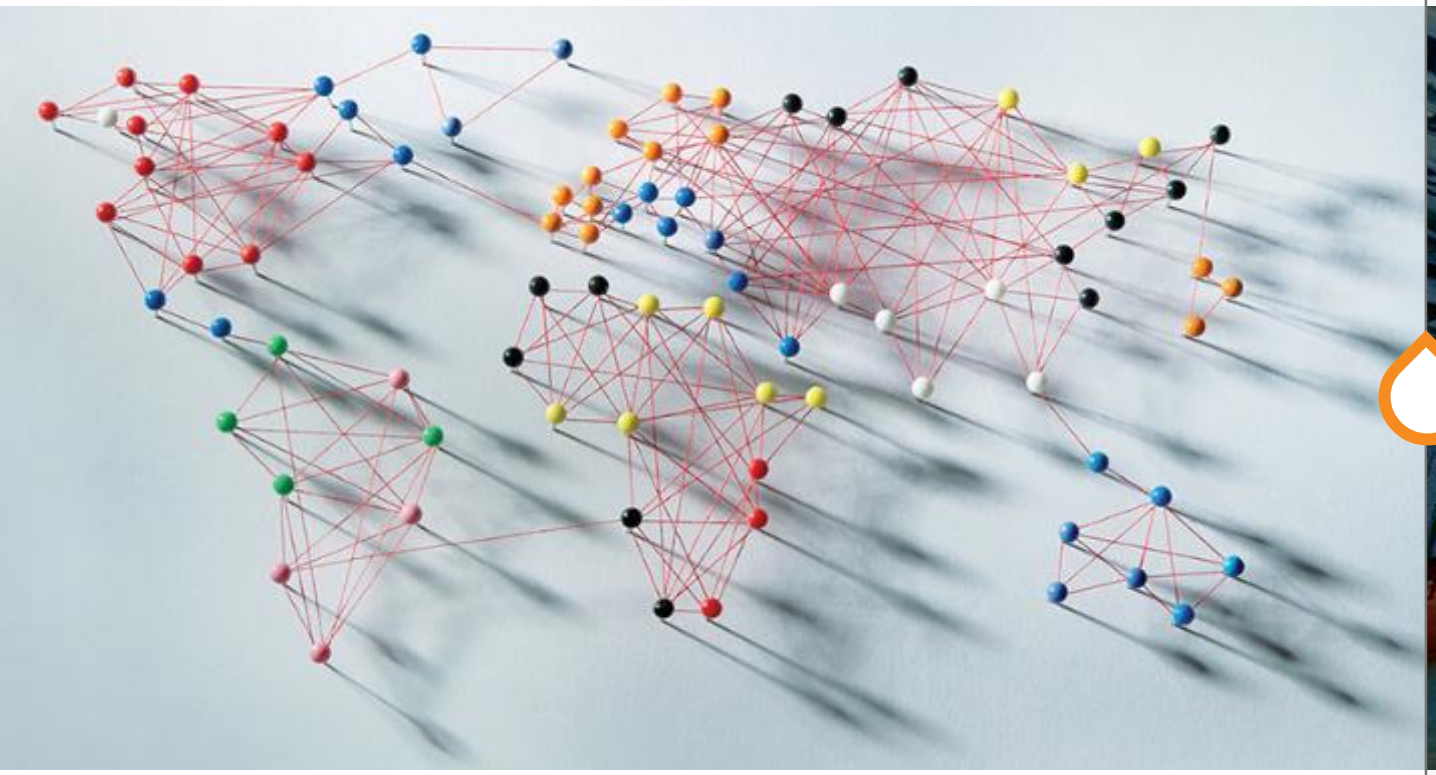
WATER
TREATMENT SPECIALISTS



WINERY ENGINEERING ASSOCIATION - LIMITED -

WEA South Australian Conference
25-27 July 2018

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SPEAKER – MATT HOWLAND

WEA South Australian Conference

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WINERY WASTEWTER PRE-TREAMENT TECHNOLOGY

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TRADITIONAL WINERY WASTEWATER PRETREATMENT

- Centrifuge
- Wedge Screen
- Rotary Drum Screen
- Wedge Pits (Settling)
- Geotech bags

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PRE-TREATMENT TECHNOLOGY
PSF Rotating Belt Filter

“Compact, Small Foot Print”

Stand alone

In-Channel

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PRE-TREATMENT TECHNOLOGY

The PSF Rotating Belt Filter is designed and produced to treat various wastewaters.

There are three (3) main processes

1. **Solids separation**
2. **Sludge Thickening**
3. **Dewatering**

- Total Suspended Solids (TSS) separation efficiency is Typically:
  40 - 80%

- Biochemical Oxygen demand (BOD) is design dependent:
  20 – 30%

- Dry Matter percentage after sludge dewatering is process water depended:
  20 – 30%

Stand alone

In-Channel

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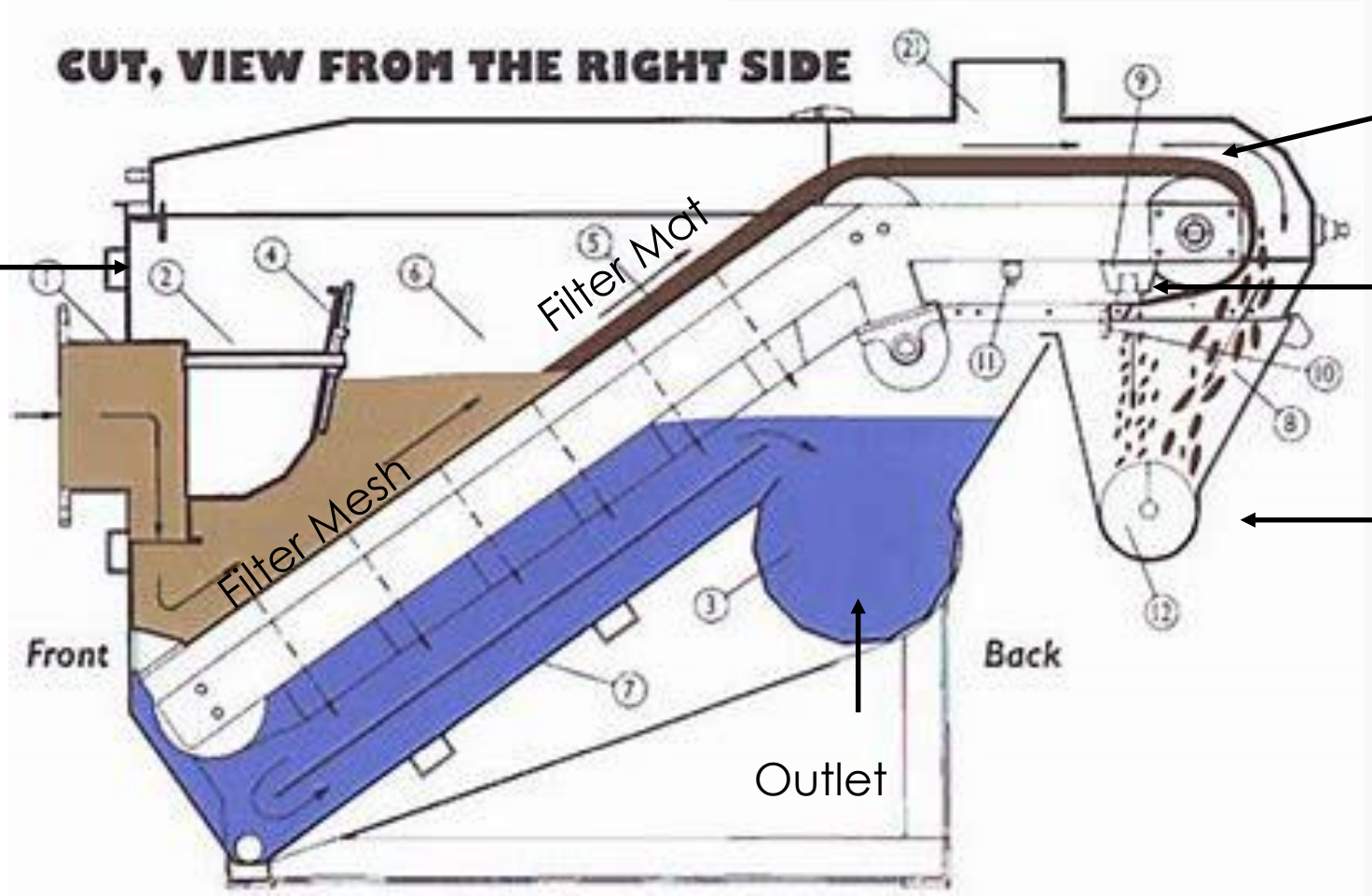
SEQUENCE OF OPERATIONS



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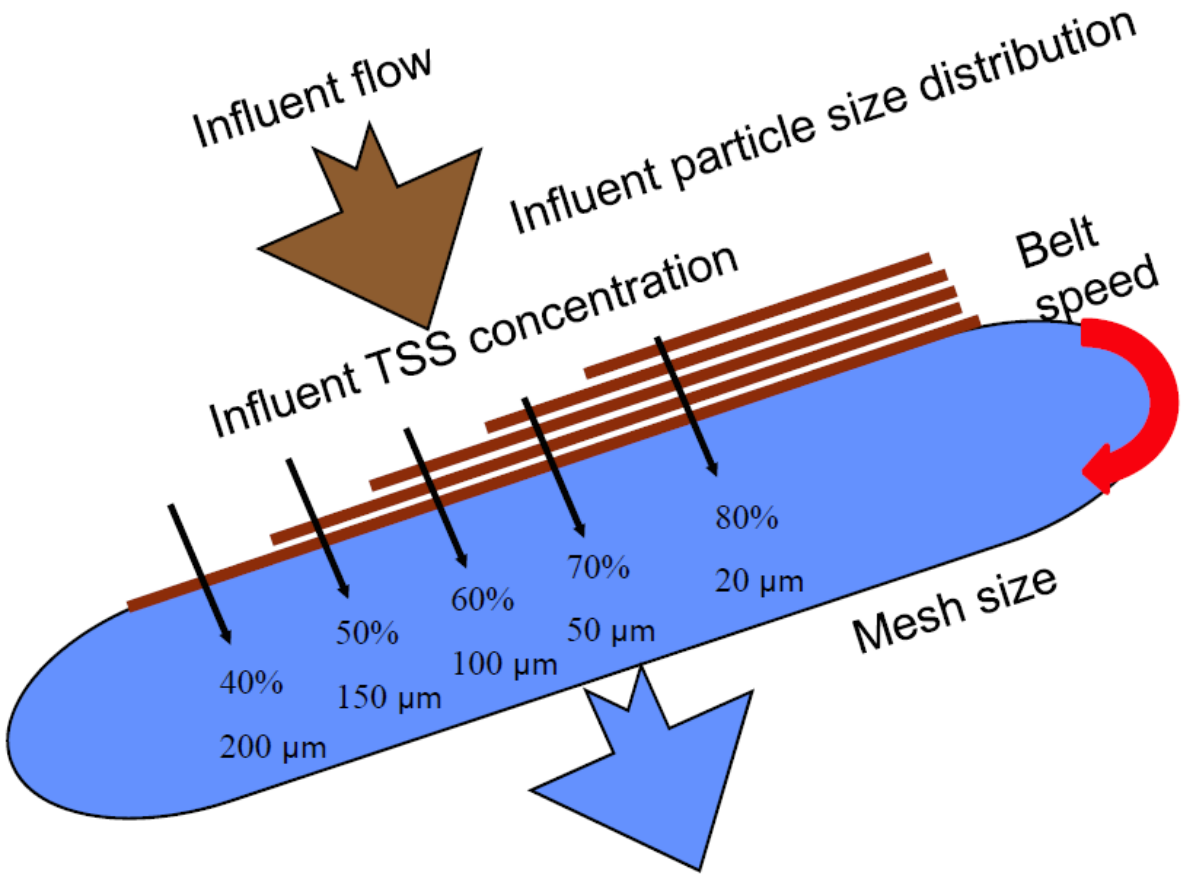
CONT.

Mesh Size range from 1000um to 58um

Rule of thumb: 25% of particles in influent > filter mesh openings = filter mat build-up



Operating Variables:

- Influent flow rate
- Particle size distribution
- Influent TSS levels
- Belt speed
- Mesh size (microns)

40 - 80% TSS removal ⇨ 100 - 20 micron particles in effluent

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BUILDING A FILTER MAT

As can be seen in this photograph you want to see an equal filter mat across the entire filter mesh.

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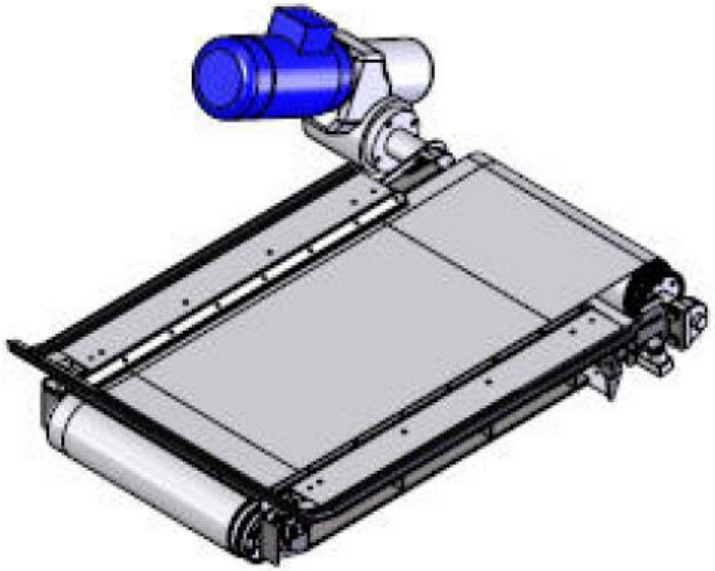
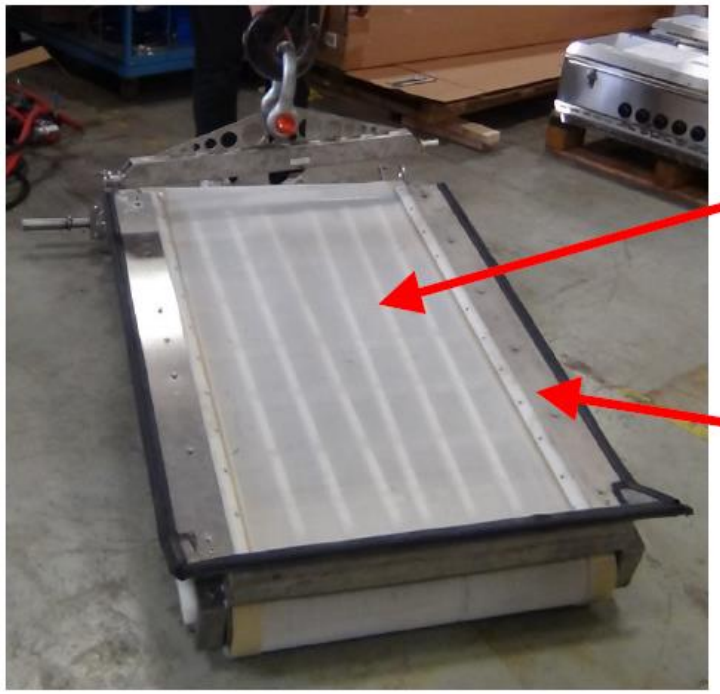
CARTIDGE ASSY & FILTER MESH





The Filter Mesh is made of polyethylene and is very durable. The way it's mounted and tensioned to the cogwheel is patented – it improves performance and allows the filter to handle higher flow rates, increasing treatment capacity in a smaller footprint.

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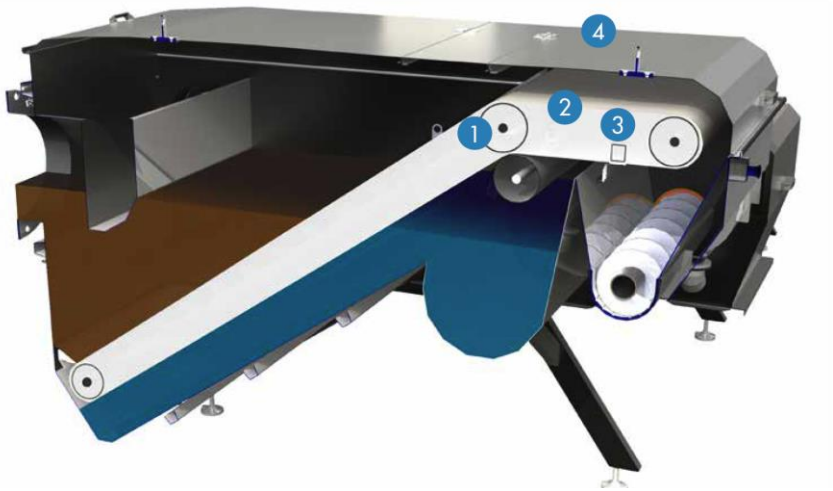
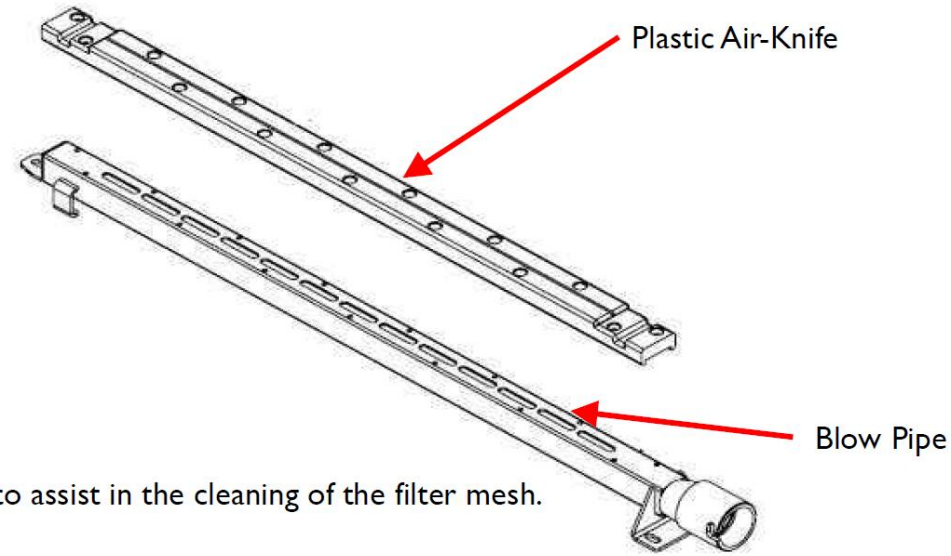
AIR KNIFE





The Air-knife is to assist in the cleaning of the filter mesh.

It's air is delivered from the Blower

Air Knife Pressure 0.4 bar to maximum of 0.75 bar or 5.8 psi to a maximum of 10.9 psi

3. The patented Air Knife automatic cleaning system uses air to clean the filter mesh, which has many benefits compared to scrapers, brushes or water-based cleaning systems.

Air is gentler on both the mesh (elongating its life) and on particles (so they don't just break into smaller pieces).

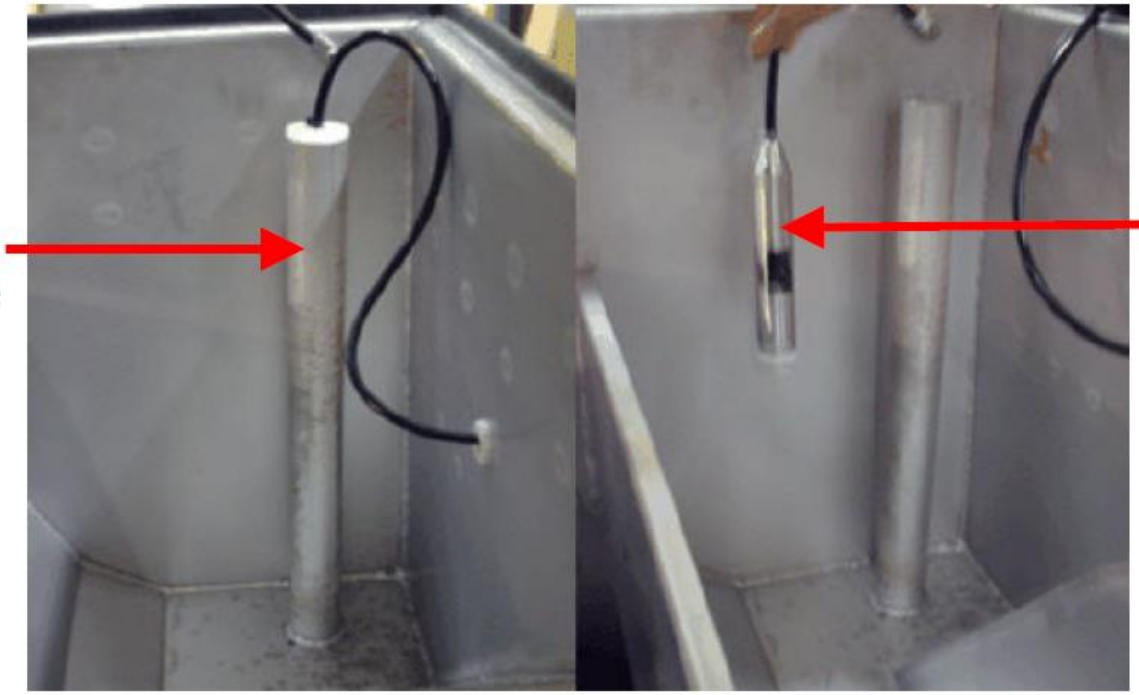
Air cleaning also keeps sludge drier for more effective and less costly dewatering.

WATER LEVEL SENSOR

Vertical Pipe Mounted Level Sensors

For replacement unit type refer to the Manufacturer and Model number of existing level sensor

Level Sensor installed in the water level pipe



Level Sensor

Typical settings are:
Start Level is 95 mm
Stop Level is 65 mm
Overflow Level is 245 mm

When the set water level is satisfied the level sensor will signal for the blower, filter mesh and auger to all turn on in this order. It will determine turn off time as well.

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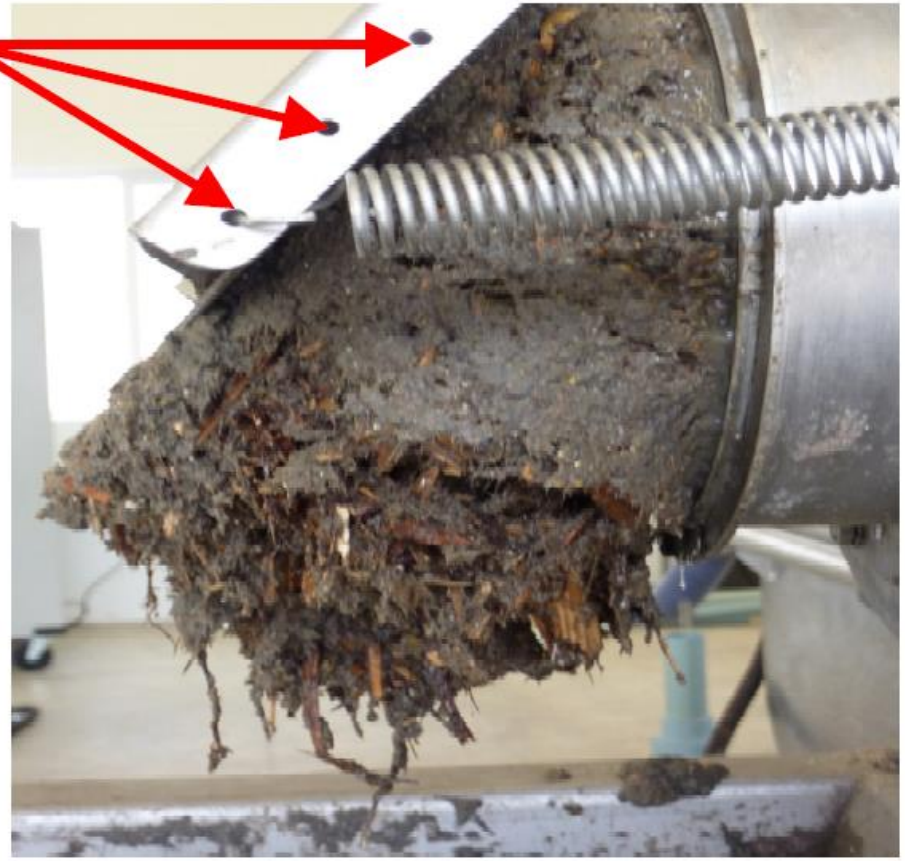
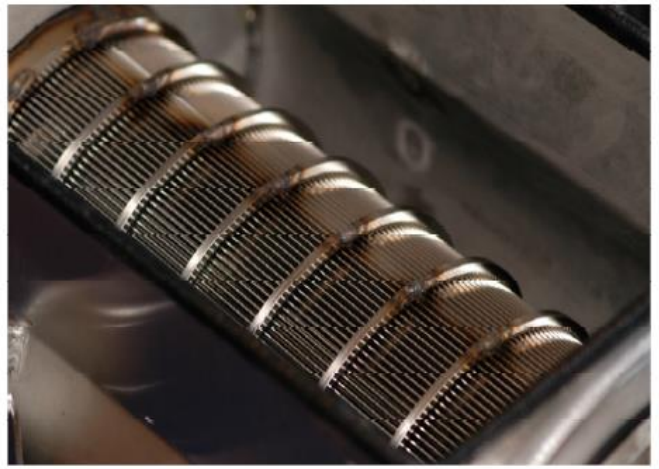
SLUDGE DEWATERING UNIT

Holes in the cover allow the spring tension to be changed for different solids to allow better de-watering and sludge build-up





Wedge wire screen

Dry Substance after sludge dewatering is 20-30% DM

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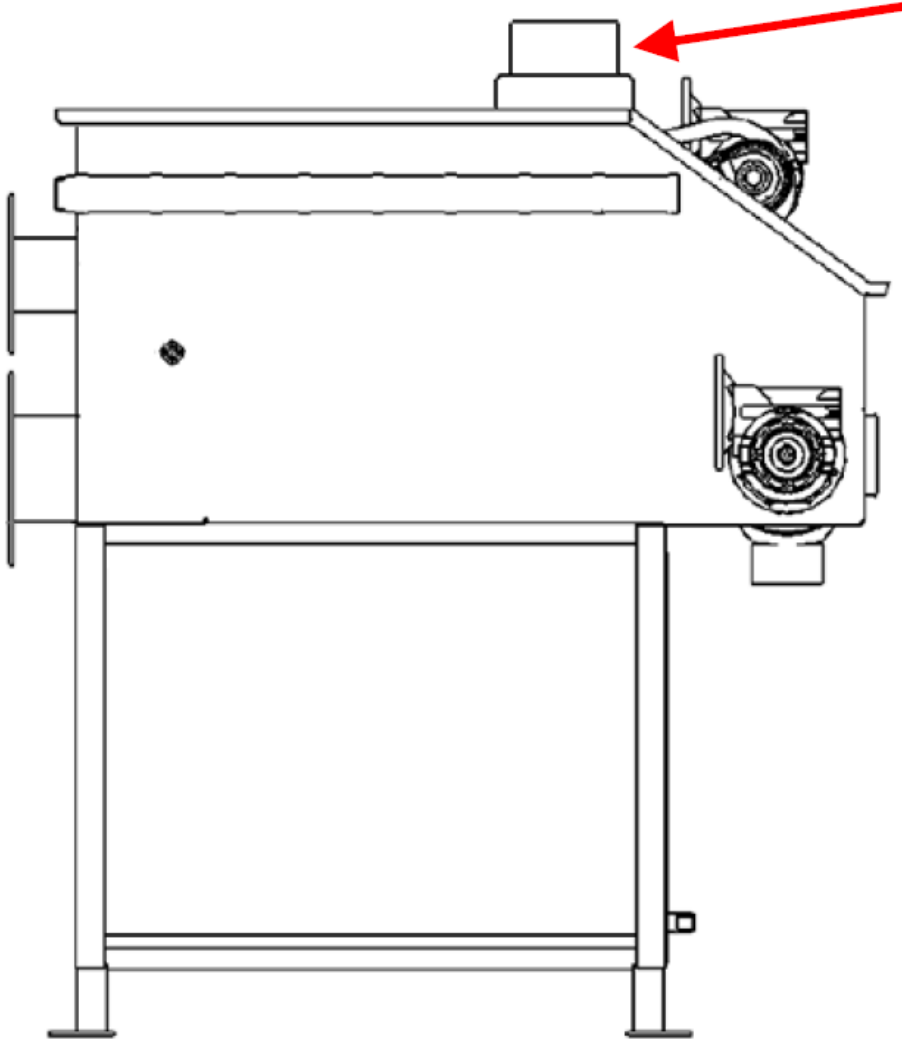
TOP VENTILATION OPENING



The filter system provides a ventilation connection pipe on the top of the unit.

This should not be covered to prevent overpressure within the system due to pressure generated by the air knife.

Overpressure will cause poor operating conditions resulting in more frequent cleaning and increased aerosols.

An air extraction system can be connected to ensure odour and bio aerosols are relocated.

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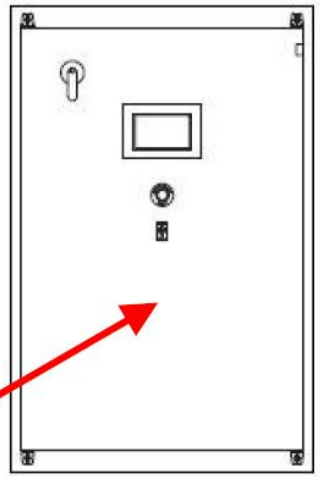
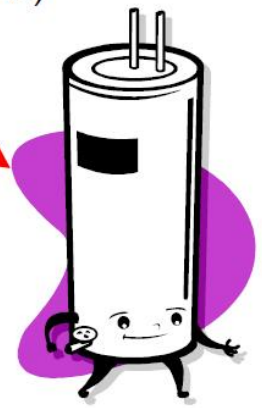
PACKAGED PSF 1000

The Filter System consists of 3 Major Components

1. Control Power Panel
2. Filter Unit with Integrated Blower
3. Hot Water Heater (BY OTHERS)





Remove cover to access the blower

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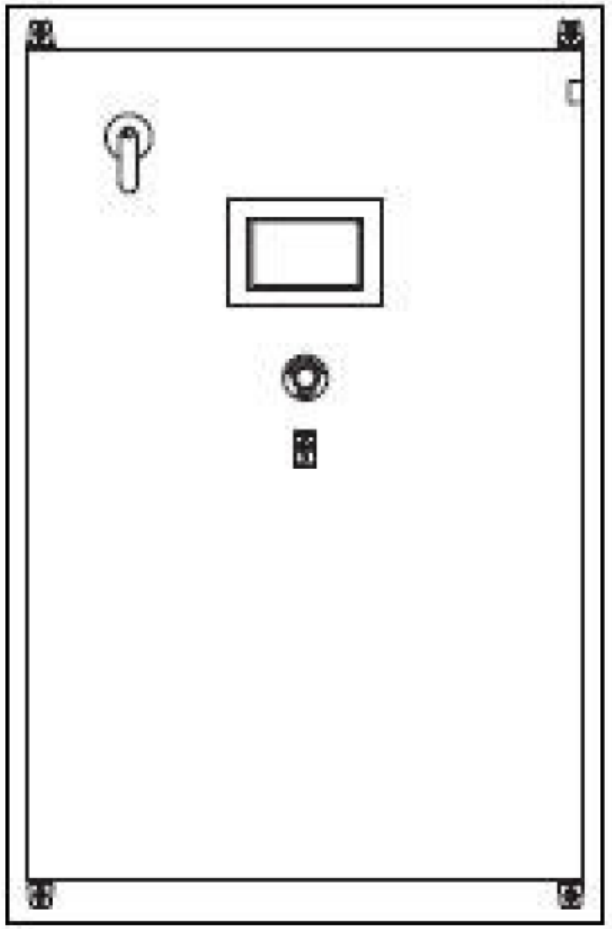
CONTROL POWER PANEL



Standard Unit Supplied with:

Allen Bradley CompactLogix L16 PLC
And Beijer A7 HMI

CPP houses the VFDs for the filter mesh and the auger.

The Filter mesh's speed is dependent on the water level.

The Auger's speed is variable, but typically set to 20Hz

Standard Electrical Supplies are:

400/230V 3 ph, 3 wire + Gnd, 50 Hz **OR** 480/277V 3 ph, 3 wire + Gnd, 60 Hz

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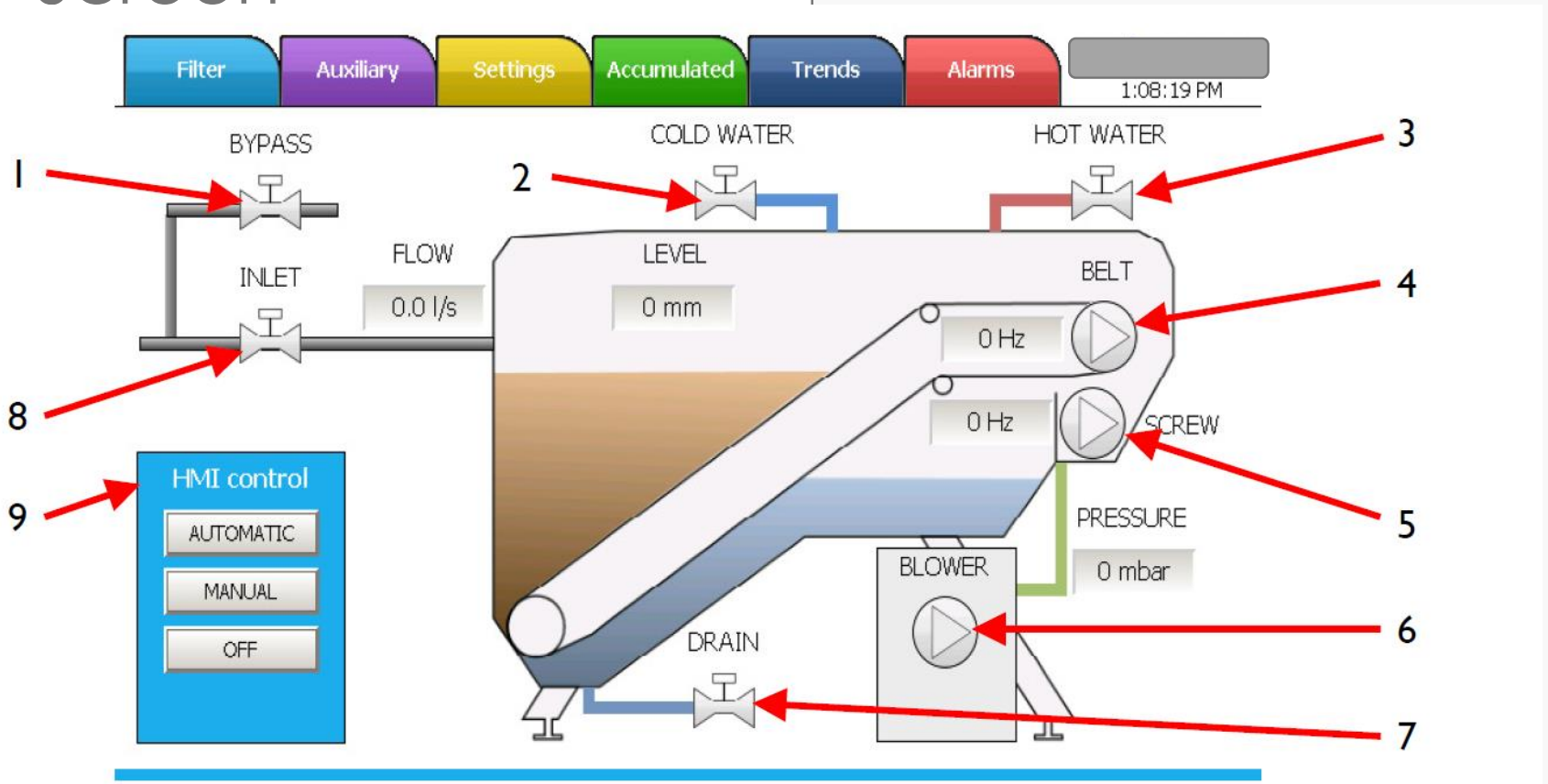
HMI - Screen



1- Bypass Valve button	2- Cold Water Valve button
3- Hot Water Flush button	4- Filter Belt button
5- Sludge Screw button	6- Air Blower button
7- Drain Valve button	8- Inlet Valve button
9- HMI control (Auto, Man, Off)	

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OPERATOR MAINTENANCE SCHEDULE

Component	Maintenance Requirement	Daily	Weekly	Monthly	As needed	Annually
Filter	Test the E-stop on the filter unit. Refer to Section 5.2.2.					X
	Check the belt tension and alignment. Refer to Section 7.3.9.			X		
	Inspect the cover lift seal.					X
	Inspect the hot water spray nozzles for clogging and cleaning performance.					X
	Inspect filter mesh for wearing, holes or tears. Refer to Section 7.3.4.		X			
	Clean filter mesh. Refer to Section 7.3.5.			X	X	
	Lubricate drive roller. Refer to Section 7.3.10.				X	X
Level Sensor	Check Level Sensor Offset. Refer to Section 7.8.2			X		
Control Power Panel (CPP)	Test E-stop. Refer to Section 5.2.2.					X
	Inspect and resolve active alarms. Refer to Section 7.9.1.	X				
	Inspect and clean air filter. Refer to Section 7.9.2.			X	X	
	Clean inside and outside of the Control Power Panel (CPP). Refer to Section 7.9.3.				X	

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Maintenance Schedule continued

Component	Maintenance Requirement	Daily	Weekly	Monthly	As needed	Annually
Sludge Auger	Inspect and unblock sludge auger. Refer to Section 7.5.1.		X			
	Clean inside sludge auger area. Refer to Section 7.5.2.			X		
	Inspect liner for wear. Refer to Section 7.5.3.			X		
	Inspect and maintain sludge auger shear bolts. Refer to Section 7.5.4.			X		
	Lubricate gear flange. Refer to Section 7.4.3.				X	
Drive Motors	Inspect gear box and motor. Refer to Section 7.4.1.			X		
	Clean motors. Refer to Section 7.4.2.				X	
Dewatering Unit (optional)	Inspect and clean wedge wire screen and spray nozzle. Refer to Section 7.7.				X	
	Replace the Wedge Wire Screen. Refer to Section 7.7.2.				X	
Air Knife	Inspect air knife pressure gauge. Refer to Section 7.6.1.	X			X	
	Inspect for even cleaning of the filter mesh. Refer to Section 7.3.4.	X			X	
	Clean air knife. Refer to Section 7.6.1.				X	

PSF ROTATING BELT FILTER BENEFITS

- 30 – 60% lower investment cost
- 1/10th the land requirements
- Integrated thickening and dewatering
- The additional benefit of grit removal in the separation stage
- Significantly lower lifecycle costs
- Smaller volume of drier sludge that reduces disposal costs.
- Less civil works (no concrete basins required)
- Equal to, or greater removal of TSS & BOD (on average 50% and 20% respectively)
- Smaller secondary/biological treatment processes (less aeration and/or space needed)
- Primary sludge with higher energy value
- Fully-automated equipment
- Fast and easy maintenance
- Lower operating costs (no chemicals to purchase)

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FILTER SPECIFICATIONS

General	PSF1000	PSF2000	PSF4000	PSF6000
Typical Flow	1-10L/s	15 – 25L/s	30 - 45L/s	60 - 90L/s
TSS Removal	40 - 80%			
BOD Removal	15 – 40%			
DM after Thickening	3 – 8%			
DM after Dewatering	20 – 30%			
Length	1544 mm	2092 mm	2444 mm	2766 mm
Width	1336 mm	1692 mm	1993 mm	2491 mm
Height	1407 mm	1291 mm	1490 mm	1778 mm
Typical Power Consumption During Operation	1.4-2.8 kW	1.8-3.6 kW	2.1-4.5 kW	2.8-5.5 kW
Hot Water (6 Bar)	8 l/s	16 l/s	21 l/s	30 l/s
Blower	Integrated into System	Stand Alone		
Air Knife	120 m3/h / 71 CFM	190 m3/h / 112 CFM	250 m3/h / 148 CFM	335 m3/h / 198 CFM
Control Panel	AB Compact Logix 5370/Mitsubishi FX – HMI Beijer			

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SITE APPLICATIONS

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BUDGET PRICING

BUDGET PRICING (Supply Only)

- PSF1000 – From $130K
- PSF2000 - From $180K
- PSF4000 - From $260K
- PSF6000 - TBA

*Budget Pricing Ex-Works Adelaide, CAD exchange rate

*Delivery Timeframes – 12 – 14 weeks (Sea freight)

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Case Study – Winery NZ

The subject winery is in New Zealand and crushes approximately 28,000 tonnes of grapes during vintage. The waste water treatment plant treats the entire WW flow prior to discharge via irrigation. The current process involves a contra shear screen, anaerobic lagoon and aerated settling tanks, Flow is 30L/s

Objective

To reduce loadings of organic/inorganic material to improve on the efficiency of the biological process, reduce solids settling and sludge handling.

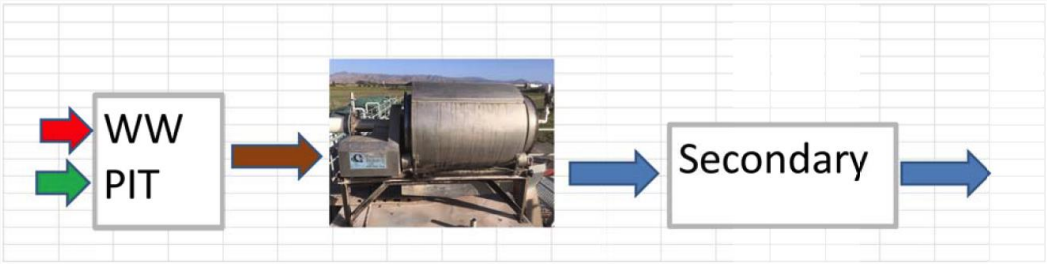
Initial Test work

The initial test work shown that by using a 210um filter mesh reduced the TSS (5500mg/l) - 60%, BOD - 25% and DM to 28%

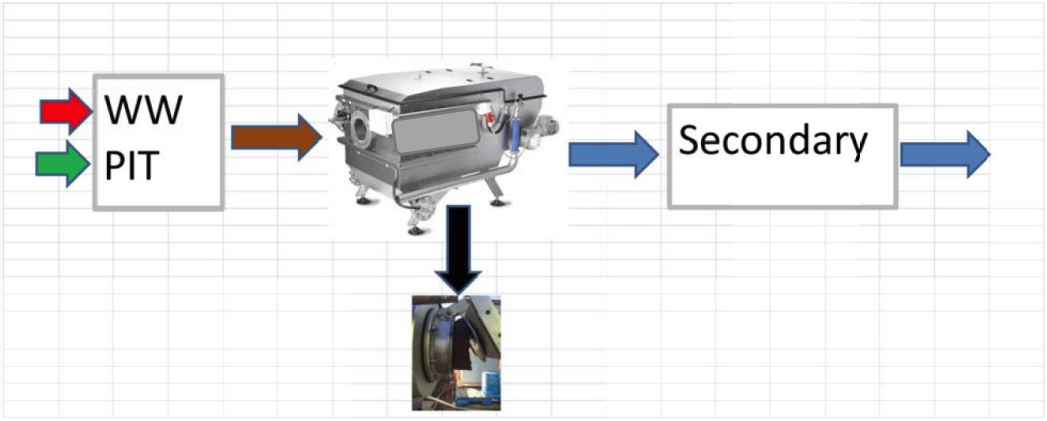
No chemicals or pH correction was required, addition of polymer will increase capture rate

Outcome

1 x SF2000 unit was purchased, removal of existing contra shear screen



Future WW Process



QUESTIONS

H2OW

can we do this better?

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