ENGINEERING TOMORROW

Case story | Salt Separation Services

Salt Separation chooses Danfoss for **cruise ship SWRO retrofit**

75%
more water
Lower SEC

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Highlights

- 75% increase in water capacity
- Significant SEC reduction
- Retrofit in the same tight space

With its extensive experience in marine SWRO, Salt Separation Services is accustomed to maximizing water production capacity in small spaces. But when a luxury cruise ship operator asked them to replace an outdated SWRO plant with a higher capacity and more energy-efficient plant in the same allocated space, the UK-based specialist outdid even the most ambitious expectations. The compact plant nearly doubles output and at the same time slashes specific energy consumption (SEC). A Danfoss high-pressure APP pump and iSave ERD are at the heart of the innovative solution.

The challenge:

Maximize **water production** within the **same engine room** space

Salt Separation Service's customer, the operator of a high-end cruise ship, needed more water but could use no additional space on its SWRO plant. Located within the ship's engine room, the aging 400 m^3/day plant was increasingly costly to maintain, and the fuel needed to generate its electrical supply came with growing financial and environmental costs.

The ship's operators wanted the retrofit to coincide with a scheduled drydock maintenance period but were otherwise open to investigating a variety of solutions as long as total costs of ownership (TCO) were attractive. As one of the ship's engineers had worked with Salt Separation Services in a previous position, the company was asked for a bid.

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The solution:

A compact, **energy-efficient plant** built in modules

According to technical and commercial director Daniel Shackleton, this kind of project is what makes Salt Separation Service's engineers smile and roll up their sleeves.

"We have provided the Royal Navy with 70% of their SWRO systems – including submarines – and we have worked with Danfoss since the launch of their very first APP pumps back in 2002," Shackleton says. "We have also collaborated with Danfoss in many R&D projects through the years, so we know their compact, energy-efficient pumps and ERDs well. We had no doubt they would be part of this retrofit, but we couldn't know which components we would specify until we were well into the design process."

After an on-site survey and multiple conversations with the ship's operators, Salt Separation Services came up with a proposal that increased production capacity by 75% and significantly reduced SEC. To get it into the small available space, however, the new plant would have to be brought onboard through the ship's hull in drydock.

"Cutting a hole into a ship's side isn't as difficult as it might sound to people unfamiliar with these things," explains Shackleton. "But the hole's size is proportional to its cost. To make everything come together, we would have to work within the dimensions of the ship's ribs, which meant we would have to make the plant as compact as possible to fit in the engine room – and then design it to be split it into modules small enough to get through the opening in the hull and into the engine room."

Salt Separation Services specified a Danfoss APP 30 high-pressure pump and an iSave 40 for the plant. "These energy-efficient components had a capacity big enough to deliver 700 m^3/day," says Shackleton, "but were compact enough to fit the modules we could squeeze through the hole made available in drydock."

The result:

75% more water and **lower SEC** than the previous plant

Salt Separation Services designed, built, and tested the plant at its facilities. Then, it deconstructed the plant into three modules that could be shipped to the drydock to be brought onboard, re-assembled, and commissioned. The new plant increases capacity by 75% with a significantly lower SEC.

"This project is a good example of how retrofits can make a huge difference for SWRO operators," reflects Shackleton. "With some creative engineering and the technology we now have available, they can significantly boost production capacity and reliability – also in quite tight spaces – and all with very attractive TCO. With their focus on innovative energy efficiency and compact reliability, Danfoss is at the forefront of reducing SWRO's financial and environmental costs."

Salt Separation Services

About Salt Separation Services:

Salt Separation Services Ltd. specializes in the design, manufacture, and maintenance of reverse osmosis desalination systems. With over 30 years of industry experience, they offer bespoke solutions for a wide variety of marine and industrial applications. Their expertise includes seawater desalination, brackish water treatment, and potable water systems, supported by a commitment to innovation and client-focused service. Salt Separation Services also provides comprehensive aftercare, including system upgrades and maintenance, ensuring long-term reliability and efficiency for their customers.

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