

System Building



Designing a System

- I apply an Engineering Approach to systems design
- Consider your constraints, and weigh options that meet or exceed requirements and fall within constraints
- Consider existing equipment if present, and if a complex build, consider doing it in stages

Design Constraints

- Constraints to Consider
 - Cost
 - Maximum Gravity
 - Volume
 - Complexity
 - Brewing Time
 - All Grain? Mash Goals?

Mike Christian's Build

- Budget Available, but not huge
- Wants a Speedy Brew with easy cleanup (aim for 4-5 hours start to finish)
- Wants to do All Grain
- Brew 5 Gallons of High Gravity (1.1 OG+)

Consider System Types

- To explore options, we considered different types of all grain setups
- Traditional Mash Tun vs Brew in a Bag
- Traditional Infusion Mash vs HERMS vs RIMS

Mash Types

Traditional Mash Tun

- Highly flexible on gravity
- Adds at least one, if not two extra vessels (Mash Tun, Hot Liquor Tank) – extra cleanup
- Multiple Temperature Rests possible, but requires multiple infusions

Brew in a Bag

- Simple cleanup
- No sparging, potentially limiting efficiency (does this matter?)
- Single Vessel for both mash and boil, so less cleanup
- Potentially more equipment to help lift the bag out of the vessel
- Multiple temperature rests still possible, again using multiple infusions

Types of Systems, continued

HERMS

- Heat Exchanged Recirculating Mash System
- Needs a Hot Liquor Tank and a dedicated Mash tun
- Allows multiple temperature rests via indirect heating
- No chance of scorching wort
- Needs at least one, if not two pumps

RIMS

- Recirculating Infusion Mash System
- Needs a RIMS tube (heating element in a tube)
- Allows multiple temperature rests via direct heating
- Needs at least one pump
- Doesn't need a hot liquor tank
- Risks scorching wort

Start Designing

- Start thinking about options vs design constraints
- Would it be possible to run a brew in a bag with a RIMS setup? We think so!
- One challenge: A RIMS tube requires a pump to push wort past the heating element to increase temperature... what about boiling?

A note about pumps

- Pumps have performance constraints
- They can only push a given volume so high
 - This is called “head” and is measured as distance
- When bubbles form in the liquid the pump becomes less effective
 - This is called “cavitation”
 - Cavitation happens during boil
 - Don’t pump boiling liquid!



How do we solve boil with RIMS?

- Implication: RIMS systems are all electric
- Heating element in the RIMS tube
- What if we add a second heating element in the kettle?
 - The “bag” part of brew in a bag now risks resting on the heating element.... Is this a problem?
 - Only if you turn on the second element while the bag is in place

Concept of Operations

- Mash with the Brew in a Bag setup
 - Heat added through RIMS tube, constant pumping during mash, continually recirculating wort
 - Pull the bag at the end of mash and suspend bag over the kettle (use a winch mounted on the ceiling!)
 - Unplug the RIMS tube, and plug in the other heating element into the controller for boil
 - At end of boil, drop a wort chiller coil into the kettle

How can we ease cleanup?

- Use a fine-mesh metal basket instead of a bag
- But wait! There's a heating element in there?
- Put feet on the bottom of the basket to clear the element
- Utah Biodiesel Supply makes custom mesh baskets for brewing that fit perfectly into your kettle, and are not super expensive



Needed Equipment List

- 1 Kettle – 15 gallons
- 1 Metal Screen Mesh Insert
- 1 RIMS tube
- 1 extra heating element
- 1 pump
- 1 winch
- High temperature tubing
- Quick disconnects
- Wort chiller

Where do I buy stuff?

- Not the only resources, but I've had success with these vendors
- Local Homebrew Shop – give them your business, they care about you!
- Utah Biodiesel Supply - www.utahbiodieselsupply.com
- Northern Brewer - www.northernbrewer.com
- MoreBeer - www.morebeer.com
- NorCal Brewing Solutions - www.norcalbrewingsolutions.com
- eBrew Supply – www.ebrewsupply.com
- The Electric Brewery – www.theelectricbrewery.com
- McMaster Carr - www.mcmaster.com
- Grainger – www.grainger.com