WineEng - NZ 2018

Winery Resources – Future Challenges

The National Conference & Exhibition of the **WEA**

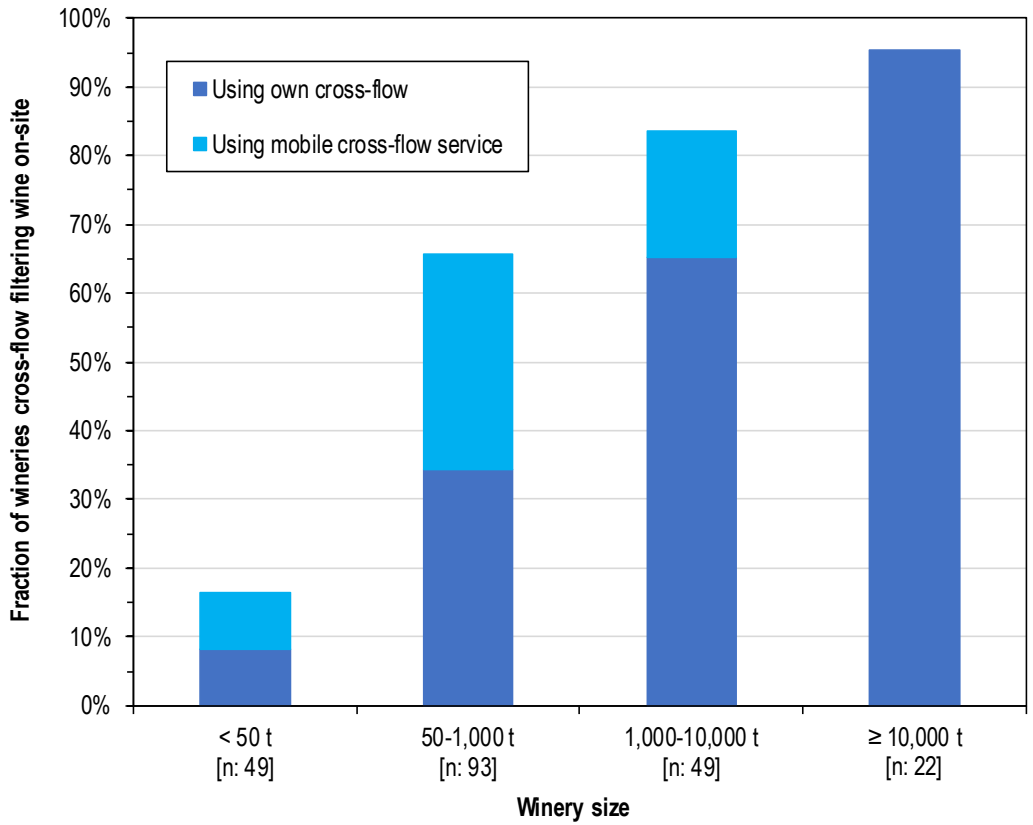
PALL Food and Beverage

Striving to be DE Free in the Winery

WEA 2018
Ragan Wood
Systems Sales Specialist

Filtration. Separation. Solution.SM

Crossflow Filtration



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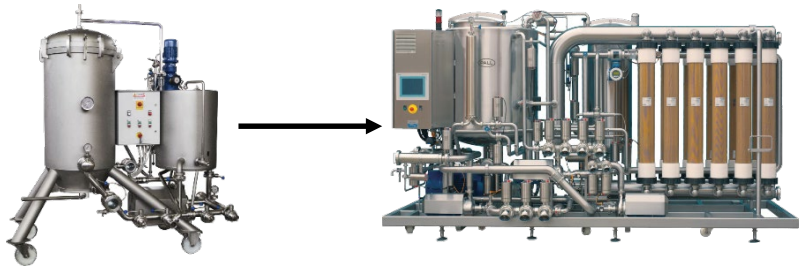
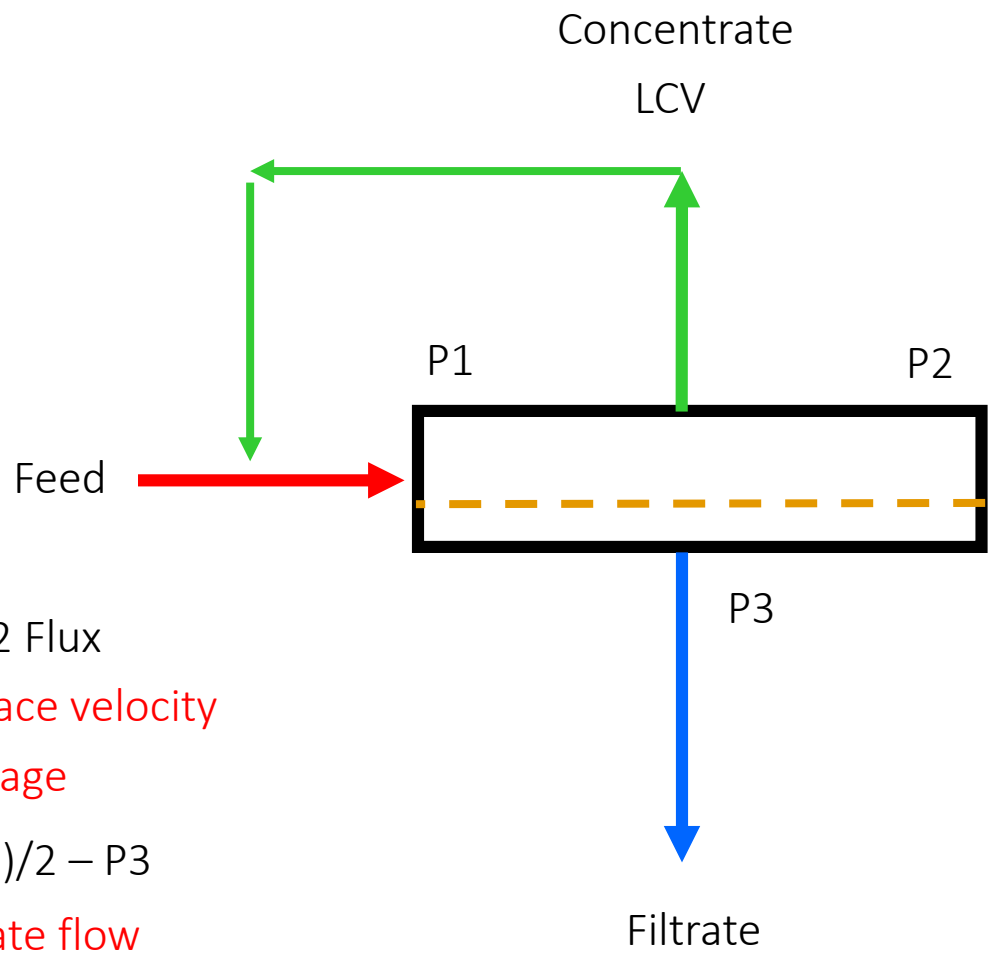


"The biggest single advance we have made in quality improvement in the last 25 years"

Wine Crossflow – The Principal



Delta P = P1 – P2 Flux

Creates the surface velocity

to prevent blockage

TMP = (P1 + P2)/2 – P3

Creates the filtrate flow

but also the blockage tendency

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Wine Crossflow – Sustainability driven technology

ENVIROMENTAL BENEFITS OF CROSSFLOW:

- Replaces DE throughout the Winery (RDV and Earth Filter)

TO REDUCE:

- DE consumption
- Wine movements
- Disposal costs
- Labour

TO IMPROVE:

- Filtrate Quality (lower downstream filtration costs)
- Wine Value $$$
- Oxygen pick up
- Working conditions

Wine Crossflow – Separation Membrane

Microfiltration (from 0,1 um and more)

Solids, Microoganisms

Ultrafiltration (from 1’000 - 1’000’000 dalton)

Macromolecules, Virus

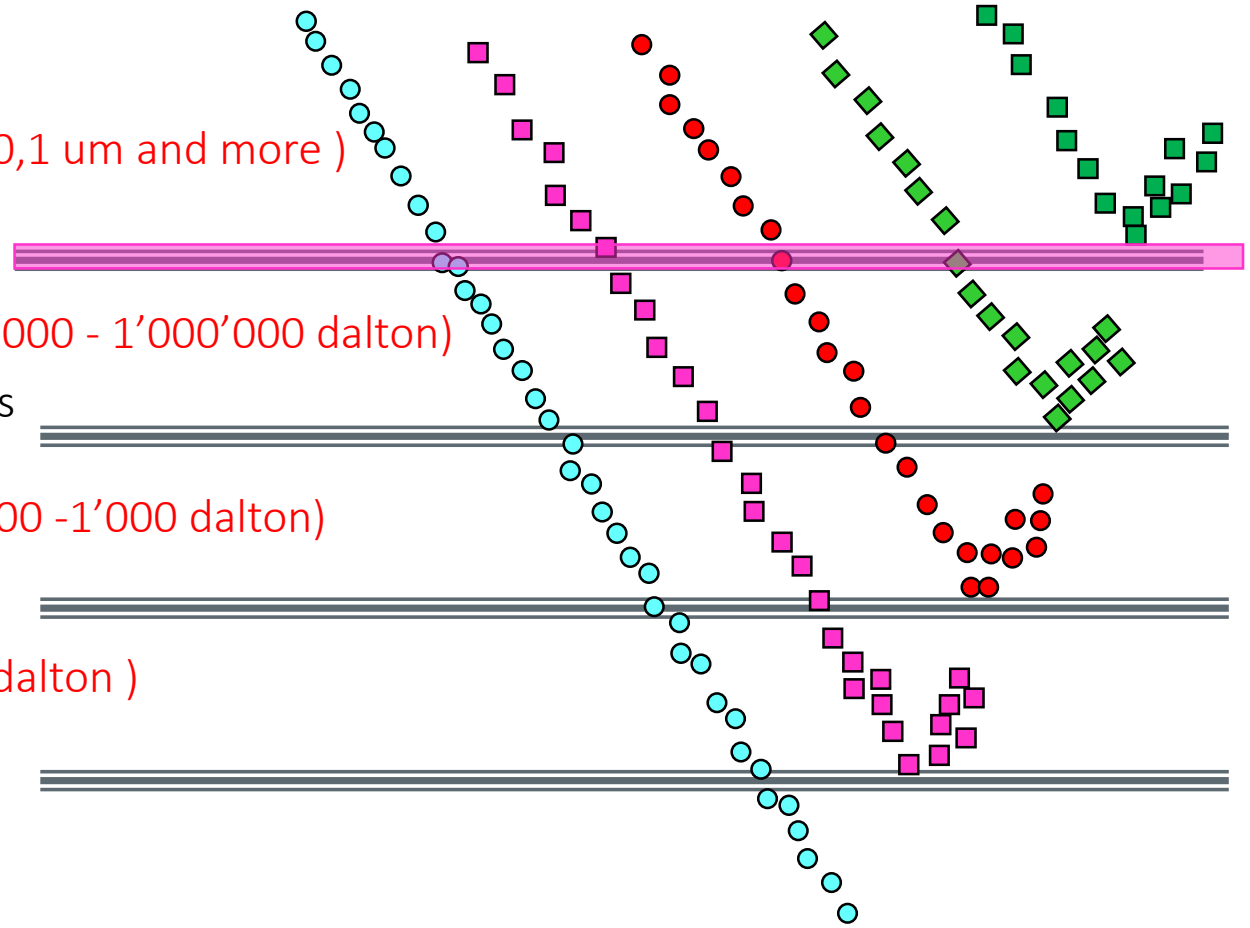
Nanofiltration (from 200 -1’000 dalton)

Sugars, Divalent Ions

Reverse Osmosis (50 dalton)

Monovalent Ions

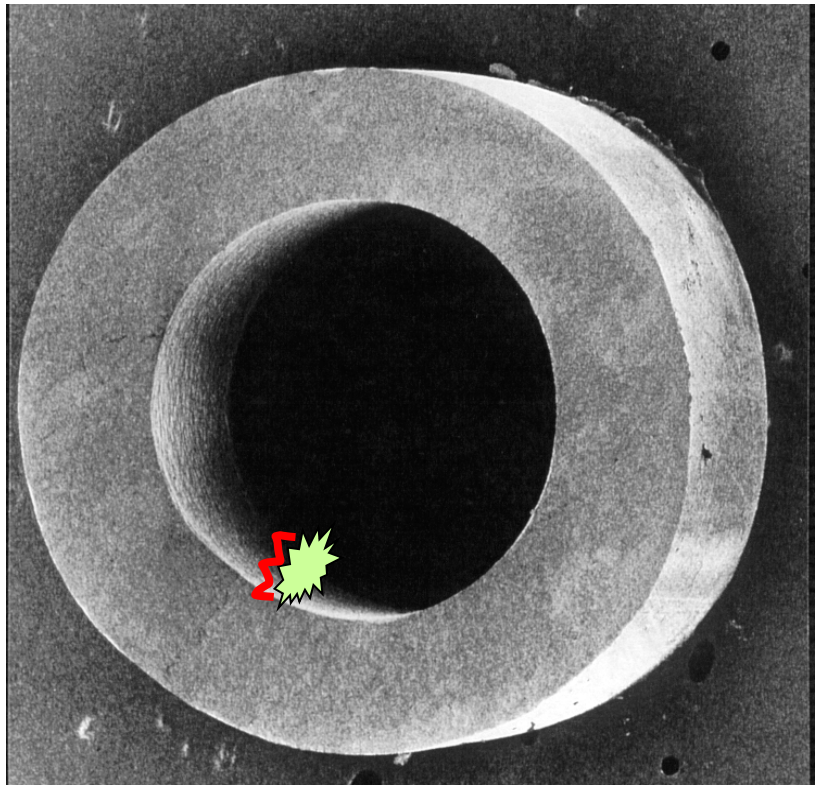
Water

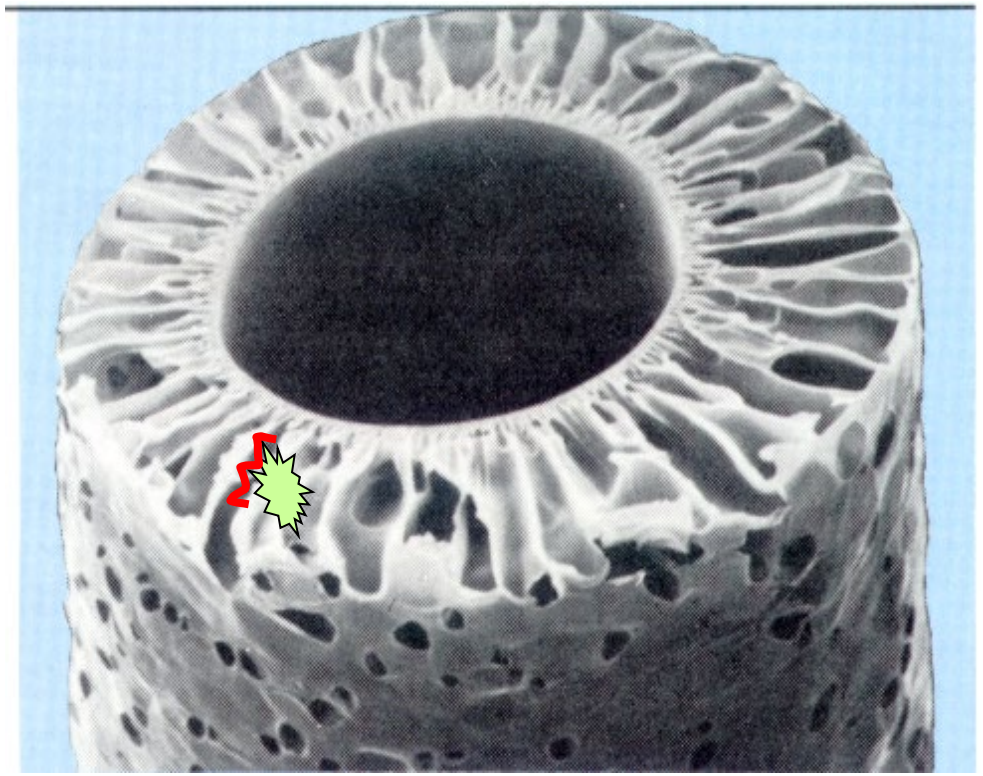


PALL Crossflow Filtration

- Benefits
  - Eliminates use and disposal of filter aids
  - More consistent filtrate quality
  - Higher wine yields
  - Less labour and handling
  - More hygienic operation
  - Lower operating costs

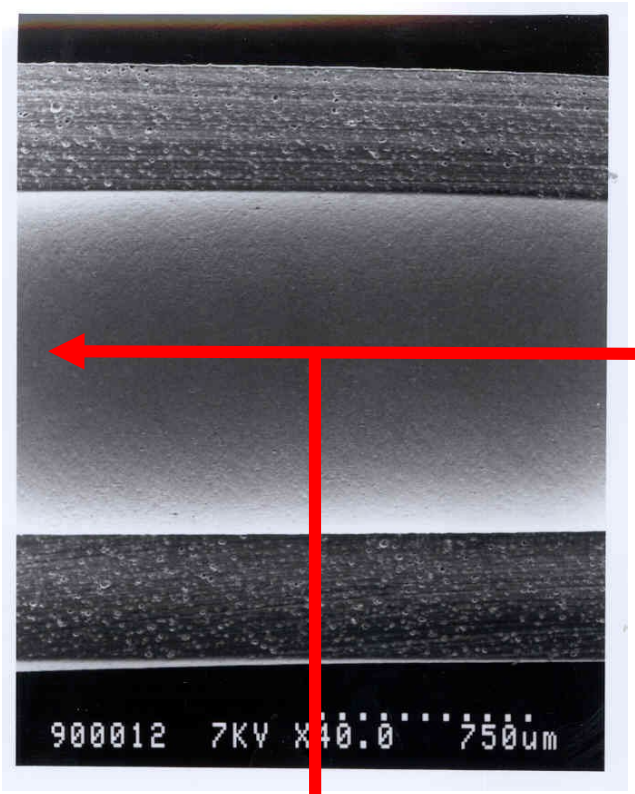
Oenoflow Membrane – Hollow Fibre Comparison





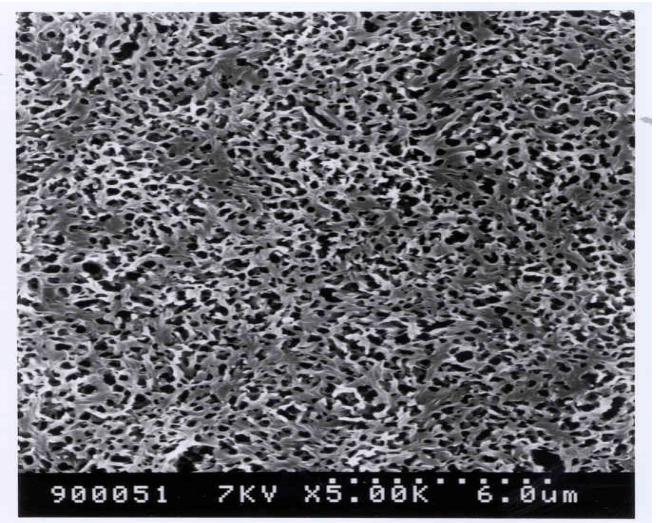
- Higher mechanical resistance
- Higher abrasion resistance
- Lower risk of breakage
- Longer life
- More effective backflushing

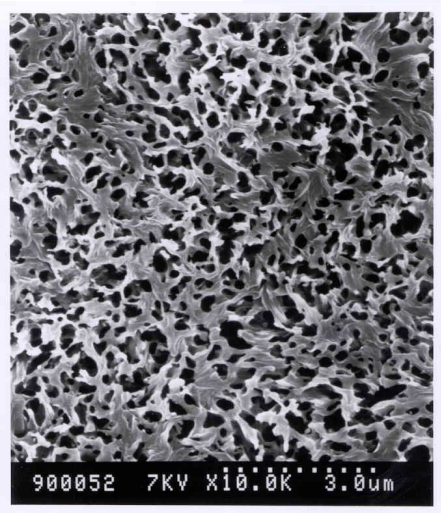
Oenoflow Membrane – Uniform Pore Size Distribution

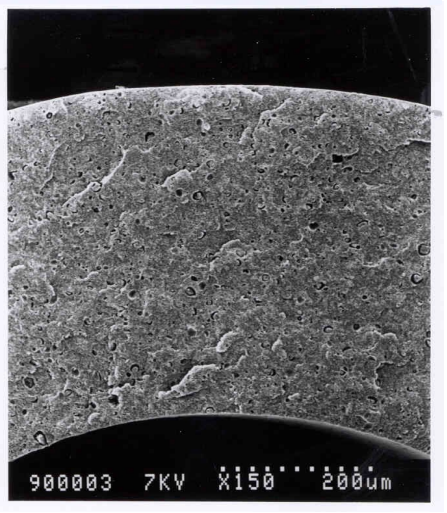


FEED

FILTRATE







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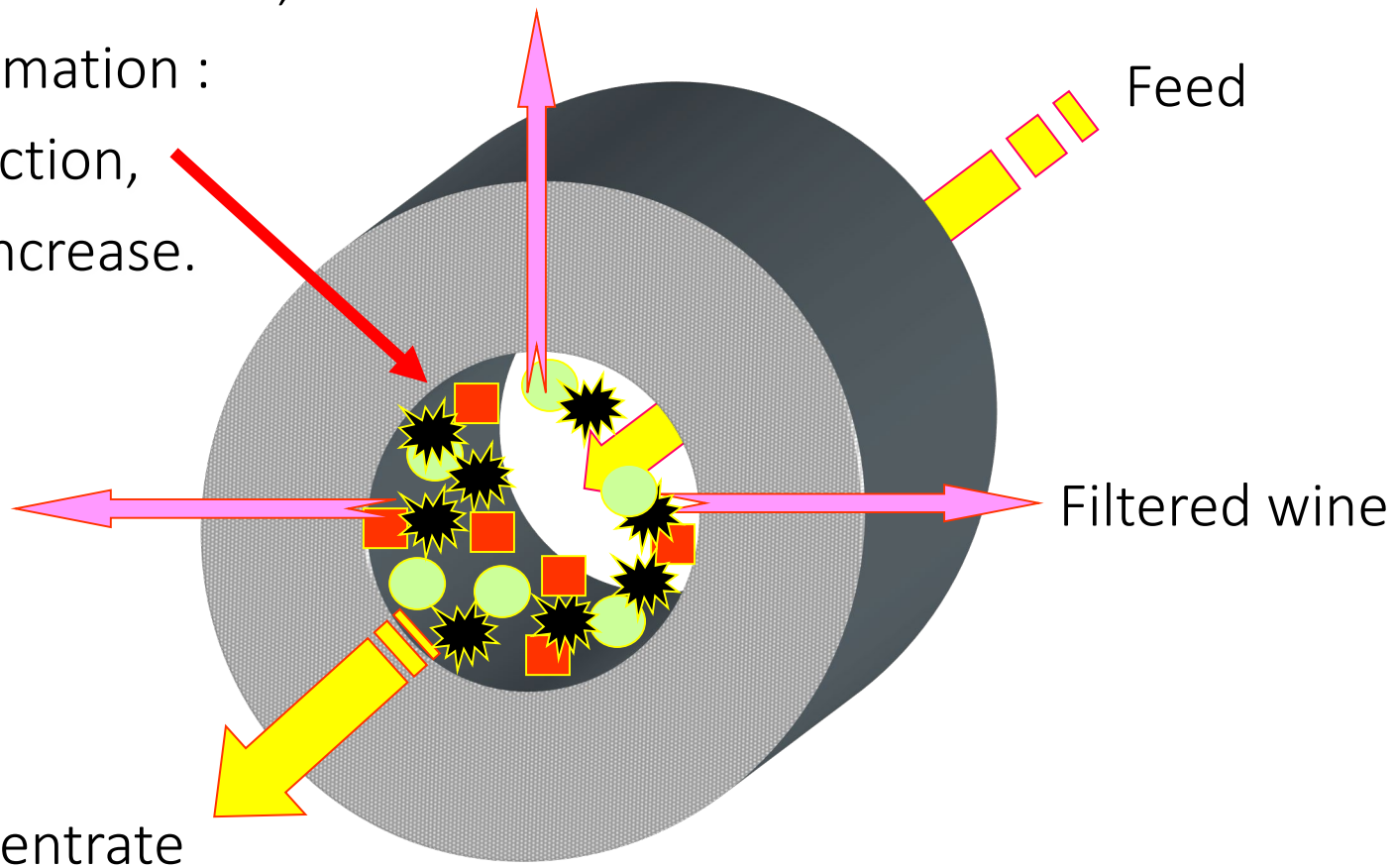
OenoFlow - Effect Of Backflushing

Build up of contamination,
gel layer formation :
flux reduction,
rejection increase.



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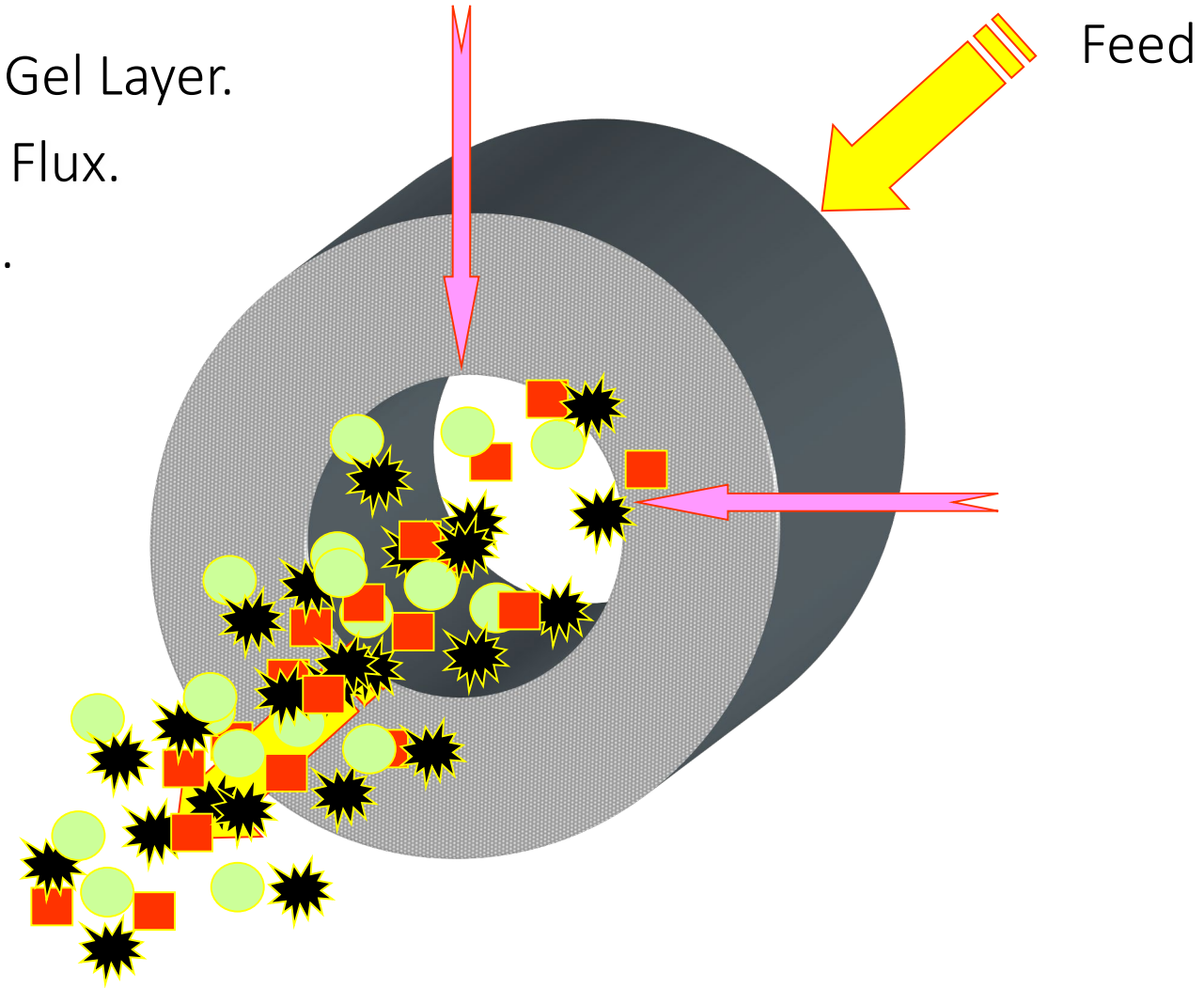
OenoFlow - Effect Of Backflushing

"Breakage" of the Gel Layer.

Restoration of the Flux.

Impulse of Filtrate.



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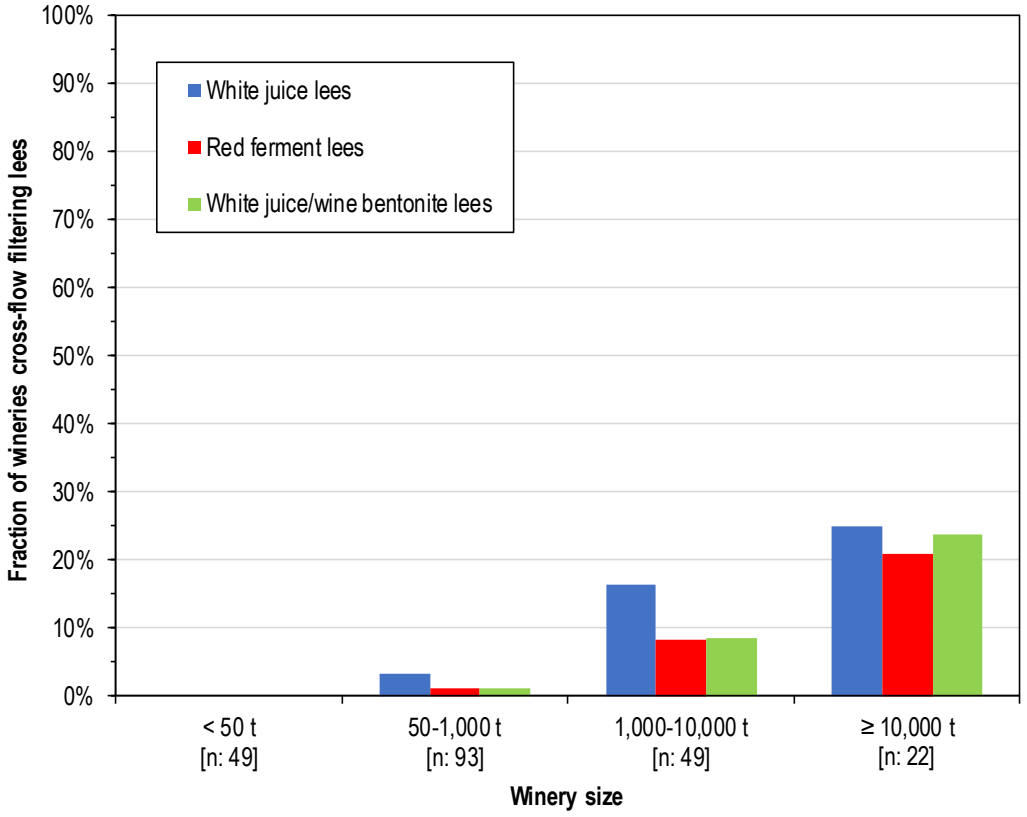
Questions?

Wine Crossflow – Sustainability driven technology

- Diatomaceous Earth
  - Non-Renewable Resource
  - Disposal Issues
  - Health Implications

High Solids Crossflow Filtration



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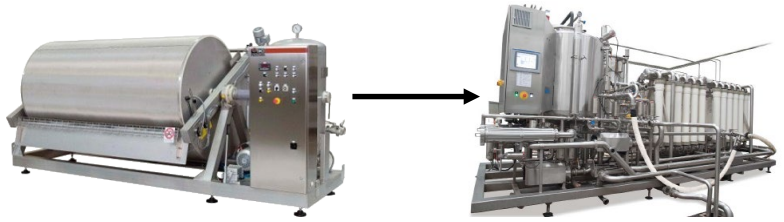
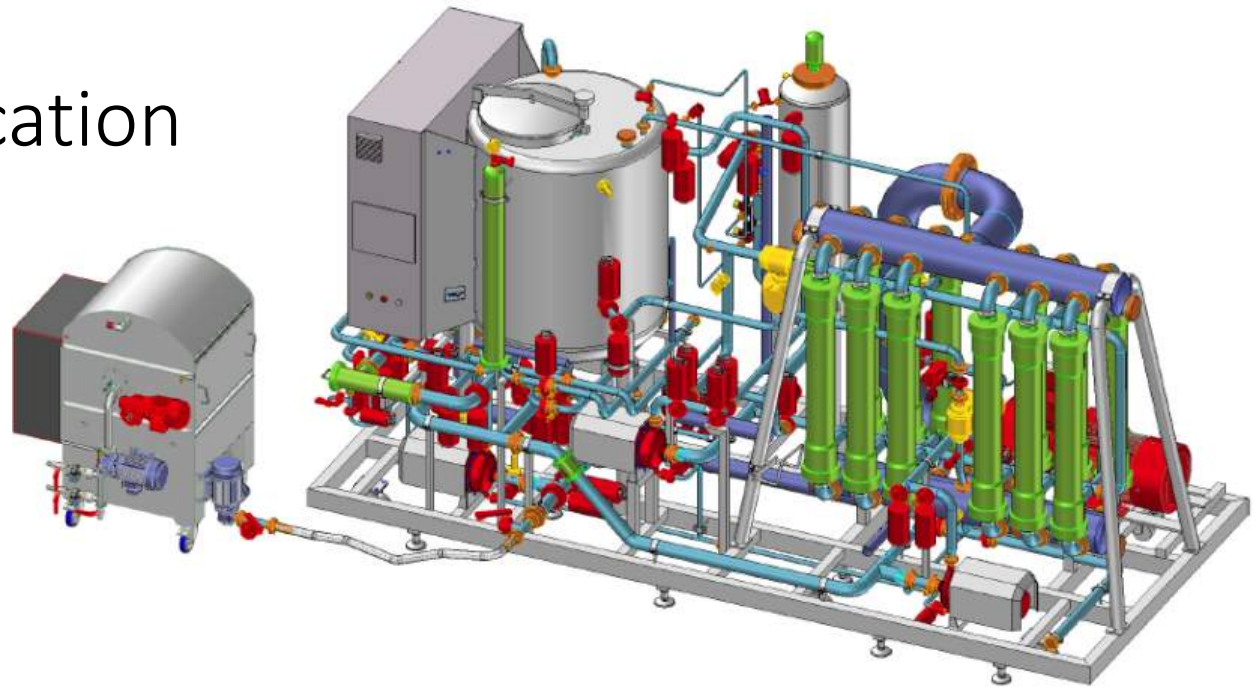


Helps to avoid oxidation and product dilution common with rotary vacuum drum filters (RDV)
Therefore increasing value $$$

PALL Oenoflow HS System

1. Juice Lees
2. Wine Lees
3. Wine Clarification



Hollow Fibre Filtration System

- Hollow Fiber Polyvinylidene fluoride (PVDF)
- 0.2 micron
- 2.6 mm fiber ID

- Fully Automated
- Batch Processing
- Enclosed system

Performance using Oenoflow HS System

- Average flux rate 30-50 LMH with lees
- Up to 85% solids
- Typical Permeate Turbidity < 1 NTU
- Less oxygen pick up than traditional RDV

Analytical Parameters	Unit of measure	Untreated lees	RDV Filtrate	Oenoflow HS Filtrate	Oenoflow HS Retentate
Free Alcohol	%	12.36	10.90	11.95	14.8
Reducing sugars	g/l	1.80	1.30	1.70	2.00
Total alcohol	%	12.47	10.98	12.05	15.02
pH		3.26	3.30	3.31	-
Total acidity	g/l	5.71	4.95	5.48	-
Volatile acidity	g/l	0.23	0.18	0.21	-
Tartaric acid	g/l	2.10	2.00	2.00	-
Malic acid	g/l	2.10	1.70	1.80	-
Lactic acid	g/l	0.50	0.30	0.40	-
Total polyphenols	mg/l	<180	<180	224	240
OD 420nm		0.05	0.051	0.05	-
Oxygen	ppm	1.20	4.30	1.60	1.50
Turbidity	NTU	-	19	0.05	-
Suspended solids	%	32	0	0	80

Comparative figures must be validated on an individual application-specific basis. Variation will occur based on individual conditions.

Analytical Parameters	Unit of measure	Untreated lees	RDV Filtrate	Oenoflow HS Filtrate	Oenoflow HS Retentate
Free Alcohol	% volume	12.38	11.93	12.40	14.2
Reducing sugars	g/l	3.20	3.20	3.30	3.55
Total alcohol	% volume	12.57	12.12	12.60	14.60
pH		3.41	3.45	3.46	-
Total acidity	g/l	5.11	4.86	5.02	-
Volatile acidity	g/l	0.36	0.35	0.38	-
Tartaric acid	g/l	2.00	2.00	2.00	-
Malic acid	g/l	<0.2	<0.2	<0.2	-
Lactic acid	g/l	1.50	1.50	1.60	-
Total polyphenols	mg/l	1496	1527	1552	1850
Intensity		5.27	6.22	5.99	-
Tonality		0.757	0.68	0.69	
Anthocyans	ppm	335	348	345	
Oxygen	ppm	1.20	4.90	1.25	1.50
Turbidity	NTU	-	18.90	0.60	-
Suspended solids	%	8	0	0	80

Cost of wine recovery with RDV filter

Basis: 2.6 million L/year (10% of volume)

Factor	Annual Cost ($)
Cost of DE	88,465
Cost of DE disposal	15,611
Labor and Electricity cost	15,000
Total Cost	119,076

Cost of wine recovery with Oenoflow HS System

Factor	Annual Cost ($)
Membrane cost (5years life)	28,800
Labor, Electricity & Chemical cost	12,120
Total Cost	40,920

Return on Investment

Value of recovered wine with DE filter (75% recovery at $1.66/L)	$3.237 Million
Value of recovered wine with Oenoflow HS (85% recovery at $1.84/L)	$3.588 Million
Annual recovered wine savings with Oenoflow HS	$351,000
Additional Oenoflow HS savings	$58,956
Total Crossflow savings	$409,956
Oenoflow HS Capital Cost	$405,000
Payback	12 months

Recovery of Wine from Lees

Feature	Benefit	Value
No filter aid requirement (DE)	-Less labor and handling -Lower disposal costs	- Lower operating costs - Environmentally friendly -Improved working conditions
Enclosed system design	- Higher quality, higher value wine - Minimal oxygen pick up - Hygienic operation	- Fast return on investment - Brand protection
Low hold-up Volume	- Processing of small batches - Reduced wine losses - Higher wine quality	- Less downtime - Brand protection
Wide bore hollow fibers	- Concentration up to 85% solids - Long module service life - Consistent filtrate quality (low turbidity)	-High wine yield - Lower operating costs -No further processing before bottling/packaging filtration
Fully automated working cycles	- Simple to use - Unattended operation	- Lower operating costs

Questions?

Thank you for your attention!

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