Case study

LEPRINO FOODS COMPANY - ROSWELL, NEW MEXICO USA
Food & Beverage

Highlights

General information
Leprino Foods Company is the world's largest producer of premium quality mozzarella and the largest US exporter of whey and lactose products.

PROJECT LOCATION: Roswell, New Mexico USA
CLIENT: Leprino Foods Company
OPERATIONAL SINCE: September 2001

Challenge
Increase capacity of existing treatment plant and reduce operational cost of entire treatment system.

Solution
Place the Kaldnes™ MBBR biofilm step ahead of the existing conventional activated sludge system to act as a pre-treatment system.

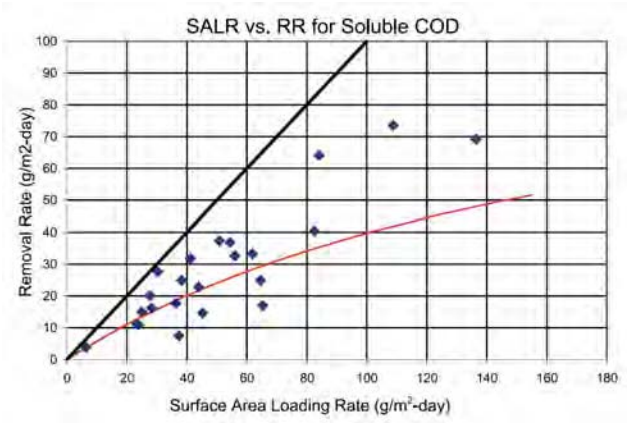
Challenge
Leprino's existing wastewater treatment system was an extended aeration activated sludge process designed for 8,620 kg/d of BOD but was being overloaded at times to >13,600 kg/d during spill events in the factory. The overloading did not make operation of the existing system easy. Polymer addition was required to ensure settling of MLSS in the clarifier, which increased treatment costs. The use of mechanical aeration devices in addition to a fine bubble aeration system was required to maintain a positive dissolved oxygen concentration in the basins which translated into extra costs for the treatment facility. The ultimate challenge was to add a beneficial treatment system which would complement the existing treatment system and provide for stable operation.

Concept
The overall design concept of this project used a combined biofilm and activated sludge system where the Kaldnes™ MBBR biofilm reactor acts as a pre-treatment device ahead of the existing activated sludge system. Leprino looked at the Kaldnes™ MBBR biofilm process as a means of pretreatment to remove 30-40% of its easily degradable organic matter and to act as a buffer when shock loads were headed toward the treatment plant.

Design
In operation, the Kaldnes™ MBBR biofilm reactor effluent flows directly, via gravity, into the two (2) parallel activated sludge basins, which consume the remaining organic matter contained within the wastewater. The first design phase of the upgrade was based on the filling degree of media in the Kaldnes™ MBBR biofilm reactor to 33% its liquid volume. The design flow is an average of 3,025 m^3/d with a BOD load of 10,590 kg/d.

DESIGN LOAD
Flow: 126 m³/h- Average
BOD: 10,590 kg/d
COD: 15,575 kg/d
TSS: 3,026 kg/d
TN: 515 kg/d
TKN: 333 kg/d
NH3-N: 45 kg/d
NO3-N: 181 kg/d
PO4-P: 272 kg/d
Temperature Range: 25°C -40°C

At this design, BOD load and media fill fraction, the estimated removal of soluble BOD is 35% leaving <6,885 kg/d soluble BOD/day to be treated by the existing activated sludge units.



Since the maximum filling capacity of an Kaldnes™ MBBR biofilm reactor is 67% of liquid reactor volume, the overall treatment capacity of the reactor can be upgraded by just adding media to the reactor and extra air to the existing aeration grid system. In order to meet future capacity, the first increase in media fill will be to 45% of the reactor's volume. At this second stage, the system will treat an average influent BOD load of 12,110 kg/d to an effluent soluble BOD of 7,266 kg/d (40% removal of soluble BOD) at a flow rate of 3,460 m³/d. The final media increase will be to 67% fill of the reactor's volume. At this maximum fill of carrier media, the system will treat an average influent BOD load of 13,733 kg/d to an effluent soluble BOD of 7,575 kg/d (45% removal of soluble BOD) at a flow rate of 3,925 m³/d.

Results

Performance of the Kaldnes™ MBBR biofilm process has been excellent. The Kaldnes™ MBBR biofilm process has removed an average of 56% of the soluble COD load from the wastewater. Operationally, the downstream activated sludge system has significantly improved operation, using less mechanical aeration, polymer for settling and anti-foam in aeration basins.

The table below shows data from the first 2 months of start up. Both the influent and effluent values of soluble COD (SCOD), total suspended solids, (TSS), ammonia-nitrogen (NH_3-N), nitrate-nitrogen (NO_3-N), total dissolved solids (TDS), total phosphorus (TP) and chlorides are shown. The average removal rate for the system has been 56% of the soluble COD. The graph above shows the surface area loading rate vs. removal rate for soluble COD. The red line represents the regression analysis of the data and supports a >40% removal of soluble COD up to loads of 85 g/m² d.

Parameter	SCOD	TSS	NH_3-N	NO_3-N	TDS	TP	Chloride
Influent	2,290	1,026	12.5	58.1	4,167	89.4	383
Effluent	1,004	1,758	9.17	43.9	3,582	113	328

All values as mg/L

Operationally, the plant has significantly improved operation overall. The polymer usage in the secondary clarifiers has been completely turned off due to the improved settling rates of the MLSS in the clarifier. Return sludge pumping rates have decreased due to the increased concentration of settled MLSS in the clarifier. In addition, because of better settling rates, the surface aeration devices have been turned off since the extended aeration basins are now capable of maintaining a positive dissolved oxygen concentration (>2 mg/L). The reduction in use of all these items has a positive effect on the cost of treating the wastewater resulting in a cost savings for Leprino Foods WWTP.

info@anoxkaldnes.com
www.anoxkaldnes.com

AnoxKaldnes
Klosterängsvägen 11A
SE-226 47 Lund, Sweden
Tel. +46 46-18 22 00
Fax. +46 46-13 32 01