AUSTRALIAN & NEW ZEALAND winemakers

WINERY ENGINEERING ASSOCIATION

WINE CONFERENCE & EXHIBITION NZ 2008

MONTANA BRANCOTT WINERY

Centrifuge Clarifyers

Applications for the New Zealand Wine industry

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seital Separatori Italia

Unique process requirements

- Process bottlenecks - Single varietal forming overwhelming bulk of production.
- Short timeframe in which to turn around tank space
- Potentially even shorter timeframes and larger loads to come as newer plantings come on stream.

➢ There is a need for technological assistance which alleviates production bottlenecks and speeds up throughput

Centrifuge Technology Can

- Reduce juice settling time pre-fermentation and clarification time for wines post fermentation
- Reduce refrigeration costs from cold settling
- Potentially reduce load on earth and stack filtration

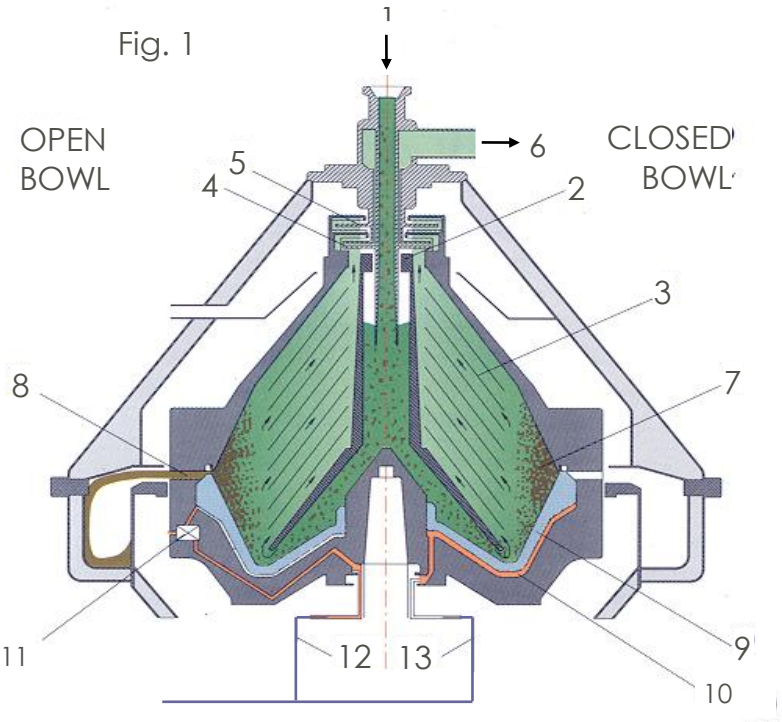
High Speed Disk Clarifiers

The Revolutionary Fully Automated SE501SEIX-Q3P3

SE401EIX-Q2P2

SE 501SEIX-Q3P3

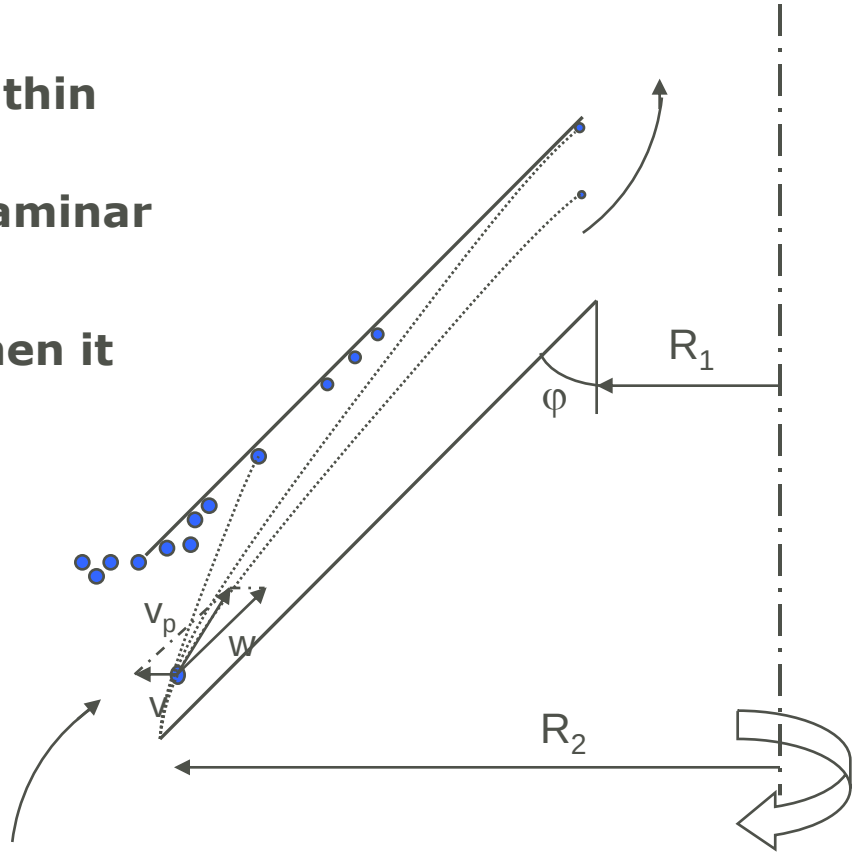
Self Cleaning Bowl



1. Product inlet
2. Distributor
3. Disk stack
4. Centripetal pump
5. Hydraulic sealing device
6. Clarified product outlet
7. Sludge chamber
8. Ejecting ports
9. Sliding piston
10. Closing chamber
11. Bowl valve
12. Closing Oper. Water
13. Opening Oper. Water

Flow Pattern in the disks

- **The liquid is divided into many thin layers by the disks**
- **It is assumed that the flow is laminar**
- **Fluid velocity near wall is zero**
- **A solid particle is separated when it reaches the upper disk surface**
- **The solids particles slide down the disk surface into the solids bowl chamber**



W = velocity of the principal flow direction

V = radial velocity

V_p = particle velocity

Equivalent Area of Separation

$$EAS = \frac{2\pi}{3g} \cdot N \cdot \omega^2 \cdot \left(R_2^3 - R_1^3\right) \cdot \left(tg\,\varphi\right)^{-1} [m^2]$$

R_1=inner disk radius [cm]

R_2=outer disk radius [cm]

φ = disk cone angle

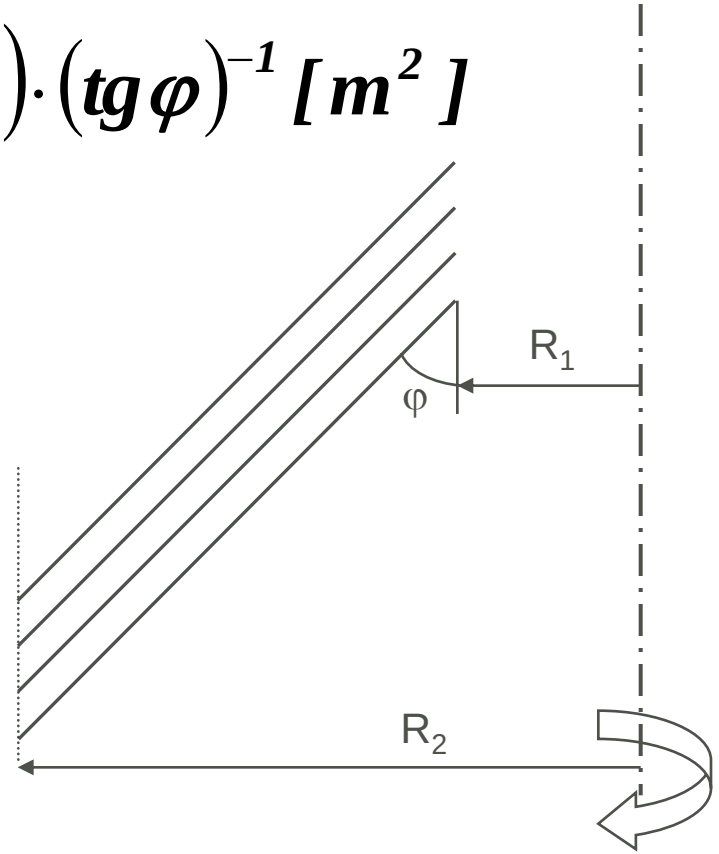
ω = angular velocity [s^{-1}]

N = disks number

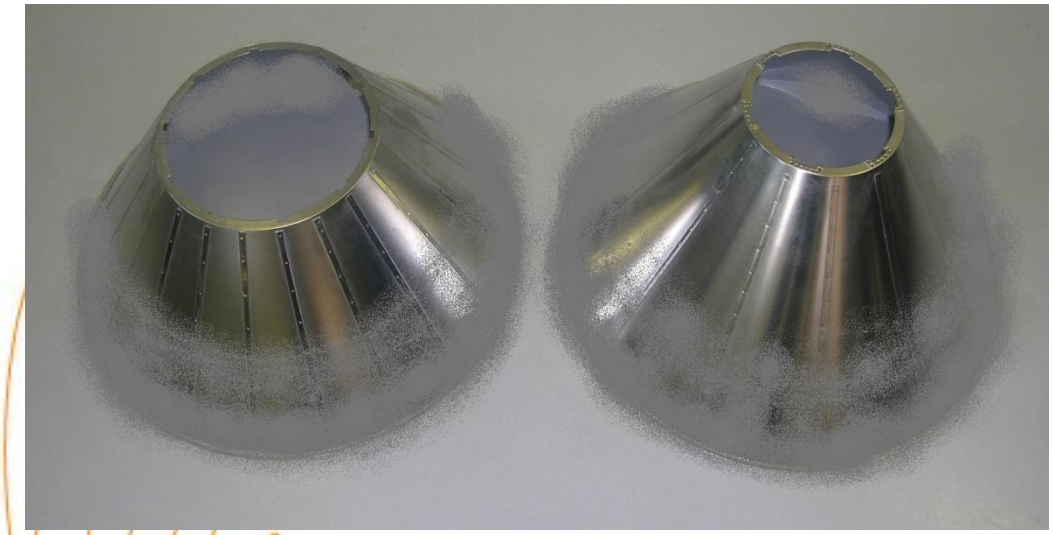
g = gravity acceleration [m/s^2]

EAS range = 20.000-240.000 [m^2]

for SEITAL clarifiers



Reduced Inner Disk Diameter



Two disks with same angle and same outside diameter

Decreasing inner diameter:

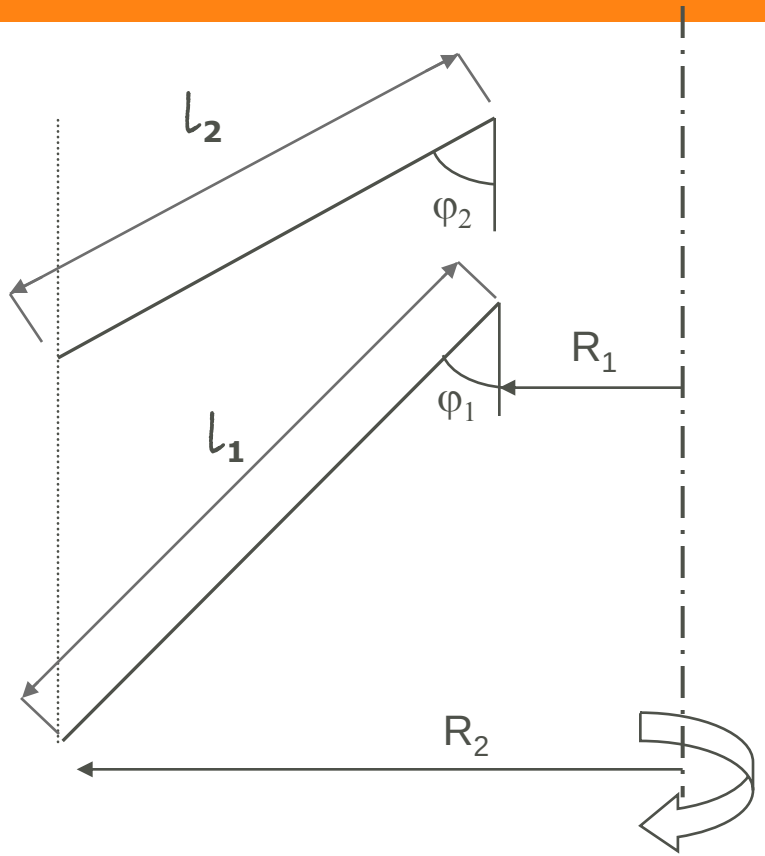
- **Longer path for clarification**
- **Higher equivalent area of separation**
- **Smaller distributor inner diameter results in a more gentle inlet feed of the product**
- **This results in a reduced "free surface" in potential contact with air**

Disk Cone Angle

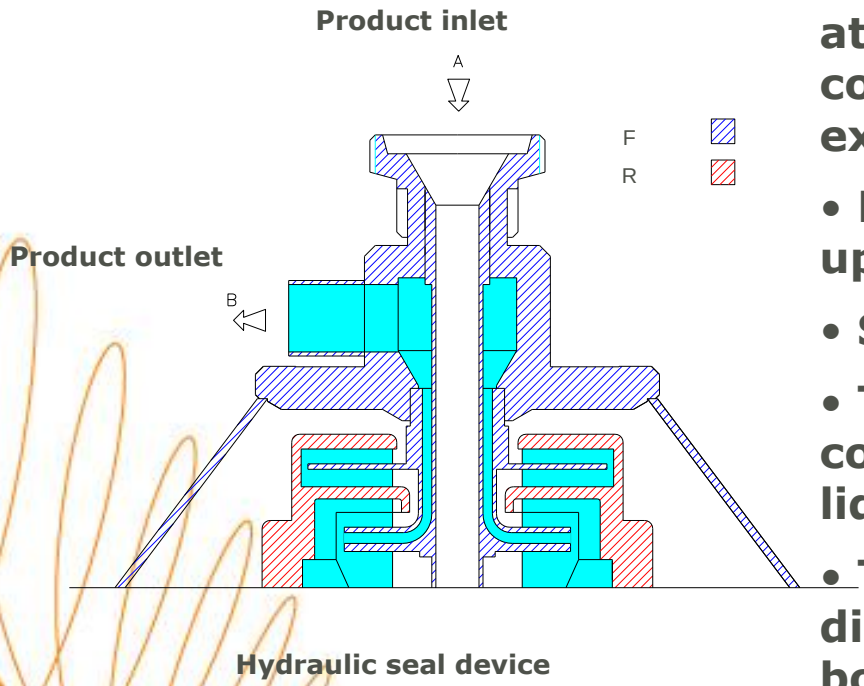
At fixed inner and outer

diameter R_1, R_2:

- **If angle $\varphi 1 < \varphi 2$**
- **The separation path is longer ($L_1 > L_2$)**
- **The equivalent area of separation increase with arctg(φ)**
- **Common angles 42°-35°**
- **From 42 to 35° there is an increase of 28.5% of the equivalent area of separation**



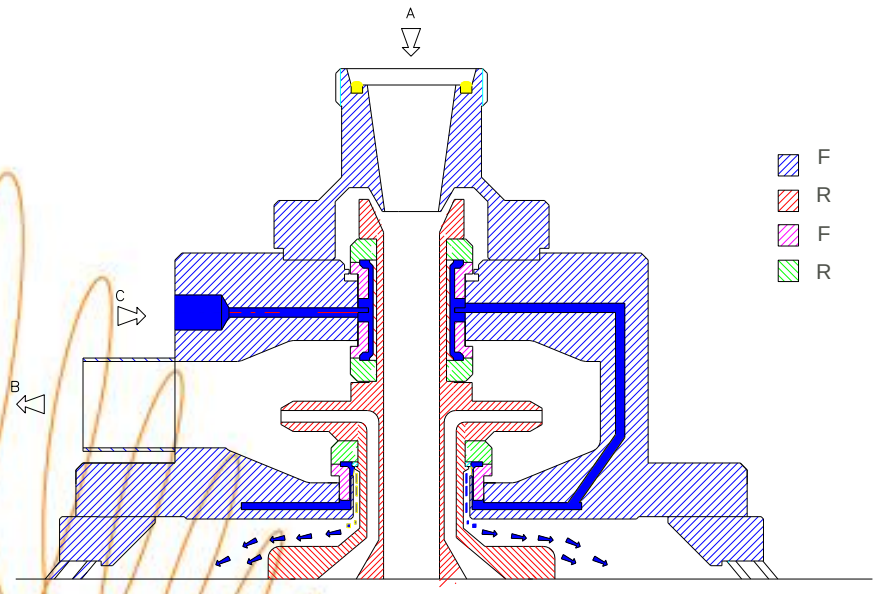
Hydraulic Sealing



Hydraulic seal device

- Achieved by an additional chamber at the top of the bowl, that separates completely the processed liquid from the external ambient
- Minimizes CO_2 losses and Oxygen pick-up
- Sealing is acheived by the product itself
- Thus it's not possible for any contamination with auxiliary sealing liquid (i.e. water)
- The seal is maintained also during a discharge, when for a short period the bowl is not completely filled

Hermetic mechanical seals



- **Achieved by a set of mechanical seals**
- **Resulting in almost zero CO_2 losses**
- **almost Zero Oxygen pick-up**
- **Clarification under pressure up to 10 bar**
- **Suitable for sparkling wines**
- **Full C.I.P. design**
- **These seals are suitable for juice and wine, WITHOUT CHANGING ANY PARTS**

Operational Benefits

- **Superb DO parameters due to extremely efficient bowl and seal designs.**
- Optional Mechanical Seals to maintain pressure and process Sparkling Wine.
- Reduction of RDV requirements results in reduced losses and down graded wine thus returning improved wine quality and price potential for the winery.
- Proven ability to handle bentonite at high speeds.
- **Juice Clarification after pressing reduces requirements for refrigeration / cold settling thus accelerating process whilst reducing costs.**
- Proven ability for the unit to be set to the winemaker's principles for NTU requirements.
- **Proven ability to remove carbon finings from colour susceptible white varieties due to higher rotational speeds**
- With agitation of tanks or simply handling tank bottoms, the SEITAL unit has proven ability to effectively clarify lees / solids
- Proven abilities for very high solids content in the sludge discharges reducing and even removing need for RDV requirements thus reducing need for tank space.

In brief, any manner of wines and juices - ex Malo fermentation, bentonite removal, bentonite lees, in line bentonite dosing, Gross lees, carbon removal, all handled by the SEITAL.

Design and Install - Simplicity

- **No concrete plynth required – reduced infrastructure costs**
- **Skid Platform mounted – can move with your growing winery**
- **Service of bowl valves without bowl dis-assembly**
- **Fully automated**
- **On-line / internet monitoring and servicing**

Vintage 2005 - Side by Side Centrifuge Trials

USA, against 2 other leading brands

Juice and Wine Charateristics

Juice:

- Grapes were crushed, enzymes added.
- First press from continuous screw presses and fermented separately
- Solids range from 4 to 10%
- Goals: reduce solids to 2%

Wine:

- Clarification after fermentation
- Goals: reduce solids from 1% to traces

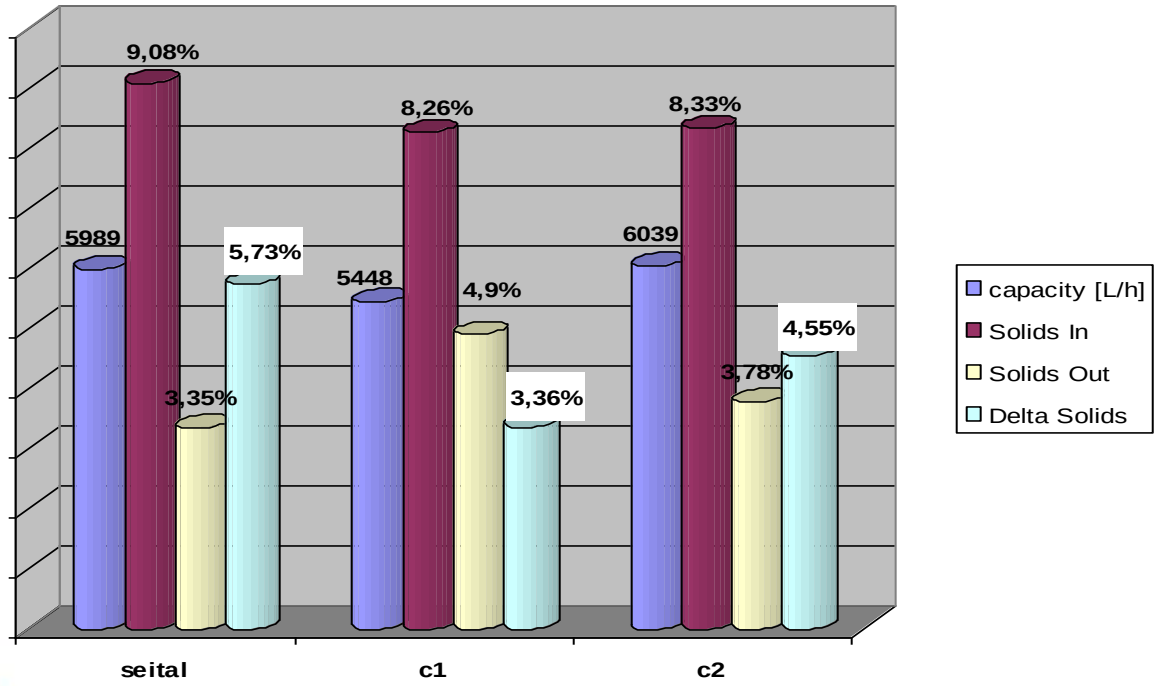
Varieties Crushed

1. Chardonnay
2. French Colombard
3. Chenin Blanc
4. Muscat Canelli
5. Muscat Alexander
6. Symphony
7. Palomino
8. Zinfandel
9. White Grenache
10. Merlot
11. Syrah
12. Cabernet Sauvignon
13. Ruby Cabernet
14. Carignane

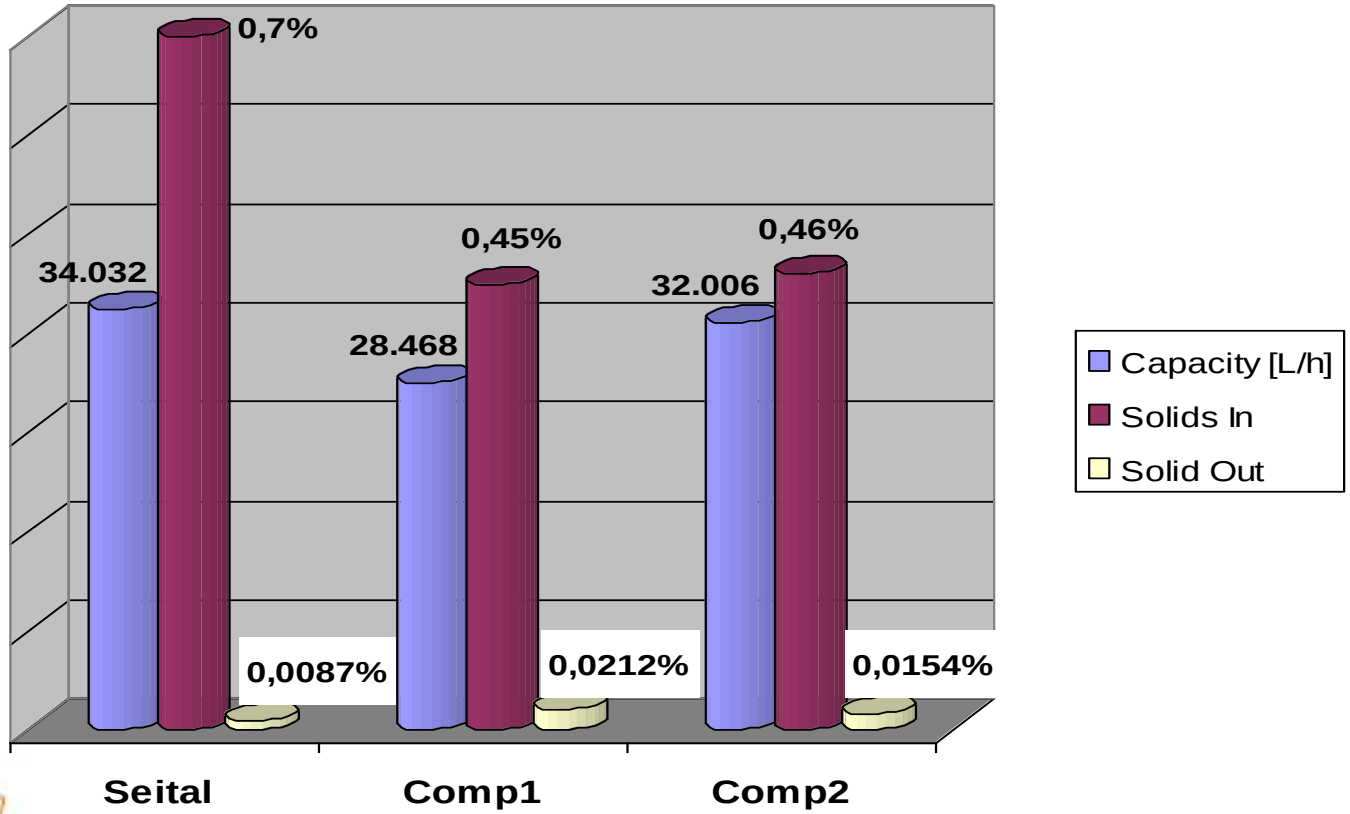
Evaluation Criteria

- % Solids reduction
- Flow rate vs. % Solids reduction
- Oxygen Pick-up
- Loss of product
- Product Characteristics
- Equipment Cost
- Spare Parts Costs

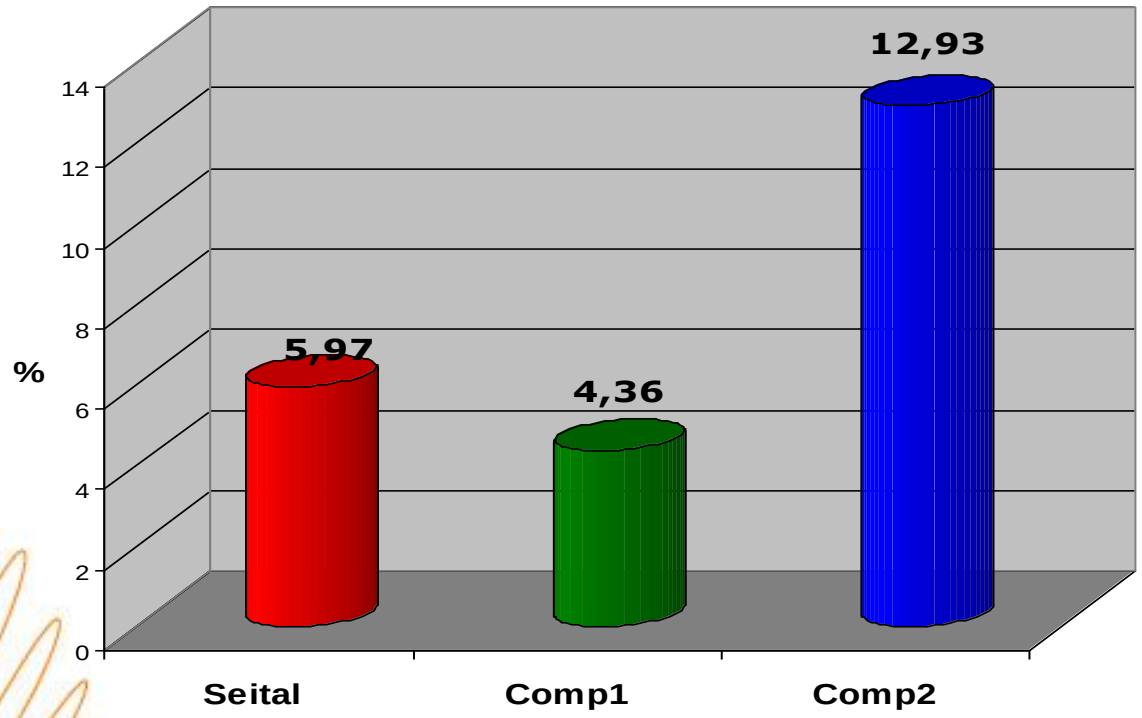
Juice Solids Reduction & Capacity



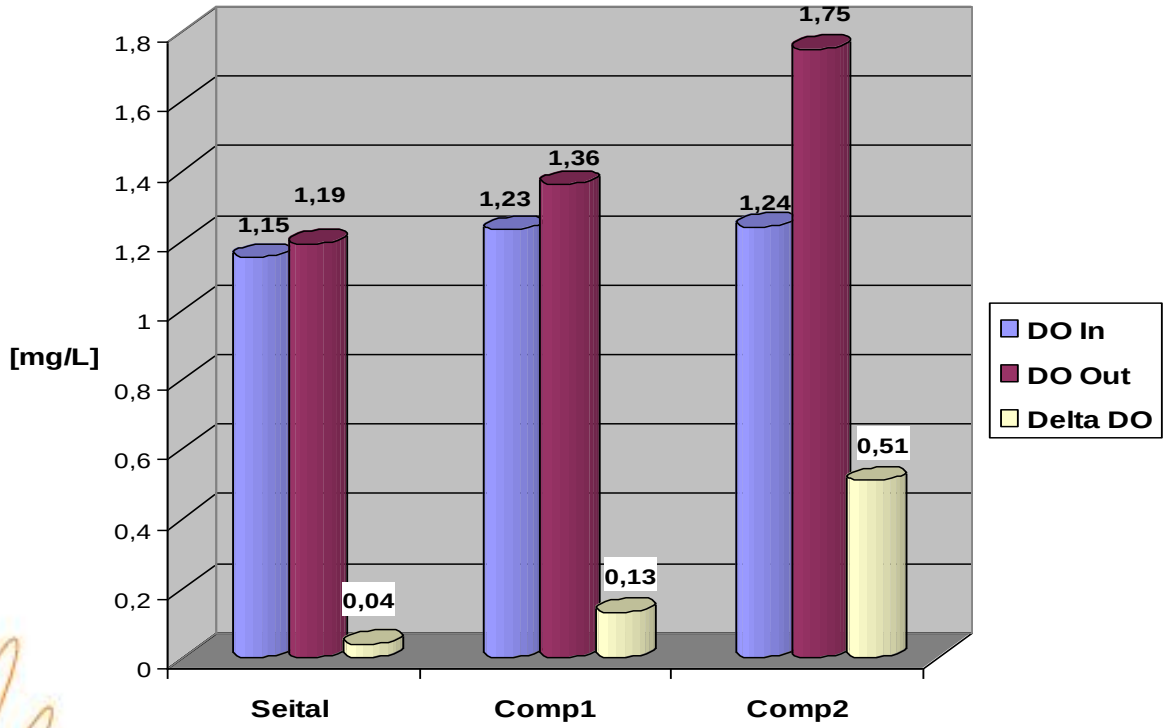
Wine Solids Reduction and Capacity



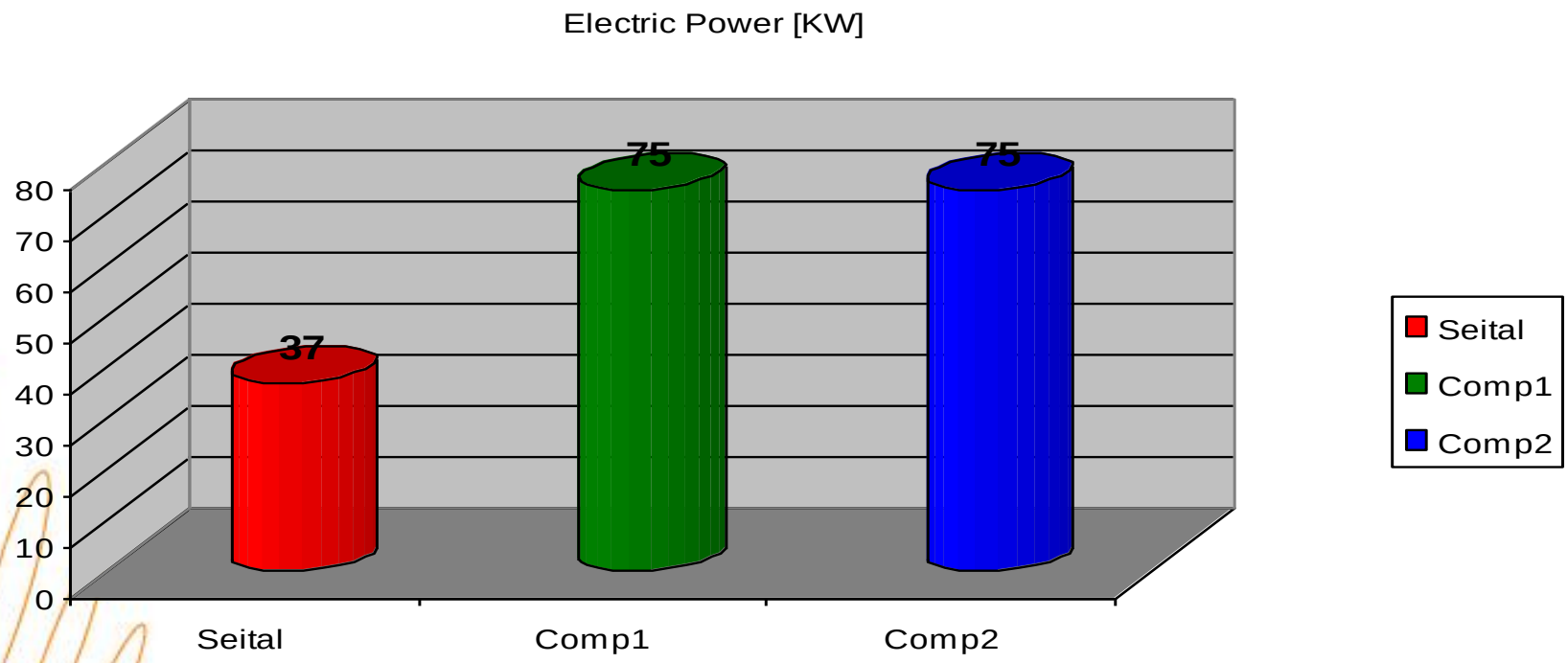
Wine in Discharge Volume



Wine Oxygen Pick-up



Power consumption



Conclusions

- Centrifuge technology has been used in food industries for decades
But much of the technology has not been wine-specific.

- Centrifuge technology = Fast clarification of juice and wine
= Faster throughput
- Faster throughput enables winery growth and for less infrastructure cost
- Seital's Unique bowl design creates a larger equivalent
Area of separation, higher rotational speed and lower Oxygen pickup
- Low Oxygen pickup = retention of aromatics – critical for Sauv. Blanc.
  - critical for Pinot noir
- Reduced power consumption from refrigeration used for settling
- commercial trials have shown consistently lower kw consumption and lower oxygen pickup than competitors

THANK YOU

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