



## Case Study: MMC

0.53 m<sup>3</sup>/hr Effluent recovery trial project

September 2014



## Customer Profile

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One of the largest producers of manganese in the country. They produce manganese which contains less than 99.9 % selenium. They supply over 120 companies across 20 countries with their product. The addition of manganese is important, it improves the mechanical properties, specifically the hardness and the corrosion resistance of aluminium alloys. The Electrolytic manganese is responsible for producing various ferrous and non-ferrous alloys. They are located in Mpumalanga in South Africa and they care about the community, they are involved in various community projects.

## Technical Situation

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Water Icon submitted a proposal to design a pilot plant in order to study the methodology and show the results of what a full scale MVR replacement would achieve. This pilot plant was a replica of a full sized plant in all aspects and mimicked the full sized system in the pre-treatment, 1st Stage RO and 2<sup>nd</sup> Stage RO treatment phases. The pilot plant would not only allow us to prove the treatment methodologies but would also give us a feel for the effect of the feed water on the filtration/softening media and the RO membranes as well as the yield through the membranes under different feed water conditions. Actual flow rates through the two RO systems can also therefore be ascertained.

## Solution

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A pilot plant consisting of Pre-treatment and Post treatment was designed. The pre-treatment comprised of Chemical dosing and settling with the post treatment comprised of filtration, softening and Reverse Osmosis.

<b>The Pilot plant consisted of the following:</b>
• Receiving waste water tank
• Dosing systems for chemical make-up/addition – coagulant/flocculant dosing
• softener
• Settler
• Physical filter
• Reverse osmosis membranes

## Process description

Feed comes into the Receiving waste water tank from a process containing a form of calcium, magnesium, manganese and other associated salts and is pumped through a series of dosing stations where various chemicals are used to remove hardness of salts and promote rapid settling. The supernatant is sent to the clarified water tank and the sludge is sent for removal.

The post treatment pump then transfers the water from the settler into a series of media filters to remove suspended solids from the pre-treatment stage as well as to ensure that the water contains minimal non- precipitated calcium and manganese. A reducing agent is then added to the water before it sent to the Reverse osmosis membranes and this is done to ensure that the manganese is kept at a valence state of 2+ and thus will protect the reverse osmosis membranes. The final destination is the Reverse osmosis membrane.



The Pilot plant



A view of the conical settler



The chemical dosing system