



# Optimising Your DAF Process

Process Management for  
Dissolved Air Flotation Systems





A photograph of a Dissolved Air Flotation (DAF) system in a wastewater treatment plant. The machine has a large horizontal roller and a conveyor belt. A thick layer of brown, frothy sludge is being skimmed off the surface of the water. The background shows the industrial structure of the tank.

**Maintaining your DAF  
system is priority #1, right?  
Wrong.**



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# DAF Elements that Require Attention & Potential Problems:

1. Solids loading rate
2. Hydraulic loading rate
3. Regular testing
4. Probe/Analyser maintenance
5. Chemical usage





# Specific Operational Challenges

Influent  
Variability

pH Control

Temperature  
Fluctuations

Accuracy of  
Online  
Measurements





# Specific Operational Questions

- What to measure – and why?
  - Where to measure it?
  - Is a shift or daily grab sample good enough?
- Hint: It is not**
- Is my system running as designed?
  - Is my instrument giving me correct readings?
  - What do I do with the data?
  - Do chemical and/or power savings matter?

**Hint: Absolutely**





# Typical DAF System Process Operation

Overloaded system

Lack of true understanding of DAF  
process conditions

Ongoing reliance on individual  
operator knowledge/experience



Process  
Operation  
is Not  
Process  
Optimisation



# Determining DAF Efficiency – The Manual Approach



Decreasing  
effluent  
turbidity



Sludge cake  
accumulating in  
back 1/3 of DAF



**HEALTHY**



Thick Sludge Cake

Low turbidity



# Determining DAF Efficiency – The Manual Approach



Minimal change in  
effluent turbidity

No sludge cake

High turbidity



UNHEALTHY

Thin  
Sludge Cake

High turbidity





We Can Help



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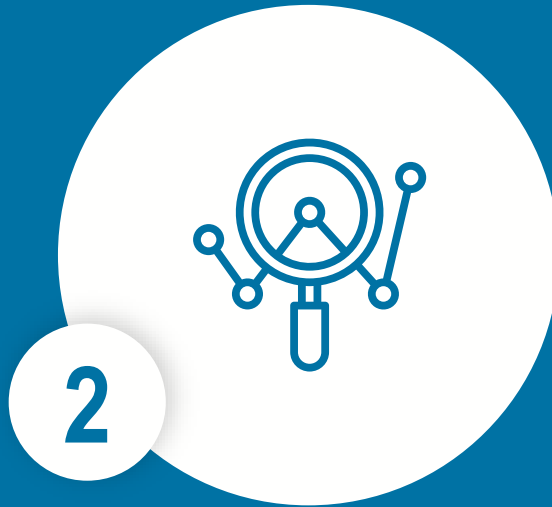




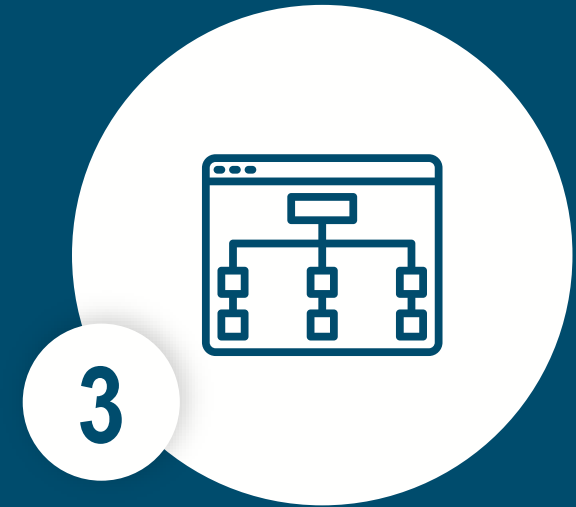
# How Can We Help?



**Rugged online instrumentation  
for industrial processes**



**Real-time  
monitoring**



**Automated  
process control**



A close-up photograph of a blue plastic bottle being filled by a machine. The machine has a red nozzle and a silver metal body. The bottle is partially filled with blue liquid. In the background, several other similar bottles are visible, some with red caps. The image is overlaid with a blue diagonal band containing text and a logo.

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# Rugged Instrumentation



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# Rugged Instrumentation



## Total Suspended Solids (TSS) / Turbidity Monitoring

Solitax sc Sensors

TSS sc Sensors



## pH Monitoring

Digital Differential pH &  
ORP Sensors



## Organics (TOC) Monitoring

BioTector B7000i Online  
TOC Analyser

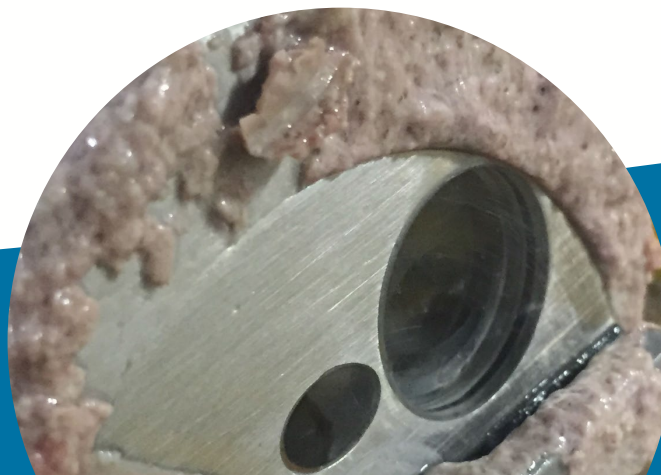




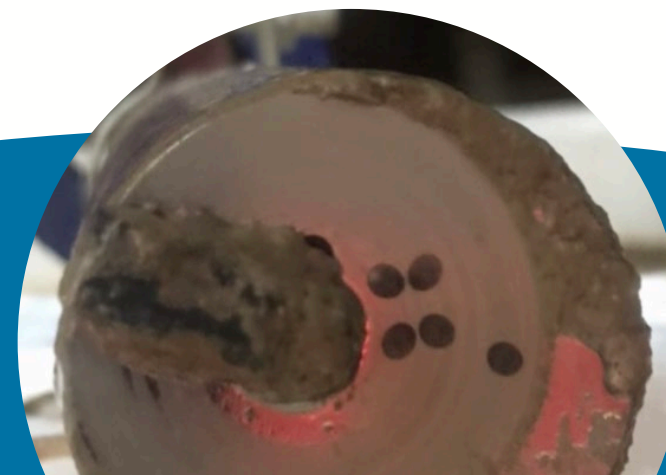
# Getting the Job Done in the Dirtiest Environments



**Self-Cleaning  
Wipers**



**Humidity  
Sensors**



**Multiple  
Detectors**





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# Real-Time Monitoring



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# Real-Time Monitoring

24/7 Process Visibility

Instrument Health Monitoring

Resource Savings

- Chemicals
- Labour

Reduce downstream  
treatment costs

Identify product loss



# Universal Controller

sc1000



## Standard Features

- Highly configurable
- Up To 8 Sensors
- Plug And Play Functionality
- C1D2 Certification
- NEMA 4x/Ip66
- 4 Relays
- Up To 12 mA Outputs
- Up To 12 mA Inputs
- SD Card For Data log And Configuration
- Networking
- Allows Up To 32 Devices Per Network

## Communication Options

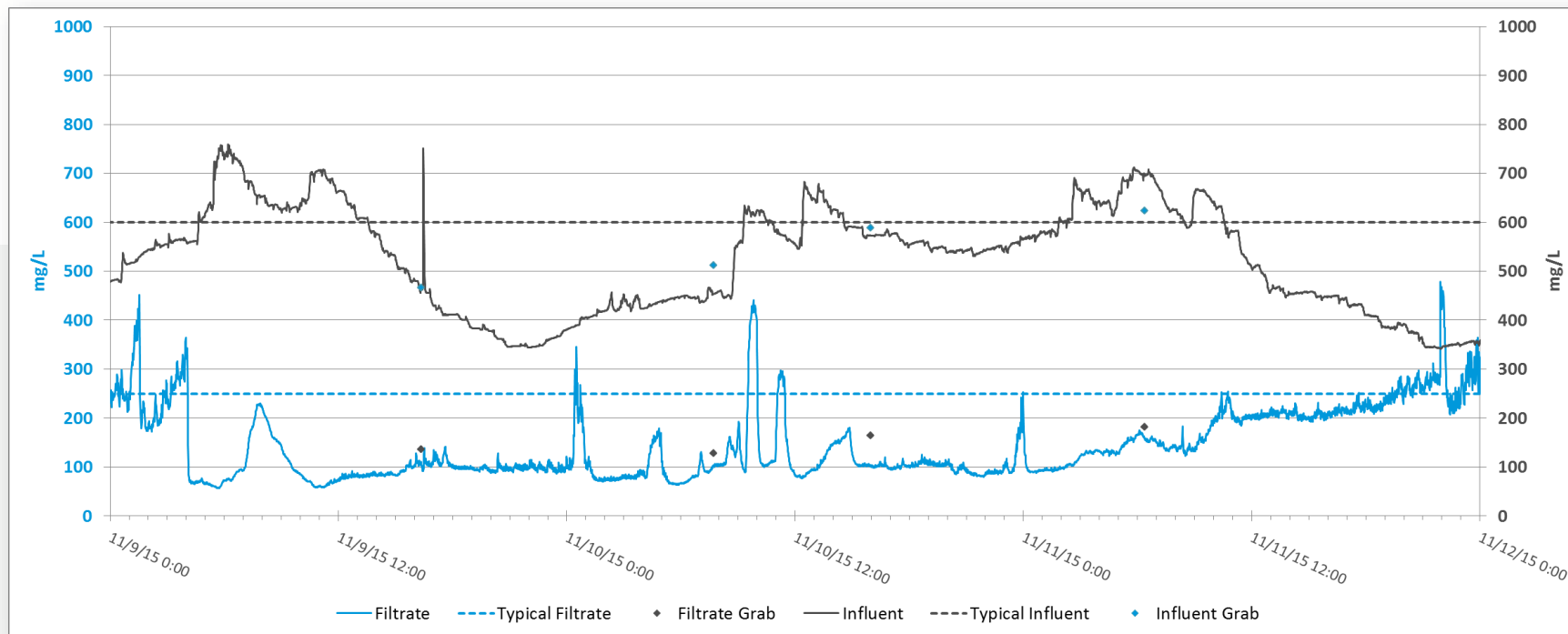
- Modbus Rs232/Rs485
- Modbus TCP/IP
- Profibus Dp
- Hart 7.2







Knowing the  
Process is a  
Good Start,  
But...







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# Automated Process Management

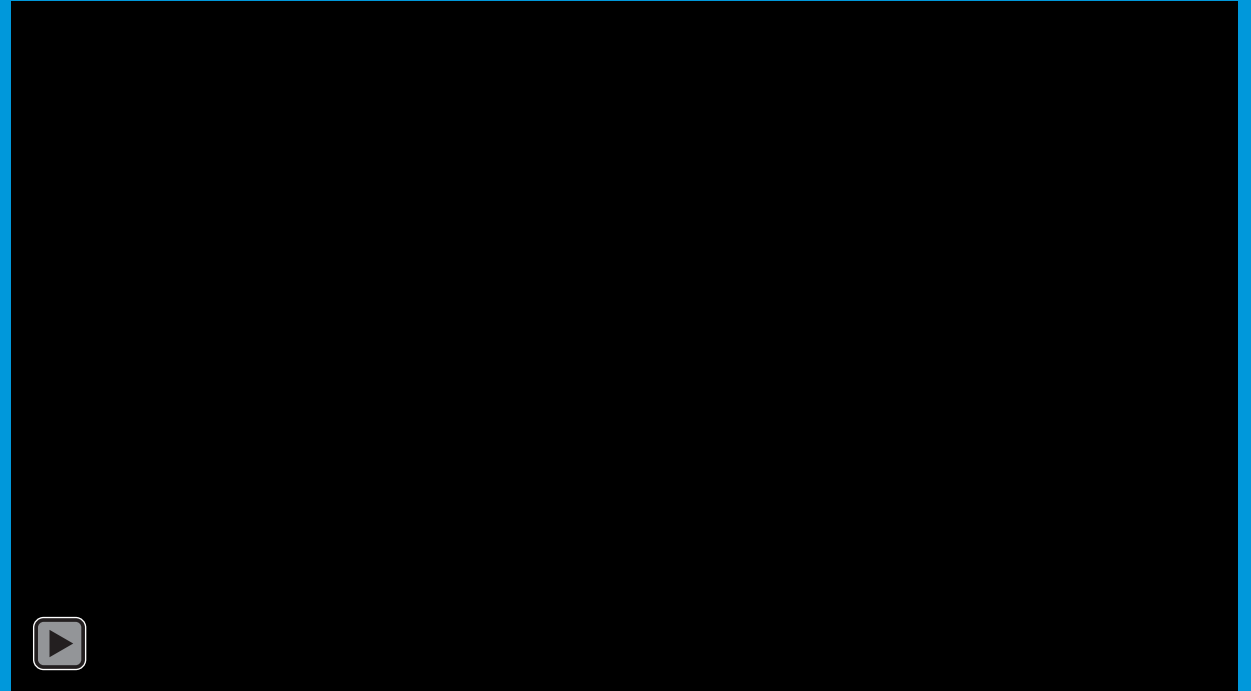


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## Process Management

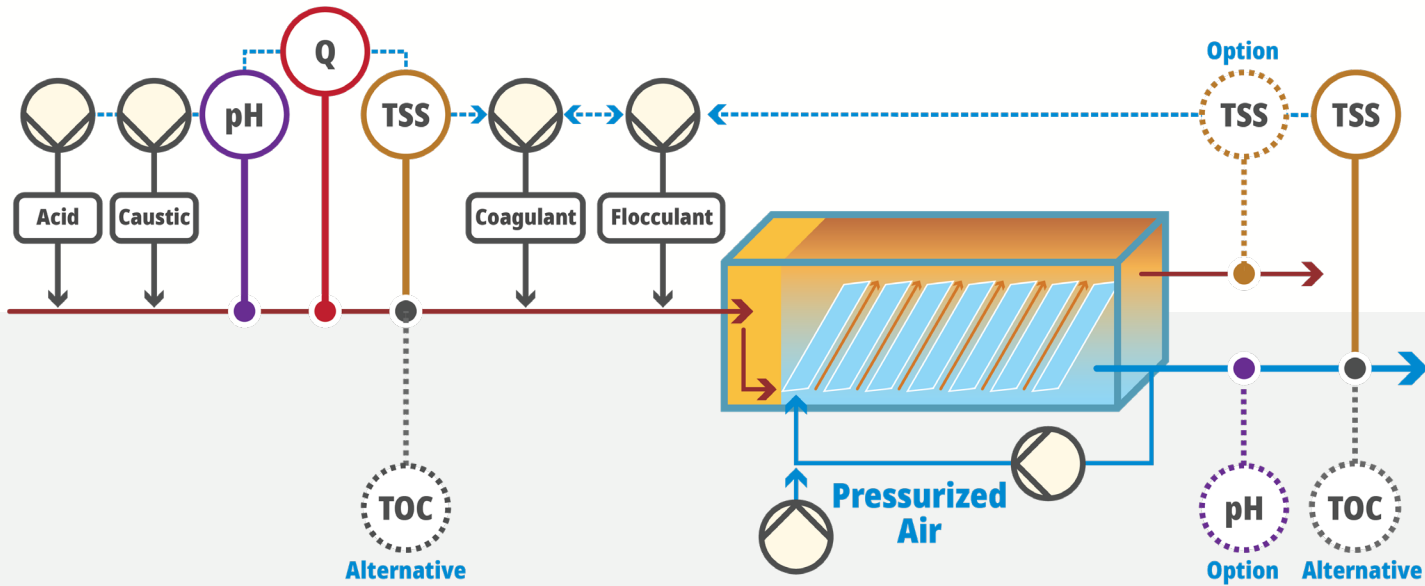
1. Collect real-time data
2. Calculate dynamic set points
3. Treatment adjusted – chemical feeds or aeration
4. Manual and automated modes available







# RTC-DAF System Overview



RTC DAF Parameters	Monitor	Manage
pH, Influent	Y	Y
pH, Effluent (optional)	Y	Y
NTU (TSS), Influent	Y	Y
NTU (TSS), Effluent	Y	Y
NTU (TSS), Float	Y	Y
Flow	Y	



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# RTC-DAF Input and Output Options

Inputs	
Influent Flow	Standard
Effluent Turbidity	Standard
Effluent pH	Standard
Influent pH	Optional
Influent Turbidity	Optional
Coagulant Flow Rate	Optional
Anionic Flocculant Flow Rate	Optional
Cationic Flocculant Flow Rate	Optional
Pre-DAF Acid Flow Rate	Optional
Pre-DAF Base Flow Rate	Optional
Post-DAF Acid Flow Rate	Optional
Post-DAF Base Flow Rate	Optional
5 Open Parameters	Optional

Outputs	
Coagulant Flow Rate Setpoint	Standard
Anionic Flocculant Flow Rate Setpoint	Standard
Cationic Flocculant Flow Rate Setpoint	Optional
Pre-DAF Acid Flow Rate Setpoint	Optional
Pre-DAF Base Flow Rate Setpoint	Optional
Post-DAF Acid Flow Rate Setpoint	Optional
Post-DAF Base Flow Rate Setpoint	Optional





# RTC-DAF User Defined / Adjustable Settings

- Effluent Turbidity or TSS Setpoint (NTU or mg/L)
- Coagulant PPM dose
- Anionic Flocculant PPM dose
- Cationic Flocculant PPM dose
- Effluent Turbidity or TSS PID values
- Coagulant Specific Gravity
- Anionic Flocculant Specific Gravity
- Cationic Flocculant Specific Gravity

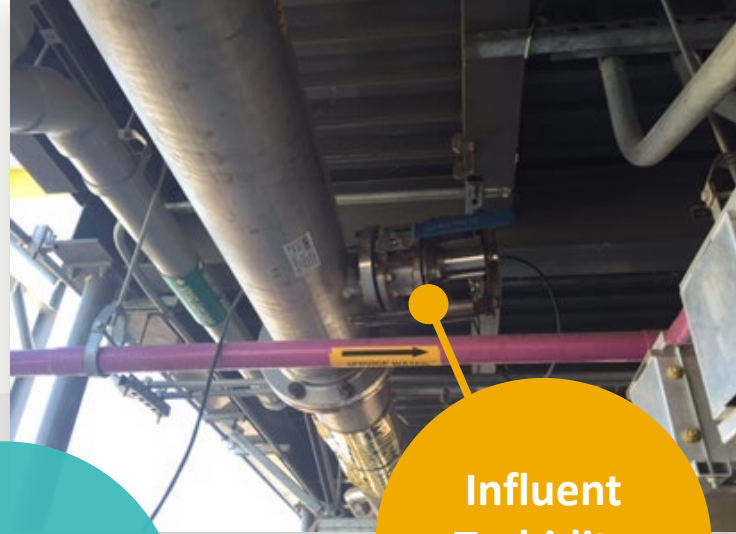
- Pre-DAF pH target value and range
- Pre-DAF pH PID values
- Post-DAF pH target value and range
- Post-DAF pH target value and range
- Minimum and Maximum Limits (flow setpoints, pump ranges, PPM or lb/ton, etc)
- Warning and Alarm limits for all measurements



Process pH  
& Temperature



85% Solids  
Reduction



Influent  
Turbidity  
Sensor

pHIN TEMP  7.6 <sup>pH</sup> 14:49:44 2018-11-15	pHIN TEMP  88.0 <sup>F</sup> 14:49:44 2018-11-15	INF1797502 SOLID  3406 <sup>ppm TS</sup> 14:49:45 2018-11-15
pHD sc  EFF1797776 SOLID  1460 <sup>ppm TS</sup> 14:49:41 2018-11-15	pHD sc  000000083487 INF000000083487 TS  7985.637 <sup>PPM Chan1</sup> 14:49:42 2018-11-15	TSS sc  000000083487 EFF000000083487 TS  528.793 <sup>PPM Chan2</sup> 14:49:42 2018-11-15



Effluent  
Turbidity  
Sensor



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# The Benefits of Automated DAF Process Management



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# Benefits

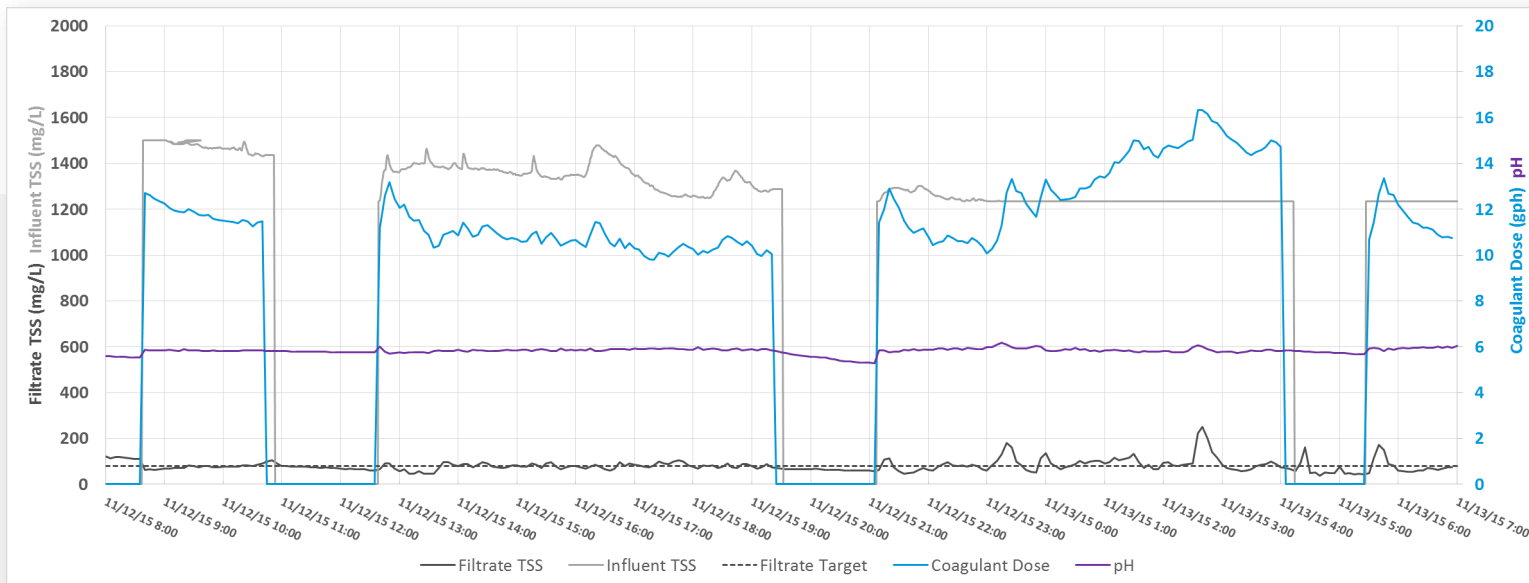
- Automated chemical dosing
  - Eliminate manual adjustments
- Reduce operator interaction
- Optimise both solids and filtrate quality
- Consistent & cleaner effluent concentration
  - Reduced discharge costs
- Critical visibility into the process
- Chemical savings
- Save time
- Consistent compliance and reduced fees

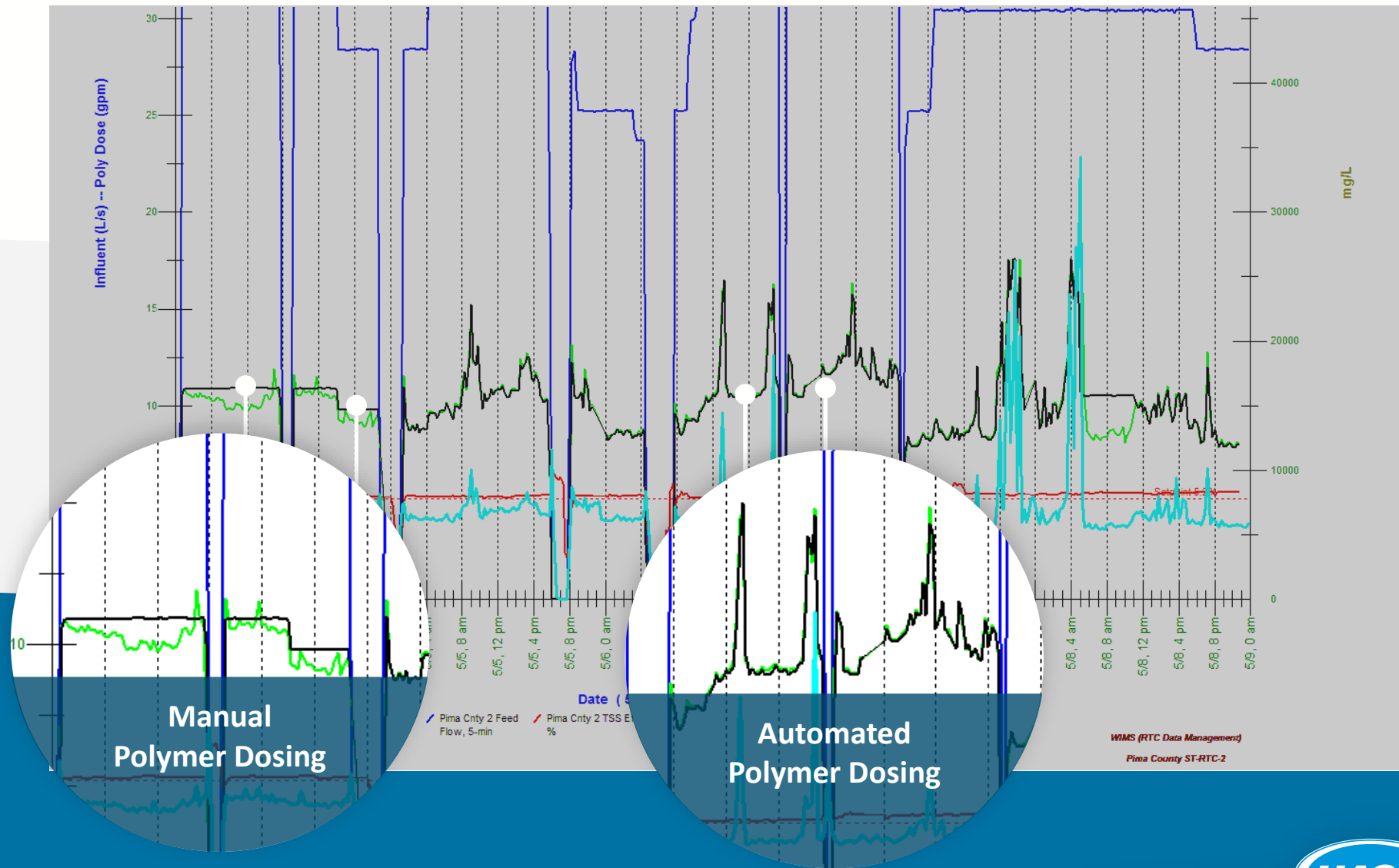




# RTC-DAF in Action: Example of Real Benefits

Your process might still be highly variable, but the desired outcome is consistently met regardless of variation.

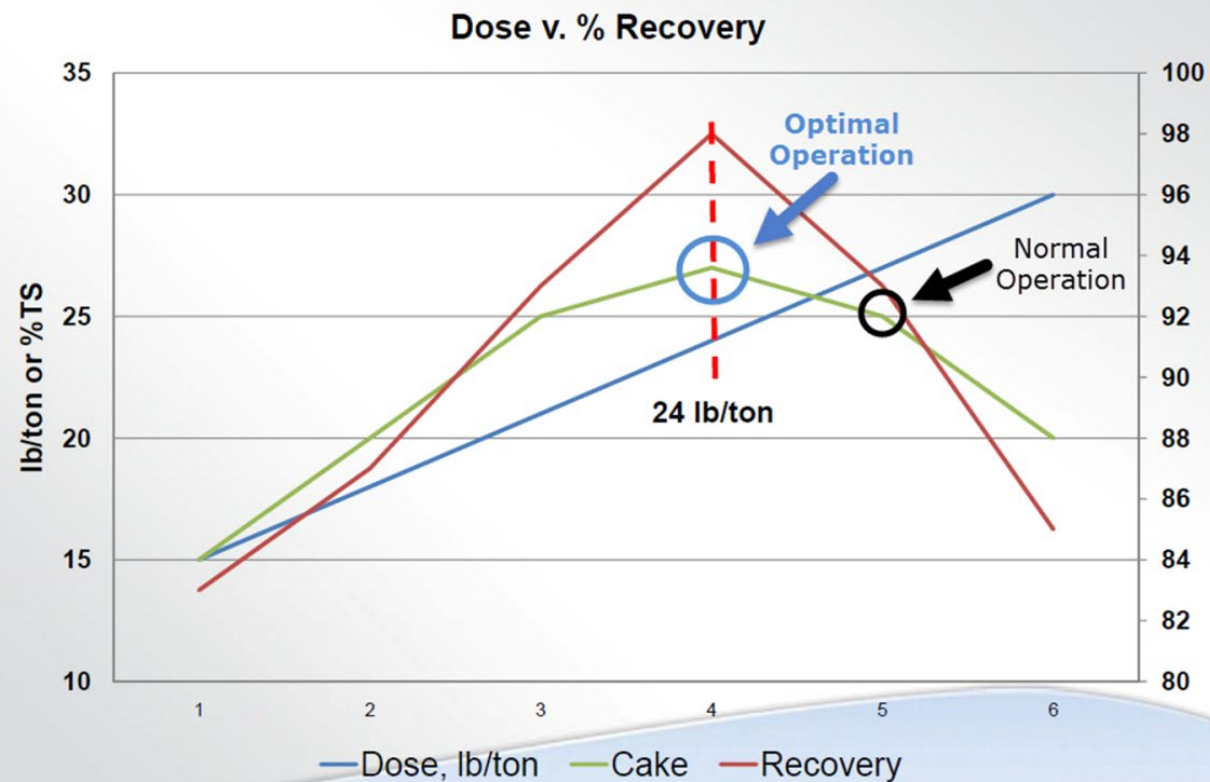








## Performance Curve



Courtesy of Steve Walker, Carollo Engineering  
"Polymer Optimization through for Centrifuge Dewatering," 2011

## Polymer Performance

There is an **OPTIMAL** dose ratio.

Adding chemical beyond the optimal point is wasting both chemical and budget.

**MORE POLYMER  $\neq$  BETTER RECOVERY**



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A photograph of a modern, multi-story building with large glass windows and a flat roof, illuminated by warm sunset light. The building is reflected in a pool of water in the foreground. A blue geometric overlay is on the left side of the image.

# A Proven Approach from the Industry Leader







# Experience. Expertise.

BOD/COD  
Removal

Nitrification &  
Denitrification

Phosphate  
Removal

Solids  
Handling

Disinfection

85+ Years  
of Water  
Analysis  
Expertise

Over 6,000  
Associates

2,600+ Process  
Management  
Systems Installed  
Globally

27+  
Systems

Developed  
Over Last  
10 Years

A Truly Global  
Footprint

Every  
Continent  
(Except  
Antarctica)



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Dissolved Oxygen Control  
Ammonia Removal  
Total Nitrogen Removal  
Chemical Phosphorus Removal  
Sludge Retention Time  
RAS Control  
Sludge Thickening  
Sludge Dewatering  
DAF Coagulant/Polymer Control  
Chlorination / Dechlorination





Instrumentation + Software  
= **Less Uncertainty  
& More Efficiency**



A silhouette of two industrial workers wearing hard hats and safety gear, shaking hands on a metal walkway of an industrial facility. The background is a vibrant sunset with a bright sun and orange clouds. In the foreground, there are large, dark, cylindrical structures, possibly pipes or tanks, and a body of water reflecting the sunset. A blue diagonal graphic element is on the left side of the image.

# One More Benefit? Hach Support

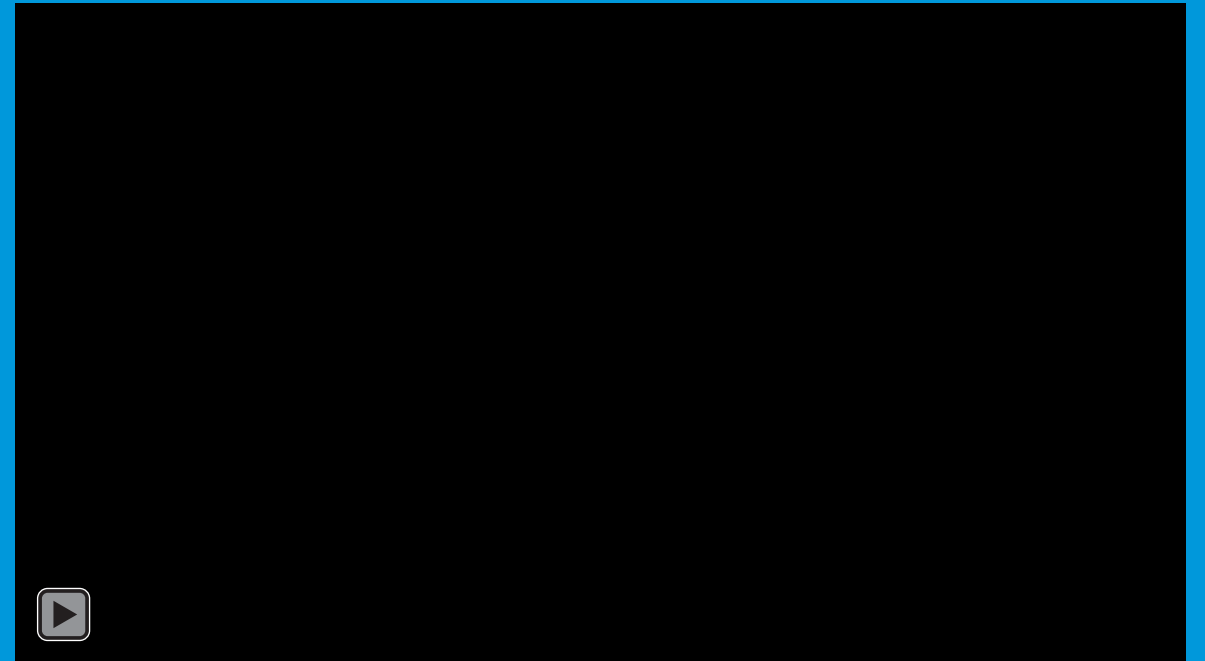






## Yearly Service Partnership

1. A dedicated Hach® support team available to consult
2. Hach technicians providing guidance specific to your plant and application
3. Monthly reports to review your plant's performance
4. Reduced risk of unexpected downtime with service/maintenance recommendations





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# How to Get Started

*Typical Process Stages*

**Discuss needs**  
with Hach  
Representative  
& Process  
Management  
Specialist

**In-Depth  
Project Planning**  
Best practice  
to include 3rd  
party partners  
(Engineers, Energy  
Consultants, etc)

**Proposal**  
Technical  
Recommendations  
Pricing

**Proposal Approval**

**Installation**

**Commissioning**

**Ongoing Support  
& Optimisation**





# Let's Go.



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