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**SUCCESS STORY - SCRUBBER SYSTEM PUMPS
IN THE FERTILISER INDUSTRY**

Pacifichem Corro CRP non-metallic chemical process pumps have proven themselves as an exceptionally good replacement for exotic metal and rubber lined slurry pumps on corrosive applications, as well as corrosive erosive slurry type applications as found in the fertiliser industry in South Africa, New Zealand, Australia and Israel over the past twenty years.

One of the applications where Pacifichem Corro CRP pumps have given exceptionally good service life and importantly produced substantial cost savings has been on fertiliser plant gas scrubber systems where Hydrofluorosilicic Acid (HFS, FSA, HFA), a highly corrosive and erosive aqueous solution is pumped. Hydrofluorosilicic Acid is produced during the concentration of phosphoric acid in an evaporation process unique to the phosphate industry. The vapour stream from the phosphoric acid reaction is scrubbed with water to form Hydrofluorosilicic Acid from naturally-occurring silica and fluorine in the phosphoric acid.

One plant report reducing pump maintenance costs on the scrubber system pumps by 80% since converting to Pacifichem Corro CRP pumps on their gas scrubber system. Prior to the conversion they had Hastalloy C chemical process pumps and rubber lined slurry pumps installed.

The following is an overview based on experiences at fertilizer plants in New Zealand where Pacifichem pumps are now installed on their gas scrubber plants.

The background is as follows:

1. Due to the corrosive nature of the phosphate rock used in the manufacture of fertiliser, process plants traditionally installed Hastalloy C pumps on this application.
2. Acceptable pump and mechanical seal service life was experienced when the phosphate rock was sourced from Nauru, although maintenance costs were high when repairs were required.
3. Due to issues in obtaining rock from Nauru, most fertilizer plants started sourcing phosphate rock from other locations around the world and shortly thereafter they began experiencing severe wear problems with the Hastalloy C pumps due to the inferior grade of rock. The cost to repair these pumps was also exceptionally high, not to mention the cost of lost production.

4. Initially most plants converted from the Hastalloy C pumps to rubber lined slurry pumps.
5. Whilst the pump wet end life improved, seal life was poor due to the corrosive and erosive nature of the rock. Maintenance costs soared and in addition plant down time was a major issue.
6. The lip seals installed in the rubber lined pumps were then replaced by expensive Hastalloy C mechanical seals with hard silicon carbide faces.
7. However maintenance costs remained high, mechanical seal reliability was generally "unpredictable" and expensive to repair and gradually the wet ends also became troublesome with short service life.
8. At that stage a number of plants changed from slurry pump manufacturers to one that offered pumps with dynamic seals which they believed would give improved reliability. The system operated with a pump duty of 110m³/hour at 5 Bar.
9. Due to NPSH problems the replacement pumps were oversized (6 x 4) when installed to allow the pumps to operate to the left of their best efficiency point (BEP).
10. This led to problems with pumps running close to closed valve and minimum flow requirement conditions.
11. Cavitation became a major problem with wear on the outside diameter of the impellers, which in turn led to premature pump failures.
12. A Pacifichem Corro CRP Group II pump was then installed on a trial basis.
13. Initially similar wear was evident on the impellers of the Pacifichem Corro pumps, albeit that they had less wear compared to the previous slurry pumps, this being caused by high tip speed and cavitation. However being a synthetic thermosetting corrosion & wear resistant resin material the service life of the Pacifichem Corro pump wet end increased considerably and spare components when required were considerably less expensive and much easier to obtain.
14. At this stage Pacifichem Corro pumps were giving between 6 - 12 months operating life. This was considerably better than the 1 - 3 months generally obtained with the rubber lined slurry pumps.
15. The mechanical seal installed in the Pacifichem Corro pump is a standard John Crane Type 502 double back to back elastomer bellow mechanical seal with silicon carbide hard faces. A Safematic flow monitoring control unit is also installed to reduce flush water consumption to acceptable levels. This was a major improvement and the sealing arrangement gave good reliability and service life.

16. As the fertiliser plants came under pressure from local councils and the EPA (Environment Protection Authority) to reduce plant emissions the pump duty was revised to increase flow rates by running the pumps at higher speeds.
17. The rubber lined slurry pumps still installed failed within as short a time period as three (3) days once this speed change was effected.
18. The Pacifichem Corro CRP pumps installed gave over six (6) months life with wear on the impeller due to cavitation the main reason for the drop in performance.
19. The plants then employed a group of consultants to examine the process and provide a solution to improve plant and pump reliability.
20. Changes recommended by the consultants and undertaken were to increase the scrubber nozzle size from 45mm to 75mm thereby increasing the flow through the scrubber system.
21. The pump duty on the primary and secondary scrubber pumps was upgraded to 220m³/hour at 5 Bar. This resulted in improved cooling and lowered the HFA temperature from between 90°C down to 75°C.
22. Pacifichem Corro CRP pumps then replaced all the rubber line pumps on the scrubber system. The pumps used were Pacifichem Corro CRP 200-150-400 (8' x 6' x 16') close coupled pumps with 75kW 4 pole electric motors to handle the revised pump duty for the primary and secondary scrubber pumps.
23. As a result of the above changes the pumps stopped cavitating and pump service life improved dramatically.
24. Initially routine six (6) month inspections were carried out on the Pacifichem Corro CRP pumps to check wear and showed minimal wear on the volute casings and impellers. This was stopped after the first year due to the good service life and minimal wear.
25. One plant still believes the operating temperature is still close to 90°C even after the changes and their Pacifichem pumps continue to operate without any problems.

As a result of installing the Pacifichem Corro CRP pumps fertiliser plants are now able to run continuously for years without any emission issues with the local councils and the EPA authorities, whilst improving plant reliability considerably and reducing pump operating costs. According to one plant they have reduced their annual pump maintenance spend on their gas scrubber pump system by 80% since installing the Pacifichem pumps.

Another interesting fact reported is that they have reduced levels of silica in the venturi's and the chemical consumption rate has dropped as a result of more scrubbing being done at the front end of the process.

In addition to the scrubber system pumps the plants also use Pacifichem Corro CRP pumps for general chemical transfer applications, including vertical spindle sealess pumps on their water effluent treatment plants and bund areas where the pH, temperature and different types of acids and concentrations of acids varies constantly.