

Welcome to the webinar!

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ZeeWeed* MBR with memDENSE* for Resilient Wastewater Treatment

2 years of successful operation at the City of Detroit Lakes WWTP





ZeeWeed MBR with memDENSE for Resilient Wastewater Treatment

Today's Presenter



Matt Reeve
Process Engineer



ZeeWeed MBR with memDENSE for Resilient Wastewater Treatment

Agenda

What we will cover today:

- Technology Introduction
- Experience
- Results and Benefits
- Implementation
- Q & A

**ZeeWeed Membrane
Bioreactor (MBR) with
memDENSE optimizes
membrane and biological
performance, reducing
operating costs, boosting
resilience, and giving
operators peace of mind.**

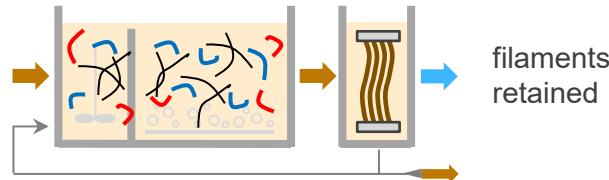


ZeeWeed MBR with memDENSE

MBR plus Densification

CONVENTIONAL MBR

Uncontrolled MLSS characteristics limit MBR performance

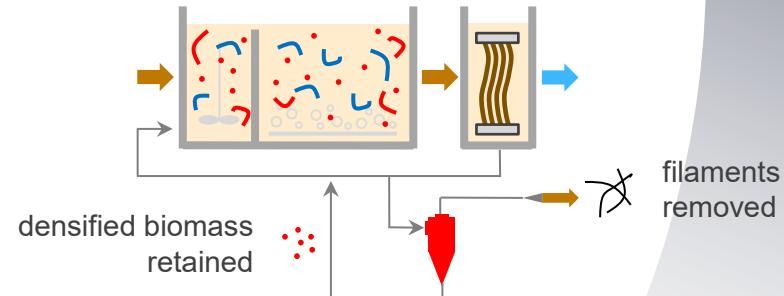


 filaments

 flocs

ZeeWeed MBR with memDENSE

Tailored MLSS characteristics unlock MBR potential



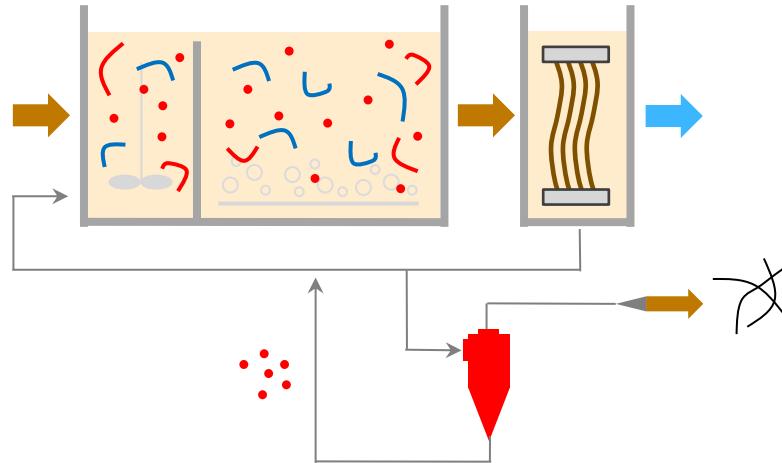
densified biomass retained

 densified biomass

 filaments removed

ZeeWeed MBR with memDENSE

How it Works



❖ filaments

❖ flocs

❖ densified biomass

SELECTIVE WASTING

Removal of light biomass fraction

- foulants, colloids, pin floc
- nuisance bacteria, filaments

DENSIFICATION

Retention of dense biomass fraction from plants with an anaerobic zone

- improved filterability
- nutrient removal specialists

ZeeWeed MBR with memDENSE

Optimizes Membrane & Biological Performance

MEMBRANE PERFORMANCE

- Permeability increase
- Fouling reduction
- Cleaning optimization

BIOLOGICAL PERFORMANCE

- Biological P removal enhancement
- Process aeration energy reduction
- Nuisance foam control

ZeeWeed MBR with memDENSE

Experience

Plant	Size	Configuration	Commissioned
Detroit Lakes, MN, USA	1.2 MGD // 4.5 MLD	A2O MBR	2023
Watercare, New Zealand	0.3 MGD // 1.1 MLD	MLE MABR-MBR	2024
PUB, Singapore	2.64 MGD // 10 MLD	Step-feed MABR-MBR	2024
Île Arrault, France	4 MGD // 15.1 MLD	MLE MBR	2024
Gwinnett County, GA, USA	19 MGD // 72 MLD	A2O MBR	2025
Jordanelle, UT, USA	1.2 MGD // 4.5 MLD	A2O MBR	2025

A2O - Anaerobic-anoxic-oxic
MLE - Modified-Ludzak Ettinger
MABR - Membrane Aerated Biofilm Reactor

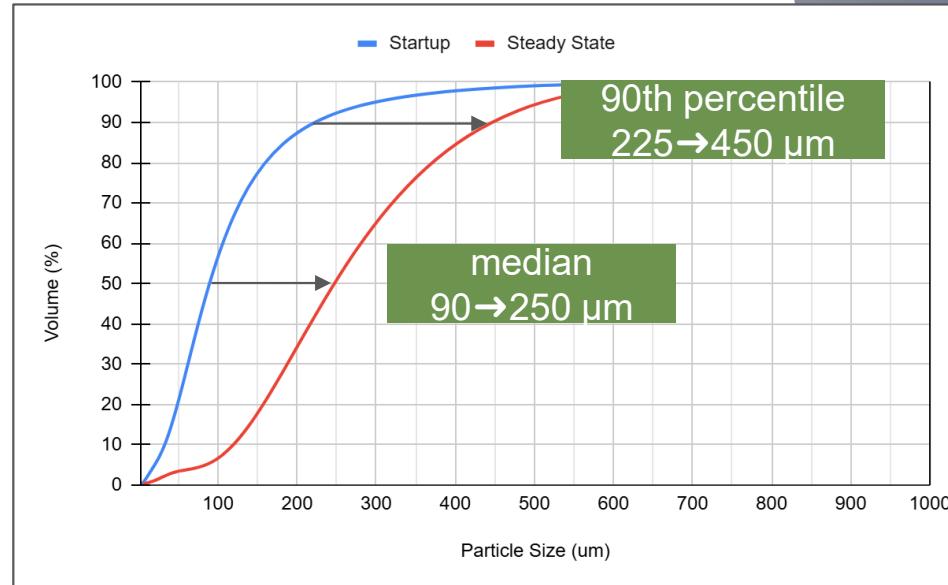
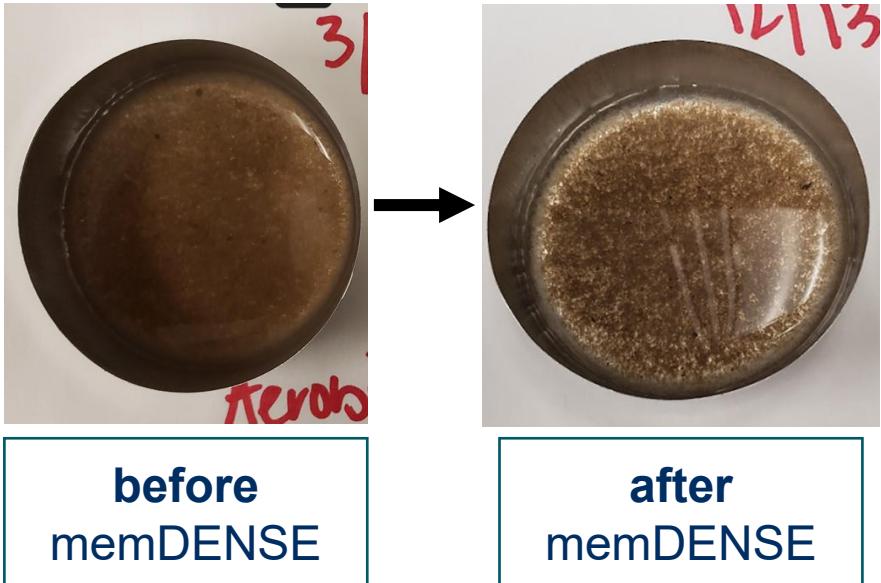
DETROIT LAKES MINNESOTA, USA

- 1.2 MGD MBR
- A2O configuration
- Total Nitrogen (TN) 7 mg/L
- Total Phosphorus (TP) 0.07 mg/L
- MBR + membrane sludge thickener
commissioned 2019
- memDENSE commissioned 2023



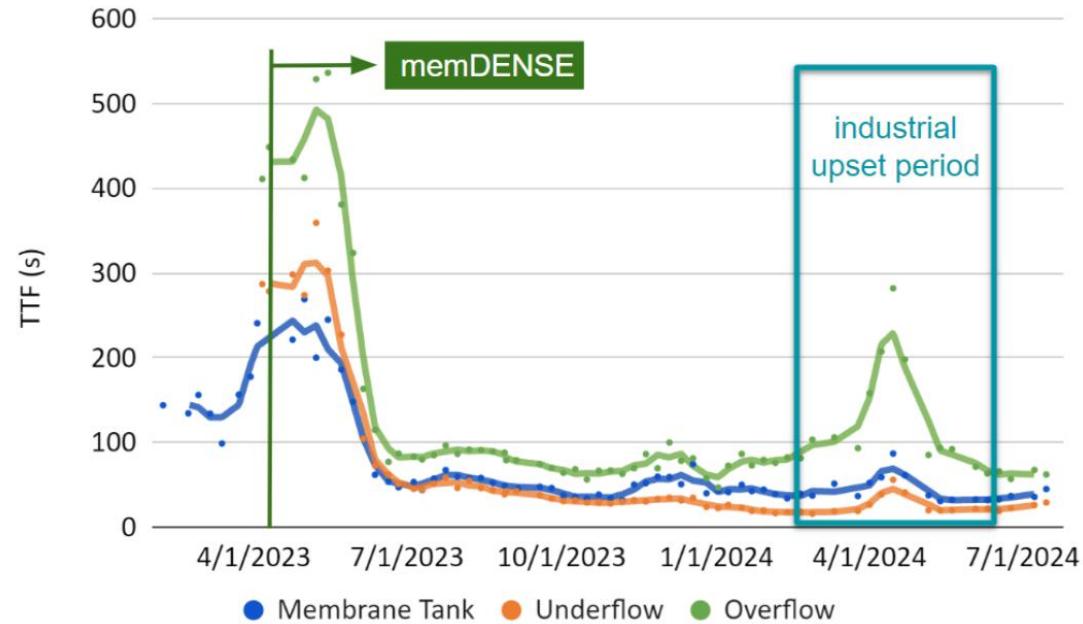
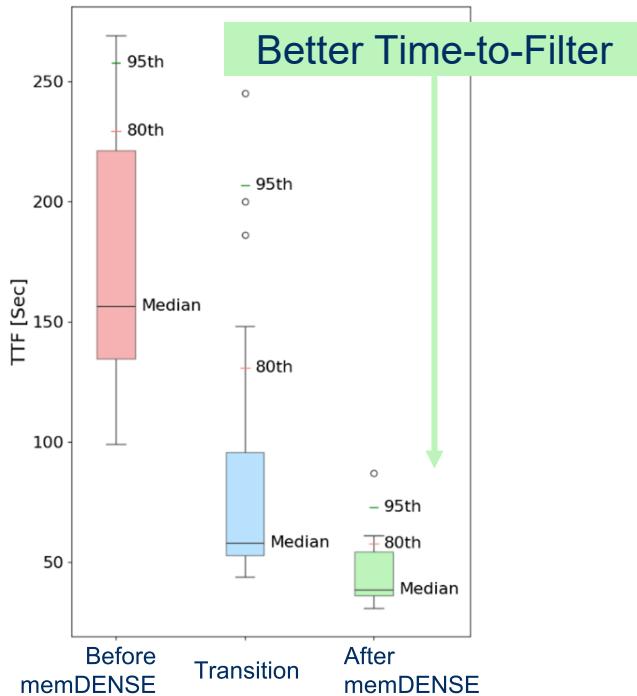
memDENSE INCREASES FLOC SIZE

Easier to filter, Less fouling, Better biological P removal



MORE RESILIENT BIOLOGY

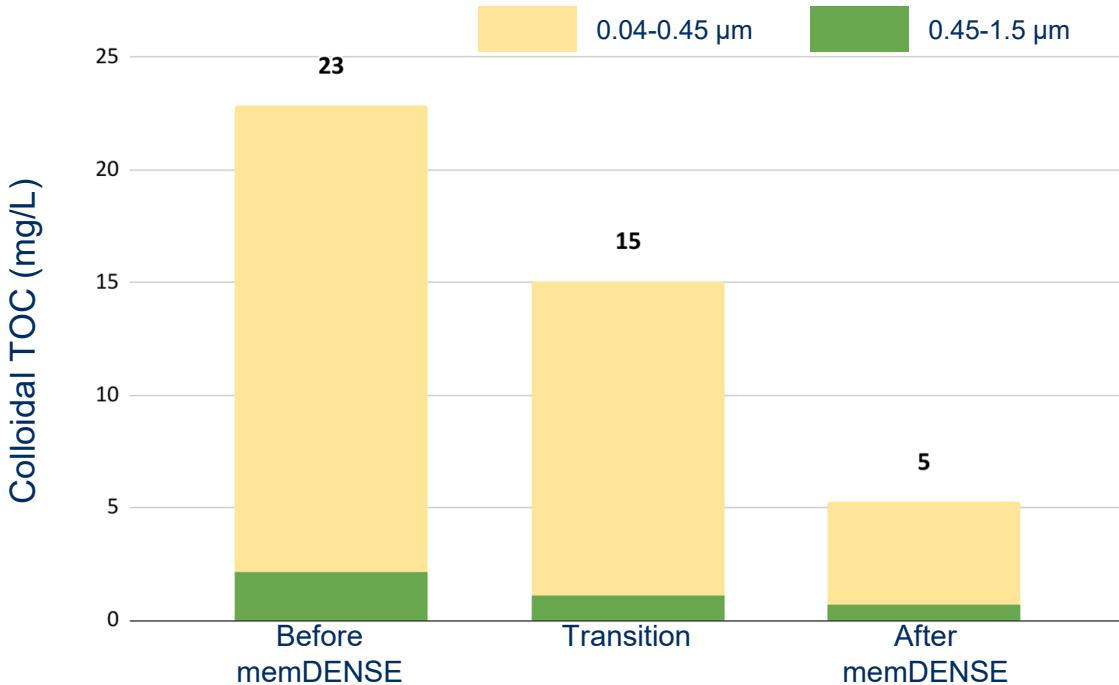
With easier to filter Mixed Liquor



and mitigation of biological upsets

REDUCED MEMBRANE FOULING

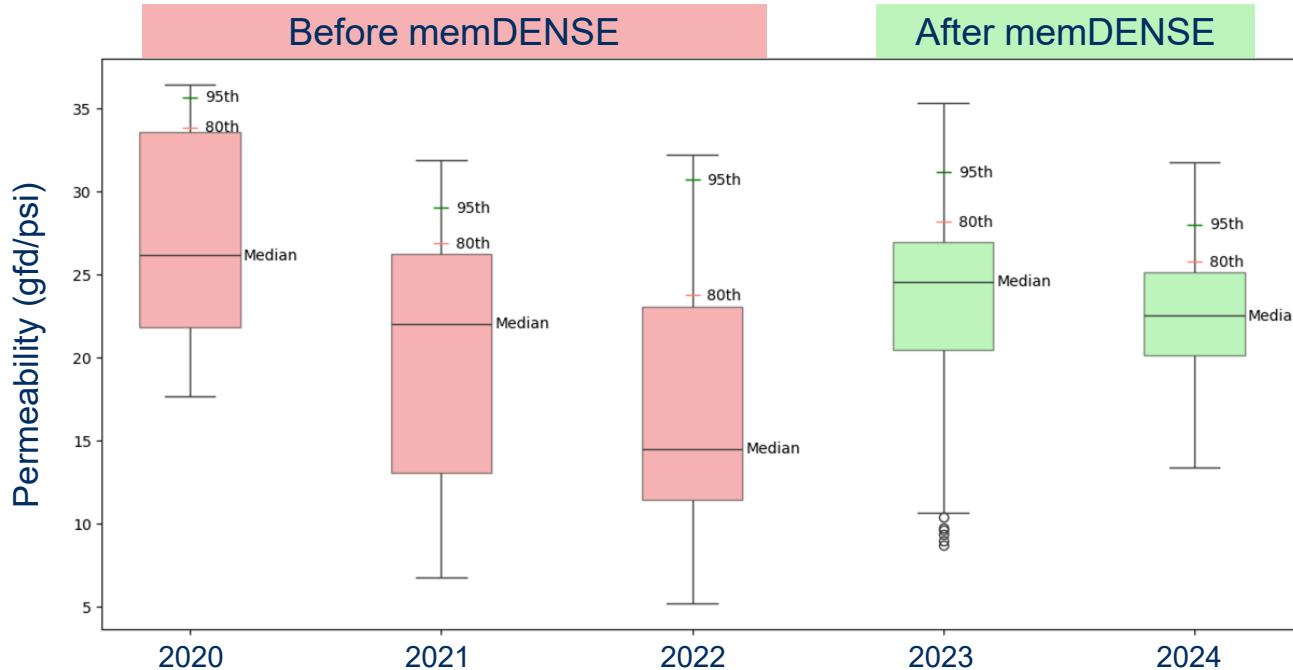
Removal of organics that require cleaning



memDENSE removes
colloidal material that
causes fouling
- reduces fouling
- reduces cleaning

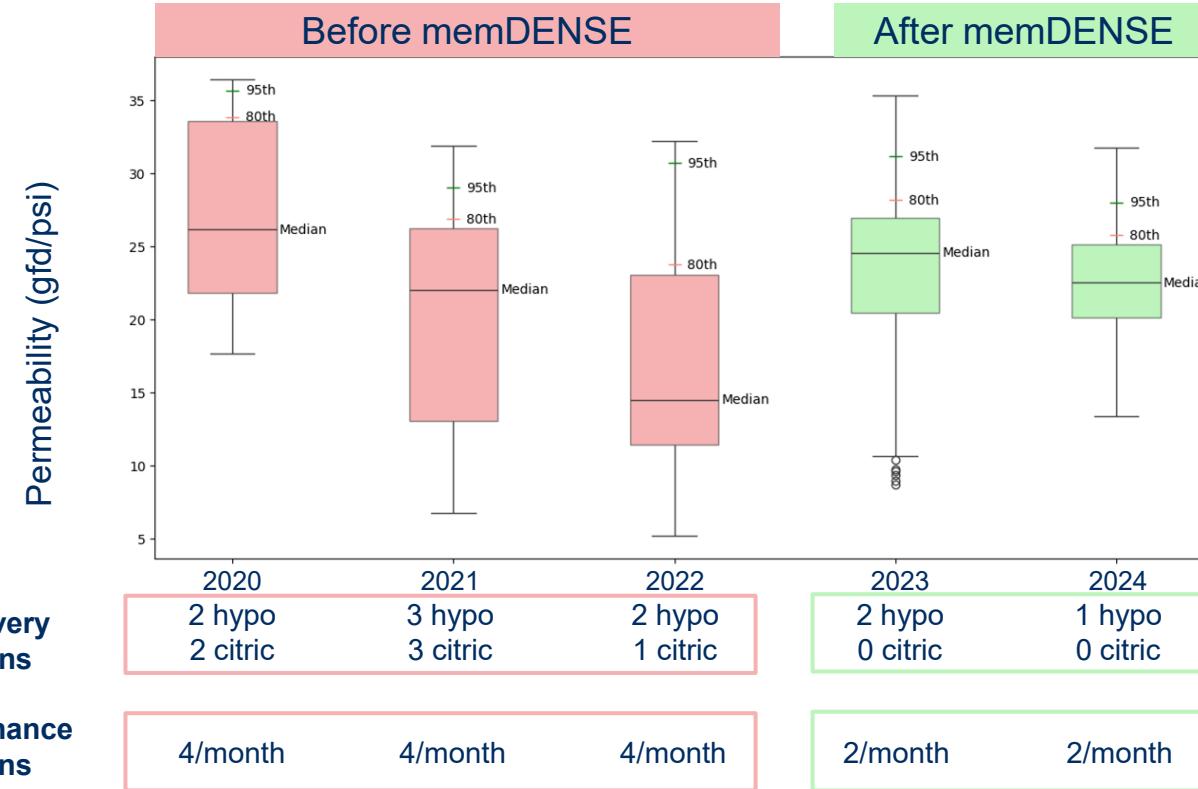
MEMBRANE PERMEABILITY INCREASE

Capacity to handle the unexpected



Increased permeability to withstand seasonal variability

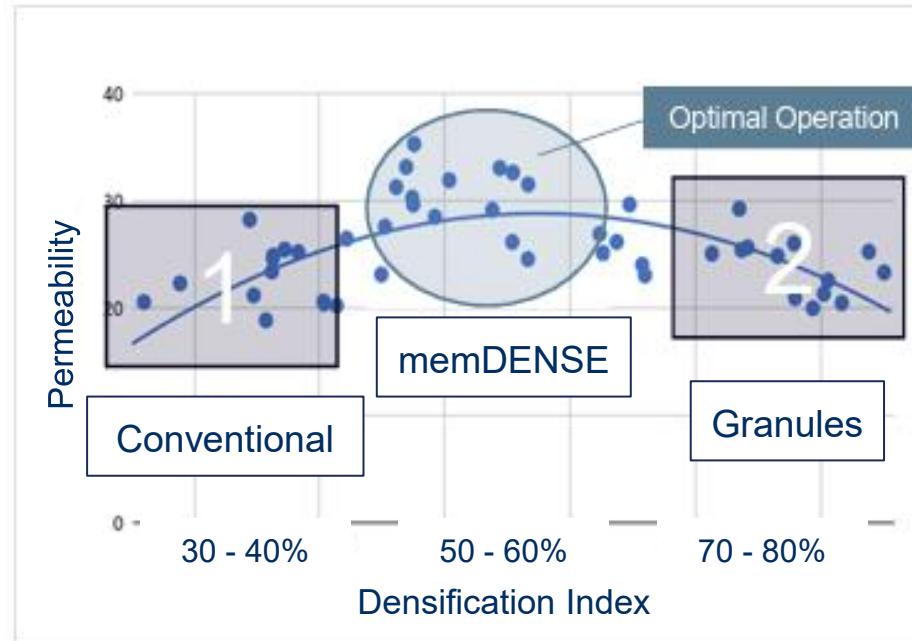
CLEANING CHEMICAL SAVINGS



50% reduction
in maintenance
& recovery
cleans

OPTIMIZING PERMEABILITY

memDENSE is best for MBR



memDENSE mixed liquor optimizes permeability

Densification Index (DI): fraction of sludge that's densified

NUISANCE FOAM CONTROL

memDENSE Removes Foam Causing Filaments



Before memDENSE

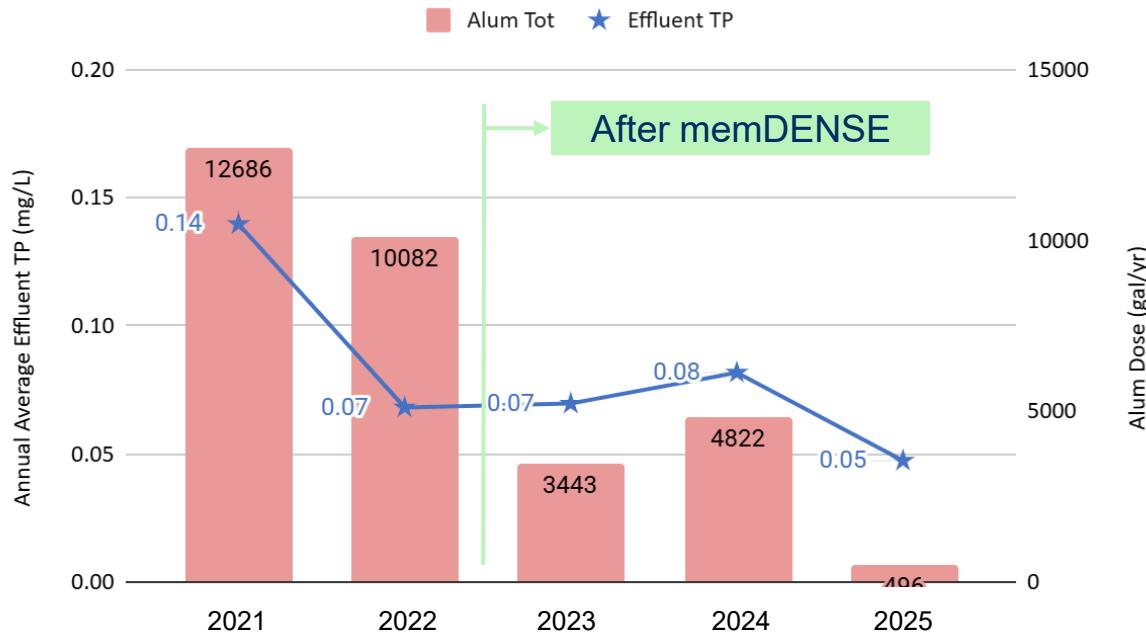


After memDENSE

BETTER BIOLOGICAL P REMOVAL

Chemical savings

Alum Requirement for P removal



memDENSE retains phosphorus accumulating organisms and improves biological phosphorus removal

70% alum savings with same or greater phosphorus loading

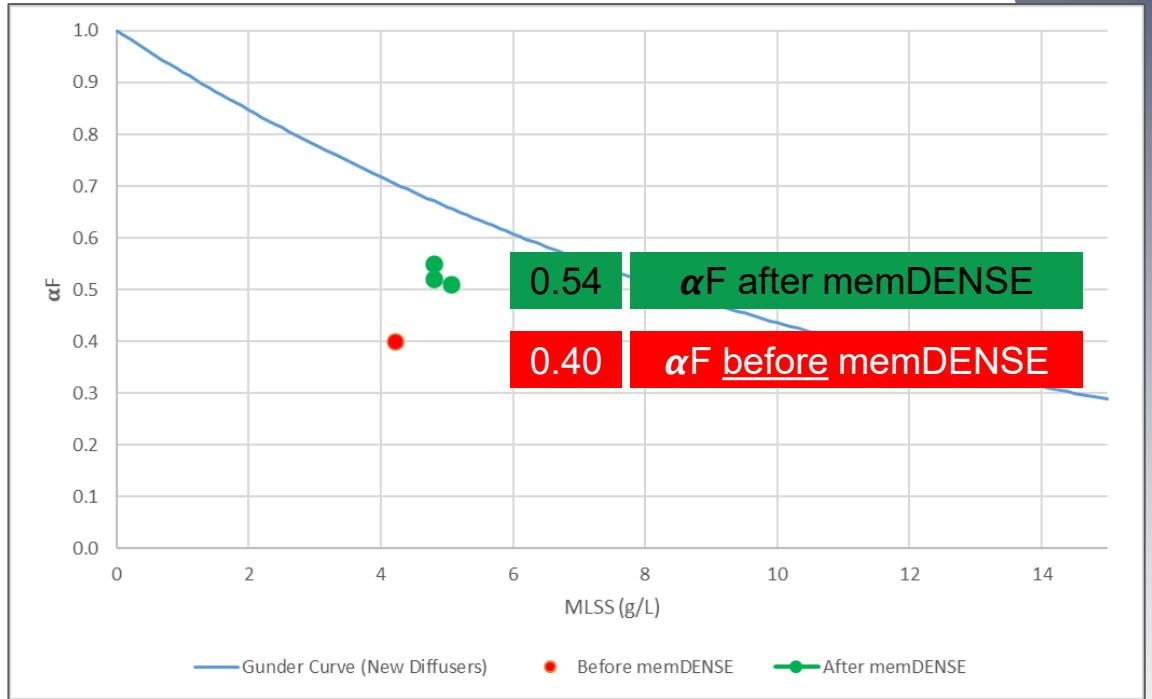
PROCESS AERATION ENERGY REDUCTION

Up to 30% Energy Savings

memDENSE increases oxygen transfer efficiency by up to 30%

Evidence shows less resistance to diffusion of O_2 from bubbles to biology

~\$30,000 savings on process aeration for a 5 MGD MBR



α_F is the relative O_2 transfer rate in dirty water vs clean water, including diffuser membrane fouling

ZeeWeed MBR with memDENSE

Optimizes Membrane & Biological Performance

MEMBRANE Performance	Result	BIOLOGICAL Performance	Result
Permeability Increase	Restored to year 1	Bio-P Enhancement	70% reduction in coagulant
Fouling Reduction	80% reduction of cTOC	Process aeration	30% reduction
Cleaning Optimization	50% reduction in RC/MC	Nuisance foam control	Foam eliminated

memDENSE IMPLEMENTATIONS

Ile Arrault, France



memDENSE IMPLEMENTATIONS

Gwinnett County, Georgia, USA





ZeeWeed MBR with memDENSE for Resilient Wastewater Treatment

Questions

We are actively seeking your feedback on using
ZeeWeed MBR with memDENSE.

Take our quick survey to share your thoughts
for a chance to win a **free year of memDENSE**



Scan QR Code

or

[Click Here for Survey](#)