

HYBACS®

A BLUEWATER BIO TECHNOLOGY

Hybrid Activated Sludge

HYBACS® is a patented **HYBrid ACTivated Sludge** process for nutrient removal, developed from a technology originating in South Korea.

The process consists of two biological stages followed by clarification.

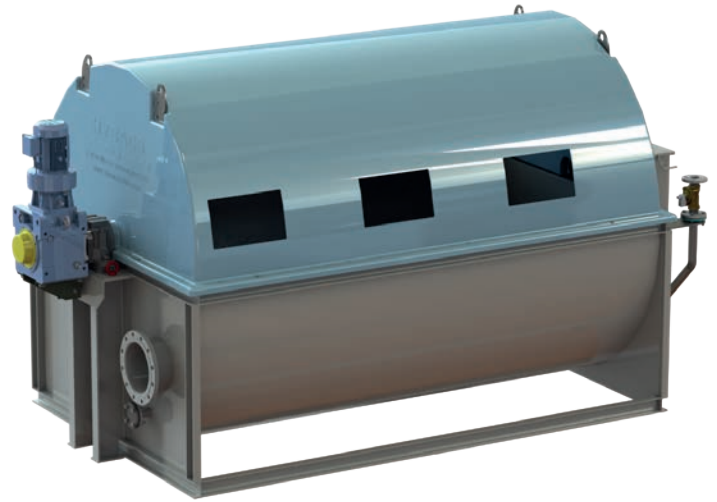
- **The first stage** comprises Bluewater Bio's Shaft Mounted Advanced Reactor Technology (**SMART™**) units, containing attached biomass
- **The second stage** is conventional activated sludge, with suspended biomass

The high COD in the **SMART™** unit stimulates the dense, attached biomass to produce enzymes which accelerate the hydrolysis of material in the wastewater. The hydrolysed material is oxidised more readily in the activated sludge stage, enabling a higher loading rate and reduced tank size.

HYBACS® also encourages the formation of a granular activated sludge floc with excellent settlement characteristics, enabling increased loading rates on clarifiers.

HYBACS® is especially applicable to upgrading existing activated sludge plants to treat increased loads and improve effluent quality.

It has been demonstrated that **HYBACS®** can produce effluents with qualities that comply with the most stringent European nutrient removal standards.



Benefits

- Reduces physical footprint by up to 50%
- Enables upgrade of existing activated sludge plants without interruption
- Significant CAPEX benefits
- Modular construction enables rapid deployment
- Reduces power consumption associated with aeration by up to 30%
- Reduces chemical consumption for nutrient removal
- Reduces embodied & operational carbon
- Intrinsically odourless

The core benefit of **HYBACS®** is that it enables an existing activated sludge process to be swiftly upgraded for increased capacity or performance, by simple offline installation of **SMART™** units.



HYBACS®



HYBACS® is configured with:

- **SMART™** units upstream of the activated sludge stage
- RAS is returned upstream of the **SMART™** units to sustain a highly concentrated and active biomass and a high floc loading.

Technology

SMART™ Unit, the first stage of the **HYBACS®** process, is a type of biological reactor comprising plates fixed to a rotating structure. The plates are 50mm thick and manufactured from mesh with a voidage of 95%, producing a biological environment that supports a large quantity of attached biomass, specialised for hydrolysing COD in the influent wastewater.

Aeration from rotation – the biomass partially drains as the plates rotate, enabling convection in and out of the plates both of the liquor containing pollutants and bacteria and of the surrounding air.

Thus, as the plates rotate, the biomass is aerated from the atmosphere when above the liquor, and brought into contact with pollutants when submerged. This advective flow substantially increases the transfer rate of pollutants and oxygen to the biomass, increasing the hydrolysis rate.

Off-site Manufacture – **SMART™** units are pre-assembled in steel tanks, enabling the highest quality standards during manufacturing and testing, and can be installed quickly and simply onto a flat surface reducing installation time.



This image shows the large quantity of biomass attached to the 50mm thick mesh plates. Bacteria culture analyses and enzyme studies demonstrate that the biomass is much more active than conventional mixed liquor.

Granular Activated Sludge

Another benefit of **HYBACS®** is improved sludge settlement; typically, SSVI values of mixed liquor are less than 80 ml/g. Such low SSVI values allow for the clarifiers to be designed at comparatively high rates, or for the activated sludge tanks to operate at comparatively high MLSS concentrations, typically 4000 mg/l. In spite of the low SSVI, the sludge also has good clarification characteristics and treated effluents can comply with a standard of BOD 10 / SS 15.

HYBACS® powered by SMART™

The **HYBACS®** Upgrade at Tubli WPC has more than doubled the capacity of existing aeration lanes.



The compact SMART™ units are in the background.

Consequently, in the HYBACS® process:

- High rate hydrolysis increases the capacity of the downstream activated sludge process
- Modular **SMART™** units can be installed quickly reducing construction time and risk
- An effluent TN of 10 mg/l can be achieved without external carbon dosing for municipal wastewater treatment
- Power savings of up to 30% can be achieved.

BLUEWATER BIO



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