

# Optimising Your DAF Process

Process Management for  
Dissolved Air Flotation Systems



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**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**



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# 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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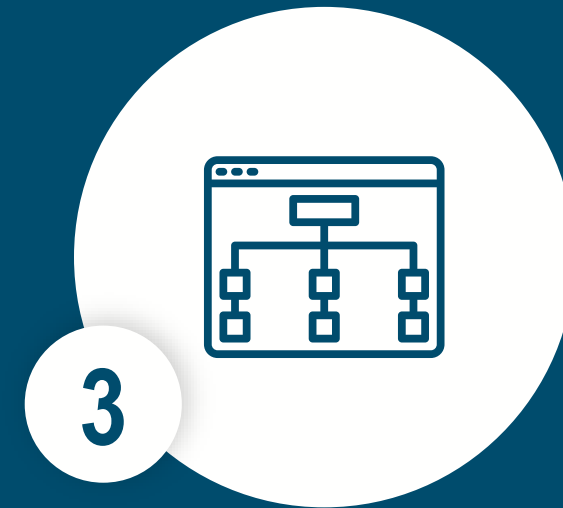
# How Can We Help?



**Rugged online instrumentation  
for industrial processes**



**Real-time  
monitoring**



**Automated  
process control**



A photograph of an industrial water treatment facility. In the foreground, there is a metal staircase with railings leading up to a platform. On the platform, there are large pipes and a red electrical cabinet. The background shows a concrete wall and a body of water. The image is overlaid with a blue graphic on the left side containing the number '1' and the text 'Rugged Instrumentation'.

1

# 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



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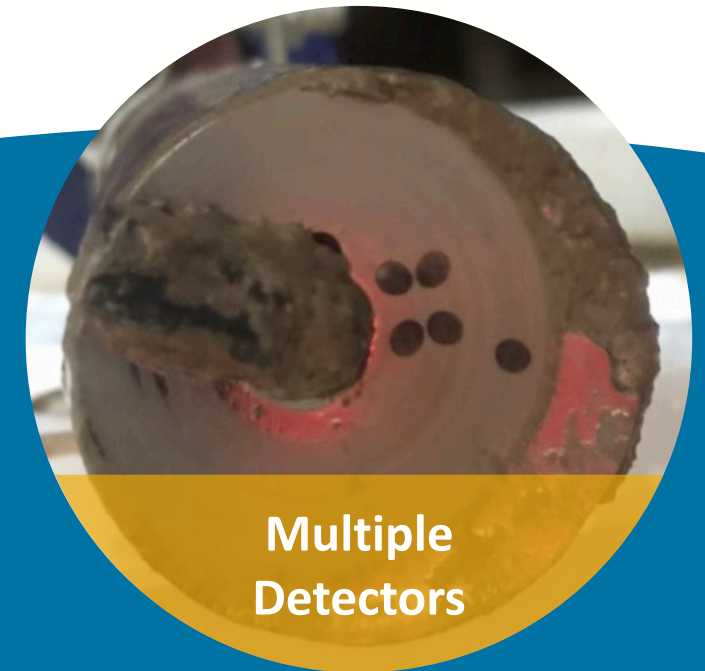
# Getting the Job Done in the Dirtiest Environments



**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

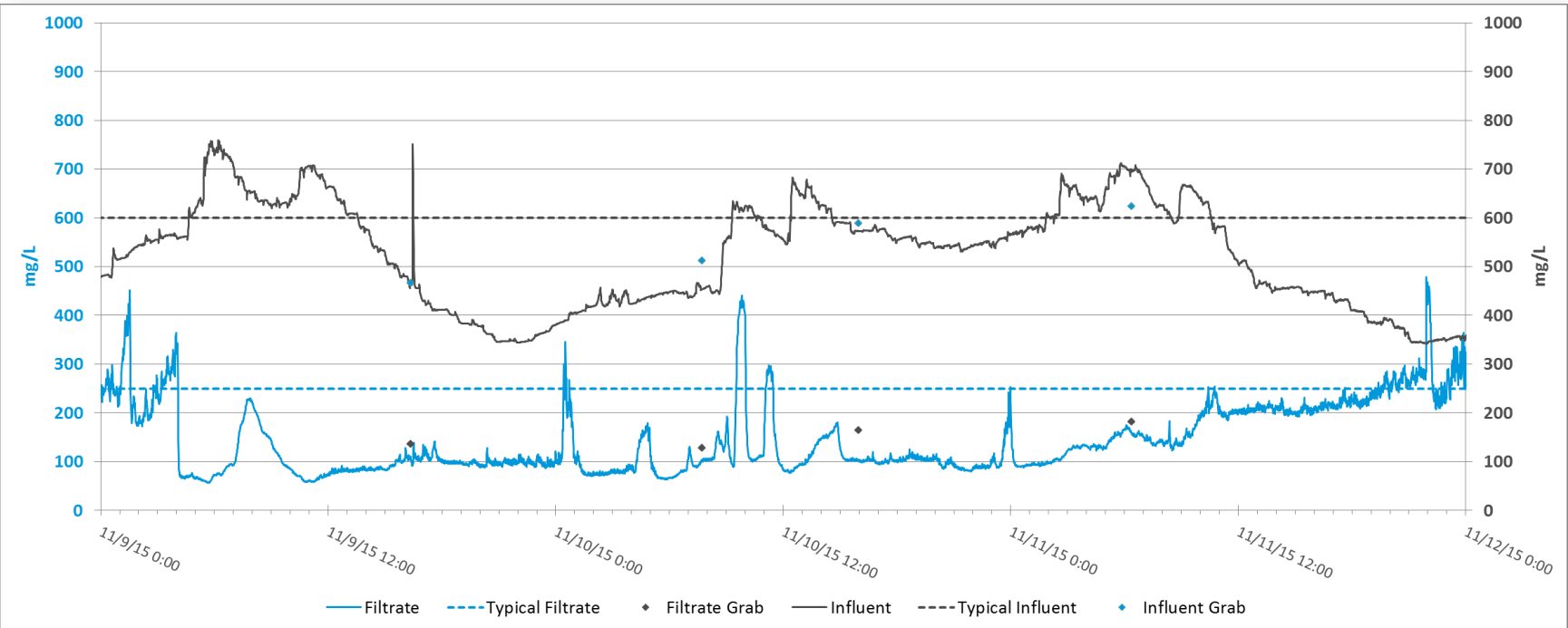


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Knowing the Process is a Good Start, But...







3

# Automated Process Management



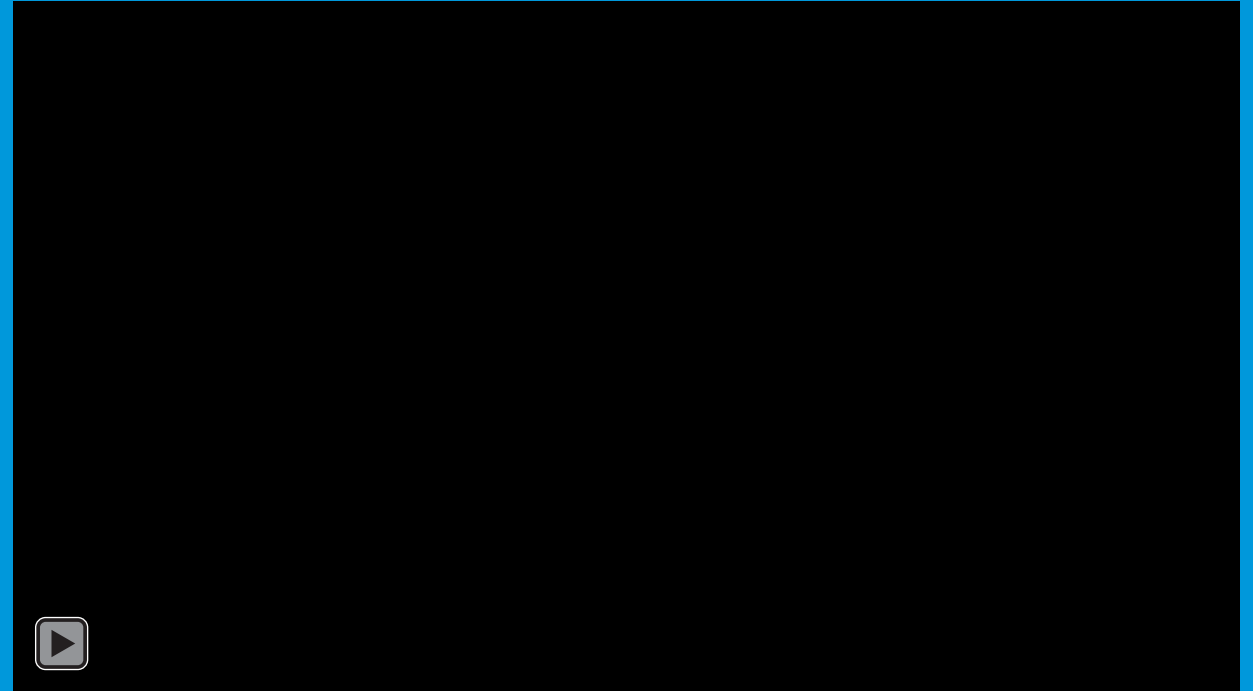
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# Process Management

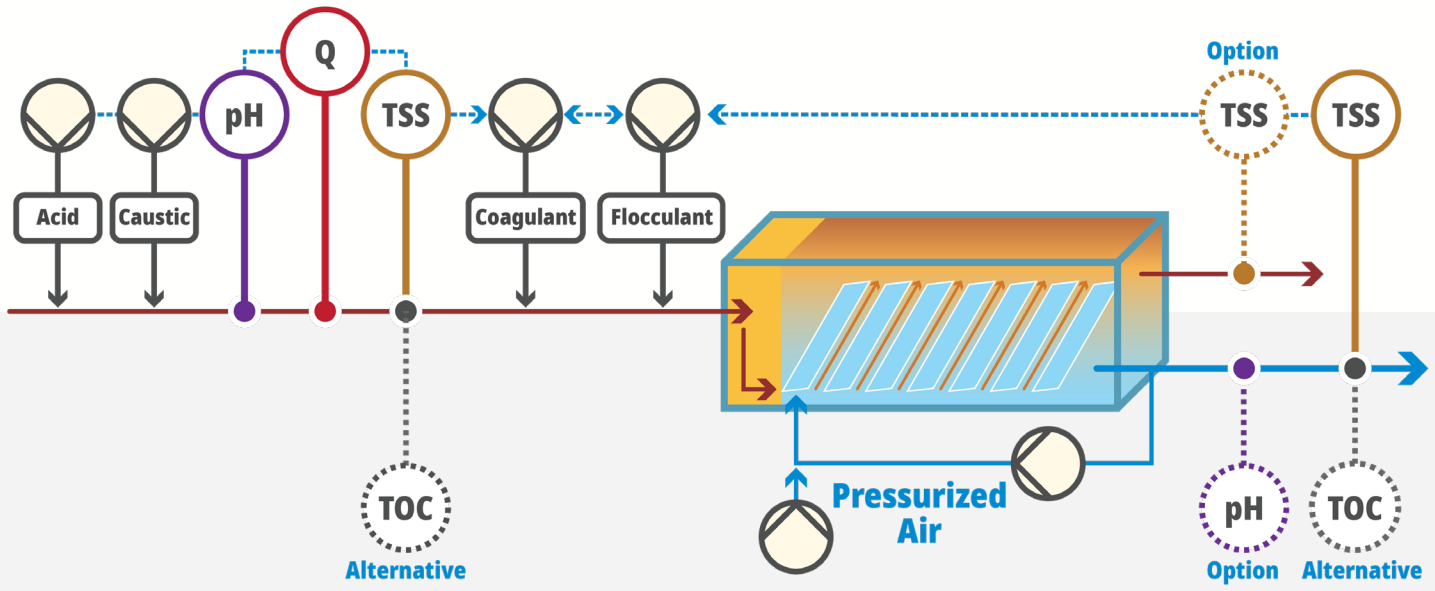
1. Collect real-time data
2. Calculate dynamic set points
3. Treatment adjusted – chemical feeds or aeration
4. Manual and automated modes available







# 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       |        |

# 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



Influent  
Turbidity  
Sensor



85% Solids  
Reduction

|  |   |  |
|--|---|--|
| pHIN<br>TEMP<br><b>7.6<sup>pH</sup></b><br>14:49:44 2018-11-15                           | pHIN<br>TEMP<br><b>88.0<sup>F</sup></b><br>14:49:44 2018-11-15  | INF1797500<br>SOLID<br><b>3406<sup>ppm</sup><br/>TS</b><br>14:49:45 2018-11-15                                   |
| pHD sc<br>EFF1797776<br>SOLID<br><b>1460<sup>ppm</sup><br/>TS</b><br>14:49:41 2018-11-15 | pHD sc<br>000000083487<br>INF000000083487<br>TS<br><b>7985.637<sup>PPM</sup><br/>Chan1</b><br>14:49:42 2018-11-15 | TSS sc<br>000000083487<br>EFF000000083487<br>TS<br><b>528.793<sup>PPM</sup><br/>Chan2</b><br>14:49:42 2018-11-15 |



Effluent  
Turbidity  
Sensor



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# The Benefits of Automated DAF Process Management





# Benefits

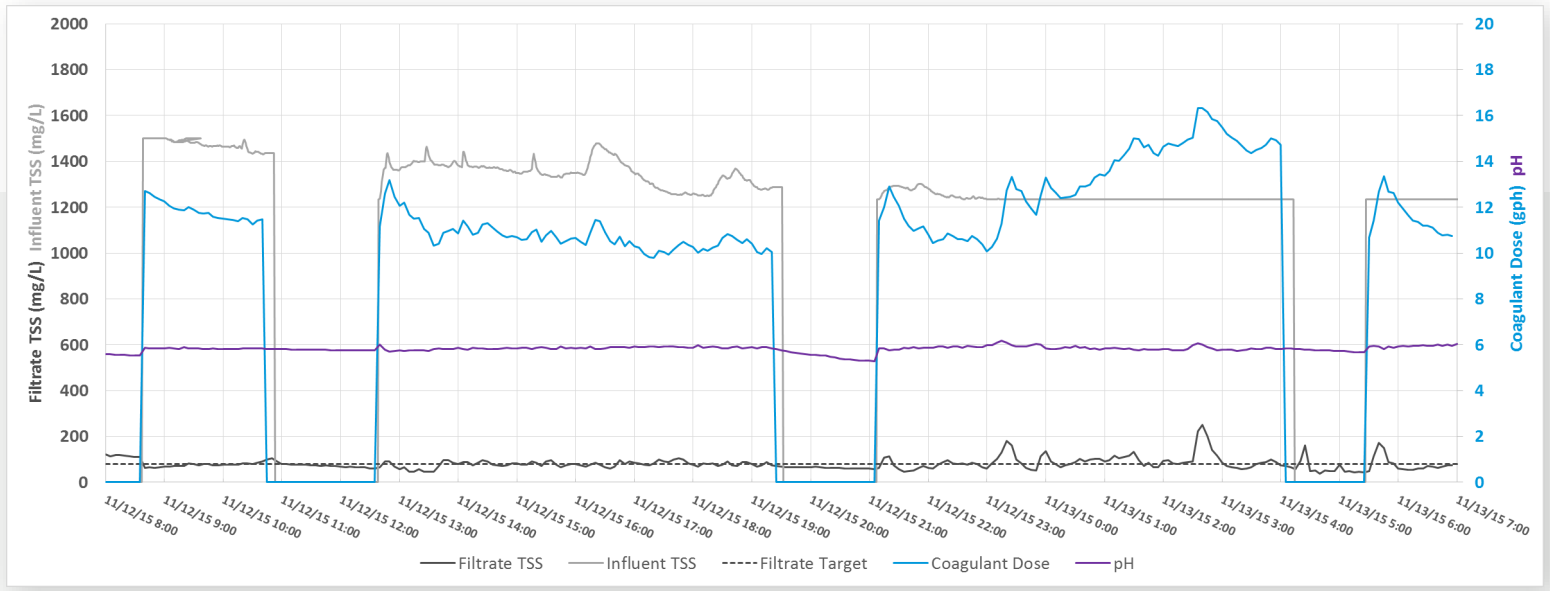
- Automated chemical dosing
  - Eliminate manual adjustments
- Reduce operator interaction
- Optimise both solids and filtrate quality
- Consistent & cleaner effluent concentration
  - Reduced discharge costs
- Critical visibility into the process
- Chemical savings
- Save time
- Consistent compliance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





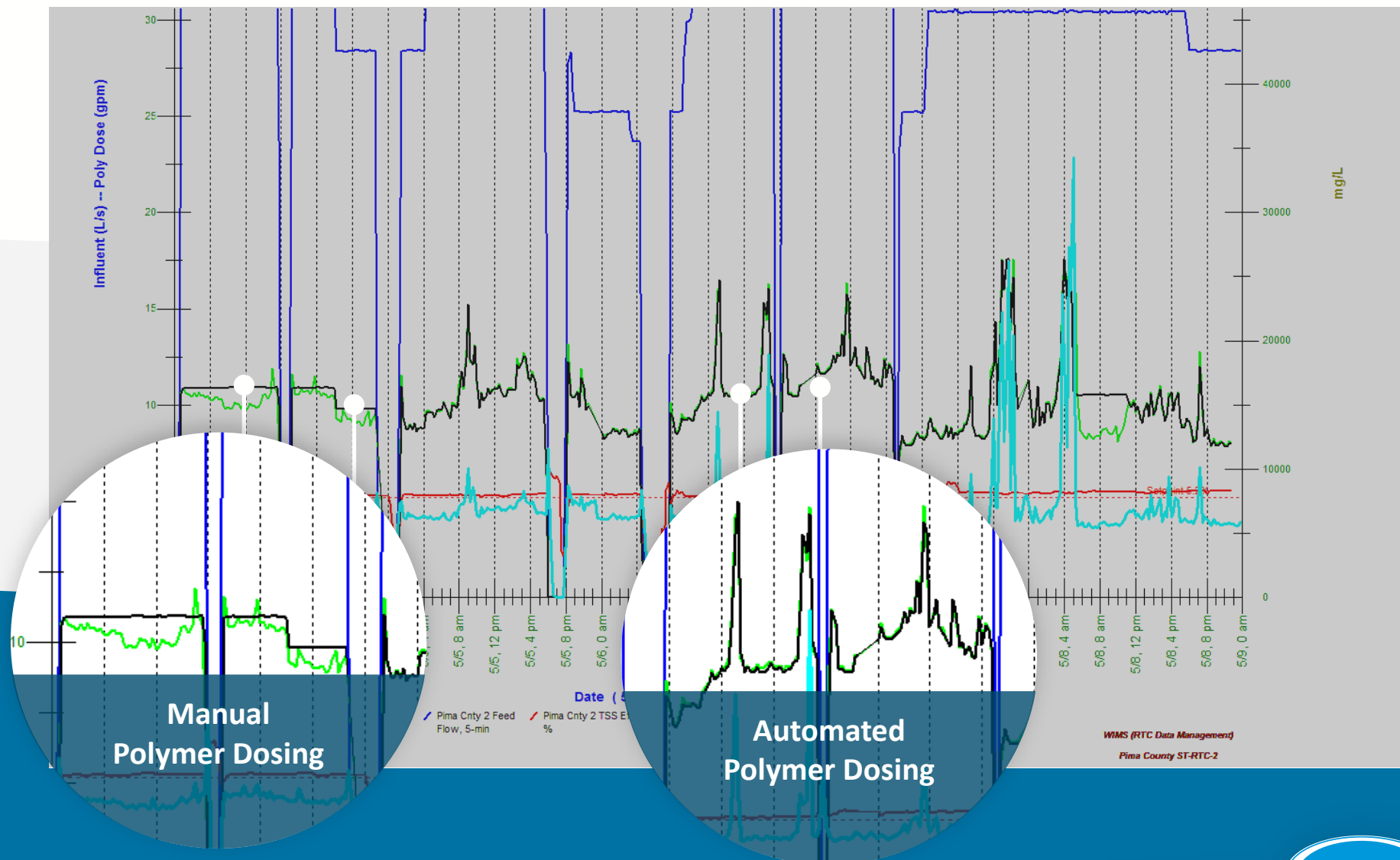


# RTC-DAF in Action: Example of Real Benefits



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





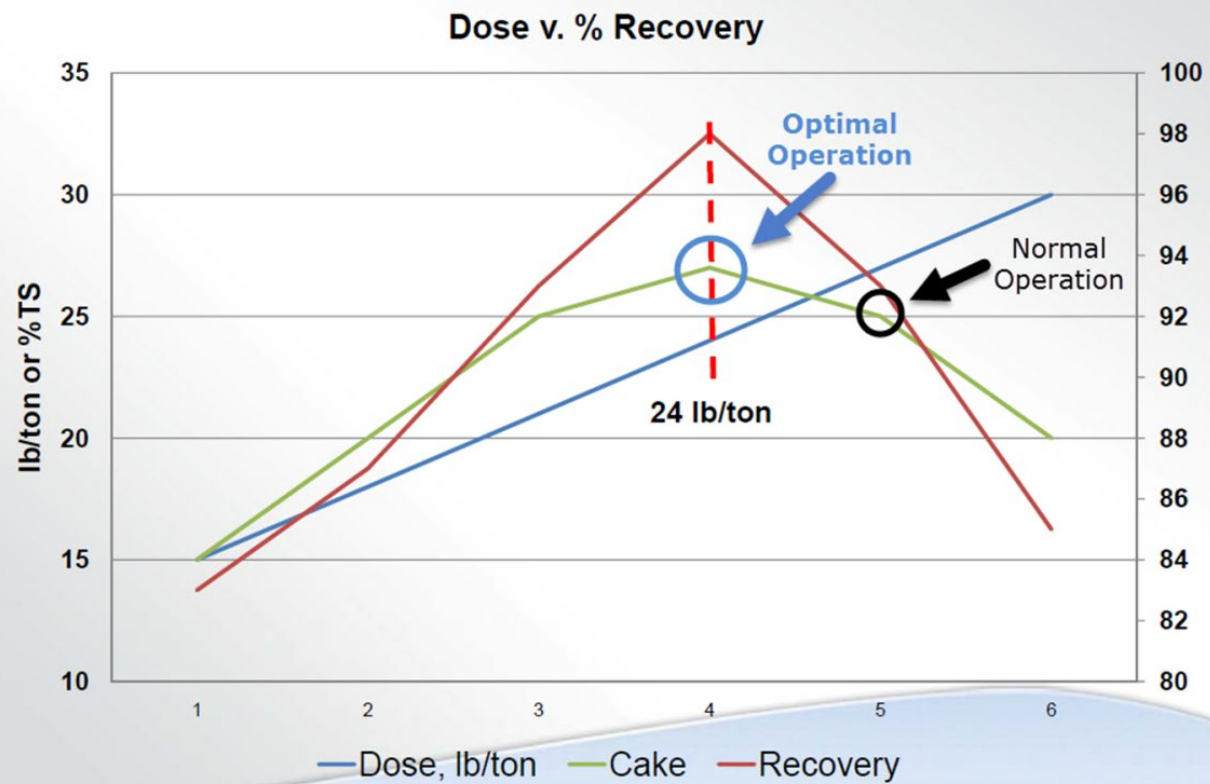
Manual  
Polymer Dosing

Automated  
Polymer Dosing





## 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 Proven Approach from the Industry Leader







# Experience. Expertise.

85+ Years  
of Water  
Analysis  
Expertise

Over 6,000  
Associates

2,600+ Process  
Management  
Systems Installed  
Globally

27+  
Systems

Developed  
Over Last  
10 Years

BOD/COD  
Removal

Nitrification &  
Denitrification

Phosphate  
Removal

Solids  
Handling

Disinfection

A Truly Global  
Footprint

Every  
Continent  
(Except  
Antarctica)



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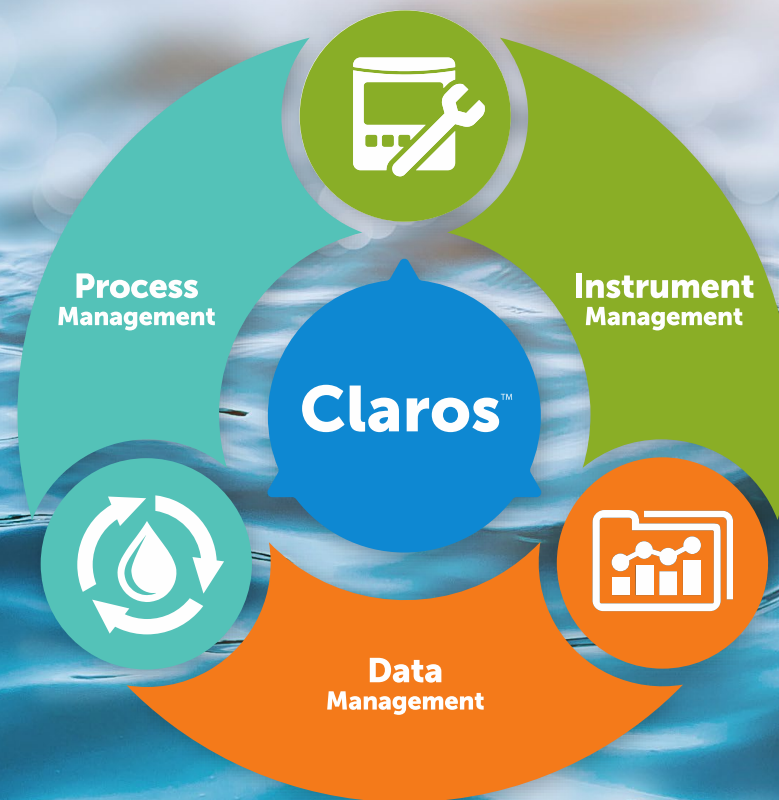


- Dissolved Oxygen Control
- Ammonia Removal
- Total Nitrogen Removal
- Chemical Phosphorus Removal
- Sludge Retention Time
- RAS Control
- Sludge Thickening
- Sludge Dewatering
- DAF Coagulant/Polymer Control
- Chlorination / Dechlorination





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





# One More Benefit? Hach Support

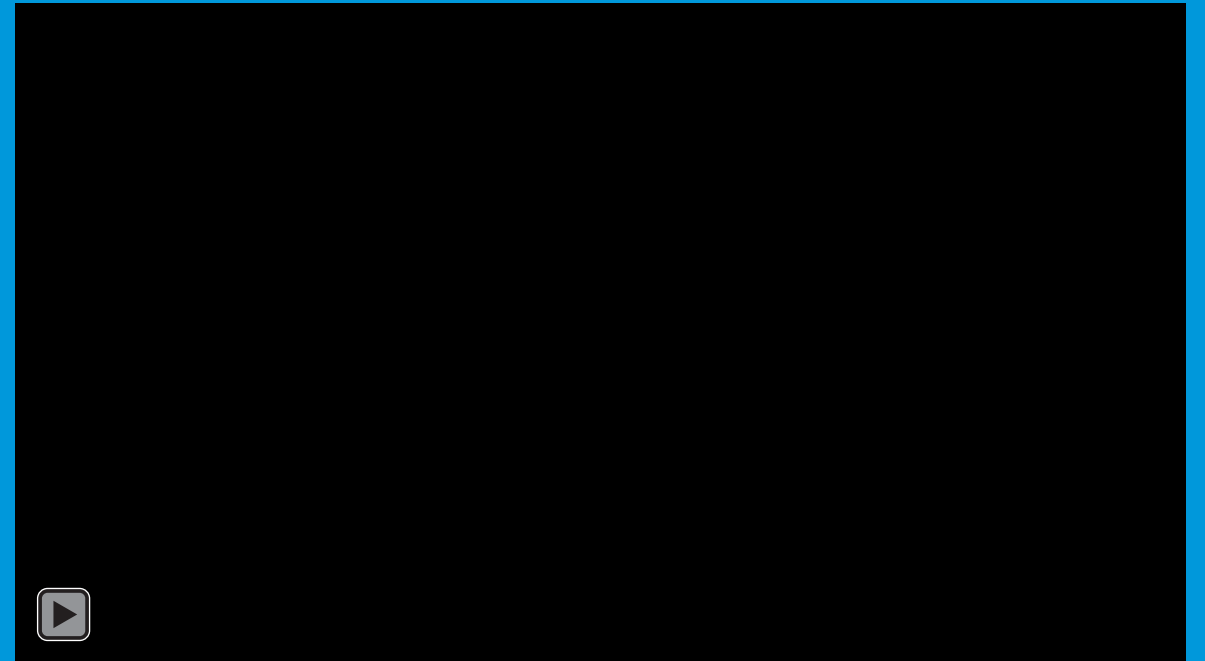






## Yearly Service Partnership

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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