



How to assemble all the pieces of the Ironworker (in progress)

Step by step instructions for assembling the Ironworker machine.

Written By: jeanbaptiste



INTRODUCTION

Before you start this guide, you should have followed all the other ironworker guides to build the different modules.

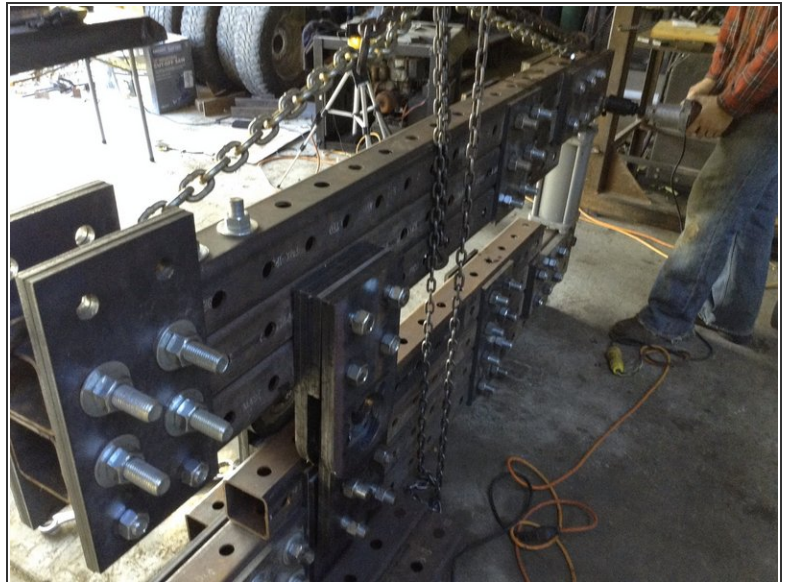
This guide will walk you through putting them all together into a complete machine.

Step 1 — How to assemble all the pieces of the Ironworker (in progress)



- TODO I don't think this video should be in the guide. It more about the process of documenting it and talks about disassembling which may be confusing to people. It doesn't add any info.

Step 2



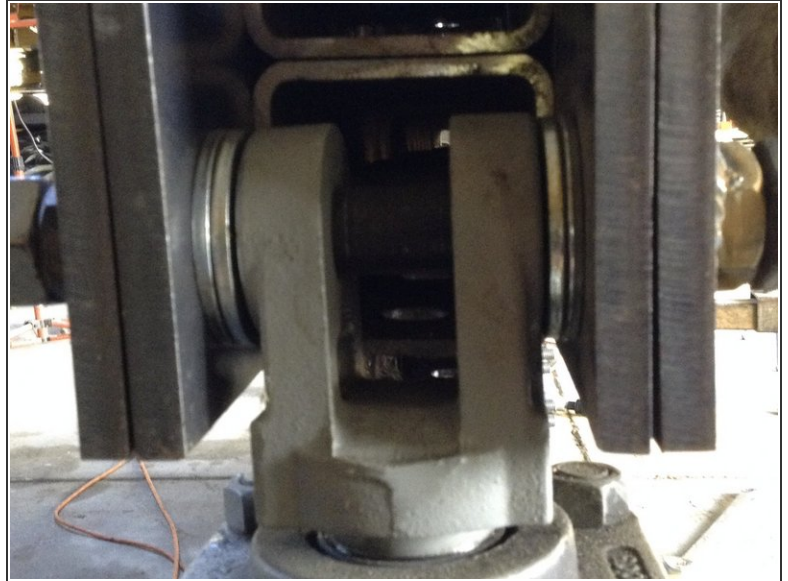
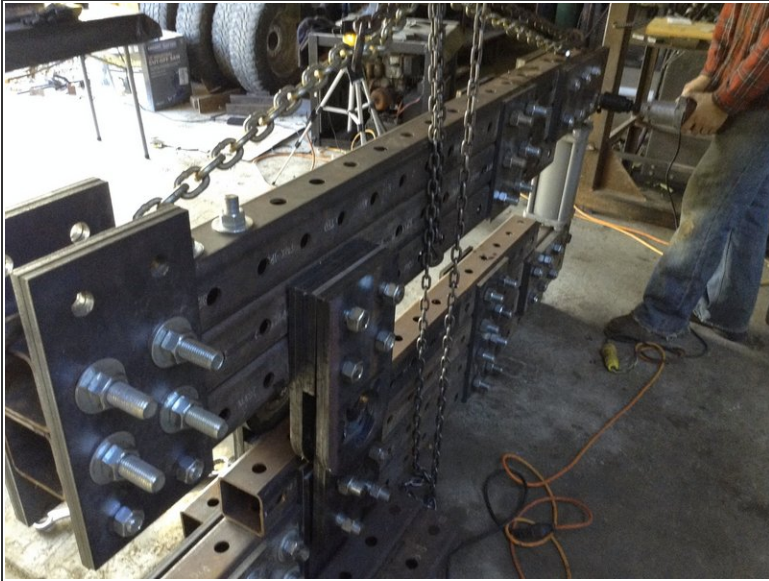
- Use the hoist to lift the upper frame into place, making sure the pivot plate holes roughly align.

Step 3



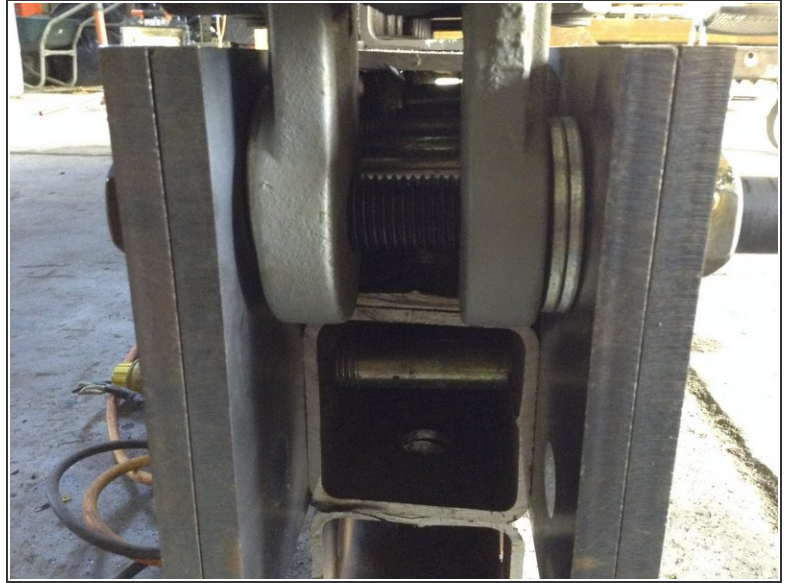
- Parts:
 - 4 1" nuts
- Dill out the threads of each nut using a 1" drill bit.
- TODO pic

Step 4



- Parts:
 - 1 10" x 1" hardened bolt
 - 1 1" nut
 - 4 1" washers (spacers)
- Put a bolt through a drilled out nut, the bottom hole of the plates on the frame, 2 washers, the piston side of the cylinder, 2 more washers, the other plates, and another drilled out nut. Make sure the hose connectors on the hydraulic cylinder face away from the rest of the ironworker.
- TODO better 1st pic
- Put a nut on the bolt but don't tighten all the way.
- If you have trouble getting the bolt through, try using an impact wrench to drive it through. If that doesn't work, it may help to loosen the plates with the welded nuts. Make sure not to put in too many spacers while they're loose and to tighten them when you're done.

Step 5



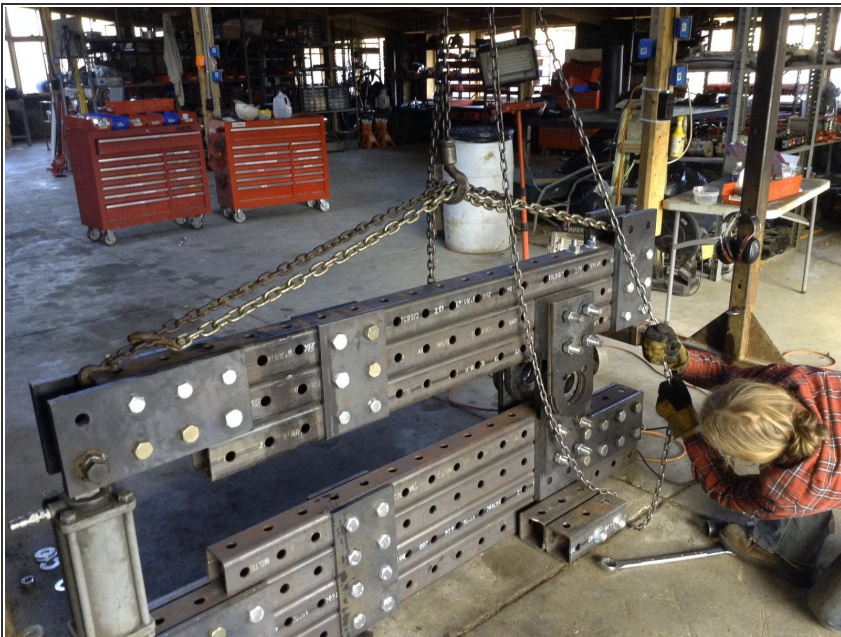
- Parts:
 - 1 10" x 1" hardened bolt
 - 3 1" washers
 - 1 1" nut
- Put a bolt through a drilled out nut, the bottom hole of the plates on the frame, 2 washers, the base side of the cylinder, 1 more washer (on ours there was only room for 3 spacer washers), the other plates, and the last drilled out nut. Make sure the hose connectors on the hydraulic cylinder face away from the rest of the ironworker.
- Put a nut on the bolt and tighten it and the top one.

Step 6



- Weld each of the 4 drilled out nuts to the pivot plates.

Step 7



- Adjust the hoist so that the pivot plate holes line up perfectly.
- Tighten the 8 nuts that hold on the pivot plates. They should be tight enough to hold the pivot plates flat, but not so tight that the plates can't wiggle slightly.

Step 8



- Parts:
 - 1 3" x 8" solid shaft (cut a length if you've got a longer piece)
 - 2 1" nuts
- Weld a 1" nut to each end of the shaft.
- In the picture we put a bolt into the nut temporarily to hold it in place while welding.

Step 9



- Parts:
 - 1 oz grease
- Put grease on the shaft and push it through the pivot plate holes using an impact wrench on the nut welded to the shaft. Each end of the shaft should line up with the outermost pivot plate with a bushing which is the 3rd plate in from each side.
- If you're having trouble getting it all the way through, here are some things to try:
 - Add or remove weight on the shaft by raising or lowering the hoist.
 - Tighten or loosen the bolts holding the pivot plates.
 - Make sure all the pivot plates are lined up properly.
- If you still can't get it quite all the way through leave it for now. As long as it's close, you'll be able to pull it the rest of the way through with the pinch plates in a couple of steps.

Step 10



- Parts:
 - 2 1 hole 1/2" tube
- Put the cubes in between the pivot plates on either side of the shaft. Rest them on little pieces of wood temporarily so that they're about 1/2" above the tube below them.

Step 11



- Tighten the 8 pivot plate bolts.
- They should be tightened with about 150 ft-lbs of force since they're critical for keeping the blades perfectly aligned during cutting.

Step 12



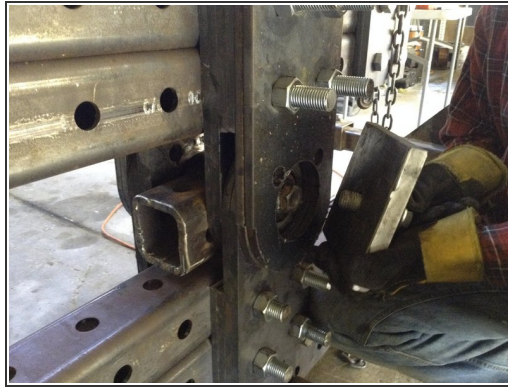
- Parts:
 - 1 1" x 8" x 16" plate (it can be longer than 16")
- Cut 2 8"x8"x1" plates.
- The picture shows 7"x7" plates because we had 7" stock handy. They do the job, but we recommend 8".

Step 13



- Make holes in the center of each 8"x8" plate big enough for 1" bolts. We drilled starter holes and then used an acetylene torch to widen them.
- TODO picture of torching

Step 14



- Parts:
 - 2 1" x 2" bolts
 - 2 1" washers
- Take a 2"x1" bolt, put a washer on it, put it through the 8"x8" plate, and screw it loosely into the bolt at the end of the shaft. Then repeat on the other side.
- If the shaft isn't centered, first put on the plate on the side where the shaft isn't far enough through. Tighten the plate until you see on the other side that the shaft is centered.
- The point of these bolts and plates is to pinch the pivot joint as tightly together as possible. They should be tightened with about 150 ft-lbs of force.
- You want the bolt to be most of the way through the shaft nut when fully tightened. If it looks like the bolt will be too long for the nut and will bottom out against the shaft, add more washers. If it looks like the bolt won't get almost all the way through the nut, take out the washer.
- Remove the wooden supports holding up the 2 cubes in the pivot if they're still there. The pressure from the pivot plates should hold them in place.

Step 15



- Remove the hoist.

Step 16



- Parts:
 - 6 1 hole x 5 hole plates
- Lay the 6 plates on the lower frame in the middle.
- The picture show 3 of the plates shorter. That's a mistake! They should all be 5 holes (20" long).

Step 17



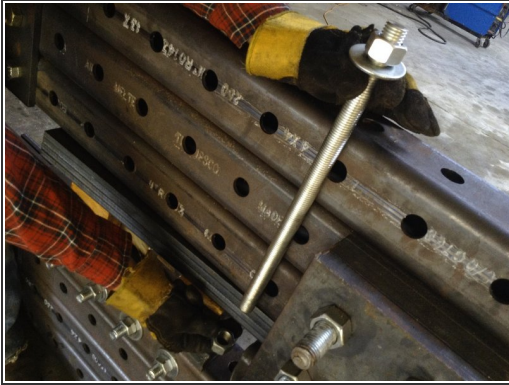
- Put the lower blade assembly in place so it's hanging off the 6 plates with the blade face up.
- Adjust the blade assembly and the riser plates so the row of hole closest to the edge of the 2 x 4 hole plate lines up with the holes in the lower frame tube, and the riser plates extend about 1" past the left edge of the blade towards the pivot.

Step 18



- Parts:
 - 4 1" x 7" bolts
 - 8 1" washers
 - 4 1" nuts
- Put the bolts through washers, the lower blade mount plate, the lower frame, another set of washers, and put on the nuts. Hand tighten them.

Step 19



- Parts:
 - 2 1" nuts
 - 1 1" washer
 - 1 16.5" x 1" threaded rod (TODO link to guide on cutting threaded rod)
- Put a piece of plywood or some other spacer on the lower blade and rest the four plates on it.
- Put a nut and washer on one end of the threaded rod and put it through from the top of the upper frame down through the plates.
- Put a nut below the plates without a washer. Hand tighten.
- Remove the wooden support.

Step 20



- Parts:
 - 4 7" x 1" bolts
 - 4 1" washers
- Put the four bolts with washers through the upper frame. The bolts should go through the washers, then through the frame from the side where the hydraulic cylinder is on the right.
- TODO pics

Step 21



- Put the upper blade support over the bolts from the side where the cylinder is on the left.

Step 22



- Parts:
 - 4 1" nuts
 - 4 1" washers
- Put washers and nuts on the top blade support bolts and hand tighten.
- TODO pics
- TODO press and tighten blades in new steps

Step 23



- Put the table assembly threaded rods through the frame from the side with the lower blade. They should go through the holes on either side of the lower blade plate.
- TODO from mon- reorg this to have threaded rods in this guide. 17" rods. 5 washers. clamp structure and work surface struture separately. clamp bolts 13"

- TODO fix bot mid plate everywhere i took pics on mon

Step 24



- Parts:
 - 2 1" washers
 - 2 1" nuts
- Put a washer and nut on the end of each rod holding the table.

Step 25



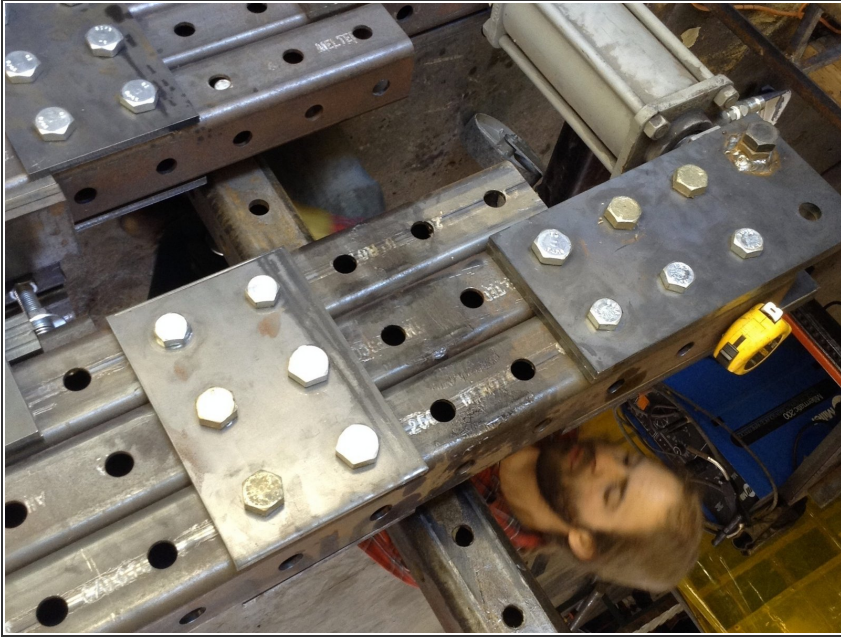
- Parts:
 - 2 ounces of grease (I made up 2 oz, Marcin should verify)
- Apply grease to both sides of the top part of the frame as shown in the picture. Squeeze some out using the gun and then smear it around.

Step 26



- Parts:
 - 3 15" x 1" threaded rod
 - 3 1" washers
 - 3 1" nuts
- put the washer onto threaded rod and screw the nut onto one end
- repeat twice

Step 27



- Parts:
 - 1 1/2" 12 hole tube
- Put three threaded rods through the uprights and tubes on the bottom hole, fourth hole up, and top hole of the uprights.
- TODO better picture

Step 28



- Parts:
 - 2 12 hole 1/2" tubes
 - 3 1" x 16" threaded rod
 - 6 1" washers
 - 6 1" nuts
- Put the two upright on either side of the frame near the cylinder as shown.
- Put threaded rods through the bottom hole, 4th from the bottom hole, and top hole of the uprights. Do NOT put any through the top part of the frame since it needs to be able to move up and down.
- The uprights make sure the bottom and top stay in perfect alignment so the nuts have to be very tight. Use a hydraulic system to open the ironworker all the way and then use 150 ft-lbs of force when tightening these 3 bolts.

Step 29



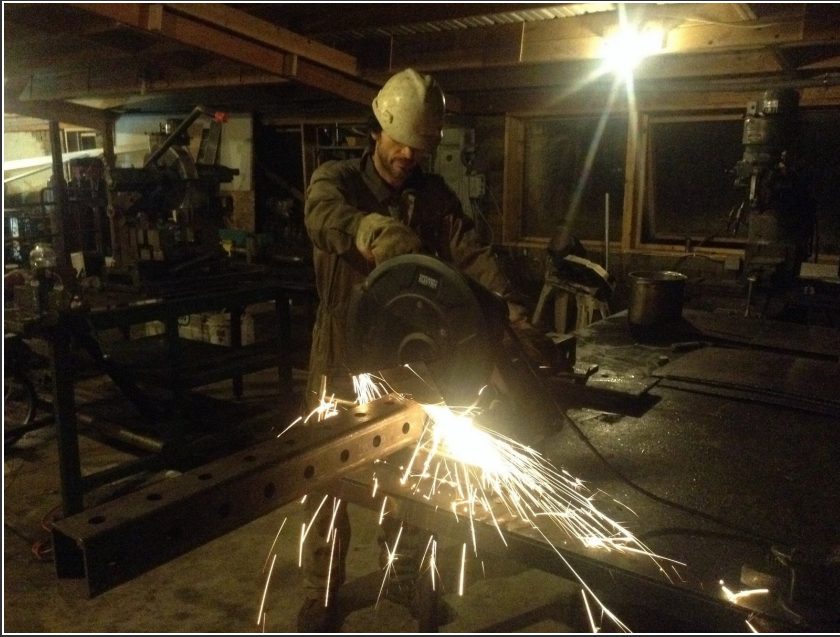
- Adjusted the table so that both surface of the table is at the same height as the edge of the blade.
- To do this, raise the table with the floor jack after loosening table-holding bolts and raise the table level to match the blade edge level.
- Once the table level is set than retighten the table-holding bolts.

Step 30



- Add the legs.
- Use 9 hole tubes, quarter inch wall.
- Bolt rear legs to the stabilizer tubes using a 23" length of threaded rod

Step 31



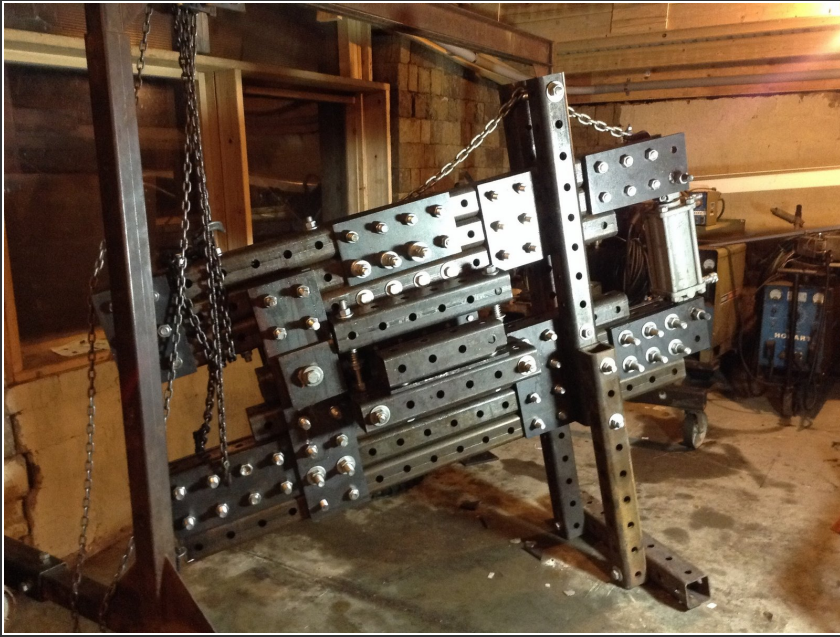
- Cut the leg and feet tubes to size

Step 32



- Use the hoist to lay the machine on its side
- Take off the temporary legs to facilitate moving the machine outside

Step 33



- Hoist the machine up to stand on the rear legs

Step 34



- Raise the front of the machine after it stands on the rear legs
- Add the front legs

Step 35



- Cut bolts for the legs

Step 36



- Finished!