

Benefits of MBR technology for the Carré de Réunion Wastewater Plan



Overview

Located within viewing distance of the famous Palace of Versailles, the Carré de Réunion Wastewater Plant acts as a centralized treatment facility for the surrounding region.

The Carré de Réunion plant has been required to expand capacity while maintaining stringent effluent requirements as more and more of the local treatment facilities have been taken offline in an effort to consolidate resources. Furthermore, the facility upgrade was confined to a very limited footprint in order to remain unnoticeable to visitors of the neighboring palace gardens.

Koch Separation Solutions (KSS) and OTV France Nord (Veolia) jointly developed an expansion strategy centered around membrane bioreactor (MBR) technology. Currently, Carré de Réunion is the largest MBR plant operating in Europe, and is the fifteenth largest of its kind in the world.

Since commissioning, the upgraded facility has consistently met the ever-increasing treatment demands of the Versailles region, without disturbing the experience of the palace's 7,500,000 annual visitors.

The Challenge

To expand capacity and improve the effluent quality of the existing conventional activated sludge (CAS) treatment plant within the limited existing footprint without negatively impacting the nearby palace of Versailles.

The Solution

KSS and OTV France Nord (Veolia) provided an expansion strategy leveraging the benefits of MBR technology.

With the ability to operate at higher mixed liquor suspended solids (MLSS) concentrations, the PURON® MBR nearly doubled the treatment capacity of the conventional wastewater treatment plant within the same footprint and bioreactor infrastructure.

By incorporating the MBR into the existing plant infrastructure, KSS and Veolia were able to keep the system discreet and unnoticeable to visitors of the palace. Additionally, the visible components of the system were housed in a building with architecture similar to the surrounding area.

“Our green plant is discreetly placed in the plain of Versailles, as a protective oasis for our living environment” said Mr. Daniel Higoïn, director of SMAROV who owns and operates Carré de Réunion. The treatment plant has a “refined and elegant architecture, integrated in[to] one of the most beautiful landscape[s]”

In addition to facilitating plant expansion, the PURON ultrafiltration membrane acts as a physical barrier which completely retains suspended solids within the bioreactor. As a result, the upgraded MBR produces higher quality effluent than the existing CAS system, and is unaffected by biological upset events.

KSS was selected by Veolia as partner due to the technological benefits of PURON® MBR technology along with successful collaborative efforts on over fifteen MBR projects across Europe and KSS' dedication to providing a customer-driven solution from project inception through operation of the system.

Europe's Largest MBR

Equipped with approximately 162,000 m² of membrane area, the upgraded MBR system has processed peaks up to 38.0 MGD since its commissioning in November 2015. In addition to the 10 filtration trains currently in operation, infrastructure for two additional trains was provided to facilitate future expansions as more hydraulic load is shifted to Carré de Réunion from smaller de-centralized plants.

Before entering the membrane filtration tanks, wastewater is treated with a series of anoxic and aerobic activated sludge treatment zones to meet stringent total nitrogen (<10 mg/L), phosphorus (<1 mg/L) and BOD (<5 mg/L) effluent limits. Working in concert with the biological treatment steps, the PURON® ultrafiltration modules provide a physical separation barrier ensuring that the effluent requirements are consistently achieved regardless of upset conditions. Consistent effluent quality is especially important for Carré de Réunion, because the treated water is discharged into Ru de Gally creek located in the palace gardens, and eventually enters the Seine River.

Although the MBR system has provided consistent treatment since commissioning, KSS continues to support the plant operators in an ongoing effort to optimize system performance.

A team of KSS process engineers and field-service technicians has provided frequent site visits and remote data monitoring services which have led to optimization of plant operation. Implementing these changes has thus far led to decreased energy consumption, cleaning chemical reduction, more stable system performance, and an overall lower cost-of-ownership for the citizens of the Versailles region.

Product Overview

KSS supplied 100 PURON PSH 1800 submerged membrane modules for the Carré de Réunion MBR.

PURON MBR utilizes a virtually unbreakable reinforced hollow-fiber membrane. KSS' unique manufacturing process results in an ultrafiltration membrane with tight pore distribution, and as Mr. Higoïn pointedly stated, "this membrane is at the very heart of the [water] purification process".

PURON MBR's patented single header design and central aeration system allows the robust hollow-fiber membrane to consistently produce the high quality effluent required at Carré de Réunion with minimal energy consumption. Furthermore, the free-floating fibers at the top of the PURON module eliminate the build-up of hair and fibrous material that can potentially clog the upper ends of products that employ both top and bottom headers. This new "Stage 1 UF system" re-moves solids and concentrates the waste 25 times, equivalent to a 96 percent reduction in water content. Removal of the solids enables the bioreactor process to work smoothly. Off-site disposal of bioreactor waste has been reduced tenfold. Cleary calculates that the total annual cost of off-site disposal of waste has been reduced from \$332,000 to \$104,000, a 69 percent reduction amounting to a savings of \$228,000 per year.

"We have been able to reduce our costs and maintain a reliable, manageable process," says Cleary. "We went five months without wasting in the bio system and without any ill effects. With the Stage 1 UF system, we finally have a process that works."



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