Flottweg
Separation Technology

Flottweg

Engineered for your success!

Presentation: Dewatering Technologies

Flottweg Separation Technology

- Why Dewater?
- Factors To Consider
- Dewatering Technologies
- Comparison
- Summary

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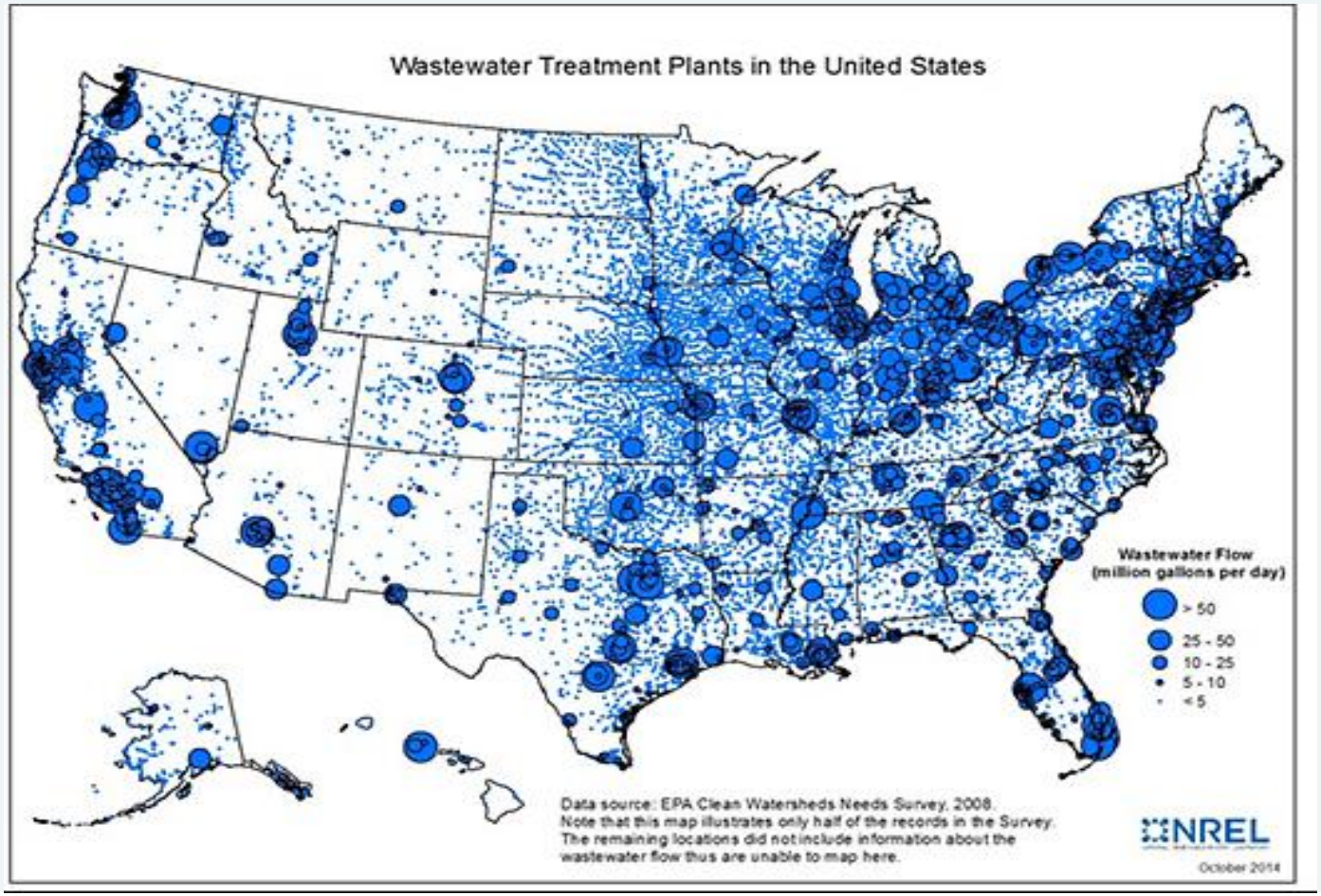
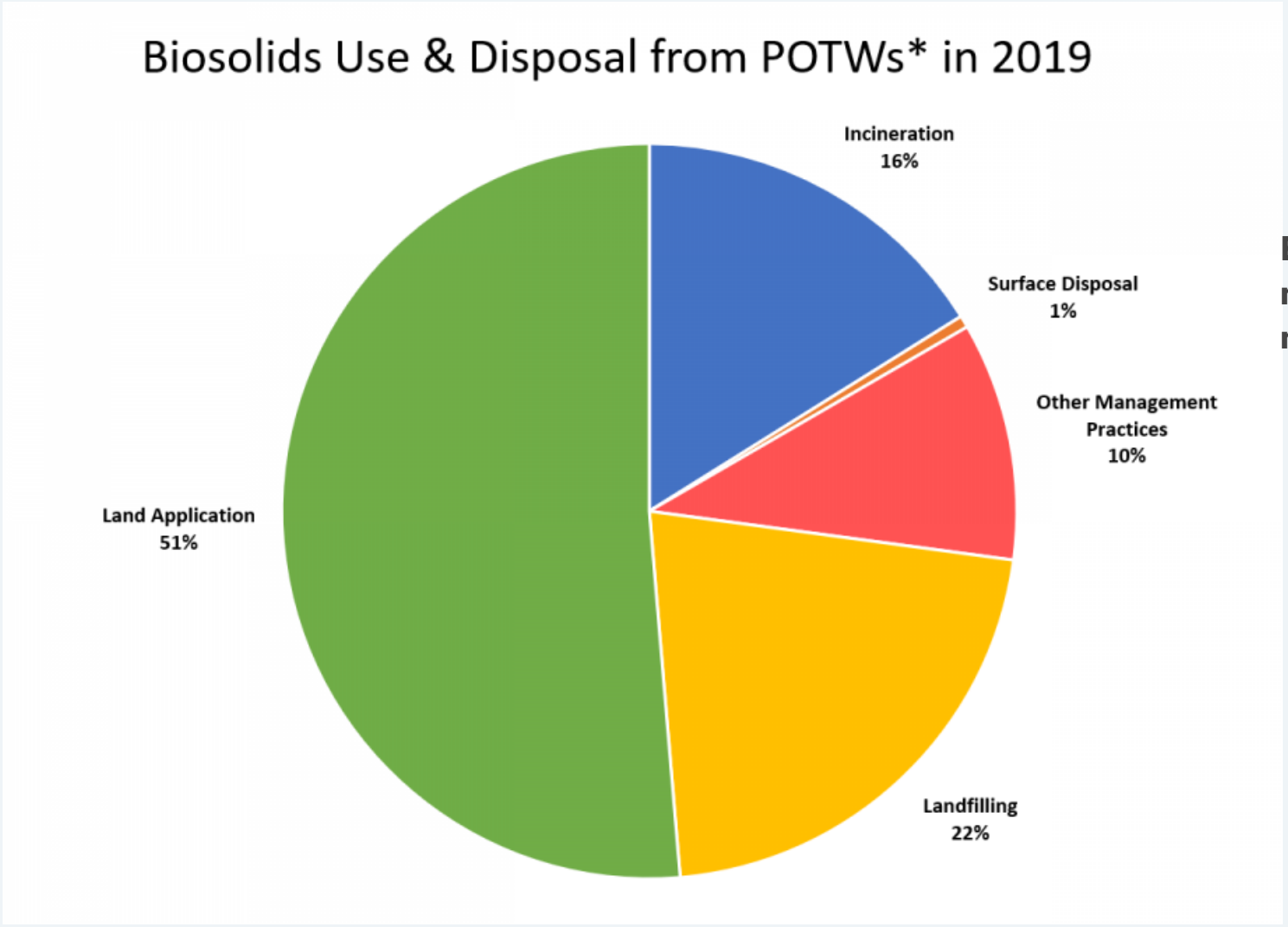
Why Dewater?

More than 16,000 wastewater treatment plants and based on the EPA 2019 biosolids annual report approximately **4.75 million dry metric tons (dmt) of biosolids are produced**.



Biosolids



Each disposal method costs money!

Why Dewater?

The purpose of dewatering is to remove water existing between and within the sludge particles (free water). The reduction in weight and volume greatly reduces the disposal and transportation costs.

If the sludge is going to a dryer, reducing the moisture content of the sludge by dewatering can save about 60% in energy costs.

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Which dewatering technology is the best?

Dewatering Technologies
Factors to consider

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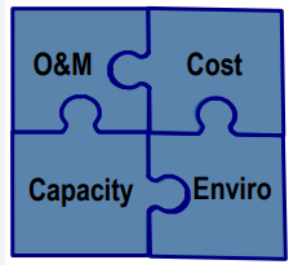
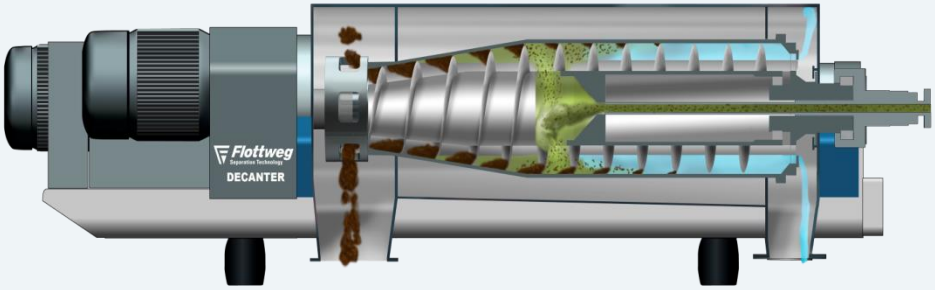


Dewatering Technologies

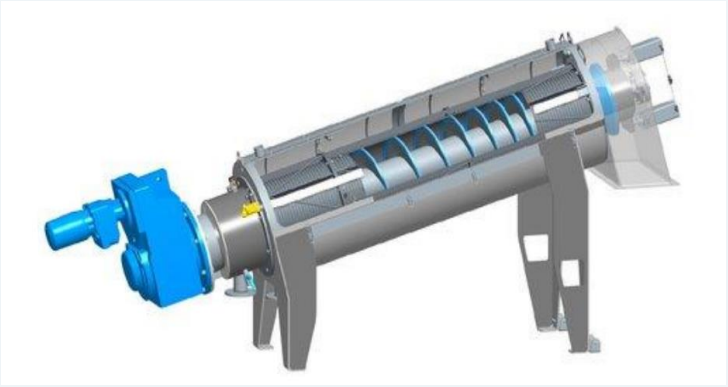
Factors to consider

Dewatering Technologies

Press or Spin?

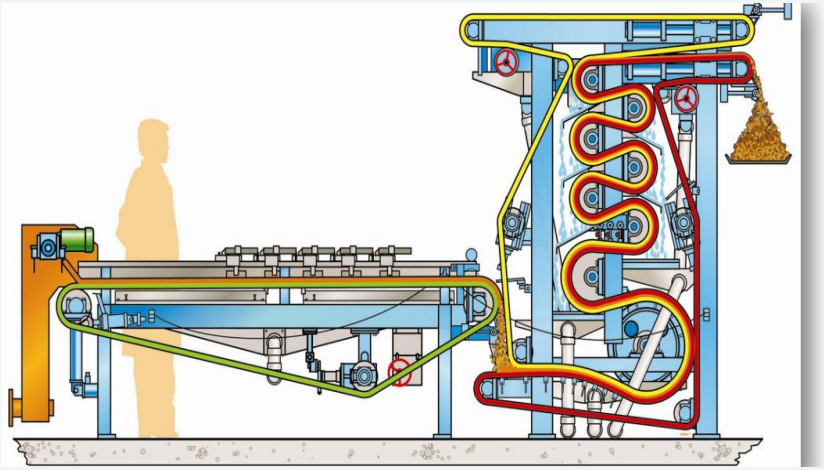


Centrifuge

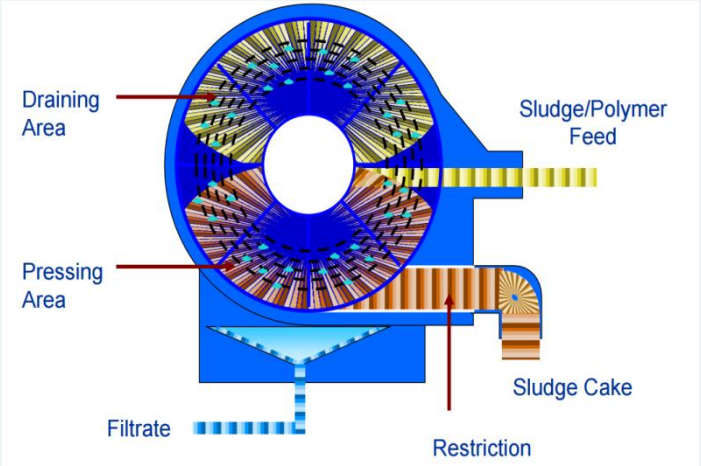


Screw Press

Belt Press



Rotary Fan Press



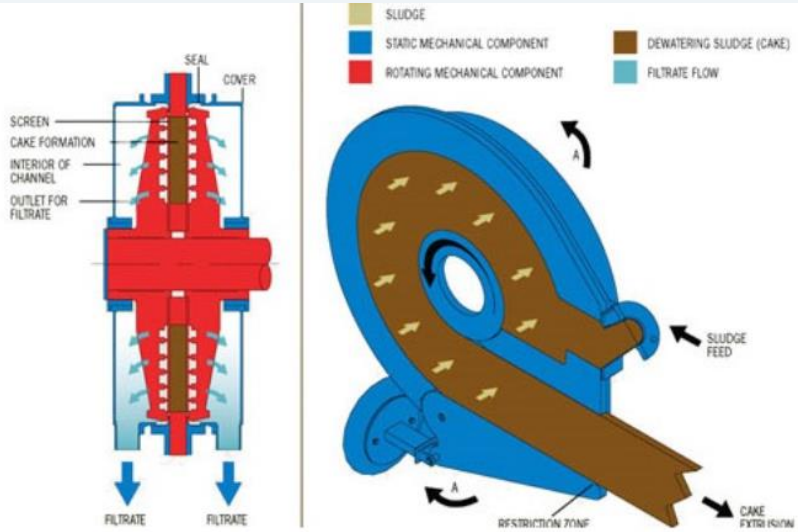
Dewatering Technologies

Rotary Fan Press

Manufacturers: Prime Solutions, Fournier

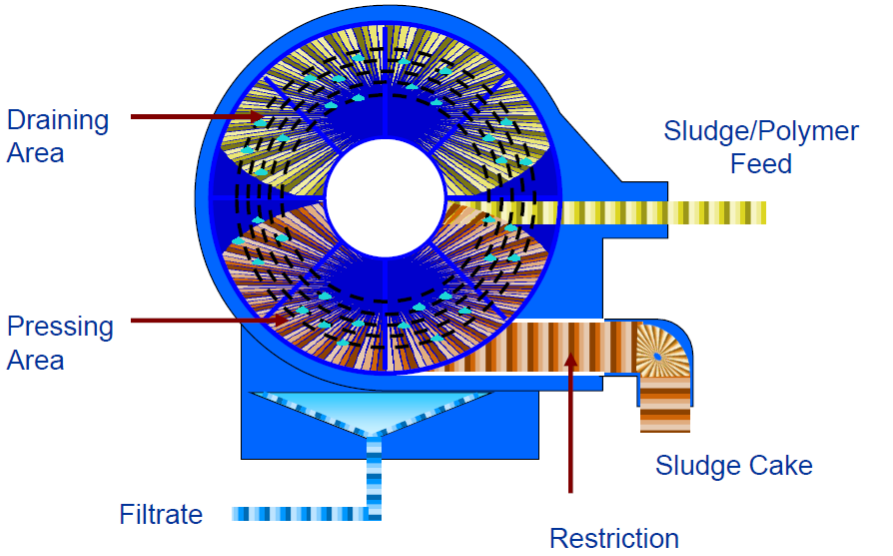
Dewatering Technologies
Rotary Fan Press

Working principle: The sludge is fed into a rectangular channel and rotated between two parallel revolving screens. As the free water passes through the screens, the sludge continues to dewater as it travels around the channel. The sludge builds up solids until enough pressure is generated against the outlet restriction arm.



1 2014 Fournier Rotary Press video WITH SOUND - YouTube

Videos - Rotary Press (fournierdewatering.com)



Rotary Fan Press

Strengths and Weaknesses

Strengths

- Enclosed design, contained odor source
- Easy to start-up & shut down
- Low power consumption
- Low wash water consumption (depending on mfr)
- Small footprint
- Low maintenance cost

Weaknesses

- Small throughput, multiple units required
- High capital cost
- Lower cake solids
- Requires low variability in feed conditions, can’t handle upsets
- Potential clogging in dewatering area
- Works better on sludges that are more fibrous (i.e. primary sludges)
- Initial cake solids low because it relies on friction of cake to convey

Dewatering Technologies

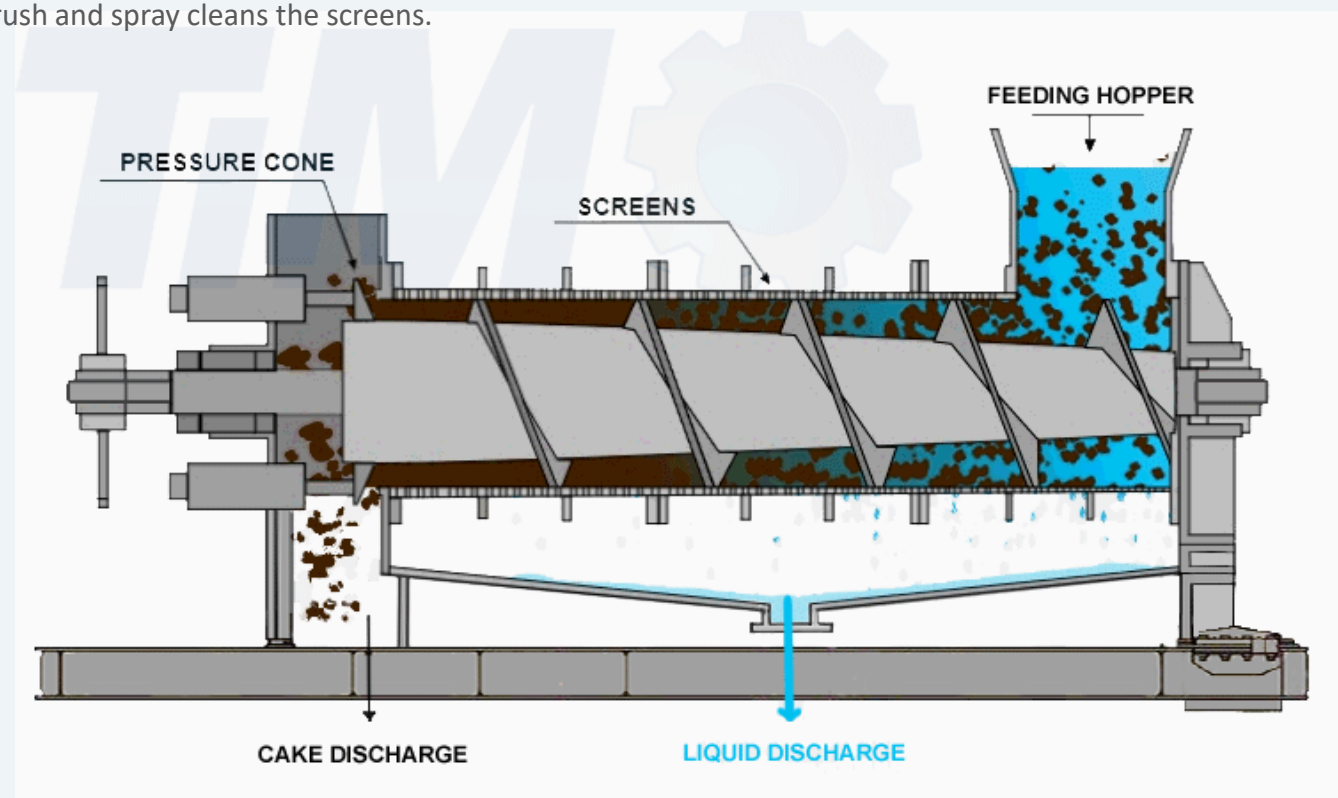
Screw Press

Manufacturers: FKC, Huber, PW Tech, Andritz, Schwing

Dewatering Technologies

Screw Press

Working principle: The screw shaft rotates in a cylinder that is composed of filter screens. The diameter of the screw shaft gradually becomes larger from the inlet to the outlet and the gaps between flights decrease and the screen openings become smaller. This increases the pressure on the sludge against a screen and the liquid (filtrate) is passed through screen. The solids are compressed and convey out the one end of the cylinder. A pneumatic cylinder maintain backpressure for optimum cake dryness. A brush and spray cleans the screens.



Inclined Screw Press

Strengths and Weaknesses

Strengths

- **Enclosed design**
- **Simple operation**
- **Low operator attention**
- **Low power consumption**
- **Low maintenance requirements**
- **Suitable for wastes that contain large particulates and inorganic material (grit)**

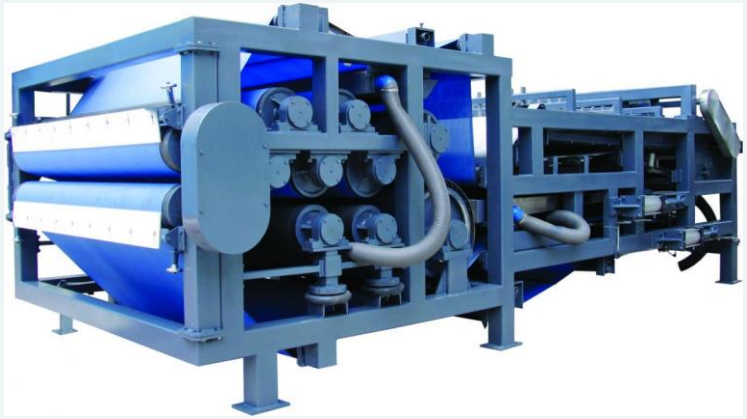
HUBER Screw Press Q-PRESS® - Bing video

Weaknesses

- **Low throughput = more units = larger footprint**
- **Lower cake solids**
- **Sensitive to changing feed characteristics**
- **High polymer use**
- **Lower Solids Capture Rate**
- **Moderate wash water requirement for cleaning**

Dewatering Technologies

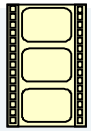
Belt Filter Press



Manufacturers: BDP, Charter Machine, Andritz, Ashbrook, Komline

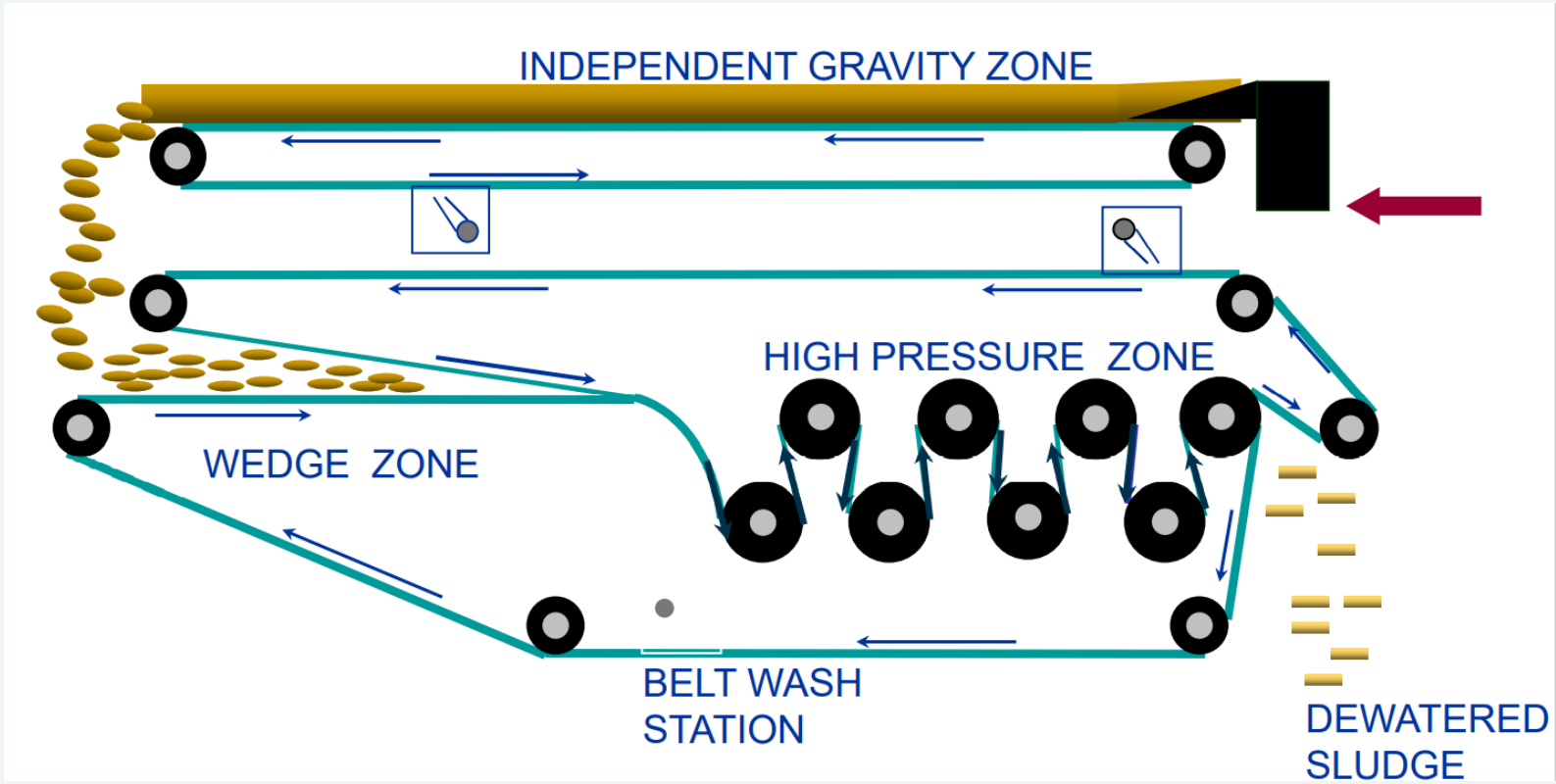
Belt Filter Press

Working principle: the sludge is carried by two tensioned filter belts through a series of rollers. The squeezing of the sludge layer between the belts removes the free water.



Gravity Zone, Wedge Zone, High Pressure Zone, Solids Discharge.

Revolutionary dewatering technology for the environment industry - Bing video



Belt Press
Strengths and Weaknesses

Strengths

- Relatively low capital cost
- Low operational cost
- Moderate energy requirements
- Low polymer consumption
- Simple to operate
- Easy to observe output

Weaknesses

- Large space requirement
- Sensitive to changes in sludges
- Needs constant adjustment and attention to properly operate
- Relatively low cake solids compared to other dewatering technologies
- Open process; high odors, spills, aerosols, maintenance and safety issues
- High wash water required
- High labor requirement, more operator attention needed
- Difficulties with greasy sludges (FOG's)

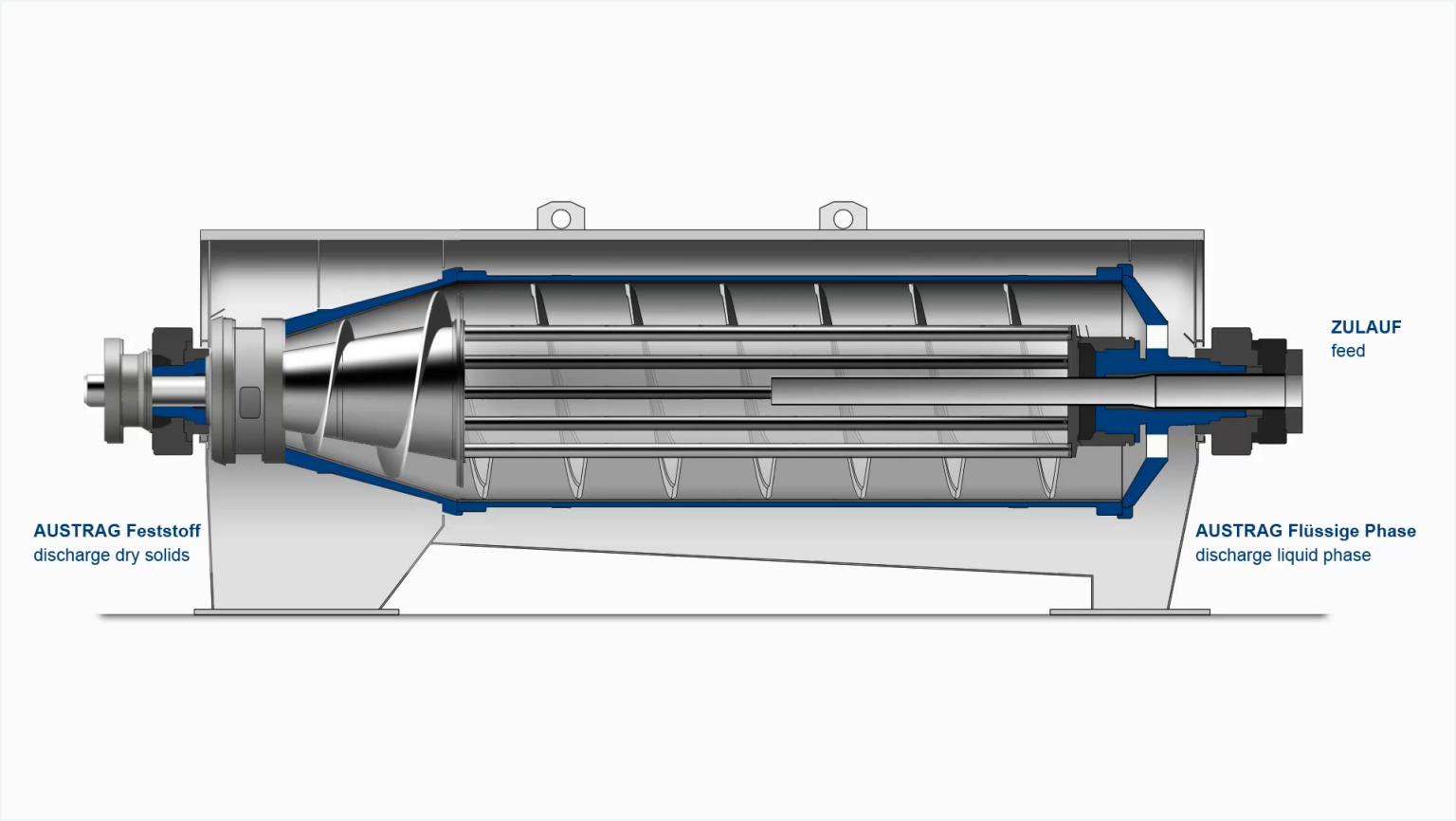
Dewatering Technologies

Centrifuges

Manufacturers: Flottweg, Andritz, Alfa Laval, Centrisys, Flottweg

Centrifuges

Working Principle: The centrifuge comprised of a bowl and scroll that rotates at approximately 3000rpm generates 3000g's. The sludge is introduced through a feed pipe into the bowl. Any solids with a higher specific gravity than water is thrown to the inside of the bowl. The scroll which operates at a slightly faster (or slower speed) conveys the sludge out to the cone end of the bowl. The liquid (centrate) is continuously discharged over the weir from the other end of the bowl.



Centrifuge

Strengths and Weaknesses

Strengths

- Large processing capacity
- Highest solids of any other technology
- Small footprint, low staffing requirements
- Enclosed design, contained odor source
- Easy start-up & shut-down operation
- Continuous operation with minimal supervision
- Performance independent of solids loading
- Low wash water consumption

Weaknesses

- High installed power
- Moderate capital cost (low cost to capacity ratio)
- Noise (< 85 dBA)
- Moderate polymer use
- Constant flow required
- Most major repair work performed by manufacturer

Dewatering Technologies

Overview

Parameter	Belt Press	Fan Press	Screw Press	Centrifuge
Capital Cost	Low	High	High	Moderate
Loading Capacity	Moderate	Low	Low	High
Sludge sensitivity	High	High	High	Low
Cake Solids	Low	Moderate	Moderate	High
Polymer Use	Low	High	High	Moderate
Capture Rate	Moderate	Low	Low	High
Power	Moderate	Low	Low	High
Wash water	High	Moderate	Moderate	Low
Odor	High	Enclosed	Enclosed	Enclosed
Noise	Moderate	Low	Low	High
Operator Oversight	High	Moderate	Moderate	Low

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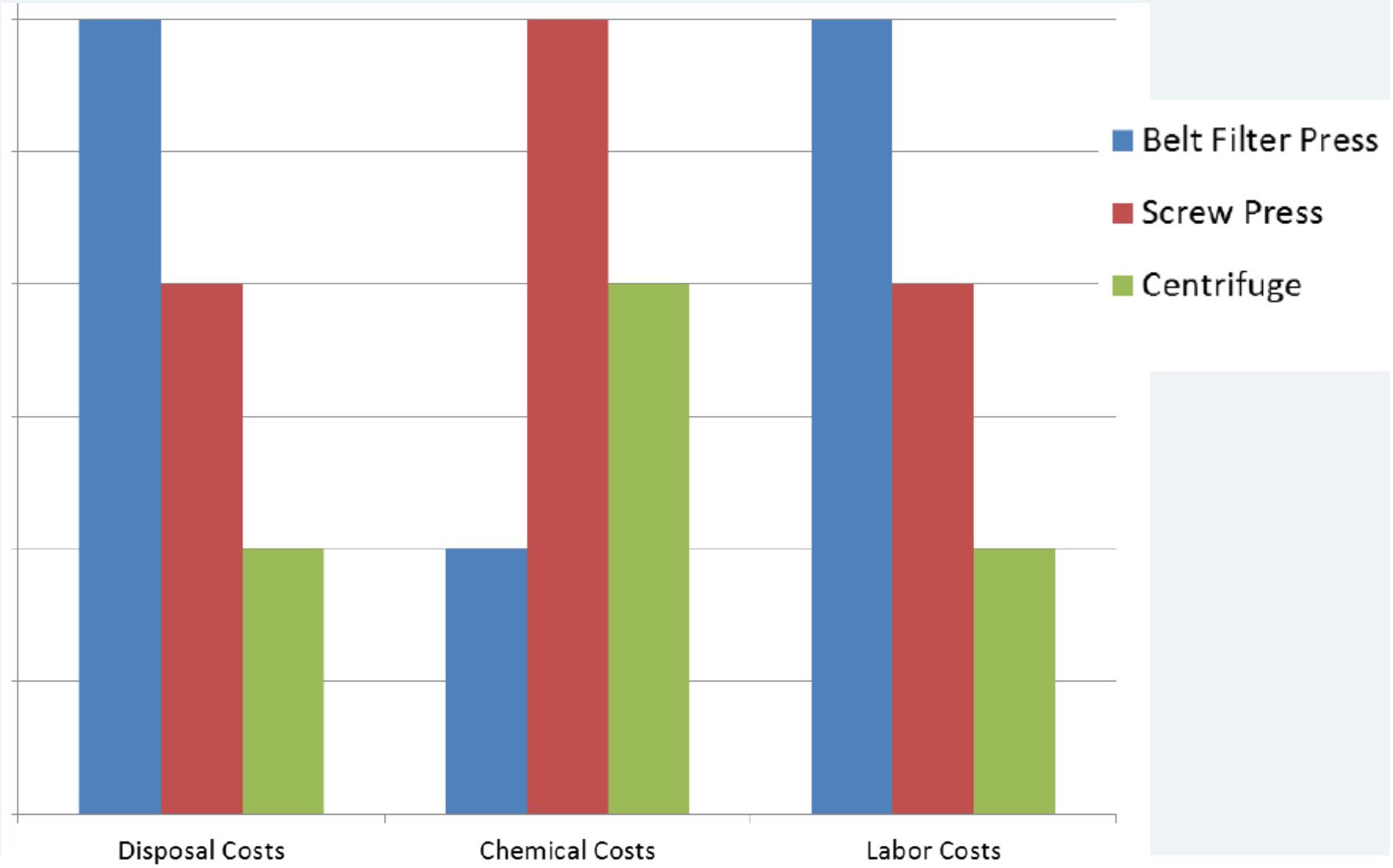
Test Results

	Belt Press		Screw Press		Centrifuge	
	Cake Solids	Poly	Cake Solids	Poly	Cake Solids	Poly
Anaerobic	15-17	21-23	21	32	23-26	20-22
Aerobic	15-16	14-16	20	25	19-22	20-22
WAS	15-16	14-16	*	*	17-20	18-20
Primary	25-29	9-11	-------	-------	20-35	11-12
Lime (WTP)	30-50	2-5	-------	-------	55-65	0
Alum (WTP)	15-20	5-10	-------	-------	22-26	8-12

Comparison of operating costs



FLOTTWEG

DRY MATTER IS SAVING MONEY!*

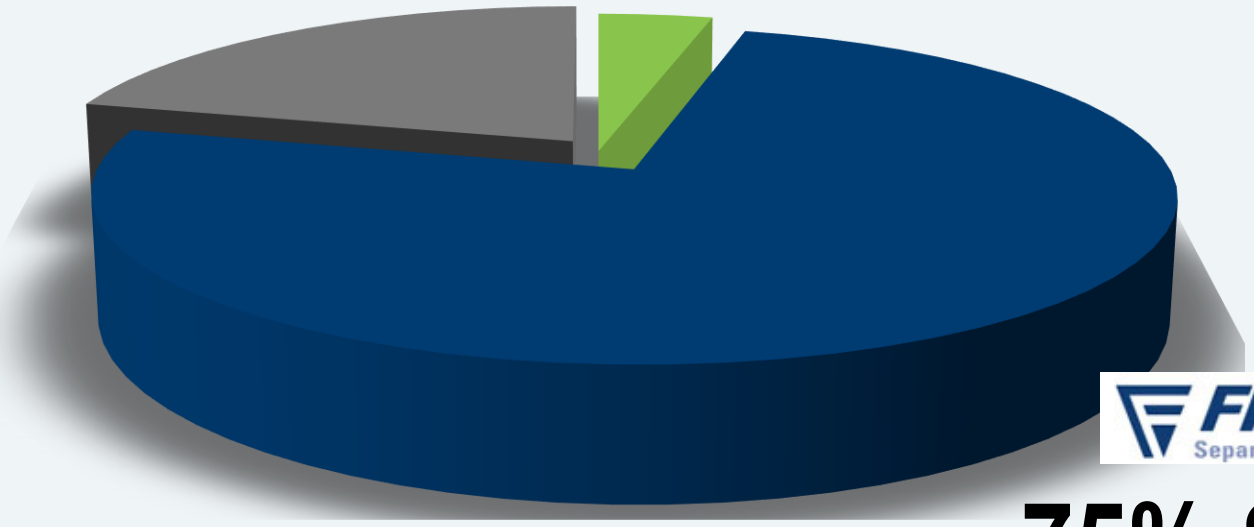
21% POLYMER COSTS

$3.00 / lb active substance

($1.20 / lb neat, 40% activity)

4% POWER COSTS

$0.09 / kWh



75% SLUDGE DISPOSAL COSTS

$52.00+ / ton cake

***source: pricing taken from DWA Merkblatt M366, March 2011**

Summary

Every plant is different….needs and priorities will vary.

Every Sludge is different….performance results will vary.

Bench Testing and/or Pilot Testing are always recommended.

A complete holistic approach produces the best dewatering selection

- Disposal options and limitations
- Space availability
- Regulations
- Operating costs
- Labor costs
- Storage capacity

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