Mark4 printer todo list – As

1. Fab Aluminum top plate and print bed
   1. Define Cable management concept from dock to tool. Be sure to enable multiple docked tools and one mounted tool.
      1. Define /prototype tool parking concept
      2. Design and prototype cable management structures that can reach to all corners of the build plate when attached to the tool, and not interfere with others on tools that are docked.
      3. Decide how cables get from controller to dock-end of cable management structure. Maybe holes through the top plate near each tool dock.
   2. Define Cable management concept from control board to dock
      1. Define control board mounting. Replace prototype plywood board with "something", ideally cuttable on Big Red. Options:
         * FR4 (aka garolite) – not lasercuttable? But maybe can be marked with the laser for hole locations?
         * Acrylic – not ideal because it might get too warm and is brittle.
         * Aluminum sheet?
      2. Be sure to add standoffs between boards and the board.
      3. Define interface connection for all cables
   3. Define holes needed in top/bottom plates for enclosure attachment.
      1. Add 3mm holes to enable through-bolting of 2020 rail on all edges of the top plate. Just in case we think of something to bolt on.
   4. Revisit pulley standoff attachment – through hole (current design) or threaded top plate. 6/8- Decided to stick with through holes and bolts for the pulley and motor standoffs.
   5. Revisit Y-rail to top plate attachment – through hole (current design) or threaded top plate. 6/8 – Decided to tap holes in the top plate if there is no issues drilling 2.5mm through 3/8 with the milling machine in the metal shop.- Mike to check with David.
   6. Y-Axis limit switch mounting holes
      1. Add holes to the design – both ends of each rail.
      2. Add positive stop to prevent block from going off the rail at minY and max Y.
      3. Do we need to protect the switch better?
      4. Do we need to adjust the travel speed to protect the switch?
      5. Can we wire the switch so that if it gets broken it signals "stop"
   7. Finalize print bed details
      1. Define magnet holes – locations and depths. (Thinking about multiple hole patterns and depths to allow decisions later)
      2. Define and add features for spring steel build-plate alignment
      3. Define spring fastenings or other keepers are each kinematic ball location
      4. Mounting features for heater cable and thermistor cable
      5. Define redundant thermal overrun protection (thermistor location and any required grooves for cable)
      6. Verify the thermal fuse current value in the power switch assembly and see if we want to go lower. Safety in case of short circuit.
      7. Build final print-bed side of bed kinematic supports
2. Fab aluminum bottom plate
   1. Get some nylon footed leveling feet for the base.
3. Complete enclosure design
4. Document setup and calibration procedures
   1. HW assembly, particularly Z-axis components.
   2. Belt tensioning procedure
   3. Define and create any needed HW setup gages.
   4. As-built documentation
   5. SW parameters – z-offsets, dive-heights, other user parameters in the gcode file
5. Optimize Z-axis limit switch mount HW and location
   1. Move home switch position to top of Z axis. Will require combining this function into the z-probe.
   2. Need to prove the inductive switch will work with an aluminum plate so.
   3. Can we also put in a safety limit switch on the bottom of the rail to work as a backup to prevent over-lowering?
6. Investigate wobble and squeak of Z-Axis acme shafts – they wobble and make noise.
   1. Is there enough force to wobble the build pate?
   2. Add Nylon bearing to top end of shaft.
   3. Can we straighten out any slight bends.
   4. Replace one Z-Axis shaft coupler that failed. Maybe switch to a more flexible coupler.
   5. Redrill motor mount holes on Z axis motors to allow some motor movement.
   6. Investigate swapping R/L brackets that hold the Ball side of the Kinematic mounts. Might allow moving the rails and motors up so motors cam be installed without removing the base plate. 6/9 – Investigation complete – decided not to pursue. Moving motor mounts up 12mm will make it so we can get the motors out. Of their mounts without the need to remove base plate.
7. Define the tool lock/unlock motor assembly
   1. Buy parts to allow duplication of the Jubilee lock morot – tensioning cable, springs, limit switches, etc. ,
   2. Motor position
   3. Acquire/print/assembly parts
8. Build a "real Jubilee" tool using the mosquito hot end we bought for the project.
   1. Current tool is prototype.
   2. Water cooled print head ala Mark McComsey – NOT YET.
9. Add an "estop" switch on the printer for user immediate shutoff.
10. Decide on "production" use model for printing and maintenance
    1. If Panel Du, acquire one and figure out where it attaches to the machine
    2. If web-control, need to figure out the controller (Rpi zero?), plus keyboard, mouse, etc.
    3. Our Duet board is wireless. We need to get the wireless in the studio to be robust, rework the Duet board to become wired, or replace the Duet with a wired-LAN version.
11. Before reassembly
    1. Verify all rail blocks have a full complement of bearings
    2. Make alignment tools for assembly (laser cuttable when possible)
       1. Z motor mounts – z direction.
       2. Z- side rail #1 – perpendicular to top plate and centered on 4080 slot.
       3. Z-side rail #2 – parallel to rail #1 (link blocks together)
       4. S-back rail – perpendicular to top plate.
       5. Zrails vertical
       6. Y rails- parallel to each other (link blocks together with bridge)
12. After assembly with the new top and bottom plates, and heated bed
    1. Complete alignment of print bed/ nozzle/ probe.
13. Add LED lights and camera?
14. Additional sw work
    1. Define, inherit marco for tool docking
    2. Z-axis homing – move down or up?