Dewatering Equipment Overview: Application, Operations, Maintenance

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Biosolids Processing Technology

- Thickening
- Dewatering
Points of Emphasis

• Available Dewatering Technologies
• Process Generating the Biosolids
• Technology Selection
  – How The Machine Operates
  – Maintenance Requirements
  – Capital Cost
  – Energy Requirements
Types of Mechanical Technology

- Batch Process-Filter Press
- Continuous Process
  - Low Speed Technology
    - Belt Press, Gravity Belt Thickener, Rotary Drum Thickener, Screw Press, Volute Press
  - High Speed Technology
    - Centrifuge
Biosolids Thickening

Low Speed Technology
Biosolids Thickening: *Low Speed*

**Gravity Belt Thickener**
- Straight forward operation
- Enclosed process available
- Some GBTs require no civil prep
- Low energy (~2-5 hp)
- Low Maintenance
- Range: 120 gpm to 900 gpm

**Rotary Drum Thickener**
- Straight forward operation
- Enclosed process, no mist
- Simple installation
- Low energy (~2 hp)
- Maintenance varies
- Range: 60 gpm to 750 gpm
Gravity Belt Thickener

ABE.mp4
Gravity Belt Thickener

Operations

• Manual process optimization

• Tuning Parameters:
  – Belt Speed
  – Hydraulic Loading (gpm)
  – Solids loading (lbs./hr.)
  – Polymer dosage
  – Mixing/Polymer injection point/polymer concentration

Maintenance

• Manual or automatic bearing lube available

• Bearings lubrication every 6 months

• Continuous, self cleaning belt

• Belt replacement 2000-4000 hours

• Wear items, seals, grid, doctor blades
Rotary Drum Thickener

G3 RDT movie_cfg1_h264.mp4
Rotary Drum Thickener

Operations

• Manual process optimization
• Tuning Parameters:
  – Drum Speed
  – Hydraulic Loading (gpm)
  – Solids loading (lbs./hr.)
  – Polymer dosage
  – Mixing/Polymer injection point/polymer concentration

Maintenance

• Trunion and chain drive
• Pillow block with direct drive
  – Gear box fluid every 6 months
• Spray shower
• Wedge wire repair
• Wear items, trunions, chain drive components
Biosolids Thickening

High Speed Technology
Decanter Thickening: High Speed

- High throughput per footprint
- Advanced, autonomous controls
- Enclosed process = better atmosphere
- Relatively compact solution
- Polymer used to tune recovery rate
- Range from 25 gpm to 1000 gpm
Decanter Centrifuge Thickening

Decanter inside~6116768.mpeg
## Decanter Centrifuge Thickener

### Operations
- Manual or full automation for process optimization
- Tuning Parameters:
  - Bowl Speed
  - Pond depth
  - Torque/Load
  - Hydraulic Loading (gpm)
  - Solids loading (lbs./hr.)
  - Polymer dosage
  - Mixing/Polymer injection point/polymer concentration

### Maintenance
- Manual back drive bearing lube ~300 hours
- Manual or automatic main drive bearing lubrication
- Gear box fluid every 6 months
- Clean in Place-as needed
- Wear saddles as needed
## Technology Comparison: Thickening

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Gravity Belt Thickener</th>
<th>Rotary Drum Thickener</th>
<th>Thickening Centrifuge</th>
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<tbody>
<tr>
<td>Wash water</td>
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<td>Power</td>
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<tr>
<td>Cake dryness</td>
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</table>
Biosolids Dewatering

Pressure Filtration

Centrifugation
Belt Filter Press

- Robust, long service life
- Low maintenance
- Variety of configurations
- Low energy use (~10 hp)
- Wide range of operation
Belt Filter Press

BFP_preview_200814.mp4
Belt Filter Press

Operations

• Manual process optimization
• Tuning Parameters:
  – Belt Speed
  – Hydraulic Loading (gpm)
  – Solids loading (lbs./hr.)
  – Polymer dosage
  – Mixing/Polymer injection point/polymer concentration
  – Belt tension (50 pli max.)

Maintenance

• Manual or automatic bearing lube available
• Bearings lubrication every 6 months
• Gear box fluid 1000 hours
• Hydraulic fluid 1000 hours
• Continuous, self cleaning belt
• Belt replacement 2000 to 4000 hours.
• Wear items, seals, grid, doctor blades
Biosolids Dewatering

Screw Press
Screw Press

Low Power, Supervision and Maintenance Requirements

• User-friendly design
• Quiet!
• Requires minimal operator attention
• Simple concept – high uptime
• Low rotational speed means
  – Low power demand, reducing operational costs (~2 hp)
  – Sealed process; low to no odor
Screw Press

Operations

• Manual process optimization
• Tuning Parameters
  – Hydraulic loading
  – Solids loading
  – Mixing
  – Polymer dosage
  – Discharge pressure

Maintenance

• Manual or automatic bearing lube available
• Bearings lubrication per manufacturers schedule
• Gear box fluid 1000 hours
• Wear items, flight brushes or tips
Biosolids Dewatering

Filter Press

(Plate and Frame)
Filter Press

PP_movie_cfg1.mp4
**Filter Press**

Batch Technology for Cake Solids to 40%+

- Ideal for dry cake solids, up to 40%
- Solids capture over 99%
- Easily customized for most dewatering needs
- Operating costs low due to low energy demand, low disposal cost
- Configured for manual, semi-auto and automatic operations.
Filter Press

**Operations**
- Manual Cake Discharge
- Tuning Parameters
  - Hydraulic loading
  - Solids loading
  - Mixing
  - Polymer dosage
  - Discharge pressure

**Maintenance**
- Feed Pumps
- Cloth Wash Down
- Bombay Doors
- Replace Cloths
- Replace Frames
Biosolids Dewatering

Decanter Centrifuge
Decanter Centrifuge Dewatering
Decanter Centrifuge Dewatering

- Advanced, autonomous controls
- Enclosed process, no mist
- Relatively compact solution
- Higher performance, higher energy
- PM is relatively low
# Technology Comparison: Dewatering

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<th>Chamber press</th>
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Summary and Take-Aways

• Several dewatering technologies to choose from
• Technology selection is based on the design demands, O&M needs, capital cost and operating budget
• Sludge makes all the difference!
Questions or Comments?

Thank You!