

Project Case Study

HMS Ark Royal – Steam Replacement

Client:	Babcock Engineering Services Ltd
End User:	Royal Navy
Capacity:	2 x 100m ³ /day, 1 x 150m ³ /day & 2 x 5m ³ /day
Contract Value:	circa £0.5M
Scope:	Design, manufacture, procurement, works testing, delivery, installation, inspection hook-up and commissioning.

Contract Completion: September 2005 to September 2006



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General

Originally, fresh water on-board HMS Ark Royal was generated from steam-based flash distillation. Due to the age and high maintenance/running costs of the flash distillers and associated boilers, a decision was made to replace the two 168m³/hr distillers and one of the boilers with 2 x 100m³/day and 1 x 150m³/day Reverse Osmosis (RO) desalination plants, with the high quality water demand being met by the use of two small 5m³/day 'technical water' RO plants.

Project Details

Over the 12 months prior to contract award, Salt Separation Services provided Babcock Engineering Services with detailed design information to enable evaluation of the proposed 150m³/day desalination plant.

In September 2005, Salt Separation Services were contracted by Babcock Engineering Services to provide 1 x 150m³/day, 2 x 100m³/day and 2 x 5m³/day RO packages for HMS Ark Royal (the 100m³/day desalination packages and 5m³/day technical water packages having been proven on a previous fit on HMS Illustrious).

Each 100m³/day plant has its own pre-treatment including duty/standby sand filters, antiscalant dosing and cartridge filtration. The packages also have post-treatment remineralisation.



The 100m³/day plants are fully automatic self-contained packages, each comprising of three separate skids (to enable routing into position) bolted together and shock-mounted.

The 150m³/day plant is also a fully automatic self-contained package, comprising of two skids (to enable routing into position) that was bolted together in a “double-deck” arrangement and shock-mounted.

The 150m³/day plant has its own pre-treatment including a sand filter, antiscalant dosing and cartridge filtration. Post-treatment of the permeate is effected by remineralisation and hypochlorite dosing.

High pressure pumps are axial piston (swashplate) pumps with wetted parts in Duplex and Super Duplex Stainless Steel. These pumps have an 8,000 hour maintenance interval, require no lubrication and have a small footprint. In addition, no (nitrogen charged) discharge pulsation damper is required.



Each technical water RO plant is a fully automatic self-contained package with its own pre-treatment capable of producing 5m³/day of permeate with a TDS of <10mg/l from domestic fresh water.

In all cases, plant operation is fully automatic requiring minimal operator intervention.

In the case of both the 100m³/day and 150m³/day packages, RO membrane flushing and cleaning is fully automatic – all the operator has to do is add chemicals when instructed to do so!

The plants are also configured to allow automatic 24 hour flushing to prevent microbiological fouling.