Improving Efficiency of Dewatering Alternatives to Conventional Dewatering Technologies

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2009 PNCWA Webinar
Recent Developments In
Biosolids Management Processes

carollo
Engineers...Working Wonders With Water™

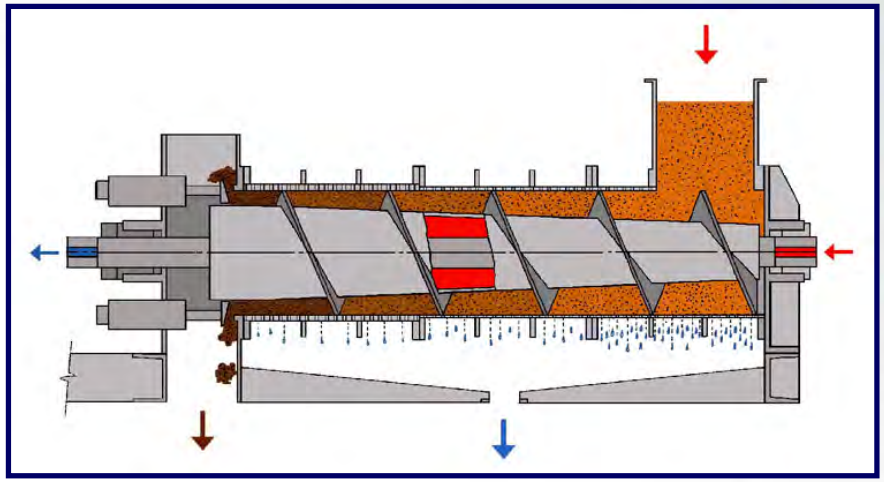
Outline

1. Screw press technology
   a. Performance survey results
   b. Pilot testing results
   c. Lifecycle cost evaluation (Class A and Class B)
   d. Design considerations
2. Rotary fan press technology
   a. Performance survey results
   b. Pilot testing results
   c. Lifecycle cost evaluation (Class A and Class B)
   d. Design considerations
3. Overview of R&D Technologies

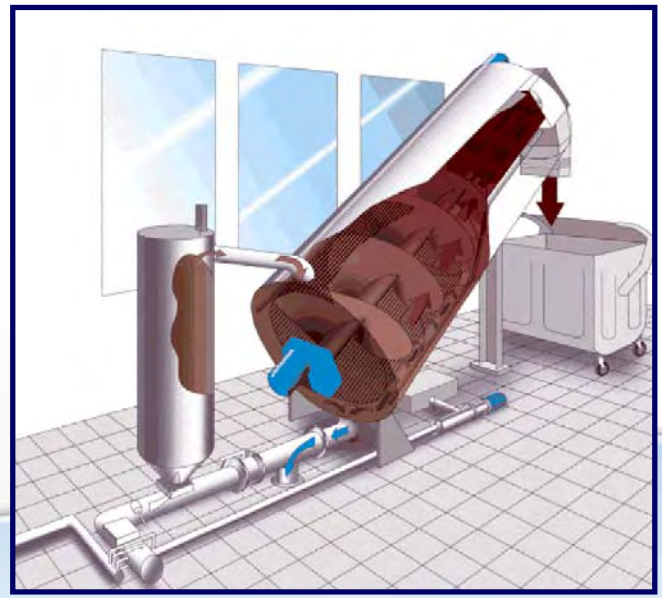
Screw Press Technology

Screw Press Manufacturers

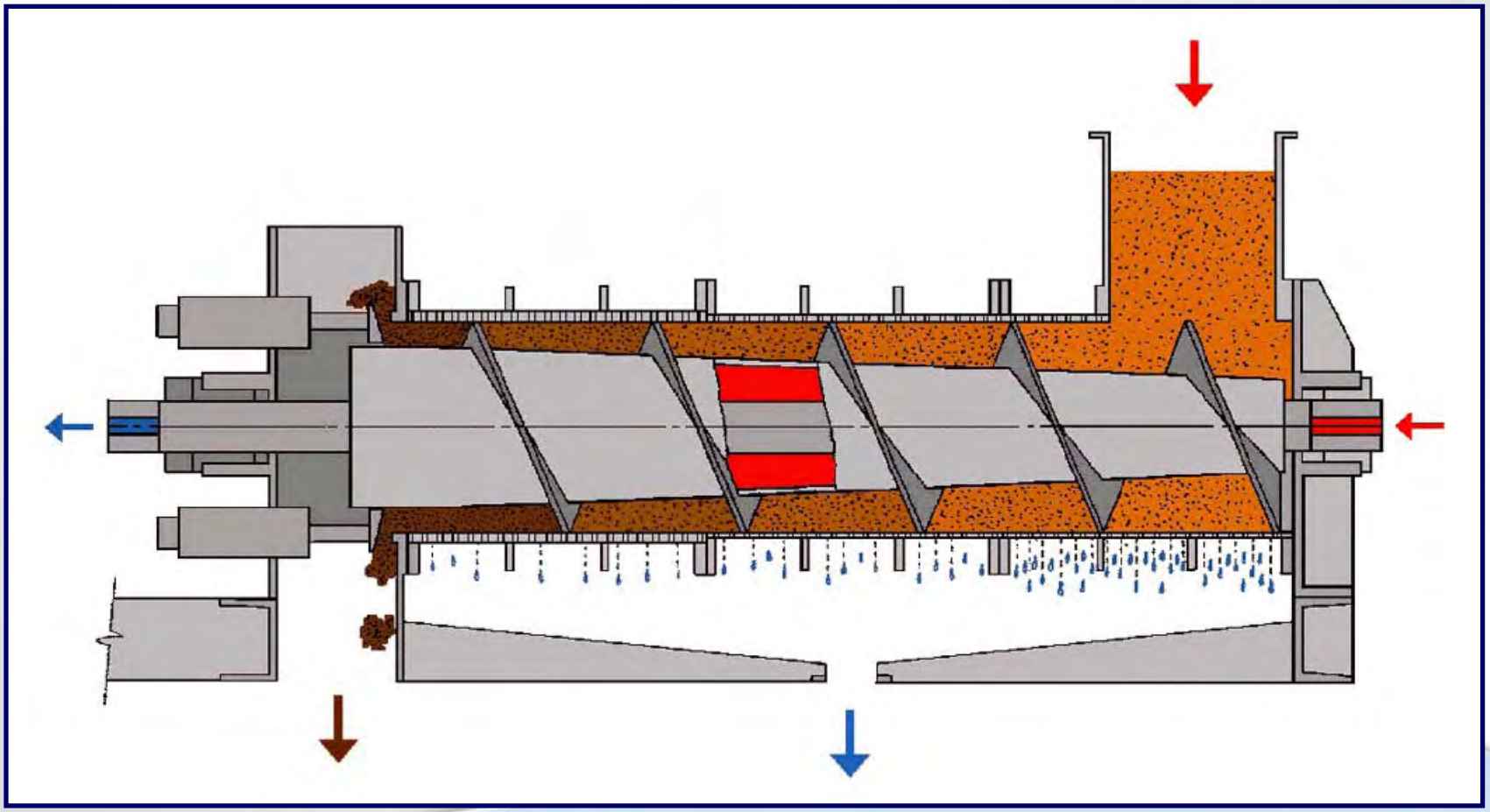
- FKC (horizontal)



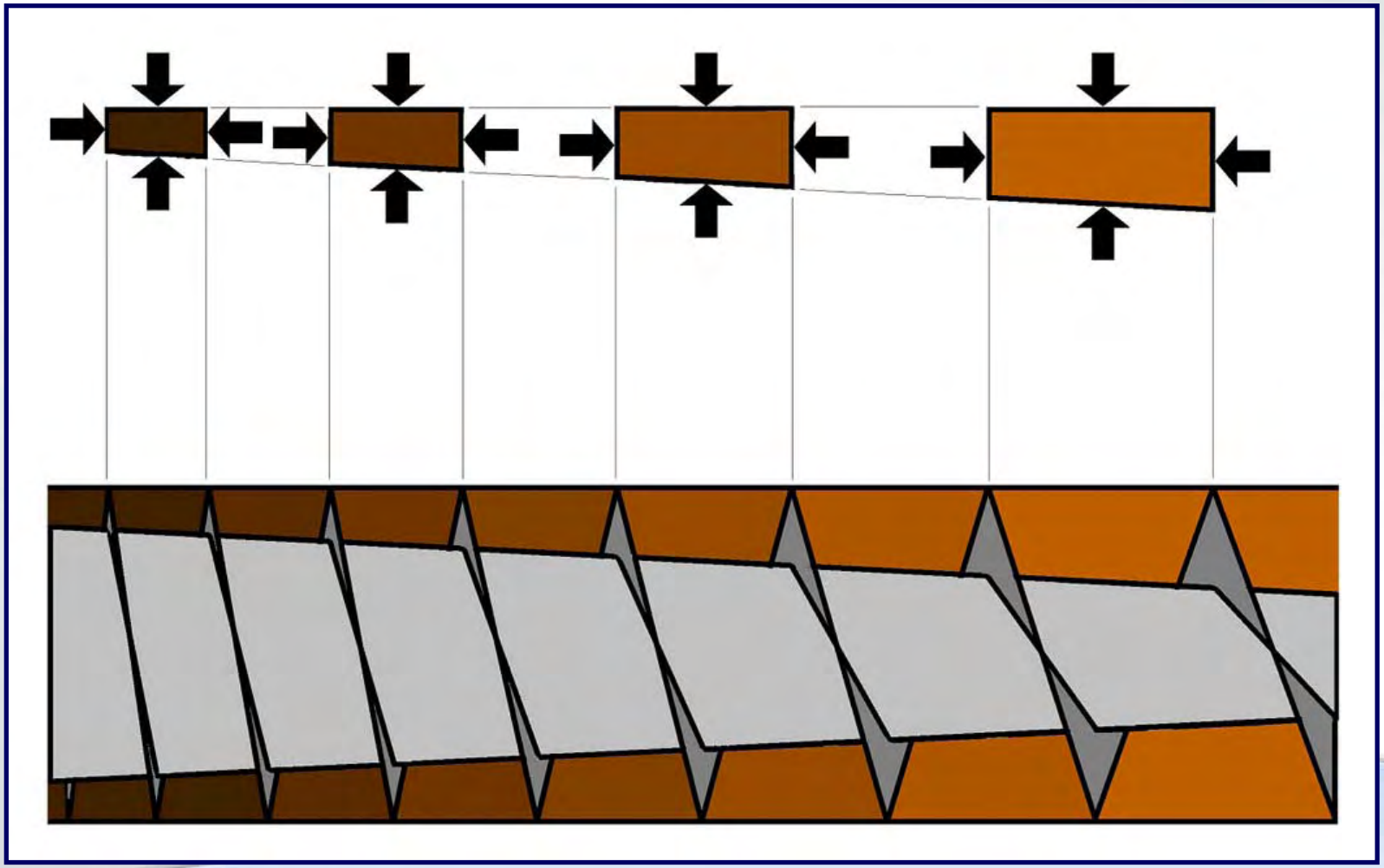
- Huber (inclined)



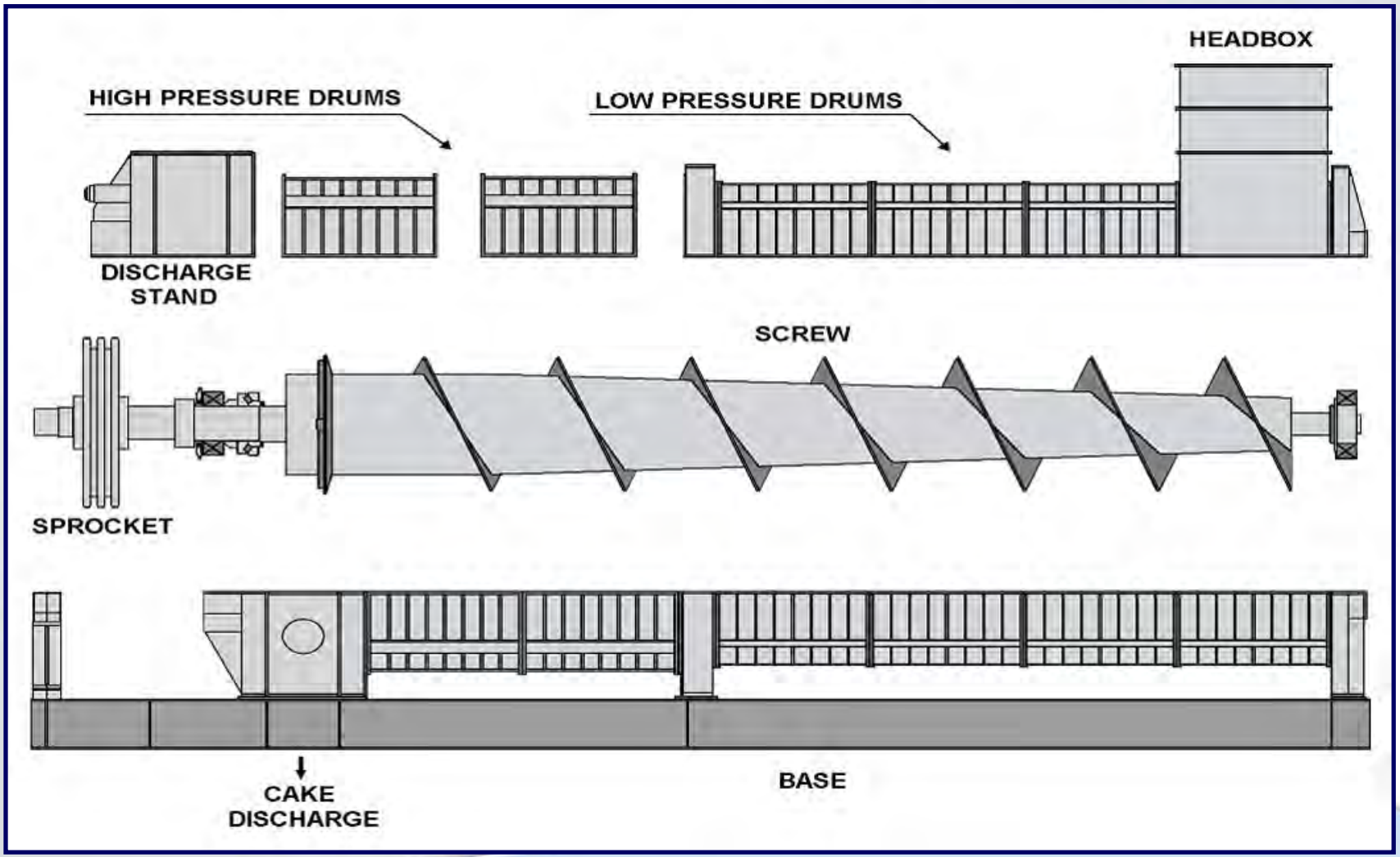
Screw Press General Description



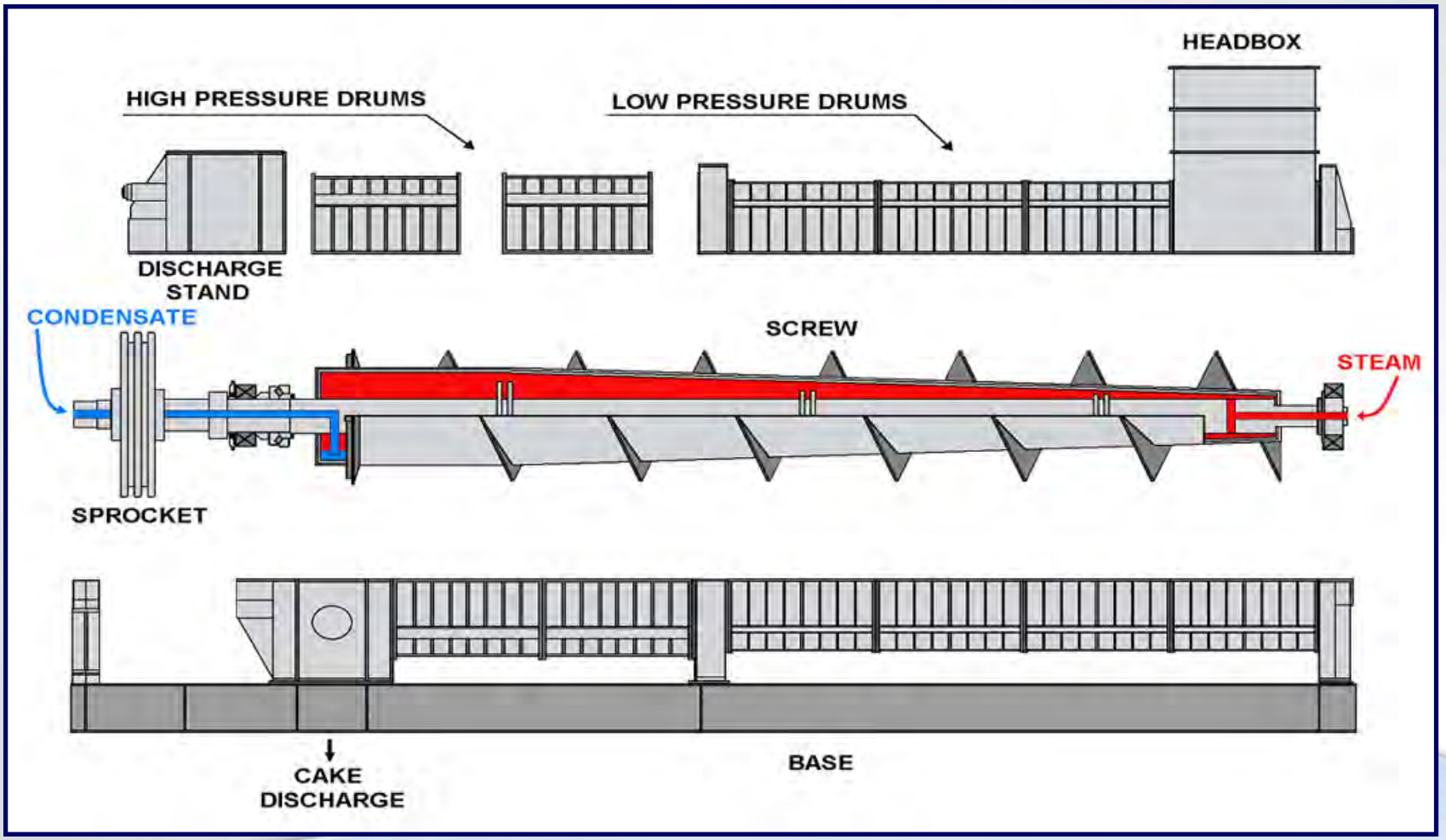
Dewatering by Volume Reduction



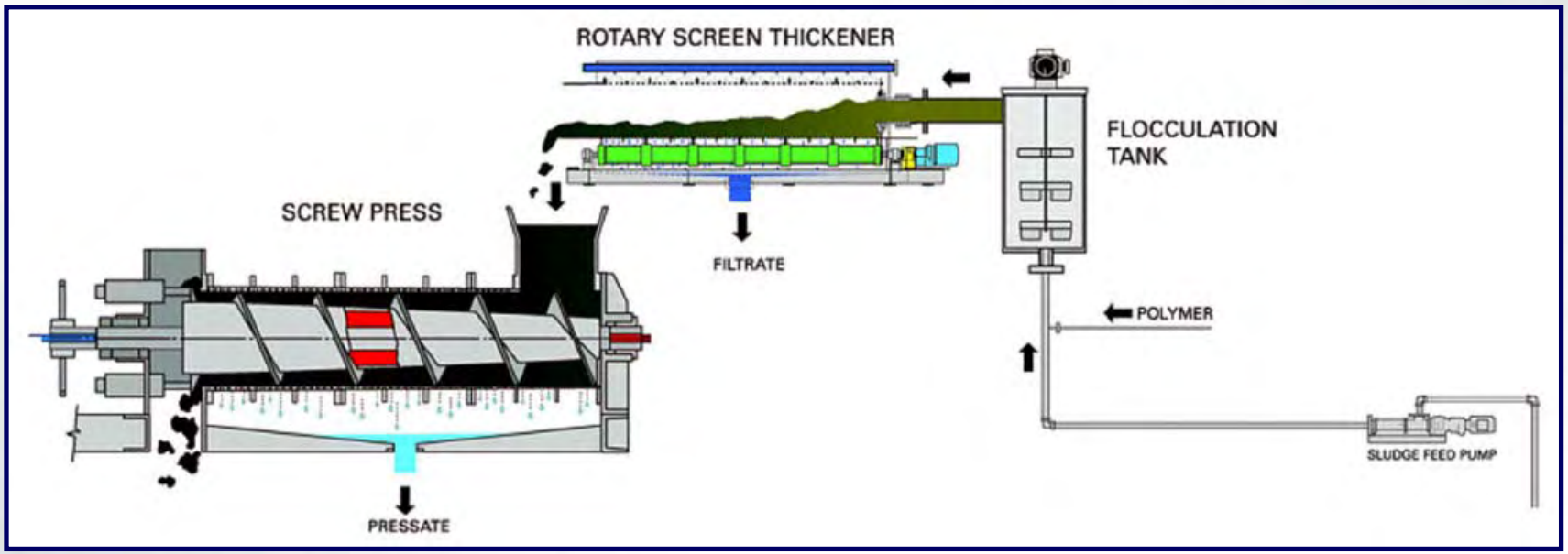
Screw Press Expanded View



Screw Press Expanded View
Class A Option



Flow Schematic



FKC Screw Press

Tallahassee, FL, FKC Installation

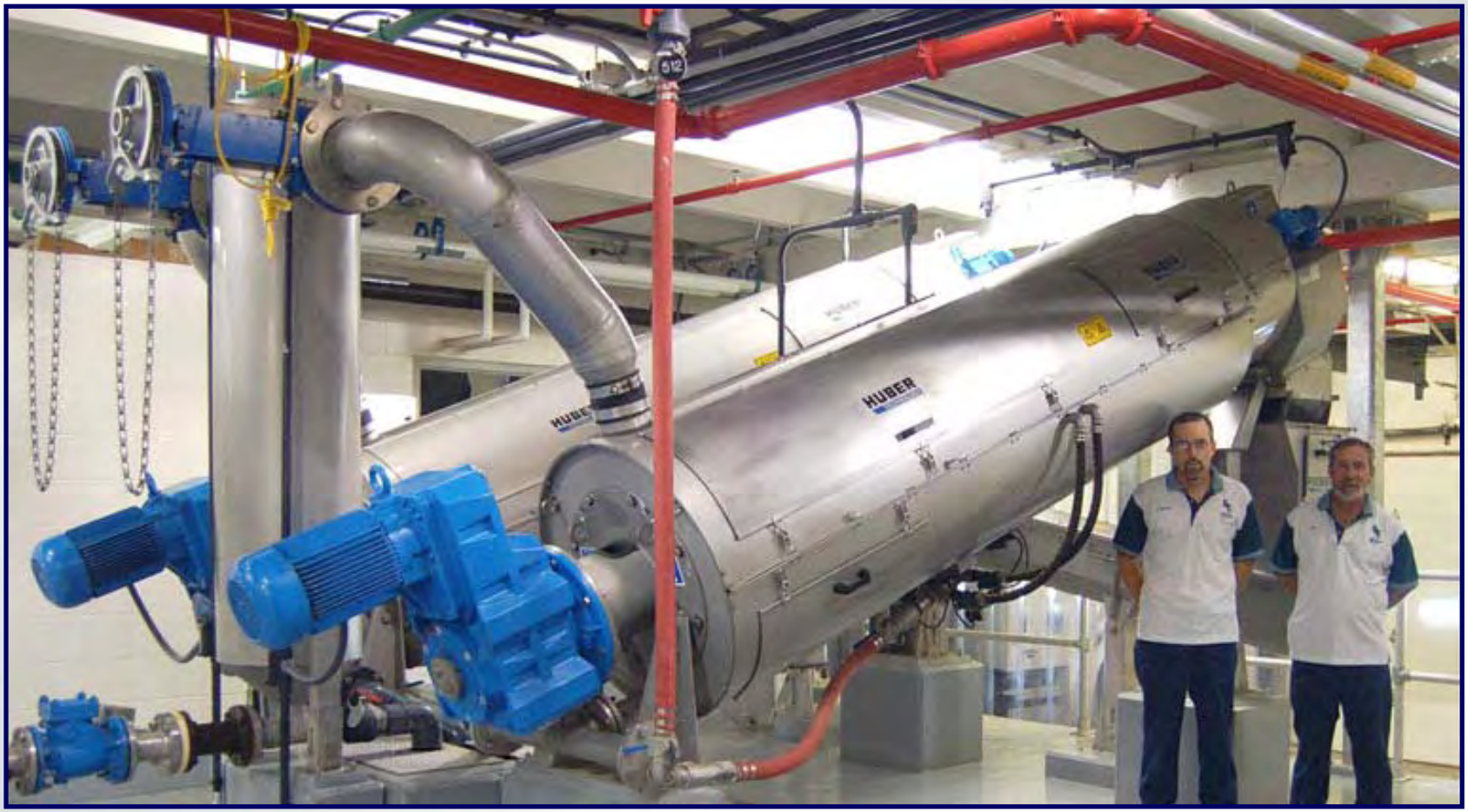
FKC Screw Press

Petaluma, CA, FKC Installation

Huber Press

Magna, UT, Huber Installation

Huber Press



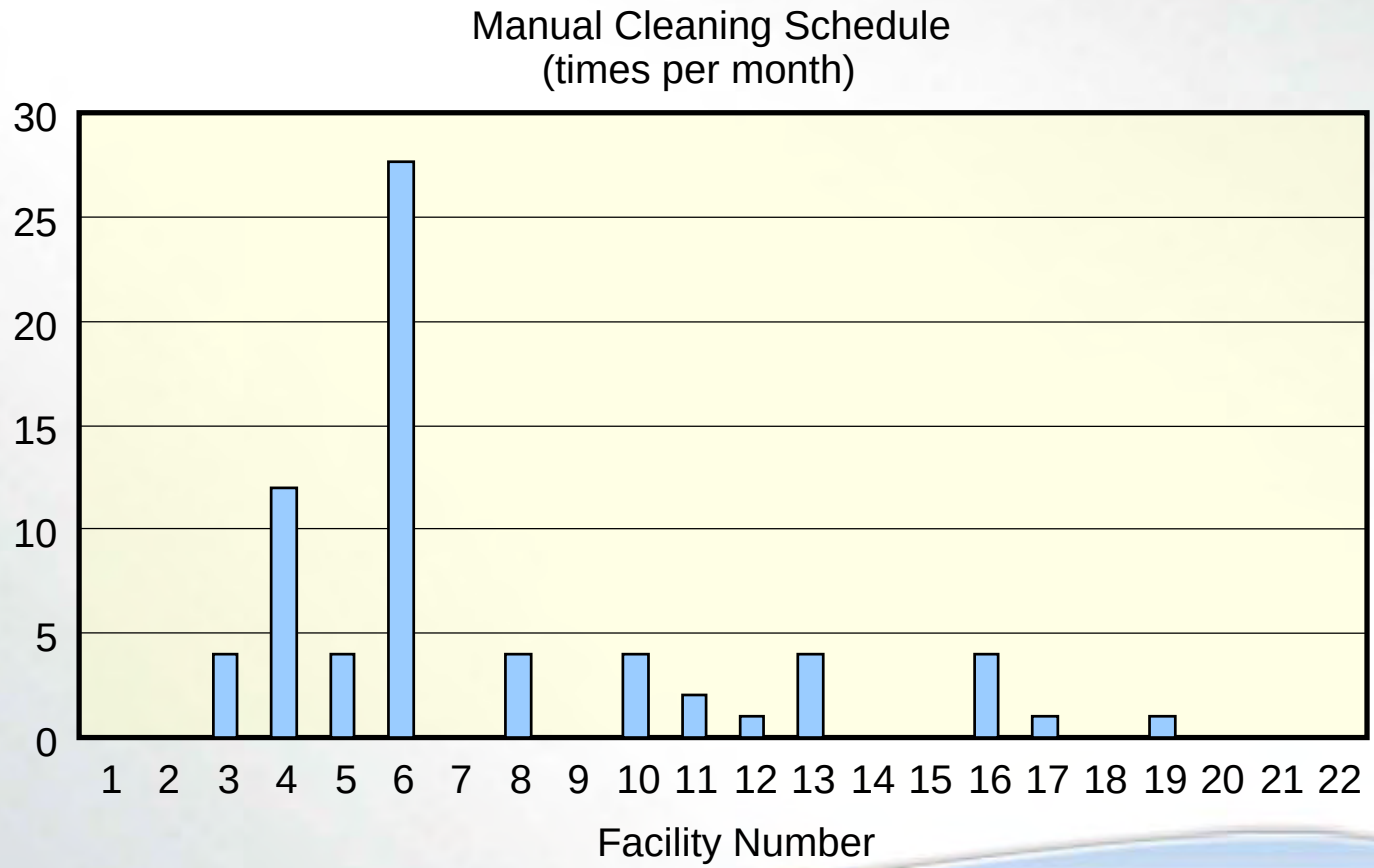
Maine, Huber Installation

Performance Survey

Survey of 22 Full Scale Installations – The Cake Solids Concentration Depends on Type of Sludge

Type of Sludge		Screw Press	Cake (% solids)
WAS	Raw	FKC	15 – 20
		FKC (with steam and lime)	20 – 45
		Huber	12 – 20
	Anaerobically Digested	FKC	21 – 28
		Huber	22 – 25
PS+WAS	Raw	Huber	18 – 40
	Aerobically Digested	FKC	> 18
		Huber	19 – 24
	Anaerobically Digested	FKC	17 – 25
		Huber	13 – 16

Survey of 22 Full Scale Installations – The Median Cleaning Schedule is Once Per Week



Case Study – St Petersburg, FL

Pilot Results - Projected Full Performance – St. Petersburg

Parameter	Manufacturers Recommendations			
	Belt Press	Centrifuge	Screw Press	
			Class B	Class A
Minimum Cake Solids Concentration (% solids)	18	21	16	33
Maximum Polymer Dosage (lb/DT)	19	25	30	33
Minimum Solids Capture (%)	95	95	90	90

“Relative” Cost Comparison

	BFP	Centrifuge	Screw Press
Capital Cost	$	$$$	$$
Building Modifications	$	$$	$$
Odor Control	$$$	$	$
Power	$	$$$	$
Maintenance	$$	$$	$
Chemical	$$	$$$	$$
Hauling	$$	$	$$
Disposal	$$	$	$$

Performance Comparison

	BFP	Centrifuge	Screw Press
% Solids Produced	++	+++	+
Filtrate/Centrate Quality	++	++	+
Reliability	++	++	+++
Operator Attention Required	+	++	+++
Ease of startup and shutdown	++	+	++

Will Vary Depending on Conditions!!!

Design Considerations

Design Considerations

- Lead time (from Japan or Germany): prepurchase?
- Custom design – varying dimensions until shop drawing
- Performance guarantee and penalty for non-compliance
- Basis of design
  - Loading & capacity: pilot test
  - Run time, unattended operation
- Effect of rising steel costs – units all SST

Design Considerations, Continued

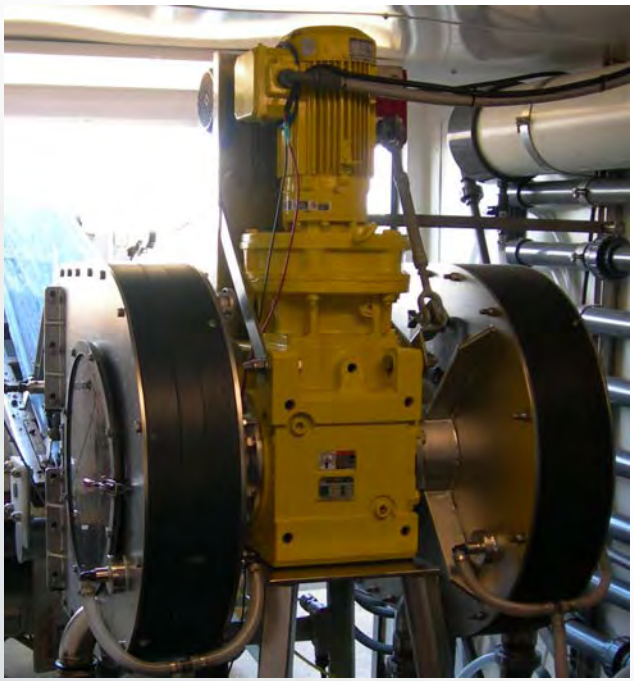
- Need headroom if RST on mezzanine
- Monorail/overhead crane
- Building considerations – footprint requirement – or outside
- Provision for Class A in future
- Cake conveyance options affects layout

Design Parameters

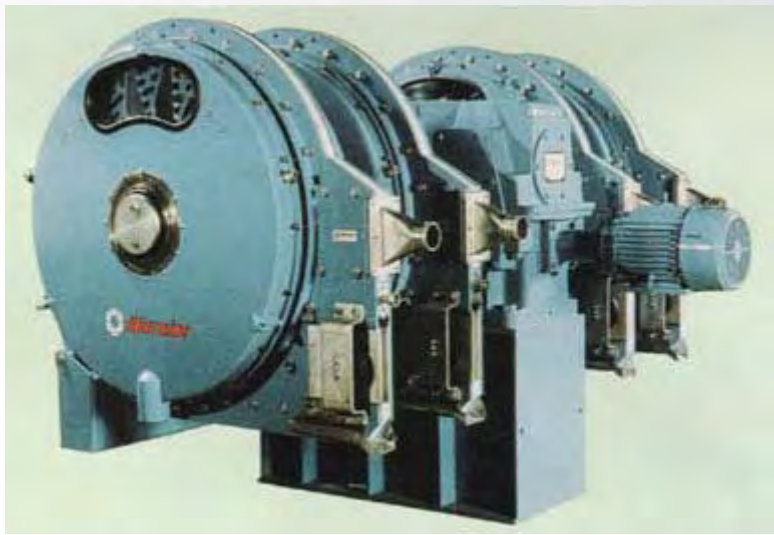
- Range of Capacity: Up to 8.5 DT/day
  - At “nominal” speed
- RST output (% Solids): around 4%
- Screw Press output (% Solids): 15 – 28%
- Polymer consumption: 20 – 40 lb/DT
- Detention time: approximately 4 hours
- Motor speed: as low as 0.3 rpm
- Motor HP – largest unit is 7.5 HP

Rotary Press Technology

Rotary Press Manufacturers

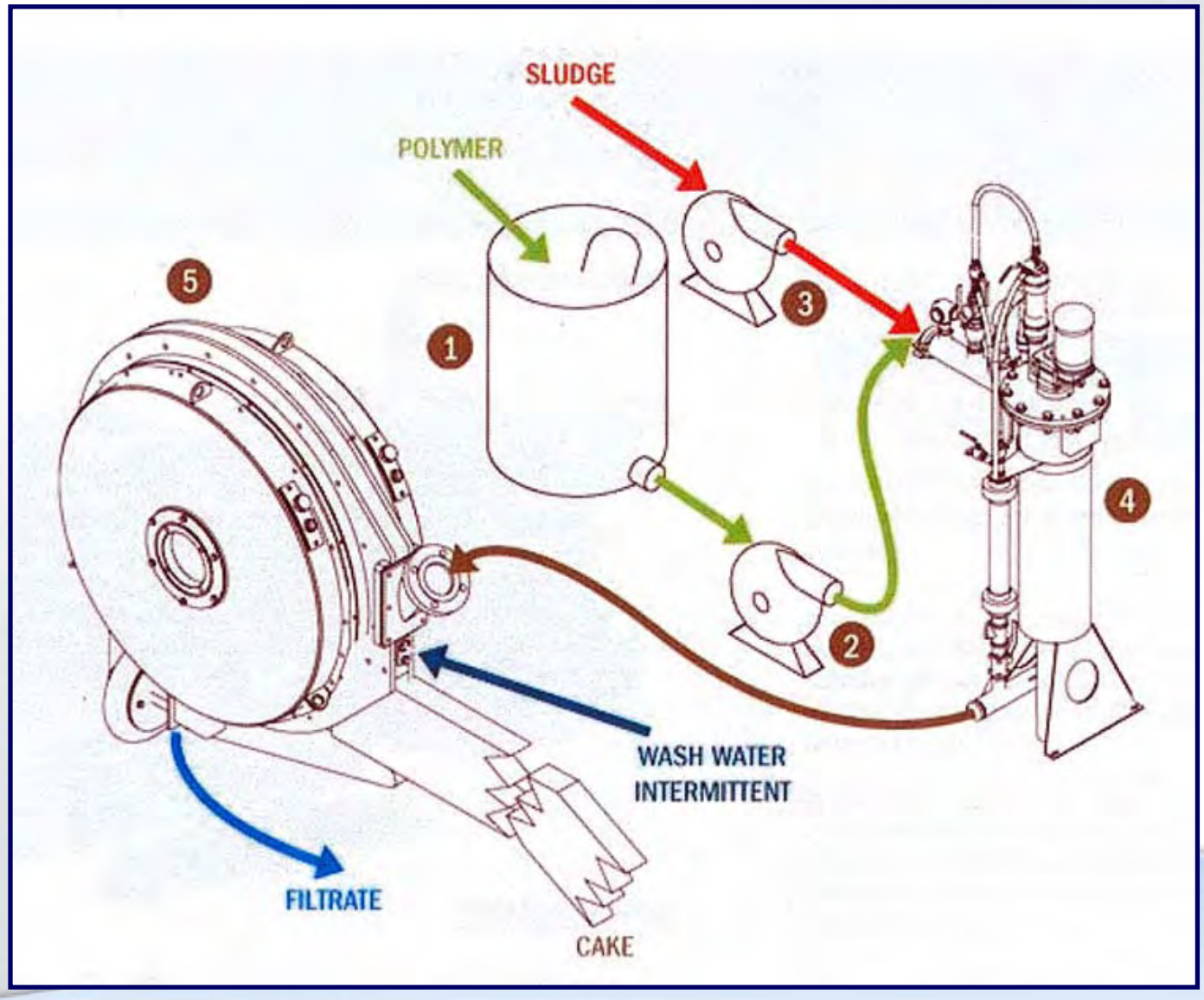


Prime Solutions

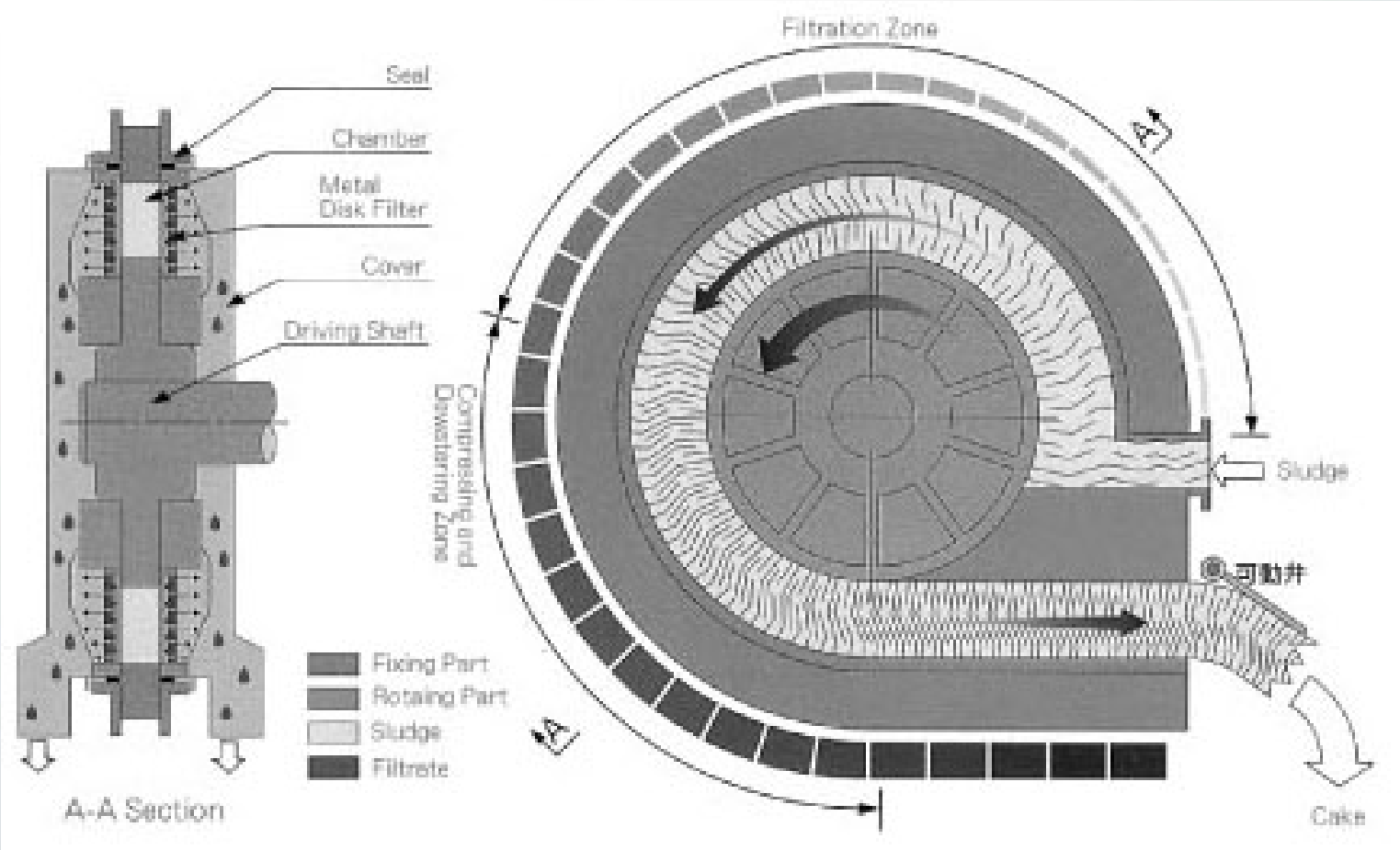


Fournier

Rotary Press Schematic



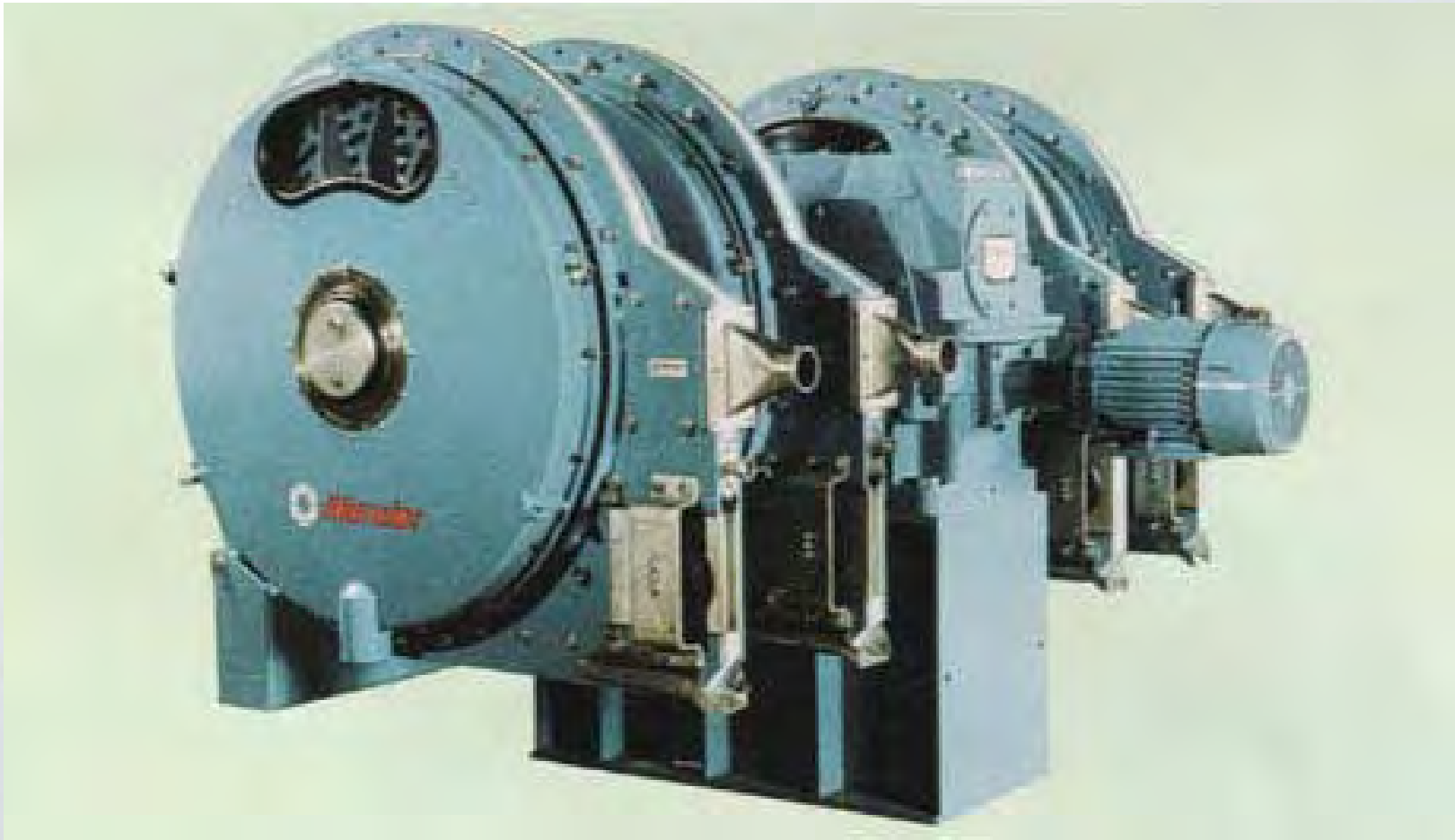
Process Cutaway



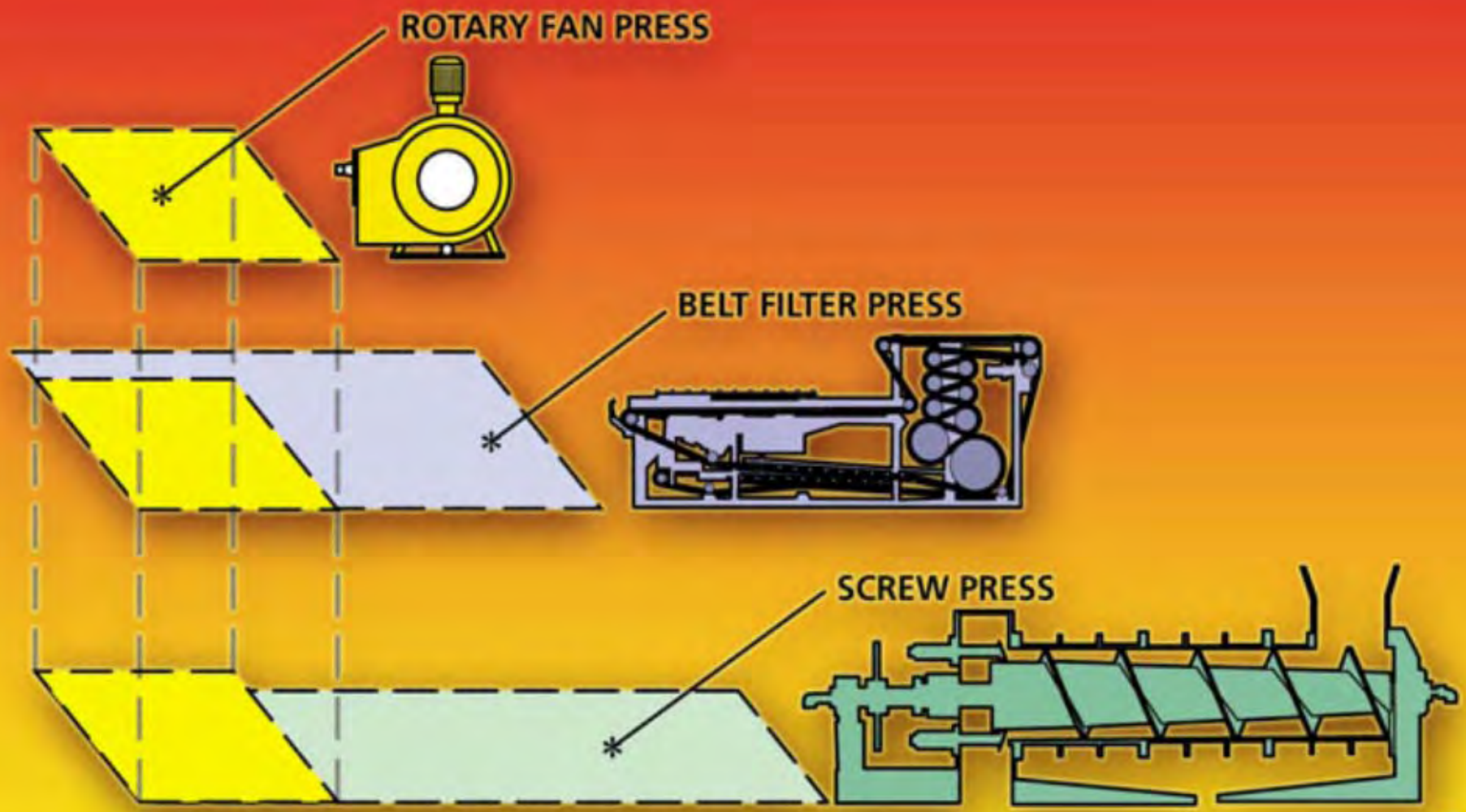
Design Parameters

- Range of Capacity: 7-250 gpm
- Cake % Solids: 12 – 28%
- Detention time: N/A
- Motor speed: as low as 1-3 rpm
- Motor HP: 5-20 HP

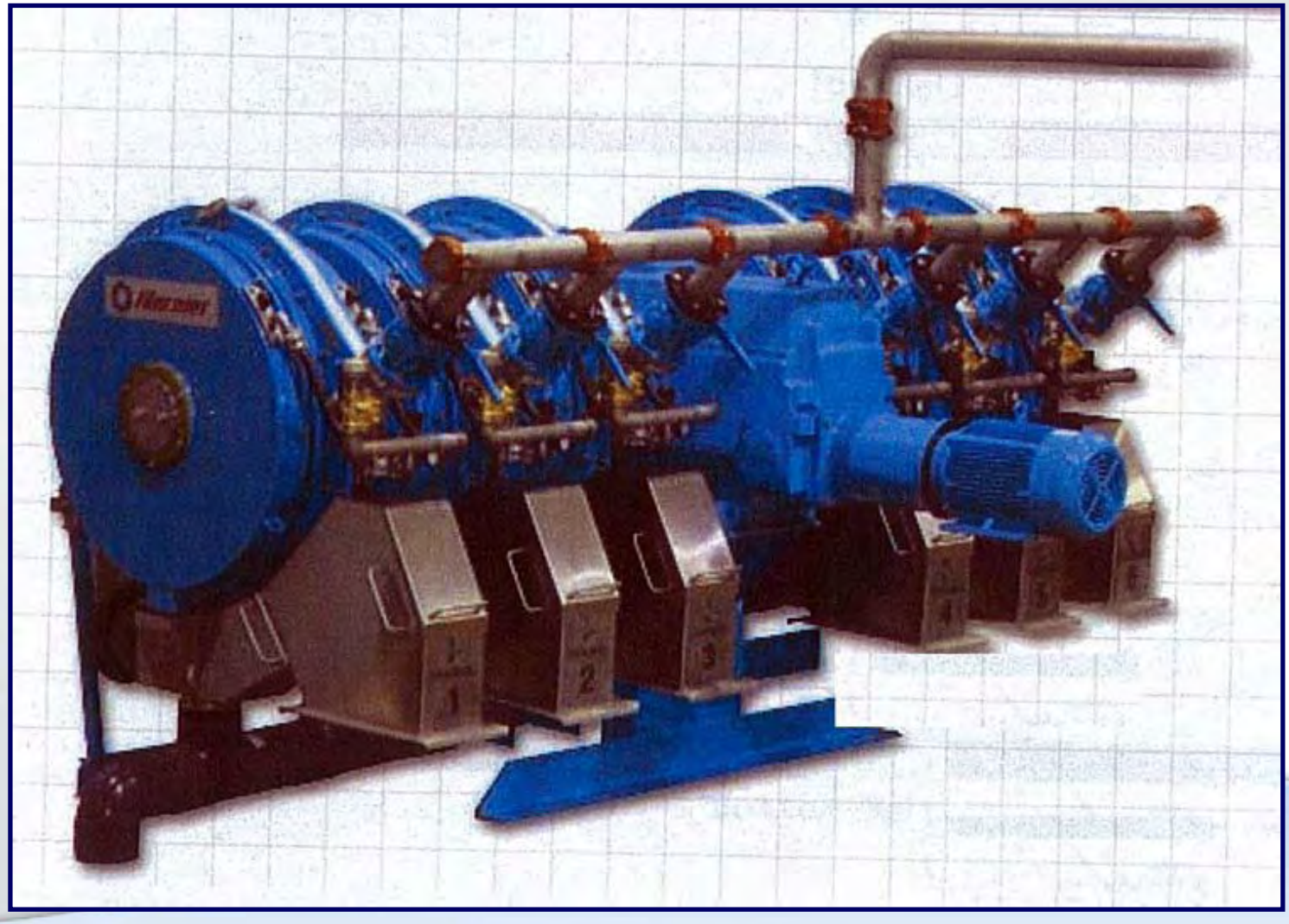
Fournier Rotary Press



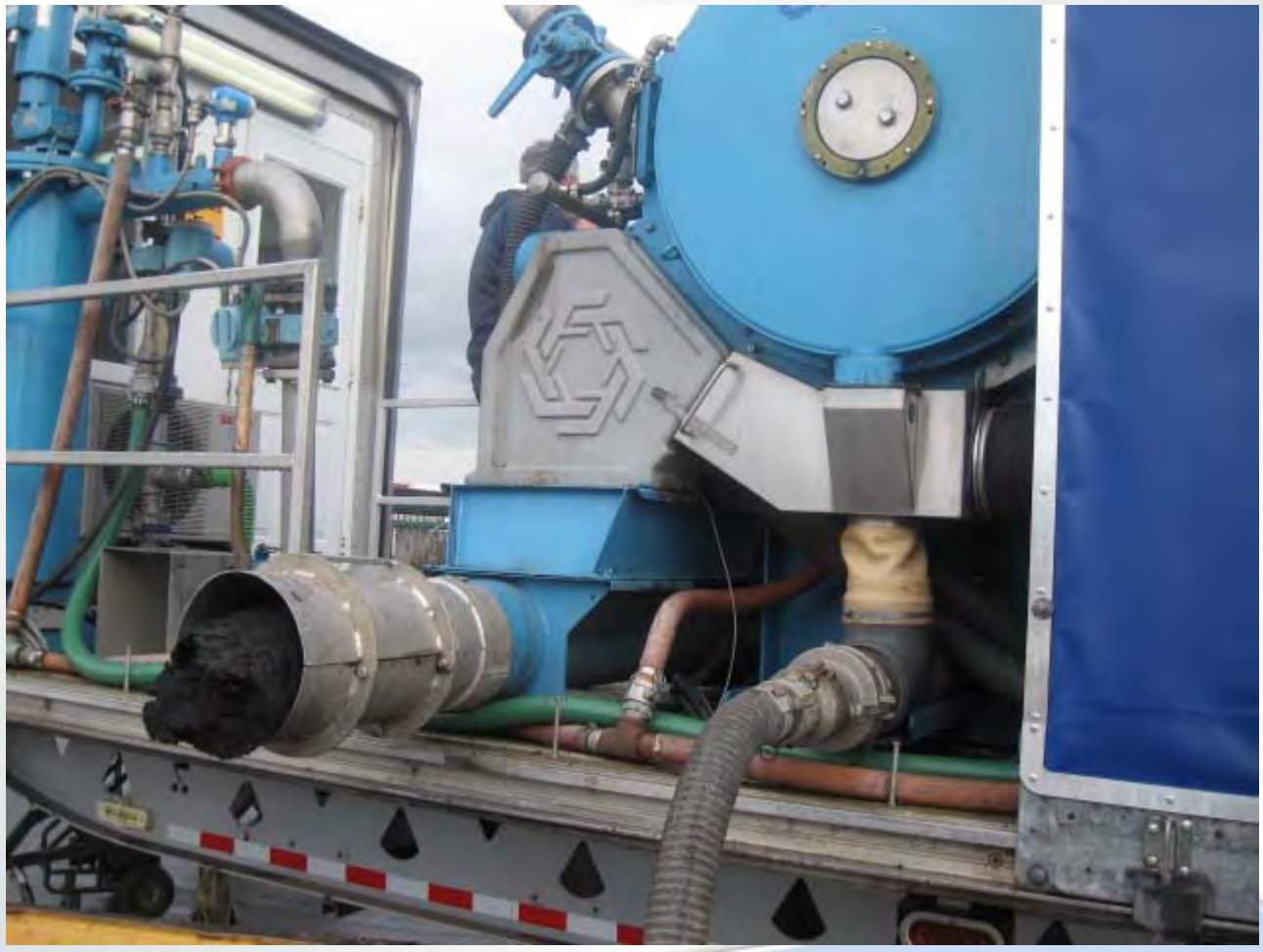
- Size Compared to Other Technologies



Multiple Channels on Single Drive



Fournier Rotary Press Pilot Test



Prime Solutions Rotary Fan Press

Performance Survey

Survey Results

Facility	Equipment	Facility Size (mgd)	Solids Type	Incoming % TS	Discharge % TS
Raiford, FL Prison WWTP	Rotary fan press	1.1	Extended aeration	1.6-2.5	19-22
Front Royal, VA Municipal WWTP	Rotary fan press	3.3	Thermophilic Anaerobic Digestion	3.5	25
Fairfield, CA Municipal WWTP	Rotary fan press	15.5	Conventional Anaerobic Digestion	2	17
Lafayette, TN Municipal WWTP	Rotary press	0.5	Conventional Anaerobic Digestion	1.0-1.5	25
Portland, ME Municipal WWTP	Rotary press	19.8	Thickened PS/WAS	3-6	19-25
Hampton, NH Municipal WWTP	Rotary press	2.5	Septage/PS/ WAS	6-8	26-28
Murfreesboro, TN Municipal WWTP	Rotary press	15	PS/WAS	0.8-1	12-14
Scarborough, ME Municipal WWTP	Rotary press	1.4	Thickened PS/WAS	3	28

Rotary Dewatering Features

- Low speed, low vibration, low shear
- Uses less energy than centrifuges or BFPs
- Modular
- Small footprint
- Minimal start-up and shutdown time
- Minimal moving parts
- Odors contained

Questions?

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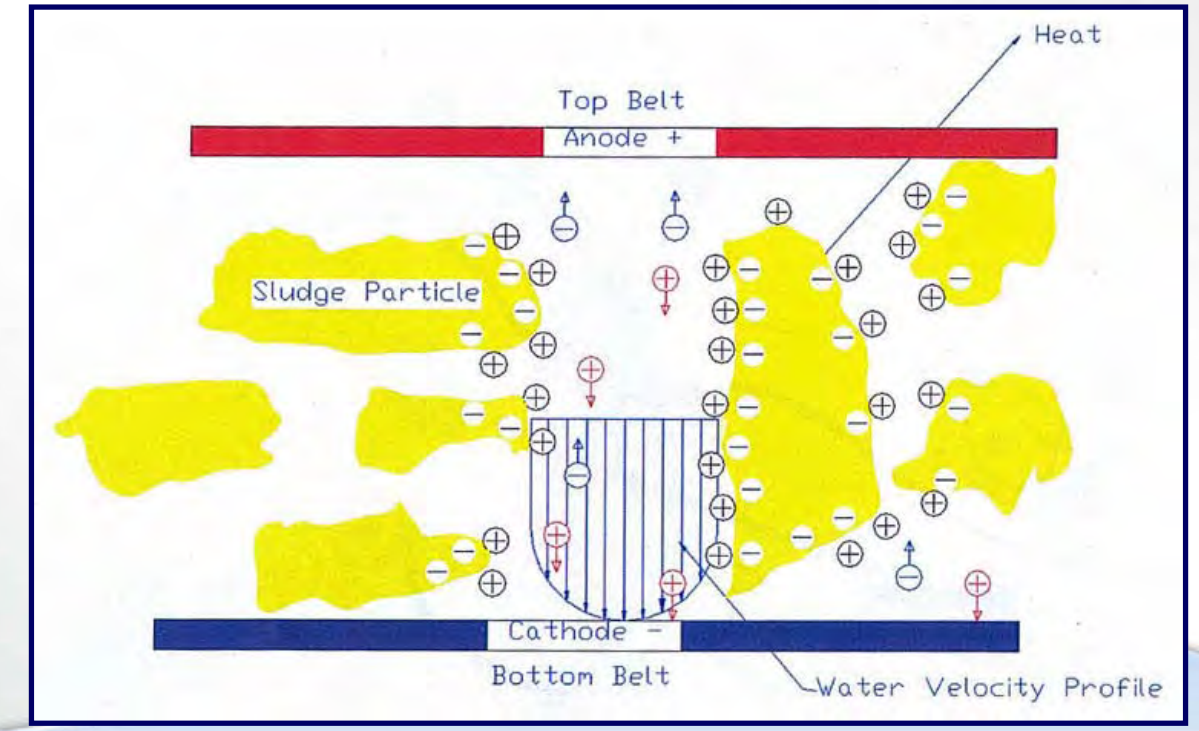
R&D Technologies

EKG Technologies

- Electrokinetic Geosynthetics (EKG) Technology
  - Theory – Electro-osmotic principle

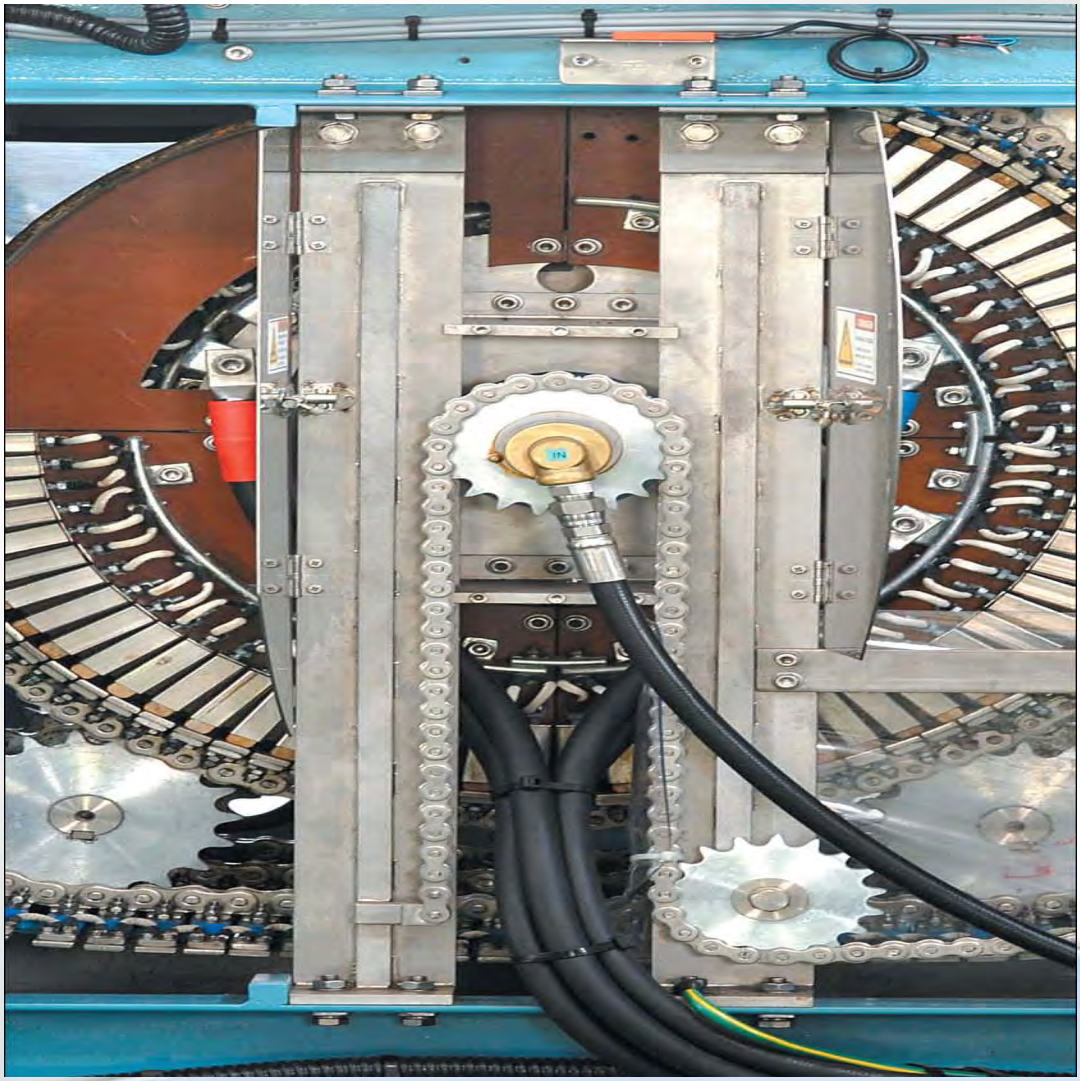


Uses of EKG Technology

- Ashbrook Product
  - Anaerobically/Aerobically Digested Sludge
    - Fresno
    - England
  - Alternative to conventional dewatering
- Siemen's Product
  - Secondary dewatering process
  - Alternative to sludge drying

Siemen's ELODE Technology

Siemen's ELODE Technology



Siemen's ELODE Technology

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