



Background

Founded in 1957 by King Saud bin Abdul Aziz, the King Saud University (KSU) was the first secular university in the Kingdom. The university is the oldest and most prominent institute of higher education, research and community services in Saudi Arabia, and is located in the capital city of Riyadh. Today, the student body consists of about 63,000 students of both genders who study courses in natural sciences, humanities, and professional studies - for which the university charges no tuition.

In 2012, Headworks BIO Inc. was awarded the contract to design an integrated fixed film activated sludge (IFAS) system for installation at this prestigious institution.

Process

One of the key challenges at the plant was to address the seasonal campus variations in occupancy levels between class periods and the summer holidays. The summer break's low flow for extended periods (about 2 months) resulted in failures of previously installed technologies. The self-regulating nature of the IFAS process was very appealing to the university. The King Saud University also had a requirement for an extremely compact plant so that the plant's presence on campus would have minimal visual impact.

Headworks BIO Brings MBBR/IFAS Upgrade to King Saud University in the Kingdom of Saudi Arabia

Customer: King Saud University
Industry: Municipal

KEY FACTS

- **Design Flow:** 10,000 m³/day (2.6 MGD)
- **BOD₅:** Influent 350 mg/L
Final effluent < 10 mg/L
- **TSS:** Influent 400 mg/L
Final effluent < 30 mg/L
- **NH₃-N:** Influent 35 mg/L
Final effluent < 5 mg/L
- **Phosphorus:** Influent 12 mg/L
- **pH:** 6.5 – 7.5
- **Temperature:** 25 – 35 °C (77 – 95 °F)

“The main reason for choosing Headworks BIO’s MBBR process was because we required a technology which is easy to operate and maintain with low OPEX costs. The other important reason for choosing MBBR was the remarkable small footprint required and its ability to produce high quality effluent suitable for reuse and irrigation.”

- Dr. Waleed M. Zahid

*Vice Dean for Development & Quality, Associate Professor,
Environmental Engineering at KSU*

Results

The new sewage treatment plant on campus treats approximately 10,000 m³/day (2.6 MGD) and the IFAS system achieves BOD reduction, nitrification, and denitrification, thus producing effluent suitable for reuse and irrigation applications. The four treatment reactors have a total footprint of 144 m² (1550 sq. ft.) - a remarkable achievement for a plant with such high treatment capacity.

Along with the process design, Headworks BIO Inc. has supplied the core components of the IFAS system, including: media, aeration grids, and media retention screens. Headworks BIO employ their proprietary media, Active Cell, offering 485 m²/m³ of protected surface area.

The ActiveCell process provides an extensive protected surface area for autotrophic bacteria that supports a self-regulation and effective biological treatment process without the build-up of end products and minerals which normally inhibits the process in suspended growth systems.

The IFAS variation of the moving bed biofilm reactor (MBBR) process gets its name from the integration of biofilm carrier technology within a conventional activated sludge process. This hybrid process enables activated sludge systems to achieve dramatic gains in volumetric levels. The result is an extremely compact system that produces excellent effluent quality, suitable for reuse applications.



Diffusers and aeration grids supplied by Headworks BIO Inc.



Installation of ActiveCell media into the tank.



The biomedium operates in a mixed motion with an aerated wastewater treatment basin.