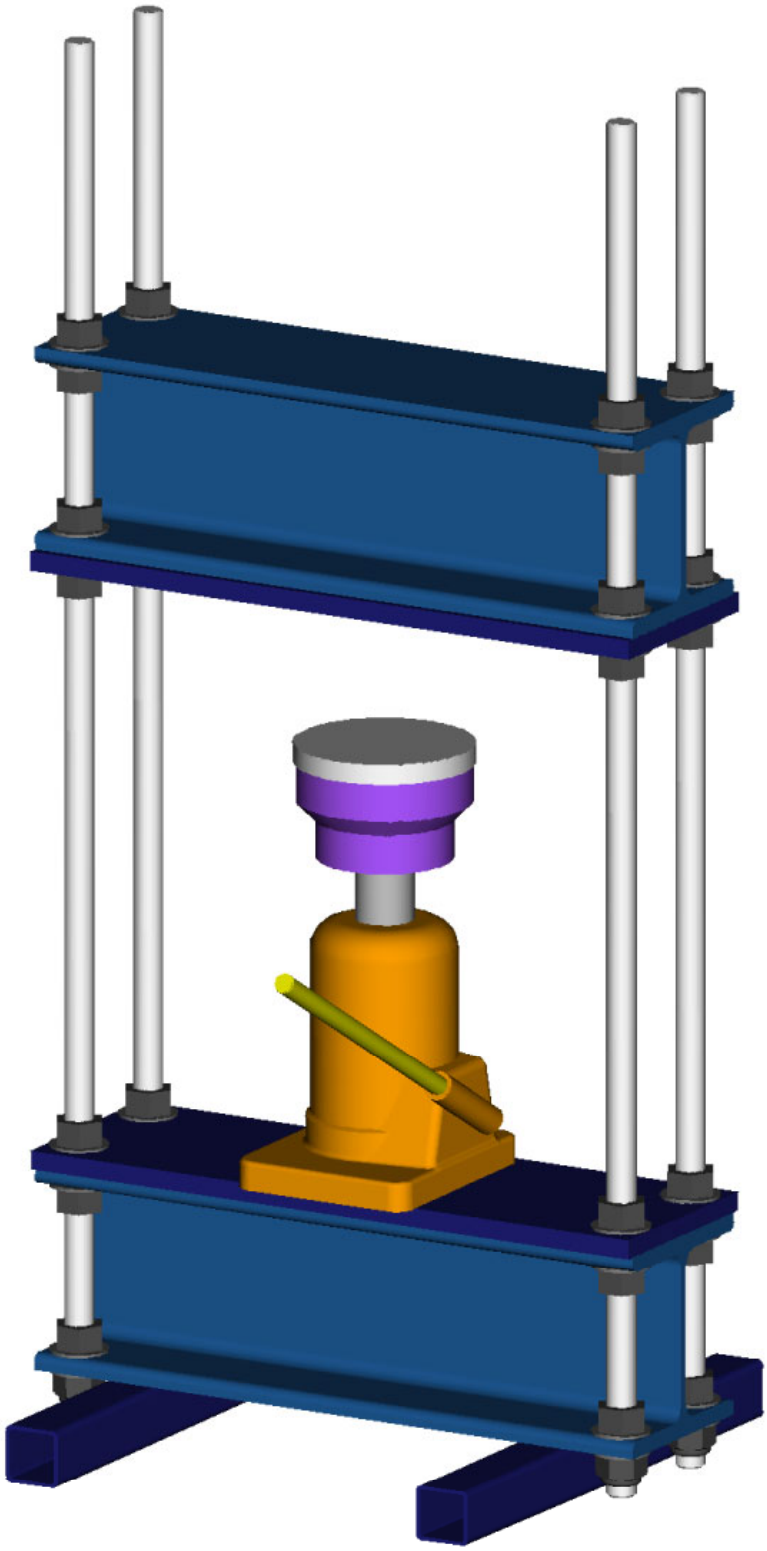
4 Spindle Heavy Duty Shop Press

Construction Instructions



4 Spindle Shop Press Construction Instructions

Congratulations! You now have the plans for a great shop press – one of the best around. This press is designed specifically for heavy-duty applications, but can also be used for highly accurate work.

Your success with the press is dependent on the care given in construction – including materials used, construction techniques and assembly methods. If you build it well, it will perform well. Load capacity is dependent on the lift source used as well as the materials chosen. The specified capacity does not include capabilities of purchased parts like the jack. Do not exceed manufacturer limits.

> **As a reminder**, these plans are for individual use only. Any use of these plans for resale or for producing products for sale is prohibited. Licensing for production and/or resale is available on request. Intellectual property rights for all materials are reserved. We thank you again for honoring these terms.

We truly hope you will enjoy your press. Please use caution and proper safety equipment while building and using it. Thank you for purchasing these plans.

Commercial Components Required:

1 Hydraulic Jack (20 - 50 ton)
Possible Source: Harbor Freight, Northern Tool, or other source

4 High Strength Threaded Rod (Grade 5 or better). Part numbers for 6 ft length are shown, but other lengths are also available.

For a **20 Ton Press:** 1” x 8 or larger required. (Fastenal # 47461)
For a **30 Ton Press:** 1.125” x 8 or larger required. (Fastenal # 47462)
For a **50 Ton Press:** 1.25” x 8 or larger required. (Fastenal # 47463)

Possible Source: Fastenal www.fastenal.com part numbers given above.

32 Nuts and washers sized for threaded rod above (Grade 5 or better):

- 32 washers.
- 28 standard nuts
- 4 nylon insert lock nuts

Possible Source: Fastenal www.fastenal.com.

1 5/8” diam. x 1.00 dowel pin
Possible Source: Fastenal # 26964 www.fastenal.com.

Fabricated Parts Required:

2 Main Load Beams - The press capacity is dependent on the size and length of the main beam. (Minimum beam size is for presses that will not usually be used at Max tonnage. Any beam with a greater area moment of inertia than the specified beam will usually work. Engineering calculations should be done to check variations in the design.)

For a **20 Ton Press:**
- 8" x 40 lbs. "H" Beam Minimum.
- 8" x 48 lbs. "H" Beam Recommended.

For a **30 Ton Press:**
- 10" x 54 lbs. "H" Beam Minimum.
- 10" x 60 lbs. "H" Beam Recommended.

For a **50 Ton Press:**
- 10" x 77 lbs. "H" Beam Minimum.
- 10" x 88 lbs. "H" Beam Recommended.

- See engineering considerations for more information.

2 Load Plate - Match Load beam size x 1/2" thick (min) - 1/2" or greater thickness.

2 Support Legs - 3" or greater square or rectangular steel tube x 30” length. (Wood like 4x4’s can be used if desired.) - use 1/8” or greater wall thickness for steel tube.

1 Jack anvil assembly. See drawings.

? Other fixtures and set-up press pieces.

Tools required:

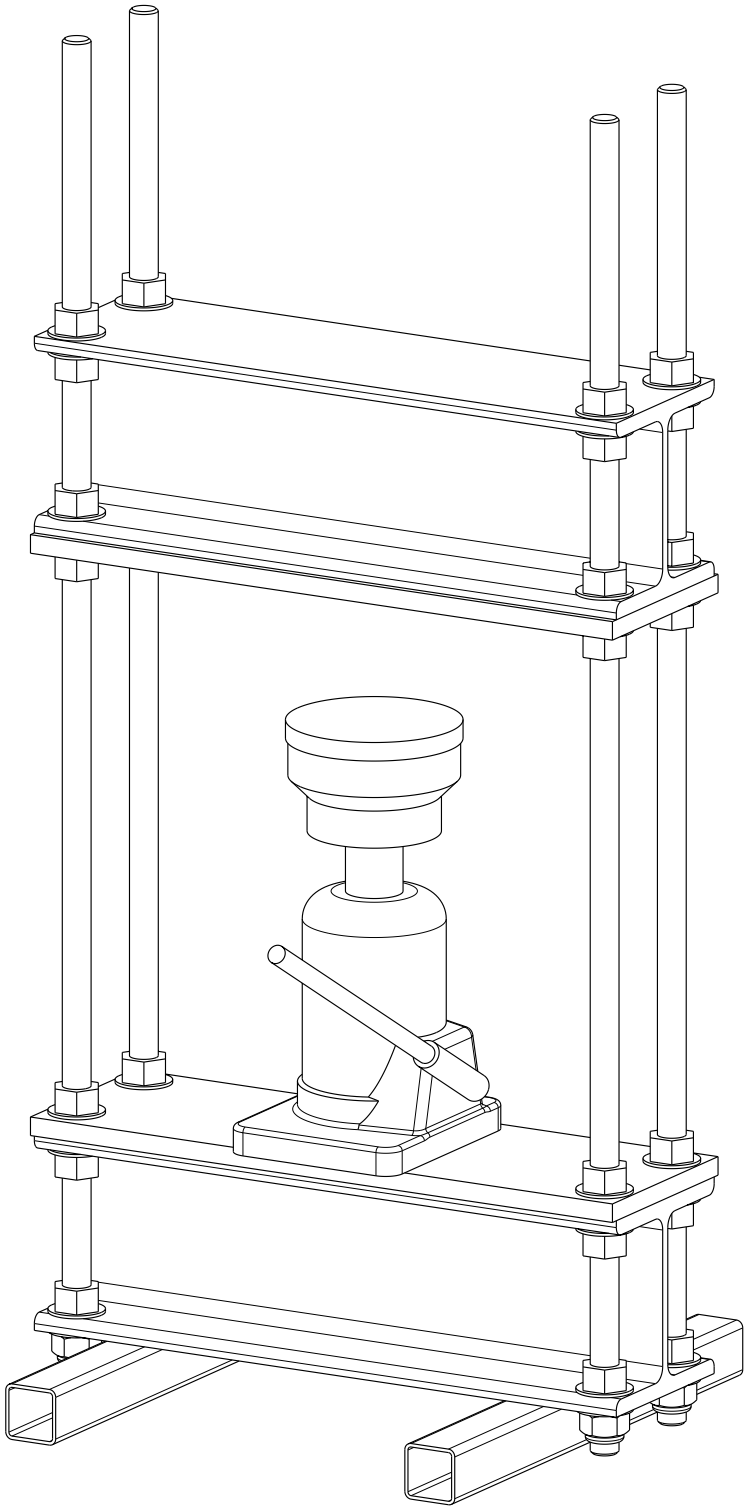
- Large Saw, to cut steel material (or most material houses will cut material to length. A hacksaw WILL NOT WORK.)
- Heavy Duty Drill press or Mill capable of 1-1/4” capacity in steel.
- Drill bit - 1", or 1.125” or 1.25” as required for selected press size.
- Hammer
- Large wrenches (at least 2) size for selected nuts.
- Wrenches, pliers, screwdrivers and other common hand tools.

Engineering considerations:

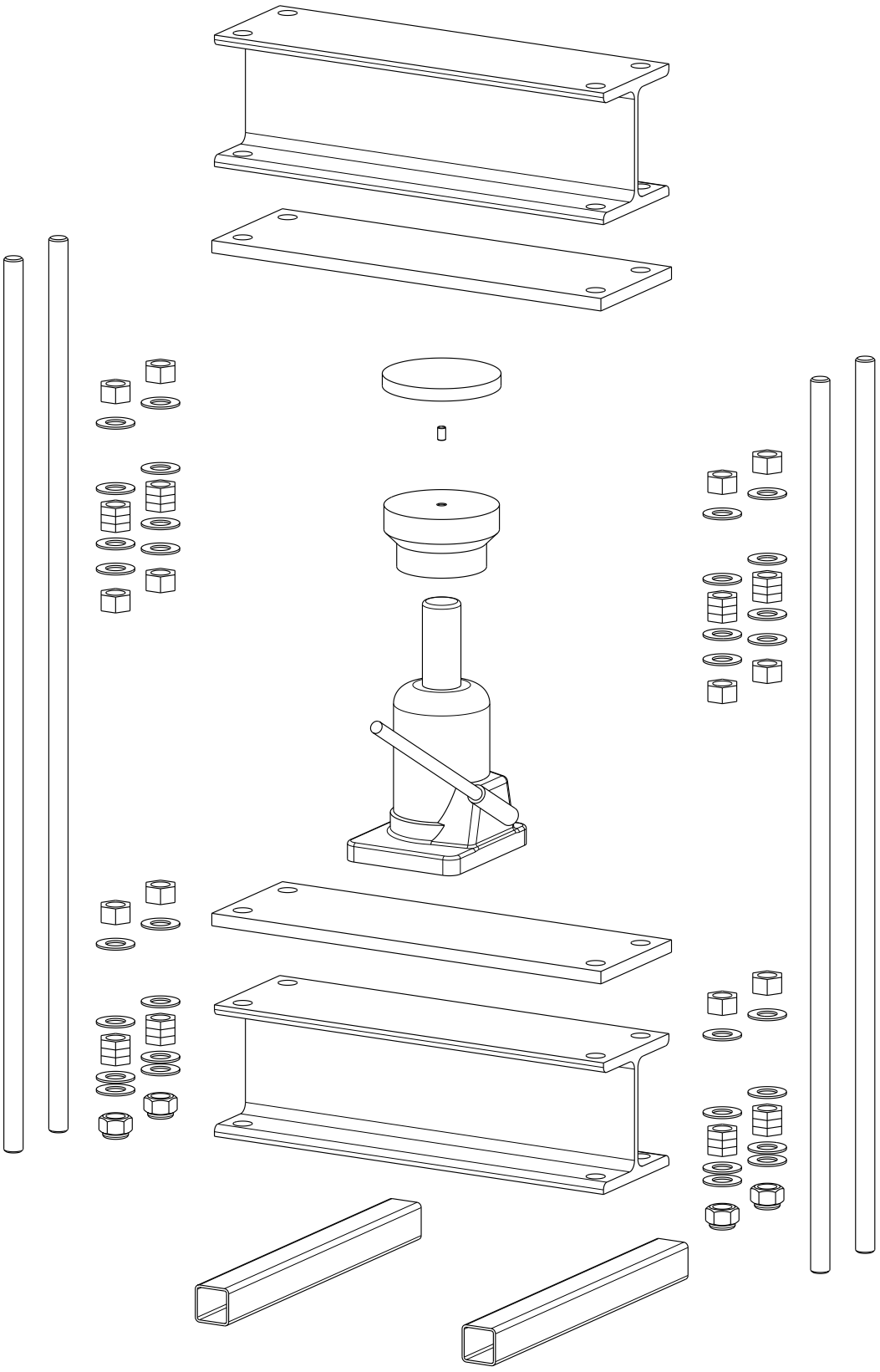
1. The press design will accommodate the rated tonnage when built to the plans specifications. If manufactured correctly, it will safely support the load limits suggested. The following criteria should be followed:
    a. The steel used in construction is ASTM A36 or better and has a minimum yield strength of 36,000-psi.
    b. The recommended beam sizes above (or larger) should be used when available. A minimum beam size is also shown for presses that will not usually see the max tonnage.
    c. A thicker load plate will help distribute the load over the flanges of the H beam giving a flatter reaction area. (Mine uses 1.25" thick plates for 50 ton press.)
    d. A safety margin of 2:1 was used for engineering calculations.
    e. The 4 main spindles (threaded rod posts) and associated nuts must be of higher strength steel. (We recommend grade 5 or equivalent or better.)
    f. All loads are intended to be vertical. Side loads, dynamic loads or other loads imposed on the structure will reduce the overall capacity.
    g. The structure is built straight and true (straight drilled holes, etc).
2. The Main Load Beams which carry the pressing forces must be sufficient to hold the forces of the jack. (For a 50 ton press the beam must be much stronger than for a 20 ton press.) We strongly suggest using the recommended beam sizes (above). If you are unsure of the final jack size to be used, build the press stronger. Also, while it is true that some of the smaller beams can carry larger loads, the intent with this press is to accommodate the loads without bending or distorting appreciatively.
    a. For the **20 ton press**, use a 20 ton hydraulic jack (or smaller). The main load beams must then have an area moment of inertia of 144 in^4 or more. (Consult your steel vendor.) Thickness of the flanges will effect flatness and deformation while pressing.
    b. For the **30 ton press**, use a 30 ton hydraulic jack (or smaller). The main load beams must then have an area moment of inertia of 290 in^4 or more. (Consult your steel vendor.) Thickness of the flanges will effect flatness and deformation while pressing.
    c. For the **50 ton press**, use a 50 ton hydraulic jack (or smaller). The main load beams must then have an area moment of inertia of 450 in^4 or more. (Consult your steel vendor.) Thickness of the flanges will effect flatness and deformation while pressing.
3. It is possible to obtain higher strength steel (consult your local supply). If steel of 50,000-psi strength is used, then the load rating can be increased by approximately 33%.
4. If the length of the main load beams change, the maximum load capability also changes. A longer beam will yield a lower overall strength.
5. **Warning:** Violation of any of these guidelines may result in the structure failing and could cause personal injury and/or property damage.

Construction hints:

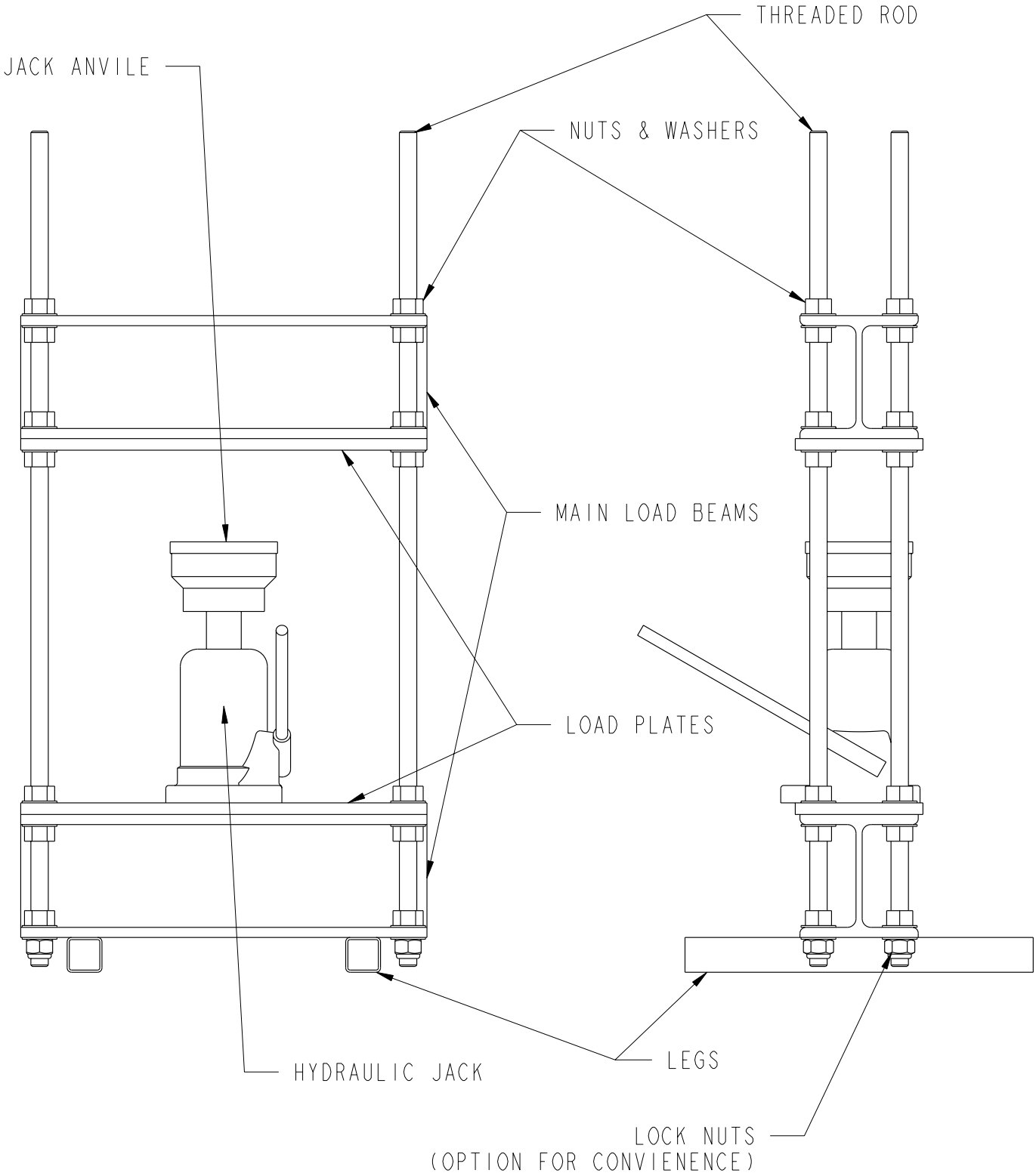
1. Possibly the most important thing is that all the components are oriented correctly when assembling. They should be square and true. Do not rely on the cut end of a tube for alignment. Drill all the holes coaxially from the top flange to the bottom. The 4 spindles need to be vertical. If the final structure is not square and true, the load carrying capabilities will be compromised.
2. Clean and de-burr all ends and holes as the sharp edges can cause injury.
3. For the upper and lower main beams, and for the load plates, it is more important that the hole patterns be symmetrical and consistent than exactly to the drawing.
4. If a specified material is unavailable, substitute thicker, heavier or stronger materials.
5. The load plates are required for point load distribution and as a flat surface for precision pressing. These plates can be ground flat and smooth if desired. They may also be hardened for maximum press life. (Note: Drill before hardening.)
6. A note on material: Any materials directly carrying the press load in contact with another piece (like the anvil or load plates) may need to be hardened to avoid damage. My first anvil was not hard and it now has an imprint of the first thing pressed. 20, 30 or 50 tons is a lot of force, and it will damage the materials. We recommend using “disposable” pressing plates for the anvil and reaction members so if damage occurs, you don’t have to replace major components. It also allows you to have different changeable plates for different purposes.
7. Inspect and verify all connections and re-do if required. Use washers under each bolt, and be sure the nuts are tight – though not over-tight. We recommend 100 ft-lbf.
8. Test your press once finished very carefully to assure the construction is sound. Carefully watch the components while testing to be sure the loads are carried adequately. Stop immediately if problems occur. Correct any issues that may exist.
9. Always use extreme caution when pressing. Large forces can cause pressed items to rupture. Use safety glasses and other appropriate gear while pressing. If in doubt, cage the items being pressed so flying pieces are contained.
10. Good luck, and **Enjoy your new press**.



4 SPINDLE HEAVY DUTY SHOP PRESS
SCALE 0.10

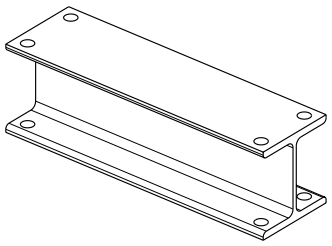


3D EXPLODED VIEW FOR REFERENCE
SCALE 0.08

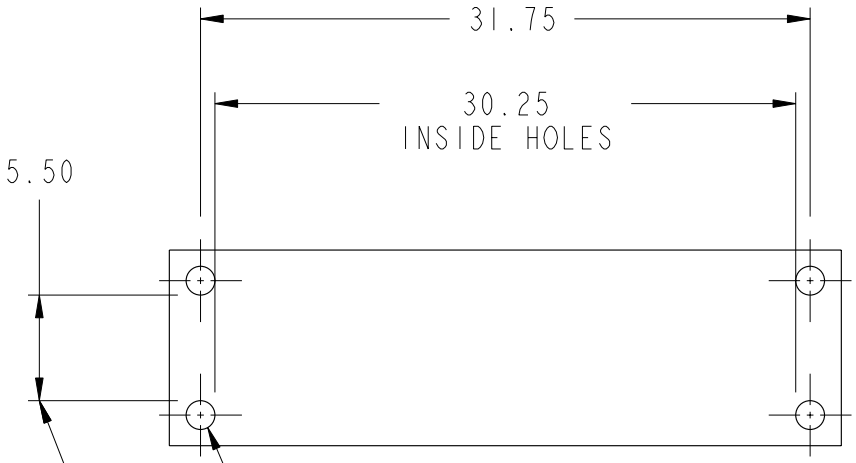


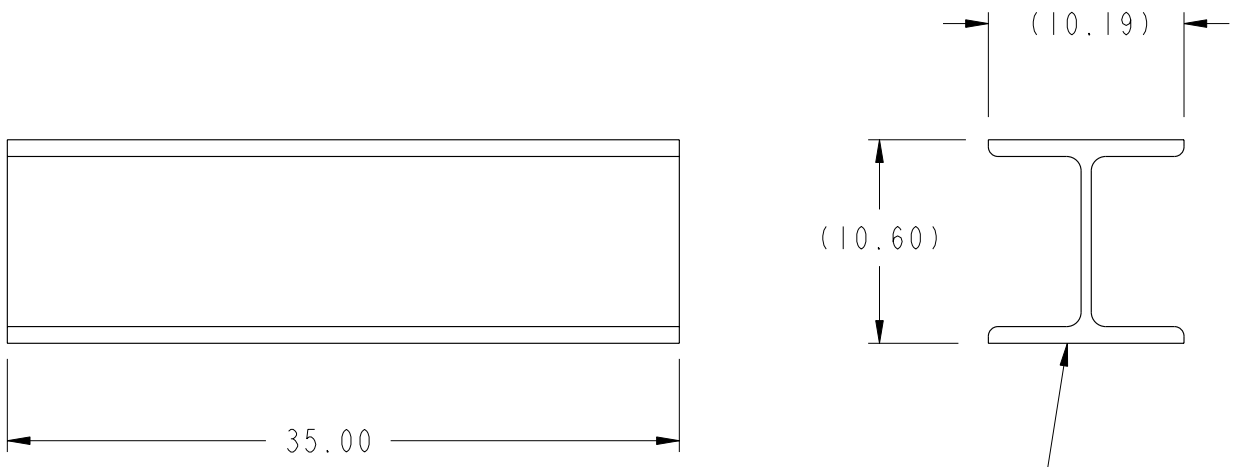
VIEWS OF PRESS WITH PARTS LABELED
SCALE 0.08

MAIN LOAD BEAM
2 REQUIRED
SCALE 0.10

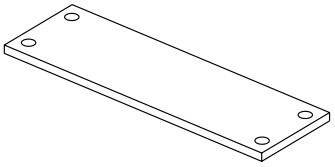


3D VIEW FOR REFERENCE
SCALE 0.05



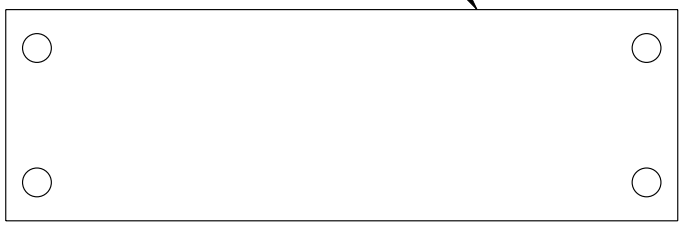


LOAD PLATE
2 REQUIRED
SCALE 0.10



3D VIEW FOR REFERENCE
SCALE 0.05

PLATE DIMENSIONS TO MATCH TOP OF
MAIN LOAD BEAM DIMENSIONS.



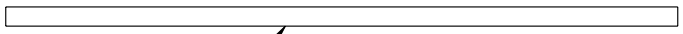
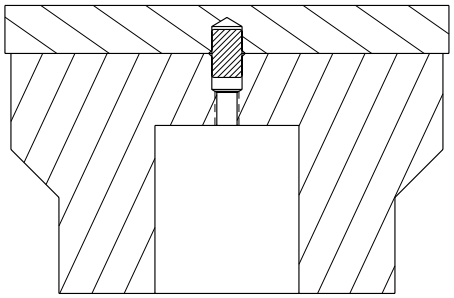
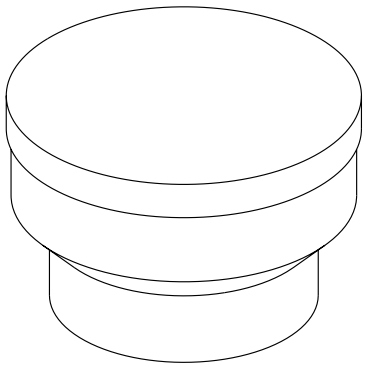


PLATE THICKNESS SHOULD BE
1/2" THICK OR MORE

JACK ANVIL ASSEMBLY

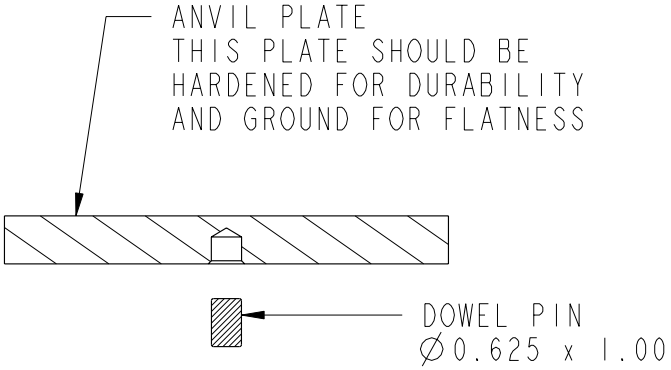


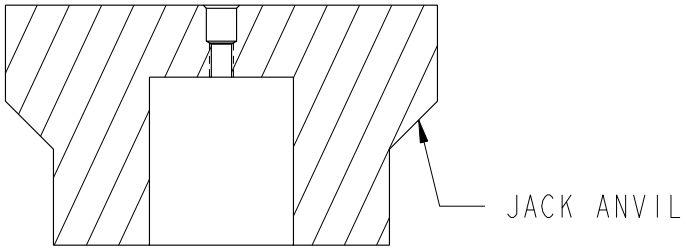
JACK ANVIL ASSEMBLY
SECTION A-A
SCALE 0.25



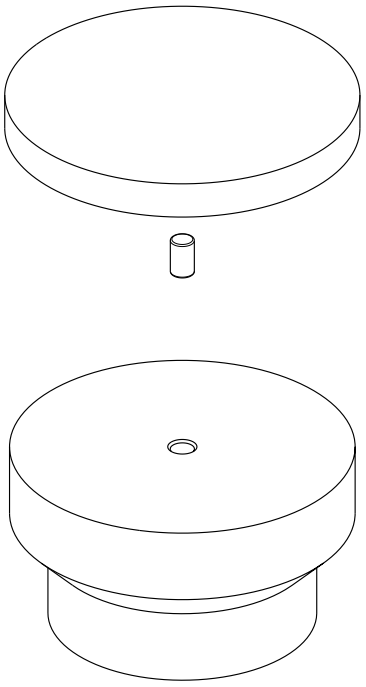
3D VIEW FOR REFERENCE
SCALE 0.20

ANVIL PARTS TO BE MACHINED FROM SOLID
THE EXACT SHAPE IS NOT SO IMPORTANT
BUILD THE ANVIL TO MEET YOUR REQUIREMENTS
SEE NEXT SHEET FOR DIMENSIONAL INFORMATION





JACK ANVIL ASSEMBLY - EXPLODED
SECTION A-A
SCALE 0.25



3D EXPLODED VIEW FOR REFERENCE
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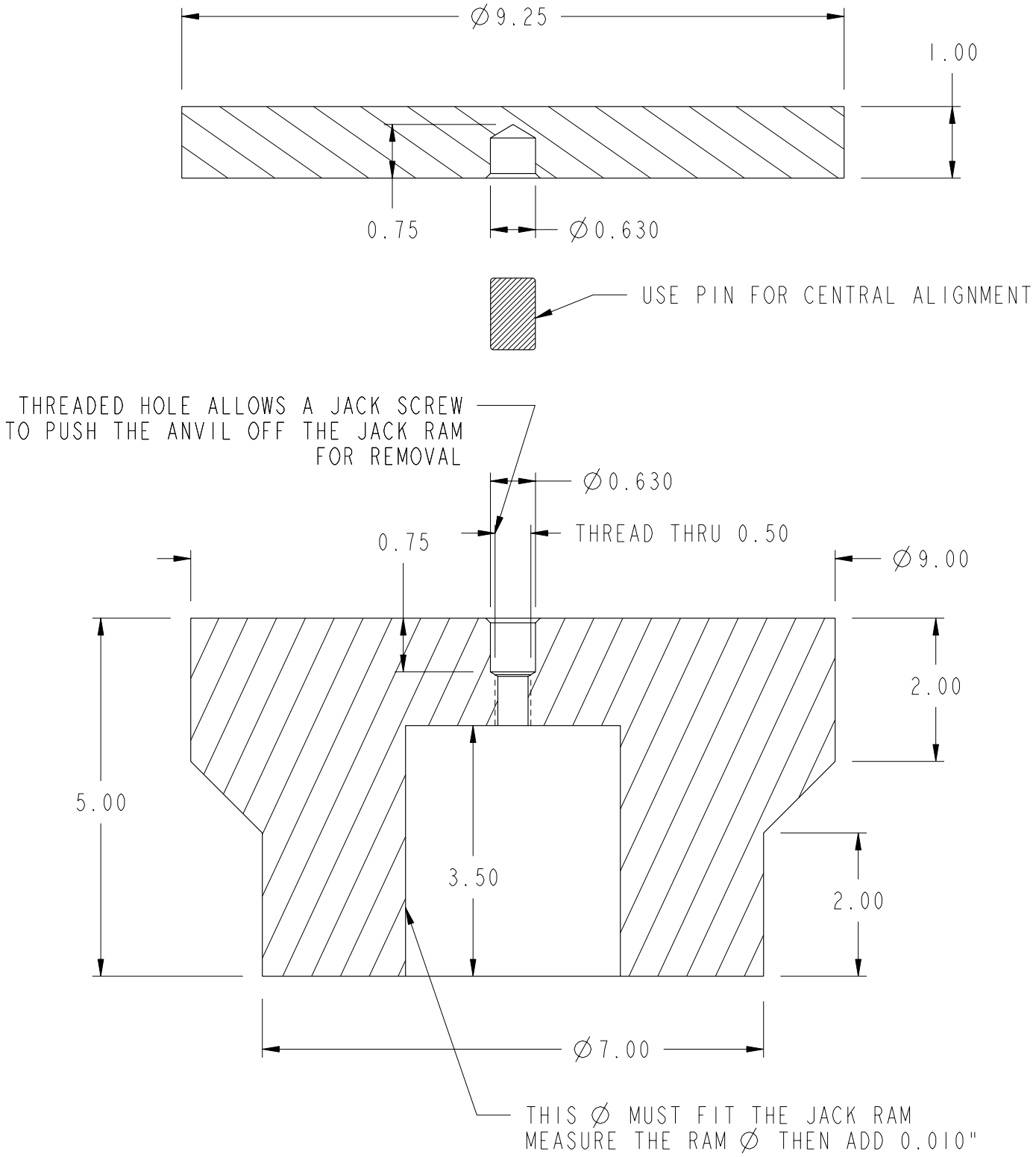
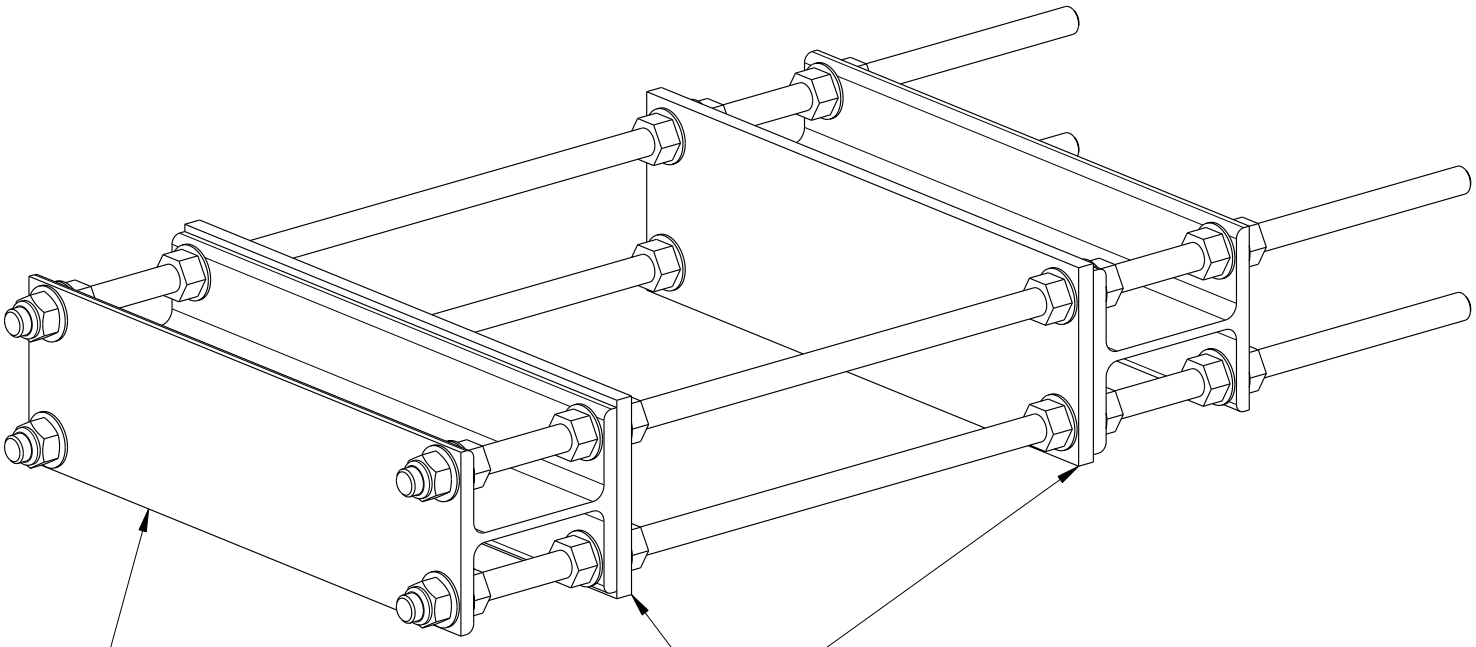


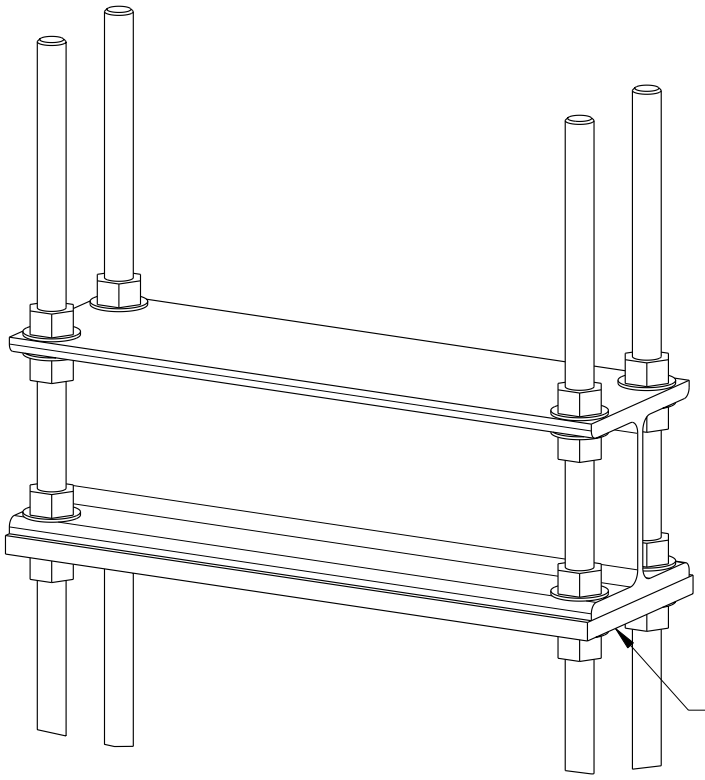
SECTION A-A
SCALE 0.50

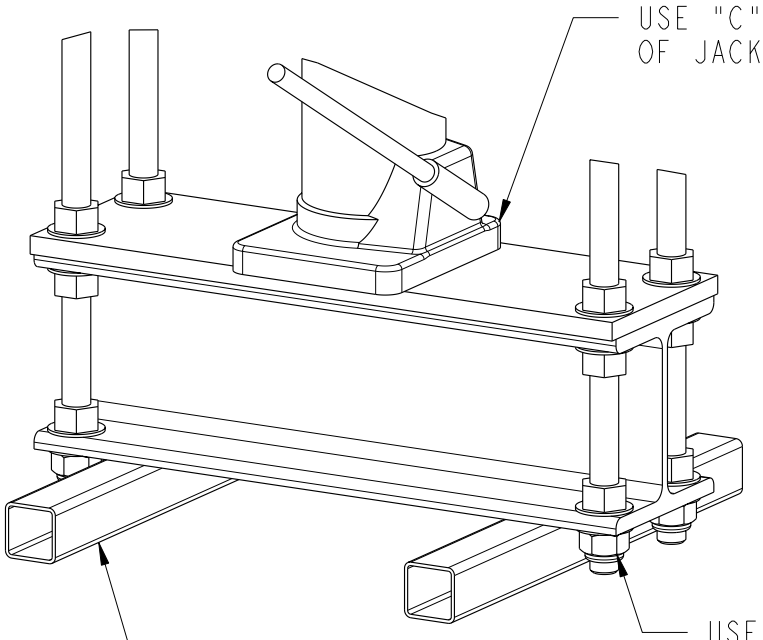


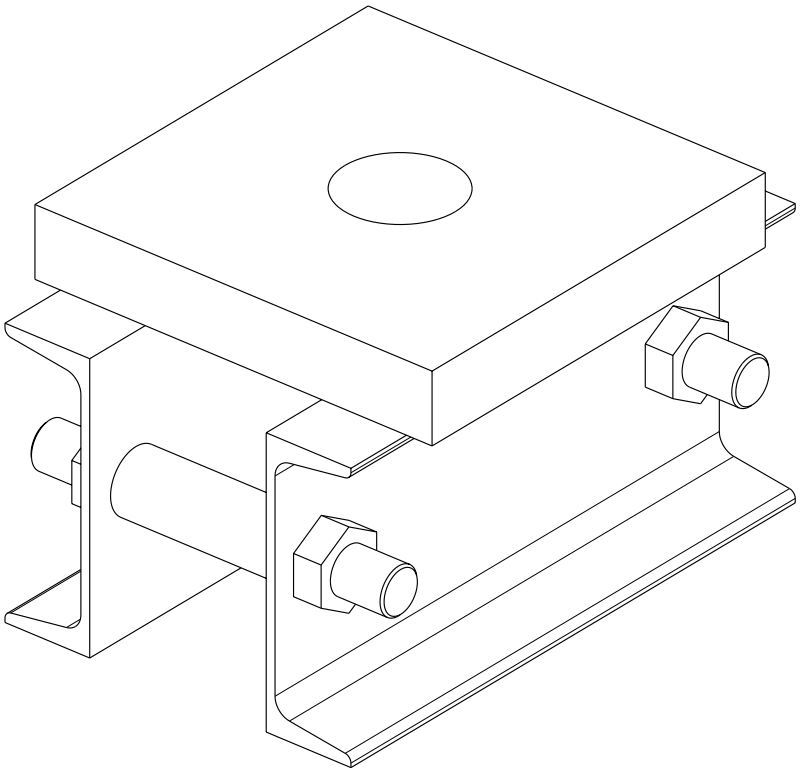
LAY BEAMS ON THE FLOOR TO
ASSEMBLE RODS AND NUTS
RUNNING THE NUTS DOWN AND
MOVING THE BEAMS CAN BE TEDIOUS

MEASURE DISTANCE AT ALL 4 CORNERS
AND ADJUST TO SET PARALLELISM

TIGHTEN ALL NUTS EQUALLY TO MAINTAIN BEST PARALLELISM







USE SET-UP TOOLS LIKE THESE TO GIVE FLEXIBILITY TO YOUR PRESS APPLICATIONS.

THIS TOOL, FOR INSTANCE, WILL ALLOW A SHAFT TO BE PRESSED OUT OF A BEARING.

BE CREATIVE, MAKE TOOLS THAT FIT YOUR EXACT REQUIREMENTS.

