YALUMBA

FAMILY VIGNERONS c. 1849

Practical Oxygen Management in the Winery

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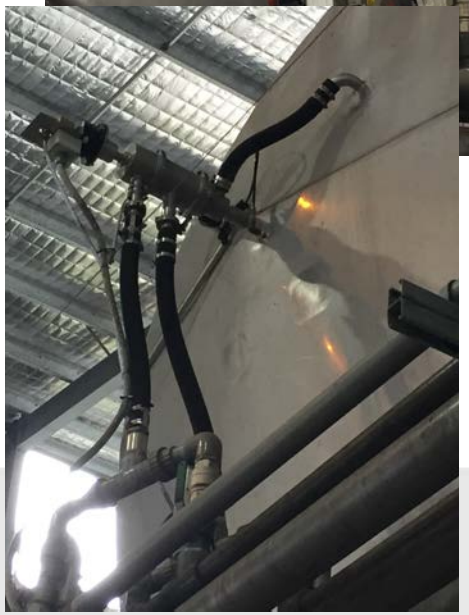
Overview

1. Fermentation Oxygen addition
2. Ullage Management
3. Bottling Oxygen management

Fermentation Air Additions

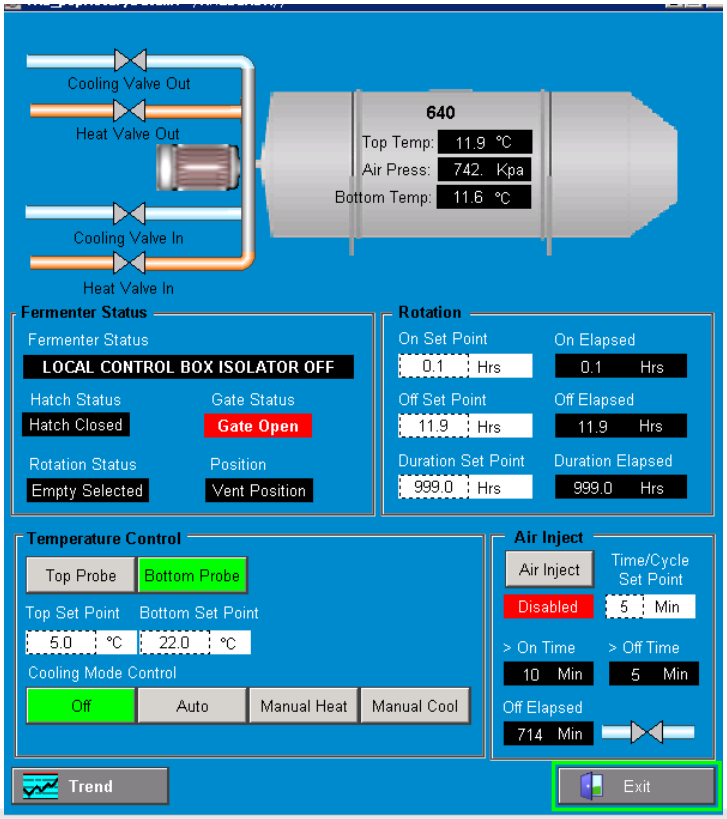
- Since 2014
- 100T SWAPs sinter on pump over
- Vinimatic fermenters
  - Automated air addition
  - Air through rotary coupling



Fermentation Air Additions

- We implemented a automated addition system around rotation recipes.

- How much to add?
- When?
- Could we measure it?
- What about DO?



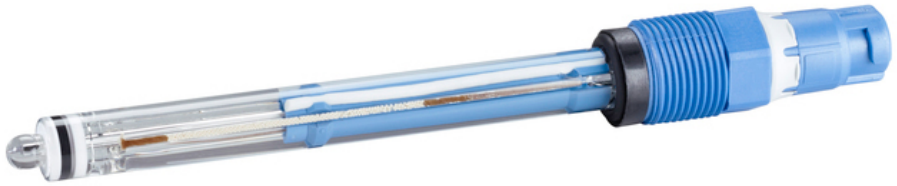
Redox

- Redox potential

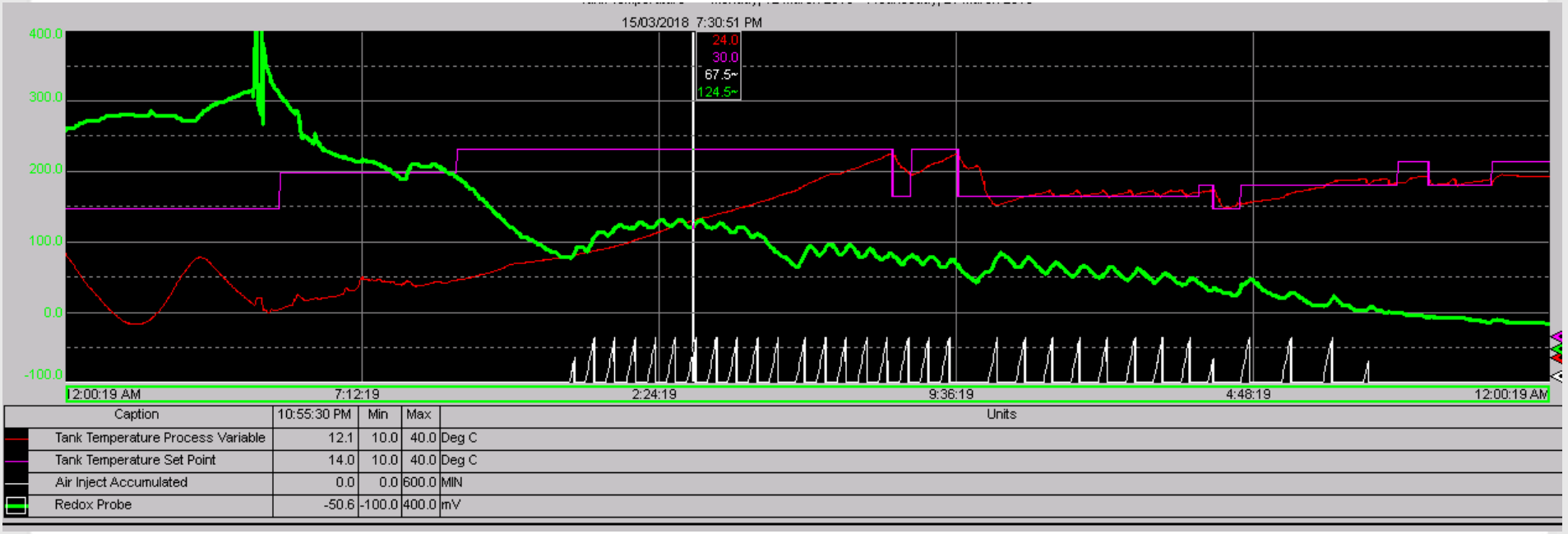
- What is Redox?
  - Oxidation Reduction Potential
  - “It’s like pH…….
    …….but different”
  - It’s the measurement of active electrons in a solution (units mV)

Inline Measurement

- E+H ORP Memosens sensor in a 100T SWAP fermenter
- This was the same fermenter we used for our oxygen addition trials



Redox Trend Data



Caption	10:55:30 PM	Min	Max	Units
Tank Temperature Process Variable	12.1	10.0	40.0	Deg C
Tank Temperature Set Point	14.0	10.0	40.0	Deg C
Air Inject Accumulated	0.0	0.0	600.0	MIN
Redox Probe	-50.6	-100.0	400.0	mV

Green – Redox

White – Air addition timer

Purple – temp S.P

Red – temp PV

What can we do with it?

- Cater oxygen addition to ferment dynamics
- Maintain a baseline redox value during fermentation
- Increase yeast and ferement health to minimise sulfide formation, improve tannin cross linking
- Identify when we had a problem

What next?

Vintage 2019 – new probe in storage tank

- Monitor micro-ox
- White wine fermentation

Dissolved Oxygen management

- Maintain O_2 at surface below 0.5-1%
- Best done with a constant flow at surface
  - Use telescopic spears on storage tanks
  - Buffer tanks more challenging
  - Floating gas dispensers
- Dry Ice can be useful for purging a space, but not for long term coverage

Prebottling Oxygen Management

- Pretty much every tank will be on ullage
- Continuous Flow
- Removing all of the oxygen requires a lot of inert gas (3-5 times volume)
- 12,000 bottles /hr = 200 bottles / min
  - 150L/min of wine removed from tank
- Remove operator error
  - Level sensors linked to ullage management

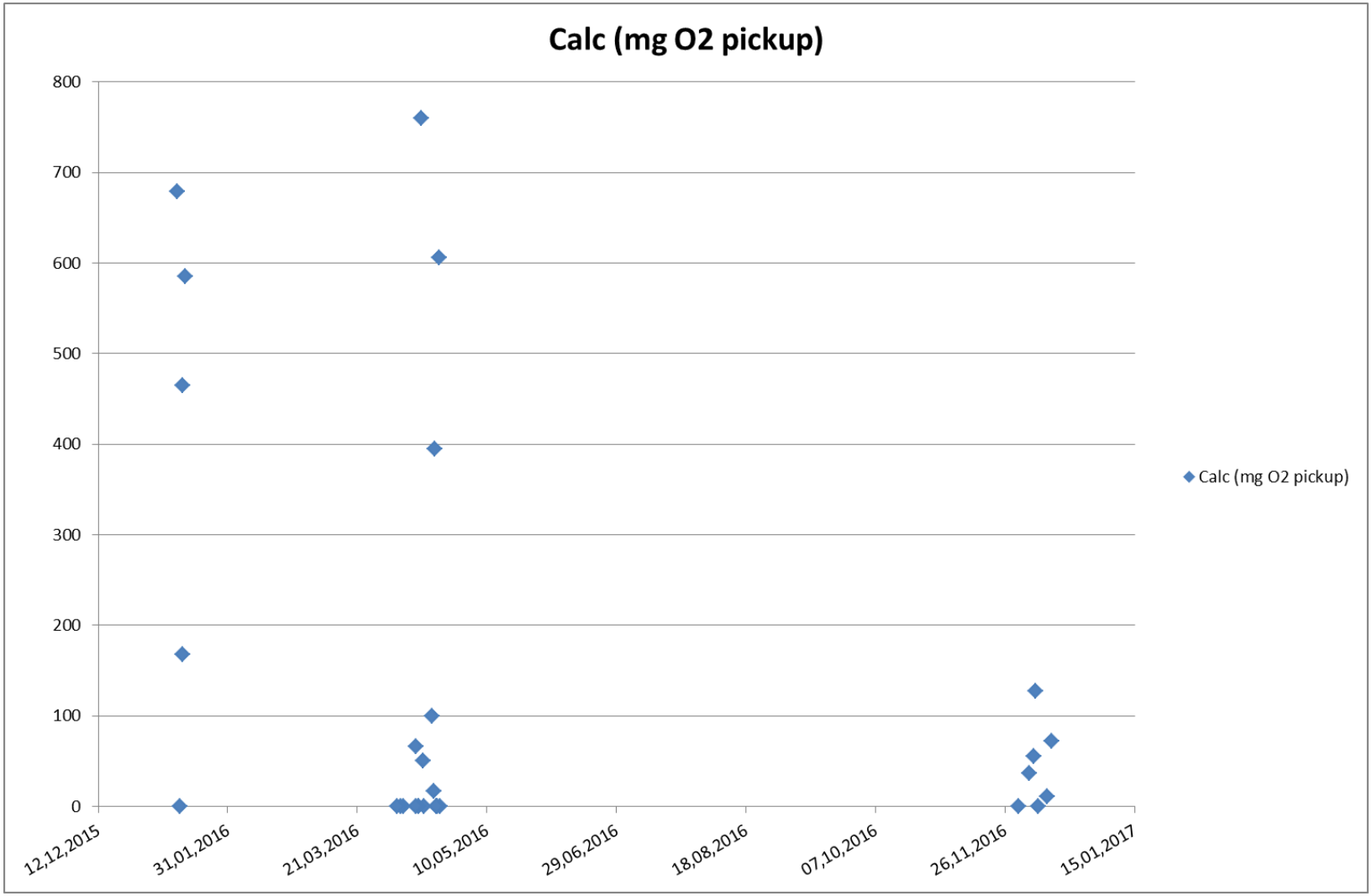
Prebottling DO management

- Gas contactor membranes
  - DO management
  - CO_2 correction at last point possible
  - N_2 removal prior to filling
- Multiple units on the market now
  - Varying levels of control and automation

Filler DO management

- Minimising TPO in bottle
- Measuing at line is critical
- Multiple steps including
  - Low DO in wine
  - Filler tank
  - Pre-evac
  - Headspace
  - Closure
- Don’t waste inert gas where it’s not needed or is ineffective
  - Bottle rinsing

Inline DO Measurement



Main points

- Oxygen addition during fermentation
- Redox to maximise benefit of oxygen addition
- Gas transfer membranes for gas management
- Ullage management
- Online DO measurement
- Minimising TPO pickup in bottle

Acknowledgments

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