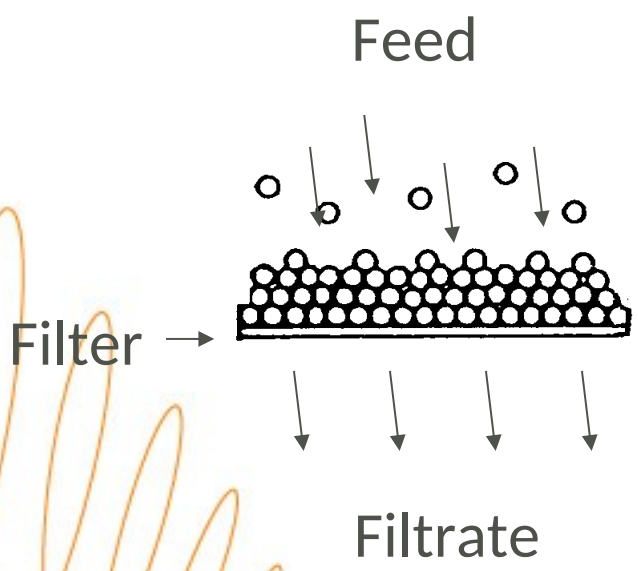
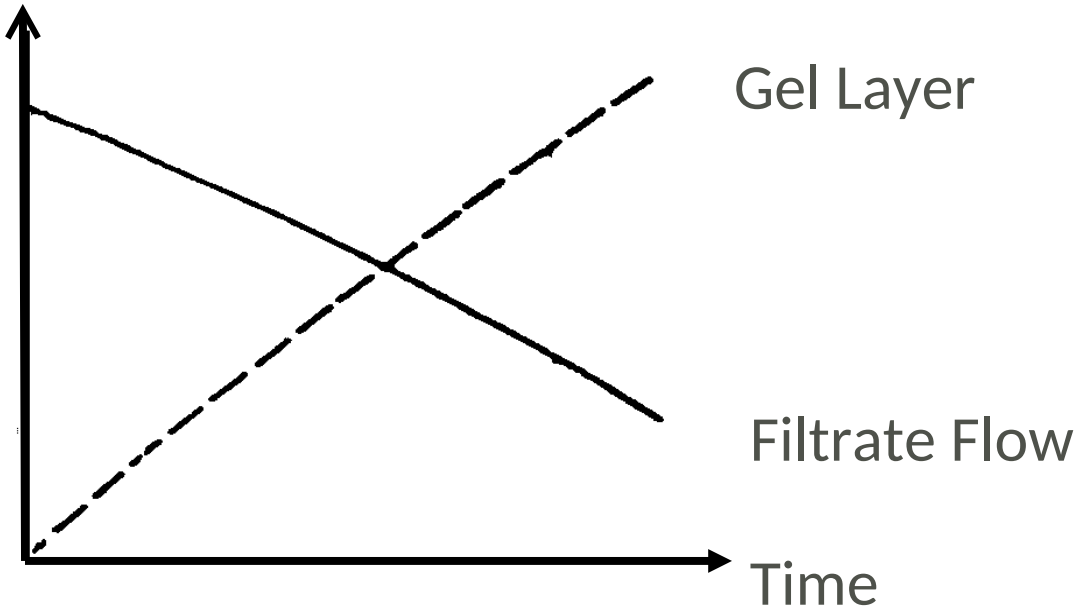
AUSTRALIAN
& NEW ZEALAND
winemakers

Cross flow filtration
The Evolution

DELLA TOFFOLA

Traditional DE filtration - Dead end filtration

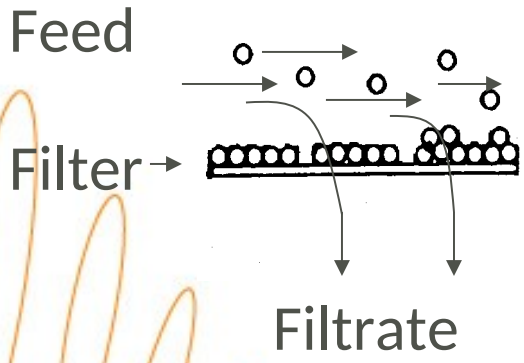


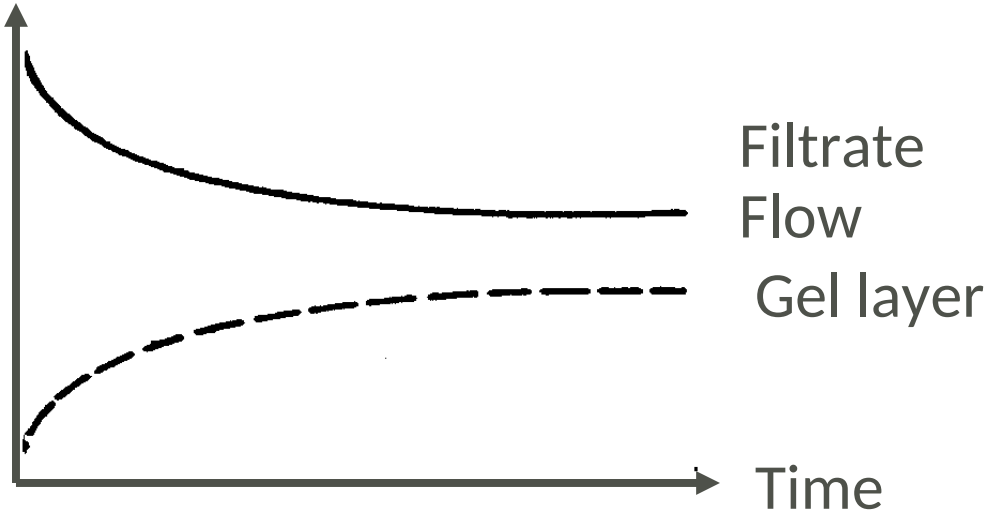


FILTRATION RATE SLOWS AS MATERIAL BLOCKS THE FILTER.

FILTER MEDIA AND SOLIDS DISCARDED TO WASTE.

Crossflow - Crossflow filtration





A minimum flow of fluid of 1.5m/sec is required to generate a process defining tangential flow.

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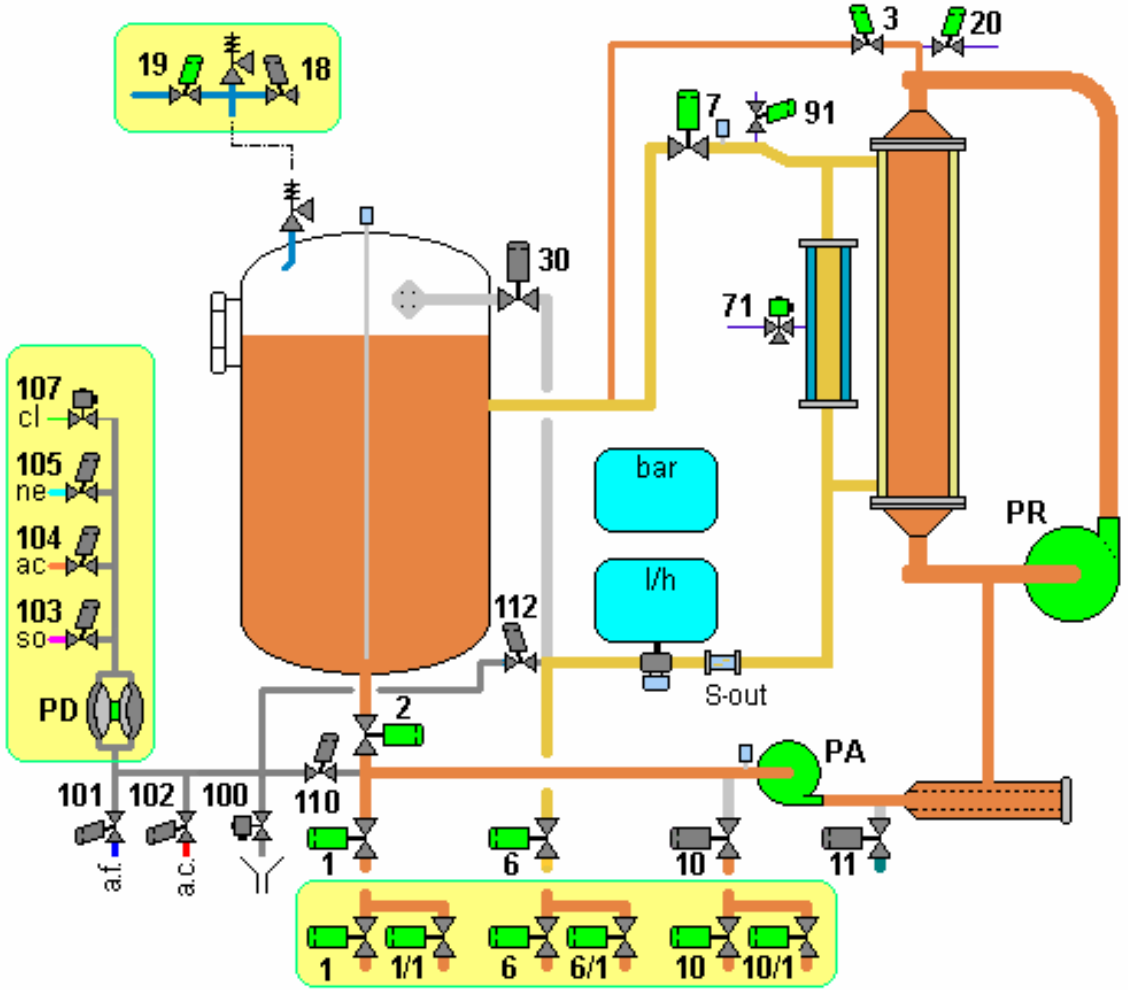
Cross flow – layout modern flow



Why Cross flow

- **Current DE process - $$$$$**
  - losses retained in spent earth
  - water utilised to generate pre-coat earth cake on vertical or horizontal candle
  - High water volume required to clean cake/candle
  - loses required after CIP – flushing
  - Earth Candle technology dirty
  - Electrical kW consumption high

Carbon foot print …..BIG and growing!

Why Cross flow

- **Slow cycle time frames, 5 – 7 hours**
- **Operator dependant –**
- **OHS exposure – carcinogens in DE**
  an alternative exists!
- **Physical foot print of DE system …… BIG**

Same technology can be utilised for water treatment.

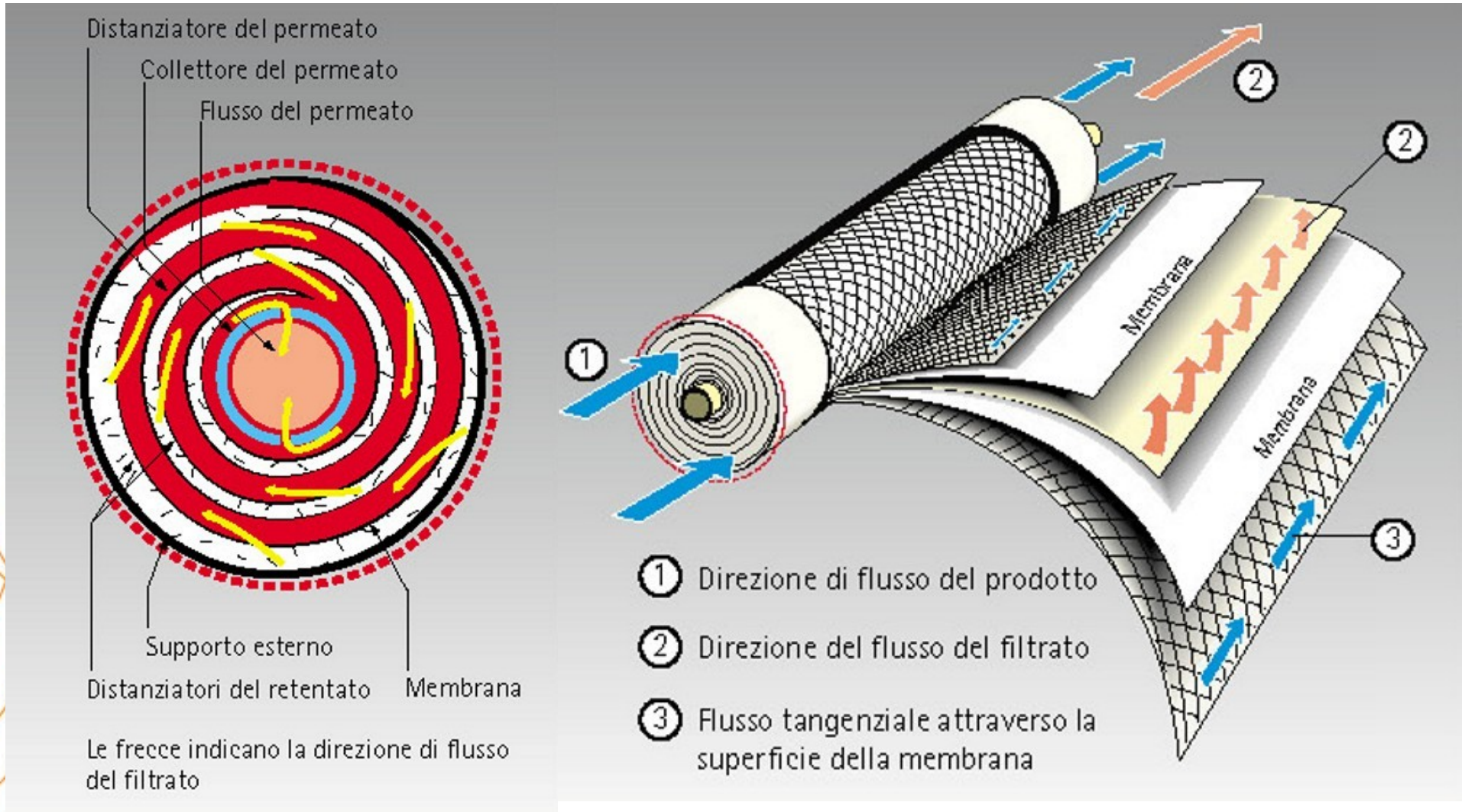
Why Cross flow

- **Local experience**
  - **Reduction in lenticular membrane costs pre bottling, elimination of multiple tank handling and cuno filtrations.**
  - **Automation, less requirement for specialised cellar hands**
  - **Eliminate multiple earth filtrations**
  - **Tail wagging the dog!**

The Evolution of Cross flow filtration

- **ORGANIC SPIRAL MEMBRANE**
- **ORGANIC HOLLOWFIBER MEMBRANE**
- **CERAMIC MEMBRANE**

SPIRAL MEMBRANE

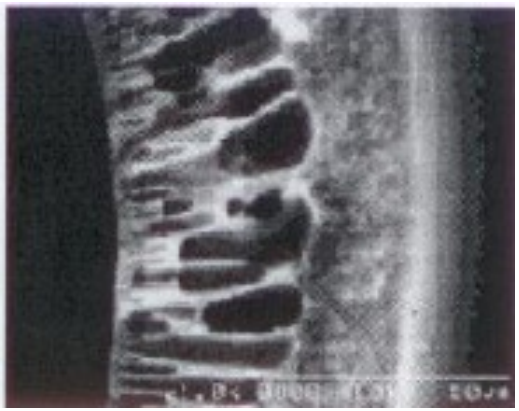


SPIRAL MEMBRANE

- Water de-salting
- Low trasmembrane pressure
  - > Fouling and rupture problems
- No backwash
  - > Short filtering time btw CIP
  - > Rapid decrease of flow rate
- Low chemical resistence
  - > reduced life time
  - > Specific cleaning solutions
- ‘Sponge’ effect – like DE
  - > Long rinsing and flush cycles
- Non constant flow rate
  - > Low temperature influence flow rate
- Storage
  - > Must be stored wet -bacteriastatic
- Permat flow
  - > low viscosity products
  - > Many dis-charges
- Low tangential speed
  - > 1.5m/sec
- Decay rate & Foul rate
  - > Flow rate reducing
- Non repareable
  - > Need to replace the membrane
- Low temperature toleranes
  - > Over 50-60°C damage
  - > Limitate efficency of the cleaning

Capillary – Hollow Fiber

- ASYMMETRIC
  - > The porossity increases
  - > Reduce adsorbive effect
  - > Increse loss of performance



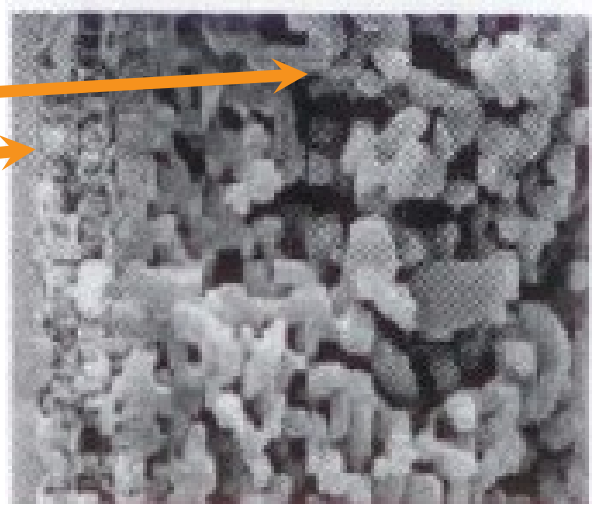
- SYMMETRIC
  - > Porossity through out the membrane
  - > Mechanical structure
  - > Decrease loss of performance
  - > Greater CIP imposed

Capillary – Hollow Fibre

- Improved trans membrane pressure
  - > Fouling problems
- Backwash now possible
  - > Limited 2-3 bars
- Some CIP resistance
  - > Yet reduced life expectancy
  - > Proprietary cleaning products
- Storage of membranes
  - > Proprietary bacteriastatic
- Low temperature
  - > Over 50-60°C CIP damagingl
  - > Limitate efficency in CIP
- Non costant flow rate
  - > Flow rate is influenced by the product temperature
- Tangential filter speed
  - > shearing
  - > Loss of performance
  - > Low Flow rate
- Reparing membranes
  - > bloc single fibre
  - > comlete module needs to be removed
- Porosity limited
  - > membrane integrity

CERAMIC MEMBRANE

- Solid composition:
  - > Support
  - > membrane
- Frame work
  - > Titanium



CERAMIC MEMBRANE

- High trans membrane pressure
  - > to 6 bar
- High back wash pressure
  - > 10 bar
- Chemical resistence
  - > Nitric Acid
  - > Phosphoric Acid
- Storage
  - > dry
- High temperature
  - > Can be steam sterilised
  - > Bacteria management
- tangential speed
  - > 6m/s
- No loss of filtration performances
  - > Flow rate constant
- Repairs
  - > One candle 0,5m²
  - > Bubble test
  - > No down time

CERAMIC MEMBRANE

- Idiot proof!
  - > Brett, VA, calcification
  - > All mistake can be rectified
- Constant long run performance
  - > Flow rate
  - > Filtration
- Low temperature products
  - > effects flow rate very little

Ceramic Membrane

- Compact disign
  - > Up to 170 m² on 1 cartreg

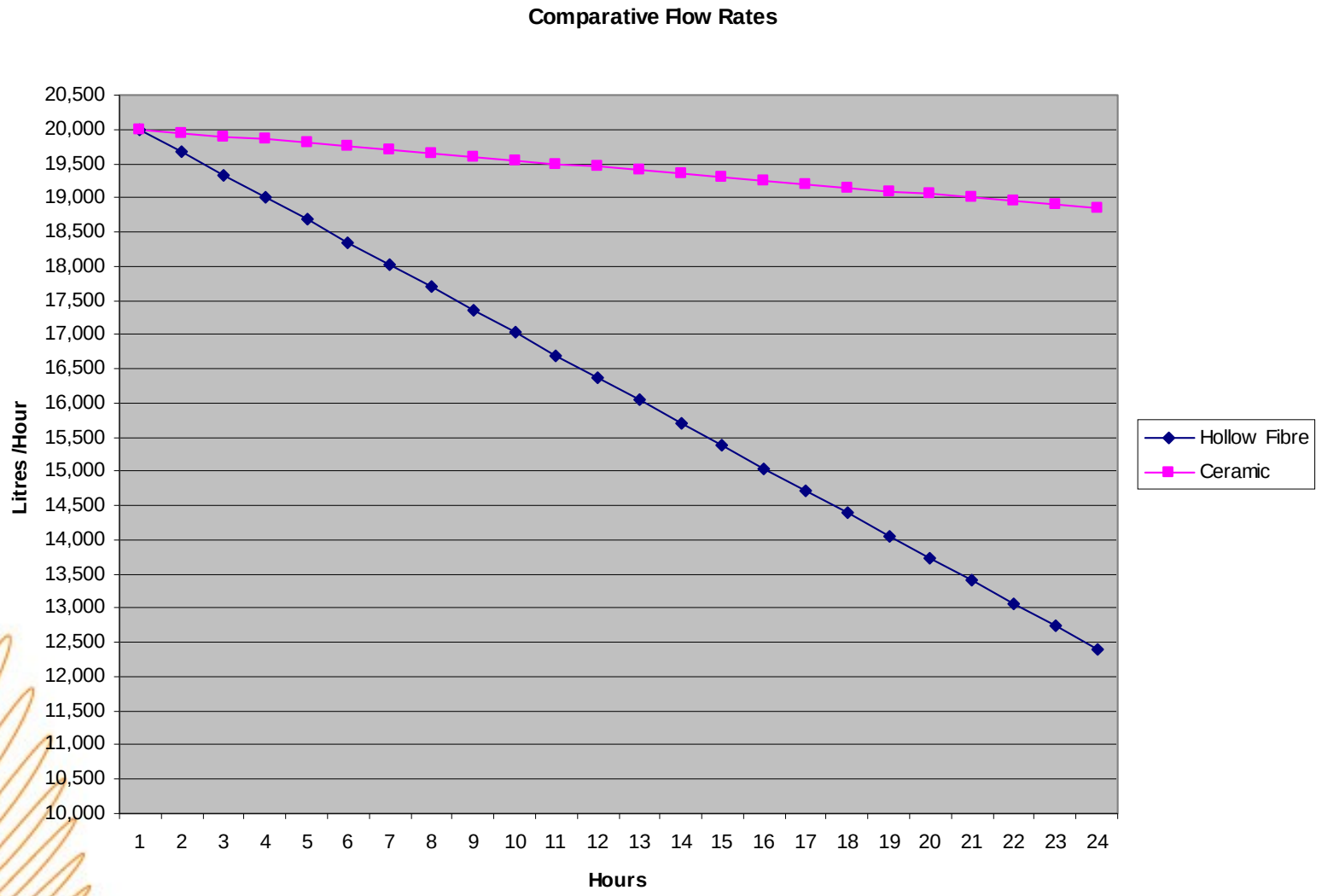
Ceramic Membrane Cross Flow Filter

Ceramic Membrane Advantages

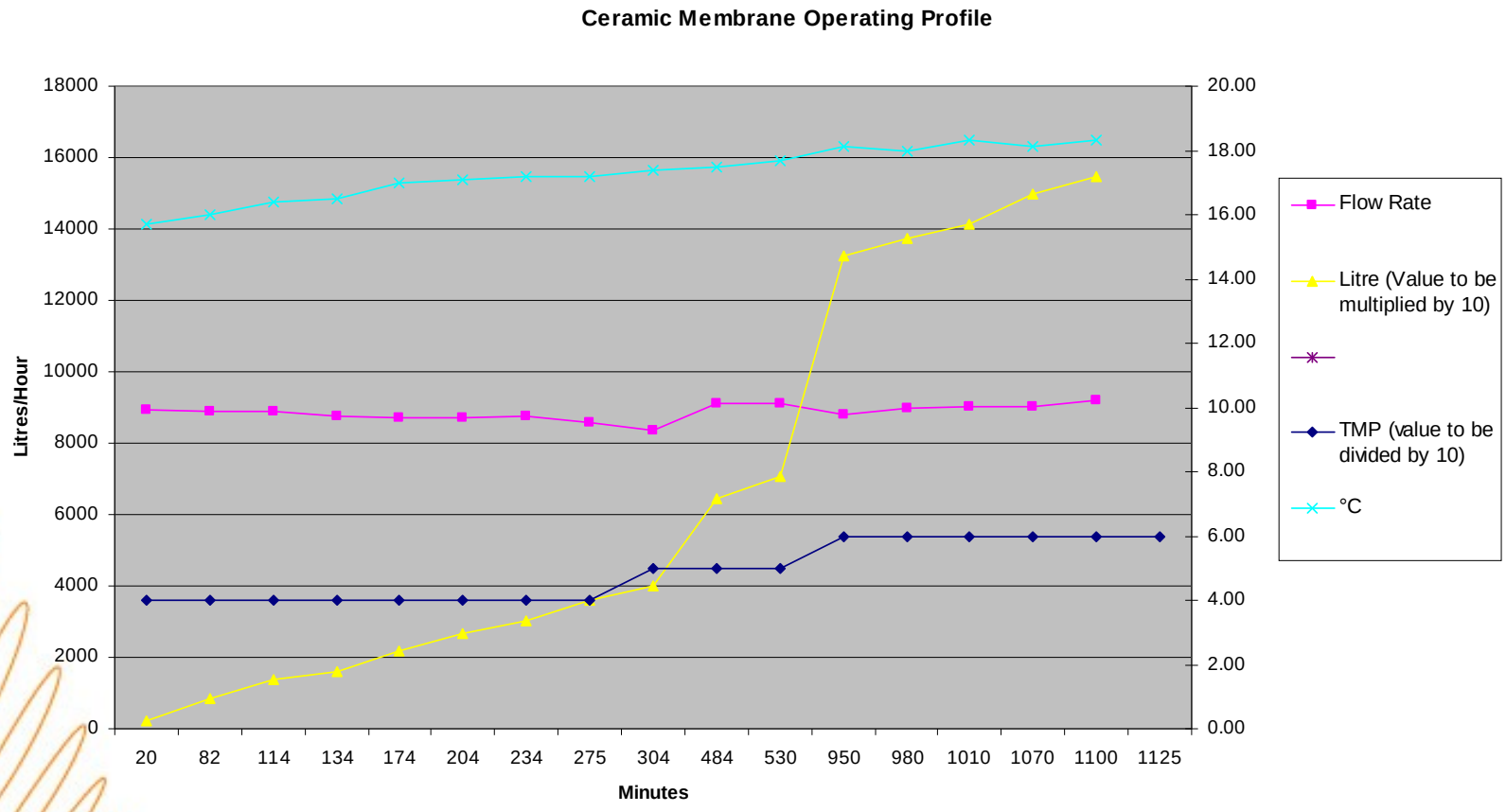
- 700m²

Ceramic Membrane Cross Flow Filter

Advantages – ceramic membrane



Advantage – ceramic membrane



Advantage – ceramic membrane

	Date	Time	YV	YNV	BV	BNV	Tank
Sample			0	0	0	2.00E+02	In line
X-flow	24 Apr	19:30	0	2.00E+02	0	1.00E+03	449
X-flow	23 Apr	19:30	0	4.00E+02	0	4.00E+03	438
X-flow	23 Apr	19:30	0	3.00E+04	0	0	448
Bottling Approval	16 Apr	10:30	0	6.00E+04	0	1.00E+04	457
	20 Apr	10:00	0	3.00E+04	0	2.00E+04	457
Bottling Samples			0	0	0	0	Bottles
Bottling Approval	12 May	14:00	0.00E+00	2.00E+05	0	3.00E+04	136
Tank	22 May		0	8.00E+01	0	0.00E+00	439
X-flow	20 May	7:30	0	0.00E+00	0	0.00E+00	In line
X-flow	20 May	12:30	0	0.00E+00	0	0.00E+00	In line
X-flow	20 May	17:00	0	0.00E+00	0	0.00E+00	In line