Induction Brewing

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About Me

- Josh Weikert
  - Began brewing in 2007
  - BJCP Master Judge
  - “Hit for the cycle” as a competitive brewer, 2012 EPHY
  - President & founding member, Stoney Creek Homebrewers

- I am not a metallurgist or a physicist (my PhD is in political science, not “real” science)
- I do not sell or in any way profit from the increased use or production of induction burners
- I am simply someone who hates very hot/cold weather and wanted to brew inside.

Brewing Heat Sources

- Gas
  - Positives
    - High power output
    - Control
  - Negatives
    - Need for ventilation
    - Cost/Inefficiency
- Electric (resistance burner, heat stick)
  - Positives
    - Can be used indoors
    - Inexpensive
  - Negatives
    - Limited power output (burner)
    - Limited control/slow reaction
    - DIY complications (heat stick)
- Other freaky stuff (magnifying lenses, stone blocks, etc.)

Why Induction?

- Propane is expensive
- Too hot/cold to brew
- Fire is dangerous
- Other electric options are more complex…
- …or too weak

- Induction addresses many common concerns of brewers (indoor, no open flame/element, simple to operate, powerful), with few drawbacks, and it's cheaper than you might think to get started!

Heating with Induction

- A coil of copper wire is placed underneath the pot
- An alternating electric current flows through the coil, which produces an oscillating magnetic field
  - This field induces an electric current in the pot
  - Current flowing in the metal pot produces resistive heating which heats the contents of the pot
- It is the POT that heats
  - Near-100% efficiency

How Much Heat?

- Blichmann jet burner: 72,000 BTUs
- 1800W induction burner: 6146 BTUs
  - BUT, the induction burner is running at near 100% efficiency, while the jet burner is operating at 30-50% efficiency (most heat is blown out around the pot)

- Time
  - Extract: to raise 5G from 70F to 212F = 0.76 hours (45 mins.)
  - All-grain: to raise 5G from 150 to 212 = 0.43 hours (26 mins.)

- Cost of operation (assumes 2 hours of operation):
  - Jet burner: 40% of a $15 tank = $6/batch
  - Induction: 3.6 kwh at 11 cents/hour (top PECO rate) = $0.41/batch
  - Roughly 15x more efficient

Equipment

- To operate on an induction burner, the pot material must be ferromagnetic
  - 432 and 304 stainless steel offers the highest resistivity
  - **Simple test: place a magnet on the bottom of the pot.** The better the grip, the better it will perform.
  - Thin-thickness equipment *can* warp over time
  - EXCELLENT for other cooking uses, especially with cast iron pots/pans!

- Pot geometry
  - Taller (soup can) pots seem to perform better than wider (tuna can) pots

The Burner

- 1800W
  - Runs off of a standard 120v outlet
  - Brings 5G to a low boil
  - Some basic pot insulation is recommended to avoid heat loss out of the sides of the pot
  - Cost: $150*

- 3000W+
  - Commercial-grade, faster-heating and may allow for larger batches, but requires greater electrical commitment (220v outlet)
  - Cost: $250*

**These prices are approximate, but real: don't overspend on this item. For example, Viking's 1800W induction cooker is over $500, for the same heating output*

5G at Boil

Induction Advantages

- Safety
  - No open flame/heating element
    - Can be left unattended
    - No risk of burns/fires
- Mash/Lauter/Sparge
  - In a direct-fire mash tun or recirculating system
  - Faster/cheaper heating of mash/sparge water than on stovetop
- The Boil
  - Lower evaporation rate
  - Very low risk of boilover
  - No impact on isomerization
  - Very limited scorching (easier cleanup, equipment life)

Induction Disadvantages

- Batch Size – TOO SMALL!
  - 1800W can boil 5 gallons
  - May be able to increase with properly designed pot (geometry)
  - More powerful units are available
  - Dilution
- Time – TOO SLOW!
  - Slower-heating than gas or heat-stick systems
  - Process refinement can address this

My System

Process/Time Savings

	Prep		Mash				Lauter/Sparge			(Heat)	Boil				Chill	Clean
Gas																
Induction																

= 15 Mins

- Time savings – approx. 90 minutes over a four-hour brewing process

- Prep mash water
- Mash – at 40mins, turn on mash out & sparge water
- Lauter – turn up sparge water, start heating runoff in-pot
- Sparge – turn boil kettle to max to cut heating-to-boil time
- Boil & leave
- Chill & clean up

Adding Induction to your Brewery

- Primary or Alternate System
  - Primary system for smaller-batch brewers
  - Alternate system during very cold/hot months
  - Pilot/small-batch system
- Supplementing your existing system
  - Incorporating an induction burner for mash/sparge water
  - Starters
- Performance?
  - 81/85 beers in the last four years have earned medals in competition
  - 2012 Eastern PA Homebrewer of the Year

- **SAVE TIME AND MONEY, in the comfort of your own home!**

In Conclusion

- THANK YOU FOR YOUR ATTENTION, and if anyone thinks of any questions later, please feel free to see me after the seminar, in the Liberty Well, or around the conference!

- Questions?

- REMINDERS:
  - I am not a metallurgist
  - I am not a physicist
  - I do not sell induction burners (but I can tell you who does…)