## Optimizing Your DAF Process

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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:

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Solids loading rate
 Hydraulic loading rate
 Regular testing
 Probe/Analyzer maintenance
 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



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### 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 Optimization



### **Determining DAF Efficiency – The Manual Approach**



Decreasing effluent turbidity

Sludge cake accumulating in back 1/3 of DAF





Thick Sludge Cake

#### Low turbidity



### **Determining DAF Efficiency – The Manual Approach**



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Minimal change in effluent turbidity

No sludge cake

High turbidity



UNHEALTHY

Thin Sludge Cake

**High turbidity** 



# We Can Help





### How Can We Help?

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## Rugged online instrumentation for industrial processes



Real-time monitoring



Automated process control



## 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 Analyzer

TOC ANALYZER





#### **Getting the Job Done in the Dirtiest Environments**

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## Real-Time Monitoring

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#### **Real-Time Monitoring**

24/7 Process Visibility Instrument Health Monitoring Resource Savings

- Chemicals
- Labor

Reduce downstream treatment costs

Identify product loss



#### **Universal Controller**

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#### **Standard Features**

- Highly configurable
- Up To 8 Sensors
- Plug And Play Functionality
- C1D2 Certification
- NEMA 4x/lp66
- 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...



## Automated Process Management

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- 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	
<b>Cationic Flocculant Flow Rate</b>	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

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- 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





## The Benefits of Automated DAF Process Management



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#### **Benefits**

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- Automated chemical dosing
  - Eliminate manual adjustments
- Reduce operator interaction
- Optimize 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.







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#### **Performance Curve**



### Polymer Performance

There is an **OPTIMAL** dose ratio.

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

#### MORE POLYMER ≠ BETTER RECOVERY



## A Proven Approach from the Industry Leader







**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<sup>®</sup> 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







### How to Get Started Typical Process Stages

<b>Discuss needs</b>
with Hach
Representative
& Process
Management
Specialist

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

Pricing

Technical Recommendations Proposal Approval

Installation

Commissioning

Ongoing Support & Optimization

# Let's Go.



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