



ITALIAN FOOD INDUSTRIES

# **CONTINUOUS AND BATCH FLOTATION SYSTEMS FOR GRAPE JUICE CLARIFICATION**

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# CLARIFICATION IN WINE INDUSTRY



Why do we need to clarify grape juices?

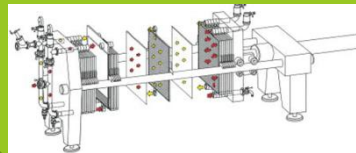
To remove all the non-desired compounds from grape juices before fermentation!

Processes being regularly in use:

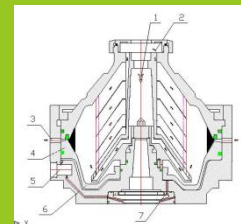
Cold Settling



Filtration  
(with/without  
filtration ads)



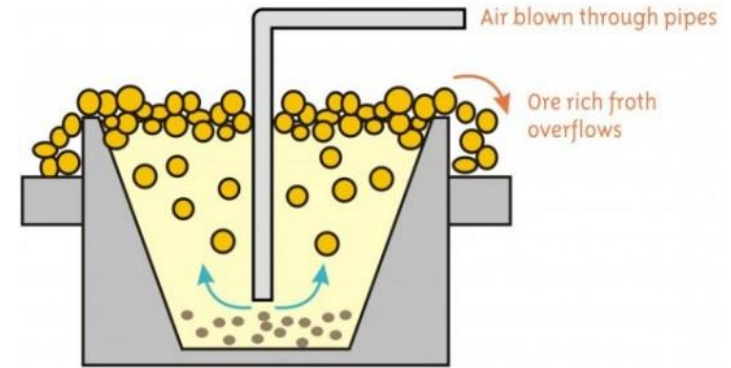
Centrifugation



Flotation



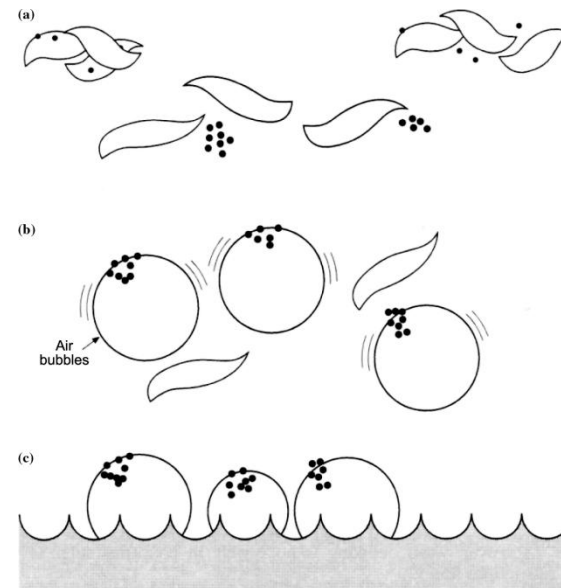
# FLOTATION: THE PROCESS



**Flotation involves phenomena related to the relative buoyancy of objects.**

- DGF, dissolved gas flotation
- IGF flotation gas flotation, induced gas a process that clarifies liquids by the removal of suspended matter.

**Due to the surface tension the suspended solids being attached to the bubbles that are induced into the liquid are carried out on the surface**



**FLOTATION:**

## **STEPS IN WINE INDUSTRY:**



- a) Enzyme treatment (pectinases) (preferably in line)
- b) Dosage/ non-dosage of clarifying agent (gelatine, bentonite, PVPP, etc...)
- c) Saturation with gas-gas (N<sub>2</sub>) at 5-6bar is mixed with the juice, the bubbles that are formed surround the particles in the grape juice (alone or formed with the clarifying agents) and bring them to the top of the flotation tank
- d) Surface removal and extraction (continuous)/rack discontinuous

**FLOTATION:**

# **FLOTATION AND WINE STYLES**



## **DEFINING WINE STYLE**

### **Receiving-Destem/Crush-Pressing: WINE STYLE**

#### **Oxidative style (N2 for flotation)**

- questionable,
- pinking effect,
- quick maturing,
- disjoint wines,
- body of wine
- reductivity of wine

#### **Reductive style (N2 for flotation)**

- fasten the process
- retention of primary aroma
- reduce the electricity costs
- prevent from oxidation and color instability
- lower the amount of solids
- improve the effectiveness of the process

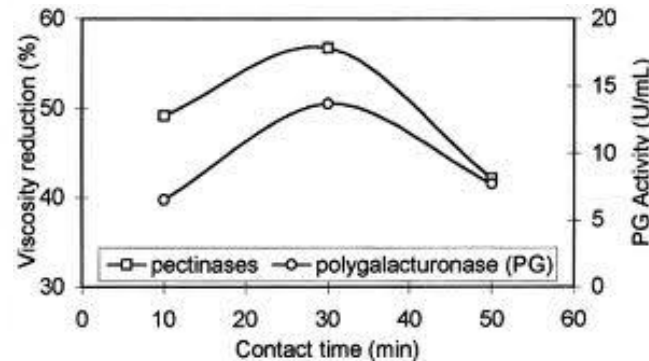
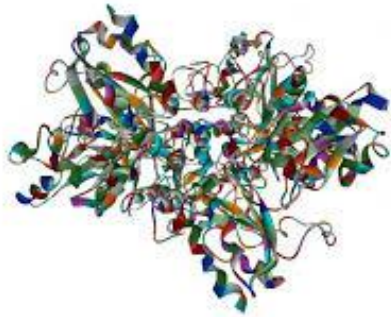
**Using air for flotation?**

**Quality or cheap wines?**

# FLOTATION: FLOTATION STEPS:



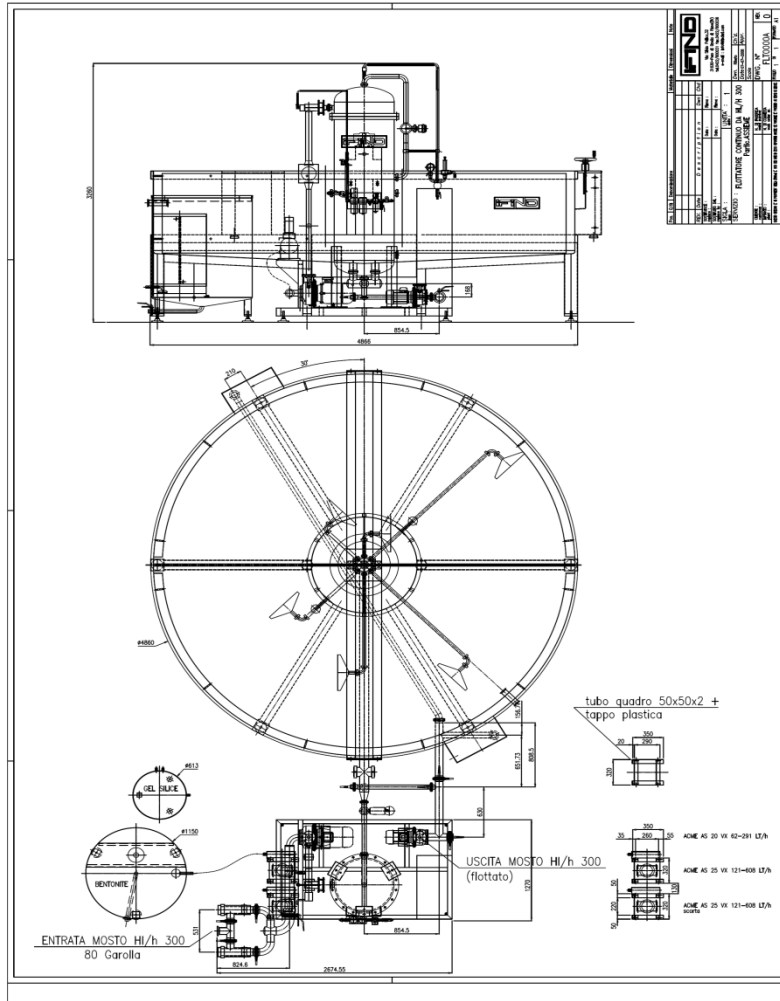
## Enzyme treatment (coloids and viscosity)



## Dosage/ non-dosage of clarifying agent (gel, bent, PvPP etc..)



# FLOTATION: CONTINUOUS FLOTATION:



Continuous Flotation System  
300HL/H

# FLOTATION: CONTINUOUS FLOTATION:



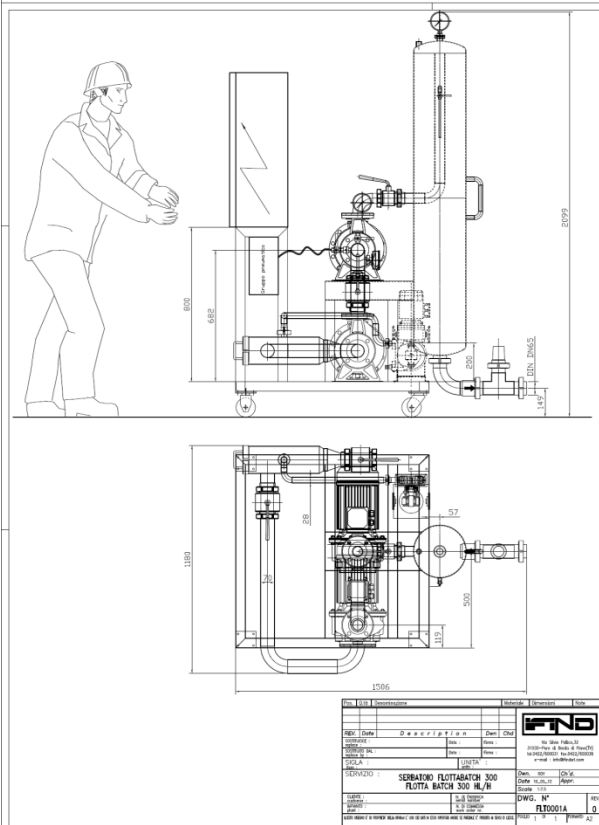


# FLOTATION:

## DISCONTINUOUS FLOTATION(1):



### DISCONTINUOUS FLOTATION SYSTEMS WITH EXPANSION VAT

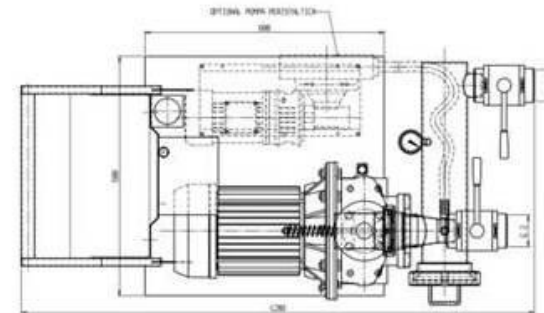
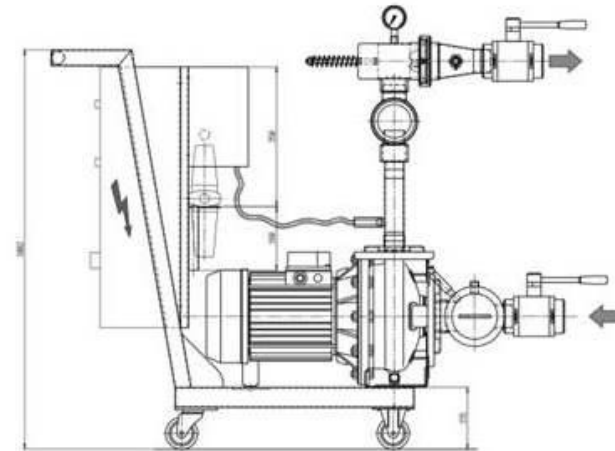


FLOTATION:

# DISCONTINUOUS FLOTATION(2):



## DISCONTINUOUS FLOTATION SYSTEMS WITH EXPANSION VAT



# FLOTATION: DISCONTINUOUS FLOTATION:



Discontinuous  
flotation in  
recirculation or not?

What about the  
temperature?



# FLOTATION: WHAT ABOUT PRESSES:



Phenols?



Free run/pressings?



Oxygen?



Solids?

# FLOTATION: PRESSES AND OXYGEN:

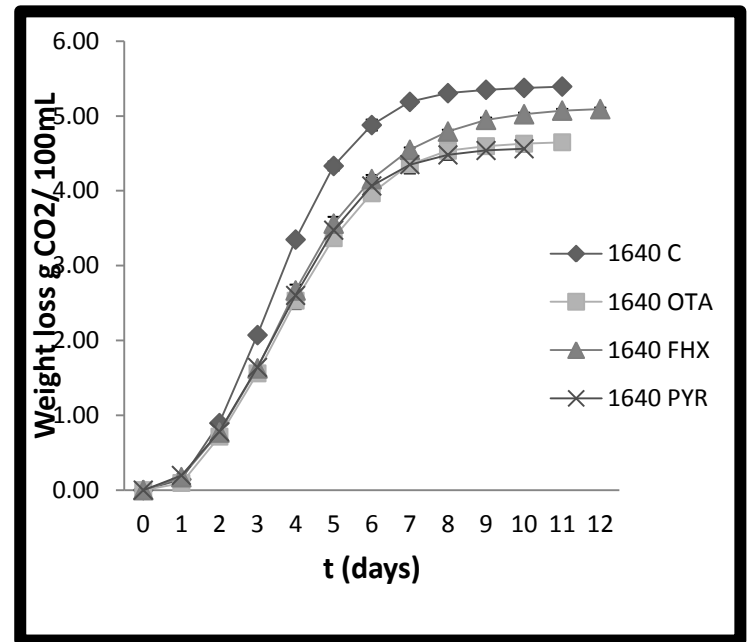


## CONDITIONS IN GRAPE JUICE:

- HIGH CONCENTRATION OF REDUCING SUGARS: >20 % w/w
- LOW TEMPERATURES OF FERMENTATION ~13-14°C
- LOW CONCENTRATIONS OF YAN (<140 mg/L)
- LOW pH
- LOW CONCENTRATION OF DISSOLVED OXYGEN
- ADDITIONS OF SO<sub>2</sub>
- RESIDUES OF PESTICIDES AND MYCOTOXINS

## WHAT HAPPEN IN THIS CONDITIONS:

- STUCK OR SLUGISH FERMENTATIONS
- PRODUCTION OF OFF-FLAVOURS
- REDUCTIVE CONDITIONS
- WINES OF LOW QUALITY



**H<sub>2</sub>S**  
**PRODUCTION**

# FLOTATION: COLD SETTLING vs FLOTATION



## Cold Settling

- almost 24h;
- energy for colling/heating;
- oxidation (colour);
- oxidation (primary aroma);
- storage room;
- non efective add. of clarif.and enzymes;
- coloid problems;
- problems with roten grapes;
- higher amounts of solids; (loss of product)

## Flotation

- 2h, in fermentation;
- low energy consumption;
- low or noone oxidation (colour);
- retain primary aroma;
- less storage room; neded
- efective add. of clarif.and enzymes ,in line ;
- prevent coloid problems;
- prevent problems with roten grapes;
- lower amounts of solids; (loss of product)

# CHEERS!!!



**Cheers  
Salute  
Prosit  
Gezuar  
Genatz  
Zivjeli  
Viva  
Ganbei**



**Nazdravlje  
Noroc  
Do  
Kampai  
Kippis  
A vossa  
Pripitek  
L'chaim**

# Presentation context

- This presentation was given as part of a workshop on grape and juice processing equipment convened by the Australian Wine Research Institute (AWRI) at the 15<sup>th</sup> Australian Wine Industry Technical Conference in July 2013.
- The main intention of the workshop was to provide attendees with information on equipment that is new or unusual or that has not been widely used in Australia.
- This and the other presentations given were prepared by equipment suppliers, not by AWRI, and AWRI does not necessarily endorse the views presented. Before the purchase of any major winery equipment, AWRI recommends appropriate background investigations being undertaken; including visits to facilities already using similar equipment, consultation with independent experts and the performing of in-house trials.
- AWRI received no payment from suppliers for the inclusion of their equipment in the workshop.
- For any further details on the workshop please contact AWRI Senior Engineer, Dr Simon Nordestgaard, by email at [simon.nordestgaard@awri.com.au](mailto:simon.nordestgaard@awri.com.au).