WWTP’s Continuous-Loop Filter Technology for Sludge Thickening & Dewatering
Outline

- Conventional WWTP Scheme
- Continuous-loop Filtration Technology Overview
- Process Description
- Case Study: Enderby, British Columbia, Canada
- Summary
CONVENTIONAL WWTP SCHEME

- PRIMARY TREATMENT
  - Collection System
  - Settling Tanks

- SECONDARY TREATMENT
  - Biological

- SLUDGE PROCESSING
  - Thickener
  - Digester
  - Methane Gas
  - De-Watering

- DISINFECTION
  - Clarifiers
  - Disinfection
  - Plant effluent to river

- Biosolids processing
  - Biosolids to landfill
CONVENTIONAL WWTP SCHEME

**PRIMARY TREATMENT**
- Collection System
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**SLUDGE PROCESSING**
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**DISINFECTION**
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**Plant effluent to river**

**Biosolids to landfill**
Purpose of primary treatment:

*To remove particulates from raw municipal wastewater – thereby reducing the organic loading downstream.*

Available technologies for primary:

- Large settling tanks/clarifiers (conventional)
- Continuous-loop filtration
CONTINUOUS-LOOP FILTER MUNI APPLICATIONS

- Enhance solids removal performance for **Overloaded primary sedimentation tanks**.

- **Plant expansion** where land is expensive or unavailable by increasing primary or secondary process capacity.

- Primary treatment for **New plants** (Dig-free, concrete-free solution for mountainous or earthquake-prone areas).

- Provide **Integrated solution** for primary solid separation, sludge thickening and dewatering (3 in 1).
Enhance solids removal performance for **overloaded** primary tanks

TSS 300-500 mg/L

TSS 200-400 mg/L

Overloading can be due to:
- Poor engineering design (i.e. undersizing)
- Increase in flow rate to the plant (i.e. population growth)
- Regulatory change (i.e. more stringent discharge limit)
Option #1 – Reduce incoming solids with continuous-loop filter, prior to primary treatment

- TSS 300-500 mg/L
- TSS 150-250 mg/L
- TSS 100-200 mg/L

Option #2 – Parallel treatment of primary with continuous-loop filter

- TSS 300-500 mg/L
- TSS 100-200 mg/L
MUNICIPAL APPLICATIONS

- Primary treatment for new plants
- Primary sludge thickening
- Primary sludge dewatering
- Stormwater and CSO treatment
- Expanding primary or secondary capacity

“We were facing an expansion of 2 to 3.5 MGD by adding another oxidation ditch. Instead we added better primary treatment and were able to defer spending several million dollars by spending $250k on a Salsnes Filter”
INDUSTRIAL APPLICATIONS

- Tanneries, pulp & paper, slaughterhouses, food processing, aquaculture
Tromso, Norway – 10.5 MGD (1,660 m³/hr)
1600 ft² (150 m²) Footprint
LET THE SOLIDS DO THE JOB

- Influent suspended solids (TSS) form a filter mat on the mesh
- Filter mat itself enables high TSS and BOD removal
• Screw-press dewatering, evacuates odors
• 4-6% DM after thickening, 20-30% after dewatering
THE KEY: CONTROLLING THE FILTER MAT

- If 25% of particles in influent > filter mesh opening = filter mat build-up
- Thicker mat → more TSS/BOD removal, smaller solids

Operating Variables:
- Influent flow rate
- Particle size distribution
- Influent TSS levels
- Belt speed
- Mesh size (microns)
TRADITIONAL PRIMARY TREATMENT
In One Step:
- Separation 40-80% TSS
- Thickening 4-6% DM
- Dewatering 20-30% DM
BENEFITS OF SALSNES CONTINUOUS-LOOP FILTRATION

- <50% the cost of sedimentation/clarification
- Ideal for greenfield and plant upgrades
- Compact, modular design significantly reduces footprint to 1/10th of traditional primary treatment
- High treatment efficacy (>50% SS, >30% BOD)
- Sludge dewatering reduces disposal costs
- Enables waste to energy conversion
- Reduces environmental footprint
ENDERBY, BC CANADA – CASE STUDY

1500-2000 m³/day (0.5 MGD)
250 mg/l TSS influent
Operational Challenges:

- 15 m$^3$/day of wet sludge (1-2% DM) costly to dispose
- Unstable biological process
- Limited footprint for expansion
- Digester converted to EQ tank
- TSS now removed before biological treatment
- WAS reduced from 15 to 1.3 m³/day (25% DM)
- Chlorine replaced with UV Disinfection
ENDERBY REDESIGNED PLANT

Housing

Sludge
Reduced sludge volume from 2.8 to 0.2 gpm (0.2 to 0.01 L/s)
Sludge DM increased from 1-2% to 20-25%
COST BENEFITS

• Significantly lower total lifecycle cost
• Less land needed (1/10\(^{th}\) of conventional primary)
• Less civil works
• Can be designed for higher TSS/BOD removal rates than conventional primary → enables downsizing / less aeration
• No need for separate thickening or dewatering processes
• Higher energy value in primary sludge
• Low maintenance and operation
• Fully automated equipment
SUMMARY

• Continuous-loop filter technology provides cost-effective integrated sludge thickening and dewatering for primary treatment and many industrial applications

• Ideal solution to replace/augment conventional primary

• Benefits include:
  – Lower capital, installation and operating costs
  – Highest TSS/BOD removals in smallest footprint
  – Reduced stress on downstream processes (i.e. activated sludge)
  – Produces smaller volume of drier sludge
  – Proven technology for over 20 years
  – Over 550 units operating around the world
QUESTIONS?

Thank you for your attention.

For more information, please visit:

www.salsnes-filter.com or www.trojantecnologies.com