SEEPEX.
An Ingersoll Rand Business

SYDNEY WATER LEADS WITH SAI SYSTEM

APPLICATION DETAILS

- Centrifuge feed: 50 m³/h at 2.5-3% DS, equating to 1,500 kg/h
- Trailer loading: 20 wet tons of biosolids within 4 to 5 hours
- Cake solids percentage: Approximately 24% dry solids at 95% capture
- Pump discharge pressure set point: 1.4 bar

KEY SPECIFICATIONS

- Flexibility of design to fit into brownfields
- Closed system to contain odors
- Mobile unit that can be used on any site that requires the transportation of dewatered sludge cake

BACKGROUND

Sydney Water is Australia's largest water company, providing water, wastewater, recycled water and some stormwater services to more than 5.2 million people in Greater Sydney, the Illawarra and the Blue Mountains. They ensure the health of waterways and contribute to the overall quality of life in the region. Their water resource recovery facilities (WRRF) collect and treat approximately 1.5 billion liters of wastewater each day before it is reused or discharged into rivers or the ocean. Its wastewater systems consist of approximately 27,000 kilometers of wastewater pipes, 30 WRRFs and 695 wastewater pumping stations.

Sydney Water has a longstanding relationship with SEEPEX, having utilized their pumps well before SEEPEX officially established its presence in Australia in 2012. Currently, the WRRF in West Camden, southwest of Sydney, is operating at full capacity and is in the midst of significant upgrades to meet increasing demands from its catchment area. These upgrades are set to double the plant's treatment capacity, ensuring it can accommodate up to 72,000 new dwellings by 2046.

In the interim, West Camden is also tasked with managing temporary flows from the Southwest Growth Area until the Upper South Creek Advanced Water Recycling Centre becomes operational in 2026. These initiatives are critical for the plant to maintain compliance with its environmental protection license and to support the anticipated regional growth.

Aerial view of West Camden WRRF

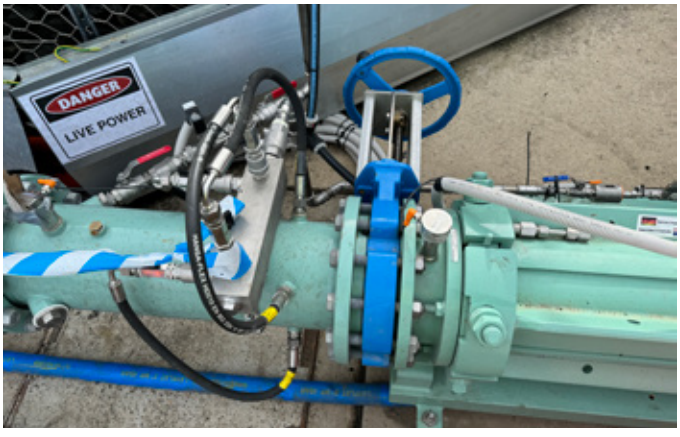
TASK

SEEPEX has played a crucial role at West Camden Water Recycling Plant by supplying essential pumps for digested sludge, WAS (Waste Activated Sludge), and TWAS (Thickened Waste Activated Sludge) as part of the plant's ongoing dewatering upgrade. Although SEEPEX's Smart Air Injection (SAI) technology had not yet been established as a permanent solution in Australia, the upgrade at West Camden provided an ideal opportunity to test and prove its effectiveness.

During the renovation of the dewatering building, a mobile dewatering system was required to ensure uninterrupted operations. Mark Ziogas, Principal Engineer for Sydney Water, had been actively searching for a site to trial the SAI technology. The timing of the upgrade created the perfect environment for this trial. Working in collaboration with Robert Elson from Downer and their teams, they implemented the SAI system as a temporary measure during the upgrade. This is a significant step toward the potential integration of SAI into permanent designs across Sydney Water's facilities in the future.

The previous transportation design at West Camden relied on traditional dual 40-meter shaftless screw conveyors to move the biosolids to the top of trucks or into a silo for storage. From there, a vertical screw conveyor was required to lift the biosolids from the silo back to the distribution conveyors to the trucks. This method involved multiple steps and significant structural support, making the process more complex and less efficient.

Left: SAI system loaded from mobile centrifuge with dewatered sludge;
Top-right: SAI control unit and air receiver vessel; *Bottom-right*: Boundary layer and air injection ports



COST SAVINGS

ENHANCED EFFICIENCY AND REDUCED COSTS

IMPROVED SAFETY

SEEPEX PRODUCTS

- Smart Air Injection (SAI)
  - BTHE 130-6LS (15 kW), polymer dosing pump (0.55 kW), SAI control unit, 1200 L air receiver and 11 kW compressor

SOLUTION

West Camden WRRF implemented a temporary dewatering system featuring SEEPEX's SAI. This innovative solution provides an efficient and cost-effective approach to biosolids pumping and dewatering, offering significant operational advantages over traditional conveying methods.

The SAI setup at West Camden includes an air compressor using food-grade oil-free compressor 11 kW, the SEEPEX SAI pump BTHE 130-6LS and polymer lubrication pump MD 012-12, SAI control unit, an air receiver vessel and the discharge pipe into trailers, which was supplied by the customer.

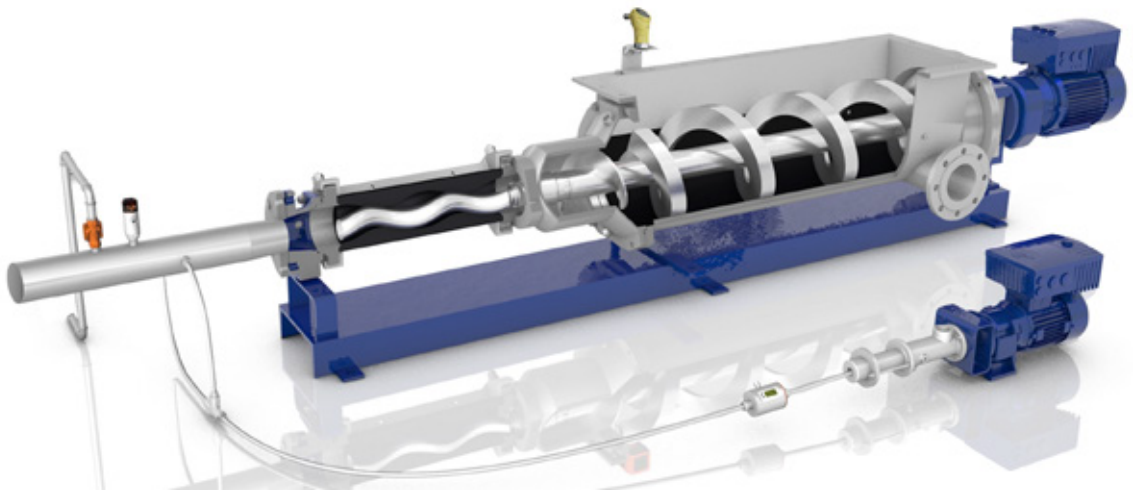
SAI uses a combination of progressive cavity pumping and dense phase pneumatic conveying to transport highly dewatered sludge discontinuously in short plugs in a particularly energy-efficient manner, unlike any other conventional conveying technology. As a result, friction losses only occur along these plugs and not in the entire pipe, resulting in numerous unique advantages, such as the ability to transport up to 1,000 meters with a low-pressure pump and PN10 piping.

Pneumatic dense phase conveying with supporting lubricant minimizes friction losses in the pipeline. SAI's characteristic pressure behavior is also evident at West Camden, where the operating pipeline pressure is only 4 bar.

To maintain operations during the upgrade, the West Camden site hired a mobile centrifuge to dewater sludge alongside an access road. The setup allowed sludge to be fed into an extension hopper positioned above the SEEPEX pump. By utilizing temporary steel pipework, the pumped sludge was efficiently routed directly into truck loading bays.

The SAI setup allowed the team to maintain their regular shifts, ensuring they could meet the facility's demands while keeping the plant running smoothly throughout the extensive upgrade process. This seamless integration of the temporary dewatering system with the SAI technology was crucial in minimizing disruptions and maintaining operational efficiency during the renovation.

The SAI technology presents numerous benefits and future opportunities. It offers a more economical solution compared to conventional belt and screw conveyors, eliminating brownfield footprint constraints. The straightforward pump solution reduces both operational and asset complexity. The construction time and cost are also minimized as the system negates the need for large conveyor assets, support structures, and access platforms.



> IMPLEMENTING SEEPEX SMART AIR INJECTION AT WEST CAMDEN WRRF HAS BEEN A TRANSFORMATIVE STEP IN BIOSOLIDS MANAGEMENT. THIS INNOVATIVE TECHNOLOGY NOT ONLY ENHANCES EFFICIENCY AND REDUCES COSTS BUT ALSO SIGNIFICANTLY IMPROVES SAFETY AND ENVIRONMENTAL OUTCOMES. IT REPRESENTS THE FUTURE OF SUSTAINABLE WASTE HANDLING.
>
> **MARK ZIOGAS**
> PRINCIPAL ENGINEER,
> (TREATMENT) WATER
> AND ENVIRONMENT SERVICES,
> SYDNEY WATER

The enclosed pipe system of SAI minimizes the need for odor extraction and emission controls, improving safety compared to conventional methods. This temporary trial has allowed the technology to be proven in Australia. Stickiness tests have been conducted and found there was no increase during the process. At West Ryde, a NATA-accredited laboratory, odor tests were performed to evaluate the impact on odor potential.

The testing included both solids analysis using simple gravimetric methods and specialized off-take gas testing over a 10-day incubation period. The results indicated that there was no measurable impact on odor potential throughout the testing period.

SAI uses single pipes that can be routed directly to the silo inlets, providing a more streamlined and efficient solution. For municipal water utilities in Australia, the alternative to conventional processes, which has been tried and tested worldwide for years, can quickly pay for itself.

This installation represents the first use of SAI in Australia, highlighting its innovative nature. Beyond permanent installations, the SAI system can be used for temporary applications such as cleaning out digesters and other tanks, minimizing handling and reducing community risks and odor impacts. As SAI is flexible enough to retrofit to virtually all layouts with a discharge pipe of up to 1,000 meters, Sydney Water can deploy SAI to other sites as needed.

The SEEPEX SAI system implemented at the West Camden WRRF represents a significant advancement in biosolids handling and dewatered sludge transport. Its innovative approach, efficiency, and versatility make it an asset for Sydney Water, providing a model for future applications in other sites and contexts.

BENEFITS

- Cost-effective and efficient solution compared to conventional belt and screw conveyors
- No brownfield footprint constraints
- Reduced operational and asset complexity
- Shortened construction time and lower costs
- Sealed system minimizes odor extraction and emissions
- Improved safety over traditional conveying methods
- Versatility for use in both permanent and temporary applications

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