



FLUID TECHNOLOGY SOLUTIONS

Specialist in Flood Defence, Sewage Surge, Flood Management
Warning Alert System

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Supplementary Information

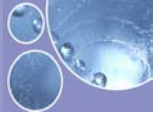
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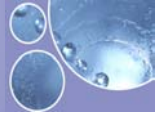


Project Management Services

Microbac offer a variety of project management services to suit client needs including:-

- Plant design
- Analysis of influent wastewaters
- Pre-treatment design
- Post-treatment design
- Plant fabrication
- Plant installation
- On-site commissioning of plants
- Provision of operating and maintenance manuals
- Training of operators and technicians
- Management, operation and maintenance of plants
- Planned and emergency maintenance contracts
- Remote monitoring of plants by telemetry
- Provision of process guarantees on plant performance
- Plant leasing
- Troubleshooting and treatment plant remediation
- Analysis of discharge waters
- Continued involvement with projects after commissioning





Marine Bioreactors

Microbac design and build Marine Bioreactors for use in all types of shipping and off-shore platforms to treat both black and grey waters and, in some cases, oily wastewaters and produced water.

The Marine Bioreactors are based on Microbac's submerged, aerated fixed-film Bioreactor plant with additional features to enable its efficient use in marine environments.

A small footprint and compact design enables the Marine Bioreactors to be fitted into available space and also makes them suitable for retrofitting on ships and offshore rigs. The high efficiency of the treatment units produce excellent quality discharges under all normal conditions and they tolerate shock loadings and recover quickly.

The Bioreactors are constructed in coated steel or stainless steel and are available for Eex applications if required.

Microbac Marine Bioreactors are IMO and US Coastguard approved and they produce discharges well inside current limits to ensure compliance with future IMO requirements.

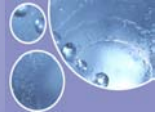


Membrane Bioreactors

The Microbac Membrane Bioreactor combines Microbac's submerged aerated fixed-film Bioreactor and hollow fibre filtration membranes to produce a very small footprint treatment unit suitable for municipal sewage and a wide range of industrial wastewaters.

The Membrane Bioreactor degrades harmful organics and ammonia and removes suspended solids to produce a discharge better than the most stringent standards, typically less than 5:5:5::BOD:SS: ammonia. At the same time, the process disinfects the wastewater so that it is available for reuse or harmless discharge in the most sensitive receiving waters.



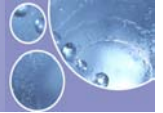


Industrial Bioreactors

The provision of wastewater treatment systems for complex industrial wastewaters is the mainstay of Microbac's business. Unlike sewage, industrial wastewaters from many industrial processes contain a cocktail of recalcitrant organic compounds that require considerably more retention time in the biological zone of the treatment plant to ensure that they are fully degraded. Data to support the sizing of a treatment plant for these complex wastewaters can be provided by laboratory and / or pilot Bioreactor trials. The latter can provide valuable assistance in validating the design of the treatment plant by determining the optimum retention times and degradation rates of the constituent organic molecules. Microbac's biological cultures are also used in the trials and, during the course of the work, these formulations may be modified to promote more rapid biodegradation rates and to optimise the overall performance of the Bioreactor unit.

Treatment plants can be supplied in carbon steel or stainless steel, or they can be constructed in concrete, where appropriate.





Bioreactor Installation, Courtaulds, China

Introduction

Following a successful on-site trial using a mobile Bioreactor, Microbac has installed a full-scale Microbac Bioreactor unit in a Courtaulds textile plant in China to reduce the Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD₅) of the wastewater.

Information obtained from the site trial enabled accurate sizing of the full-scale Bioreactor unit to be achieved and allowed the client to approach the project in a phased manner and to commit to the final stage of the project with increased confidence.



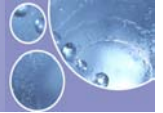
Treatment

The major benefits of the Microbac Bioreactor unit for the Chinese site were the low civil engineering requirements and the ease of installation, coupled with the lack of moving parts in the Bioreactor and subsequent low maintenance requirements. In addition, as the unit runs on a semi-automatic basis, little operator input is required on a day to day basis.

In order to fulfill the consent discharge requirements implemented by the Chinese authorities, the Bioreactor, in this instance, is located downstream of a Linatex/Crossfields Macrosorb unit which is used to remove the coloured components from the wastewater generated during the textile dyeing process. In removing colour from the wastewater, a proportion of COD is also removed but at this stage, significant organics remain in the waste stream to be treated with the Microbac Bioreactor.

Results

Results to date demonstrate that the Microbac Bioreactor unit effectively removes COD and BOD levels to well below the discharge consents of 180 mg/l and 40 mg/l respectively.



Offshore Oil Platforms, Russia

Microbac has recently delivered two offshore wastewater treatment plants (WWTP's) for Sakhalin Energy Investment Corporation (SEIC). The plants, designed to treat grey and black waters from platform personnel, have been installed on the Lunskoye A (LUN-A) and Piltun (PAB) platforms that operate offshore Sakhalin Island, Far East Russia. Offshore winter temperatures can be as low as -39C and the area is prone to high seismic activity. The Microbac Bioreactors (MBR's), which have IMO approval, are designed to meet the extremely strict discharge standards imposed by the Russian Authorities in terms of organic load, BOD, Suspended Solids, Ammonia and Phosphate. The stringent discharge requirements have been imposed to reduce any adverse impact on the feeding ground of the critically endangered Western Grey Whales, that spend four to five months a year feeding off Sakhalin's Piltun Bay and to protect the wild salmon stocks that are of great importance to Sakhalin Island economy.

The plants have been provided to withstand the lowest winter temperatures and to remain structurally intact under severe seismic accelerations. Prior to building the plants, the design was validated using Finite Element Analysis.

The WWTP's comprise a compartmentalised tank to provide equalisation of the influent wastewater, biological treatment using a fixed film bioreactor, solids settlement and a clean water chamber. The tank, pipework and associated components are trace heated and insulated to provide frost protection down to -39C, ambient.

Both plants are skid mounted and controls for the operation of the ancillary equipment are based on the use of SMART transmitters to measure process parameters. The subsequent signal outputs, which are relayed to the Local Control Panel mounted on the skid, provide all indications, alarms and control functions for the WWTP's.

Wastewater Treatment Plant After Insulation

