Induction Forge Training

@team_blacksmithing

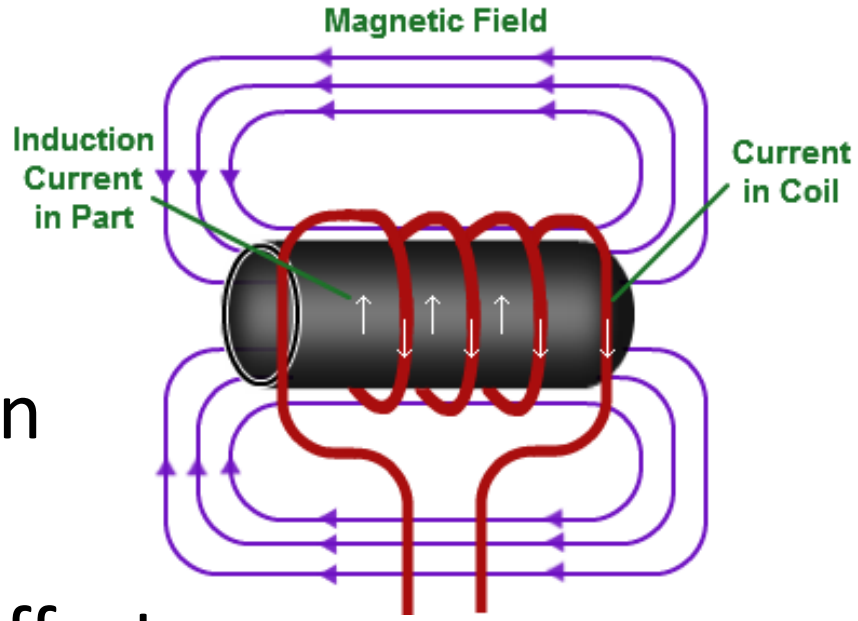
V0.8

Safety First

- General Blacksmithing Concerns
  - Hot stuff
  - PPE
  - Burn care
  - Stuff we can’t handle
- Induction-Specific
  - High Freq radio noise: Not good for implants like pacemakers
  - Metal-containing jewelry, pins inside can cause issues

Induction Forge – How It Works

- High Frequency current in coil
- Loops create a magnetic field
- Induction causes current in the part
- Eddy currents generate molecular friction, friction creates heat
- Rising heat compounds effect



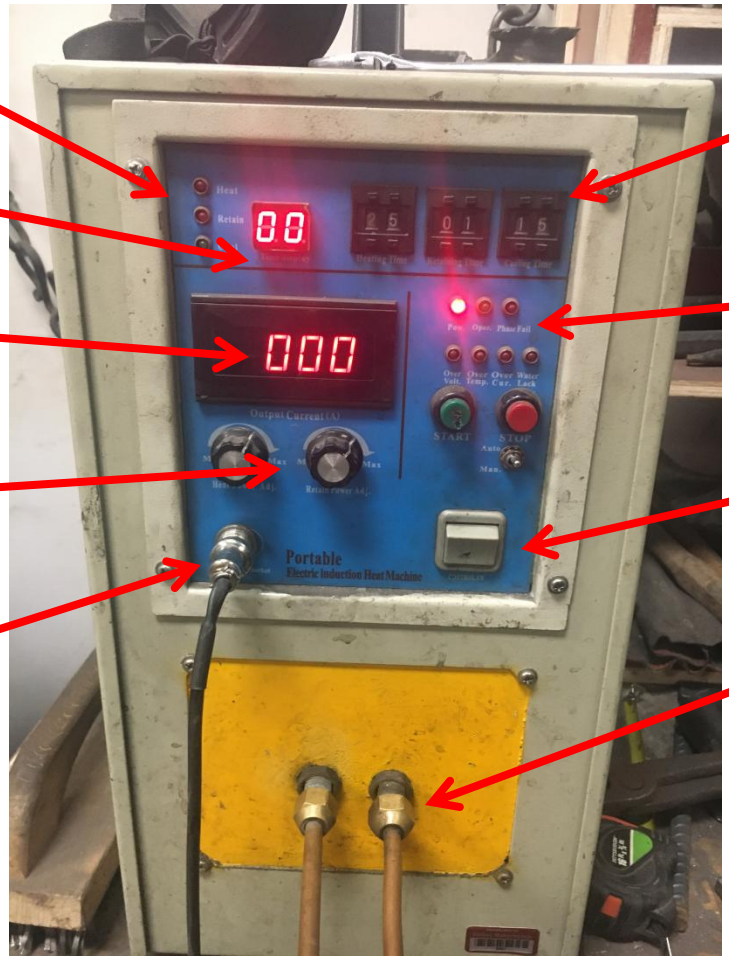
Safety Second

- Tool Doesn't Care Where Induction Occurs
- Can cause problems:
  - Can heat tongs, jewelry, other metal
  - Not just within the coils
- This can be used to your advantage
  - Awkward parts can be heated
    - between leads
    - Near the ends of the coils
- You may need to plan your forging to abide by geometry limitations

Two Boxes, One System

- Forge consists of two parts:
  - The Induction Forge
  - The DMS Radiator (under the table)
- Radiator powers on automatically when induction forge powered up
- Coolant flow Helps keep the coils cool - allows longer work time (hours) before overheat
- Can cool machine down more quickly if Over Temp light is on

Front Panel


Mode Lights
Cycle Timer
Current Current
Current Limits
Foot Pedal Cable
Heat/Hold/Cool Time Setting
Status Lights
Power Switch
Induction Coil
Portable
Electric Induction Heat Machine

Timers and Timing

- Cycle Timer Heat Hold Cool

- When the foot pedal is clicked, the Cycle Timer will track each cycle's timer (Heat/Hold/Cool) in sequence

Setting The Timing

- Leave “Hold” at 1 second
- Leave Auto/Manual on “Auto” for manual timing (Switch is installed upside down - don’t ask)
- Set up max 67% duty Cycle (2 on and 1 off) for Heat and Cool
  - Ex: 30 heat, 15 cool, or 20/10 for smaller items

Timing Selection

- Use longer heat times for larger pieces
  - Max 60/30
- Setting too long a Heat time will make you less efficient, as you can't reheat until all three timers have sequenced

Running One Cycle

- Insert metal, click the foot pedal
- Metal will heat as cycle counter counts up to end of Heat timer
  - OK to remove early
- Will then count for “Hold” and for “Cool”
  - You should be working the metal on the anvil during this time
- Pressing the pedal will start the next cycle
  - Pressing before Hold/Cool complete won’t do anything
- Changing the timing while still within one cycle won’t change THIS cycle, but will apply next loop

Beyond the Norm

- Geometry may make inserting metal difficult/awkward.
  - You can insert and set into position before pressing foot trigger
- You can disable the timer cycle to stop a heat early to make removal from coil easier w/out shorts/sparks
- You can use the arms of the coil or outside the coil to (inefficiently) heat your metal if it won't fit inside coils

Troubleshooting

- No Power/Fan/Lights
  - We currently share an outlet with the powder coat oven
  - Check the plug
    - If Powder Coat is plugged in, OK to unplug ONLY if not running (glowing number gauge lit on lower right of Oven Panel)
    - A complete powder coat cycle is typically only 20-30 mins, so can use outlet shortly if currently in use

Troubleshooting (cont)

- Sparks
  - You can short out the coils with metal – use care not to do so
    - It's hard on the electronics
    - It can stop your heat cycle
    - It can be startling
  - Sparking only occurs during Heat cycle

Error Lights

- Error Lights
  - Under Normal Conditions, only the Power light will be on
  - Over Temp means the machine needs a break (coolant is too hot)
    - Leave running so radiator can do its job
  - Over Volt, Over Current, & Water Lack should be reported
    - Shut down, tag out with note, and report on Talk and tag @team_blacksmithing

Coils and Induction

- We have different coils for different tasks
- More loops = more efficient heating
- Closer coils = more efficient heating
- Can swap out coils to meet your needs
- White material on coils is a thermal and electrical insulator
- Not necessary, but nice to have

Coil Swapping

- Coils have coolant (distilled water) running through them
- Use two wrenches on connector when tightening/loosening
  - Reduces torque on internals
- When tightening, you want snug, not gorilla tight
- An occasional drip is OK, but if leaking, probably needs tightening
- No need to drain coolant – just swap quickly

Shutting Down/Cleaning Up

- OK to turn off at end of use, but if used for long time, let run idle for a bit and cool the coolant
- Put away tools, clean up scrap
- Place anvils, tools, post vise in a reasonable place

Issues or Concerns?

- Open a Trouble Ticket on TALK
- Tag @team_blacksmithing
- Reach out to a Blacksmithing Committee member for help