SLUDGE THICKENING AND DEWATERING WASTEWATER OPTIMIZATION SYSTEMS

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WHY SLUDGE OPTIMIZATION?

• Reduce polymer consumption?
• Produce a more consistent sludge?
• Improve biogas production?
• Reduce time required for thickening/dewatering equipment operations and maintenance?
• Others?

Sounds good. But my sludge is pretty consistent. Let’s examine that.
HOW TO OPTIMIZE SLUDGE PROCESSING

• Real time solids measurements
• Sludge flow measurements
• Tight control of polymer dose and flow
• Well performing thickening/dewatering equipment
• Automate with feed forward and feed back control (Real Time Control)

King County South Treatment Plant (Renton, WA)
KING COUNTY DAFT POLYMER OPTIMIZATION

• Installed SOLITAX in DAFT feed
• Verified SOLITAX and grab sample measurements consistent.
• DAFT feed ranged from 3,000 to 12,000 mg/L.
• Implemented feed forward control to consistently meet a set point of active polymer to dry ton mixed sludge (lbs/DT).
• Results
  – Reduced the lbs/DT setpoint.
  – Realized 20% - 30% reduction in polymer (~$30k to 40k annually in 2005 dollars)
  – Tighter control of thickened sludge concentration (6.0 to 6.5%)

That’s 10 years ago. Now industry has further advanced optimization.
SLUDGE THICKENING REAL TIME CONTROL

- Feed forward and feed back for optimum control
CASE STUDY: SLUDGE THICKENING RTC MOGDEN, UK (THAMES WATER)*

- 76 MGD WWTP
- Polymer savings = 35% reduction.
- Thickened sludge increased from 4.5% to 5.5%
- Increase in biogas production by 6%
- Less drum blinding with over use of polymer
- Improved filtrate quality (less return solids loadings so less primary sludge to process)
- Ability to focus on preventative rather than reactive maintenance.

THAMES WATER – NO RTC

*Graphic 1: Operational results before the use of RTS-ST System*
THAMES WATER – WITH RTC
SLUDGE DEWATERING REAL TIME CONTROL

• Feed forward control (feed back manual)
"My feed sludge flow rate really doesn’t change that much.”
Little changes have a big impact!

Look how much the polymer flow rate changes to maintain 38 pounds of polymer per dry ton of sludge!

As the centrifuge ramps up and seals, the perfect amount of polymer is fed—no need to babysit the polymer feed system.

Centrifuge ON

Centrifuge OFF

"My feed sludge concentration really doesn’t change that much.”
Little changes have a big impact!

You as the operator choose the specific polymer dose you want. Here they changed from 37 to 38 pounds of polymer per dry ton of sludge.

By varying the polymer flow to match the sludge loading, the solids capture rate is maximized and there are fewer solids being recycled in the centrate to the head of the plant. There is also less polymer in the centrate, so there is less centrate foaming and other centrate maintenance problems.

Little changes have a big impact!

CASE STUDY: SLUDGE DEWATERING RTC
CONFIDENTIAL CO WWTP
A TYPICAL WEEK – CO WWTP

Day 1
Variable polymer demand as shown previously

Day 2
Similar to day 1, the RTC manages the variable polymer demand in real time

Day 3
Big increase in feed sludge flow and concentration—the RTC adjusts to these conditions automatically so the operator doesn’t have to worry

Day 4
Massive decrease in feed sludge flow and concentration—again, the RTC adjusts to these conditions automatically so the operator can focus on the centrifuge

Day 5
Huge increase! But rather than babysitting the polymer system, the operator can maximize the run and fill up the truck before the weekend!
RESULTS: SLUDGE DEWATERING RTC
CONFIDENTIAL CO WWTP

Better polymer control:

☑ Less solids loading in centrate
☑ More consistent cake
☑ Less cleaning and maintenance
☑ Operators can focus on the critical items
☑ Polymer savings – 22% reduction
IN CONCLUSION - SLUDGE OPTIMIZATION OPPORTUNITIES. REAL TIME CONTROL THICKENING AND DEWATERING

• Reduce polymer consumption (20-40%)
• Produce a more consistent sludge
• Improve biogas production
• Reduce time required for thickening/dewatering equipment operations and maintenance
• Increase solids capture
DISCUSSION
SLUDGE THICKENING – NIEDERMITTLAU WWTP

• Previously operated in a feed forward mode only with total solids measurement upstream of thickener
• Implementation of Hach Sludge Thickening RTC (feed forward and feed back) provided greater process stability and a more even supply to digester
SLUDGE THICKENING – WWTP GROENEDIJK

- Polymer savings ~20%
- Payback of less than 2 years for equipment investment