DIY Camera Arm

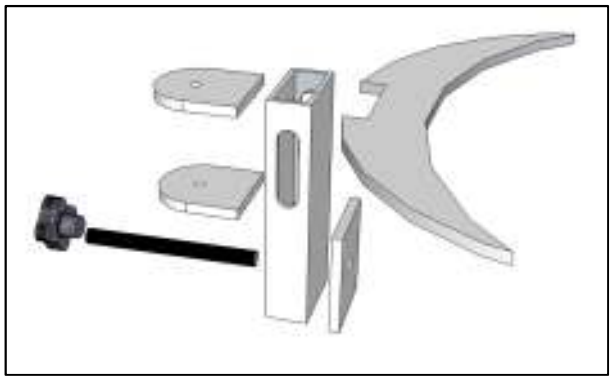
Good camera arms are expensive. Unfortunately, bad camera arms make noise, fail to hold securely, or more commonly both. I use a Fifth Arrow arm and am very pleased with it. But I wanted something that would give me a little more arm length and an additional joint for added flexibility.

Our arm is made up of three sub-assemblies: the mount, the body, and the head. We'll look at building each of them separately, and then put the sub-assemblies together to form the entire mounting system.

A word about welding before we begin. In the videos covering this build, I used oxy acetylene and aluminum welding (brazing) rods. I would *highly* recommend that you tig weld the aluminum components. While the brazing method I used worked well for everything but the head (which was redesigned to overcome this issue in the final iteration), tig welding would produce a much more reliable outcome.

IMAGES NOT TO SCALE

Making the Mount:



COMPONENTS:

- 2" x 1" aluminum box stock (5 ½"
- ¼" aluminum bar stock (2" x 2 ½")
- ⅜" threaded rod (3")
- ⅜" hex nut
- Plastic knob (⅜" threaded hole)
- ¼" aluminum bar stock (2" x 6") – Used to create the "tree claw"
- ¼" (2) aluminum bar stock (2" x 2 ¼") – Used to create the arm mounting brackets

The head is built around a 5 ½" piece of 2" x 1" aluminum box stock. Drilling / cutting the slots for the ratchet strap first will simplify the process. The slots for the ratchet straps should be ¼" wide and approximately 1 ½" long. This will be sufficient to fit most ratchet straps. After drilling ¼" holes to define the ends of the slots, you can use a jigsaw, a dremel with a cutoff wheel, or whatever method you can use with the tools on hand to connect the holes. Be sure to file the edges of the holes smooth, and they will snag and abrade the ratchet straps otherwise.

Making the tree claw is probably the biggest challenge of the entire build. I didn't measure either of the radii of the curves. Basically I just used a radius that gave me a six inch width with the full 2" width of the stock. I then used the inside radius that gave me a 1" final width after cutting the slot for the mount body. This slot is cut to provide more surface are for welding / brazing. The slot I cut was wide enough to allow the 2" wide box stock to fit into the claw to a depth of ½".

Once the camera arm is strapped to the tree, it will need to be leveled. The mount itself will tend to lean out from the tree a bit. The ⅜" threaded rod is used as a sort of leveler. The 2" x 2 ½" piece of flat stock (the thread plate) is welded to the back of the mount body to give sufficient thickness to drill / tap

for the ⅜” threaded rod. Once the piece is welded drill a 5/16” hole, centered on the mount body width, through the mount body and through the thread plate, and tap with a ⅜-16 tap. The knob is threaded onto the ⅜” rod and the ⅜” nut is tightened backward against the knob to secure it. I put a bit on Loctite on both the knob and nut to help keep it secure. The opposite end of the rod is then brought to somewhat of a point on a grinder. This will help it to bite into the tree a bit and, together with the wings of the claw, provide a secure three-point grip on the tree.

The mounting arm brackets are made by cutting or grinding a 1” radius on the end of the 2” x 2 ¼” pieces of bar stock. Drill ¼” holes 1” from the end of the radius and centered on the brackets. The spacing of the brackets on the mount body is critical. The easiest way to establish this spacing is to clamp the brackets with a piece of the 1” x 2” box stock, and two ¼” nylon washers clamped between them. Leave them clamped up like this until you’ve established at least the outside welds. You can then unclamp and weld the inside joints.

Arm Assembly:

COMPONENTS:

- 2” x 1” (2) aluminum box stock (16”)
- 1” x 1” (2) aluminum box stock (15”)
- ¼” x 4 ½” stainless (or nickel) bolts
- ¼” (6) stainless (or nickel) washers
- ¼” (3) stainless lock nuts
- ¼” x 3” stainless (or nickel) bolt (to attach arm assembly to mount)

The arm assembly is straightforward. Again, two pieces of 1” x 2”, and two pieces of 1” x 1” aluminum box stock are combined to make a strong, flexible, lightweight arm, totaling 45”. The holes for the inter-arm joints, as well as the hole used to mount the arm assembly to the mount brackets, should be drilled ½” from the end of each piece. Stainless or nickel washer should be used only on the outside of each bolt / washer stack. The inside washers of the top and bottom, as well as the washers fit between the arms, should be nylon, delrin, or some other synthetic material to reduce friction. I doubled up on the nylon washers to make absolutely sure there would be no noise. But single washers would probably be fine. The nuts should be lock nuts, and the tightening on these will determine how stiff the joints will

be. Too tight, and you'll have problems making adjustments in the moment of truth. Too loose, and the arms may not stay in the position you set them in. But, with lock washers, you won't have to adjust the tension often.

The Head:

COMPONENTS:

- 2" x 5" aluminum round stock
- ⅜" x 2" stainless bolts
- ¼" x 1" threaded rod
- ⅜" i.d. x 1" nylon spacers

When I originally built this camera arm the head was basically just a ¼ " thick x 2" aluminum flat stock, bent into an "L" shape with a ¼" hole drilled in it. This was then welded to the end of the last arm section. This didn't work. I broke the welds twice; once lower my pack from a tree, and once before dawn on opening morning 2017. I shot a doe later that morning, and only had footage from a bow-mounted GoPro. I immediately determined to re-design the head. My solution was to build the head out of solid round stock. Step one is to drill two 5/16" holes through the center of the cross section of the round bar. The first hole should be about ⅝" from the end of the bar. Hole two should be 1 ⅛" from the end. I then used a tablesaw to "mill" a 1" slot through the center of the round stock perpendicular to the holes you just drilled, so that it can fit over the last section of the arm. While I used a tablesaw with a carbide tipped blade, there are other solutions. One is a milling machine (obviously). You could likely do it with a hacksaw or jigsaw, followed by files. However you need to do, just be sure you know the limits of your machines and that you follow all safety standards. And, probably the most important safety rule, if it feels iffy in the pit of your stomach, do it a different way. Now, slip this slot over the end of the last arm section and, using the holes you drilled earlier, use them as a template to drill two matching holes in the end of the arm.

The nylon spacers are going to be a little too thick to fit easily inside the arm section. But, you need them in there to keep from crushing the hollow arm section when you tighten down the bolts on the head. I just used a belt sander to bring the thickness of the spacer down so that it fits easily, but tightly, inside the arm section. It doesn't matter how you get there. Sand, cut, or grind them down however is easiest for you.

Now, we drill a 13/64" hole approximately ⅝" deep in the very center of the "top" of the head. You will then tap this hole and, using Loctite, thread in the ¼" threaded rod. This is where you will mount your fluid head later. Now you're going to re-drill the holes on *only one side* of the head to a ⅜" diameter. The holes on the opposite side are tapped to ⅜".

Now, to assemble the head slip the nylon spacers inside the end of the arm section. Slip the head over the arm section and slide and thread the ⅜" bolts through the head, arm section, and spacers and tighten down, thus securing the head to the arm.