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# Hitch Pin Project

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Description:**

This project consists of building a hitch pin. General skills needed to build this project include: drawing, measuring, laying out the project and cutting the materials, and basic welding skills. GMAW (MIG) welding is used to hold the pieces of the hitch pin together.

**Materials:**

- (1)  $\frac{3}{4}$ " HR Round
- (1)  $\frac{3}{8}$ " x 1" HR Flat
- (1)  $\frac{1}{4}$ " HR Round

**Tools:**

- Hacksaw
- Hossfeld Bender
- GMAW welder
- Chop saw
- Metal File
- Center punch
- Drill Press
- $\frac{3}{8}$ " twist drill
- Cutting Oil
- Bench Grinder

**Procedure:**

1. Measure out the 3 materials according to the attached plan and cut them out. Use the chop saw  $\frac{3}{4}$ " round. The hydraulic shear for the flat. Cut the  $\frac{1}{4}$ " round with a hacksaw.
2. Dress the cut edges with a file.

Handle:

3. Starting with the  $\frac{1}{4}$ " rod make the cut, this will be the handle
4. Make a  $\frac{1}{4}$ " mark at the end of the 6" rod you just cut and make a 180 degree bend at the  $\frac{1}{4}$ " marking on the Hossfeld Bender until the end is parallel with the rest of the rod
5. Make a  $\frac{1}{8}$ " mark at the other end of the rod
6. Put the other side of the rod in the Hossfeld Bender and make sure the first bend is closest to you and bend until the second bend meets the first end.

Pin:

7. Take your pin and measure where you will be drilling the hole. Mark with a center punch.
8. Securely clamp the round stock and drill the hole then file down the rough parts and bevel the end closest to the newly drilled hole on a bench grinder.

Assembly:

9. Tack your pin to the middle piece flat piece, then weld it around.
10. Tack your handle to the middle piece on one side, then weld it
11. Flip it over and repeat step 9
12. Grind off rough parts of weld if desired and spray paint if desired as well

**Cutting List:**

Qty	Size	Material
1	3/4" x 5"	HR Round
1	1" x 3/8" x 2"	HR Flat
1	1/4" x 6"	HR Round

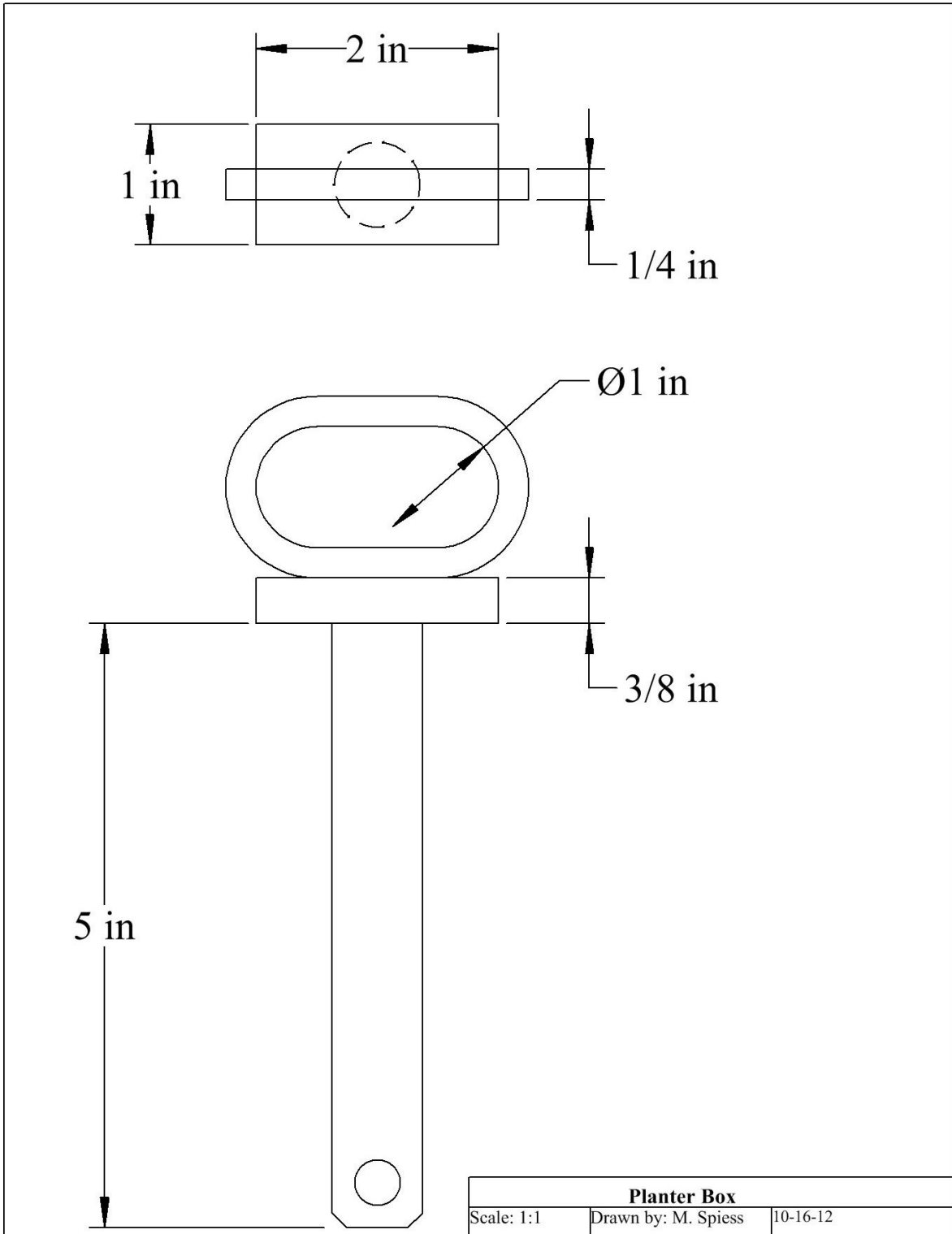
**Notes:**

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**Photo/Drawing:**



## Worksheet

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. What type of welder will we be using? \_\_\_\_\_
2. What are the two measurements that we will be making the bends for the handle at?  
\_\_\_\_\_
3. How long is the rod that we are using for the handle? \_\_\_\_\_
4. What size hole are we going to drill in the  $\frac{3}{4}$ " rod? \_\_\_\_\_
5. Do we file the metal towards or away from ourselves? \_\_\_\_\_

### Grading Rubric:

<u>CRITERIA</u>	<u>POSSIBLE</u>	<u>SCORE</u>
Correct Measurements	5	
2 bends of handle piece meet up	5	
Hole in the pin in centered	5	
Appearance (clean welds, everything is aligned)	5	
Workmanship	5	
Total	25	

## Teachers Notes:

This project is perfect for a beginning ag mechanics class, it is a fairly easy project no matter what their ag mechanics skills are. As long as the students carefully read the directions and refer to the plan they will be able to construct this project. This project seems intimidating because of the welding factor but with practice the students will easily dominate. One thing to watch out for that is somewhat tricky is making the bends for the handle. You have to watch carefully as you are bending it because sometimes it slips and if you don't fix it the two bends won't meet up. If the two bends meet but are kind of sticking out you can put the newly made handle piece into a vise grip and clamp down to help form it better.

## Agricultural Standards Met:

- 6.0 Health and Safety. Students understand health and safety policies, procedures, regulations, and practices, including the use of equipment and handling of hazardous materials:
- 6.1 Know policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities.
  - 6.2 Understand critical elements of health and safety practices related to storing, cleaning, and maintaining tools, equipment, and supplies.
  - 6.4 Maintain safe and healthful working conditions.
  - 6.5 Use tools and machines safely and appropriately.
  - 6.6 Know how to both prevent and respond to accidents in the agricultural industry.
- B1.0 Students understand personal and group safety:
- B1.1 Practice the rules for personal and group safety while working in an agricultural mechanics environment.
  - B1.2 Know the relationship between accepted shop management procedures and a safe working environment.
- B5.0 Students understand agricultural cold metal processes:
- B5.1 Know how to identify common metals, sizes, and shapes.
  - B5.3 Know layout skills
  - B5.4 Know basic cold metal processes
- B9.0 Students understand advanced metallurgy principles and fabrication techniques:
- B9.1 Understand metallurgy principles, including distortion, hardening, tempering, and annealing.
  - B9.2 Operate and maintain various arc welding and cutting systems safely and appropriately.
  - B9.3 Operate and maintain fabrication tools and equipment safely and appropriately.
  - B9.7 Construct a welding project (using any electric welding process, appropriate products, joints, and positions), including interpreting a plan, developing a bill of materials, selecting materials, and developing a clear and concise fabrication contract.

## Objectives:

By properly completing this project, students will be able to:

- Read a plan to and layout dimensions.
- Use a chop saw and hydraulic shear to cut metal rods
- Use a hossfeld bender to bend the metal rod
- Use GMAW welding to piece the pieces together

**Alternative Tools/Methods/Materials:**

- Hot metal bending instead of hossfeld bender. You would need to find an 1" rod so you could wrap the rod around it
- Use SMAW welding.
- Pins can be made in other sizes using the same basic plan.

**Safety Review:**

- Hydraulic shear safety – watch fingers, turn off after you make a cut, don't leave metal in the shear, wear safety glasses
- Chop saw safety – make sure your rod is secure, watch fingers, wear safety glasses
- SMAW welding safety- wear a shade 10 helmet, wear gloves, wear safety glasses
- Hossfeld bender – watch finger when putting the metal in the bender as well as adjusting the spacing, watch out for people around you so you don't hit them, wear safety glasses

**Project Time:**

Demonstration:	30 minutes
Build:	1-2 hours

**Demonstration Notes**

1. Practice the bending for the handle to get the two bends to meet up
2. Weld the pin to the middle bar piece first, then weld the handle to the middle piece
3. Tack your metal before welding to make sure it won't move
4. Use a magnet to hold the pin in place to tack, then use a scrap metal piece to hold the handle up for the weld
5. When doing the second bend for the handle make sure the first bend is closest to you or else you will end up with a "S"

**Bill of Materials:**

Projects:		24					
Size	Description	Units	Qty/Project	Cost/Unit	Order	Amount	
1/4"	HR Round	20' bar	0.025	\$3.00	1	\$	3.00
3/4"	HR Round	20' bar	0.025	\$10.97	1	\$	10.97
3/8" x 1	HR Flat	20' bar	0.008	\$22.50	1	\$	22.50
					TOTAL	\$	36.47

Project from: Combination of Turlock High School. Plan by Jennah Proxmire.