caused significant corrosion damage.

HydroChem's specialist cleaning team was asked to visit the site and inspect the galvanised steel surfaces to determine what materials needed to be removed from the cooling tower's surfaces. It was critical that the passive galvanised layer should be neither damaged nor removed during the cleaning process.

Upon inspection the cleaning team found the equipment was in exceptional condition despite five years of continuous operation. All surfaces remained well passivated, and showed no signs of white rust, iron oxide or hard water scale. The heat exchanger tubes were also in excellent condition with a passive surface and only a very light coating of dust and dirt.

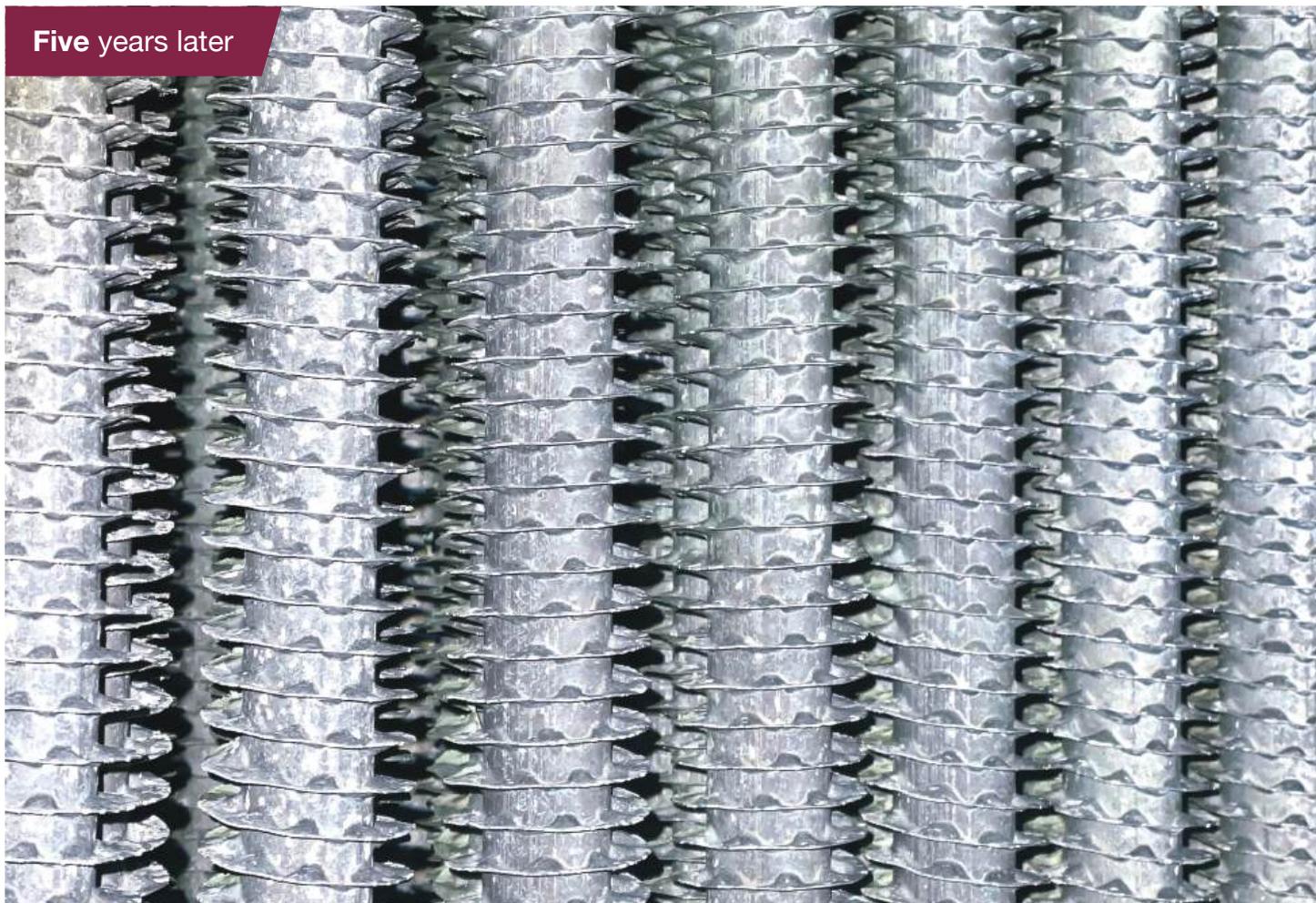


The cooling tower above the drift eliminators with a section removed reveals a spray arm that evenly distributes water to cool the galvanised steel heat exchanger tubes below.



Internal view from the basin of the passivated cooling towers shows the rows of galvanised steel heat exchanger tubes above.

Five years later



The galvanised steel heat exchanger tubes show no degradation five years after passivation.

The solution

HydroChem recognised that the success of the passivated galvanised tower clean would be largely dependent on the cleaning team's ability to preserve the passivate layer.

HydroChem conducted a simulation of the galvanised surface cleaning test in its own R&D laboratory. The chemists chose product called **GALCLEAN**, a neutral pH blend of green surfactants, dispersant, calcium stabiliser and corrosion inhibitor.

The impact of **GALCLEAN** in testing was measured for metal loss during a simulated clean on passivated galvanised corrosion. The testing showed in a miniscule loss of between 0.002 and 0.006 μm (0.000002-0.000006mm), which was a phenomenal result.

Given the cooling towers' galvanised film thickness is 85-100 μm (ASTM A123 and ISO 1461), a 0.006 μm loss is equivalent is less than 0.007% of the passive film.

The HydroChem team were delighted to be able to quantify two outstanding results that demonstrated an attention to detail and outstanding technical aptitude. The passivation success has given the client significant peace of mind regarding critical componentry in their data centre cooling infrastructure.

The cleaning recommendation has identified HydroChem as a supplier and partner that is willing to look outside the box for bespoke service solutions.