



## INDUSTRIAL WWTP

# IFM Successfully Designs a UF System for High Zinc and Oil & Grease Removal

In Spring 2016, IFM successfully completed startup of the Design Build project for wastewater treatment for a major NW Ohio Cleaning Product Manufacturer. Dating back to February 2015, IFM convinced the owner to sway from standard physical / chemical treatment to membrane filtration via tubular ultrafiltration (UF) membranes for the treatment of residuals from product manufacturing.

IFM utilized the data collected from the Summer 2015 pilot at the old facility to come up with a design that would handle TSS, FOG, Zinc and Phosphorus.

tank while being dosed and mixed with coagulants, to aid in the precipitation of phosphorus to be rejected by the membranes. The pH in the UF tank is also monitored to ensure that zinc precipitation is successful. Additional metal scavengers are being evaluated for zinc polishing.

When the process tank reaches appropriate pH levels, a batchdown or modified batch cycle will occur. During a modified batch cycle, the UF process tank will continue to be topped off as clean permeate is discharged from the facility.



The complete system installed at the manufacturer's facility

Using pH control and chemistry, IFM could combine the removal of the previous components to a 90%+ removal, with one technology, with crystal clear discharge to the local POTW. The alternative would require a 2 step process of emulsion breaking followed by metal precipitation.

The designed system contains EQ tanks that all of the waste from the facility will be collected in. The waste from the EQ tank will then be sent to the UF process

Batchdown mode is similar to the modified batch previously discussed. The difference is that during batchdown mode, the UF process tank is not continuously topped off. The transition into batchdown may occur automatically or can be initiated manually. During this process, permeate is still being sent to the sanitary sewer from the facility, which in turn concentrates the process fluids.

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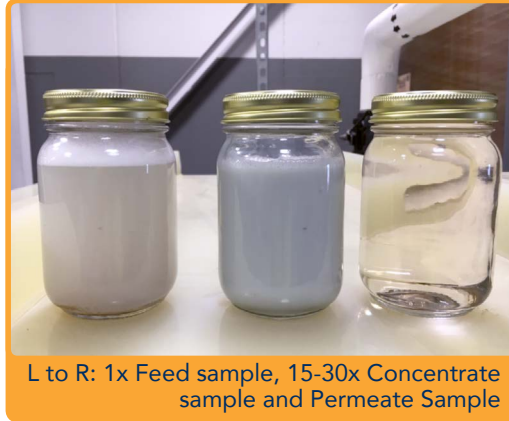
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After the batchdown cycle has completed, a clean-in-place (CIP) process will run automatically through the UF system to clean the system prior to the next process begins. The CIP's must be performed to remove foulants from the membranes and to extend the operational life of the membranes. The system contains a chemical cleaning tank that all cleanings and rinses will occur through this tank.

IFM installed this UF system in February 2016, prior to the everyday process of the facility began. Below is a table analytical results from pilot that was conducted as well as our current analysis results using the designed UF system.

The system has been operating with minimal cleanings and achieving 30x concentration appears attainable. Minimal cleanings have been required and the system, since being fully cleaned via KLD II membrane cleaner, is achieving over design flux rates. Currently, operational flux is maintained over 50 GFD.



L to R: 1x Feed sample, 15-30x Concentrate sample and Permeate Sample



Holding tanks that collect all of the wastewater to supply the system

### PILOT UF OPERATING TABLE

Parameter	Units	1x Feed	Permeate
pH	S.U.	7-10	7-10
CBOD-5	mg/L	2,000-7,000	1,622-6,000
Total Suspended Solids (TDS)	mg/L	500-1,000	<5
Total Solids	%	0.5-0.75	-----
COD	mg/L	5,000-10,000	2,400-14,000
Oil and Grease	mg/L	25-250	<25
Zinc	mg/L	10-20	7-14
Total Phosphorous (P)	mg/L	72-600	9.6-223**
Total Dissolved Solids (TDS)	mg/L	1600-4000	>5000

### CURRENT OPERATING RESULTS

Parameter	Units	1x Feed	UF Feed	Permeate
pH	S.U.	9.8-11.6	8.9-9.8	9.0-9.8
CBOD-5	mg/L	200-3160	8170-10300	240-1100
Total Suspended Solids (TSS)	mg/L	40-440	2320-22500	<5.6-6.3
Total Solids	%	0.1-0.9	0.6-4.2	0.15-0.21
COD	mg/L	2380-11310	14840-96080	160-8770
Oil and Grease	mg/L	5-28	150-4080	<5
Zinc	mg/L	1.3-7.0	17-105	0.07-5.5
Total Phosphorous (P)	mg/L	5-150	145-380	0.8-25.6