CASE STUDY

PROJECT LITHIUM PROCESSING PLANT

PRODUCTS Multimedia Filtration, Brackish Water Reverse Osmosis, Lamella Clarifier, Dewatering Screw Press

INDUSTRY Mining

LOCATION Western Australia

BACKGROUND

A leading global producer of lithium required process water and potable water for a new lithium hydroxide (LiOH) conversion plant at Kemerton, approximately 160km south of Perth, WA. MAK Water was contacted by a local water provider which had an opportunity to enter into a long-term agreement for the supply of water to the project.

MAK Water worked closely with both the water provider and the client to review water data, provide technical assistance and design & deliver the best possible treatment solution. The client was looking for a smart technical solution that minimised water usage and wastewater discharge. The water provider needed to partner with an experienced OEM capable of providing technical support for the equipment delivery phase and operational support for the life of the project.

The facility built by MAK Water consisted of a custom package of six separate plants with our premium instrumentation package, installed in a purpose built structure with additional tanks and equipment, delivery to site, installation, commissioning and operator training, plus a long term service and maintenance agreement and ClearAccess™ remote access.

OVERALL BENEFITS

- Technical Support. Expert advice and consultation with client to provide the best possible solution.
- High recovery. Dam water is precious and strictly licenced to the customer. Maximum recovery and minimum waste is important.
- Plant Reliability. Custom design with engineered redundancy and quality equipment used throughout will provide reliable operation with minimal chance of unexpected downtime and minimised impact of maintenance on production.
- Complete Package. One provider for plant design, manufacture, delivery, installation, commissioning, ongoing service and maintenance.

1) RAW DAM WATER MULTIMEDIA FILTRATION

The primary treatment process is a skid mounted Multimedia Filtration (MMF) system designed to treat dam water and produce 4,200 m^3/day of process water for the facility.

MAK Water skid mounted MMF plant

MAK WATER KEY SOLUTIONS

- 2 x 50% glass media filters
- Chemical dosing: coagulant, chlorine
- Duty standby (2x 100%) backwash and chemical dosing pumps
- 1 x 200kL feed water tank

RESULTS AND BENEFITS

- Bulk pre-filtration. Dam water is efficiently filtered before distribution to downstream treatment processes
- Plant reliability. Duty standby systems, combined with custom design and quality equipment combined protects productivity

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Several storage tanks during construction phase

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2) DEMINERALISED BOILER FEED WATER PRODUCTION

The second plant in capacity terms is a skid mounted twin-train, two-stage Brackish Water Reverse Osmosis (BWRO) plant treating a blend of filtered dam water from the primary multimedia filtration plant and filtered bleeds blowdown water from plant 3 to produce 1,144 m^3/day of strictly specified demineralised boiler feed water.

MAK WATER KEY SOLUTIONS

- 2 x 50% RO process trains
- High recovery 2 stage RO design
- Chemical dosing: pH adjustment, de-chlorination, anti-scalant
- Duty standby (2 x 100%) chemical dosing pumps
- 4 x 33% distribution pumps for boiler feed
- 2 x 50kL RO feed tanks
- 2 x 230kL RO permeate tanks
- 2 x 230kL RO brine tanks
- Meets customer's strict specifications for demineralised water

MAK Water skid mounted BWRO plant

MAK Water skid mounted BWRO plant

RESULTS AND BENEFITS

- High recovery. Custom 2-stage RO design to achieve high permeate recovery rate, minimising precious dam water consumption and brine waste discharge
- Plant reliability. Duty standby chemical dosing, and 4x 33% distribution pump set protects water supply volume and specification even in case of equipment failure
- Asset protection. Strictly controlled and accurate demineralised water protects boiler systems, maximising their performance and lifespan

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3) BOILER BLOWDOWN MULTIMEDIA FILTRATION

The third subsystem is a Multimedia Filtration (MMF) plant consisting of glass media, DMI 65 media and GAC media filtration stages, designed to treat boiler bleeds blowdown water for recycling and produce 939m^3/day of feed water for the previously described BWRO system.

MAK WATER KEY SOLUTIONS

- Multimedia filtration → DMI-65 media filtration → 2x100% duty standby granular activated carbon (GAC) filtration
- Chemical dosing: acid, chlorine and de-chlorination\ Duty standby (2 x 100%) chemical dosing pumps
- 3 x 50% feed/backwash pumps
- RO dilution/transfer pump
- 2 x 50kL bleeds blowdown tanks

RESULTS AND BENEFITS

- Wastewater recycling. Treatment of bleeds blowdown wastewater for reuse as RO feed water drastically reduces dam water consumption and wastewater discharge
- Built-in redundancy. Duty standby GAC filtration and oversized chemical and filtrate pump systems, protects water supply even in case of equipment failure.

MAK Water skid mounted MMF plant

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4) MMF BACKWASH WATER CLARIFICATION

Our customer needed to utilise their dam water allocation as efficiently as possible to maximise their production potential within their license agreement for responsible water consumption. This means recycling as much water on site as is feasible.

To this end, we incorporated a Lamella Clarifier (LC) plant designed to treat 15 m^3/h of backwash water from the two process MMF plants and recycle it to produce more BWRO feed water.

MAK WATER KEY SOLUTIONS

- Lamella clarifier with feed pump, flocculation tank with mixers, sludge pump
- Chemical dosing: coagulant, polymer
- 3 x 50kL backwash water tanks
- 1 x 22kl sludge tank

MAK Water Lamella Clarifier plant

RESULTS AND BENEFITS

- Wastewater recycling. Treatment of backwash water from MMF for reuse as RO feed water to minimise precious dam water consumption and wastewater discharge
- Compact footprint. Lamella system reduces equipment footprint substantially vs traditional gravity settling process

MAK Water Lamella Clarifier plant

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5) LAMELLA SLUDGE DEWATERING

To further reduce dam water consumption as well as waste disposal costs, the sludge waste from the Lamella Clarifier is then sent to a skid mounted Dewatering Screw Press (DSP) designed to dewater 3m^3/h of sludge from the Lamella Clarifier plant and produce dewatered solid waste cake and water which is recycled.

MAK WATER KEY SOLUTIONS

- Dewatering screw press with feed pump
- Chemical dosing: polymer
- Frame/skid mounted solution for shed installation
- Polymer makedown unit
- Pressate pump station for return to backwash waste tank

RESULTS AND BENEFITS

- Minimised water consumption. Pressate is recycled back to into the system
- Reduced waste discharge. By concentrating solid waste
- Cost reduction. Lowered waste disposal costs by concentrating solids

MAK Water Dewatering Screw Press plant

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POTABLE WATER TREATMENT (MMF)

Separate to the 5 previous plants described in the process water treatment plant, MAK Water also supplied a containerised Multimedia Filtration (MMF) and distribution plant designed to treat bore water and produce 167m^3/day of potable water.

MAK WATER KEY SOLUTIONS

- Multimedia filtration, DMI-65 media filtration and cartridge filtration
- Chemical dosing: pH adjustment and chlorine
- Potable tank recirculation and monitoring of free chlorine and pH levels
- 3 x 50% distribution pumps for potable water and safety water
- Duty standby (2 x 100%) process and chemical dosing pumps
- Safety shower and eyewash station
- Premium instrumentation package with ClearAccess™ Remote Access
- Containerised (1 x 20') solution for easy installation
- 1 x 200kL potable water tank

RESULTS AND BENEFITS

- Compliance. Achieves required potable water compliance with ADWG
- Built-in redundancy. Potable water supply protected by duty standby chemical dosing and pumping systems.
- Cost effective. Lower volume allowed bore water to be used as a source, reducing water costs.

MAK Water containerised MMF plant

Internal view of the containerised MMF plant