67

MASTER BREWERS ASSOCIATION OF THE AMERICAS

The Role of Eco-Friendly Processes in Packaging Beer

(Bob Pease, KHS USA, Inc.)

MBAA Annual Conference
June 5–7, 2014
Palmer House, a Hilton Hotel
Chicago, IL

Abstract

Packaging beer into bottle & cans – more specifically the filling process – consumes significant quantities of CO2, water and electricity.

Even as breweries strive to be more environmentally-friendly, packaging operations are challenged to improve performance, raise hygiene protocols, and increase change overs.

Consolidation of beer packaging has resulted in fewer lines and ultimately higher filling speeds. Typical machines today are very large requiring more energy and media (water, CO2, etc.) to operate at today's high filling speeds.

Additionally, hygiene protocols are extensive. There is an increased emphasis on sanitation and prevention of bacterial growth and other contamination. Beer products, unfiltered or unpasteurized have limited shelf life requiring higher hygienic protocols. The primary vehicle in sanitation is – water, heated water, and water with detergent - that applies both externally and internally to the machines. In many cases this application must be rinsed with additional water. And of course the result is waste water.

Perhaps most significantly the number of beer SKU's have skyrocketed resulting not only more stringent hygiene protocol but also more frequent sanitation as the machines change SKU to SKU.

Methods

Hygiene

Much of innovative machine design has focused on clean design. Machine surfaces, external components, moving parts and supporting structure have been greatly reduced. Fewer machines mean less clutter, surfaces and cavities that can be contaminated and would need to be cleaned. Internal surfaces have also been optimized to allow complete product dry out and rapid sanitation. Remaining external surfaces are slopped or curved to prevent standing liquids. The result is a machine that can clean both externally and internally rapidly, with minimal cleaning media (water) and resulting in less effluent.

CO2 Consumption

CO2 is a major component of beer and key media in the filling process. The package is flushed with CO2 prior to filling to minimize oxygen pick up during the filling process. Reducing CO2 consumed in this process has been another key focus of machine design. Recent bottle and can filling technology has optimized the CO2 flushing process to achieve lowest oxygen pickup of the beer during the filling process while using minimum CO2. Additionally, the CO2 which in past years were vented to open atmosphere has captured, recycled to flush subsequent containers, and finally safely vented away from the packaging area.

Electricity/Power Consumption

Clean design has fundamental changed power transmission of filling machines. Previous generations massive mechanically drive trains with large motors have been replaced with small servo and direct drive systems. These modern and high efficient drive systems greatly reduce electrical consumption.

Results

Historical CO2 Consumption vs. Current CO2 Consumption

Historical CO2 Consumption: 750 g to 1,000+g / bbl of packaged beer

Today's Designs: 375 g / bbl of packaged beer

CO2 Savings

- $ 115,000/year - 2,200 cpm line
  - 7,000 hour production
  - $100/ton CO2
- $ 63,000/year - 1,200 bpm line
  - 7,000 hour production
  - $100/ton CO2
- $6,125/year – Craft can line
  - Single shift
  - 200 cpm
- $ 3,500/year - Craft bottle line
  - Single shift
  - 200 bpm

Conclusions

Clean design

The key driver of the design is hygiene. A machine with fewer components reduces power transmission, sanitization and waste water. Hygienic design means consistent beer quality.

Contact

For additional questions please contact:

Bob Pease
Director, Wet End Product Group
KHS USA, Inc.
880 Bahcall Court
Waukesha, WI
262-787-5108