Core Brewery Beer Carbonation

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THE PROBLEM

Core Brewery in Springdale, AR wants to reduce their carbon footprint by reducing wasted carbon dioxide in their beer carbonation process and speed up the process itself.

Our goal is to modify BlueInGreen's patented CDOX technology to more efficiently dissolve CO2 in to beer and reduce the labor costs associated with the carbonation process.

The current process involve bubbling in CO2 through a carb stone and letting the bubbles float up to the top and dissolve in the beer. This process is extremely inefficient. Core estimates that of approximately 1500lb/week of CO2, half of that is wasted into the atmosphere.

THE PROJECT

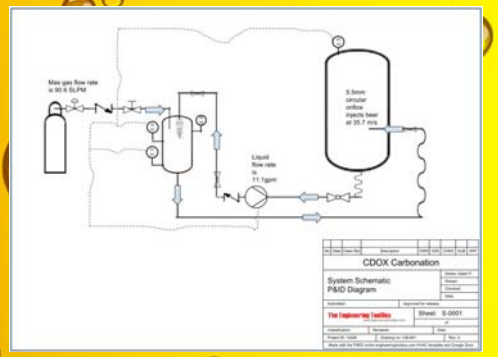
Our project began with lots of background research into beer carbonation technologies and how to apply all of the specific food grade requirements to the CDOX system. The carbonator was sized based on desired carbonation times expressed by Core for their 20 barrel, 40 barrel, and 120 barrel carbonation (or brite) tanks. An existing prototype of the CDOX from a previous senior design team was used for test data and then scaled up. We had to determine flow rate, velocity, pipe size, pressure vessel size, pressures and more using the skills (specifically Bernoulli's equation) acquired from the BENG curriculum. Excel models were crucial in finding the most efficient values, and AutoCAD drawings helped us visualize our design.

THE OUTCOME

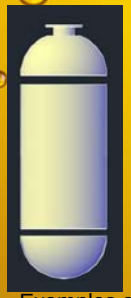
. We have decided to use BlueInGreen's new streamline CDOX because it is much cheaper due to less automation, and possibly most efficient.

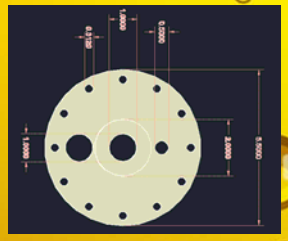
PICTURES

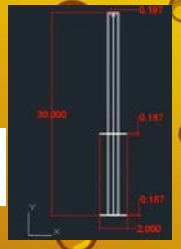
40 bbl Brite tank



P&ID for a CDOX alternative



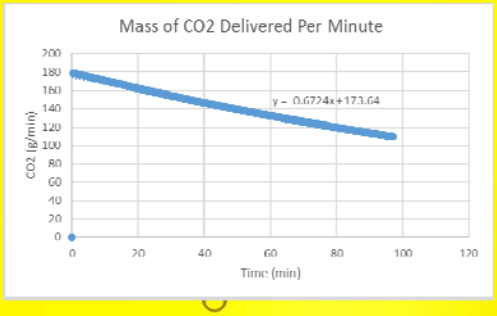




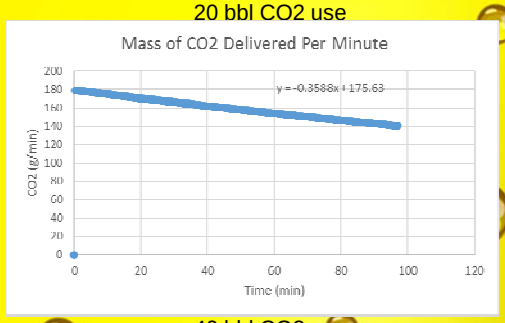
Examples of CAD drawings

BlueInGreen
solutions for water quality

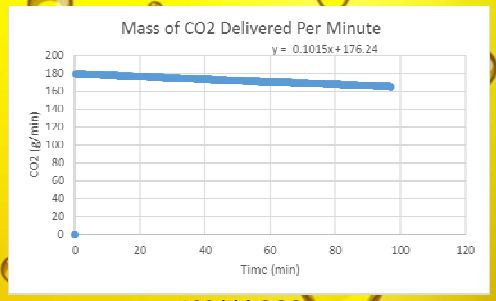
GRAPHS



20 bbl CO2 use



40 bbl CO2 use



120 bbl CO2 use

THE OUTCOME

20 bbl CO2 use – 10 lb per batch

40 bbl CO2 use – 20 lb per batch

120 bbl CO2 use - 60 lb per batch

SUSTAINABILITY

. This project contributes to sustainability by reducing the carbon footprint of Core Brewing company in Springdale, AR. Their current carbonation system releases approximately 750 lb of carbon dioxide into the atmosphere each week. With our modified CDOX technology, we should be able to achieve around 95% efficiency in dissolving CO2 into the beer. This will reduce the amount of waste CO2 by 675 lb per week (1000% reduction). This system will significantly cut down on labor hours for the brewery, time spent waiting for carbonation to reach desired levels, and the amount of carbon dioxide released into the atmosphere as waste. This saves the brewery time and money, and prevents unnecessary pollution into our environment

This project gave our group real world experience working with a client and using the skills of the engineering design process to help meet the client's needs. This project reminds us to always consider sustainability in our designs because everything is connected, even if it doesn't appear so on the surface.

This poster was prepared in partial fulfillment of SUST 4103 Sustainability Capstone