A Better Brew

Benefits of Applying Systems Engineering in the Beer Industry

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Key Talking Points

• Brewing equipment design concepts
• Applying SE to HW-centric platforms
• Applying SE in a non-traditional domain where most aren’t familiar with it
Speaker Bio

• Education/Certifications:
  • BS Mechanical Engineering Technology
    • Southern Polytechnic State University – 2005
  • MS Systems Engineering
    • Johns Hopkins University – 2013
  • INCOSE CSEP – 2011

• Work Experience
  • Northrop Grumman – Mechanical/Systems Engineer – 2005 to 2014
  • Fairhope Brewing Co – Head Brewer – 2014 to 2016
  • Diamondback Brewing Co – Brewing Consultant – 2016
  • Premier Stainless Systems – Director of Engineering – 2017 to present
About Premier Stainless

• Founded in 2000
• Core product lines:
  • Brewhouses
  • Tanks
  • Keg washers
  • Brewery support equipment
• International customer base
Core Products: Tanks & Support Equipment
Core Products: Brewhouses
Core Products: Brewhouses
Core Products: Brewhouses
Overarching Design Parameters

• System must efficiently produce wort via the standard brewing process
  • BH efficiency – reducing waste and reducing ingredients
  • Times required to complete each brewing step
  • Repeatability
  • Ease of use

• Tanks – capacities, jacket pressures, insulation, ventilation

• In this context customers somewhat view our brewhouse design as a black box

• Difficult to quantify as the customer’s expectation because these parameters are driven by their experience level and preferred brewing process
Layout Development

• Begin with equipment set defined by final quote
  • V&V paradigm – are we building the right thing
• Receive building details from customer
• Create 3D models to ensure all equipment will fit
• Organize equipment layout
  • Plan for process flow and look at future expansion
  • Account for infrastructure
  • Account for aesthetics
Detail Design

- Start with base design from legacy system
- Customize port layouts to match physical equipment layout
- Add any customer-requested upgrades or customizations
- Create manufacturing drawings and process piping diagrams
Interface Definition

- Equipment utility requirements
  - Power
  - Plumbing
  - Steam
  - Gas

- Equipment physical specs
- Applicable cut sheets

- For overall brewery construction effort we’re just one equipment provider
  - 3rd party is responsible for official set of MEP drawings
  - We’re just a part of a SoS
System V&V

• Production QC
  • BOM validation
  • QC as-built equipment
  • Automated BH system-level control testing

• Deployment & On-site testing/training
  • Reassembly and integration with building infrastructure
  • Full system testing – verification
  • Training & first brews – validation
Takeaways

• Interface definition and control are critical

• With hardware design – changes become exponentially more expensive the later in the process they occur

• SE in this type of environment requires additional effort and diligence as the engineer has to perform the role of the customer as well

• Process tailoring and agility is key to maintaining short development cycles
  • Re-use and standardized designs ease schedule pressures