

# Dissolved Oxygen Measurements in Brewing

## BACKGROUND

Brewing is an art that is becoming increasingly scientific in its approach to the perfect beer. Figure 1 shows the process flow as the raw ingredients (water, hops, malts, grains, barley, yeast, etc.) are processed to create the final beer product. Water is a critical ingredient, since over 90% of beer consist of water. Brewers' issues are taste, consistent quality, and longer shelf life to prevent spoilage. The modern brewer is moving from an art form to a reproducible scientific process. Analytical measurements play a pivotal role in this transformation. Beer making will always be an art, but Rosemont Analytical helps the master brewer consistently brew the best product possible.

## DISSOLVED OXYGEN SOLUTIONS

There are several critical control points throughout the brewery. One critical measurement is dissolved oxygen (DO). DO is measured in water purification, fermentation, aging, filtration, and filling. Dissolved oxygen monitoring throughout various stages in the brewery is critical to quality control as well as increasing final product shelf life. Too much oxygen

in the purification, aging, filtration and filling stages will affect quality by producing dimethyl sulfide (DMS), or "skunk beer". Too much oxygen may also affect the beer's shelf life. Too little oxygen in the fermentation stage will affect the yeast's effectiveness. Sterile air or pure oxygen may be added to ensure the yeast strain is in the ideal environment.

## INSTRUMENTATION SOLUTION

Rosemount Analytical Model Bx438 Dissolved Oxygen Sensor with either the Solucomp Model Xmt or Model 1056 Analyzer is the dissolved oxygen solution for the brewery.

The Model Bx438 Dissolved Oxygen Sensor accurately measures dissolved oxygen below 10 ppb. All elastomers are FDA compliant. The sensor is not flow dependent. The sensor includes material traceability to DIN 3.1b.

The Solu Comp Model Xmt-A with FOUNDATION Fieldbus is a digital solution. The Model Xmt-A transmits digital signals to a well-designed DCS such as Delta V. The Model 1056 uses a 4-20 mA analog signal with superimposed HART.

## INSTRUMENTATION

### Model Xmt-P Two-Wire Transmitter

- Choice of communication protocol: HART<sup>®1</sup> or FOUNDATION<sup>®2</sup> fieldbus.
- Simple-to-use menu structure.
- PlantWeb Enabled.



### Model Bx438 Dissolved Oxygen Sensor for Carbonated Beverages

- Highly accurate dissolved oxygen sensor.
- No oxygen offsets due to CO<sub>2</sub> effects.
- Robust, long lasting membrane design.
- Lower total cost of ownership.
- Wide range, from low PPB to high PPM.



### Model 1056 pH Analyzer/Controller

- NEMA 4X (IP65) weatherproof, corrosion-resistant enclosure.
- Fully descriptive diagnostic messages.
- Two independent outputs.
- Field configurable



<sup>1</sup> HART is a registered trademark of the Hart foundation

<sup>2</sup> FOUNDATION fieldbus is a registered trademark of the Fieldbus Foundation

# Brewery Process Schematic

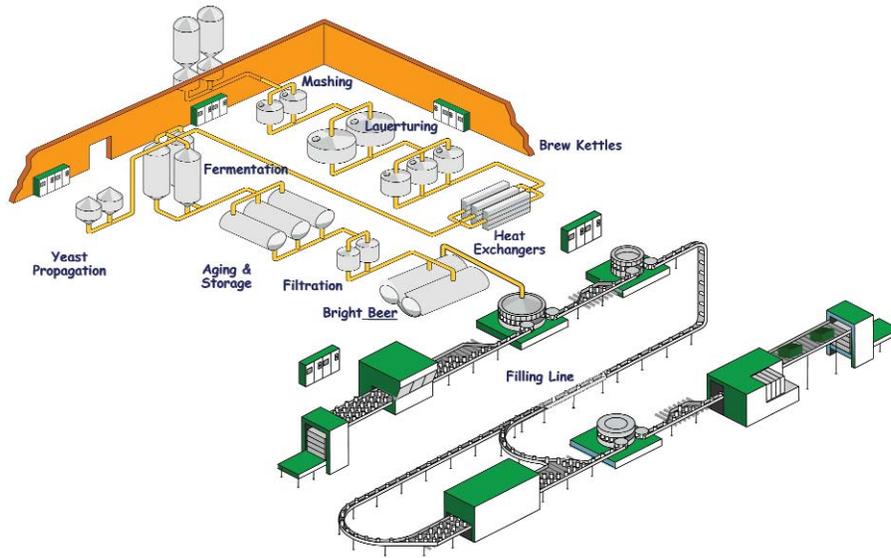
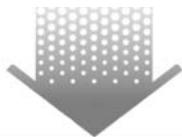


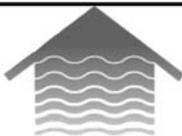
FIGURE 1. Brewery Process

Measurements	DO
<b>Stages</b>	
<b>Mashing</b>	
<b>Fermentation</b>	X
<b>Aging</b>	X
<b>Filtration</b>	X
<b>Fill Lines</b>	X
<b>Utilities — Water Purification/Filtration</b>	X
<b>Utilities — Boiler/Steam Generation</b>	X
<b>Utilities — Clean-in-Place</b>	
<b>Utilities — Waste Water Treatment</b>	X



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