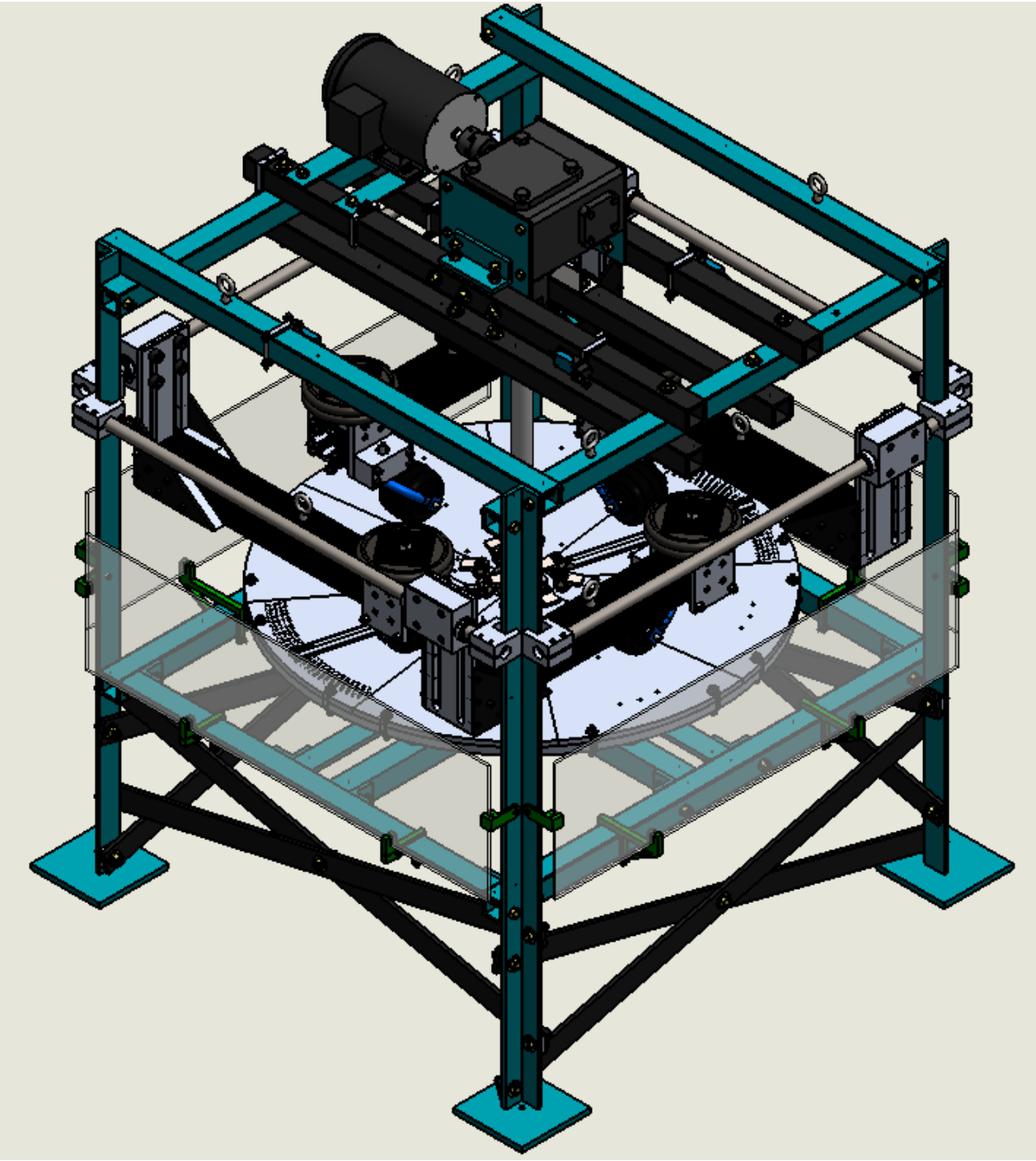
# ISWP Caster Test Version 2.2

## Assembly Instructions



# Please read the following document in its entirety before purchasing materials and assembling.

**Design of an ISWP Standards Caster Test**




University of Pittsburgh scientists are working with the U.S. Agency for International Development (USAID) under a multi-year sub-award to develop the International Society of Wheelchair Professionals, a global network to ensure a level of standardization, certification and oversight, to teach and professionalize wheelchair services, and to build affiliations to put better equipment in the right hands. Since 2002, USAID has granted more than $45 million to improve wheelchairs and wheelchair services worldwide. This sub-award – Agreement No. APC-GM-0068 – was presented by Advancing Partners & Communities, a cooperative agreement funded through USAID under Agreement No. AIDOAA-A-12-00047, beginning Oct. 1, 2012.

For further information on use of the ISWP Wheelchair Caster Test assembly instructions, contact the University of Pittsburgh's Innovation Institute at 412-383-7670 or the International Society of Wheelchair Professionals at intlsocietywheelchairprof@gmail.com.

# Table of Contents

# Notes:

These instructions are to be paired with the dimensioned and assembly drawings for part names and details about each part or assembly.

Assembly instructions may only dictate about one part, but welding and placement directions apply to all parts of the same name.

All the Rec Bar parts are made up of 2-inch (50.8 mm) Square Tubing. The different part names imply different hole patterns.

All hardware used in this assembly are in ANSI Inch, however ANSI Metric are acceptable alternatives.

All dimensions within this set of instructions is given in inches and millimeters.

A part guide has been included at the end of this document.

File down all exposed edges and corners to avoid any nicks or scratches.

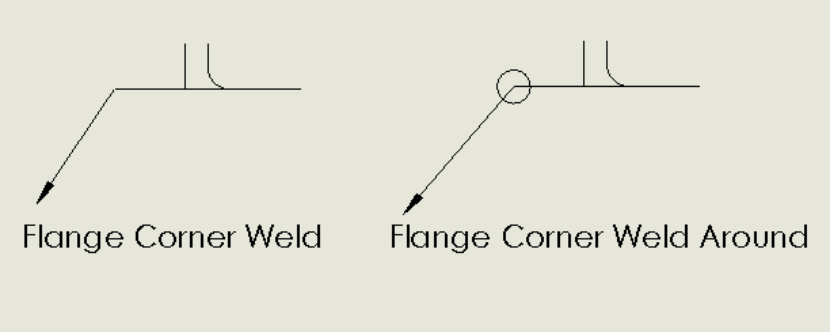
## Cutting Notes:

All parts should be cut, and holes drilled before the assembly is started. Please follow the tolerances listed on the dimensioned drawings.

## Assembly Notes:

All nuts and bolts should be loosely attached to allow for some adjustment and movement during the assembly.

# Legend:




# Tools Required

Box or open-end wrench set / socket set / adjustable wrenches (2)
Allen Wrench Set
Welder (ARC or MIG)

Drill and drill bits
Tape measure
Bandsaw
3-Axis Mill

**Additional tools that would be helpful:**

Water Jet

# Building the Base Frame

## Base Legs Assembly

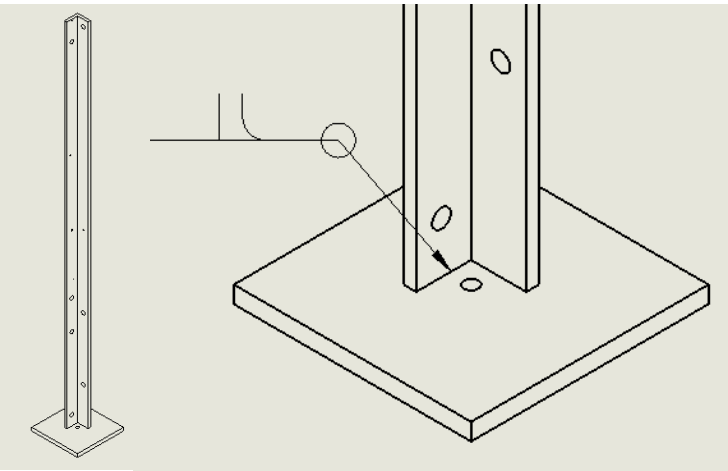


**Figure 1.** Corner weld the base leg angle iron to the mounting plate to assemble to base legs.

Start by welding together the Base Leg Angle Iron and the Base Leg Mounting Plate. To make the four [4] Base Legs, you need two [2] Base Leg Angle Iron (right), two [2] Base Leg Angle Iron (left), and four [4] Mounting Supports. Figure 1 and 2 show the setup of a Base Leg. Note, the Right and Left Base Leg Angle Irons have different hole arrangements.

To assemble, corner weld the angle iron in the center of the mounting plate on all edges. The hole in the mounting plate should be on the inside of the angle iron. The outside of the angle iron should be 2.5-inches (63.5 mm) from the sides of the mounting plate. Repeat this for all four [4] Base Legs.

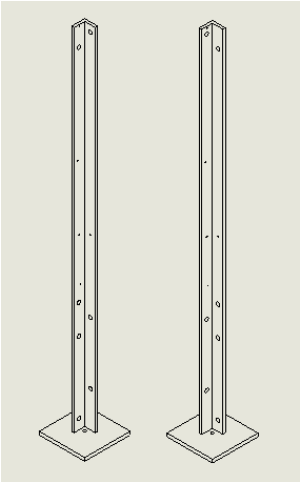


**Figure 2**. Base Leg Orientation

In Figure 2, the Base Leg pictured on the left is for the front-left leg and the back-right leg. The leg pictured on the right is for the front-right leg and the back-left leg.

## Frame Table Assembly

Figure 3 shows the basic layout and orientation of the frame table assembly. The four [4] Base Legs will be oriented such that the inside of the angle iron is facing outward, as shown in Figure 3. The angle iron of the legs should be mirroring the other on all sides.

The base frame table can now begin construction.

Use Figure 4 and the description below to follow the proper orientation of all the pieces used in the base table frame. All connections with the Rec Bar Tubing are made using ½-13 by 3-inch (76.2 mm) hex head screws and ½-13 locknuts while all connections with the angle iron pieces are made using ½-13 by 1.75-inch (44.45 mm) hex head screws and ½-13 locknuts. In addition, L Connectors are used at every joint to further connect and stabilize the base frame table, as shown in Figure 4. Note that all connections should be loosely secured. Once the attachment has been made, the table needs to be leveled and

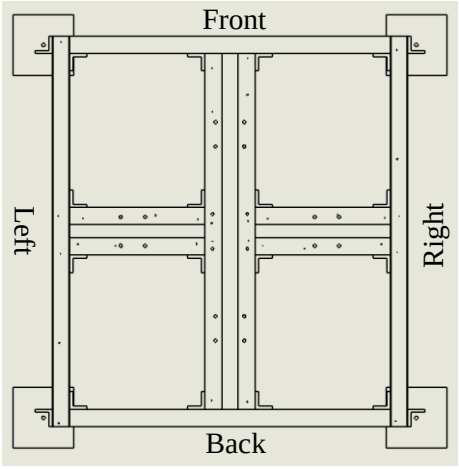



**Figure 3.** Base frame table orientation

squared so that that everything can fit together properly. Once this is done, tightly secure the table together.

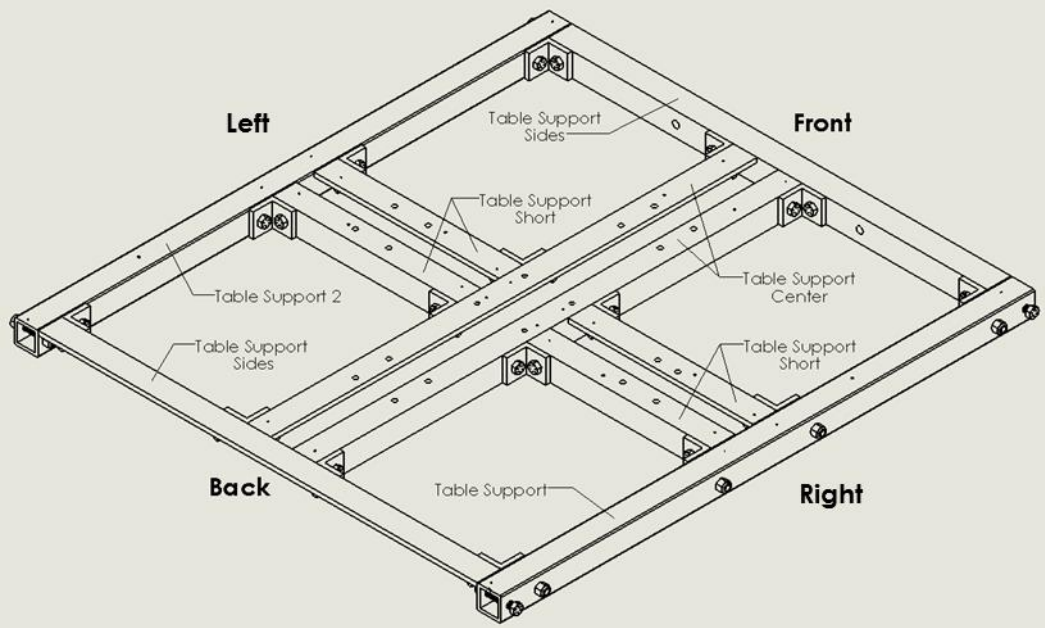



**Figure 5.** Isometric view of the base frame table

To form the table, Rec Bar Table Support and Rec Bar Table Support 2 make up the right and left sides of the frame, respectively. These are directly attached to the 3rd hole from the bottom on the Base Legs, as shown in Figure 5. The Table Support Side angle iron pieces make up the front and back outside frame of the table. The holes on the side of the angle iron face inward toward the center. Next, two [2] Table Support Center angle iron pieces are used in the center of the table and extend from front to back. The side with less holes faces outward from the center. The two [2] middle holes on these center pieces align with the L Connectors that attach to the Table Support Short pieces in the middle of the frame. These pieces extend from the center to either Rec Bar Table Supports on the left and right side of the frame. Figure 5 shows the location for the attachment of the rec bar table support pieces to the base legs. Although the base legs are set up in different orientations, the rec bar attachment occurs on the same side for all four [4] base legs. The four [4] holes below this are used for the cross brace attachment to the frame.

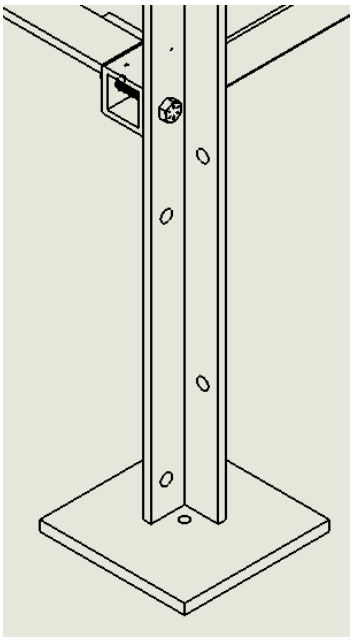


**Figure 4.** Frame Table attachment to Base Legs

## Cross Brace Assembly

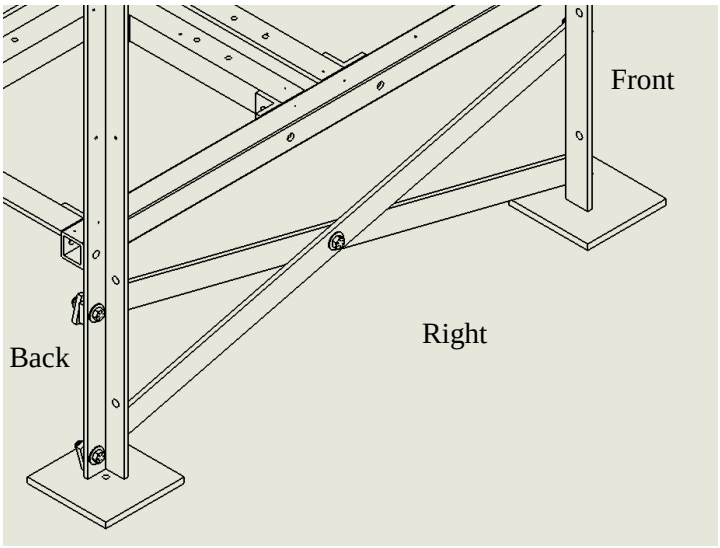



**Figure 6.** Cross Brace assembly and attachment to the Base Legs

Four [4] cross braces in two [2] different lengths are used to provide support for the frame. Two [2] sets of Cross Brace F&B are used in the front and back sides and two [2] sets of Cross Brace L&R are used on the left and right sides.

To make the cross brace, both the cross braces in a set are loosely secured through the center hole using a ½-13 by 1.75-inch (44.45 mm) hex head screw, two [2] ½-inch (12.7 mm) washers, and a ½-13 locknut. The Cross Braces are attached to the Base Legs in a diagonal orientation using ½-13 by 1.75-inch (44.45 mm) hex head screws, two [2] ½-inch (12.7 mm) washers, and ½-13 locknuts. Each hole uses one [1] screw and nut and two [2] washers straddling the cross brace. Because of the stacked orientation of the cross braces, a 3/8-inch Cross Brace Spacer is added between the Base Leg and the Cross Brace and is attached using a ½-13 by 2-inch (50.8 mm) hex head screw, two [2] ½-inch (12.7 mm) washers, and a ½-13 locknut. This process is repeated for all the remaining sides.

## Top Frame Assembly

The top frame assembly consists of four [4] rec bars placed in a square lattice. The right side is made up of Rec Bar Top Frame 4. The left side uses Rec Bar Top Frame 3 and the front and back use Rec Bar Top Frame 1-2.

Start by attaching the Rec Bar Top Frame 4 to the right side Base Legs. Orient the rec bar such that the holes are facing up. The rec bar attaches to the top holes on the Base Legs using a ½-13 by 3-inch (76.2 mm) hex head screw and a ½-13 locknut. This pattern is continued on all the other sides using their respective rec bars. Note, the right and left side rec bars' holes should align, and the front and back rec bars should be oriented such that the single holes on each bar are opposite each other.

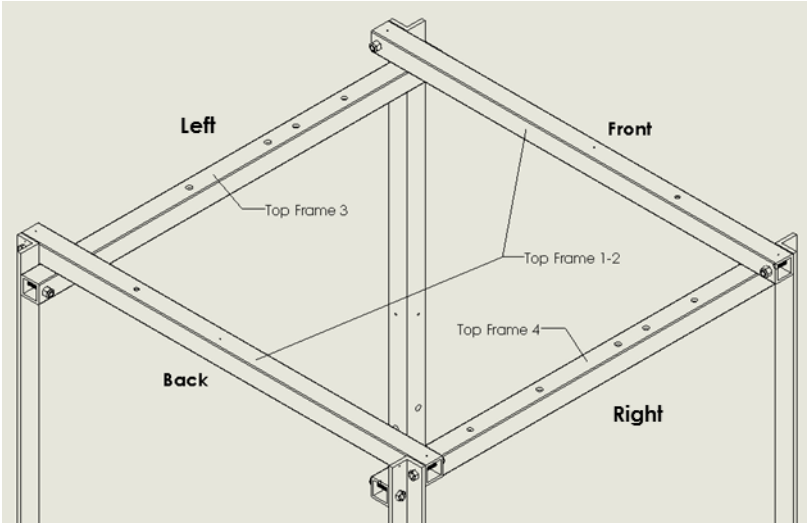



**Figure 7**. Proper orientation of the top frame

The next step is to add the gear reducer and bearing mount rec bars. Figure 8 labels which rec bar is used and where. Use this figure and the description below to follow the proper orientation of the top frame assembly.

The Rec Bar Gear Reducer is the front most rec bar used. It is attached on top of the left and right rec bar through the 2nd hole from the front. This leaves one [1] open hole between the front rec bar and the Rec Bar Gear Reducer. The Rec Bar Bearing Mount 2 is next and is attached in the same way using the next consecutive hole (3rd hole from front). Following that, both Rec Bar Gear Reducer and Rec Bar Bearing Mount are both attached through the next consecutive hole (4th hole from front). The Rec Bar Gear Reducer is attached on top and the Rec Bar Bearing Mount is attached under the left and right-side bars.

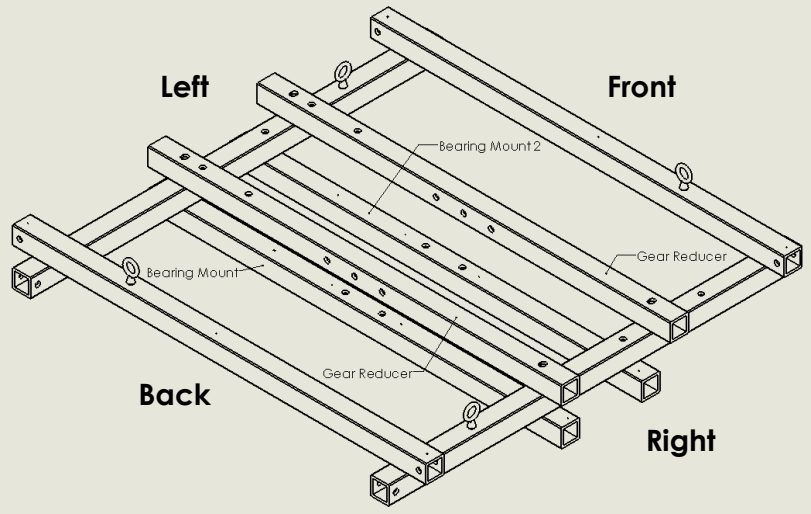



**Figure 8**. Top frame assembly

To attach the single tubes (Rec Bar Gear Reducer and Rec Bar Bearing Mount 2) to the outside frame, use a ½-13 by 5-inch (127 mm) hex head screw, two [2] ½-inch washers, and a ½-13 locknut. When connecting two [2] tubes (Rec Bar Gear Reducer and Rec Bar Bearing Mount) to the outside frame through a single hole, use a ½-13 by 7-inch (177.8 mm) hex head screw, two [2] ½-inch washers, and a ½-13 locknut. Next, screw in four [4] 1-inch (25.4 mm) eye bolts, one on each side of the rec bar top frames, as shown in figure 8.

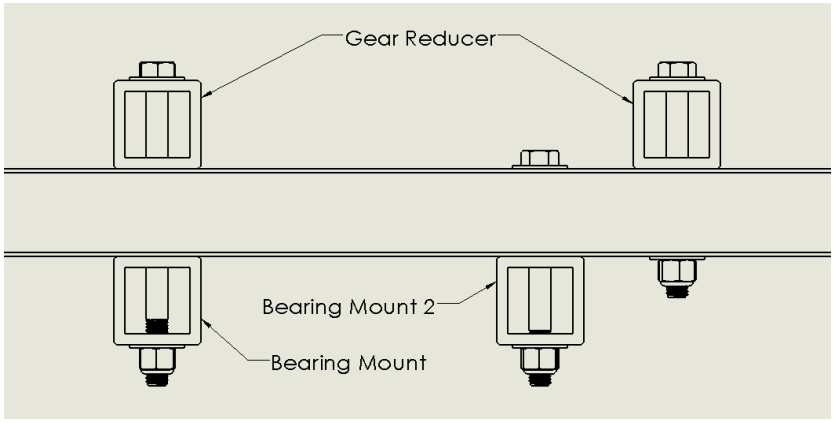



**Figure 9.** Side view of top frame assembly

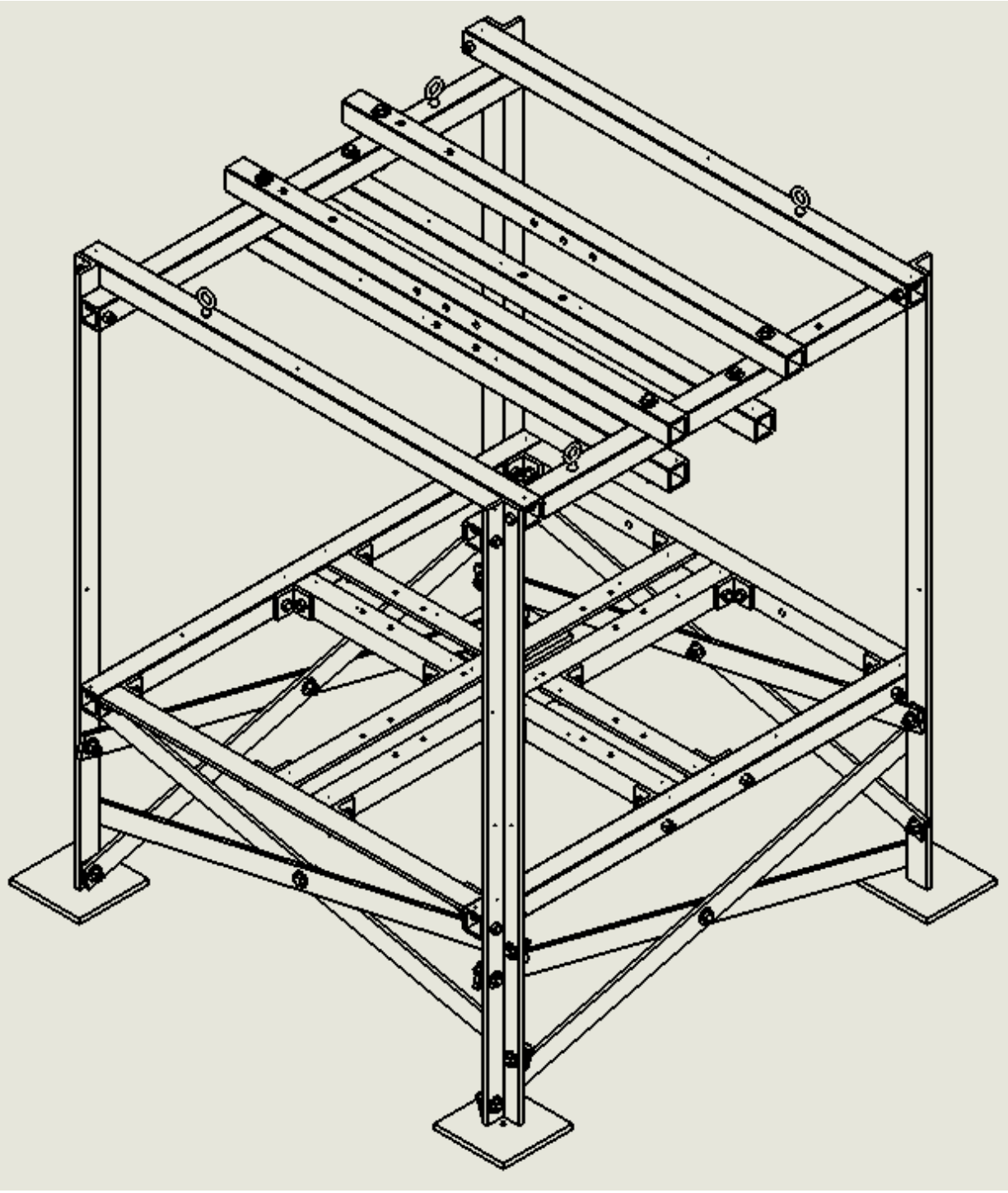


**Figure 10.** Combining all the assemblies above should yield a frame assembly as shown above

# Building the Turntable

Start by screwing in the grease fitting into the side hole of the Bearing Housing. Secure the Bearing Housing to the Bearing Housing Mount using ¼-20 by ¾-inch (19.05 mm) flat head screws. Next, secure this assembly to the Table Support Center pieces using 10-24 x 1.25-inch (31.75 mm) button head screws, a ¼-inch (6.35 mm) flat washer, and a 10-24 locknut. The Bearing Housing should maintain a tight tolerance and be press fit based on the Thrust Bearing (Part# 6678K14 at McMaster Carr). Insert the Thrust Bearing into the Bearing Housing. Next, screw in the Grease Fitting into the side hole of the Bearing Housing.

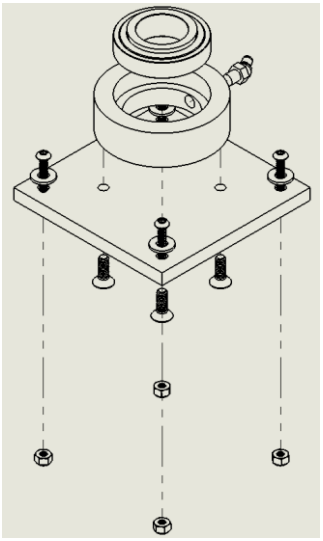


**Figure 12.** Bearing housing assembly to frame

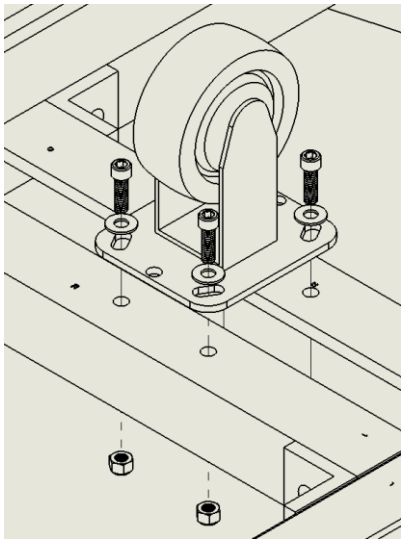


**Figure 11.** Roller Caster attachment to base frame table

Continue in the assembly by securing the Roller Casters to the frame using four [4] 5/16-18 by 1-inch (25.4 mm) socket head screws, four [4] 5/16-inch (7.94 mm) flat washers, and four [4] 5/16-18 locknuts in the four [4] corner slots. Refer to Figure 12 for the proper attachments. Repeat this process for all four [4] Roller Casters.

To secure the Base Plate on to the center shaft, a 1.5-inch (38.1 mm) Shaft Flange will be attached to both sides of the Base Plate. These shaft flanges are secured using three ¼-20 by 2-inch (50.8 mm) tap bolts, three ¼-20 by 2-inch (50.8 mm) shoulder bolts, twelve ¼-inch (6.35 mm) flat washers, and six [6] ¼-20 hex nuts. The tap bolts and shoulder bolts alternate as they are secured around the shaft flange. The tap bolts are outfitted with three ¼-inch (6.35 mm) flat washers while the shoulder bolts are outfitted with only one [1] per bolt.

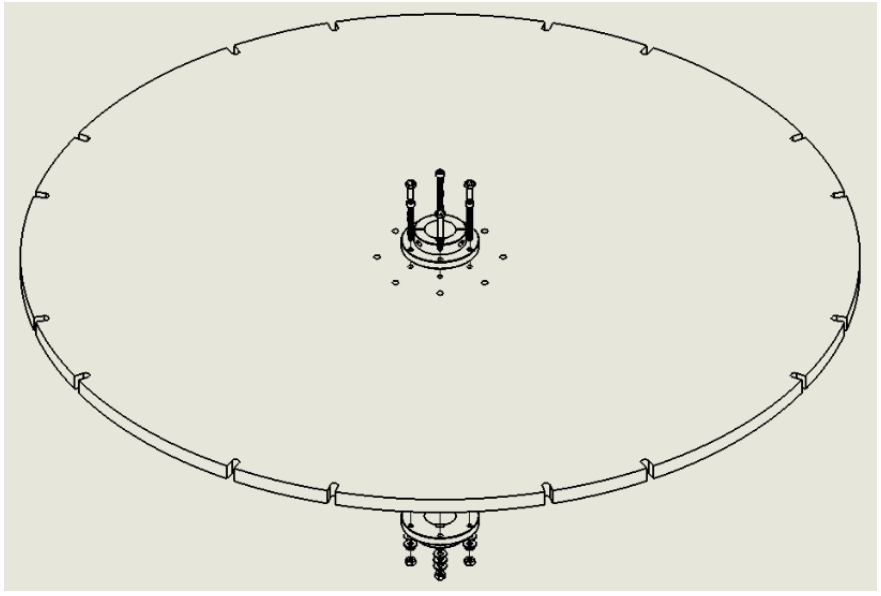


**Figure 13.** Shaft Flange attachment to Base Plate

Next, add in the Center Shaft Key to the bottom of the lowermost key slot on the Center Shaft. The bottom of the Center Shaft is characterized by the smaller diameter. Additionally, add the Center Shaft to Love Joy Key to the topmost key slot.

The entire key should perfectly fit into the slot.

When the shaft flanges are tightly secured to both sides of the Base Plate, stick the Center Shaft through the center hole of the Base Plate, aligning the key and keyway. Tighten both shaft flanges to the Center Shaft using two [2] ¼-28 by ¾-inch (19.05 mm) socket head screws per shaft flange such that the Base Plate sits at least 5-inches (127 mm) from the bottom of the Center Shaft. Add the Tapered Bearing Shield to the bottom of the Center Shaft. Keep the shield loosely secured to the shaft so that later it can be tightened to rest on the Thrust Bearing.

Take this entire turntable assembly and stick the bottom of the Center Shaft into the Thrust Bearing secured on the base frame table. Tighten the Tapered Bearing Shield such that it rests on the Thrust Bearing using two [2] ¼-28 by ¾-inch (19.05 mm) socket head screws in the shaft collar of the shield. Once tightened, loosen the shaft flange collars on the Center Shaft and lower the Base Plate such that it is resting on the Roller Casters.

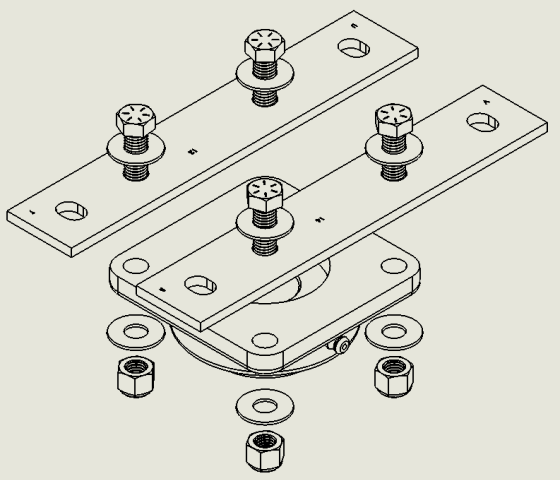


**Figure 14**. Top of Shaft Bearing Assembly

Next, start by assembling the Top of Shaft Bearing Assembly. Using a ½-13 by 1.75-inch (44.45 mm) hex head screw, two [2] ½-inch flat washers, and a ½-13 locknut, secure the Top of Shaft Bearing to the Top of Shaft Bearing Mounts. Repeat in all four [4] corners of the Top of Shaft Bearing.

Take this assembly and slip it onto the top of the Center Shaft. For this, you will need to go between the Bearing Mount and Bearing Mount 2 Rec Bars. Go far enough down the Center Shaft to be able to twist the Top of Shaft Bearing Assembly to the proper orientation. Level the assembly before securing to the top frame.

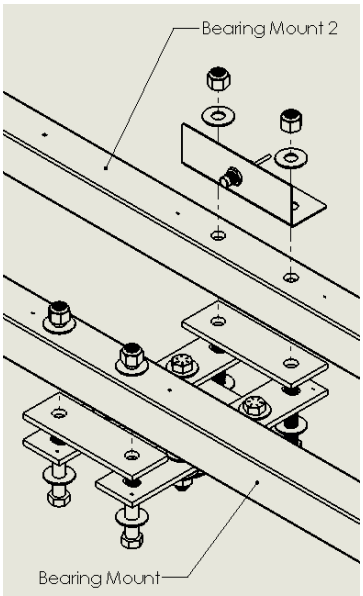



**Figure 15**. Top of Shaft Bearing Assembly attachment to frame

Next, one [1] Top of Shaft Bearing Mount Spacer is placed between the mounts and the rec bars on both sides. The mount and spacer are secured under the Rec Bar Bearing Mount using a ½-13 by 3.25-inch (82.55 mm) hex head screw, two [2] ½-inch flat washers, and a ½-13 locknut. On Rec Bar Bearing Mount 2, the Proximity Switch Mount is added on top of the rec bar and secured from below using a ½-13 by 3.5-inch (88.9 mm) hex head screw, two [2] ½-inch flat washers, and a ½-13 locknut. Add the proximity switch into the open hole. Tighten the nuts until the proximity switch is secured.

To finish the turntable assembly, add the pie pieces to the Base Plate. Two [2] Angled Pie Piece Assemblies and six [6] Slat Plate New pieces will be used. To make the Angled Slat Pie Piece Subassemblies, use a Slat Plate V4, Slat V2, and two [2] ¼-20 ¾-inch (19.05 mm) socket head screws per subassembly. The slotted end of the slat screws into one of the numbered holes of the pie piece based off the intended angle of impact. The other end of the Slat secures to the open hole toward the middle of the Slate Plate, as shown in Figure 16.

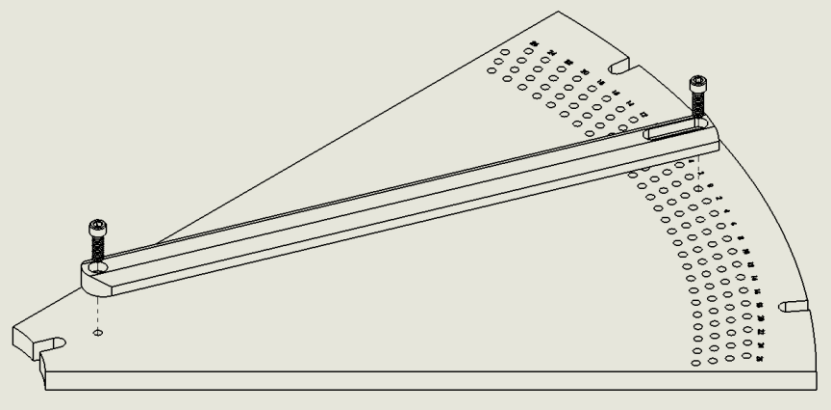


**Figure 16.** Angled Slat Pie Piece Subassembly

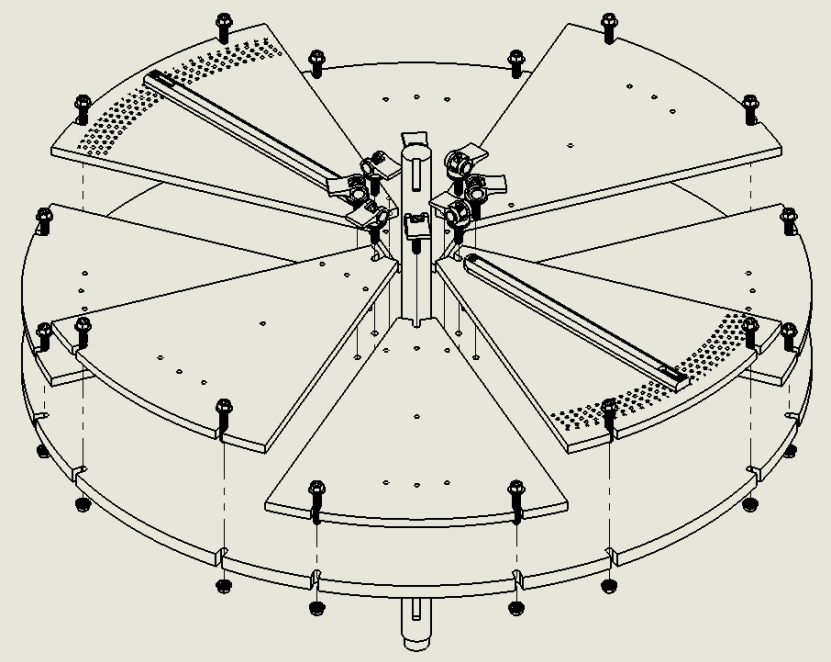


**Figure 17.** Adding the Pie Pieces to the Turntable Assembly

These plates will all be placed on the base plate in a circular pattern. Slats can later be added to these pie pieces to conduct different kinds of impact testing. The Angled Slat Pie Piece Assemblies will sit opposite each other and split the remaining pie pieces. Line up the outside grooves such that a 3/8-16 by 2-inch (50.8 mm) flange hex head screw and a 3/8-16 flange locknut can be used to secure the pie piece to the base plate. The Quick Release Clamps will sit in the inside groove of the pie piece and screw into the outer circle of holes on the Base Plate. Screw in the Quick Release Clamps with the clamp open. Once tightened, close the clamp to further hold the two [2] pieces together. Note that these clamps had their handles cut down. This step is not completely necessary depending on how you orient the tightened clamp.

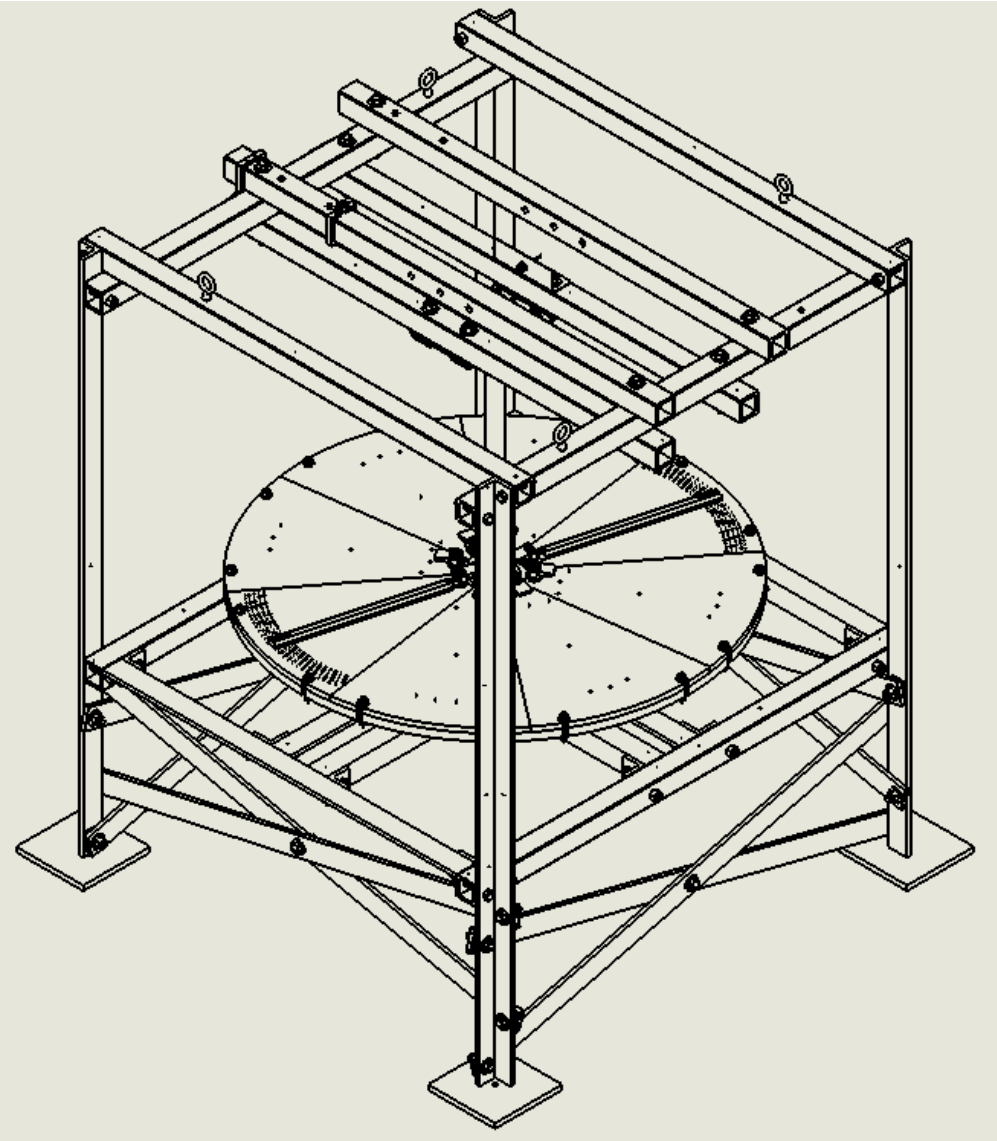


**Figure 19.** The final turntable assembly should look like this.

## Installing the Motor and Gear Reducer

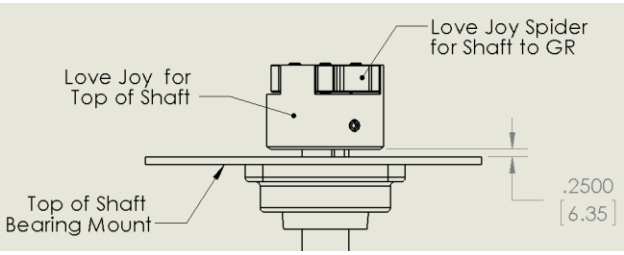



**Figure 18.** Love Joy Assembly connecting Center Shaft to Gear Reducer output

Insert the Love Joy for Top of Shaft hub and Love Joy Spider for Shaft to GR to the top of the shaft until the bottom of the love joy hub is about ¼-inch (6.35 mm) above the Top of Shaft Bearing Mounts. Slide the Gear Reducer Output Key and Love Joy for GR Output on the output shaft of the Gear Reducer. Push the Love Joy all the way up the output shaft for easy Gear Reducer installment.

Next, assemble the Gear Reducer Side Mount Subassembly by corner welding the Gear Reducer Side Mount 2 to the Gear Reducer Side Mount on the 3 sides indicated in Figure 20. Add these Gear Reducer Side Mount Assemblies to both sides of the Gear Reducer and secure using four [4] 7/16-14 by ¾-inch (19.05 mm) hex head screws per side. Take this whole assembly and mount it onto both Gear Reducer Rec Bars. Secure from the inside of the Gear Reducer Side Mounts by using a ½-13 by 3-inch (76.2 mm) hex head screw, one [1] ½-inch (12.7 mm) flat washer, and a ½-13 locknut in each of the six [6] holes. Add two [2] ½-13 by 1.75-inch (44.45 mm) hex head screws and two [2] ½-13 hex nuts to each side of the gear reducer side mount 2 holes. These will be used for leveling the gear reducer. Once the Gear Reducer is secured slide down the Love Joy for GR Output hub and align with the Love Joy for Top of Shaft hub and the Love Joy Spider for Shaft to GR. Tighten the set screws in both the love joy hubs to hold the coupling in place.

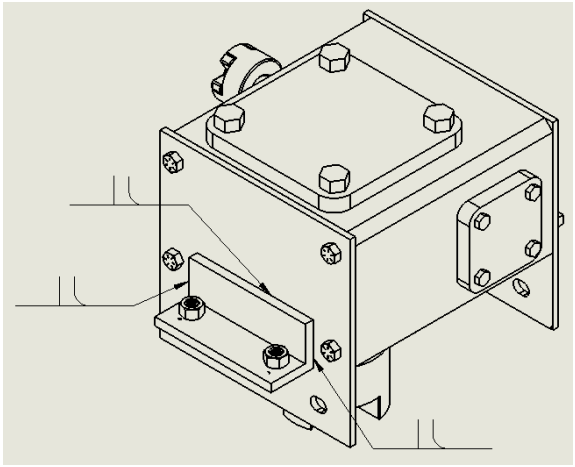


**Figure 20.** Gear Reducer Side Mount Subassembly Weld Locations

Add the Gear Reducer Input Key and Love Joy for GR Input hub on the input shaft of the Gear Reducer and the Love Joy to Motor Key and the Love Joy for Motor hub onto the Motor shaft. Loosely secure the Motor Mount to Frame pieces to the top of both Gear Reducer Rec Bars using ½-13 by 3-inch (76.2 mm) hex head screws and ½-13 locknuts. Place the Motor on top of the mounts and line up the slots on the Motor to the holes in the Motor Mount to Frame pieces and loosely secure the motor to the mounts with 5/16-18 by 7/8-inch (22.23 mm) hex head screws and 5/16-18 locknuts. Align the Motor shaft with the Gear Reducer input shaft and the love joy hubs and the Love Joy Spider Motor to GR. Bring together the love joy coupling and tighten the set screws on the love joy hubs to hold the coupling in place. Tighten all nuts and bolts once the motor is in proper location.

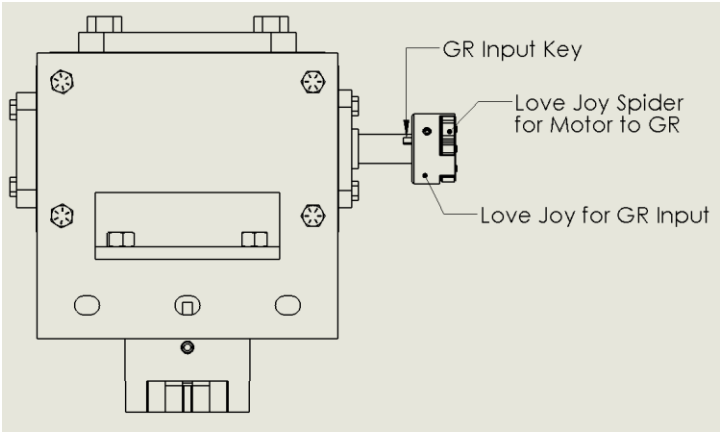



**Figure 21.** Love joy assembly connecting Gear Reducer input to Motor

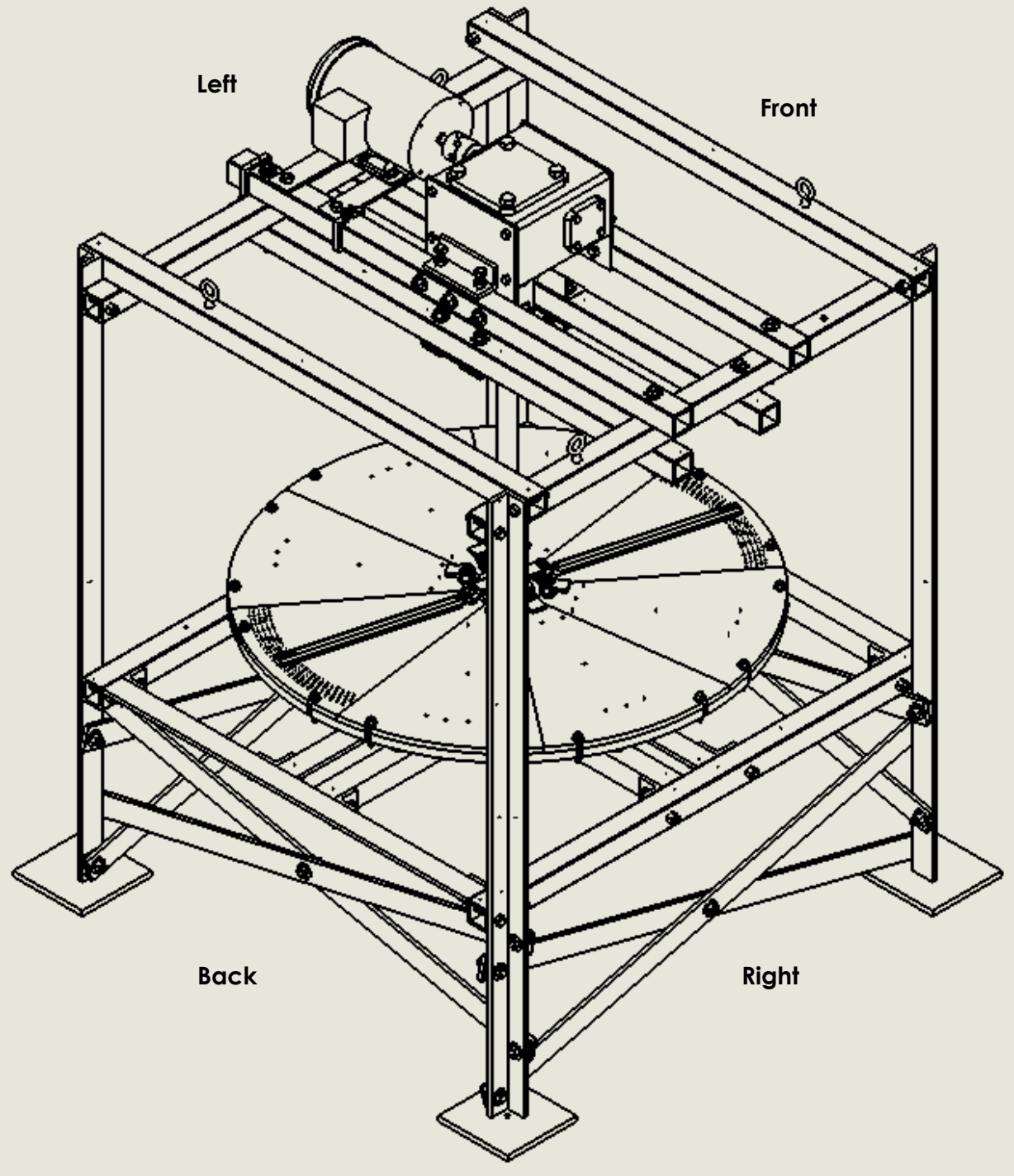



**Figure 22.** This figure shows what the final frame assembly, turntable assembly, and gear reducer and motor assembly should resemble

# Building the Arms

## Arm Support Subassembly

Start by assembling the arm support clamp assemblies. For this, you will need two [2] ¼-20 by 1.75-inch (44.45 mm) socket head screws, an Arm Support Clamp, an Arm Support Clamp Round Piece, and a 3/8-16 by 2-inch (50.8 mm) flange hex head screw. Loosely secure the ¼-20 by 1.75-inch (44.45 mm) socket head screws in the two [2] side holes. These will be used to tighten the clamp on the Arm Support Rod. Feed the flange hex head screw through the hole and screw it into the Arm Support Clamp Round Piece. This is what holds the entire arm up on the frame. Repeat this until you have two [2] arm support clamp assemblies. Add the rod into to the centered hole of one of the arm support clamp assemblies. Tighten the socket head screws such that the end of the rod is 0.5-inches (12.7 mm) from the side of the Arm Support Clamp.

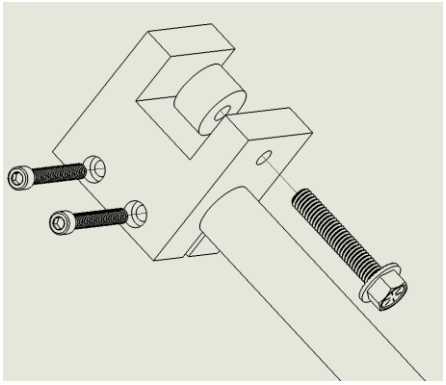


**Figure 24.** Exploded Arm Support Clamp Assembly

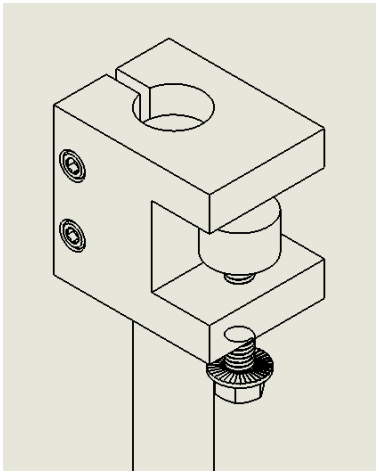


**Figure 25.** Arm Support Clamp Assembly

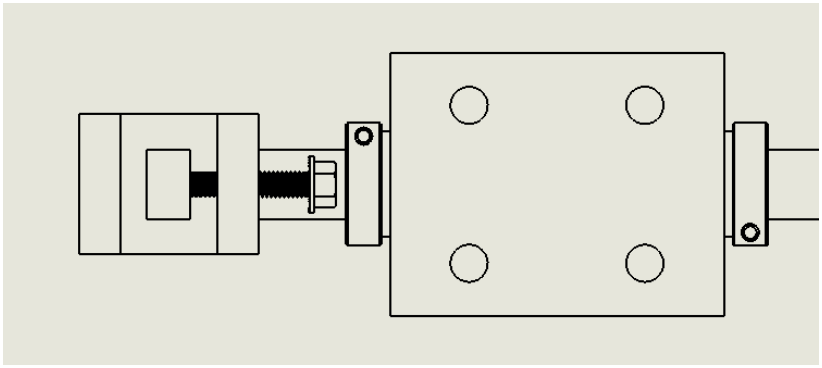


**Figure 23.** Arm Support Subassembly

Slide a 1-inch (25.4 mm) shaft collar onto the rod. Loosely secure the ¼-28 by 5/8-inch (15.89 mm) socket head screw on the shaft collar. Slide two [2] Arm Flange Bushings into the center hole of the Arm Holder, one [1] on either side, and slide this whole assembly onto the rod until it is up against the shaft collar. Add another 1-inch (25.4 mm) shaft collar on the other side of the other bushing and another Arm Support Clamp to the other end of the rod and tighten 0.5-inches (12.7 mm) from the end of the rod. Next, secure this Arm Support Assembly to the Base Legs. The 3/8-16 flange hex head screw and the Arm Support Clamp Round Piece are tightened to hold the arm assembly up against the frame.

Secure the Arm Holder such that the distance from the Arm Holder to the Arm Support Clamp is X-inches (mm). The shaft collars on the Arm Support rod may need to be loosened to move the Arm Holder. This placement will ensure that the caster's distance travelled is correct.

## Arm Subassembly

Loosely secure the Plate Gusset and the Gusset Spacer to a gusset Spacer Mount Short and a Gusset Spacer Mount Long using two [2] 5/16-18 by 1.375-inch (34.93 mm) per mount. Note that these gusset spacer mounts have been chamfered on the ends to properly fit within the channel of the 8020 Bar. Repeat this until you have 2 gusset assemblies. Slide one gusset assembly on each side of the 3-Inch (50.8 mm) 8020 Square Bar—the short gusset spacer mount on top and the long mount on the bottom—through the slots on the bar. The 8020 Square Bars should be oriented such that the single hole on the side is facing up. Screw a 1-inch (25.4 mm) eye bolt into this hole. Attach the Cam Strap s-hook to this eye bolt. The other end will be connected later. Next, align the Arm Attachment such that the 6 holes on the sides align with the last 3 holes on each of the Plate Gussets and secure with ¼-20 by 7/8-inch (22.23 mm) socket head screws. Once in place, tighten all the 5/16-18 by 1.75-inch (44.45 mm) and ¼-20 by 7/8-inch (22.23 mm) socket head screws. A Plastic 2 Plane Cross Level should be placed anywhere on the top of the 8020 square bar such that it is square with the arm.

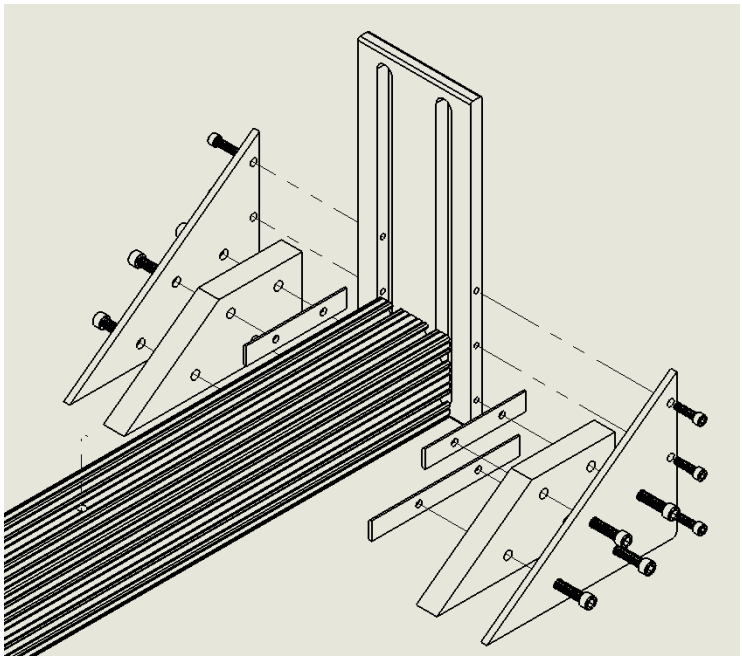


**Figure 27.** Arm attachment to 8020 Bar

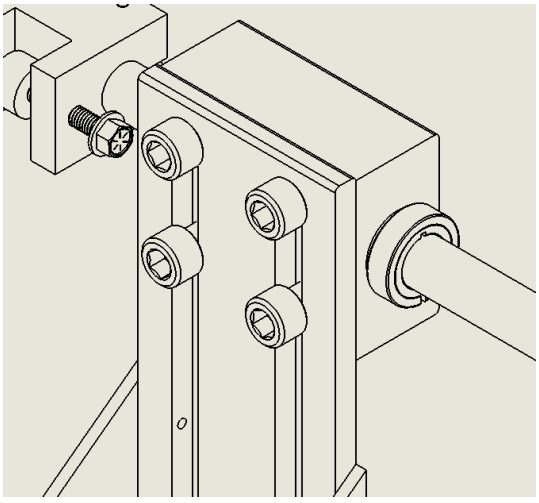


**Figure 26.** Connection between Arm Attachment and Arm Holder

To attach the Arm Subassembly to the Arm Support Subassembly, four [4] 5/8-11 by 2.5-inch (63.5 mm) socket head screws go through the slots of the Arm Attachment to screw into the open holes in the Arm Holder.

Now, the other end of the cam strap can be hooked onto the eye bolt on the top frame. Tighten the cam strap so that the arm is angle up slightly. If there is extra strap, wrap it around the rec bar until you reach the desired length. This strap holds the arm up so that test casters can be added or removed, or maintenance can be done on the arm. In addition, this strap will be there to catch the arm, prohibiting it from damaging the rest of the machine, in case of caster failure. Leave enough strap so that the arm can lay level and still have some leeway.

Next, a 5/8-11 by 4-inch (101.6 mm) socket head screw will sit in the Weight Block and a 5/8-11 hex nut will be used to tightly secure the screw to the Weight Block to create a post for the weights. A Rubber

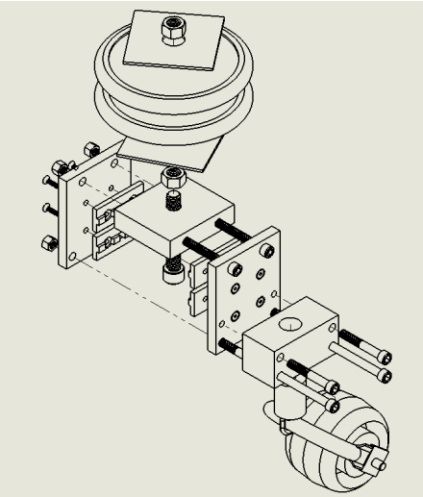


**Figure 28.** Arm Clamp Subassembly

Square will sit below and above the weights on the Weight Block. Approximately 30-pounds (13.61 kg) of plate weights will be added to each arm at the end of the build. To secure, another 5/8-11 hex nut will be used.

Secure two [2] Clamp Bearings onto both Clamp Side Plates (Hub Side & Default) using two [2] 10-32 by 7/8-inch (22.23 mm) flat head screws per clamp. Loosely secure the Clamp Side Plate (Hub Side) and a Clamp Side Plate (Default) to either side of the Clamp Weight Block using two [2] 3/8-16 by 5-inch (127 mm) socket head screws and two [2] 3/8-16 hex nuts.

The figure below shows the arm assembly at this stage of the build.

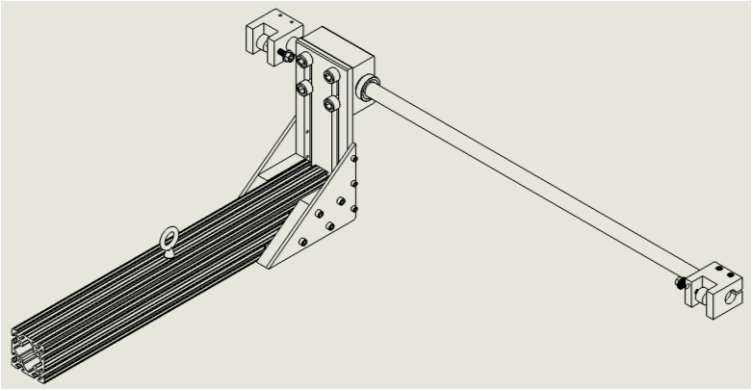


**Figure 29.** This figure shows what the complete arm assembly should look like

To attach the complete Arm Assembly to the frame, line up the arm support clamps such that the protrusions on the clamp straddle a side of the Base Leg angle iron. Before securing, be sure that the clamp sits up against the angle iron, as shown in the figure below. Note that the arm will swing on the arm support rod. Once in place, tighten the Flange Hex Head Screw as much as possible. Vibrations from testing may cause this clamp to move slightly. Periodically check to confirm that the arm is still level.

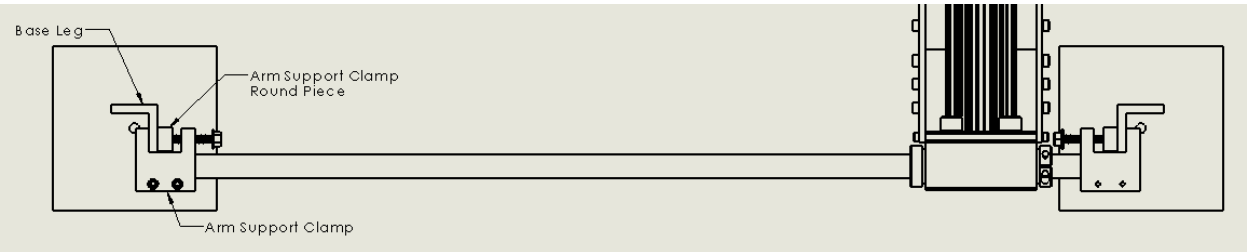



**Figure 30.** Arm attachment to the frame

Now, slide the Arm Clamp Assembly onto the end of the 8020 Bar. Before tightly securing the clamp on the bar, insert the test caster bearings into the Caster Adapter and complete the build of the test caster assembly. With the caster assembly built, tightly secure the Caster Adapter to the hub side plate using two [2] 3/8-16 by 2.5-inch (63.5 mm) socket head screws in the top two [2] holes. The bottom two [2] holes will be loosely secured with two [2] 3/8-16 by 7-inch (177.8 mm) socket head screws and two [2] 3/8-16 hex nuts. These 7-inch (177.8 mm) socket head screws will go through both side plates before the hex nut is secured. The clamp can be adjusted on the bar such that the center of the caster wheel you are testing is

centered with the center shaft of the turntable, as shown in Figure 31. Once correctly placed, secure the location of the clamp by tightening the four [4] 3/8-16 nuts.

Repeat this entire process until 4 arms are built. Each of these arms will take a different side of the caster test machine.

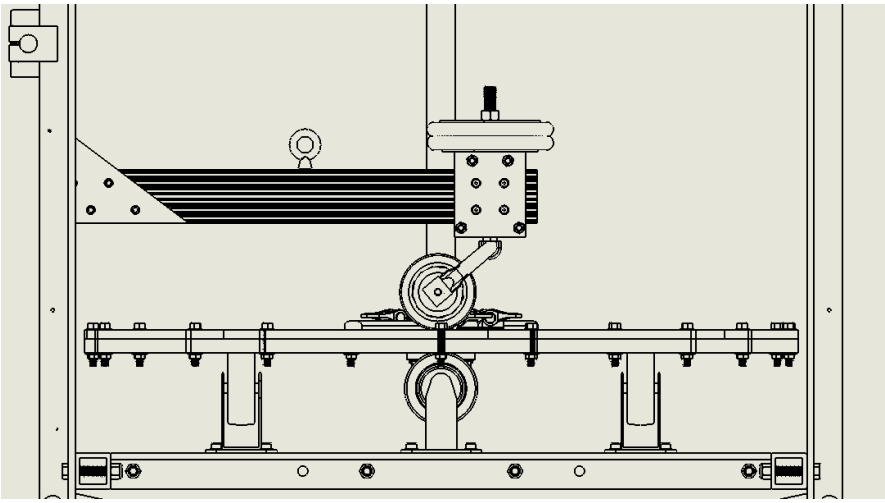


**Figure 31.** Test Caster placement on the turntable

# Finalizing the Build

## Adding the Limit Switches

Start by securing the Compact Limit Switch to the Limit Switch Clamp using two [2] M5 by 25-mm (.9843 inch) socket head screws on the side closest to the actuator. Repeat this until there is one [1] for each arm.

These Limit Switch Assemblies can be placed anywhere on the top frame rec bars. They are used to stop the turntable motion if the actuator is pulled by an arm. In this model, one Limit Switch Assembly slides onto the Rec Bar Gear Reducer in the back and connects to the arm on the back side. Another is located on the Rec Bar Top Frame 1-2 and connects to the right-side arm. The third, is on the Rec Bar Bearing Mount 2 and connects to the front side arm. The fourth is on the Rec Bar Gear Reducer in the front and connects to the left side arm. Laterally, the limit switch assemblies are placed such that they are lined up with the eye bolt on each respective arm. Once in place, a ¼-20 by 3-inch (76.2 mm) socket head screw is used to secure the Limit Switch Assembly.

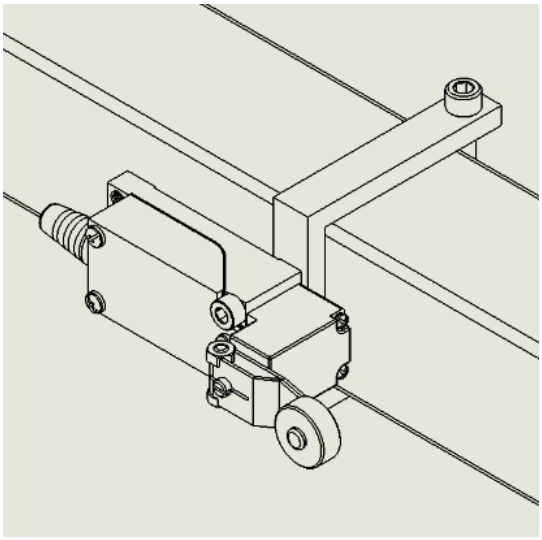


**Figure 32.** Limit Switch Assembly attachment to frame

A 3/16-Inch (4.76 Mm) Diameter Shock-Absorbing Rope is tied from the limit switch actuator to the

eyebolt on the respective arm. Leave a little slack in the rope to ensure that a full bounce of the test caster can occur.

## Adding the Polycarbonate Protectors

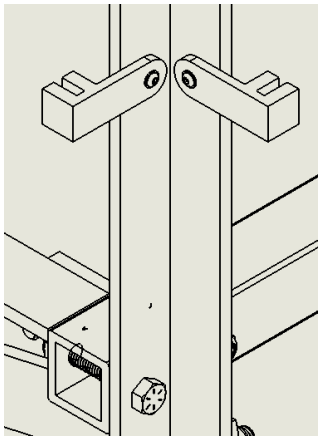


**Figure 33.** PC holder for the sides

Polycarbonate Protectors are used on all sides of the test machine to protect the surroundings from any potential test caster failures. To hold the protector sheets up, three types of polycarbonate holders are used.

The first holder is the PC Holder (Sides). These are attached to the frame through the last remaining open hole of the Base Legs. This hole is of a smaller diameter and is about half way up the leg. A 10-24 by 1-inch (25.4 mm) button head screw, No. 10 washer, and 10-24 locknut is used to secure the holder to the frame. Two [2] PC Holders (Sides) will attach to each side, one [1] on both Base Legs. Orient them such that the fork protrusions are facing each other forming a channel slot for the protective shield.

The second type of holder is the PC Holder (Square tubing). These holders will slide onto the table support rec bars and secure using a 10-24 by 3-inch (76.2 mm) socket head screw and a 10-24 hex nut. Two [2] will be used on each table support rec bar. These can be placed anywhere along the rec bar to support the protective shield. In this model, the holders are placed 10-inches (254 mm) from the Base Legs.

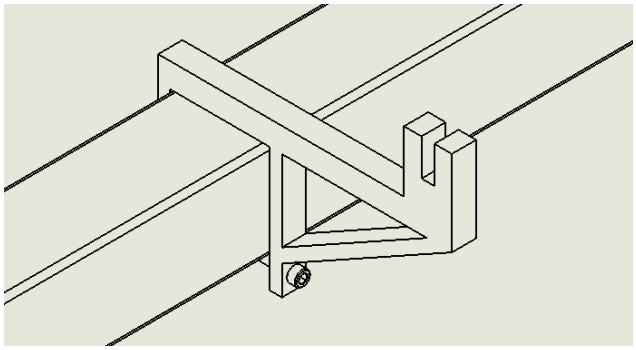


**Figure 34.** PC Holder for the square tubing

The final type of holder is the PC Holder (Angled iron). These holders are used on the Table Support Side pieces of the base table. This holder consists of two [2] pieces which are secured with two [2] 6-32 by 1.25-inch (31.75 mm) button head screws and 6-32 hex nuts. Again, these holders can be placed anywhere on the angle iron to support the shield. In this model, the holders are placed 10-inches (254 mm) from the Base Legs.

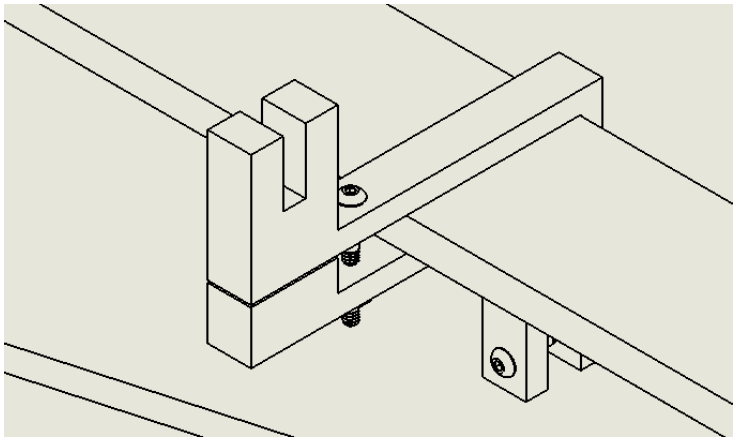


**Figure 35.** PC Holder for the angle iron

Once, all the PC Holders are on the machine, slide the Plexiglass Protector into the channel formed by the holders. These are there in case of any caster failure that could cause harm to the surroundings. The figure below is what the final assembly should look like.

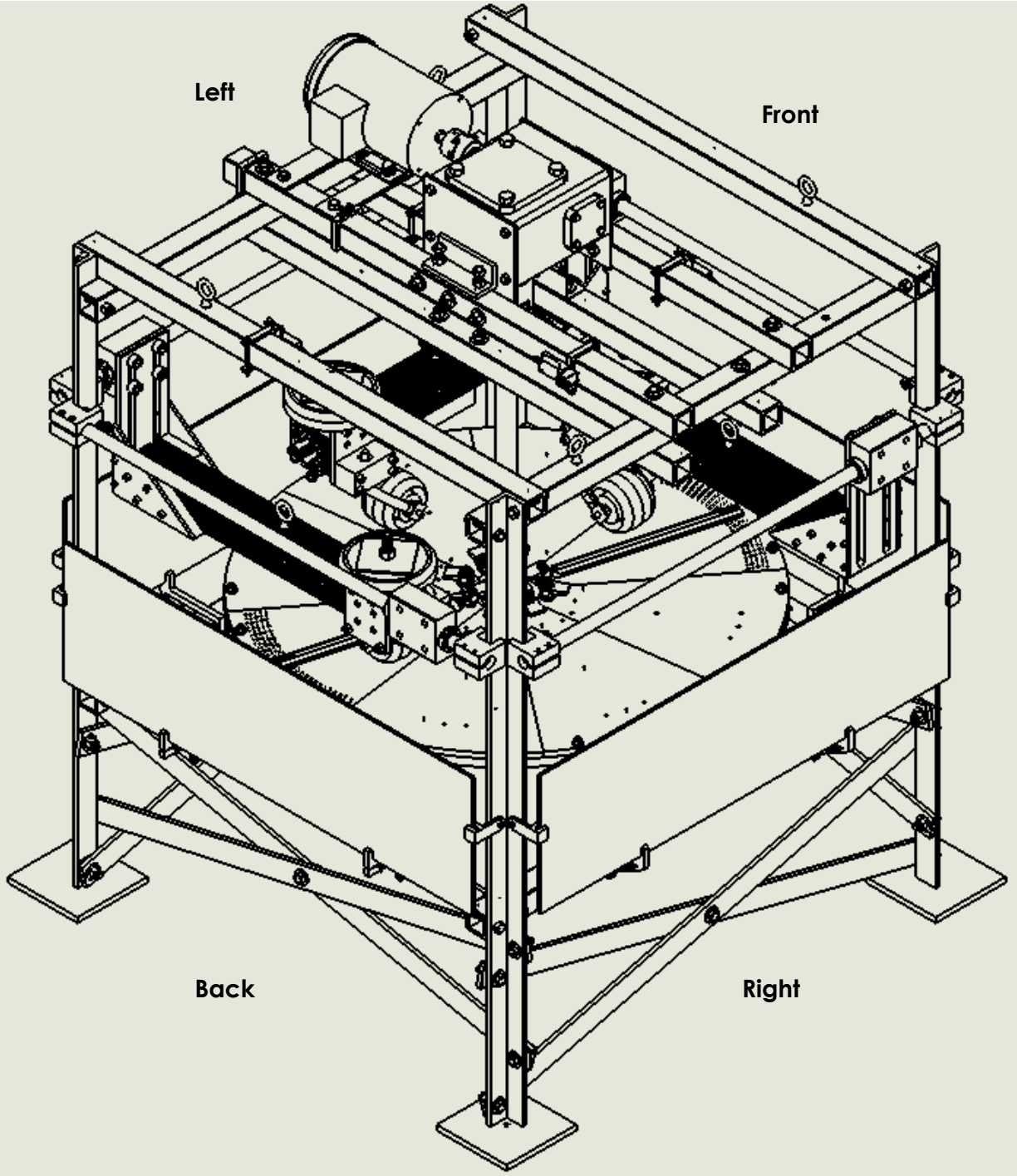



**Figure 36.** Complete Caster Test Assembly

# Electrical

## Notes:

The manual for all the components used in this list of instructions are included in the appendix.

A 220V AC power supply is assumed to be accessible for the factory being set up, but if this is not true then a separate power supply must be obtained as it is required for operation of the equipment.

Organization of the wires within the control box is up to the user and can be done in any way they find the most effective.

Various types of wire can be used for the connections between different components of the control box. The associated manuals for each component should be consulted when ordering these wires.

All components mentioned in this section are included in the Bill of Materials.

Figure B.1 in Appendix B shows the complete wiring diagram for the caster tester and can be used to properly wire the components. This is just one option of wiring the caster test. Other wiring methods will work.

## Tools Required

Wire cutters
Screwdrivers
Drill
Soldering Iron (if necessary for wire connections)

## Mounting the Components

An external single phase 110V and 220V AC power source are fed through an enclosure mounted to a nearby wall that most of the electrical components used in this test setup. These components include a power supply, a logic controller, a VFD motor controller, a LCD display, some operation buttons, and circuit breakers. A din rail has been mounted on the inside of the enclosure for easy installation and access to the electrical components. The following sections outline the installation process for each individual component.

### Mounting the Logic Controller

The power supply and the controller will be mounted on a din rail for ease of access. The DIN rail should be cut such that it fits the entire length of the enclosure and then mounted using the accompanying fasteners. Once the DIN rail is attached, the programmable logic controller can be mounted onto the DIN rail using the installation instructions included within the manual for the controller. An image of the logic controller mounted to the din rail is shown in the figure below.

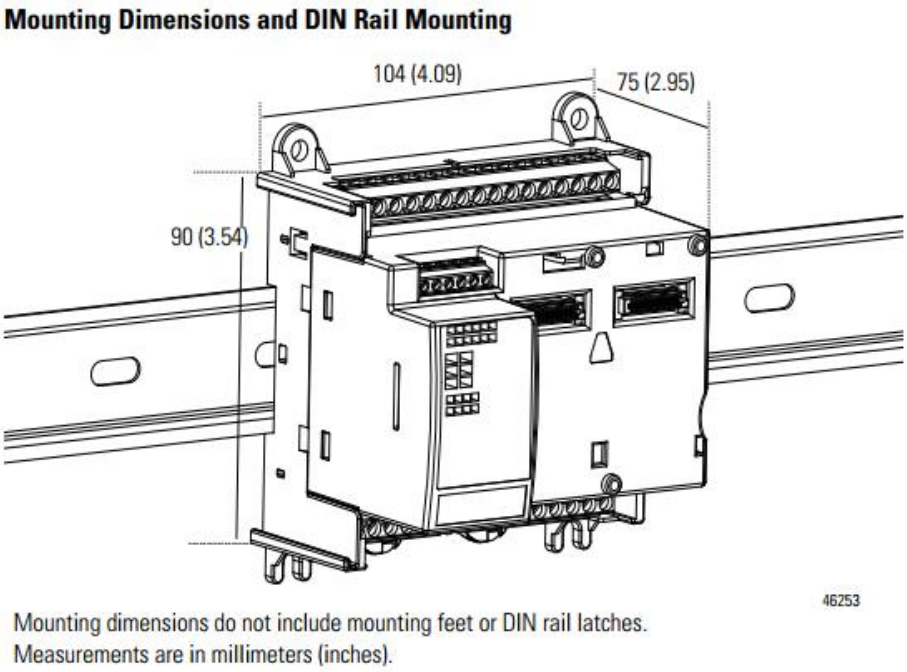



**Figure 37**. Mounting Logic Controller onto the DIN Rail

## Mounting the Power Supply

The power supply will be mounted to the DIN rail in a similar fashion to that of the logic controller. The figure below shows the proper location of the mounted power supply with the logic controller.

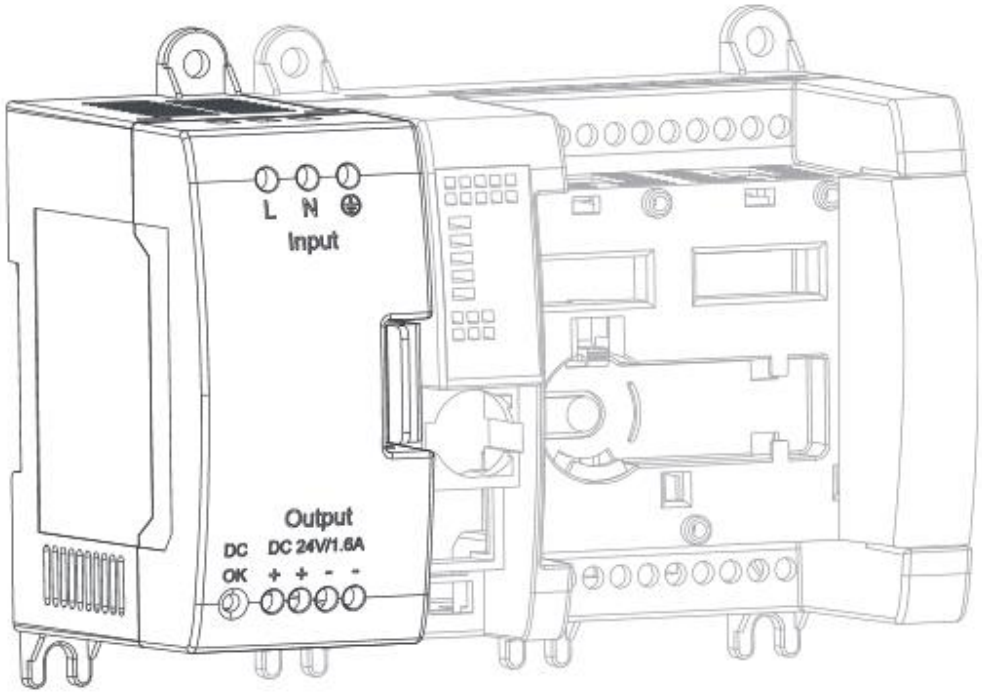



**Figure 38.** Mounting the 24V DC Power Supply to the DIN Rail

In this setup. a 2-amp circuit breaker is mounted on the DIN rail within the enclosure. The circuit breaker is wired such that it should be located nearby to the power supply. This is installed to prevent failure of the controller in the case of a power surge.

## Mounting the Motor Controller

The purpose of the motor controller is to regulate the actions of the motor by using the commands from the logic controller. Once the logic controller has been successfully installed, you can now add in the motor controller. It will be mounted to the DIN rail on the back panel of the enclosure. A DIN rail kit will need to be installed onto the VFD before it can be attached to the DIN rail. Follow the DIN rain mounting diagram and instructions in the manual for outlined steps on how to mount the motor controller.

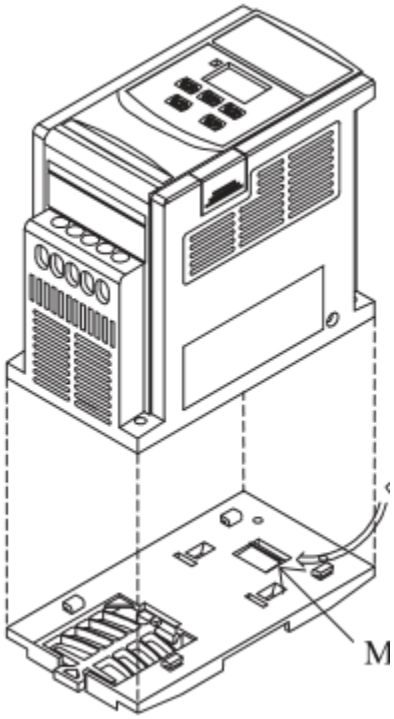


**Figure 39.** Installing the DIN Rail Kit onto the VFD

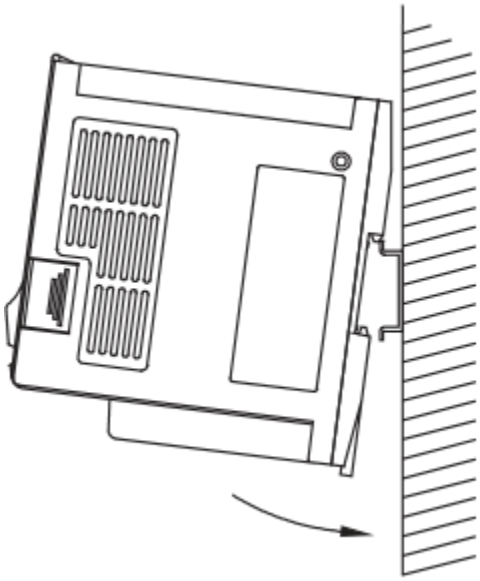


**Figure 40.** Installing the VFD to the Din Rail

## Mounting the LCD Display

The LCD display used in this set up was built for this specific logic controller. The display is mounted to the cover panel of the enclosure through a hole in the enclosure cover drilled to the appropriate size. These dimensions can be found in the user manual, in addition to instructions outlining the mounting process.

## Mounting the Push Buttons

Various push buttons will be used to operate the turntable. These buttons will perform the basic functions of stopping and starting the test cycles. Additional functions controlled by the buttons include: reversing

the direction of motion, a forward motion, pausing the test, and slowing the speed of rotation to a jog. The jog button slows the motor to around 10% of the normal speed.

All the buttons are mounted to the outside panel of the enclosure with the LCD display by drilling appropriately sized holes in the cover panel. In addition to these buttons, a panel mounted circuit breaker is, also, mounted to the cover panel. An image of the cover panel is shown in Figure 33. The associated colors for each button are up to the designer to decide, however it is recommended to use the setup shown in the following figure.

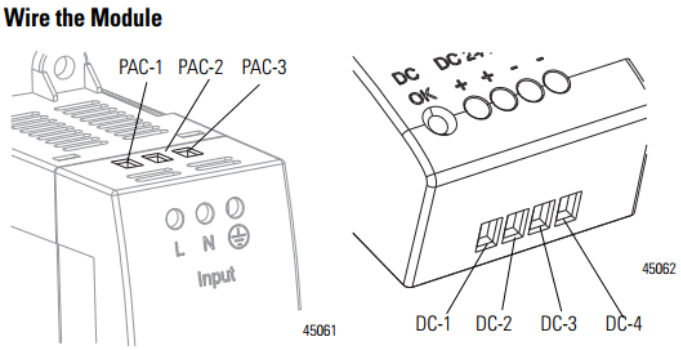

**Figure 41.** Image of the Cover Panel

## Wiring the Components

A 110V and 220V power source will supply the caster test machine with power. Within an enclosure mounted to a nearby wall, a 24V DC power supply will convert the 110V AC power source to a 24V DC power supply. This will provide the power for all the electrical components in the test setup. The power source will then connect to the logic controller, the LCD display, the limit switches, and the proximity switch. The following sections outline the wiring for each individual component.

## Wiring the Power Supply

The power supply will input a single phase 110V AC power and output 24V DC power. An image of the wiring terminals for this step is shown in Figure 33. The three-wired input from the 110V AC power source connects into the three ports of the DC power supply with the positive wire passing through the circuit breaker first. The power supply has four [4] output terminals: two [2] positive and two [2] negative. These outputs are used to power all the electrical components in this test setup. Follow Figure B.1 in Appendix B to make the proper connections with the other components.




| AC Input Connectors | | | DC Output Connectors (DC 24V/ 1.6 A) | | |
|---|---|---|---|---|---|
| PAC-1 | AC hot | 100…240V AC | DC-1 | + | |
| PAC-2 | AC neutral | 100…240V AC | DC-2 | + | |
| PAC-3 | Safety ground | | DC-3 | - | |
| | | | DC-4 | - | |

**Figure 42.** 24V DC Power Supply input and output terminals

## Wiring the Logic Controller

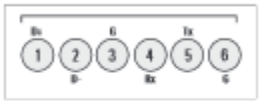
The logic controller will receive its power through the 24V DC power supply. This will then connect to all other electrical components. This is so that the logic controller can communicate with the VFD motor controller to administer the proper operations to the motor. Table 1 outlines the input and output connections of the Micro800 Logic Controller used for the caster test. Further instructions for using the logic controller are included in the manual. More information for operation and maintenance of the logic controller can be found online in Rockwell Automation's literature.

**Table 1.** Micro800 20 I/O Enet/IP Controller (RTB) Fixed Terminal Block Connections

| Input Terminals | Connection | Output Terminals | Connection |
|---|---|---|---|
| I-00 | Common Input from Limit Switches | O-00 | FWD on VFD |
| I-01 | Proximity Switch Input | O-01 | REV on VFD |
| I-02 | -- | O-02 | SP1 on VFD |
| I-03 | -- | O-03 | -- |
| I-04 | Start Button | O-04 | -- |
| I-05 | Pause Button | O-05 | -- |
| I-06 | Stop/Reset Button | O-06 | -- |
| I-07 | Jog Button | | |
| I-08 | Forward Button | | |
| I-09 | Reverse Button | | |
| I-10 | -- | | |
| I-11 | -- | | |

Below is an image of the serial port pin definitions. This is where the LCD display connects to the logic controller. Given that the LCD display uses a RS232 serial port, the logic controller will follow the RS232 example for wiring. Follow the user manual for further details. In addition, Figure B.1 in Appendix B shows the connection between the LCD display and the logic controller.

**RS232/RS485 Serial Port Pin Definition**




| Pin | Definition | RS485 Example | RS232 Example |
|---|---|---|---|
| 1 | RS485+ | RS485+ | (not used) |
| 2 | RS485- | RS485- | (not used) |
| 3 | GND | GND | GND |
| 4 | RS232 input (receiver) | (not used) | RxD |
| 5 | RS232 output (driver) | (not used) | TxD |
| 6 | GND | GND | GND |

**Figure 43.** Logic Controller Serial Port Pin Definitions

A picture of the fully wired logic controller is shown in Figure 35. In the photo all input wires from the buttons and switches are yellow and all the input wires from the LCD display are purple.

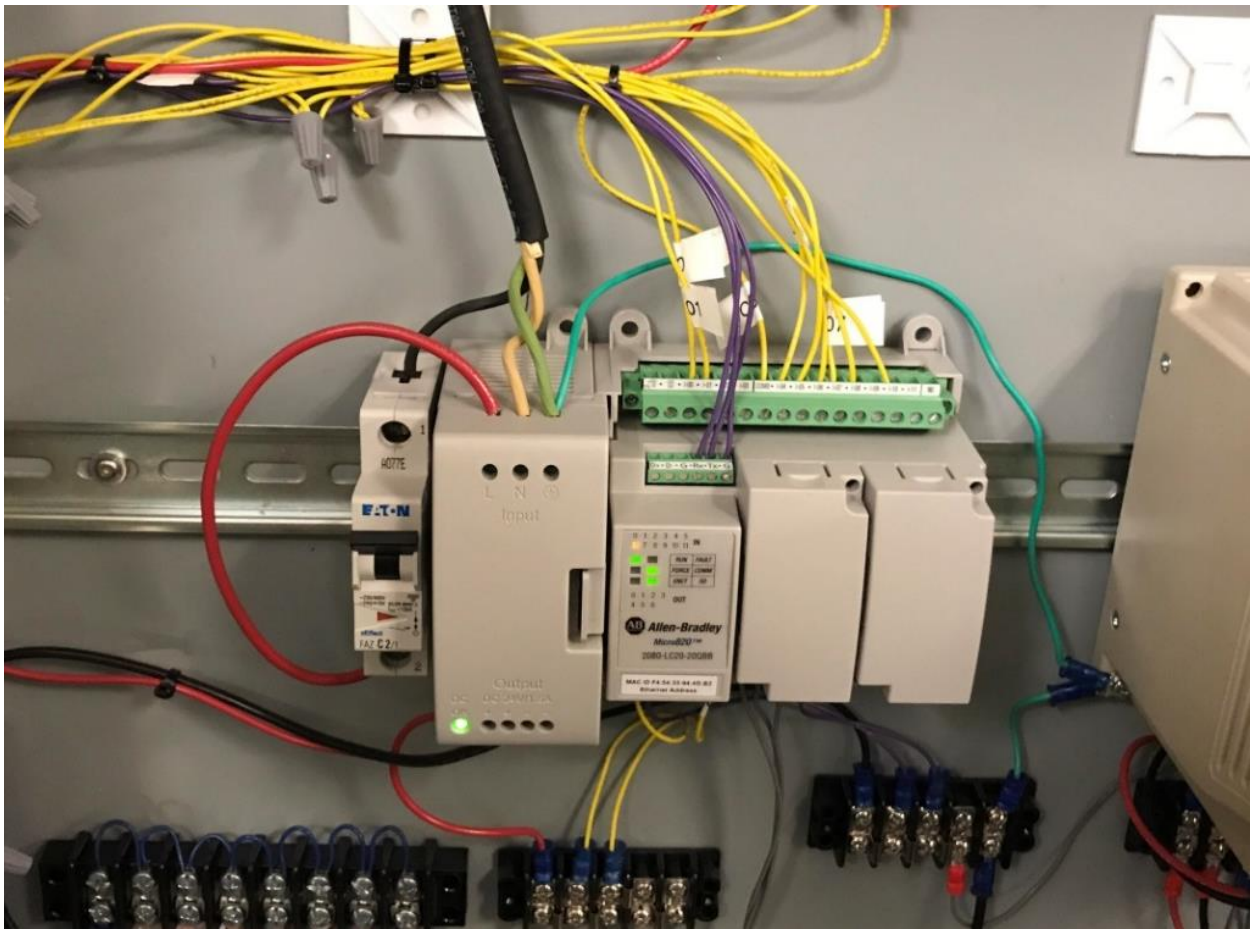



**Figure 44.** Image of fully wired Logic Controller

## Wiring the Motor Controller

The motor controller will run off a separate power supply of 220V AC power that first goes through a circuit breaker. Check the manual for more detailed instructions on mounting the VFD. The input and output connections for the motor controller are shown in Figure 37.

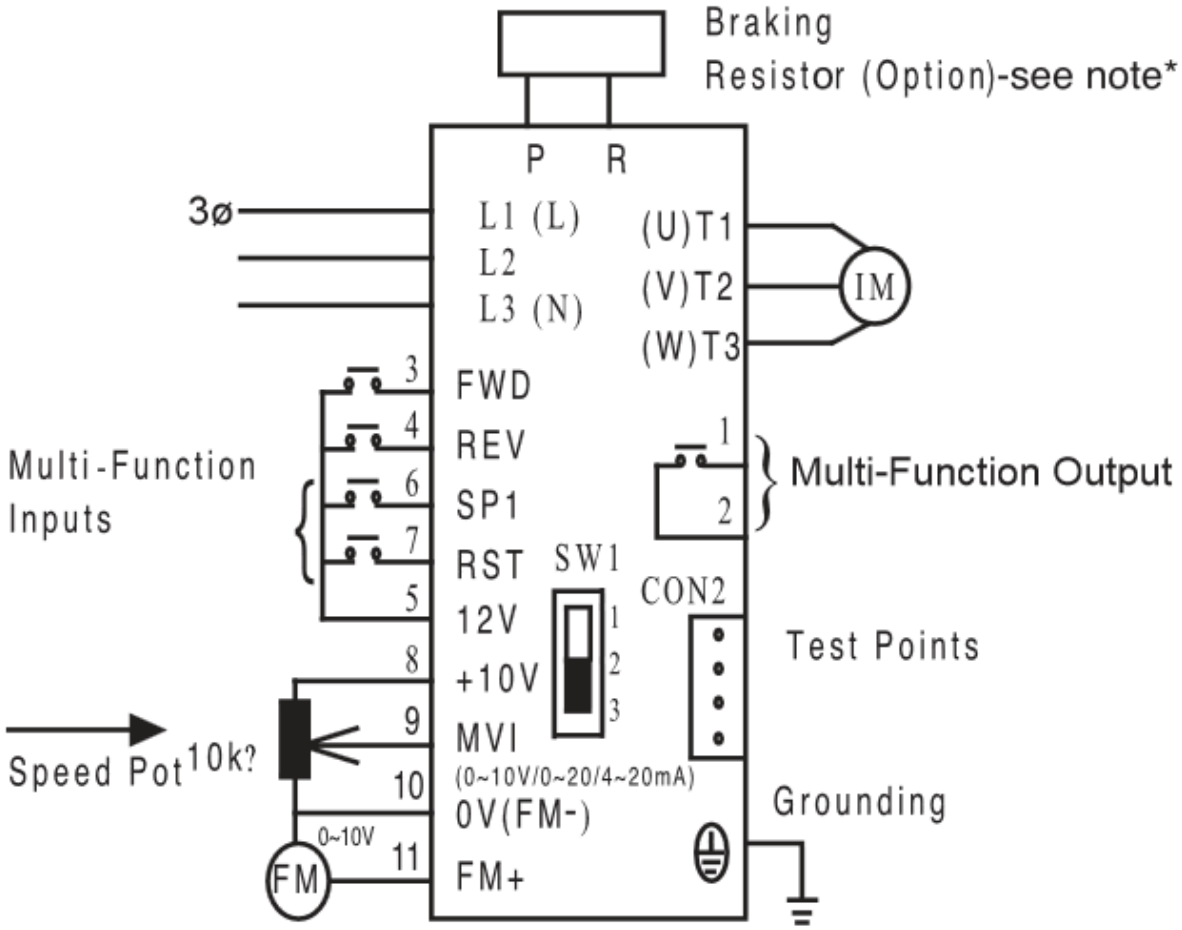
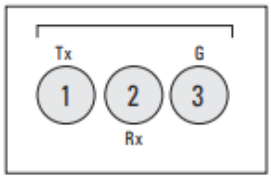



**Figure 45.** Motor Controller input and output terminals

## Wiring the LCD Display

The LCD screen connects to the 24V DC power supply through the power input terminals. Follow the instructions in the manual to properly wire the display to the power supply and logic controller. The wiring instructions for the connection of the LCD display to the controller are shown in the figure below.

*RS232 Serial Port Terminal Block*




46259

(View into terminal block)
Pin 1 RS232 TXD
Pin 2 RS232 RXD
Pin 3 RS232 GND

**2080-REMLCD to Micro820 Serial Port Terminal Block Wiring Diagram**

| 2080-REMLCD Serial Port Terminal Block | | | Micro820 Serial Port Terminal Block | |
|---|---|---|---|---|
| **Signal** | **Pin number** | | **Pin number** | **Signal** |
| RS232 TX | 1 | <--------> | 4 | RX RS232 |
| RS232 RX | 2 | <--------> | 5 | TX RS232 |
| RS232 G | 3 | <--------> | 6 | G RS232 |

**Figure 46.** LCD Display terminal definitions

## Wiring the Push Buttons

Each push button has two [2] terminals; a positive and a negative. The negative terminal is wired to a terminal block connected to a negative output from the 24V DC power supply. Each positive terminal is then wired directly to the logic controller.

The panel mounted circuit breaker receives its power from the external 220V AC power source. This circuit breaker is a 2-pole breaker, therefore, the positive and negative of the power source go through the positive and negative poles of the breaker. The breaker outputs to power the VFD motor controller.

Figure B.1 in Appendix B shows a more detailed diagram of the wiring of the push buttons and panel mounted circuit breaker.

## Wiring the Limit switches

Each limit switch is powered by the 24V DC power supply through a terminal block. All the positive connections to the limit switches branch off from a single connection to the terminal block within the enclosure. Similarly, all the outputs from each limit switch come together to make one [1] single connection to the logic controller. For further information, consult Figure B.1 in Appendix B.

## Wiring the Proximity Switch

The proximity switch contains three wires within the black insulation of the cord. One wire connects to the positive terminal block powered by the 24V DC power supply. Another connects to the negative

terminal block, also, powered by the 24V DC power supply. The third and final wire connects is the output of the proximity switch and connects to the I-01 terminal of the logic controller. Refer to Appendix B for further information.

## Wiring the Motor

The motor has only three external connections. Inside the junction box of the motor are connections outlined in the figure below. Follow the low voltage set up for the connections within the junction box.

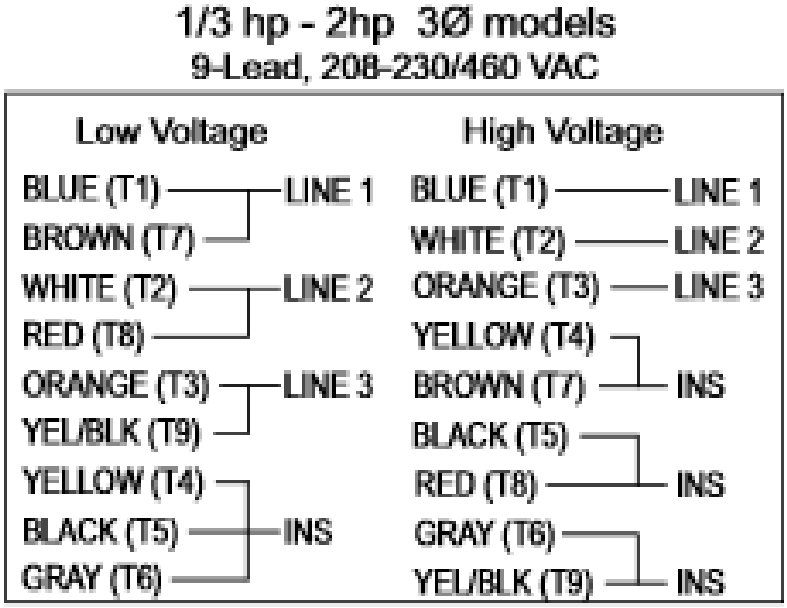



**Figure 47.** Motor wiring instructions

For further details, refer to the user manual for the IronHorse motor. Line 1,2, and 3 are the three wires that form external connections from the motor to the VFD motor controller. Follow the schematic in Figure B.1 and B.2 in Appendix B to make the proper connections.

# Appendix

## A. Links to Component Manuals

Micro820 20-Point Programmable Logic Controller:
http://literature.rockwellautomation.com/idc/groups/literature/documents/um/2080-um005_-en-e.pdf

Micro800 Programmable Controller External AC Power Supply:
http://literature.rockwellautomation.com/idc/groups/literature/documents/in/2080-in001_-en-p.pdf

Micro800 Remote LCD:
http://literature.rockwellautomation.com/idc/groups/literature/documents/in/2080-in010_-en-p.pdf

Variable Frequency 1ph/3ph to 3ph AC Motor Control
https://www.surpluscenter.com/_MoreSpecs/um11-3425-xx.pdf

IronHorse Premium Efficiency 3-Phase AC Induction Motor
https://cdn.automationdirect.com/static/manuals/ironhorsemanual/ironhorsemanual.html

## B. Wiring Diagrams

Figure B.1 shows the schematic of the complete caster test machine. This is just one way of completing the wiring of the system. There are other successful ways to wire the system.

Figure B.2 shows the schematic of the connections made in the junction box of the motor. Refer to the user manual of each component for further details.

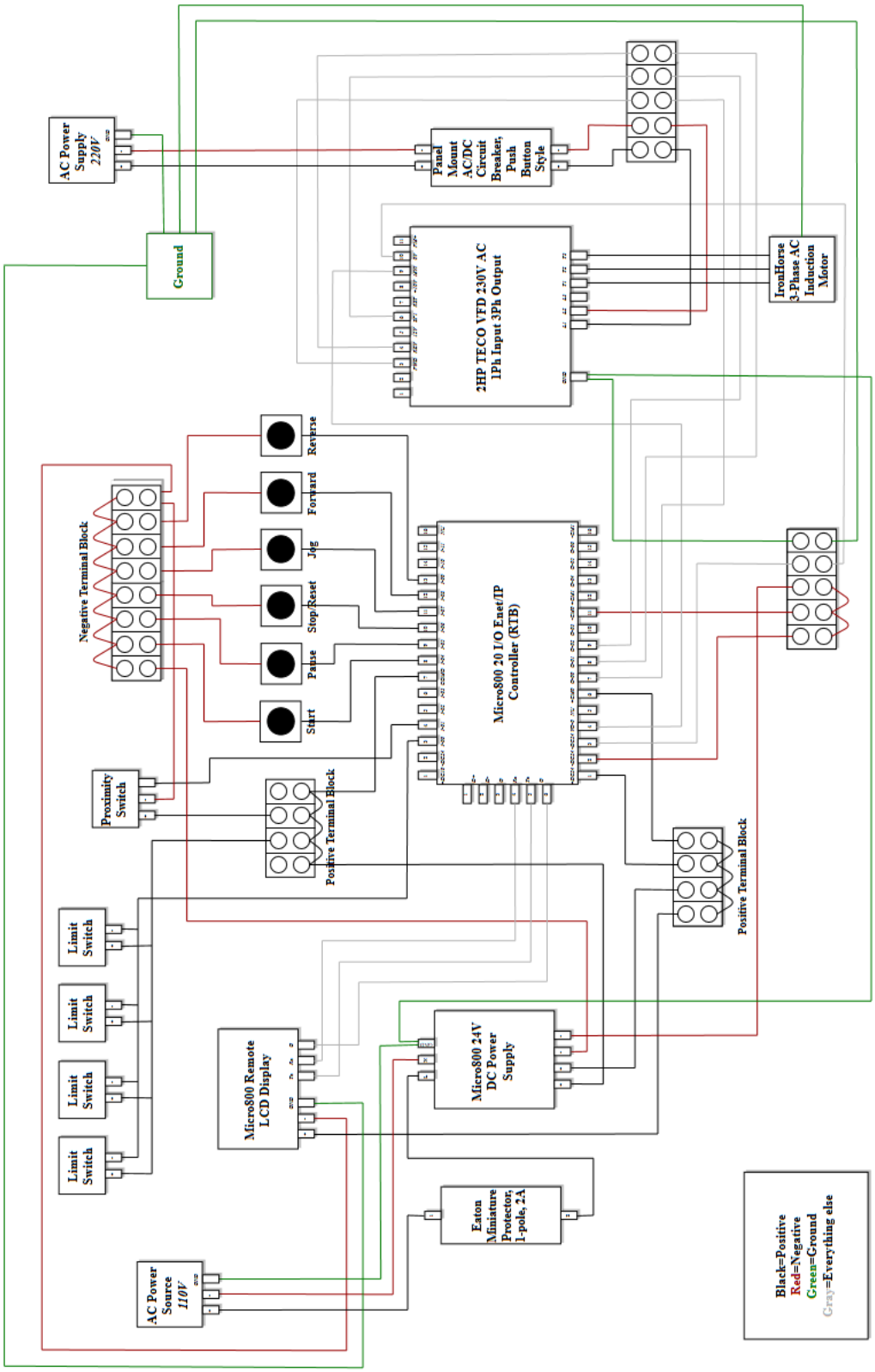



**Figure B. 1.** Complete Caster Test Schematic

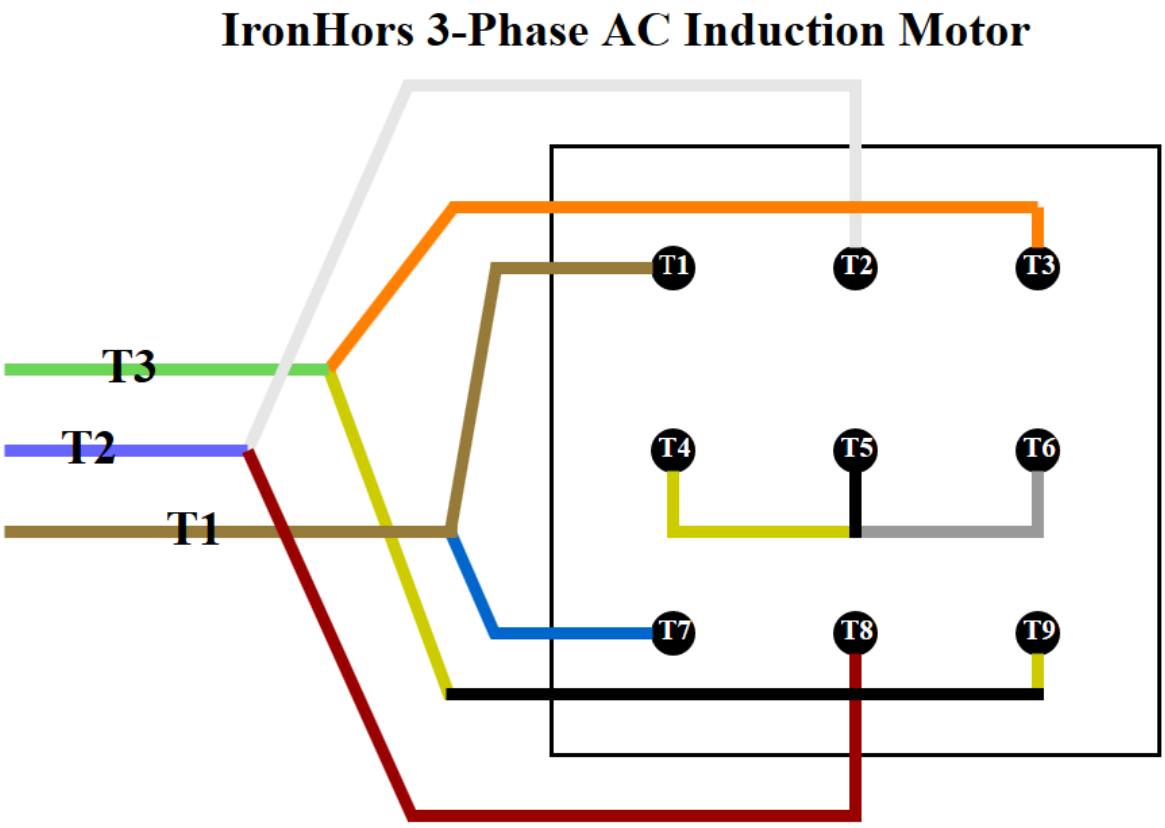



**Figure B. 2.** Motor wiring Diagram for Junction Box

# Bill of Materials

| Hardware | Qty. Needed | Source | | Pkg. Size | Pkgs. to Order | Cost per Unit | Total Cost | Parts for which Hardware is used | Finish |
|---|---|---|---|---|---|---|---|---|---|
| 0.25in Flat Washer | 13 | Fastenal | 71013 | 1 | 13 | $ 0.05 | $ 0.69 | Bearing Housing Mount connection to frame | Plain |
| 0.3125in Flat Washer | 16 | McMaster Carr | 92141A030 | 100 | 1 | $ 5.10 | $ 5.10 | Roller Caster connection | |
| 0.5in Flat Washer | 70 | Fastenal | 33861 | 1 | 70 | $ 0.47 | $ 33.15 | Cross brace connection to frame, frame connections, Top of shaft bearing connections. | Yellow Zinc |
| 1.5in Shaft Flange | 2 | McMaster Carr | 9692T39 | 1 | 2 | $ 132.67 | $ 265.34 | Turntable | |
| 1/2-13 Hex Nut | 4 | McMaster Carr | 94895A823 | 50 | 1 | $ 7.59 | $ 7.59 | Frame connections | Yellow Zinc-Chromate |
| 1/2-13 Locknut | 88 | Fastenal | 37187 | 1 | 88 | $ 0.58 | $ 51.03 | Frame connections | Yellow Zinc |
| 1/2-13 x 1.75 HHS | 44 | Fastenal | 15210 | 1 | 44 | $ 1.11 | $ 48.84 | Frame connections, gear reducer side mount 2, top of shaft bearing | Yellow Zinc |
| 1/2-13 x 2 HHS | 8 | Fastenal | 15211 | 1 | 8 | $ 1.16 | $ 9.28 | cross brace connection to frame | Yellow Zinc |
| 1/2-13 x 3 HHS | 30 | Fastenal | 15215 | 1 | 30 | $ 1.54 | $ 46.20 | rec bar frame connection, gear reducer mount to frame, frame connections | Yellow Zinc |
| 1/2-13 x 3.25 HHS | 4 | McMaster Carr | 91257A725 | 10 | 1 | $ 13.78 | $ 13.78 | frame connections | Yellow Zinc-Chromate |
| 1/2-13 x 3.5 HHS | 2 | McMaster Carr | 92620A726 | 1 | 2 | $ 3.93 | $ 7.86 | Proximity Switch connection | Yellow Zinc-Chromate |
| 1/2-13 x 5 HHS | 4 | Fastenal | 15223 | 1 | 4 | $ 3.48 | $ 13.92 | frame connections | Yellow Zinc |
| 1/2-13 x 7 HHS | 2 | Fastenal | 15227 | 1 | 2 | $ 5.24 | $ 10.48 | frame connections | Yellow Zinc |
| 1/4-20 Hex Nut | 7 | McMaster Carr | 90499A029 | 100 | 1 | $ 2.90 | $ 2.90 | turntable flange connections | Plain |
| 1/4-20 x 0.75 FHS | 4 | McMaster Carr | 90585A540 | 10 | 1 | $ 4.24 | $ 4.24 | Slat | Plain |
| 1/4-20 x 0.75 SHS | 2 | Fastenal | 73461 | 1 | 2 | $ 0.31 | $ 0.61 | Slat | Plain |
| 1/4-20 x 0.875 SHS | 24 | McMaster Carr | 92196A541 | 50 | 1 | $ 10.53 | $ 10.53 | Gusset to arm attachment | Plain |
| 1/4-20 x 1 SHS | 1 | Fastenal | 73462 | 1 | 1 | $ 0.26 | $ 0.26 | Limit switch clamps | Plain |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1/4-20 x 1.75 SHS | 16 | Fastenal | 73465 | 1 | 16 | $ 0.41 | $ 6.50 | arm support clamp | Plain |
| 1/4-20 x 2 HHS | 3 | McMaster Carr | 92196A550 | 25 | 1 | $ 10.71 | $ 10.71 | turntable flange connections | Plain |
| 1/4-20 x 2 SHS | 3 | McMaster Carr | 92196A801 | 25 | 1 | $ 11.17 | $ 11.17 | turntable flange connections | Plain |
| 1/4-20 x 3 SHS | 5 | McMaster Carr | 92196A554 | 10 | 1 | $ 5.60 | $ 5.60 | Limit switch clamps | Plain |
| 1/4-28 x 0.75 SHS | 2 | McMaster Carr | 91251A440 | 50 | 1 | $ 11.67 | $ 11.67 | tapered bearing shield | Black Oxide |
| 10-24 Hex Nut | 16 | McMaster Carr | 90480A011 | 1 | 16 | $ 0.07 | $ 1.05 | PC Holder (square tubing) | Plain |
| 10-24 x 1 BHS | 8 | McMaster Carr | 97763A342 | 50 | 1 | $ 8.69 | $ 8.69 | PC Holder (sides) | Black Oxide |
| 10-24 x 1.25 BHS | 4 | McMaster Carr | 97763A339 | 50 | 1 | $ 10.10 | $ 10.10 | Bearing Housing Mount to frame | Black Oxide |
| 10-24 x 3 SHS | 4 | Fastenal | 0171107 | 1 | 4 | $ 2.14 | $ 8.56 | PC Holder (square tubing) | Plain |
| 10-32 x 0.875 FHS | 32 | McMaster Carr | 91253A009 | 50 | 1 | $ 10.27 | $ 10.27 | Arm Clamp side plates | Black Oxide |
| 1in Eye Bolt | 8 | McMaster Carr | 3014T471 | 1 | 8 | $ 3.81 | $ 30.48 | Arm, Top frame | |
| 1in Shaft Collar | 8 | McMaster Carr | 6157K18 | 1 | 8 | $ 4.02 | $ 32.16 | Arm Support Rod | |
| 3/8-16 Flange Locknut | 16 | McMaster Carr | 93776A461 | 25 | 1 | $ 6.67 | $ 6.67 | Turntable Pie Pieces | Plain |
| 3/8-16 Hex Nut | 16 | McMaster Carr | 90499A031 | 100 | 1 | $ 6.34 | $ 6.34 | Arm Clamp | Plain |
| 3/8-16 x 2 Flange HHS | 16 | McMaster Carr | 97646A230 | 5 | 4 | $ 9.24 | $ 36.96 | Turntable Pie Pieces | Plain |
| 3/8-16 x 2.5 SHS | 8 | McMaster Carr | 91251A634 | 10 | 1 | $ 5.93 | $ 5.93 | Arm Clamp | Black Oxide |
| 3/8-16 x 5 SHS | 8 | McMaster Carr | 91251A644 | 5 | 2 | $ 5.29 | $ 10.58 | Arm Clamp | Black Oxide |
| 3/8-16 x 7 SHS | 8 | McMaster Carr | 91251A116 | 1 | 8 | $ 3.89 | $ 31.12 | Arm Clamp | Black Oxide |
| 40 Series Single-Keyed High-Cycle Linear Bearing Pad | 16 | 8020 | 40-6596 | 1 | 16 | $ 3.90 | $ 62.40 | Clamp Bearing | |
| 5/16-18 Locknut | 20 | Fastenal | 37185 | 1 | 20 | $ 0.25 | $ 4.92 | Motor Mount | Yellow Zinc |
| 5/16-18 x 0.875 HHS | 4 | McMaster Carr | 91251A582 | 50 | 1 | $ 10.00 | $ 10.00 | Motor Mount | Black Oxide |
| 5/16-18 x 1 SHS | 16 | McMaster Carr | 91251A583 | 50 | 1 | $ 10.56 | $ 10.56 | Roller Caster connection | |
| 5/16-18 x 1.375 SHS | 32 | McMaster Carr | 91251A620 | 25 | 2 | $ 14.47 | $ 28.94 | Arm Gusset | Black Oxide |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5/8-11 Hex Nut | 8 | McMaster Carr | 90499A832 | 50 | 1 | $ 13.36 | $ 13.36 | Arm Weights | Plain |
| 5/8-11 x 2.5 SHS PT | 16 | McMaster Carr | 91251A804 | 5 | 4 | $ 10.29 | $ 41.16 | Arm attachment to holder | Black Oxide |
| 5/8-11 x 4 SHS | 4 | McMaster Carr | 91251A810 | 1 | 4 | $ 2.88 | $ 11.52 | Weights | Black Oxide |
| 6-32 Hex Nut | 8 | McMaster Carr | 90480A007 | 100 | 1 | $ 1.24 | $ 1.24 | PC Holder (Angle Iron) | |
| 6-32 x 1.25 BHS | 8 | McMaster Carr | 97763A144 | 50 | 1 | $ 10.60 | $ 10.60 | PC Holder (Angle Iron) | |
| 7/16-14 x 0.75 HHS | 8 | Fastenal | 15153 | 1 | 8 | $ 0.49 | $ 3.94 | Gear reducer to mount | Yellow Zinc |
| Arm Flange Bushing | 8 | McMaster Carr | 1677K21 | 1 | 8 | $ 5.73 | $ 45.84 | Arm Support Rod | |
| Arm Support Clamp Bolt 3/8-24 x 2 SHS | 8 | McMaster Carr | 92196A365 | 5 | 2 | $ 5.66 | $ 11.32 | Arm Support Clamp | Plain |
| M5 x 25mm SHS | 8 | McMaster Carr | | | | | | | |
| No.10 Washer | 8 | McMaster Carr | 90107A011 | 100 | 1 | $ 4.24 | $ 4.24 | PC Holder (sides) | Plain |
| Thrust Beairng | 1 | McMaster Carr | 6678K14 | 1 | 1 | $ 50.68 | $ 50.68 | Bearing at Bottom of Turntable Shaft | |

**McMaster Carr Total** **$743.19**

**Fastenal Total** **$238.38**

**Total Hardware Cost** **$981.57**

| Materials | Quantity Needed | | Source | | Size to Order | Qty. to Order | Unit Cost | Total Cost | Parts for which material is used |
|---|---|---|---|---|---|---|---|---|---|
| 1" Dia. High-Strength 4140 Alloy Steel Rod | 168 | in | McMaster Carr | 6816T25 | 6 ft | 4 | $76.87 | $307.48 | Arm Support Rod |
| 1"x4" 6061 Aluminum Flat Bar | 7.25 | in | Metals Depot | F414 | 2 ft | 1 | $53.76 | $53.76 | Arm Support Clamp Round Piece, Bearing Housing |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1/2" 6061 Aluminum Plate | 1673 | $in^2$ | Alro | 20810000 | 2'x2' | 4 | $137.16 | $548.64 | Arm Attachment, Clamp Side Plate, Limit Switch Clamp, Limit Switch Clamp 2, Slat Plate V4, Slat Plate New |
| 1/2"x1" 6061 Aluminum Bar | 15.42 | in | McMaster Carr | 8975K11 | 2' | 1 | $8.24 | $8.24 | Slat V2 |
| 1/2" A36 Steel Plate | 144 | $in^2$ | Metals Depot | P112 | 1'x1' | 1 | $26.54 | $26.54 | Base Leg Mounting Support |
| 1/4" A36 Steel Plate | 192 | $in^2$ | Metals Depot | P314T6 | 1'x2' | 1 | $33.58 | $33.58 | Plate Gusset |
| 1/4" A36 Steel Plate | 76.86 | in | Metals Depot | P114 | 1'x2' | 1 | $30.52 | $30.52 | Gear Reducer Side Mount |
| 1/4" Clear Polycarbonate Sheet | 492 | $in^2$ | McMaster Carr | 8574K85 | 4'x4' | 1 | $138.86 | $138.86 | Plexiglass Protector |
| 1/4"x2" Hot Rolled A36 Steel Flat Bar | 61.26 | in | Metals Depot | F2142 | 6ft | 1 | $15.64 | $15.64 | Motor to Mount Frame, Top of shaft Bearing Mount, Top of Shaft Bearing Mount Spacer |
| 1/8"x3/4" Hot-Rolled Steel Flat Bar | 84 | in | Metals Depot | F11834 | 8' | 1 | $7.08 | $7.08 | Gusset Spacer Mount Long, Gusset Spacer Mount Short |
| 1-1/2" 440C Stainless Steel Rod | 30.38 | in | Alro | 14502200 | 3' | 1 | $146.51 | $146.51 | Center Shaft |
| 16 GA. Hot-Rolled Steel Sheet | 22.57 | $in^2$ | Metals Depot | S116 | 1'x2' | 1 | $10.24 | $10.24 | Proximity Switch Mount |
| 2"x3" 6061 Aluminum Flat Bar | 20.4 | in | Metals Depot | F423 | 2' | 1 | $78.52 | $78.52 | Arm Support Clamp |
| 2" 6061 Aluminum Square Bar | 16 | in | McMaster Carr | 9008K53 | 2' | 1 | $50.70 | $50.70 | Adapter for Caster |
| 2"x2"x1/4" wall A500 Square Steel Tube | 450 | in | Metals Depot | T122250 | 4' | 10 | $38.08 | $380.80 | Rec Bar Configurations |
| 2"x2"x3/8" A36 Steel Angle | 495 | in | Metals Depot | A12238 | 6' | 2 | $41.41 | $82.82 | Base Leg, Gear Reducer Side Mount 2, L Connector, |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2"x2"x3/8" A36 Steel Angle | | | Metals Depot | A12238 | 4' | 6 | $27.97 | $167.82 | Table Support Center_(2 & Default), Table Support Short_(L2, Left, R2, Right), Table Support Sides |
| 2"x4" 6061 Aluminum Bar | 19 | in | Alro | 21452020 | 2' | 1 | $99.75 | $99.75 | Arm Holder |
| 3/4" 6061 Aluminum Plate | 1257 | $in^2$ | Metals Depot | P334-6061 | 4'x4' | 1 | $1,170.72 | $1,170.72 | Base Plate |
| 3/8"x5" 6061 Aluminum Flat Bar | 11 | in | Metals Depot | F4385 | 1' | 1 | $16.23 | $16.23 | Bearing Housing Mount, Cross Brace Spacer |
| 3/8" Square Zinc-Plated Steel Machine Key Stock | 11.75 | in | McMaster Carr | 98491A165 | 1' | 1 | $2.87 | $2.87 | Center to Love Joy Key, Gear Reducer Input Key, Gear Reducer Output Key, Love Joy to Motor Key |
| 3/8" x 1/2" 18-8 Stainless Steel Machine Key Stock | 3.5 | in | McMaster Carr | 92530A166 | 1' | 1 | $26.10 | $26.10 | Center Shaft Key |
| 3/8" x 2" Hot Rolled A36 Steel Flat Stock | 370 | in | Metals Depot | F2382 | 4' | 8 | $17.73 | $141.84 | Cross Braces |
| 7/8" 6061 Aluminum Plate | 180 | $in^2$ | Metals Depot | P378-6061 | 1'x2' | 1 | $304.20 | $304.20 | Gusset Spacer |
| 8020 3in Square Aluminum Bar, T-Slotted Profile | 108 | in | 8020 Inc. | 3030 | 27" | 4 | $43.10 | $172.40 | 3in Square 8020 Bar |
| Vibration-Damping Pad for Heavy Machinery (36"L x 36"W x 1/8"T) | 128 | $in^2$ | McMaster Carr | 5940K61 | 1'x2' | 1 | $49.16 | $49.16 | Rubber Square |
| Shock-Absorbing Rope—Not for Lifting—3/16" Diameter | | | McMaster Carr | 3838T531 | 100' | 1 | $8.00 | $8.00 | Limit Switch Pull |
| Oil-Resistant Vibration-Damping Pad, Black, 6"x6"x1/2", 280 PSI Capacity | 144 | $in^2$ | McMaster Carr | 4056K44 | 6"x6" | 4 | $26.03 | $104.12 | Vibration damping pads for under base legs |

**Metals Depot Total** **$2,520.31**

**Alro Total** **$794.90**

**McMaster Carr Total** **$695.53**

**8020 Inc. Total** **$172.40**

**Total Materials Cost** **$4,183.14**

| Electronics | Qty. Needed | Source | | Qty. to Order | Unit Cost | Total Cost |
|---|---|---|---|---|---|---|
| Micro800 Remote LCD Display | 1 | Mosebach | 2080-REMLCD | 1 | $149.00 | $149.00 |
| Micro800 20 I/O Enet/IP Controller (RTB) | 1 | Mosebach | 2080-LC20-20QBBR | 1 | $279.00 | $279.00 |
| Micro800 24V DC Power Supply | 1 | Mosebach | 2080-PS120-240VAC | 1 | $48.00 | $48.00 |
| TECO FM50 DIN Rail Kit | 1 | FactoryMation | FM50-DIN-201 | 1 | $5.00 | $5.00 |
| 2HP TECO VFD 230V AC 1Ph Input 3Ph Output (Model No: FM50-202-X) | 1 | Surplus Center | 11-3425-2 | 1 | $199.99 | $199.99 |
| Indoor Enclosure with Lift-off Cover and Knockouts (24"x24"x8") | 1 | McMaster Carr | 75065K45 | 1 | $165.40 | $165.40 |
| Plastic 30mm Panel-Mount Push-Button Switch, Flush, Momentary, SPST-NO (Green) | 1 | McMaster Carr | 7403K19 | 1 | $17.98 | $17.98 |
| Plastic 30mm Panel-Mount Push-Button Switch, Flush, Momentary, SPST-NO (Black) | 1 | McMaster Carr | 7403K19 | 1 | $17.98 | $17.98 |
| Plastic 30mm Panel-Mount Push Button Switch, Mushroom, Momentary, SPST-NO (Red) | 1 | McMaster Carr | 7403K32 | 1 | $24.10 | $24.10 |
| Plastic 30mm Panel-Mount Push Button Switch, Projecting, Momentary, SPST-NO (Green) | 1 | McMaster Carr | 7403K27 | 1 | $18.76 | $18.76 |
| Plastic 30mm Panel-Mount Push Button Switch, Projecting, Momentary, SPST-NO (Black) | 1 | McMaster Carr | 7403K27 | 1 | $18.76 | $18.76 |
| Plastic 30mm Panel-Mount Push Button Switch, Flush, Momentary, SPST-NO (Red) | 1 | McMaster Carr | 7403K53 | 1 | $17.98 | $17.98 |
| Panel Mount AC/DC Circuit Breaker, Push Style Buttons, Screw on Mount, 2 Poles, 5 Amps | 1 | McMaster Carr | 3931T5 | 1 | $36.20 | $36.20 |
| DIN-Rail Mount AC Equipment Circuit Breaker, 1 Pole-Toggle Style, 2 Amps | 1 | McMaster Carr | 7026K6 | 1 | $19.73 | $19.73 |
| Steel Din 3 Rail. 7.5mm Deep, 1m Long | 1 | McMaster Carr | 8961K15 | 1 | $5.27 | $5.27 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 300V AC/300V DC Terminal Block, Five 20A Circuits, 7/16" Center-to-Center | 3 | McMaster Carr | 7527K65 | 3 | $3.32 | $9.96 |
| 300V AC/300V DC Terminal Block, Six 20A Circuits, 7/16" Center-to-Center | 1 | McMaster Carr | 7527K66 | 1 | $4.05 | $4.05 |
| 300V AC/300V DC Terminal Block, Eight 20A Circuits, 7/16" Center-to-Center | 1 | McMaster Carr | 7527K68 | 1 | $5.14 | $5.14 |
| Over Barrier Jumper for 7/16" Center-to-Center 300V AC/300V DC Terminal Block | 1 pack of 25 | McMaster Carr | 7527K79 | 1 pack of 25 | $4.71 | $4.71 |
| Noryl Ppo Sheet (12"x24"x1/16") | 1 | McMaster Carr | 8561K422 | 1 | $32.99 | $32.99 |
| Clip for 1.36" Flexible Plastic Conduit OD | 3 | McMaster Carr | 3185K82 | 3 | $3.88 | $11.64 |
| NPT Locknut for Continuous-Flex Plastic Conduit Fitting | 2 | McMaster Carr | 3185K114 | 2 | $1.30 | $2.60 |
| Trade Size Female x NPT Male Straight for Flexible Plastic Conduit | 2 | McMaster Carr | 6963T14 | 2 | $12.33 | $24.66 |
| Slotted Wire Duct with Snap-On Cover, Adhesive Back, 1" High x 1/2" Wide | 3.25' | McMaster Carr | 7578K42 | 3.25' | $17.99 | $17.99 |
| Cable Tie Mount, Adhesive/Fastener Mount, 4 Way, White | 1 pack of 25 | McMaster Carr | 7566K64 | 1 pack of 25 | $11.56 | $11.56 |
| Cable, SJOOW, Black Outer Insulation, 16 Gauge, 3 Wires | 25' | McMaster Carr | 7422K22 | 25 | $0.78 | $19.50 |
| Premium Straight-Blade Connector, 3-Blade Straight Plug, Grounded, NEMA 5-15, Black | 1 | McMaster Carr | 9096T11 | 1 | $15.36 | $15.36 |
| Flexible Plastic Conduit, OD 1.36" | 10' | McMaster Carr | 6959T14 | 10 | $2.11 | $21.10 |

| | |
|---|---|
| **MoseBach Total** | **$476.00** |
| **FactoryMation Total** | **$5.00** |
| **Surplus Center Total** | **$199.99** |
| **McMaster Carr Total** | **$523.42** |
| **Total Electronics Cost** | **$1,204.41** |

| Part Name | Qty. Needed | Source | | Pkg. Size | Pkgs. to Order | Unit Cost | Total Cost | Parts for which Hardware is used |
|---|---|---|---|---|---|---|---|---|
| IronHorse Premium Efficiency AC Induction Motor, 1-1/2hp, 3-phase, 208-230/460 VAC, 1800 rpm, TEFC, 56C/HC frame hot rolled steel (new MTRP-1P5-3BD18) | 1 | Automation Direct | MTRP-1P5-3BD18 | 1 | 1 | $175.00 | $175.00 | Motor |
| Bearing Hoiusing Grease Fitting | 1 | McMaster Carr | 1293K14 | 1 | 1 | $7.67 | $7.67 | Bearing Housing |
| 40:1 RA Gear Reducer 3.35 HP Left Output | 1 | Surplus Center | 13-325-40-L | 1 | 1 | $282.55 | $282.55 | Gear reducer |
| Roller Caster | 4 | Global Industrial | WG748307 | 1 | 4 | $15.00 | $60.00 | Turntable roller casters |
| Compact Limit Switch | 4 | McMaster Carr | 7988K1 | 1 | 4 | $31.23 | $124.92 | Limit Switches |
| Love Joy for GR Output | 1 | McMaster Carr | 6408K18 | 1 | 1 | $41.64 | $41.64 | GR lovejoy (shaft to GR) |
| Love Joy for Motor | 1 | McMaster Carr | 6408K14 | 1 | 1 | $10.57 | $10.57 | Motor lovejoy (motor to GR) |
| Love Joy for Top of Shaft | 1 | McMaster Carr | 6408K98 | 1 | 1 | $82.33 | $82.33 | Shaft lovejoy (shaft to GR) |
| Love Joy Spider for Shaft to GR | 1 | McMaster Carr | 6408K98 | 1 | 1 | $82.33 | $82.33 | Spider for lovejoy coupling |
| Love Joy Spider Motor to GR | 1 | McMaster Carr | 6408K75 | 1 | 1 | $7.89 | $7.89 | Spider for lovejoy coupling |
| Love Joy to GR Input | 1 | McMaster Carr | 6408K14 | 1 | 1 | $10.57 | $10.57 | GR lovejoy (motor to GR) |
| Proximity Switch | 1 | McMaster Carr | 7674K39 | 1 | 1 | $76.38 | $76.38 | Shaft to GR lovejoy Coupling Proximity Switch |
| Quick Release Clamp | 8 | McMaster Carr | 5720K62 | 1 | 8 | $58.55 | $468.40 | Turntable pie piece clamps |
| Top of Shaft Bearing | 1 | McMaster Carr | 5967K88 | 1 | 1 | $94.90 | $94.90 | Bearing |
| 2 Plane Cross Level Plastic | 4 | McMaster Carr | 3355A35 | 1 | 4 | $3.77 | $15.08 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1"x10' Cam Strap with S-Hook and Keeper | 4 | US Cargo Control | C5110SH255-OR | 1 | 4 | $5.79 | $23.16 | |

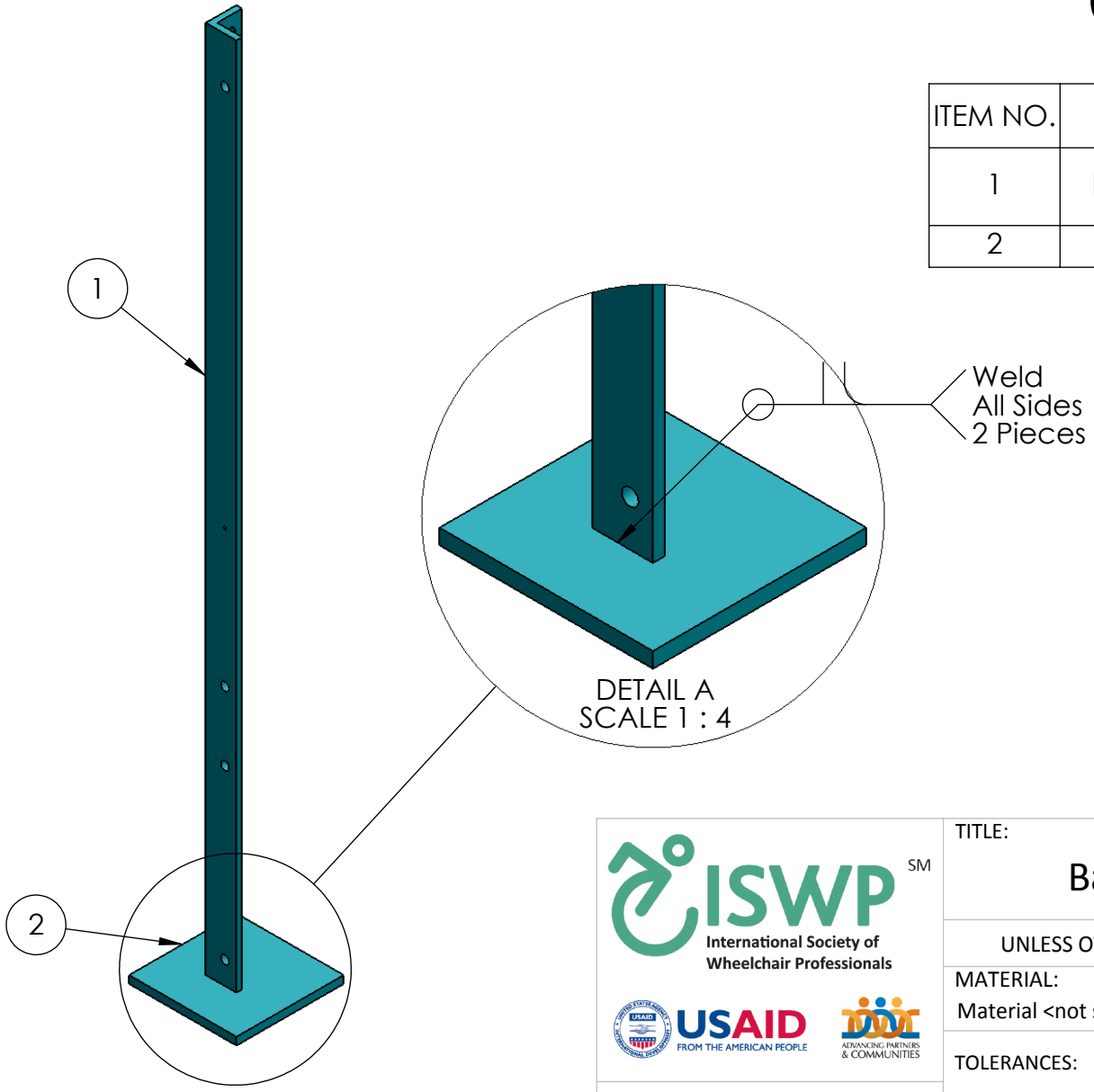
| | |
|---|---|
| **US Cargo Control** | **$23.16** |
| **McMaster Carr Total** | **$1,022.68** |
| **Surplus Center Total** | **$282.55** |
| **Automation Direct Total** | **$175.00** |
| **Total Misc. Cost** | **$1,480.23** |
| **TOTAL** | **$7,924.94** |

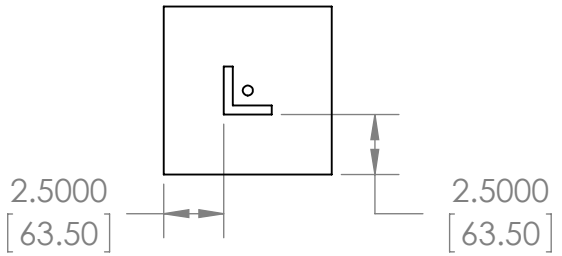
# Part Drawings

# Base Frame Drawings

# Quantity: 2

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Base Legs Angled Iron (Right) | 1 |
| 2 | Base Legs Mounting Support | 1 |

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ADVANCING PARTNERS & COMMUNITIES



TITLE:

## Base Legs (L_Front & R_Back)

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Material <not specified> | Plain |

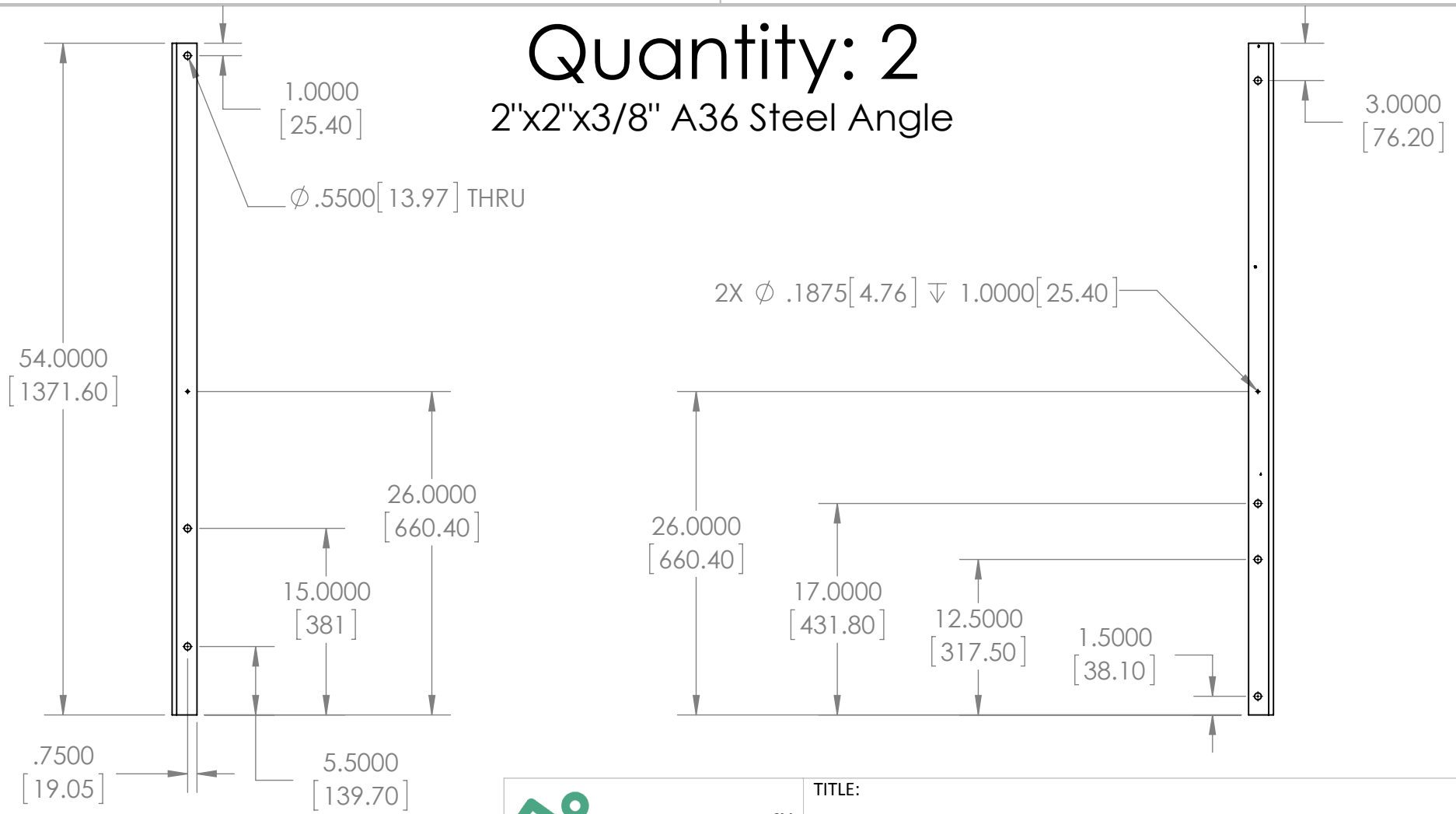
TOLERANCES: +0.100 -0.100

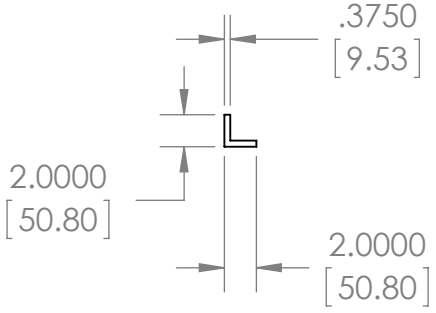
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:8 | A | 4/13/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 27.56 | SHEET 1 OF 1

# Quantity: 2

## 2"x2"x3/8" A36 Steel Angle

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TITLE:

# Base Legs Angled Iron (Right)

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Powder Coated |

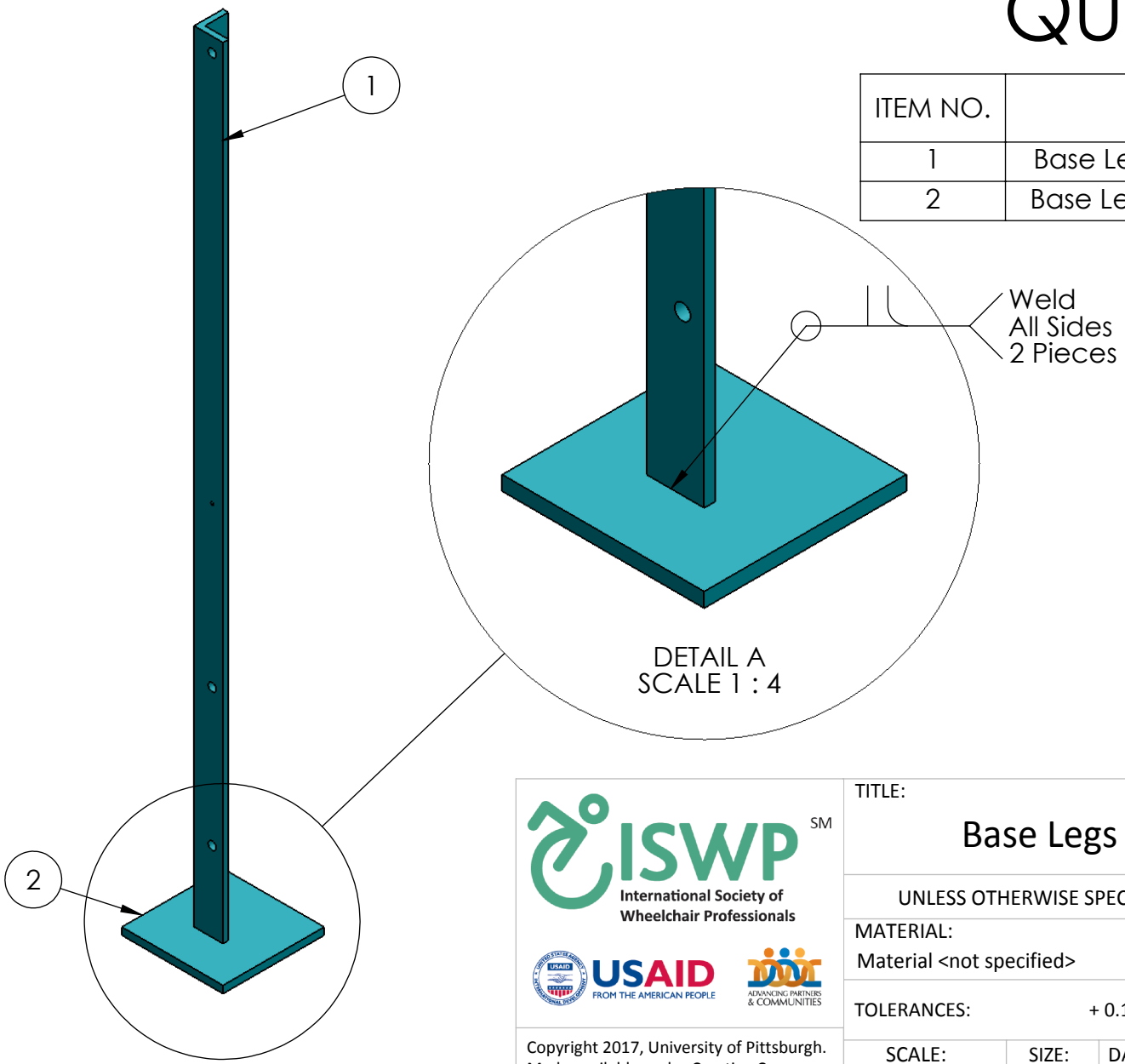
TOLERANCES: + 0.100 - 0.100

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/15/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 20.63 | SHEET 1 OF 1

# Quantity: 2

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Base Legs Angled Iron (Left) | 1 |
| 2 | Base Legs Mounting Support | 1 |

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TITLE:

## Base Legs (R_Front & L_Back)

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Material <not specified> | Plain |

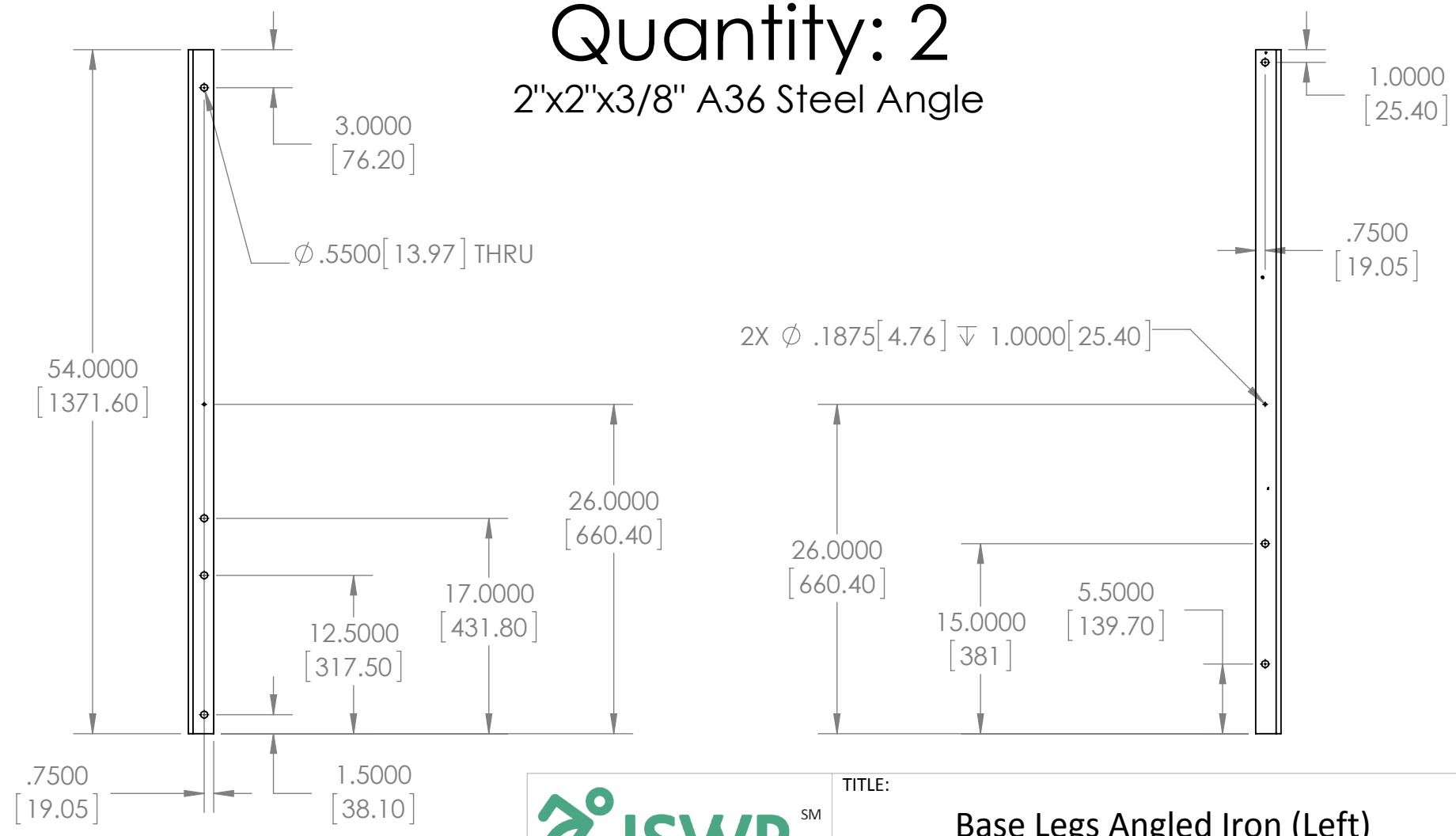
TOLERANCES: + 0.100 - 0.100

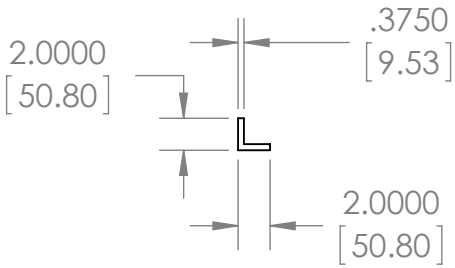
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:8 | A | 4/9/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 27.56 | SHEET 1 OF 1

# Quantity: 2

## 2"x2"x3/8" A36 Steel Angle

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TITLE:

# Base Legs Angled Iron (Left)

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Powder Coated |

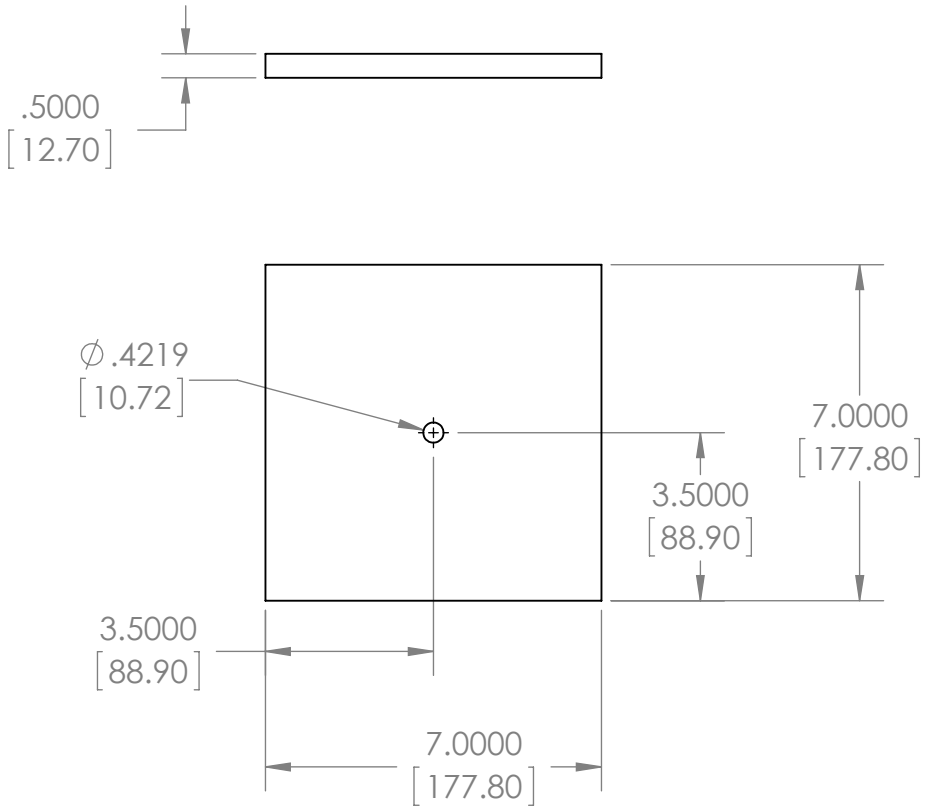
TOLERANCES: + 0.100 - 0.100

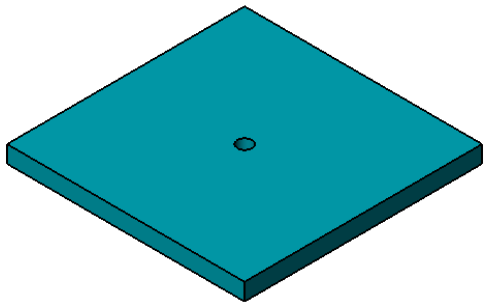
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/15/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 20.63 | SHEET 1 OF 1

# Quantity: 4

## 1/2" A36 Steel Plate



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TITLE: Base Legs Mounting Support

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

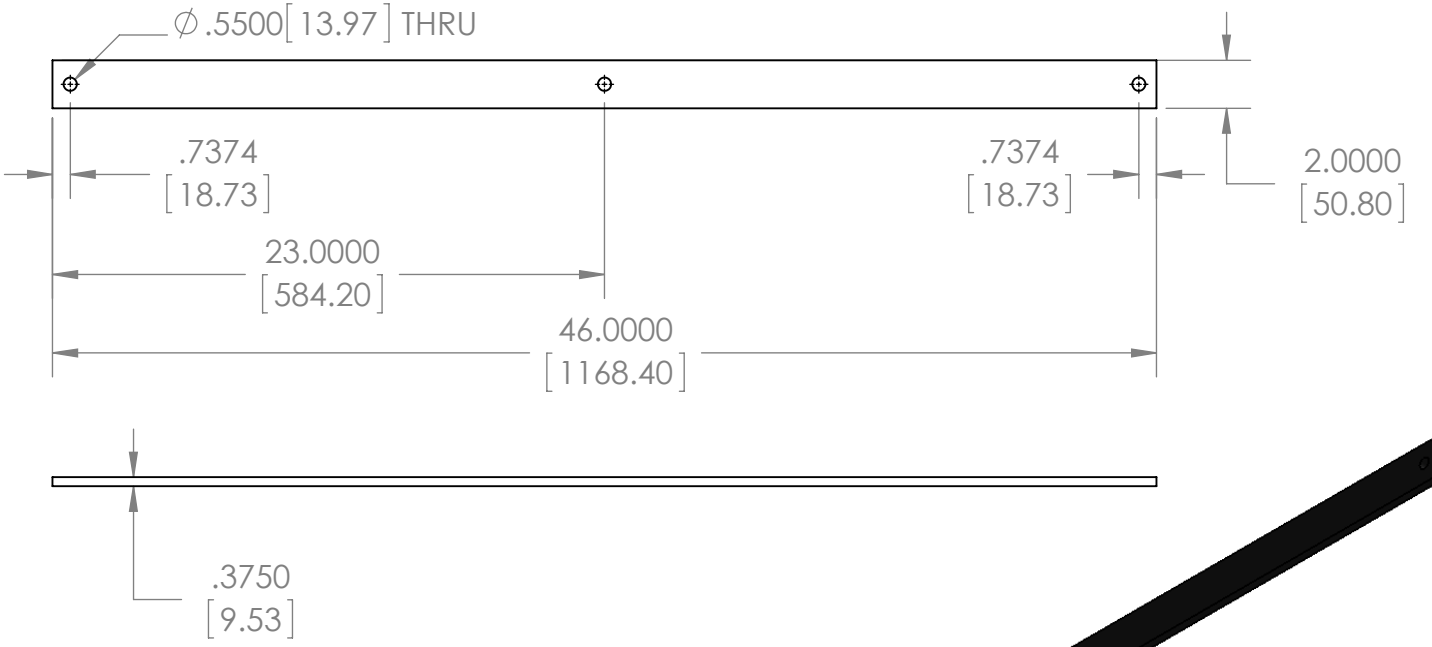
TOLERANCES: + 0.100 - 0.100

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 2/15/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 6.93 | SHEET 1 OF 1

# Quantity: 4

## 3/8" x 2" Hot Rolled A36 Steel Flat Stock




Note: Mill 50 thou on one face of cross brace with 3 inches from the ends and 4in equally around center hole to allow falt contact with other parts.

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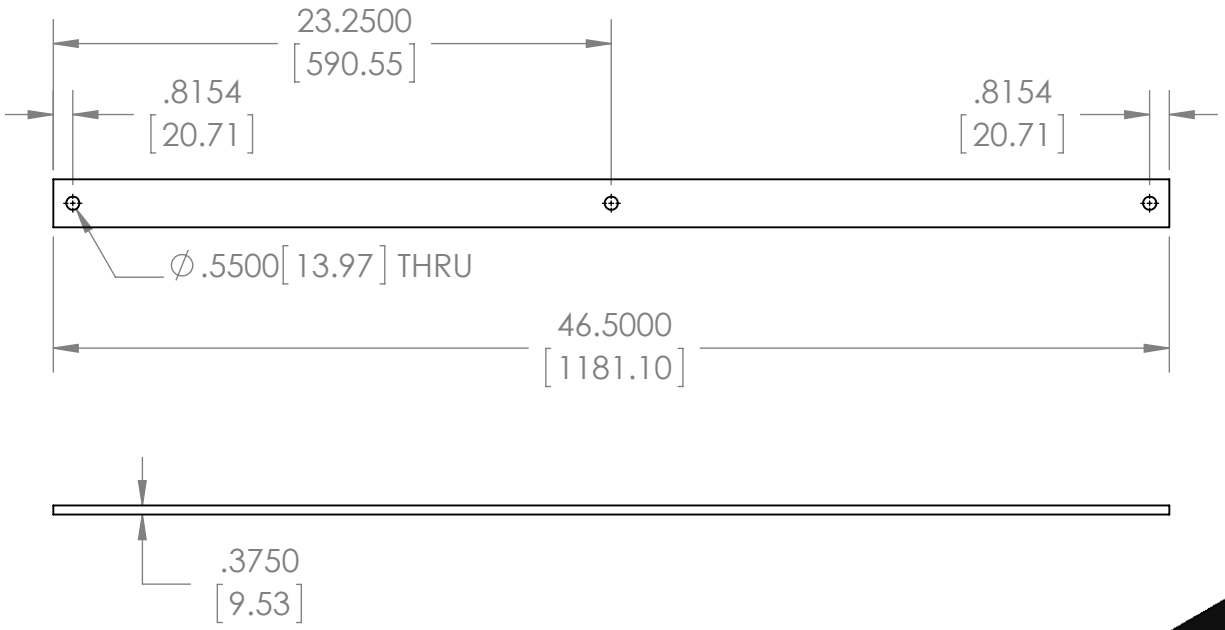
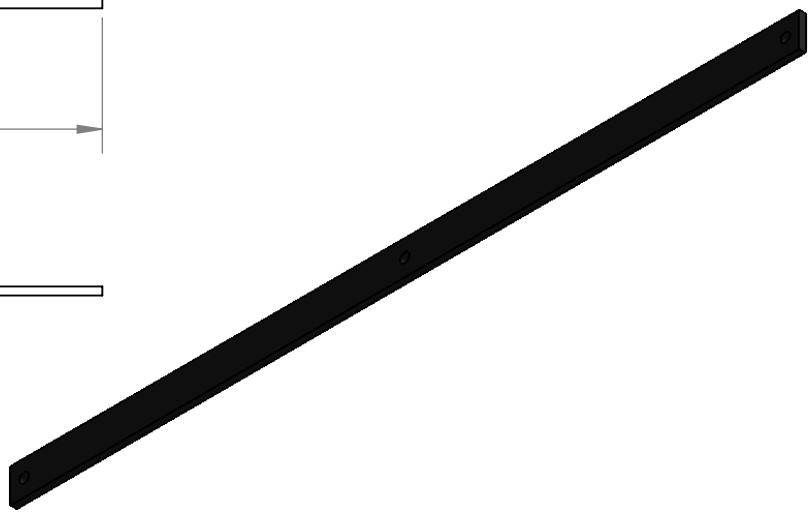
| | | | |
|---|---|---|---|
| TITLE: Cross Braces_F_B | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: ASTM A36 Steel | | FINISH: Plain | |
| TOLERANCES: | + 0.100 | - 0.100 | |
| SCALE: 1:8 | SIZE: A | DATE: 2/15/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 9.71 | SHEET 1 OF 1 |

# Quantity: 4

## 3/8" x 2" Hot Rolled A36 Steel Flat Stock



Note: Mill 50 thou on one face of cross brace with 3 inches from the ends and 4in equally around center hole to allow falt contact with other parts.

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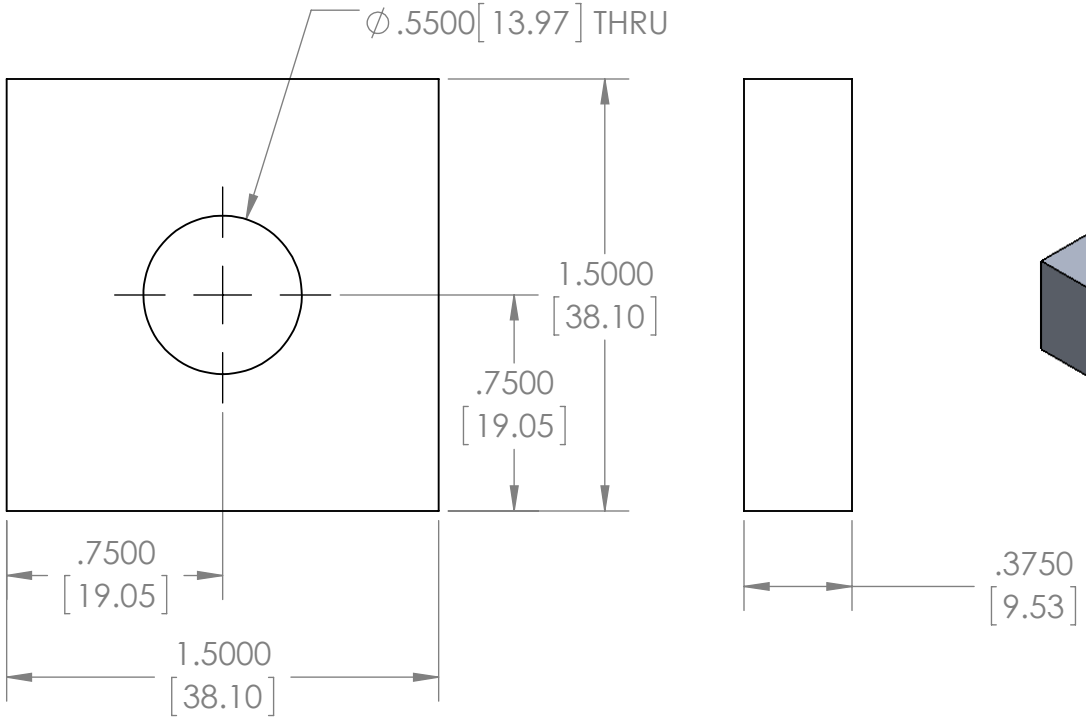
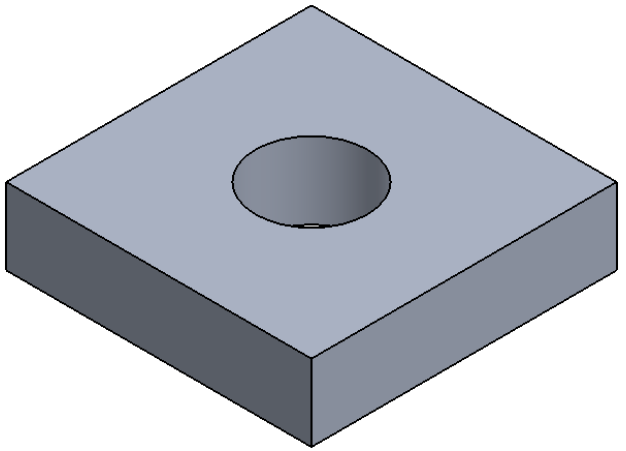
| | | | |
|---|---|---|---|
| TITLE: Cross Braces_L_R | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: ASTM A36 Steel | | FINISH: Plain | |
| TOLERANCES: | + 0.100 | - 0.100 | |
| SCALE: 1:8 | SIZE: A | DATE: 2/15/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 9.71 | SHEET 1 OF 1 |

# Quantity: 8

## 3/8"x5" 6061 Aluminum Flat Bar



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TITLE: Cross Brace Spacer

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

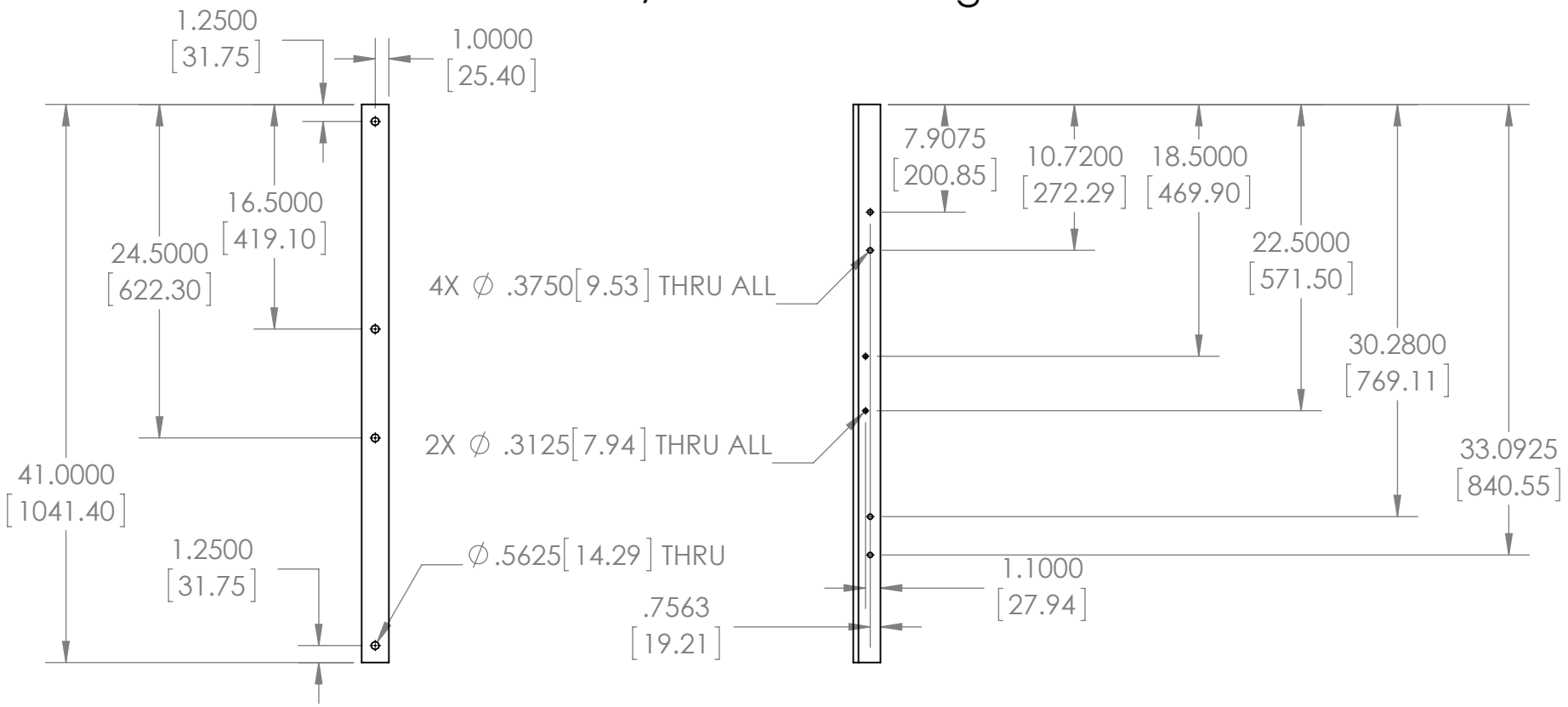
TOLERANCES: + 0.100 - 0.100

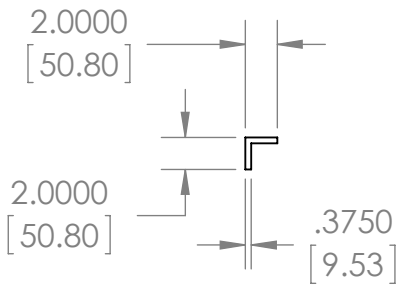
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 3:2 | A | 2/15/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.07 | SHEET 1 OF 1

# Quantity: 2

## 2"x2"x3/8" A36 Steel Angle

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TITLE: Table Support Center

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

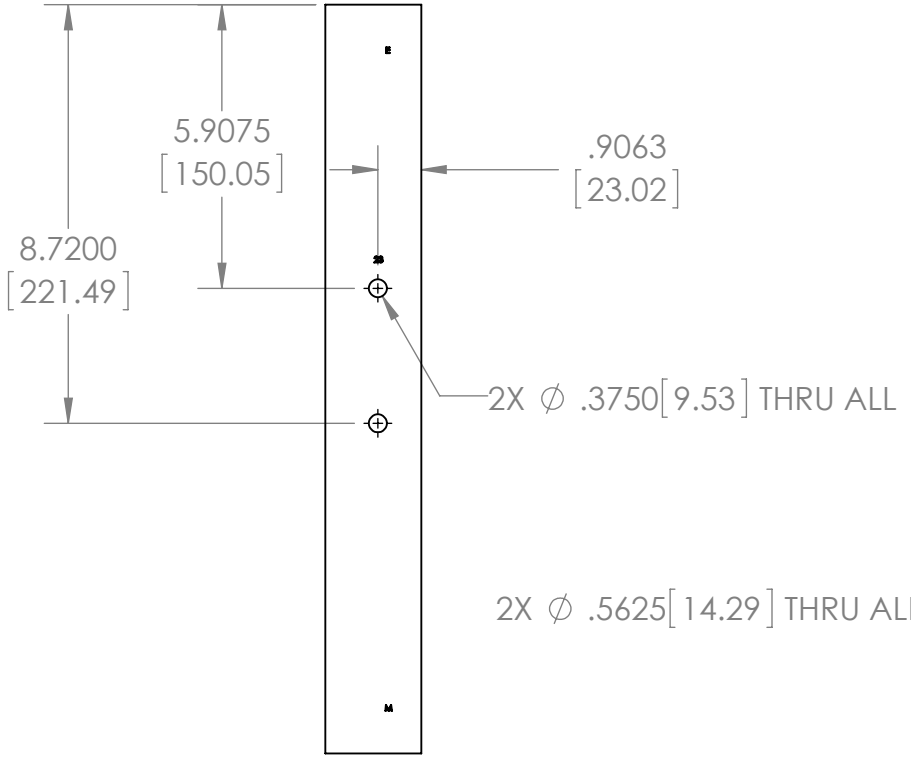
TOLERANCES: + 0.100 - 0.100

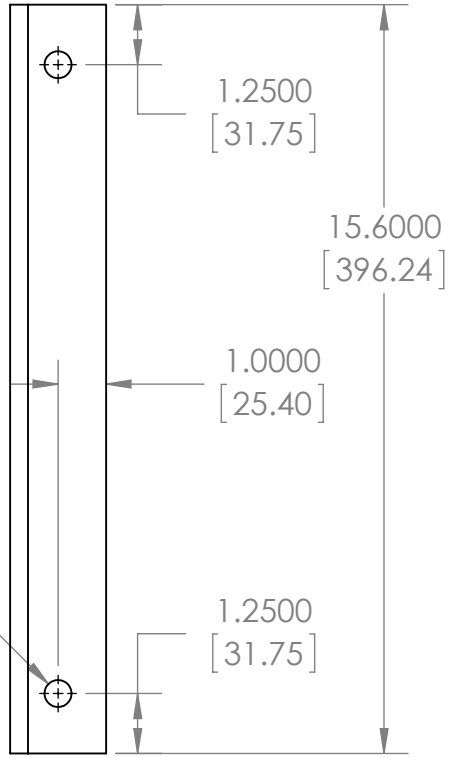
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/19/2018 | 2 |

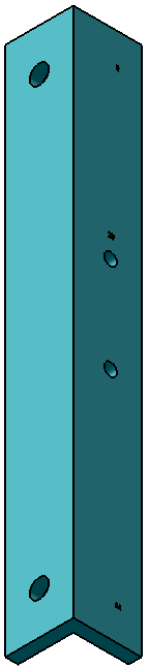
DO NOT SCALE DRAWING | WEIGHT (LBS): 15.64 | SHEET 1 OF 1

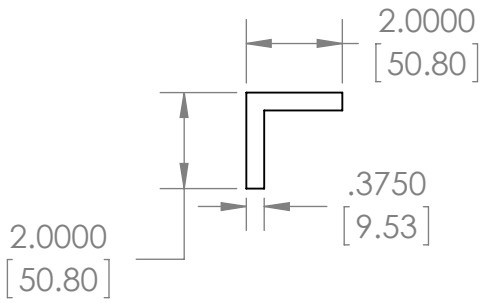
# Quantity: 4

## 2"x2"x3/8" wall A36 Steel Angle



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TITLE:

# Table Support Short

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

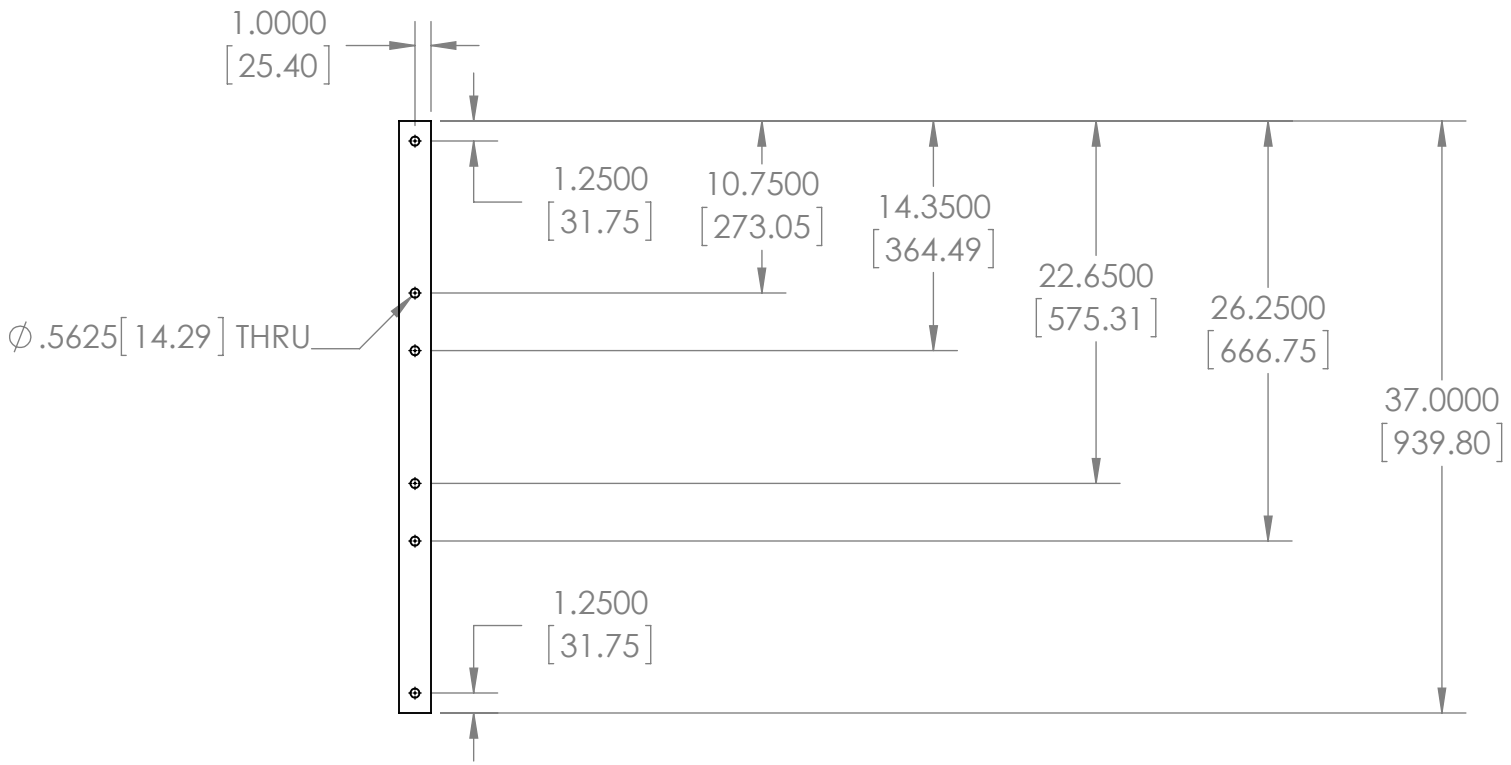
TOLERANCES: + 0.100 - 0.100

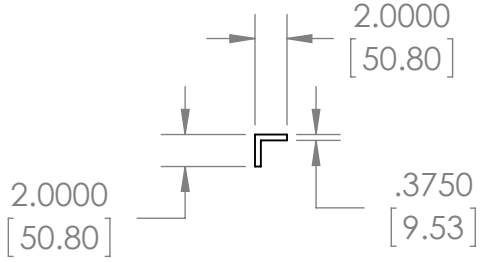
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 5.94 | SHEET 1 OF 1

# Quantity: 4

## 2"x2"x3/8" wall A36 Steel Angle

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TITLE:

# Table Support Sides

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

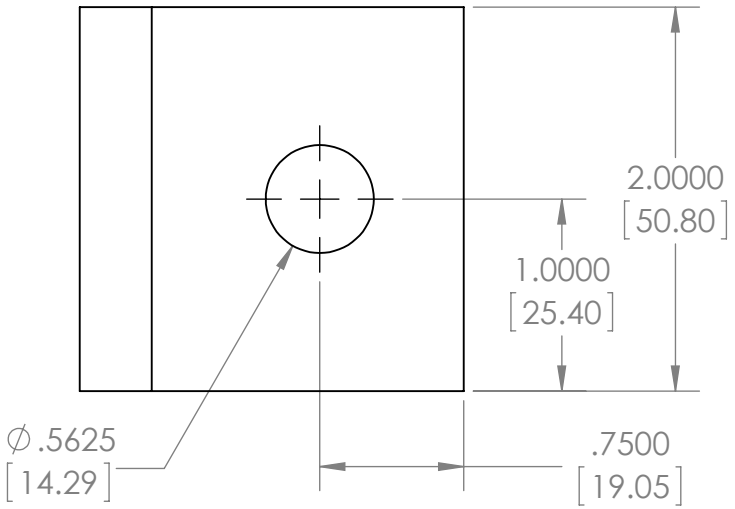
TOLERANCES: + 0.100 - 0.100

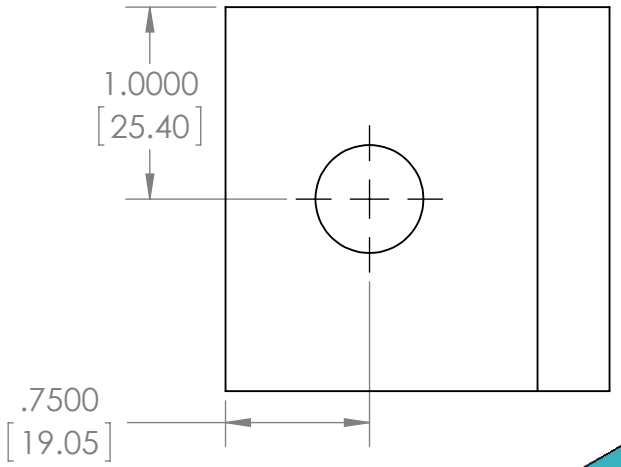
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/19/2018 | 2 |

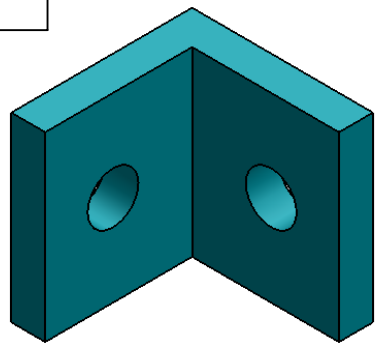
DO NOT SCALE DRAWING | WEIGHT (LBS): 14.11 | SHEET 1 OF 1

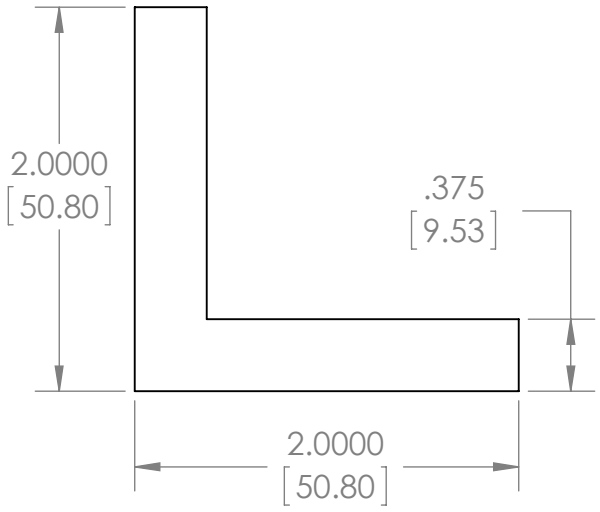
# Quantity: 16

## 2"x2"x3/8" A36 Steel Angle






Note: Mill 50 thou on outside connecting faces

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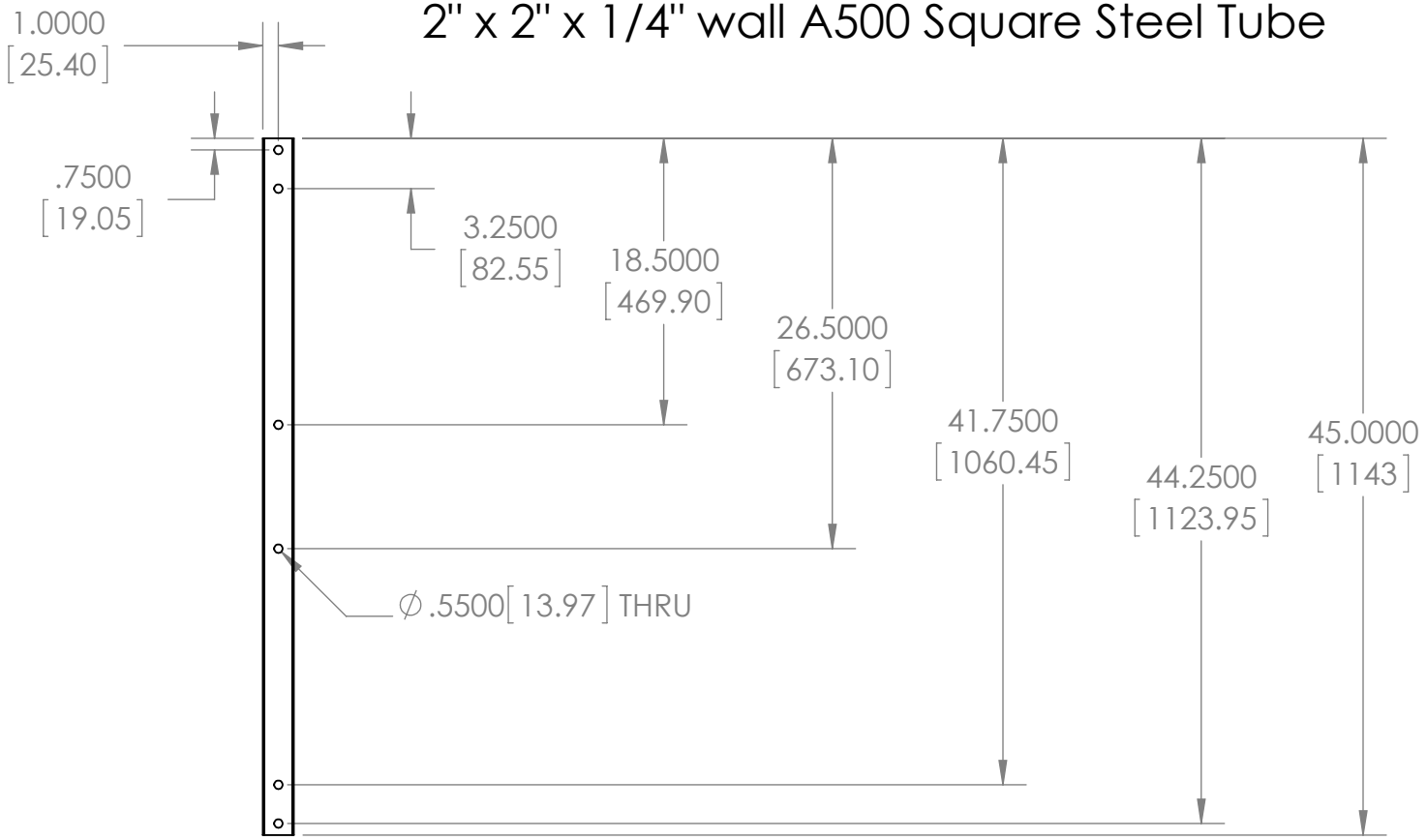
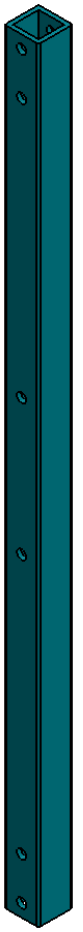
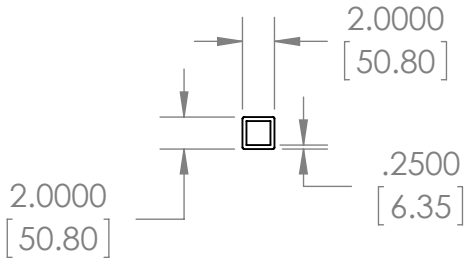
| | | | |
|---|---|---|---|
| TITLE: L connector | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: ASTM A36 Steel | | FINISH: Plain | |
| TOLERANCES: | + 0.100 | - 0.100 | |
| SCALE: 2:3 | SIZE: A | DATE: 2/15/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.72 | SHEET 1 OF 1 |

# Quantity: 1

## 2" x 2" x 1/4" wall A500 Square Steel Tube



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TITLE:

**Rec Bar_Table Support**

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| A500 Steel | Slightly Grainy, Dry |

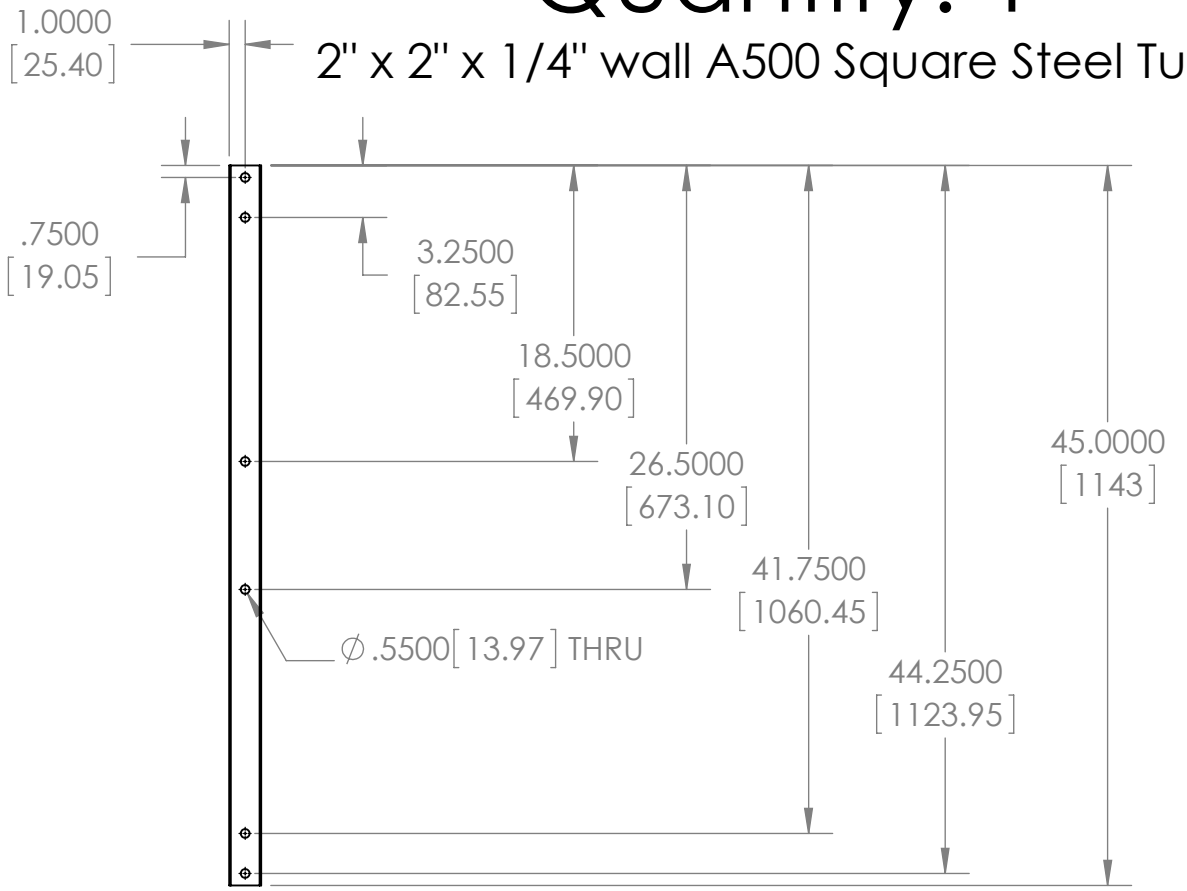
TOLERANCES: + 0.100 - 0.100

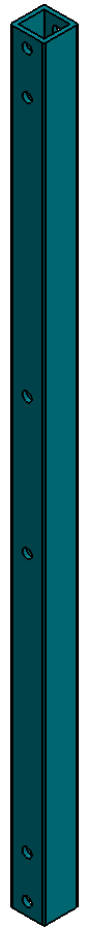
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/19/2018 | 2 |

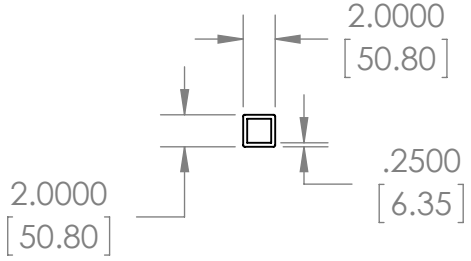
DO NOT SCALE DRAWING | WEIGHT (LBS): 20.29 | SHEET 1 OF 1

# Quantity: 1

## 2" x 2" x 1/4" wall A500 Square Steel Tube



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TITLE: Rec Bar_Table Support 2

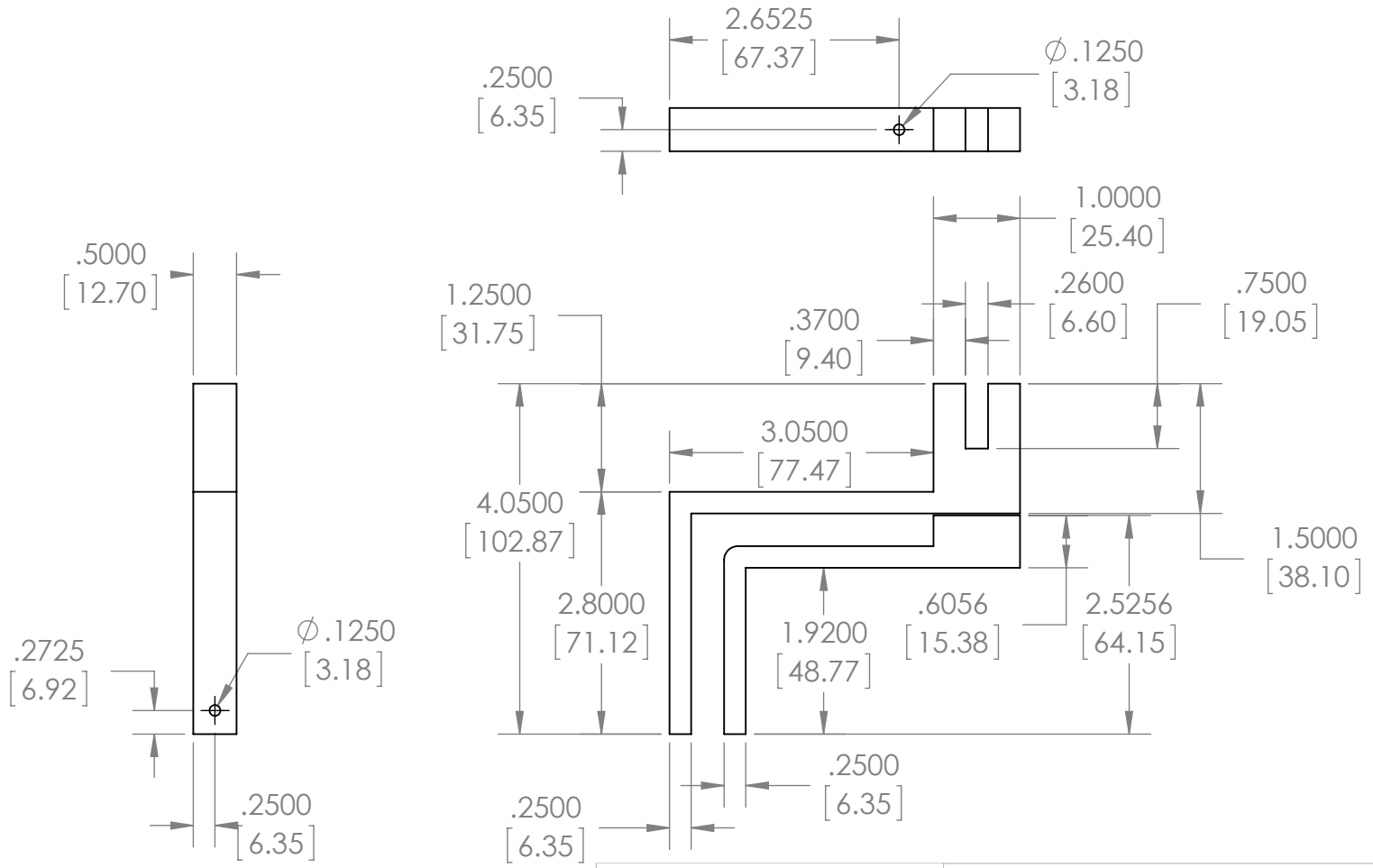
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

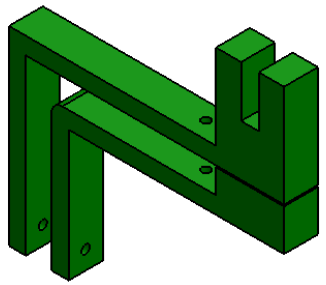
| MATERIAL: | FINISH: |
|---|---|
| A500 Steel | Slightly Grainy, Dry |

TOLERANCES: + 0.100 - 0.100

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 20.29 | SHEET 1 OF 1



# Quantity: 4

ABS Plastic

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TITLE: PC Holder (AngledIron)

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ABS | |

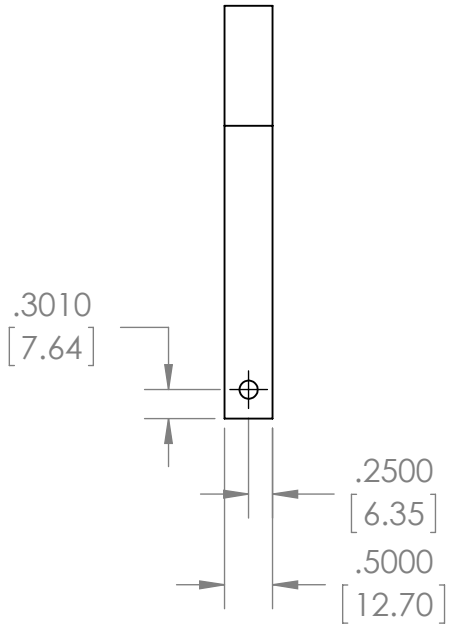
TOLERANCES: + 0.100 - 0.100

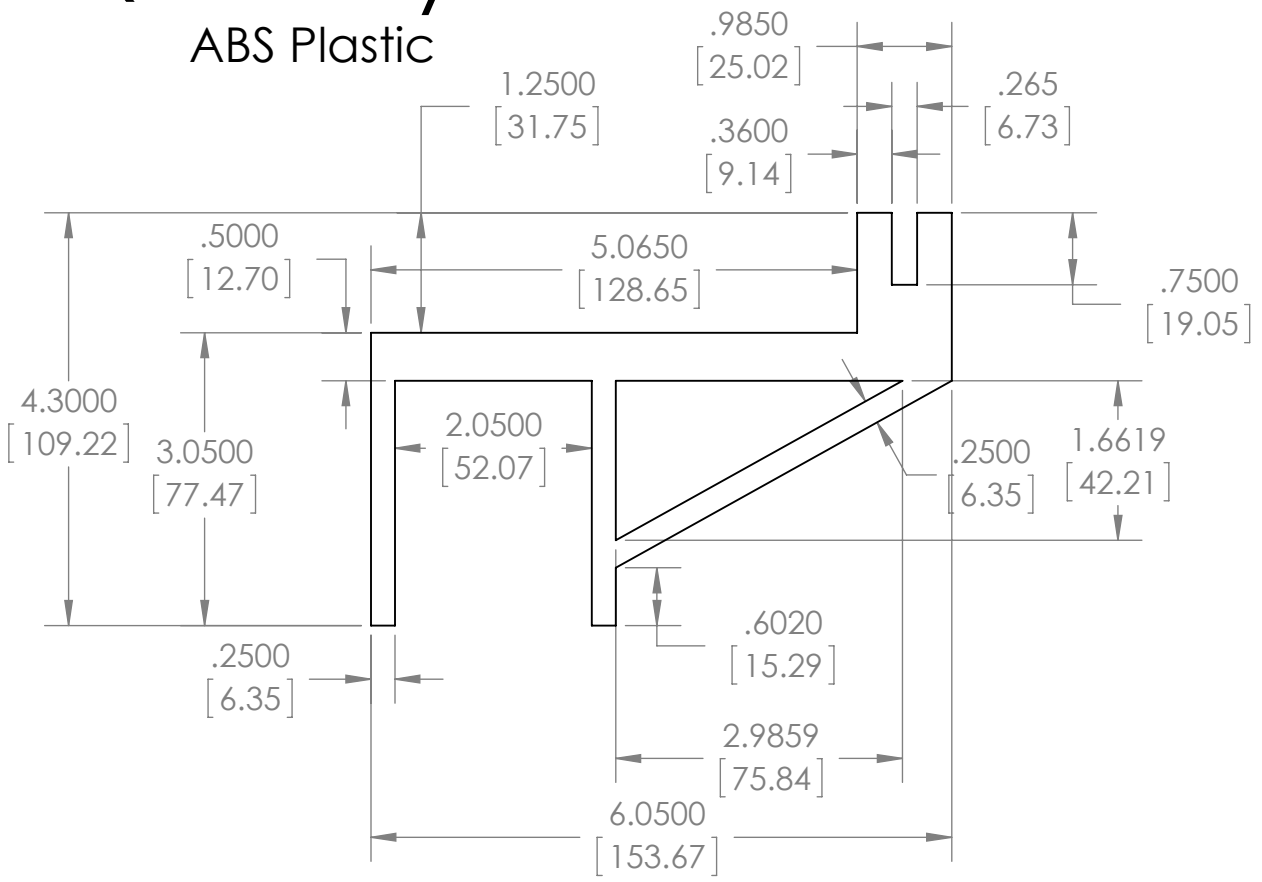
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

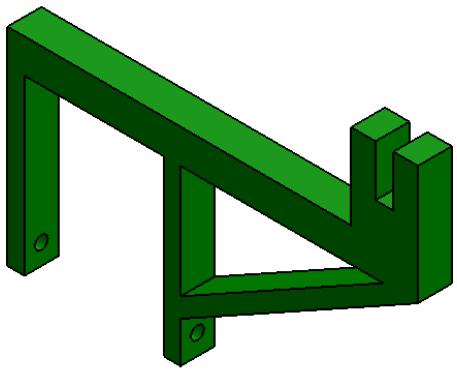
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.08 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 4

ABS Plastic



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TITLE: PC Holder (RecBar)

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ABS | |

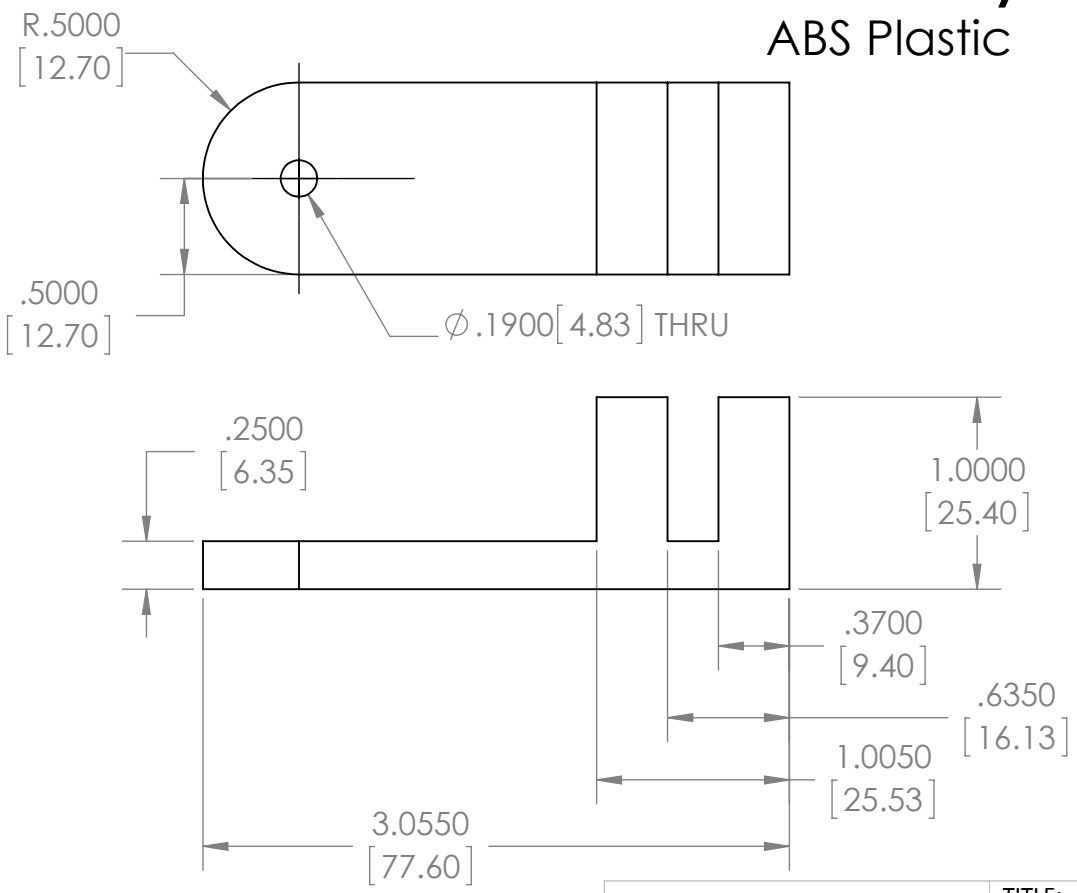
TOLERANCES: + 0.100 - 0.100

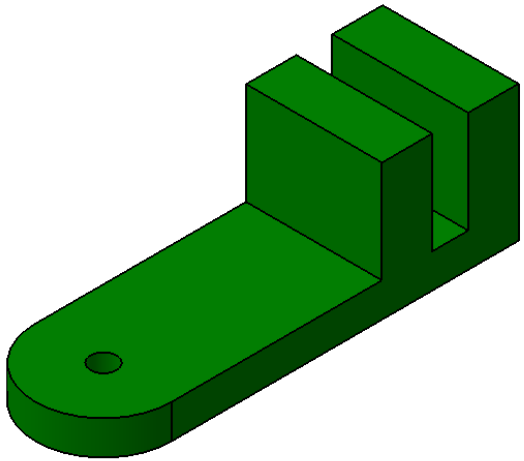
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.11 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

ABS Plastic



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TITLE: PC Holder (Side)

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ABS | Plain |

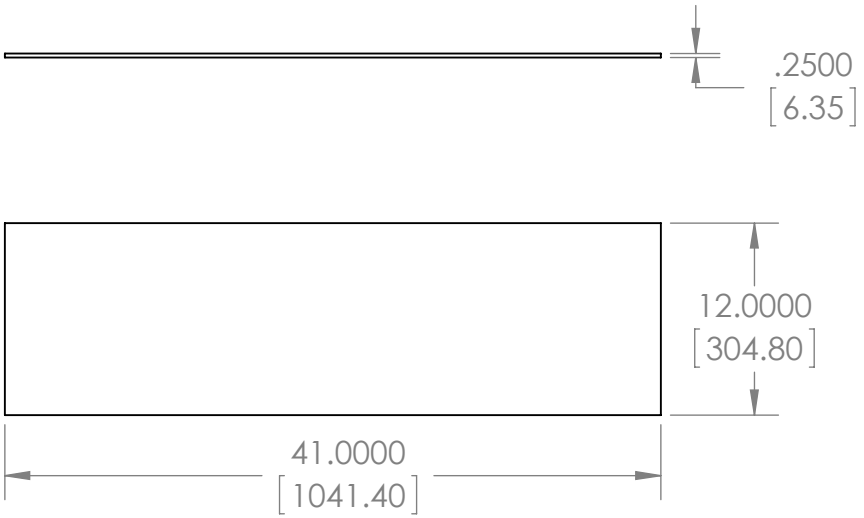
TOLERANCES: + 0.100 - 0.100

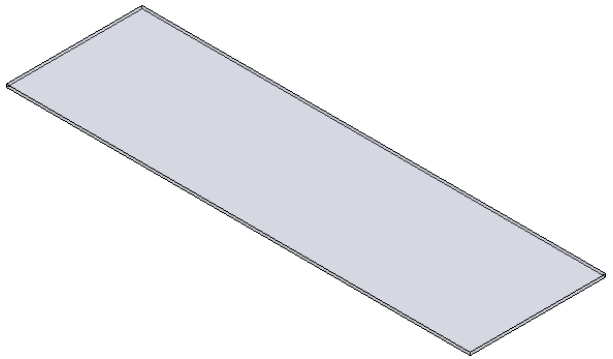
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.05 | SHEET 1 OF 1

# Quantity: 4

## 1/4" Clear Polycarbonate Sheet



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TITLE: Plexiglass Protector

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ABS PC | Smooth |

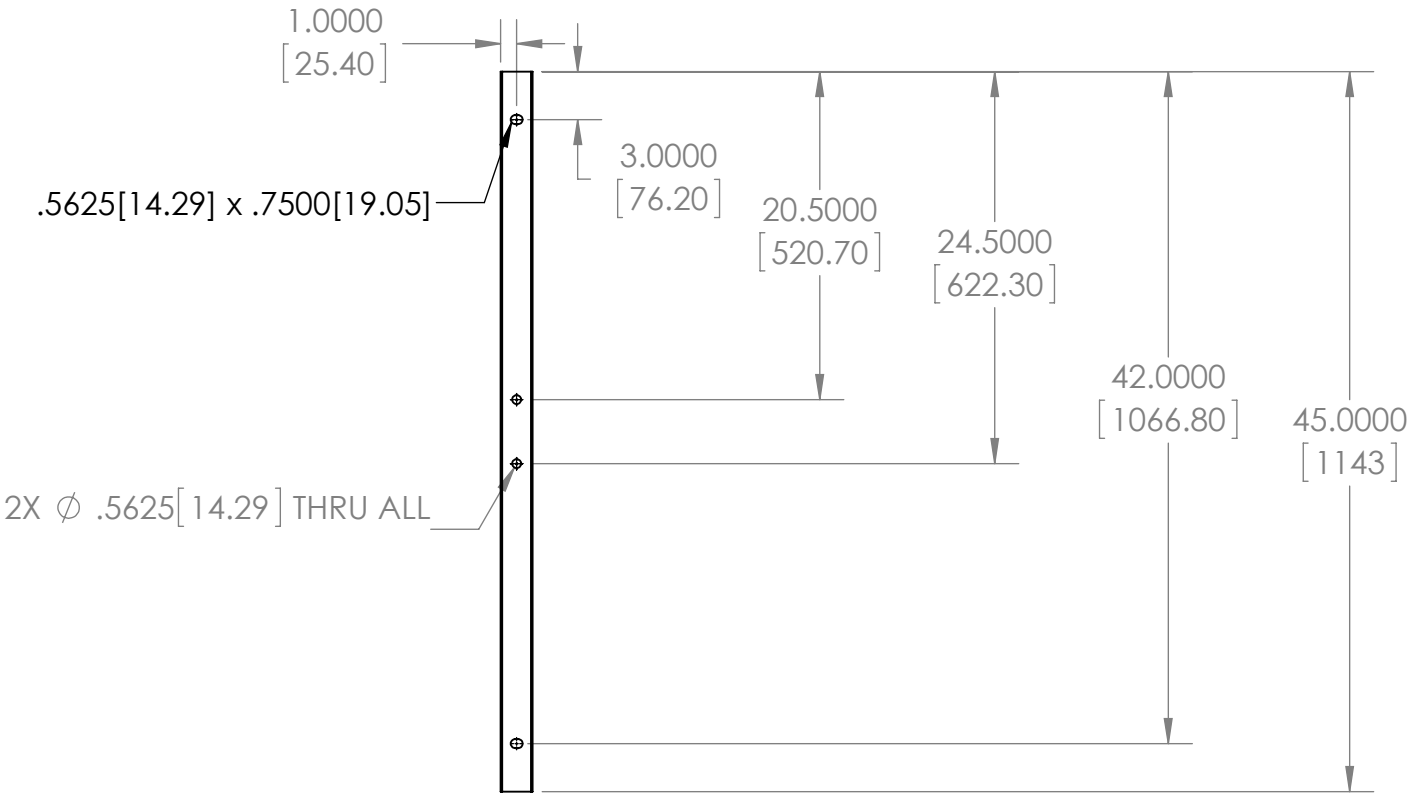
TOLERANCES: + 0.100 - 0.100

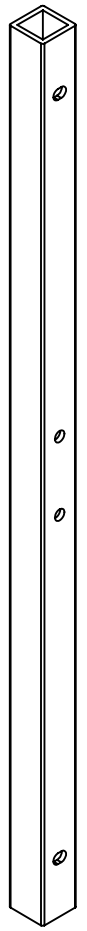
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/19/2018 | 2 |

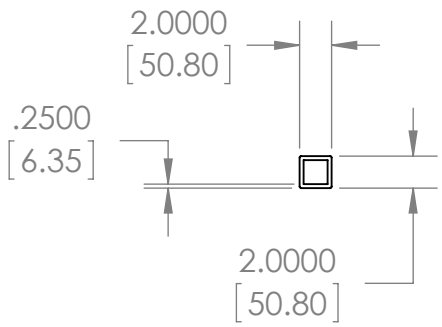
DO NOT SCALE DRAWING | WEIGHT (LBS): 4.75 | SHEET 1 OF 1

# Quantity: 1

## 2" x 2" x 1/4" wall A500 Square Steel Tube



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TITLE: Rec Bar_Bearing Mount

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| A500 Steel | Slightly Grainy, Dry |

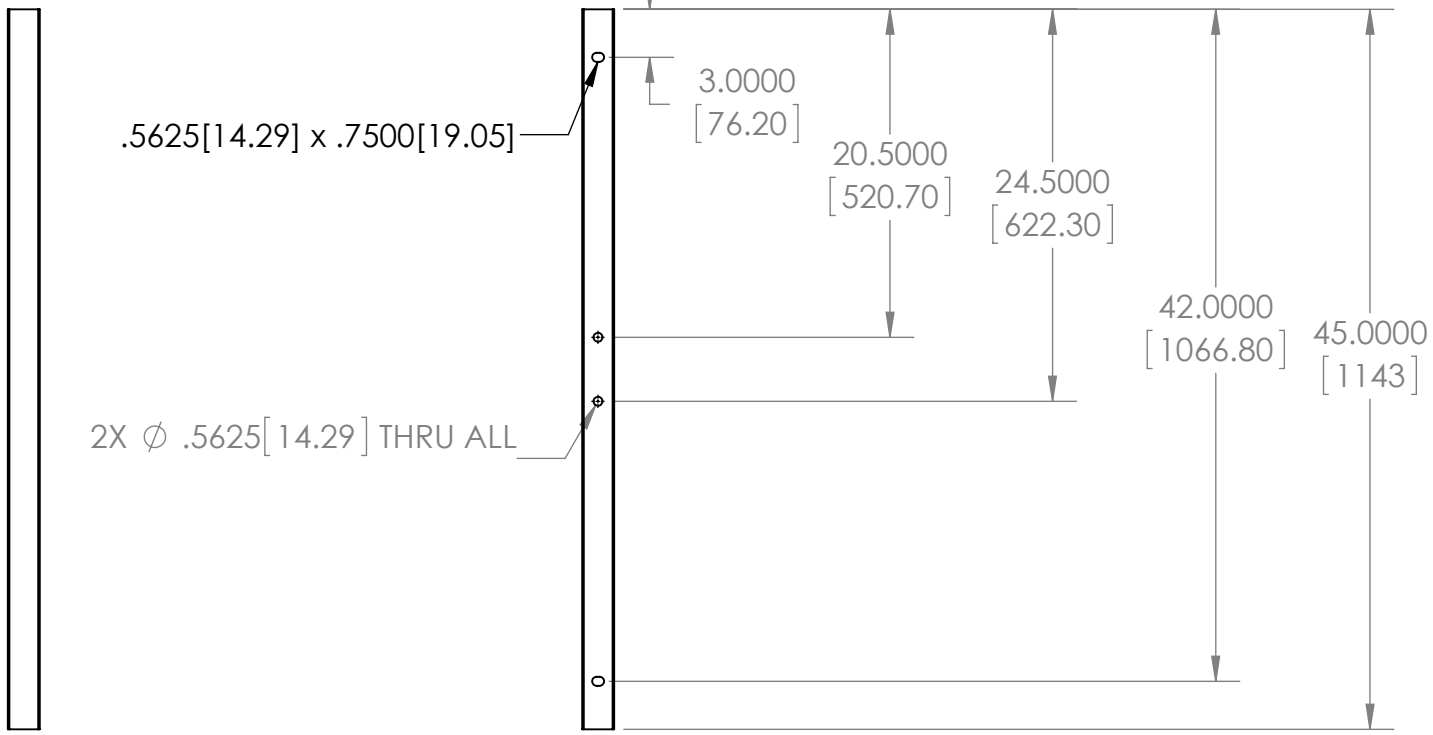
TOLERANCES: + 0.100 - 0.100

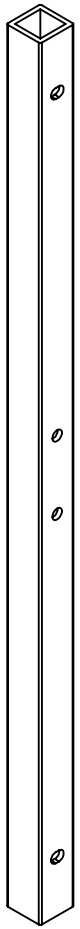
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/19/2018 | 2 |

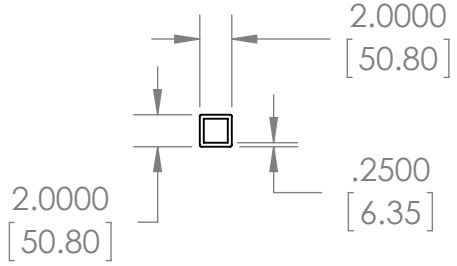
DO NOT SCALE DRAWING | WEIGHT (LBS): 20.29 | SHEET 1 OF 1

# Quantity: 1

## 2" x 2" x 1/4" wall A500 Square Steel Tube



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TITLE: Rec Bar_Bearing Mount 2

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| A500 Steel | Slightly Grainy, Dry |

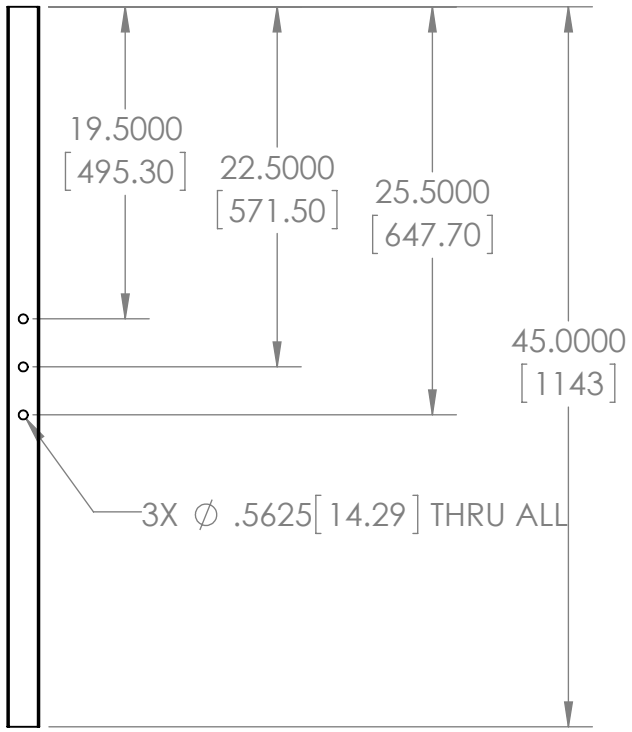
TOLERANCES: + 0.100 - 0.100

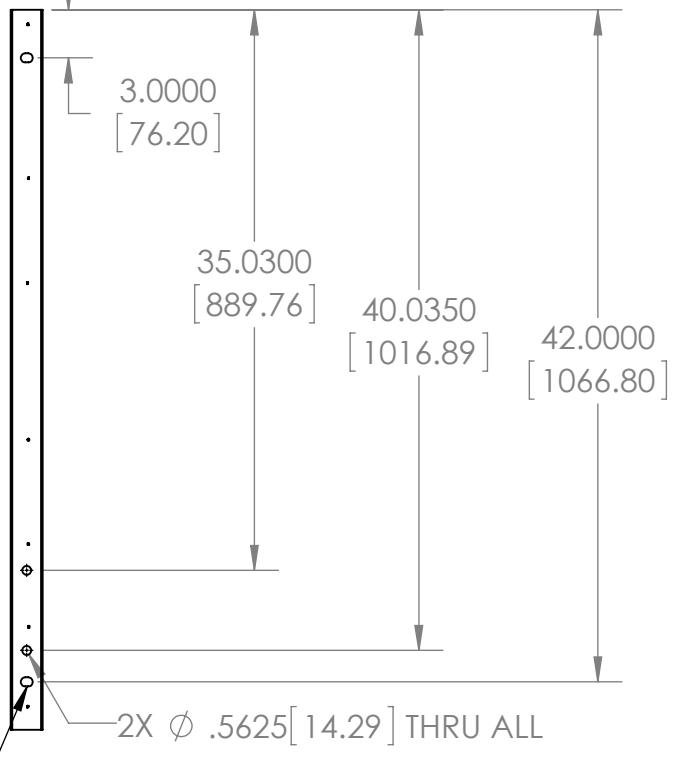
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 4/11/2018 | 2 |

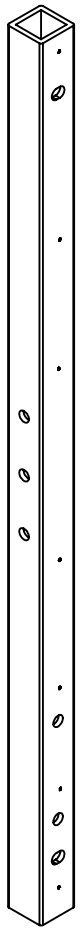
DO NOT SCALE DRAWING | WEIGHT (LBS): 20.29 | SHEET 1 OF 1

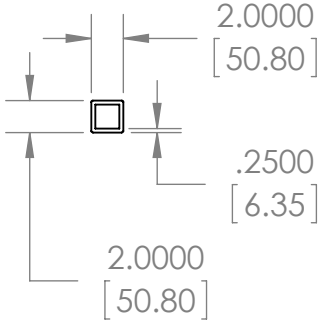
# Quantity: 1

## 2" x 2" x 1/4" wall A500 Square Steel Tube



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TITLE: Rec Bar_Gear Reducer

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| A500 Steel | Slightly Grainy, Dry |

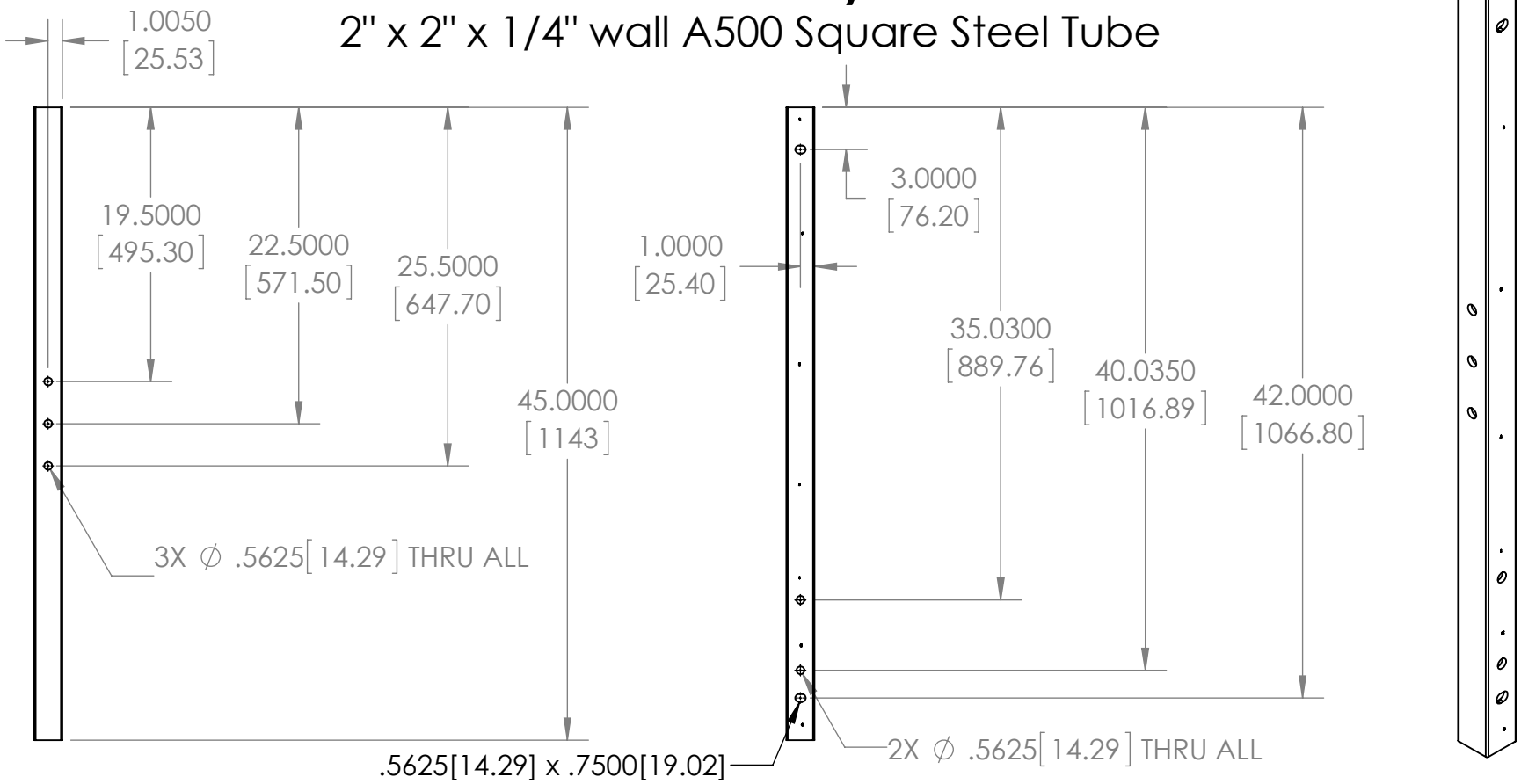
TOLERANCES: + 0.100 - 0.100

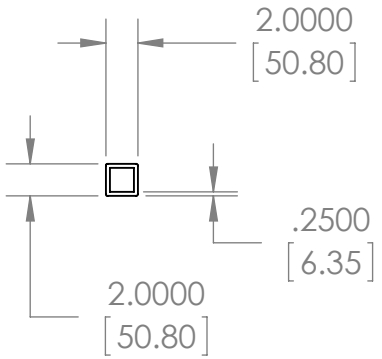
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 20.29 | SHEET 1 OF 1

# Quantity: 1

## 2" x 2" x 1/4" wall A500 Square Steel Tube

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TITLE: Rec Bar_Gear Reducer 2

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| A500 Steel | Slightly Grainy, Dry |

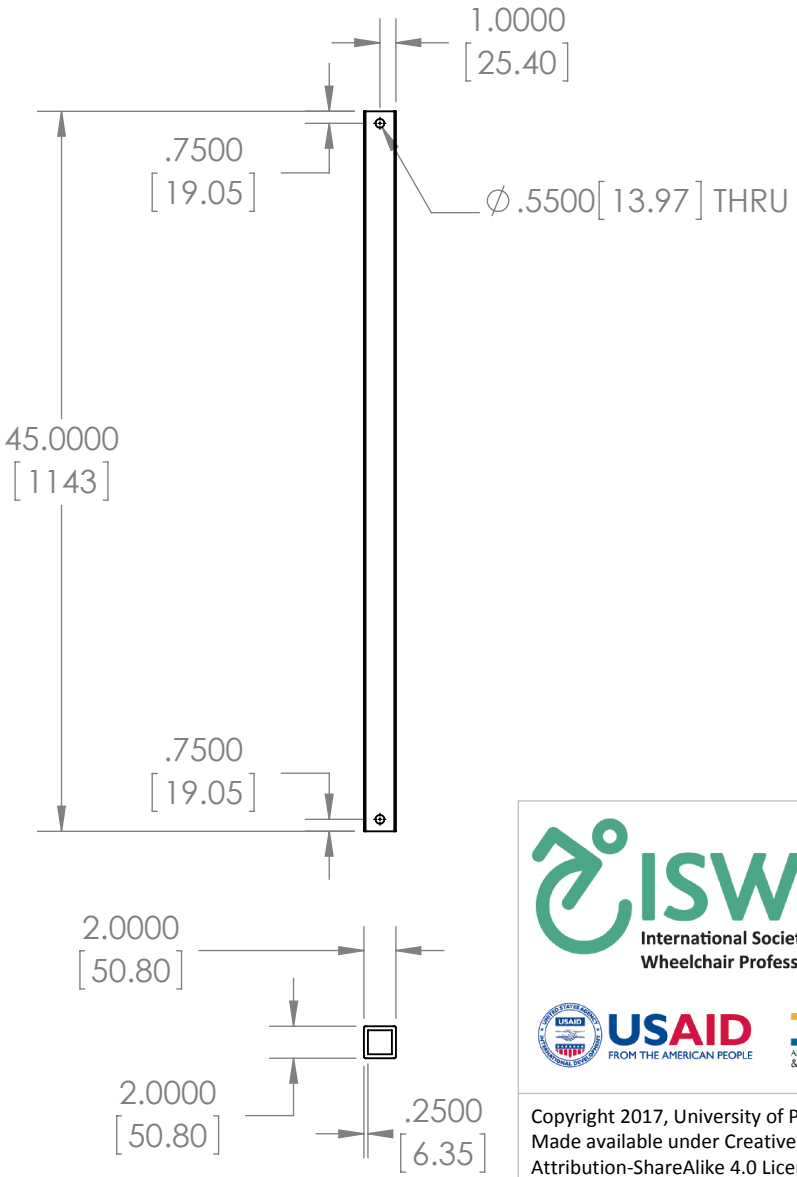
TOLERANCES: + 0.100 - 0.100

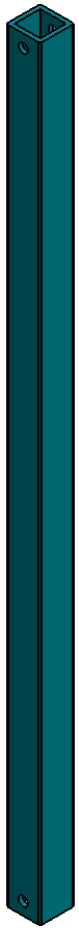
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 20.29 | SHEET 1 OF 1

# Quantity: 2

## 2"x2"x1/4" A500 Square Steel Tube



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TITLE: Rec Bar_Top Frame 1-2

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| A500 Steel | Slightly Grainy, Dry |

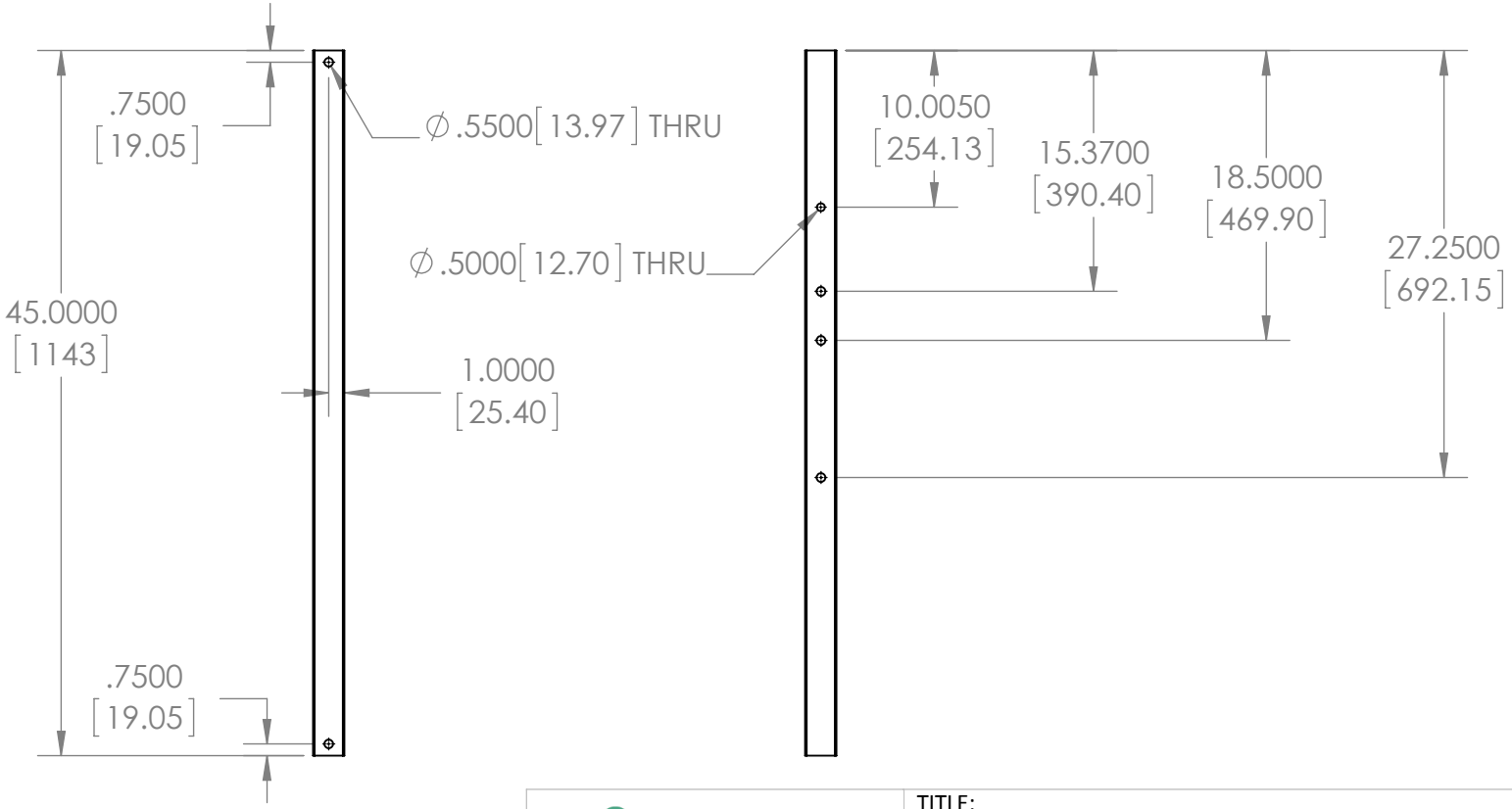
TOLERANCES: + 0.100 - 0.100

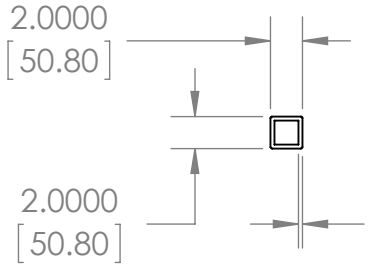
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 20.29 | SHEET 1 OF 1

# Quantity: 1

## 2" x 2" x 1/4" wall A500 Square Steel Tube

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TITLE: Rec Bar_Top Frame 3

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| A500 Steel | Slightly Grainy, Dry |

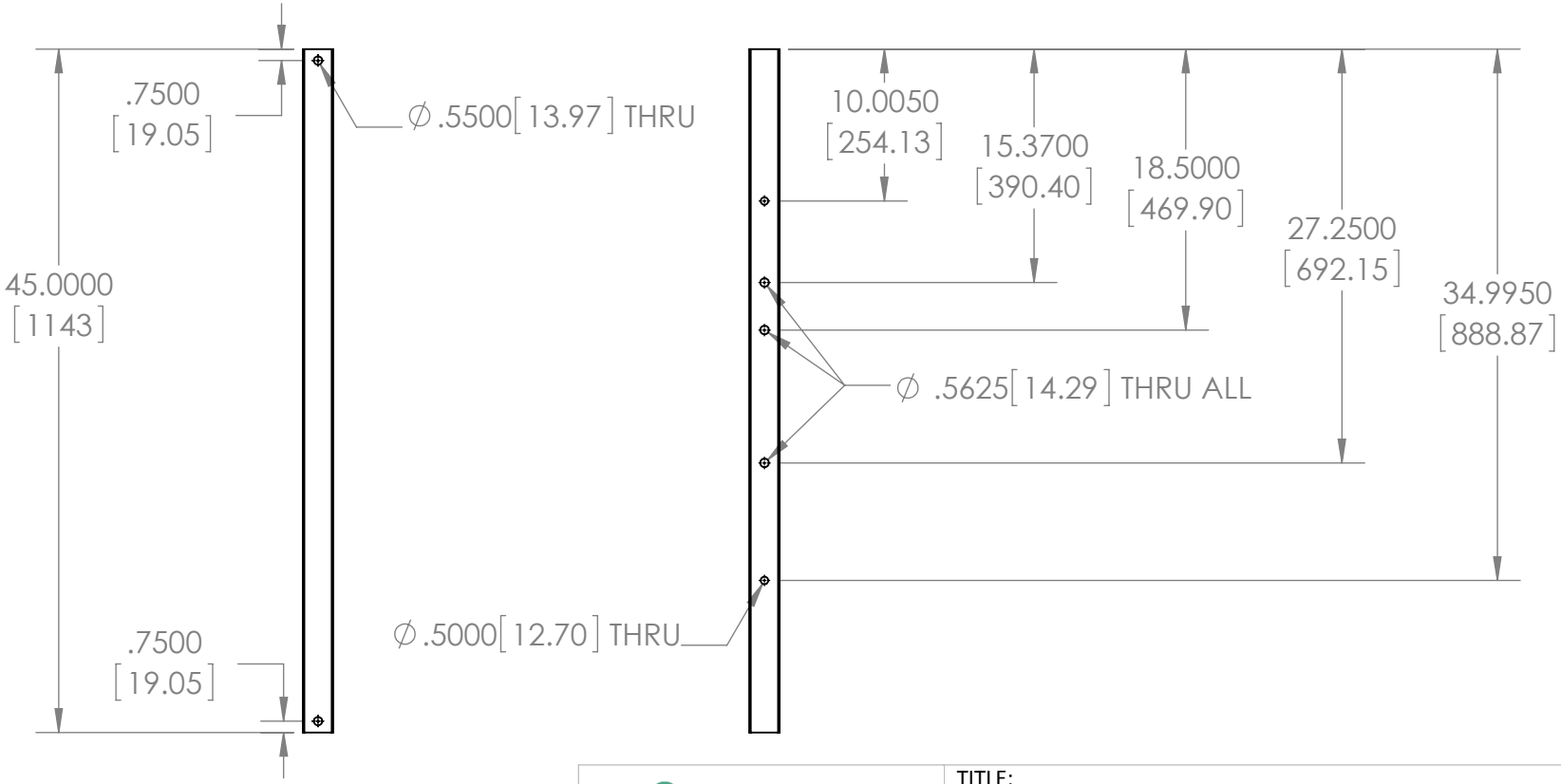
TOLERANCES: + 0.100 - 0.100

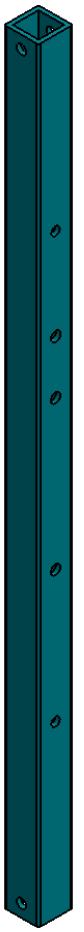
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 4/16/2018 | 2 |

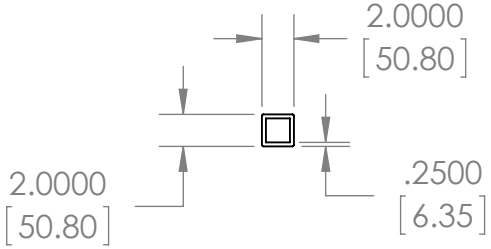
DO NOT SCALE DRAWING | WEIGHT (LBS): 20.29 | SHEET 1 OF 1

# Quantity: 1

## 2" x 2" x 1/4" wall A500 Square Steel Tube



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TITLE:

Rec Bar_Top Frame 4

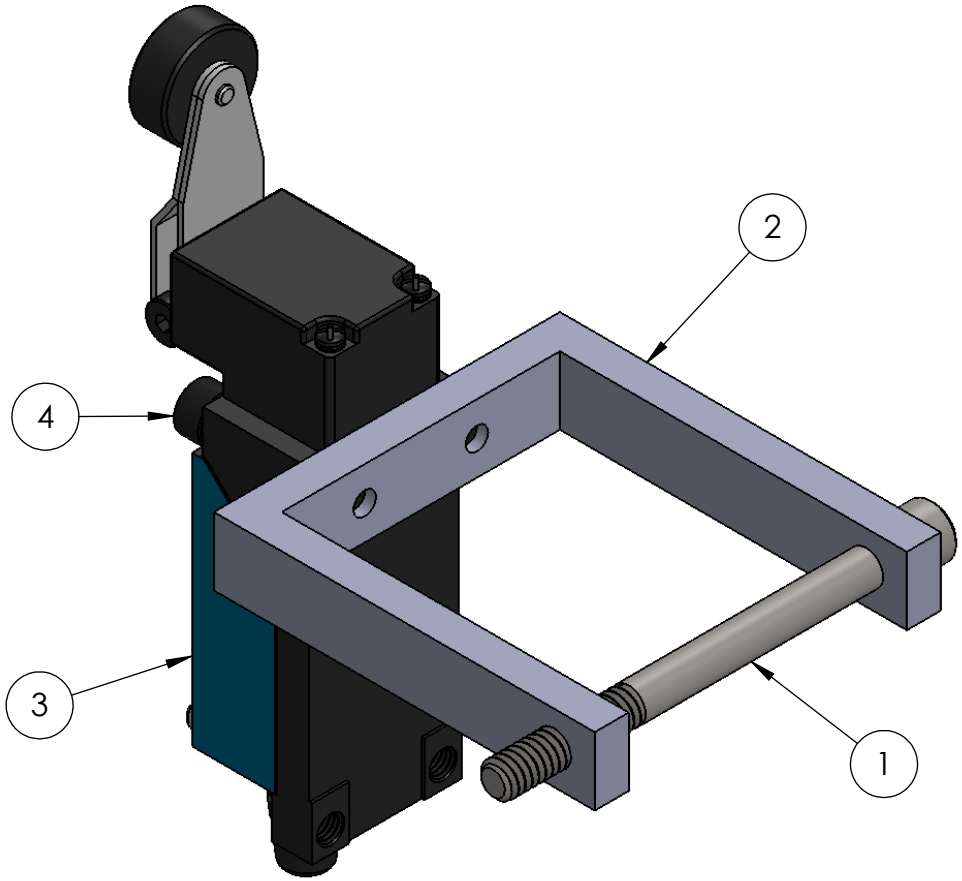
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| A500 Steel | Slightly Grainy, Dry |

TOLERANCES: + 0.100 - 0.100

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 4/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 20.29 | SHEET 1 OF 1




# Quantity: 4

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | 1/4-20 x 3 SHS | 1 |
| 2 | Limit Switch Clamp | 1 |
| 3 | Compact Limit Switch | 1 |
| 4 | M5 x 25mm SHS | 2 |

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TITLE:

## Limit Switch SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

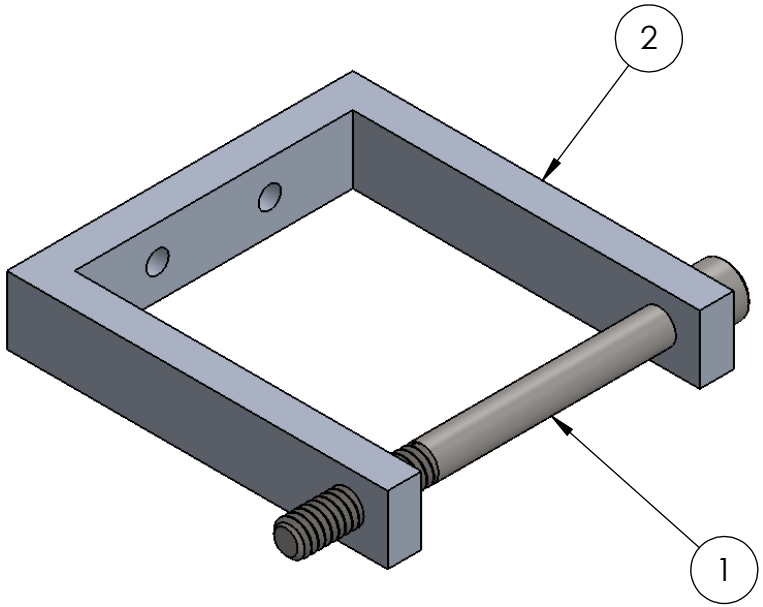
MATERIAL: Material <not specified>

FINISH: Plain

TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/20/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.27 | SHEET 1 OF 1




# Quantity: 1

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | 1/4-20 x 3 SHS | 1 |
| 2 | Limit Switch Clamp | 1 |

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TITLE:

## Limit Switch Clamp SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

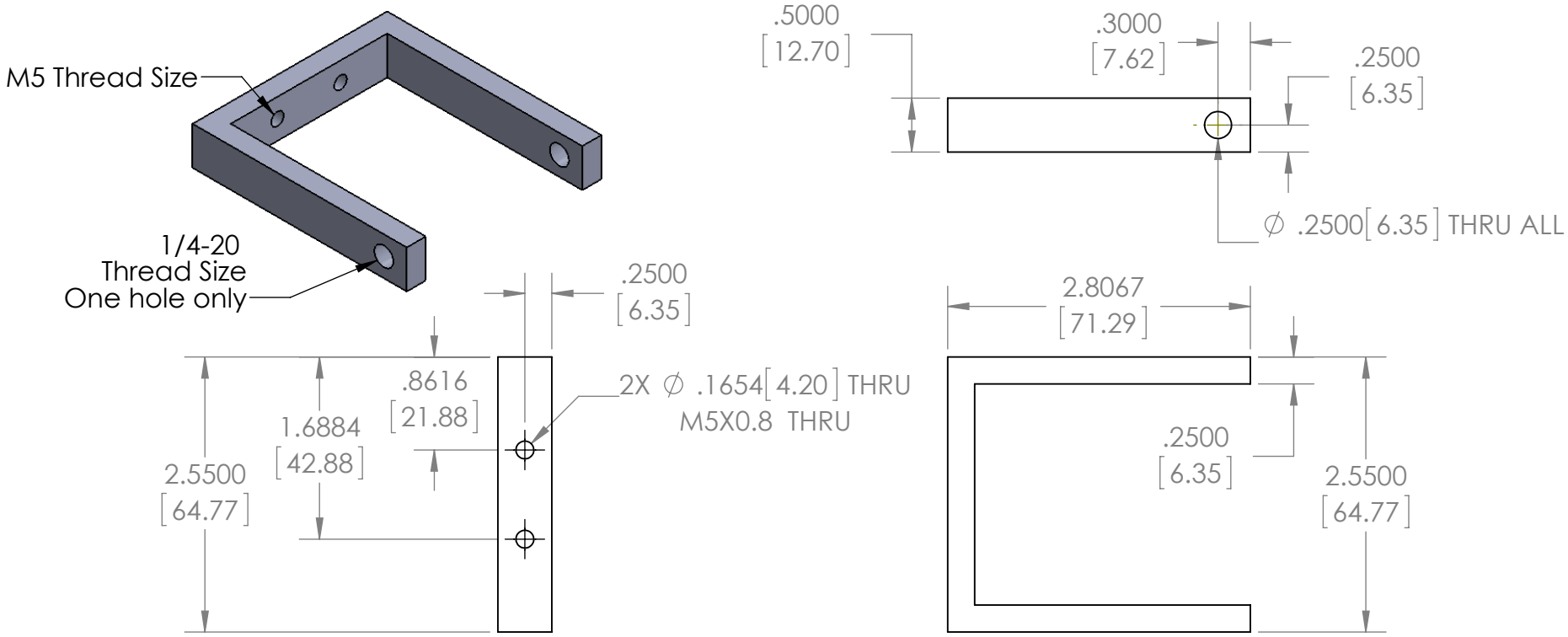
TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/20/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.14 | SHEET 1 OF 1

# Quantity: 4

## 1/2" 6061 Aluminum Plate

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TITLE: Limit Switch Clamp

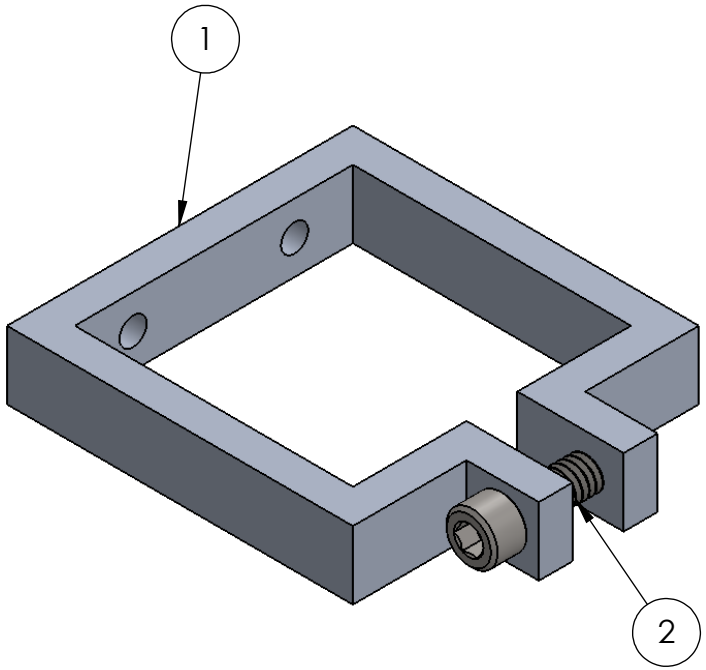
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

TOLERANCES: + 0.100 - 0.100

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 4/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.09 | SHEET 1 OF 1




# Quantity: 1

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Limit Switch Clamp 2 | 1 |
| 2 | 1/4-20 x 1 SHS | 1 |

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TITLE:

## Limit Switch Clamp 2 SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

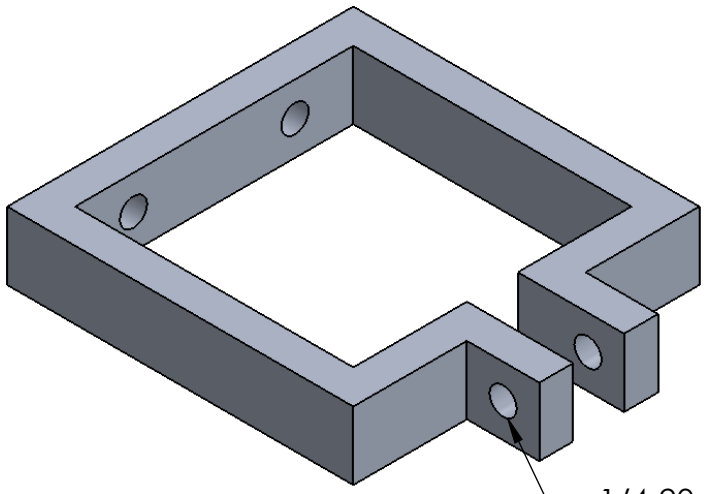
MATERIAL: Material <not specified>

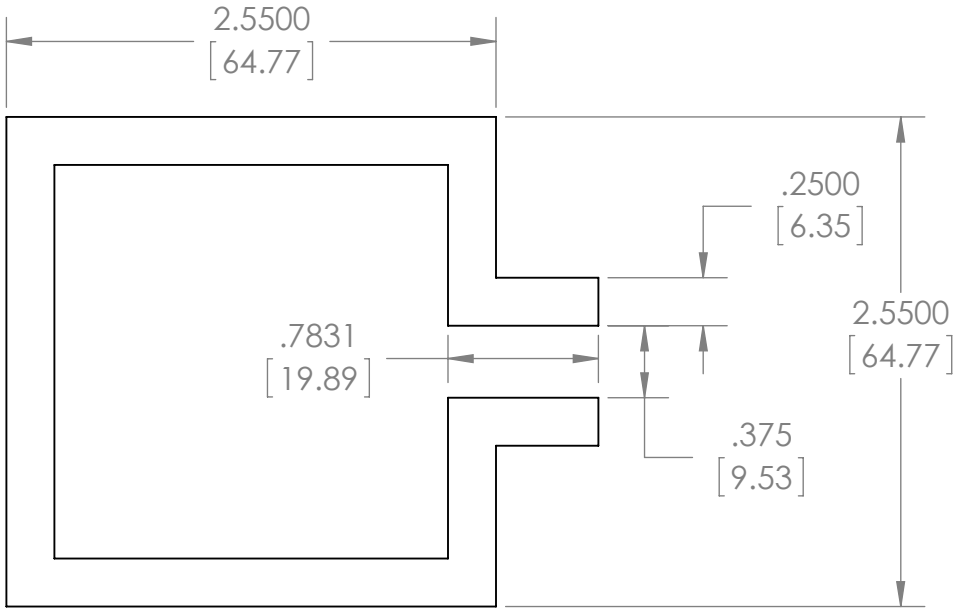
FINISH: Plain

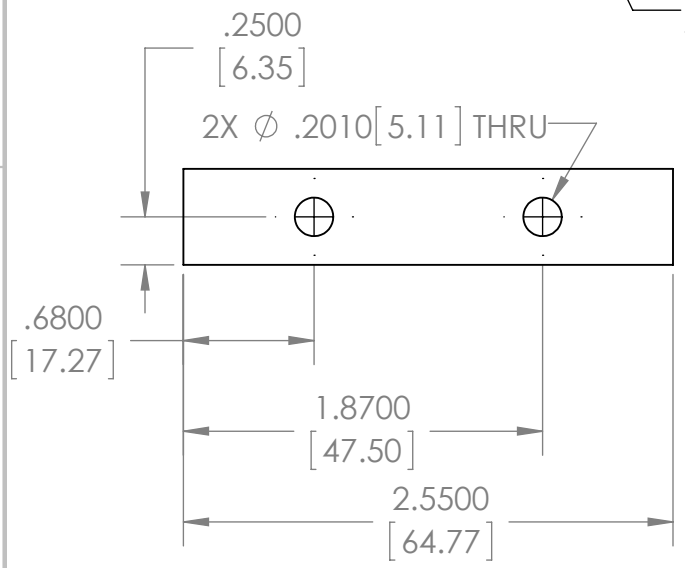
TOLERANCES:

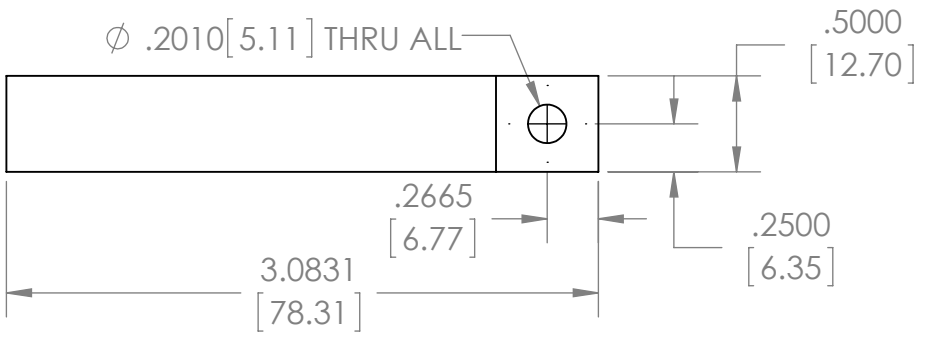
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.13 | SHEET 1 OF 1




# Quantity: 1

## 1/2" 6061 Aluminum Plate

Note: All holes are 1/4-20 and 0.201 is the drill size for the holes

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TITLE: Limit Switch Clamp 2

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

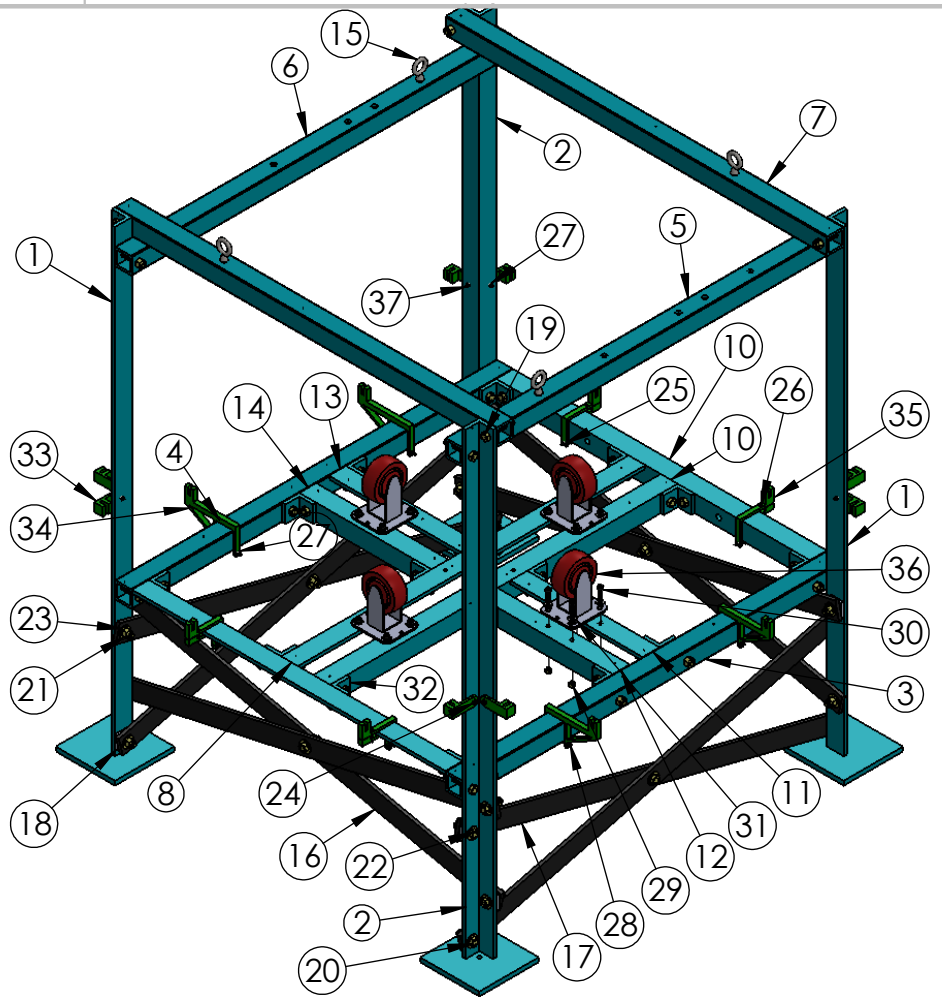
| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

TOLERANCES: + 0.100 - 0.100

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 4/13/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.12 | SHEET 1 OF 1

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Lfront&Rback Base Legs | 2 |
| 2 | Rfront&Lback Base Legs | 2 |
| 3 | Rec Bar_Table Support | 1 |
| 4 | Rec Bar_Table Support 2 | 1 |
| 5 | Rec Bar_Top Frame 4 | 1 |
| 6 | Rec Bar_Top Frame 3 | 1 |
| 7 | Rec Bar_Top Frame 1-2 | 2 |
| 8 | Table Support Center_Default | 1 |
| 9 | Table Support Center_2 | 1 |
| 10 | Table Support Sides | 2 |
| 11 | Table Support Short_Right | 1 |
| 12 | Table Support Short_Left | 1 |
| 13 | Table Support Short_L2 | 1 |
| 14 | Table Support Short_R2 | 1 |
| 15 | 1in Eye Bolt | 4 |
| 16 | Cross Brace_F&B | 4 |
| 17 | Cross Brace_R&L | 4 |
| 18 | Cross Brace Spacer | 8 |
| 19 | 1/2-13 x 3 HHS | 20 |
| 20 | 1/2-13 x 1.75 HHS | 36 |
| 21 | 1/2-13 Locknut | 64 |
| 22 | 1/2-13 x 2 HHS | 8 |
| 23 | 0.5in Washer | 40 |
| 24 | No.10 Washer | 8 |
| 25 | 6-32 Hex Nut | 8 |
| 26 | 6-32 x 1.25 BHS | 8 |
| 27 | 10-24 Hex Nut | 12 |
| 28 | 10-24 x 3 SHS | 4 |
| 29 | 5/16-18 Locknut | 16 |
| 30 | 5/16-18 x 1 SHS | 16 |
| 31 | 0.3125in Flat Washer | 16 |
| 32 | L Connector | 16 |
| 33 | PC Holder (Sides) | 8 |
| 34 | PC Holder (SquareTubing) | 4 |
| 35 | PC Holder (AngledIron) | 4 |
| 36 | Turntable Caster | 4 |
| 37 | 10-24 x 1 BHS | 8 |

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TITLE:

# Base Frame Assembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

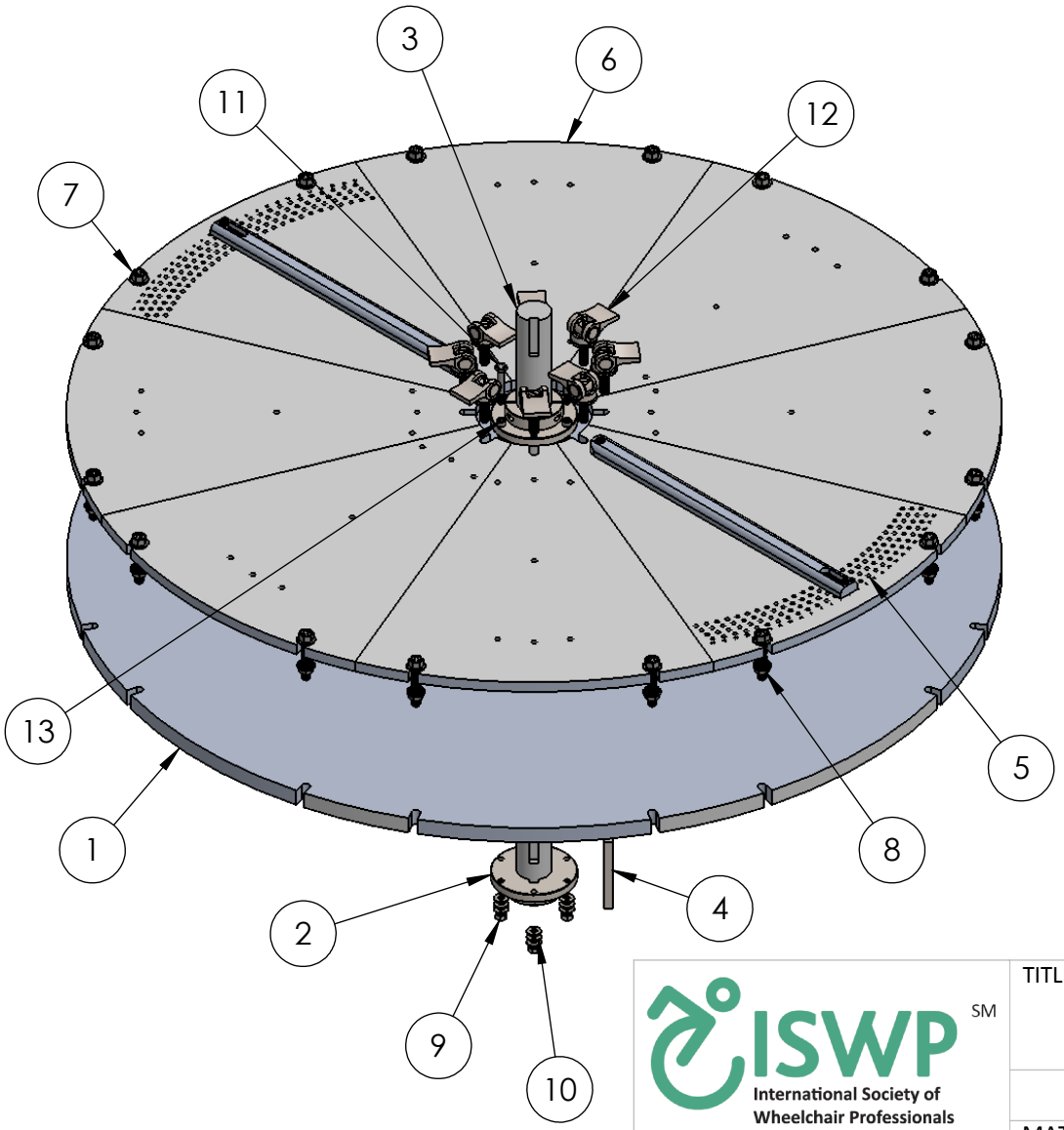
FINISH: Plain

TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:16 | A | 4/13/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 256.60 | SHEET 1 OF 1

# Turntable Drawings




# Quantity: 1

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Base Plate | 1 |
| 2 | 1.5in Shaft Flange | 2 |
| 3 | Centre Shaft | 1 |
| 4 | Center Shaft Key | 1 |
| 5 | Angled Slat Pie Piece SubAssembly | 2 |
| 6 | Slat Plate New | 6 |
| 7 | 3/8-16 x 2 Flange HHS | 16 |
| 8 | 3/8-16 Flange Hex Nut | 16 |
| 9 | 1/4-20 Hex Nut | 6 |
| 10 | 0.25in Washer | 18 |
| 11 | 1/4-20 x 2 HHS | 3 |
| 12 | Quick Release Clamp | 8 |
| 13 | 1/4-20 x 2 SHS | 3 |

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TITLE:

## Exploded Turntable Assembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

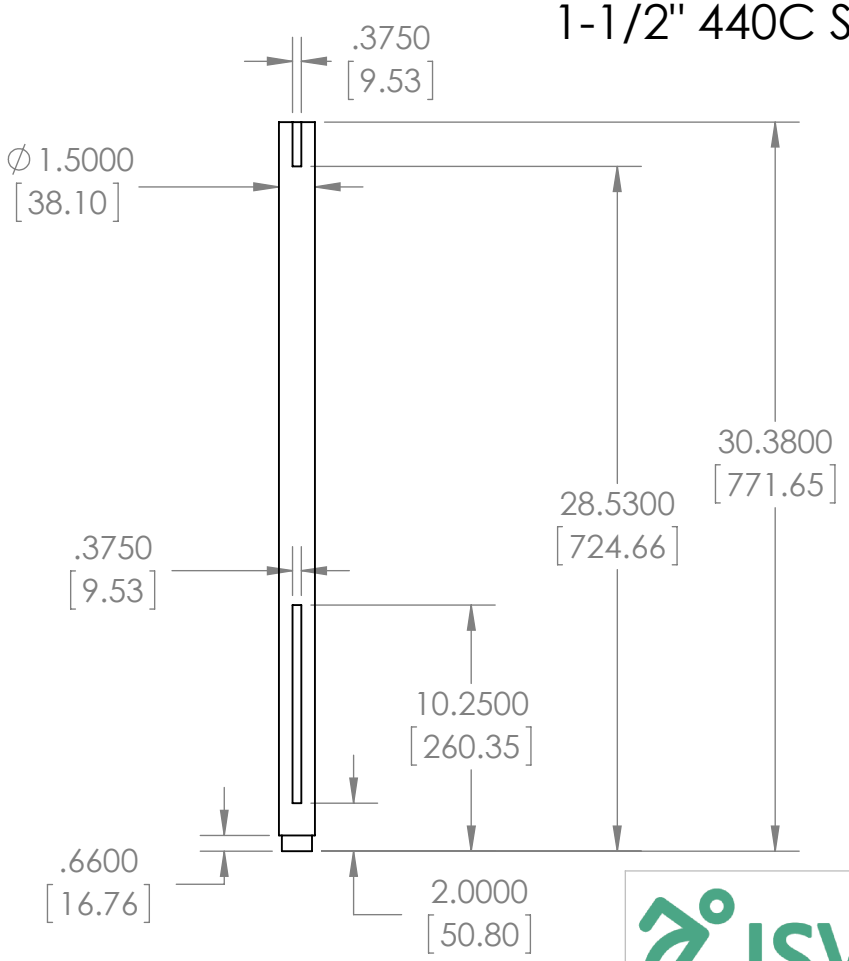
TOLERANCES:

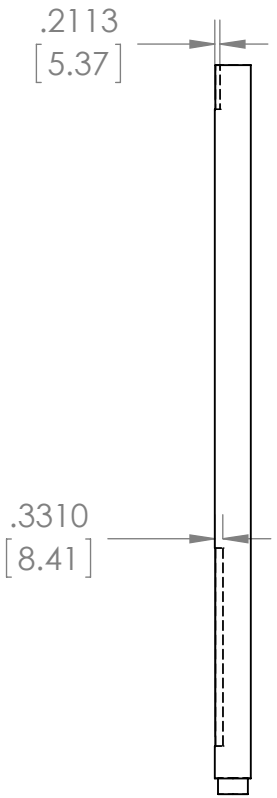
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:8 | A | 2/19/2018 | 2 |

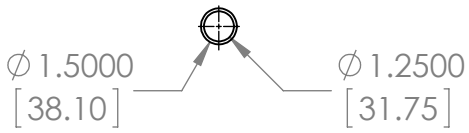
DO NOT SCALE DRAWING | WEIGHT (LBS): 175.27 | SHEET 1 OF 1

# Quantity: 1

## 1-1/2" 440C Stainless Steel Rod

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TITLE:

# Centre Shaft

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Stainless Steel (ferritic) | Plain |

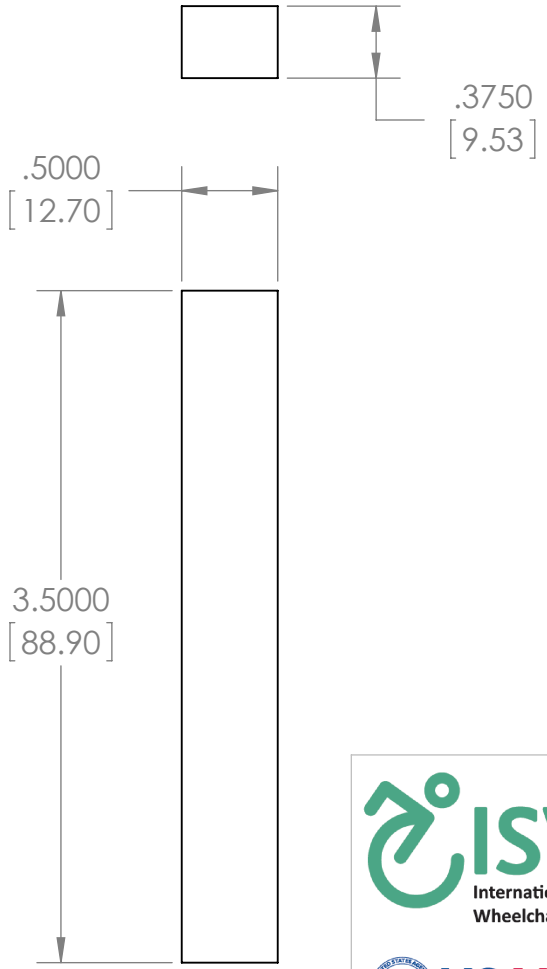
TOLERANCES: + 0.025 - 0.025

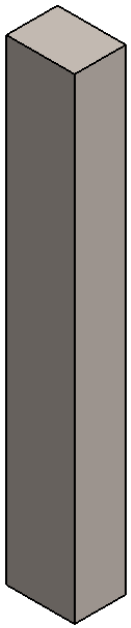
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:8 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 14.71 | SHEET 1 OF 1

# Quantity: 1

## 3/8" x 1/2" Grade 18-8 Stainless Steel Machine Key Stock



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TITLE: Center Shaft Key

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Stainless Steel (ferritic) | Plain |

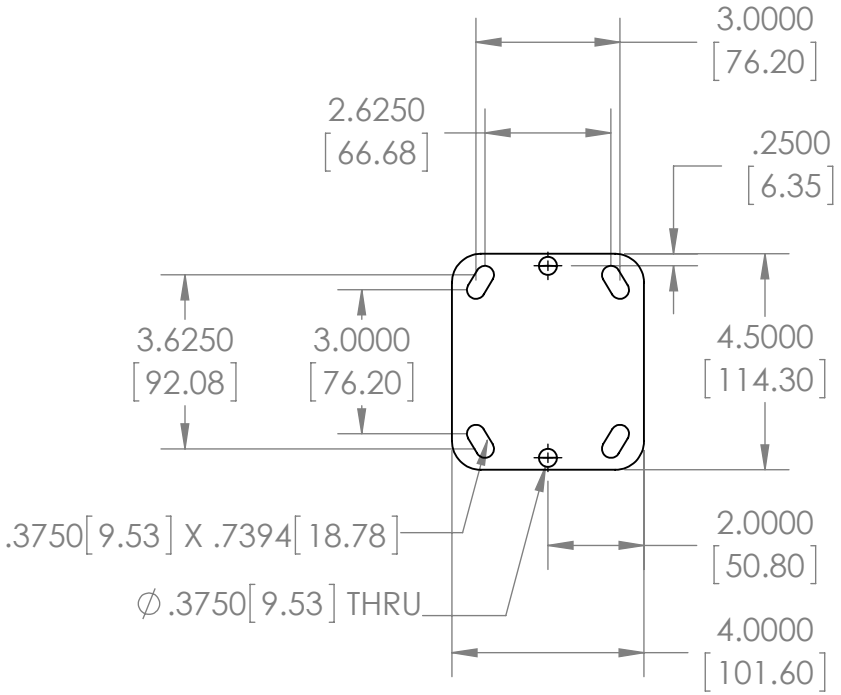
TOLERANCES: + 0.025 - 0.025

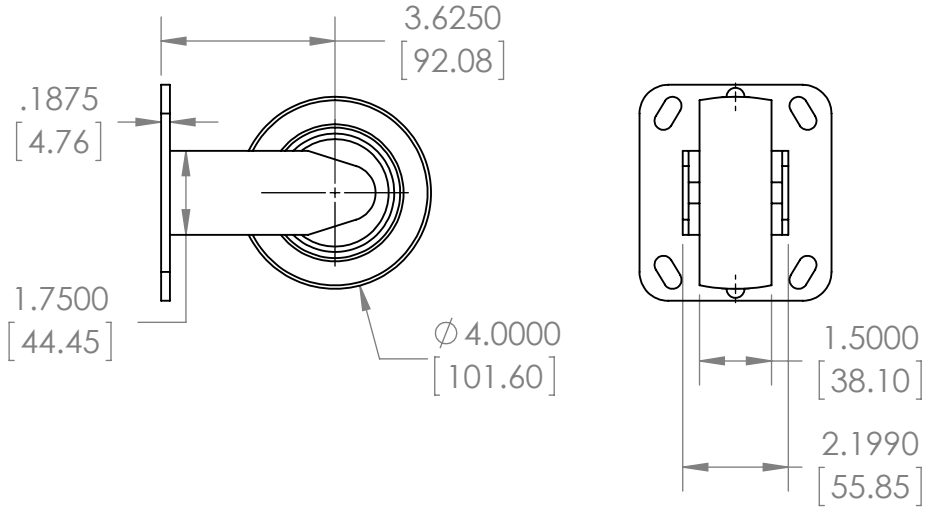
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/20/2018 | 2 |

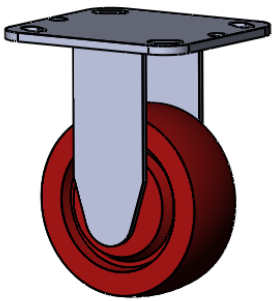
DO NOT SCALE DRAWING | WEIGHT (LBS): 0.18 | SHEET 1 OF 1

# Quantity: 4

## Heavy Duty Rigid Plate Caster 4" Polyurethane Wheel 600 Lb. Capacity



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TITLE: Roller Caster 2

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Material <not specified> | Plain |

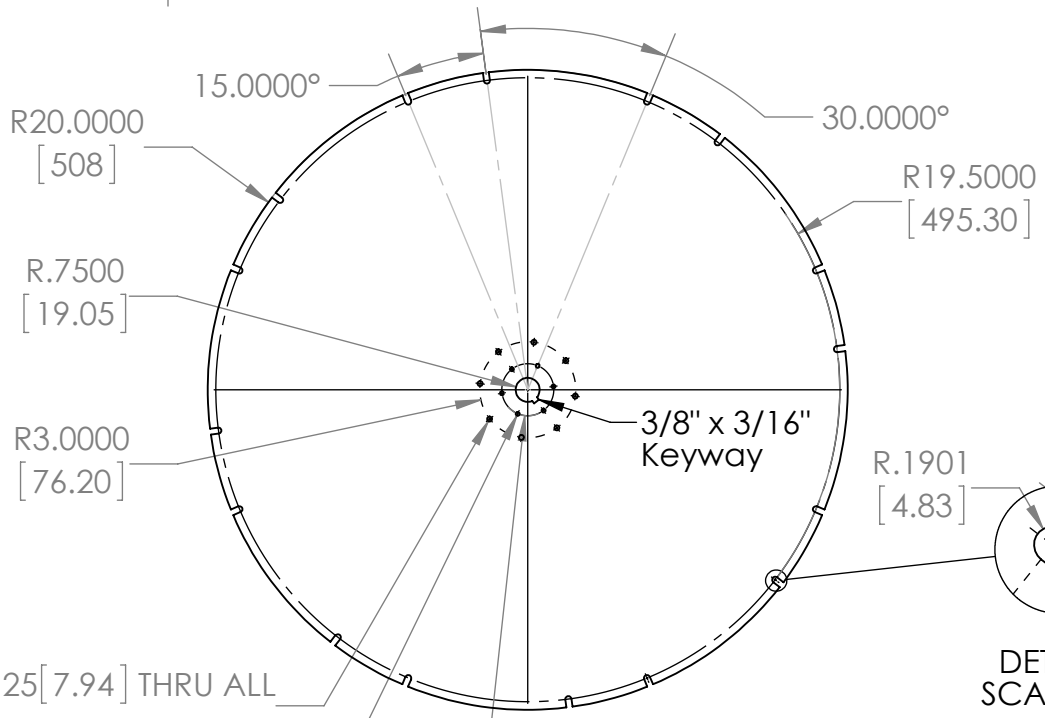
TOLERANCES: Manufacturer Spec

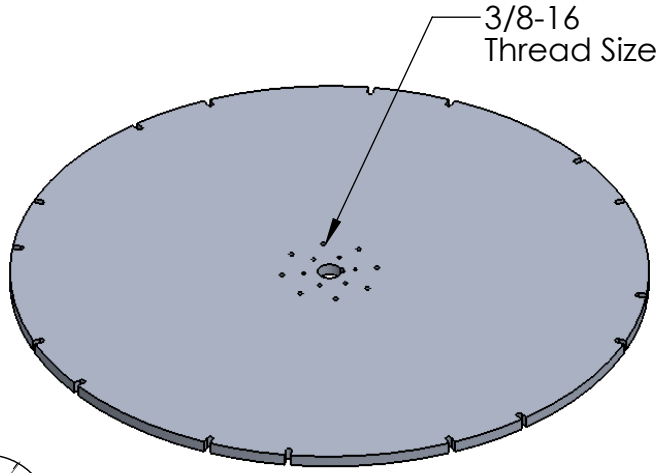
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 2/19/2018 | 2 |

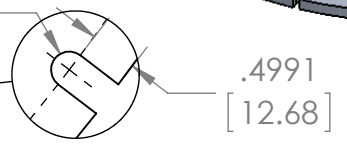
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.82 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 3/4" 6061 Aluminum Sheet


DETAIL A
SCALE 1 : 2

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TITLE: **Base Plate**

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061-T6 (SS) | Plain |

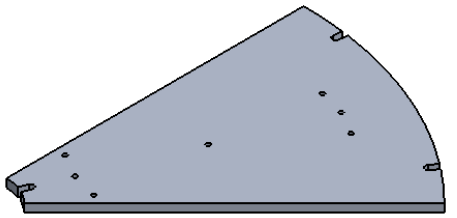
TOLERANCES: + 0.025 - 0.025

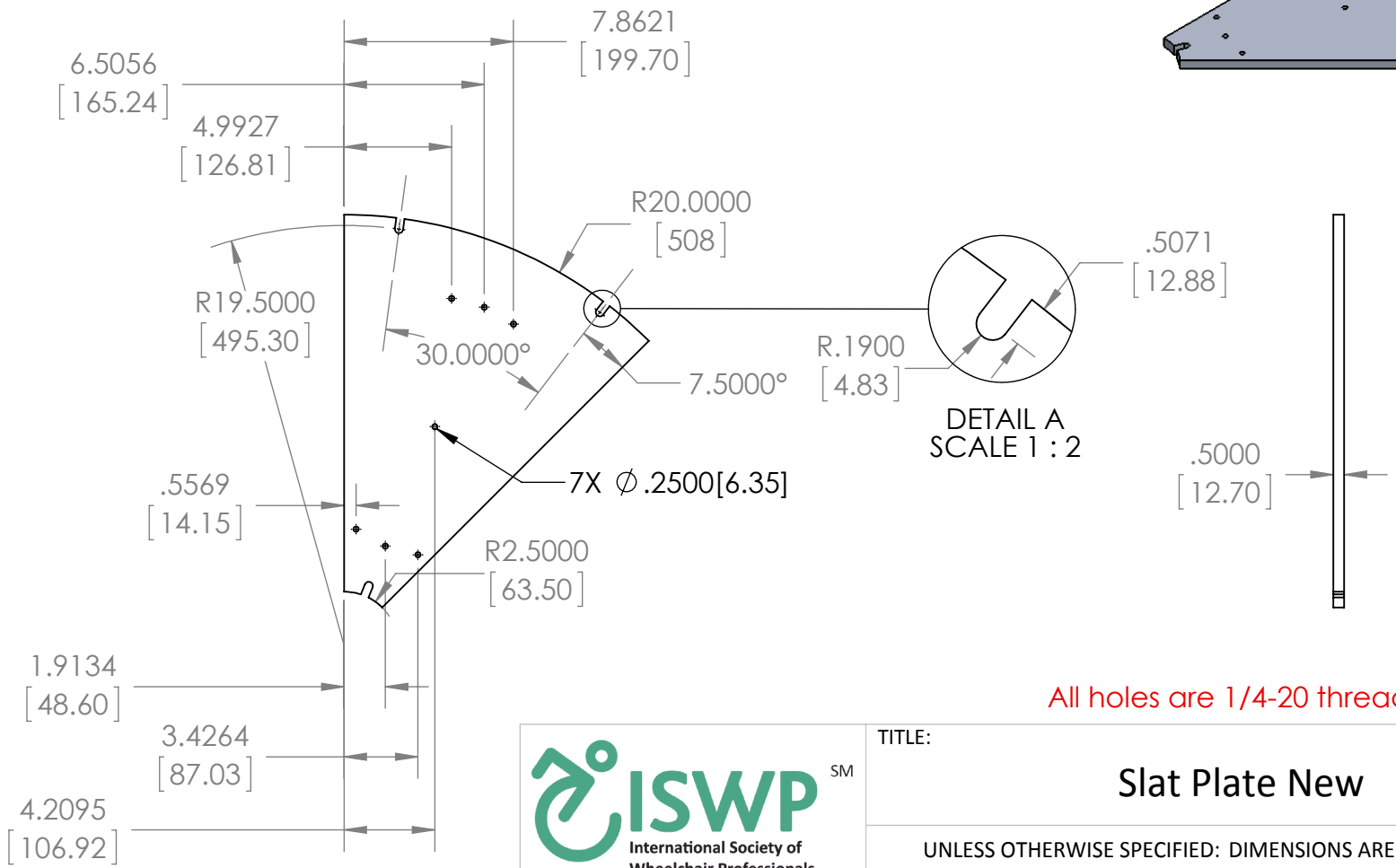
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:12 | A | 4/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 91.44 | SHEET 1 OF 1

# Quantity: 6

## 1/2" 6061 Aluminum Plate






All holes are 1/4-20 thread size

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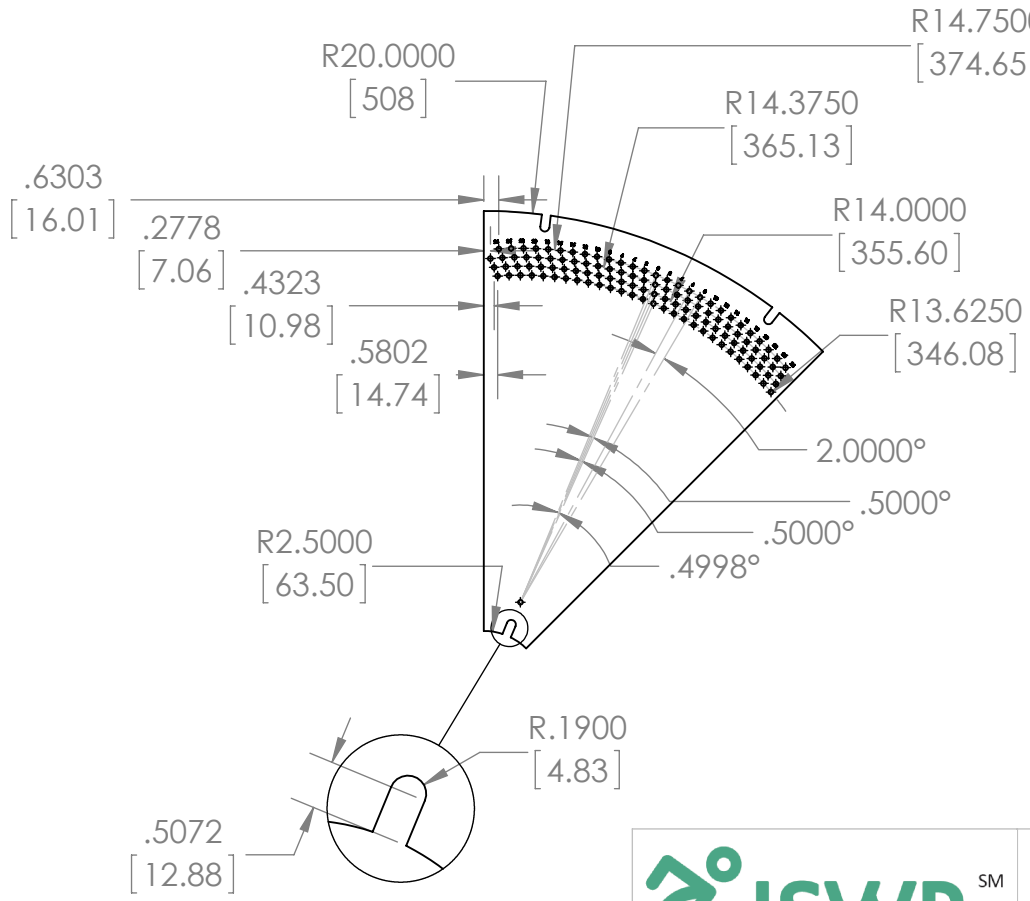
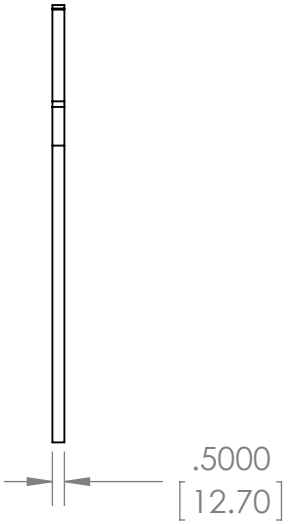
| | | | |
|---|---|---|---|
| TITLE: Slat Plate New | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: 6061-T6 (SS) | | FINISH: Plain | |
| TOLERANCES: | + 0.025 | - 0.025 | |
| SCALE: 1:8 | SIZE: A | DATE: 4/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 7.49 | SHEET 1 OF 1 |

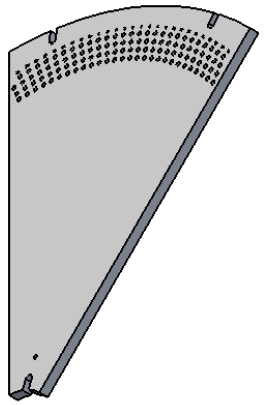
# Quantity: 2

## 1/2" 6061 Aluminum Plate




DETAIL C
SCALE 1 : 2



Row 1 has 27 holes each 2 deg apart
Rows 2-4 have 28 holes each 2 deg apart
Each row is offset by 1/2 deg and 3/8" apart

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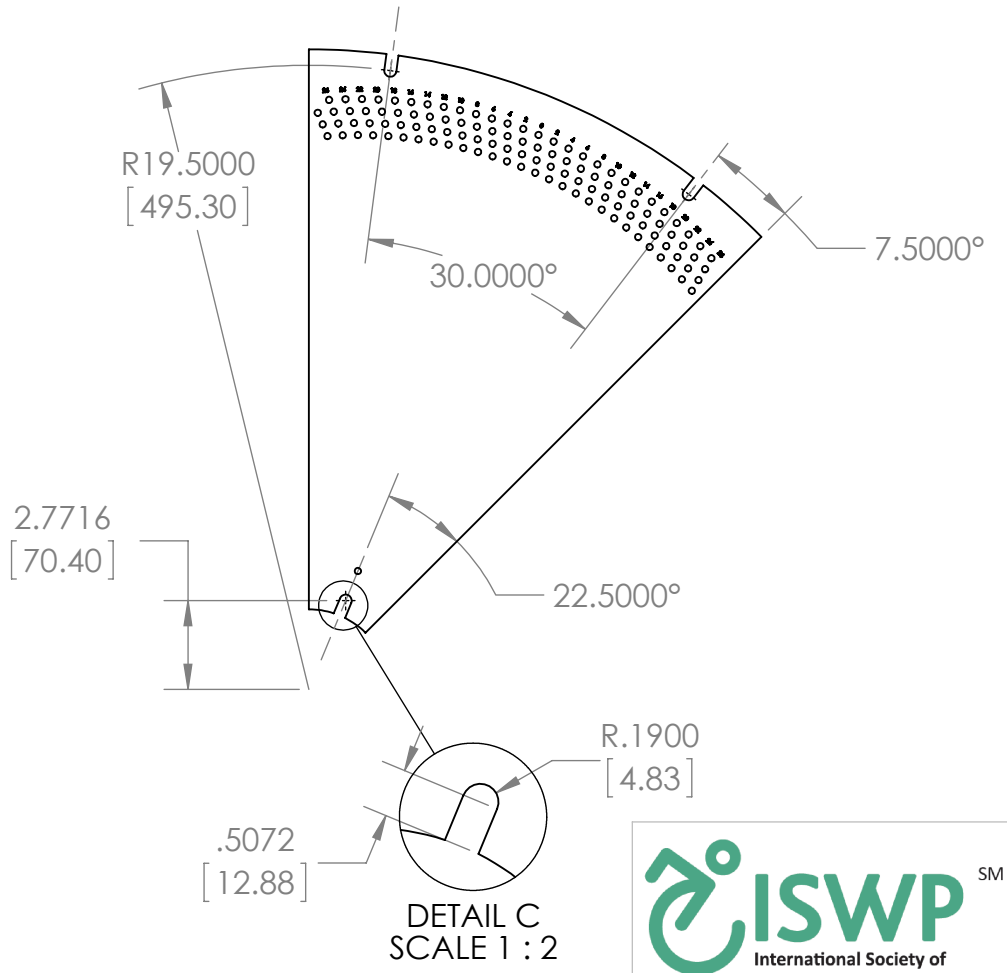
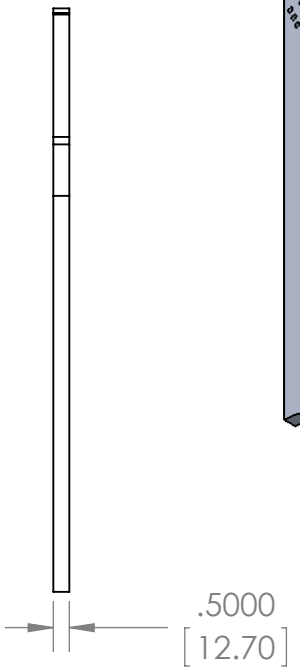
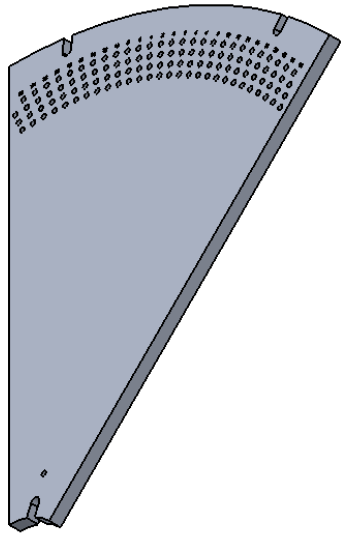
| | | | |
|---|---|---|---|
| TITLE: Slat Plate V4 | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: 6061-T6 (SS) | | FINISH: Plain | |
| TOLERANCES: | + 0.025 | - 0.025 | |
| SCALE: 1:8 | SIZE: A | DATE: 2/19/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 7.33 | SHEET 1 OF 1 |

# Quantity: 2

## 1/2" 6061 Aluminum Plate



Row 1 has 27 holes each 2 deg apart
Rows 2-4 have 28 holes each 2 deg apart
Each row is offset by 1/2 deg and 3/8" apart
ALL HOLES ARE THREADED FOR 1/4-20 THREAD SIZE

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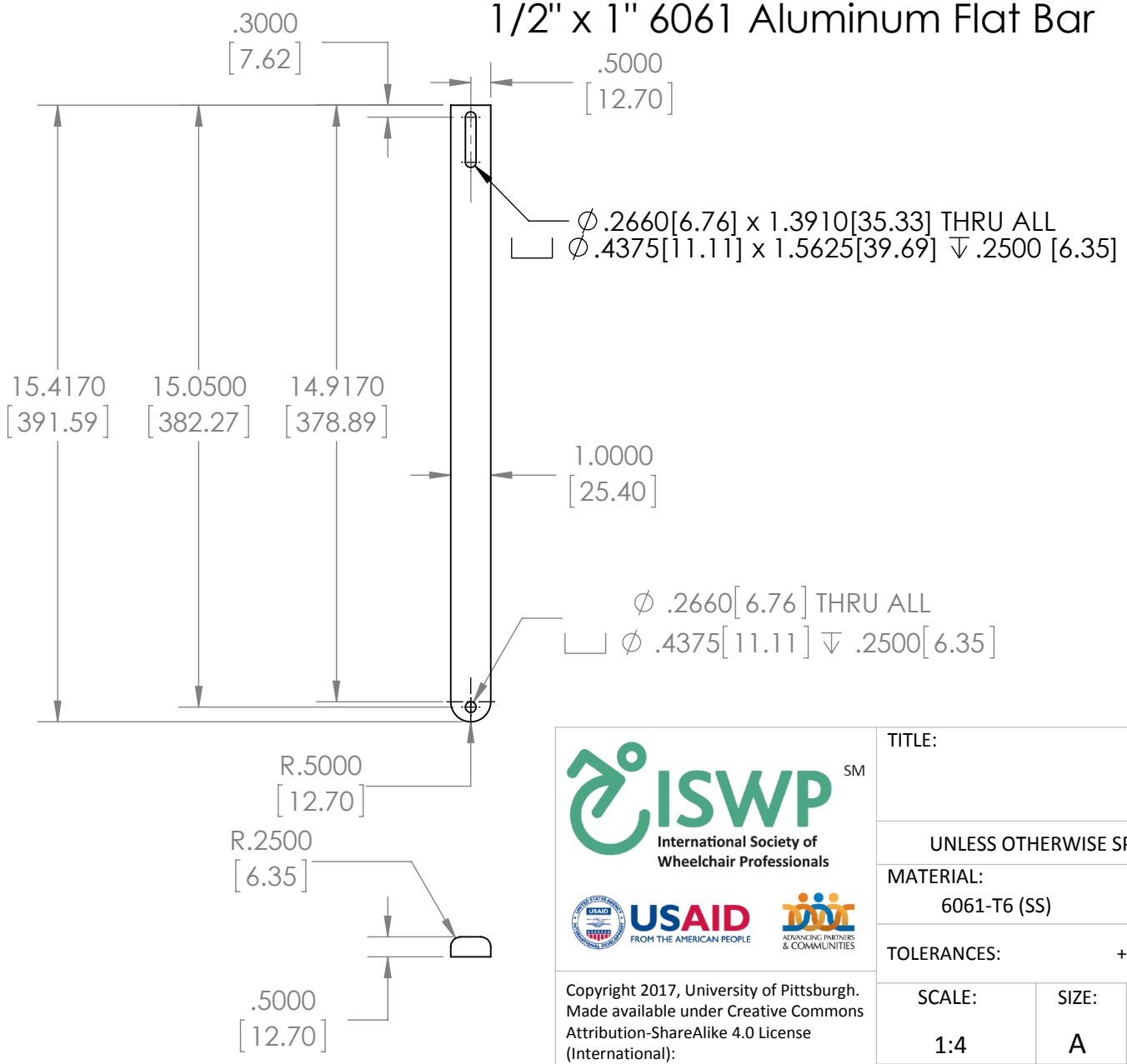
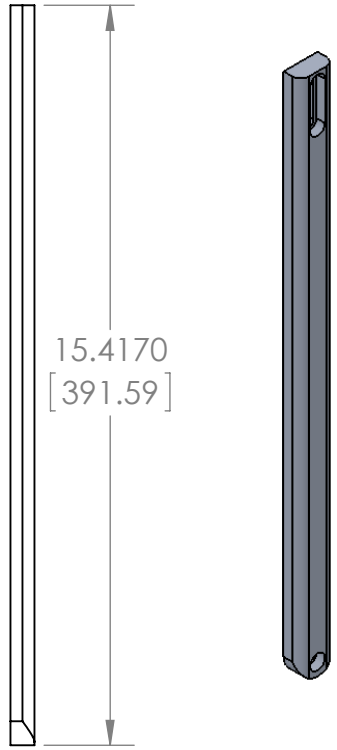
| | | | |
|---|---|---|---|
| TITLE: Slat Plate V4.2 | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: 6061-T6 (SS) | | FINISH: Plain | |
| TOLERANCES: | + 0.025 | - 0.025 | |
| SCALE: 1:6 | SIZE: A | DATE: 4/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 7.33 | SHEET 1 OF 1 |

# Quantity: 2

## 1/2" x 1" 6061 Aluminum Flat Bar



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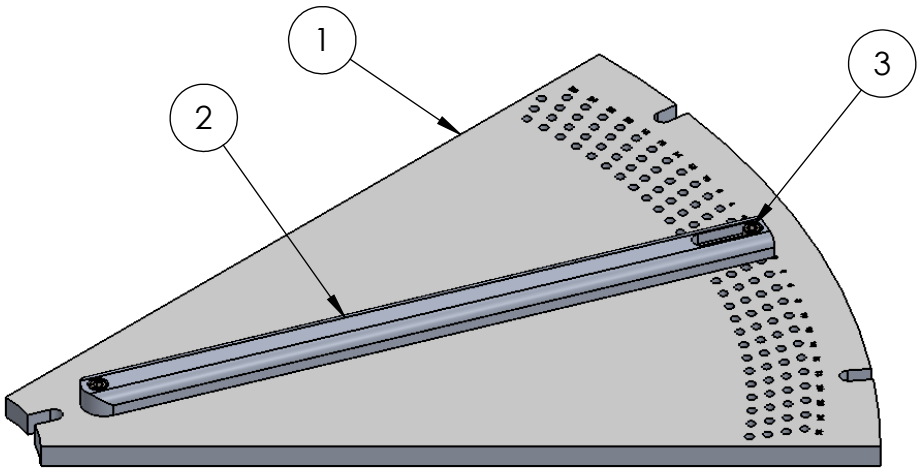
| | | | |
|---|---|---|---|
| TITLE: Slat | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: 6061-T6 (SS) | | FINISH: Plain | |
| TOLERANCES: | + 0.025 | - 0.025 | |
| SCALE: 1:4 | SIZE: A | DATE: 2/19/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.68 | SHEET 1 OF 1 |




# Quantity: 2

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Slat Plate V4 | 1 |
| 2 | Slat V2 | 1 |
| 3 | 1/2-20 x 0.75 SHS | 2 |

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TITLE:

## Angled Slat Pie Piece SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

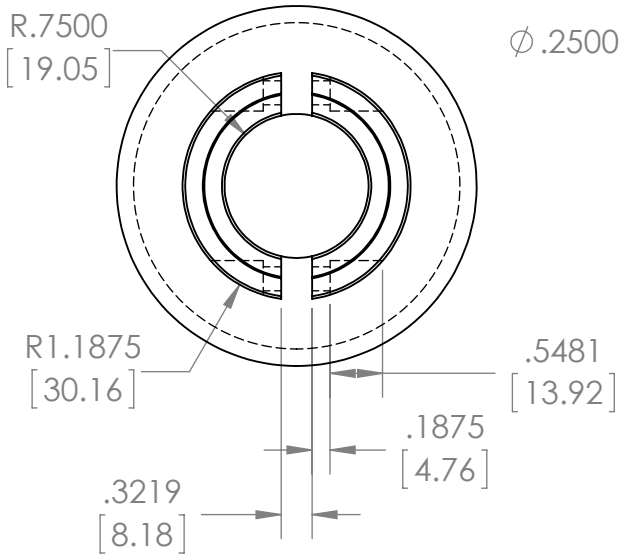
TOLERANCES:

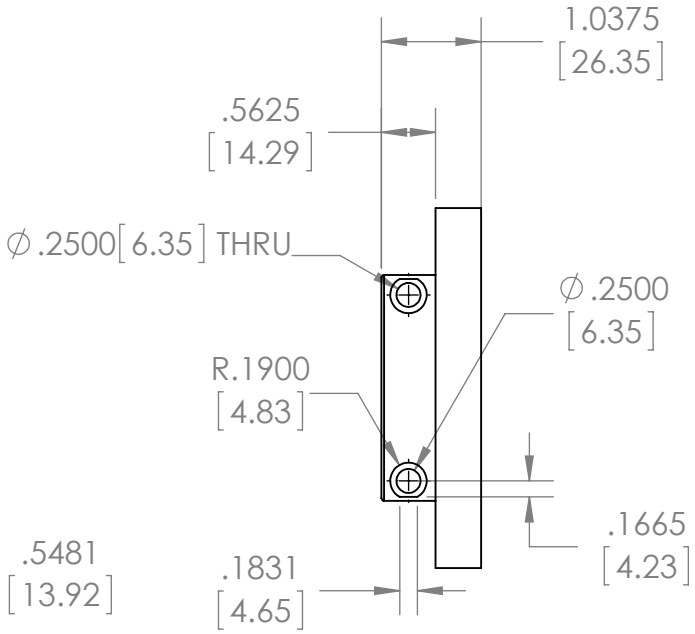
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 2/19/2018 | 2 |

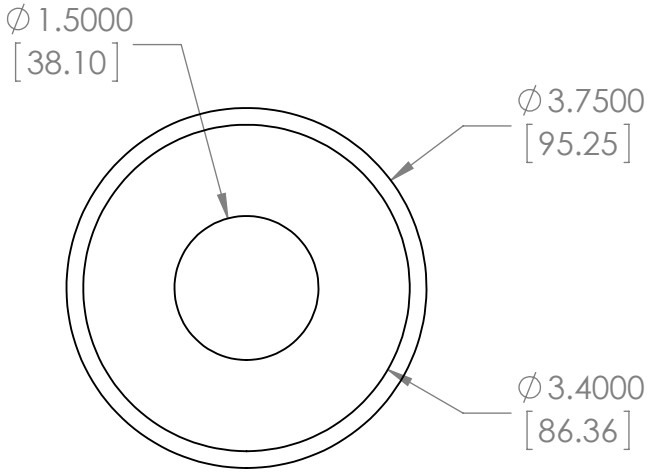
DO NOT SCALE DRAWING | WEIGHT (LBS): 8.04 | SHEET 1 OF 1

# Quantity: 1

ABS Plastic

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TITLE:

## Tapered Bearing Shield

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ABS | Plain |

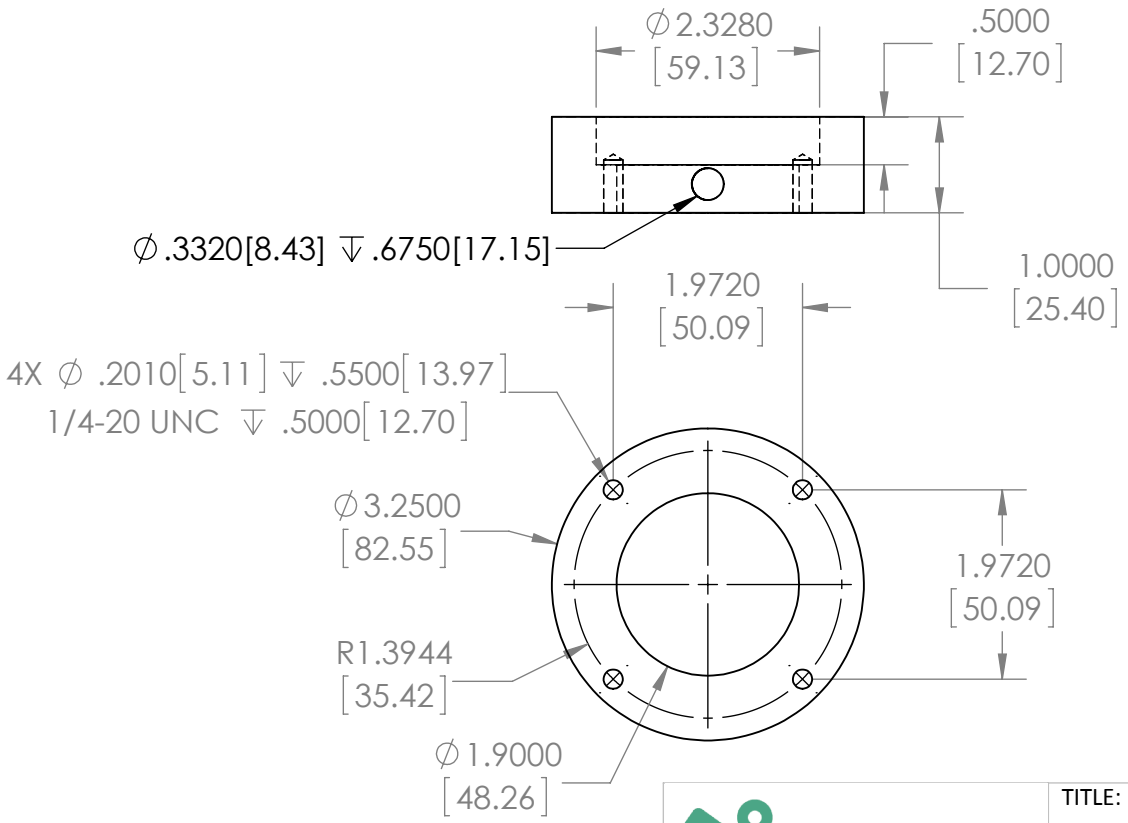
TOLERANCES: Manufacturer Specs

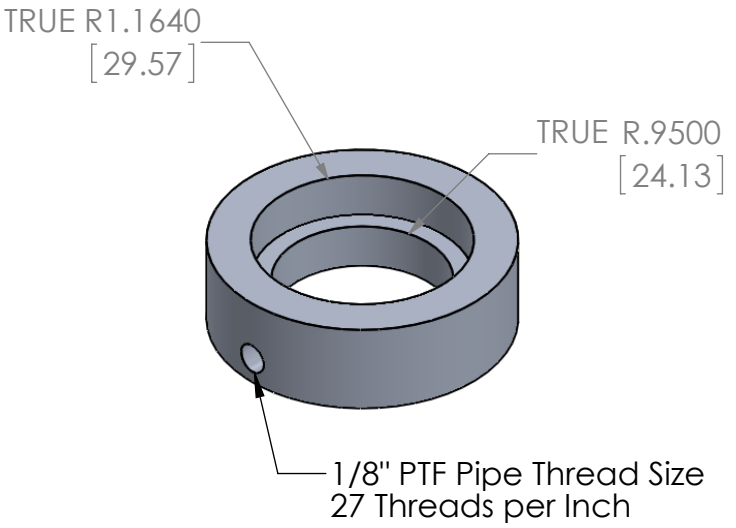
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.11 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 1" x 4" 6061 Aluminum Flat Bar

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TITLE: Bearing Housing

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

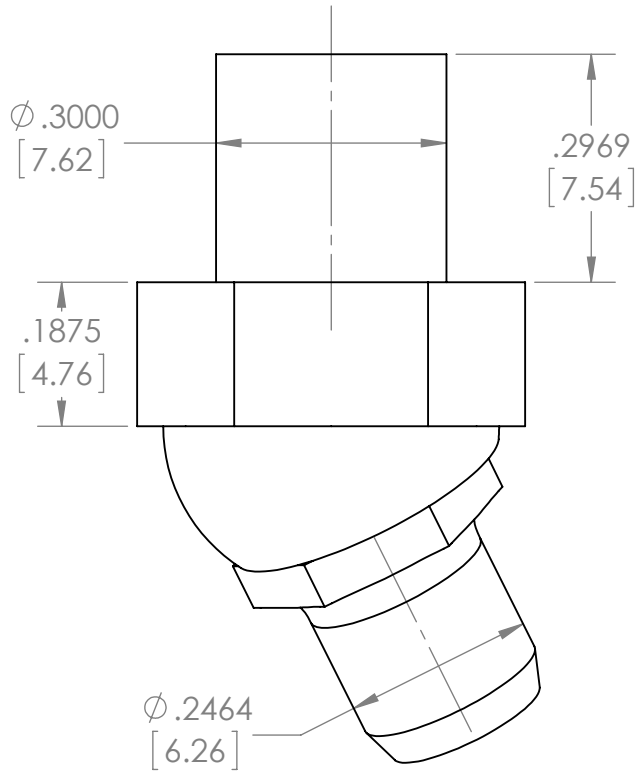
TOLERANCES: + 0.025 - 0.025

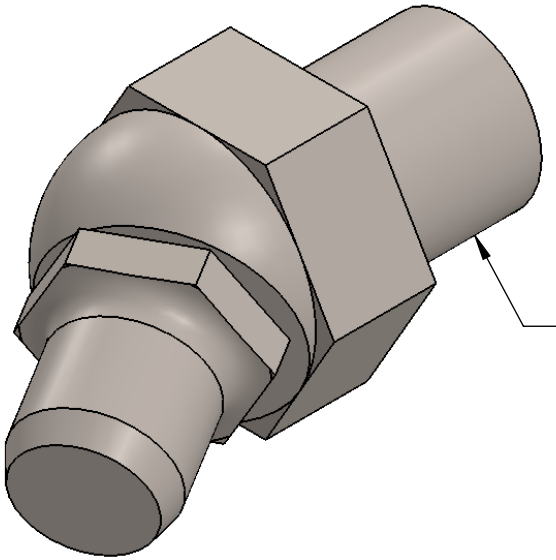
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 4/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.45 | SHEET 1 OF 1

# Quantity: 1

## 303 Stainless Steel Grease Fitting, 30 Degree Elbow, 1/8 PTF Male

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TITLE:

# Bearing Housing Grease Fitting

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Stainless Steel (ferritic) | Plain |

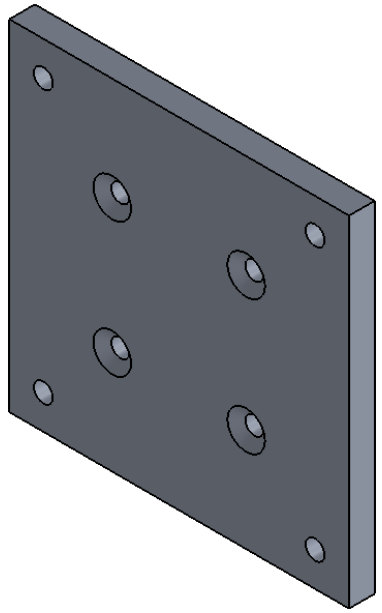
TOLERANCES: Manufacturer Spec

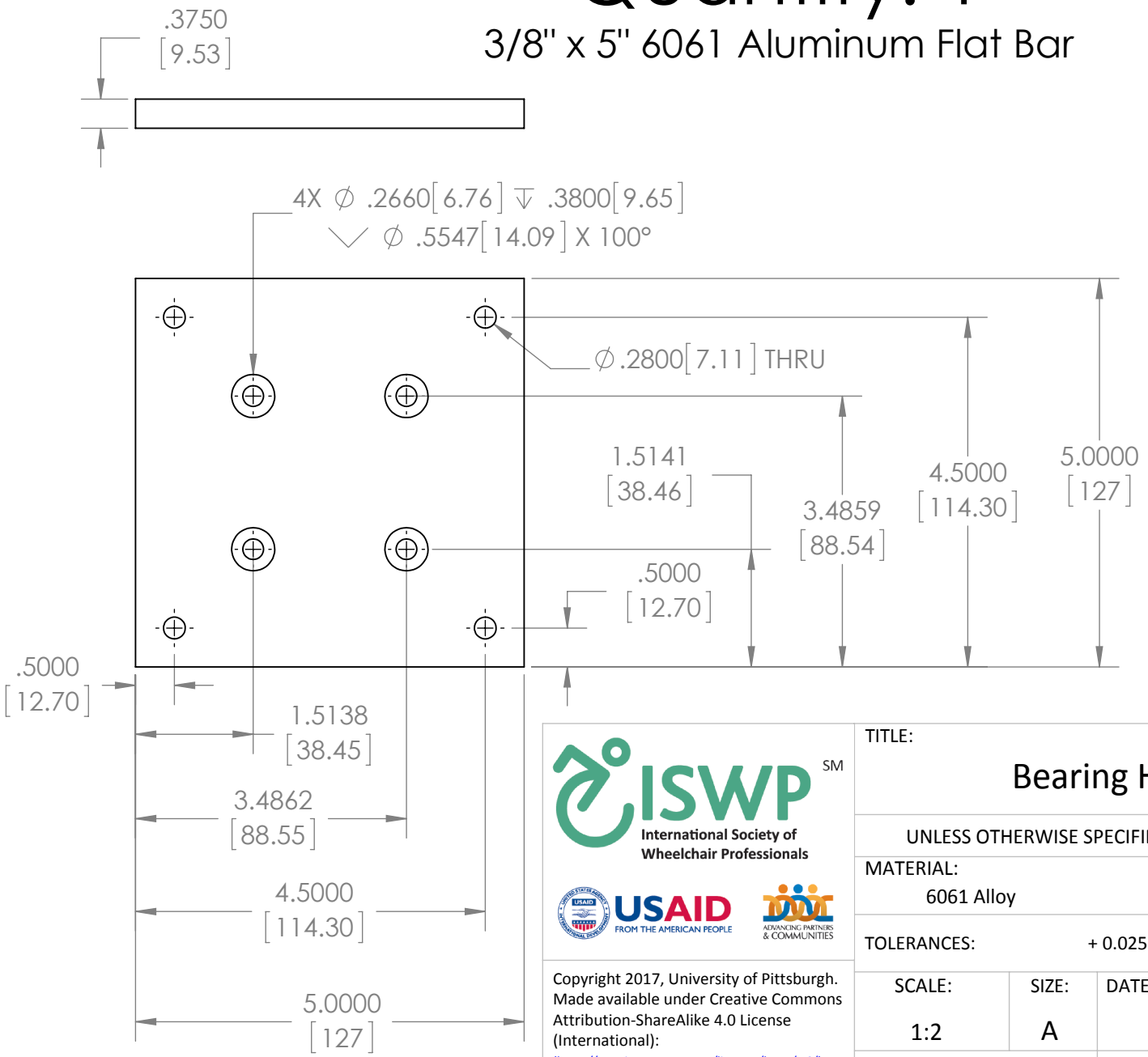
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 4:1 | A | 3/15/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.02 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 3/8" x 5" 6061 Aluminum Flat Bar



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TITLE:

# Bearing Housing Mount

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

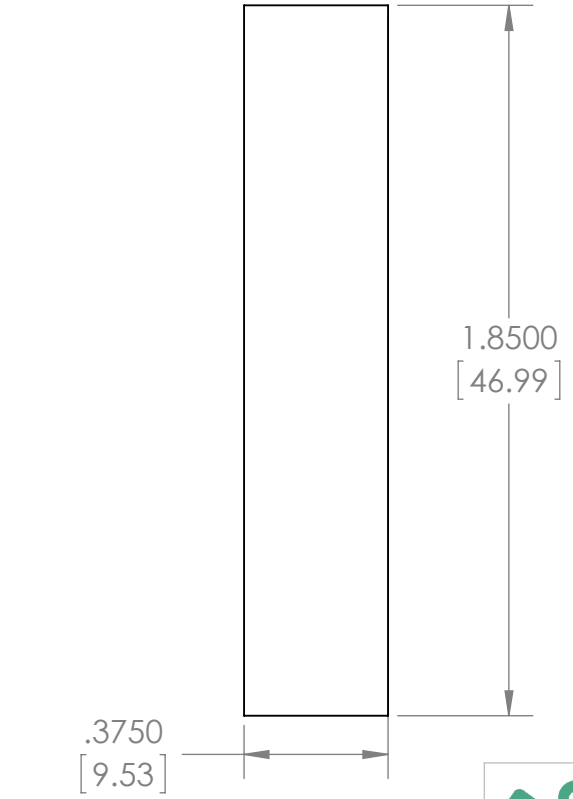
TOLERANCES: + 0.025 - 0.025

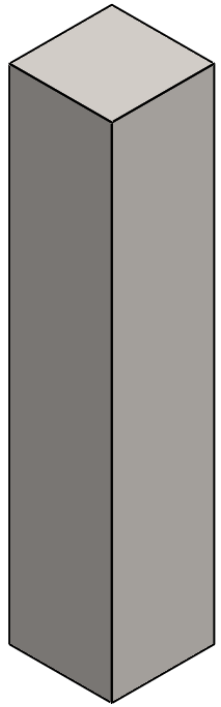
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/22/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.89 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 3/8" Square Zinc-Plated Steel Machine Key Stock



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TITLE: Center Shaft to Love Joy Key

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

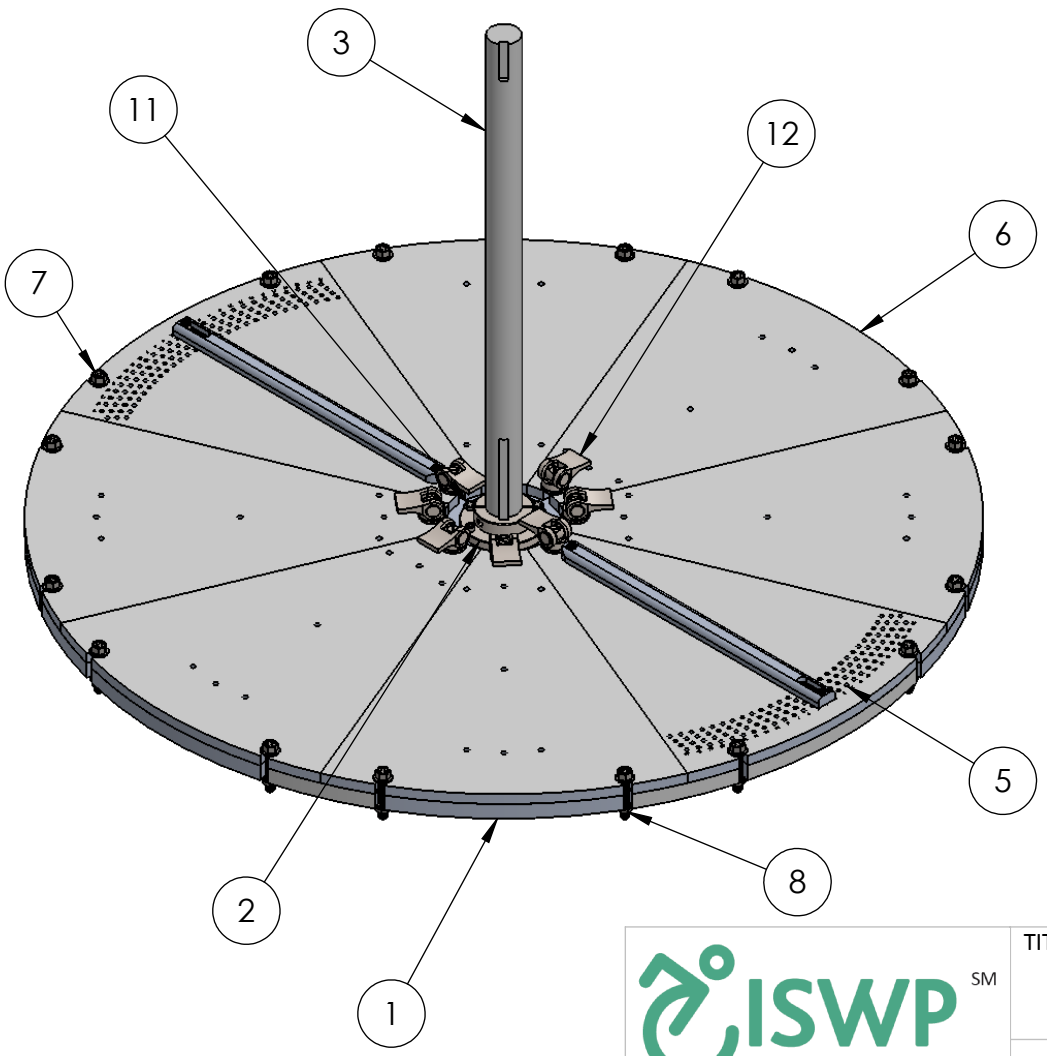
| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Plain |

TOLERANCES: + 0.025 - 0.025

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/20/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.07 | SHEET 1 OF 1

# Quantity: 1




| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Base Plate | 1 |
| 2 | 1.5in Shaft Flange | 2 |
| 3 | Centre Shaft | 1 |
| 4 | Center Shaft Key | 1 |
| 5 | Angled Slat Pie Piece SubAssembly | 2 |
| 6 | Slat Plate New | 6 |
| 7 | 3/8-16 x 2 Flange HHS | 16 |
| 8 | 3/8-16 Flange Hex Nut | 16 |
| 9 | 1/4-20 Hex Nut | 6 |
| 10 | 0.25in Washer | 18 |
| 11 | 1/4-20 x 2 HHS | 3 |
| 12 | Quick Release Clamp | 8 |
| 13 | 1/4-20 x 2 SHS | 3 |

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TITLE:

## Turntable Assembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

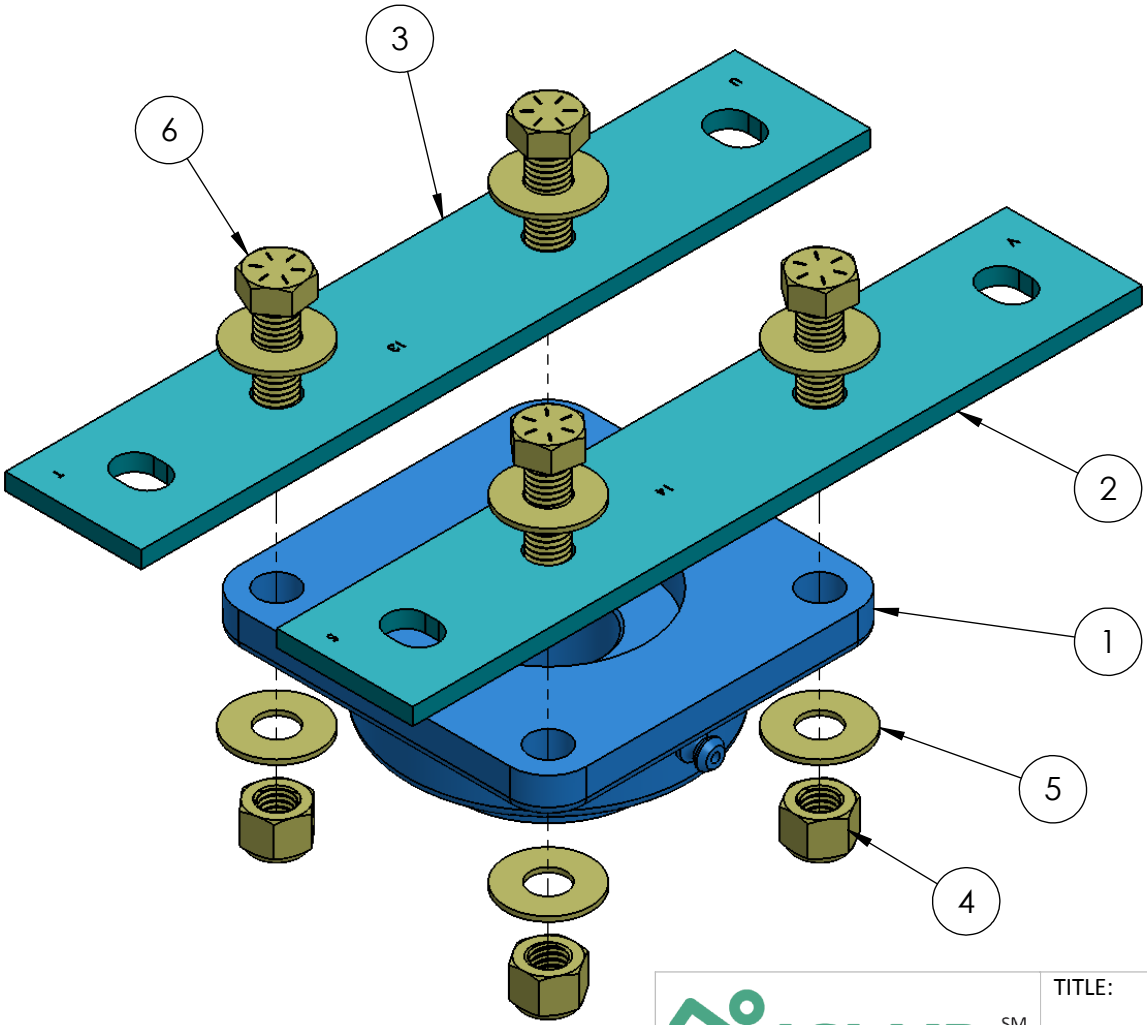
MATERIAL: Material <not specified>

FINISH: Plain

TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:8 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 175.27 | SHEET 1 OF 1




# Quantity: 1

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Top of Shaft Bearing | 1 |
| 2 | Top of Shaft Bearing Mount (Side 2) | 1 |
| 3 | Top of Shaft Bearing Mount (Default) | 1 |
| 4 | 1/2-13 Locknut | 4 |
| 5 | 0.5in Washer | 8 |
| 6 | 1/2-13 x 1.75 HHS | 4 |

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TITLE: Exploded Top of Shaft Bearing SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

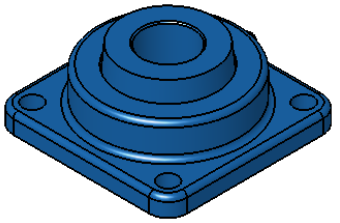
TOLERANCES:

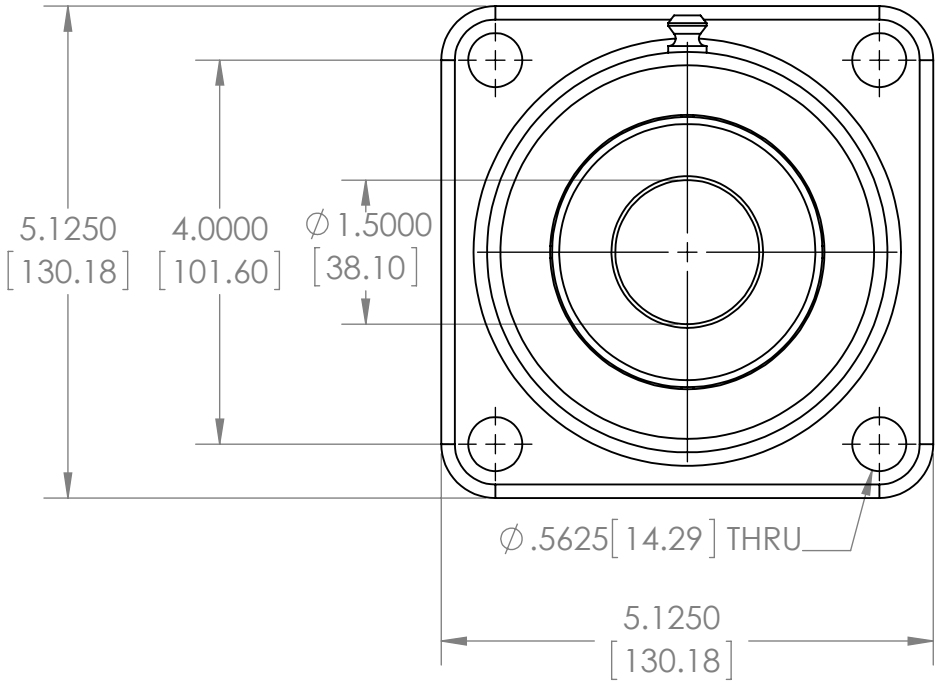
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

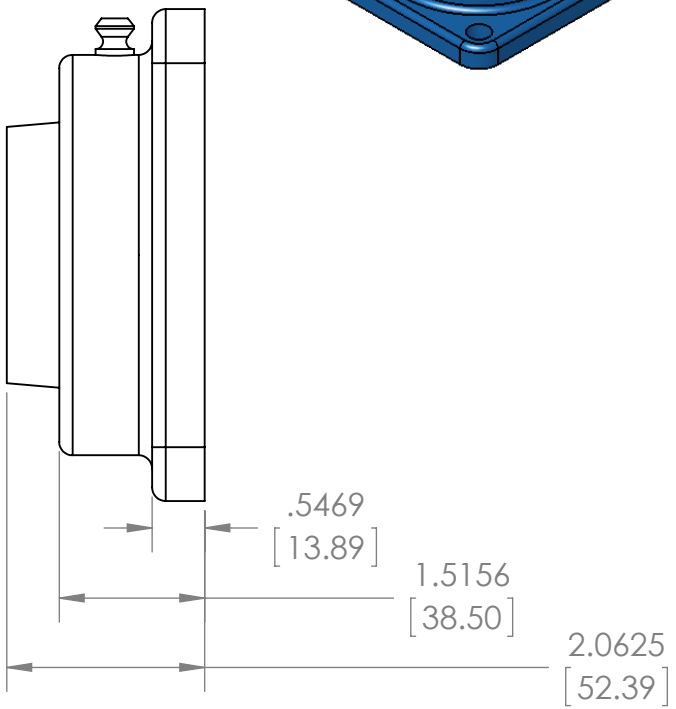
DO NOT SCALE DRAWING | WEIGHT (LBS): 9.92 | SHEET 1 OF 1

# Quantity: 1

## Flange-Mounted Ball Bearing for 1-1/2" Shaft



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TITLE: Top of Shaft Bearing

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Gray Cast Iron | Plain |

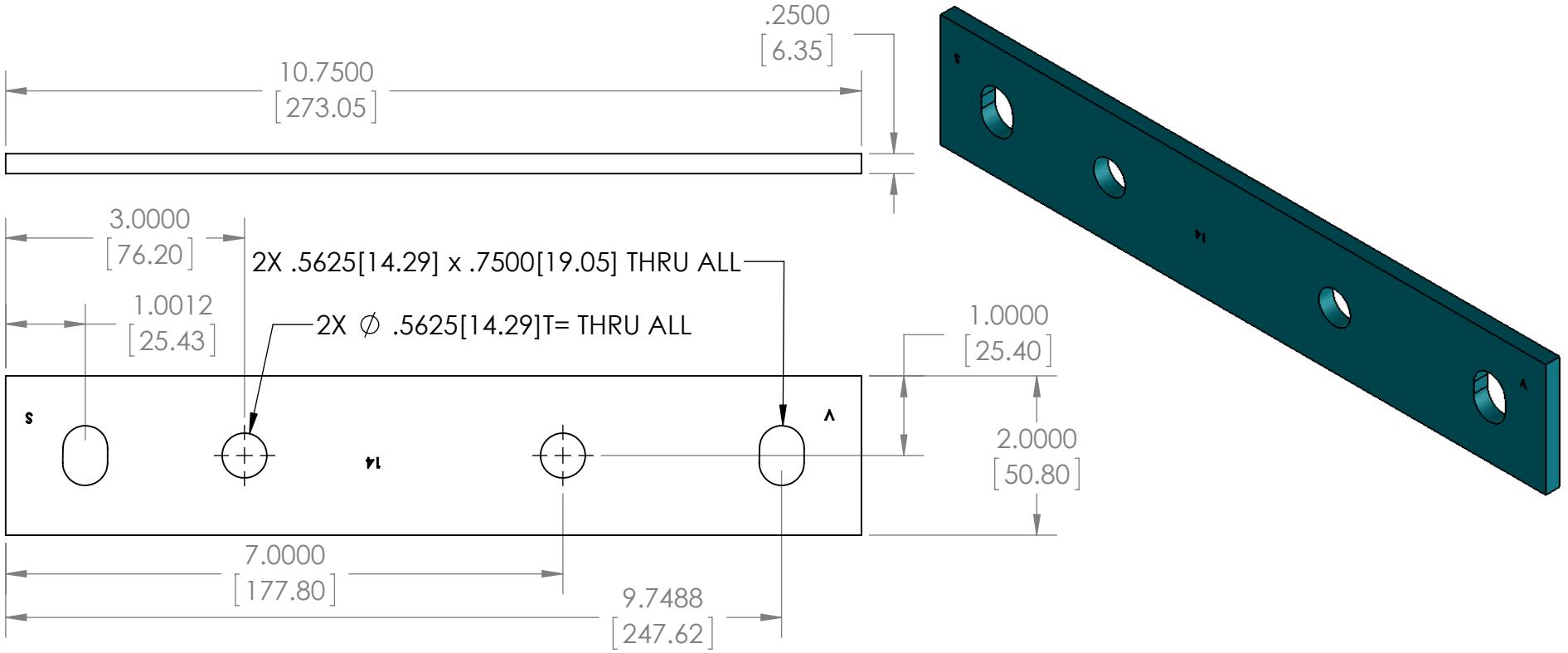
TOLERANCES: Manufacturer Spec

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 6.176 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 2

## 1/4" x 2" Hot-Rolled A36 Steel Flat Stock

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TITLE: **Top of Shaft Bearing Mount**

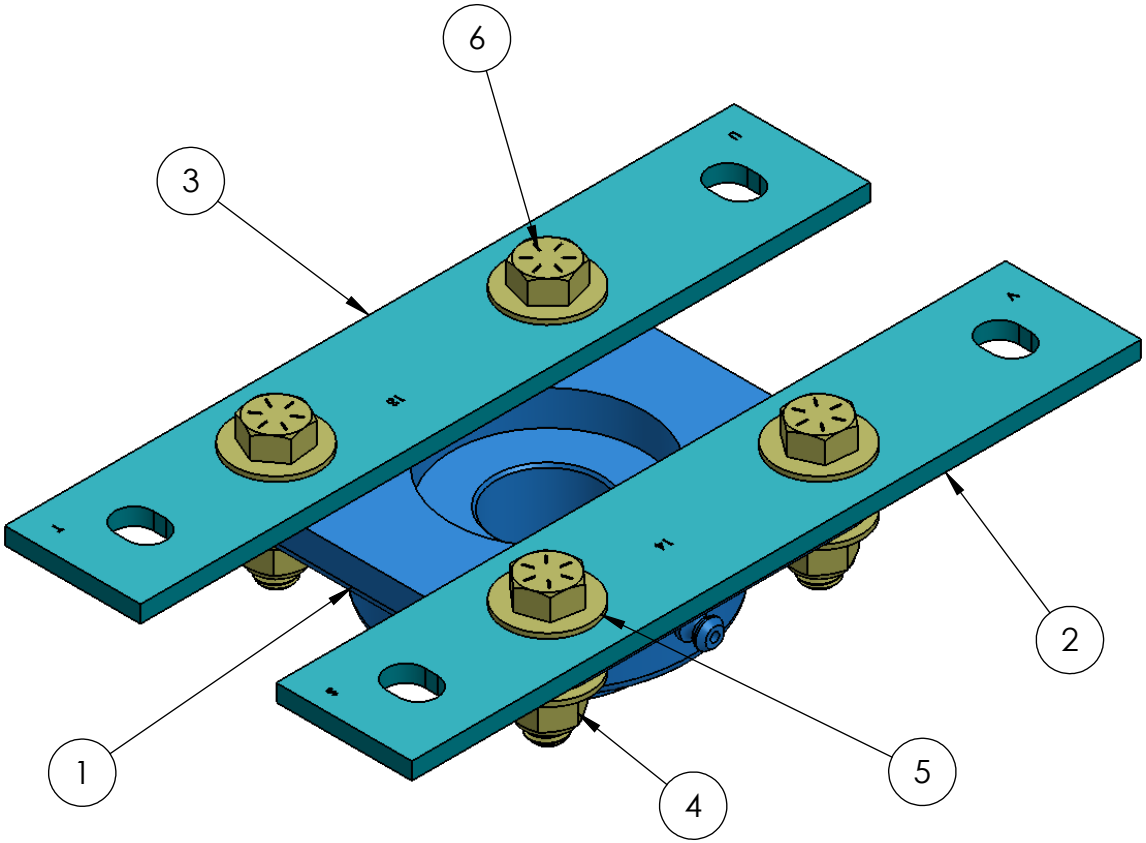
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

TOLERANCES: + 0.025 - 0.025

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 1.44 | SHEET 1 OF 1




# Quantity: 1

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Top of Shaft Bearing | 1 |
| 2 | Top of Shaft Bearing Mount (Side 2) | 1 |
| 3 | Top of Shaft Bearing Mount (Default) | 1 |
| 4 | 1/2-13 Locknut | 4 |
| 5 | 0.5in Washer | 8 |
| 6 | 1/2-13 x 1.75 HHS | 4 |

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TITLE:

## Top of Shaft Bearing SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

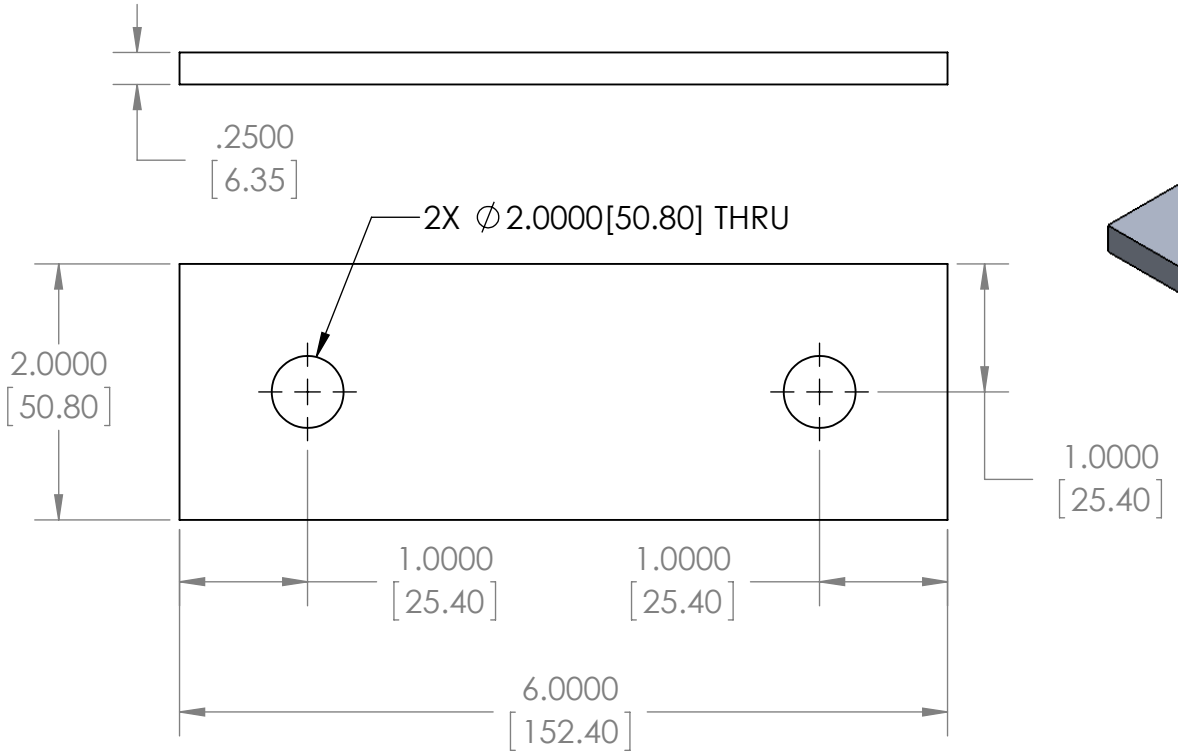
TOLERANCES:

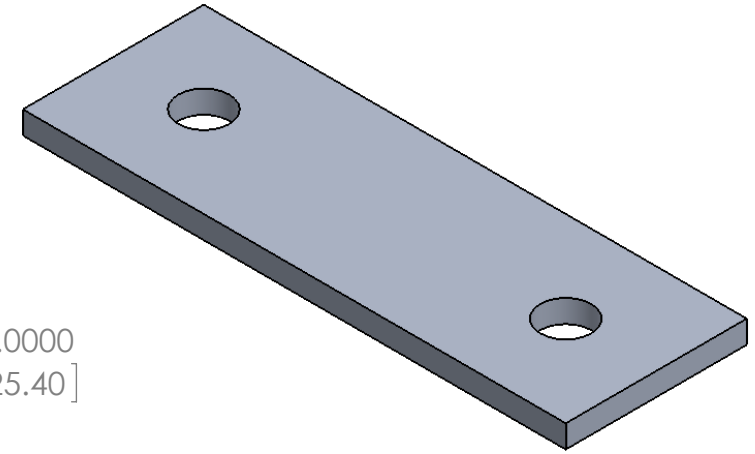
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 9.92 | SHEET 1 OF 1

# Quantity: 2

## 1/4" x 2" 6061 Aluminum Flat Bar



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TITLE:

# Top of Shaft Bearing Mount Spacer

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

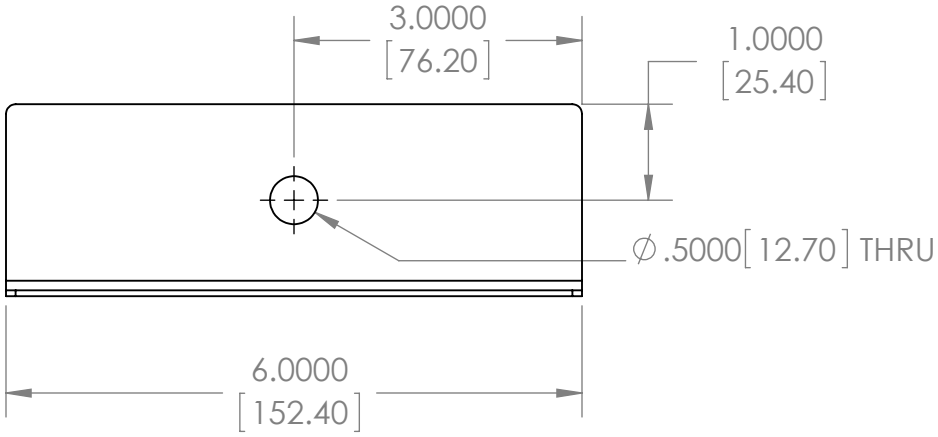
TOLERANCES: + 0.025 - 0.025

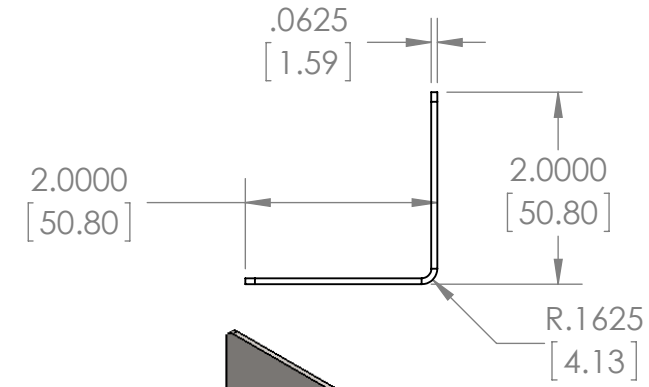
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:3 | A | 2/19/2018 | 2 |

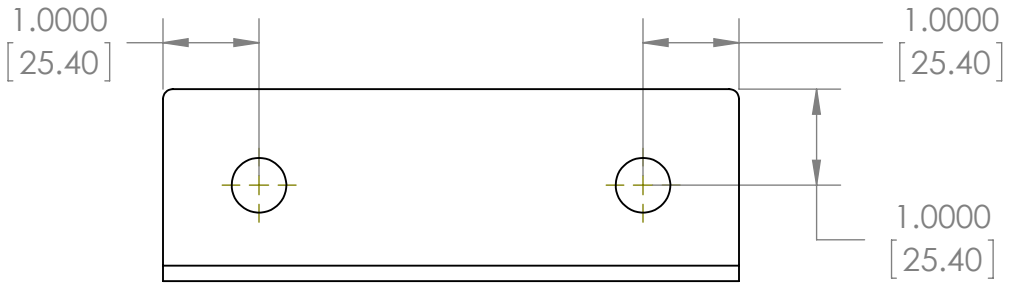
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.28 | SHEET 1 OF 1 |
|---|---|---|

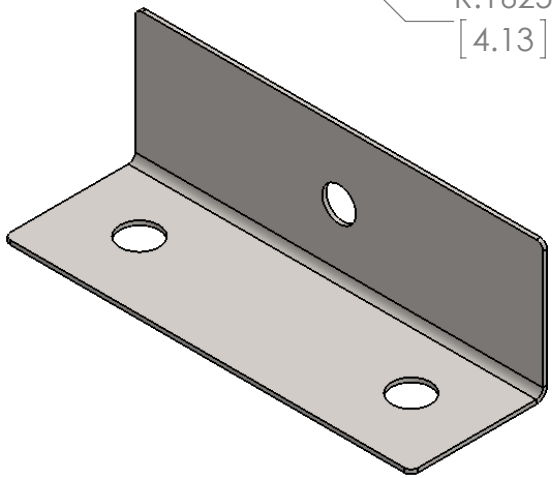
# Quantity: 1

## 16 GA. Hot-Rolled Steel Sheet



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TITLE: Proximity Switch Mount

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Plain |

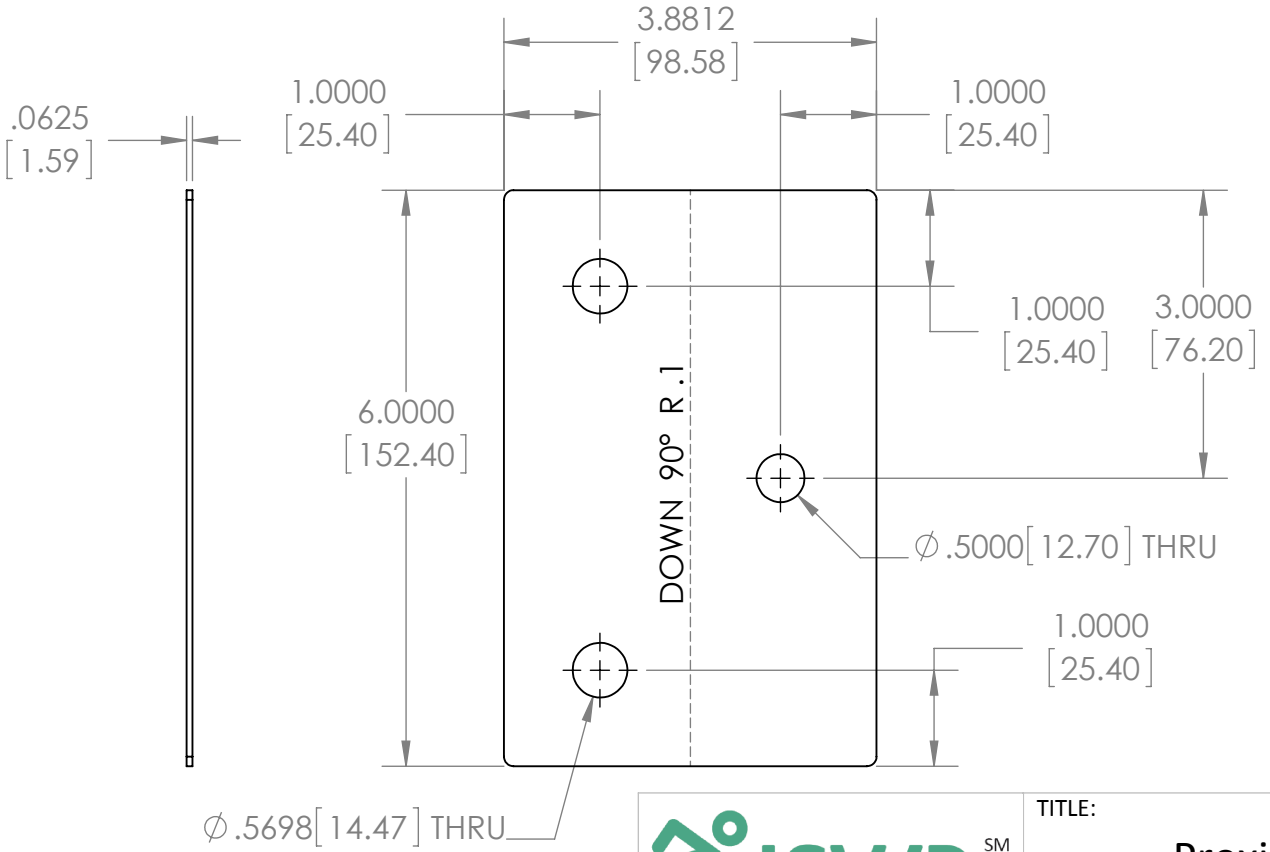
TOLERANCES: + 0.025 - 0.025

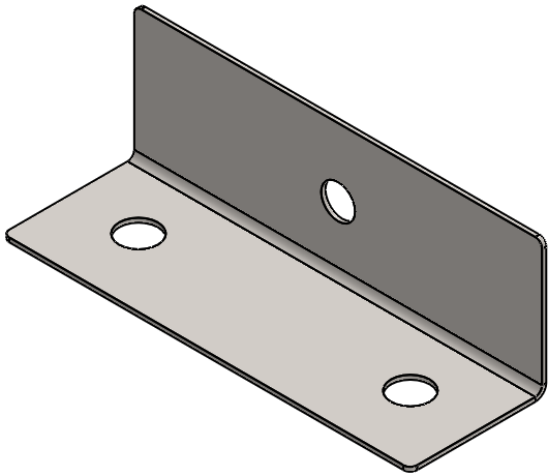
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.40 | SHEET 1 OF 1

# Quantity: 1

## 16 GA, Hot-Rolled Steel Sheet



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TITLE:

# Proximity Switch Mount Flat

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Plain |

TOLERANCES: + 0.025 - 0.025

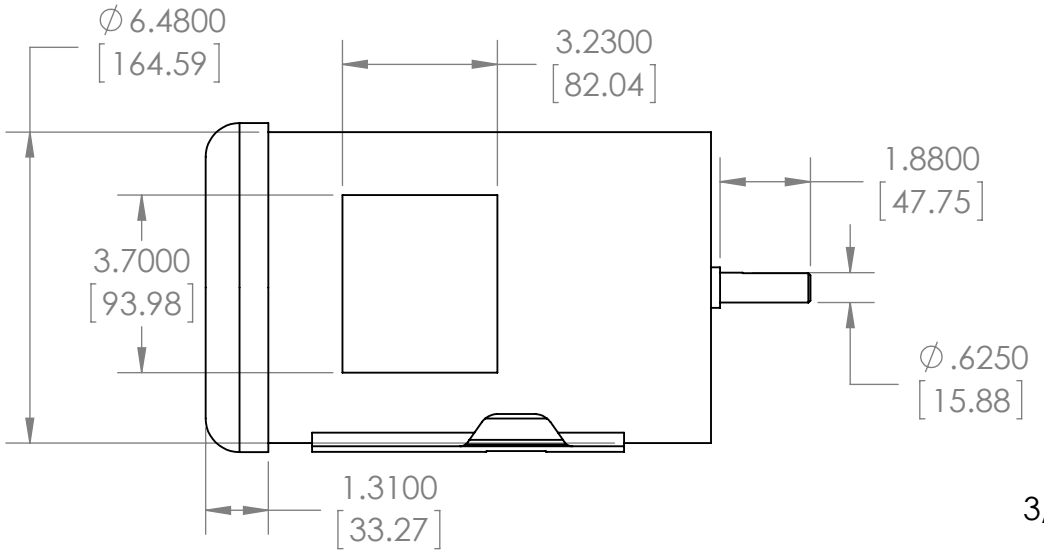
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

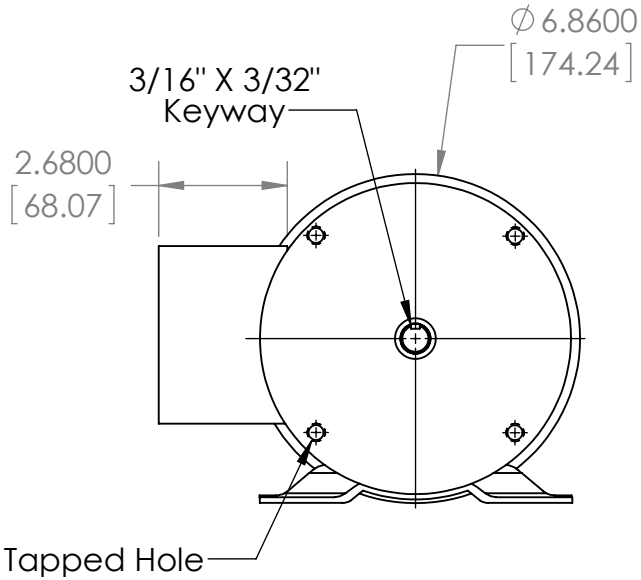
DO NOT SCALE DRAWING | WEIGHT (LBS): 0.40 | SHEET 1 OF 1

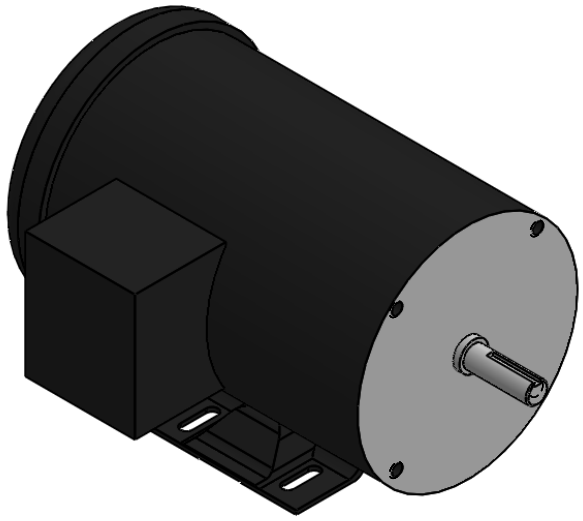
# Motor-Gear Reducer Drawings

# Quantity: 1

## IronHorse Premium Efficiency AC Induction Motor
## 1-1/2hp, 3-phase, 208-230/460 VAC, 1800 rpm



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TITLE: 3 phase motor MTR-1P5-3BD18

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Varies | Plain |

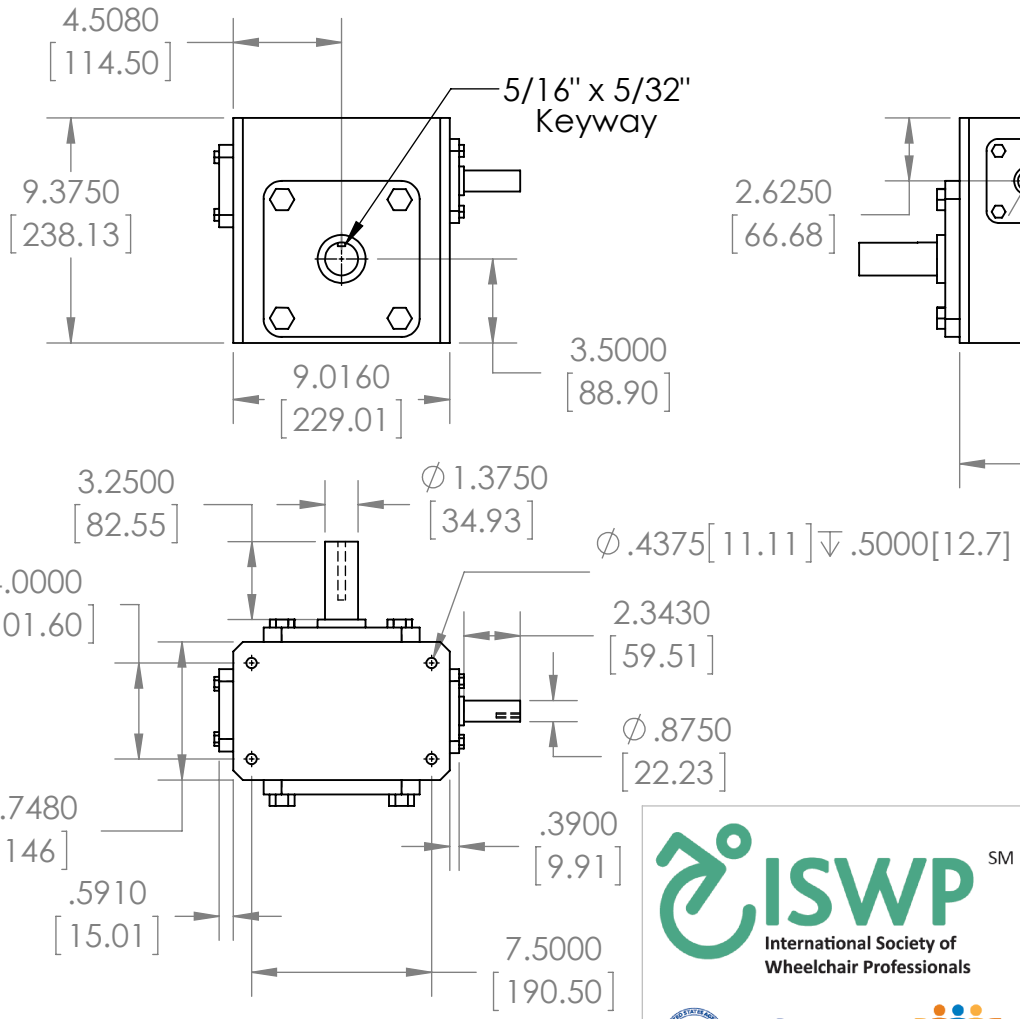
TOLERANCES: Manufacturer Specs

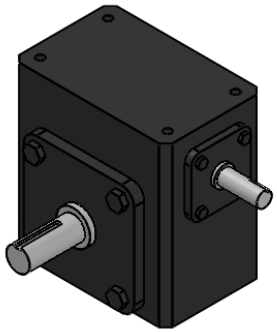
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 2/19/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 43.00 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 40:1 RA Gear Reducer 3.35 HP Left Output



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TITLE: Gear reducer 325 series

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Varies | Plain |

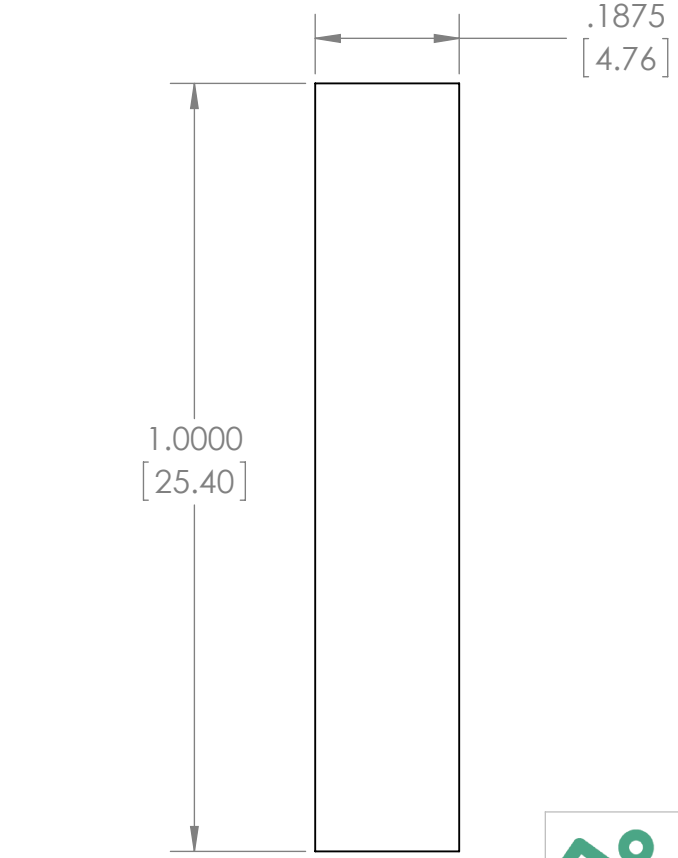
TOLERANCES: Manufacturer Specs

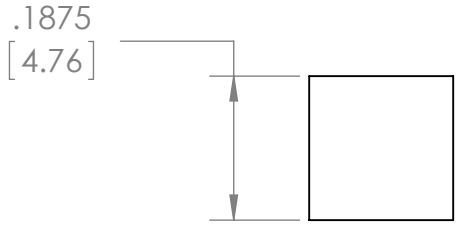
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:8 | A | 2/19/2018 | 2 |

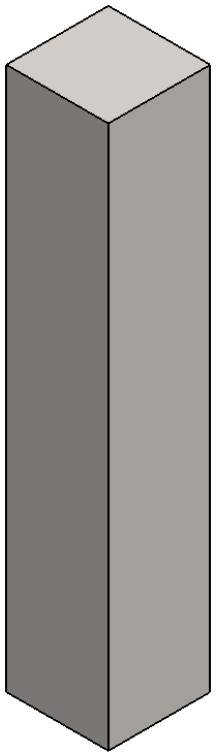
| DO NOT SCALE DRAWING | WEIGHT (LBS): 82.00 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 3/8" Square Zinc Plated Steel Machine Key Stock



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TITLE:

**Gear Reducer Input Key**

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Zinc Plated |

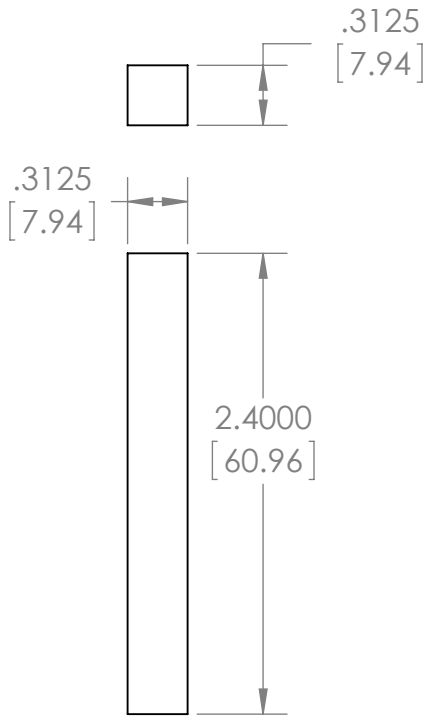
TOLERANCES: + 0.025 - 0.025

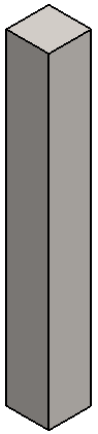
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 4:1 | A | 2/20/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.01 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 3/8" Square Zinc-Plated Steel Machine Key Stock



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TITLE: Gear Reducer Output Key

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

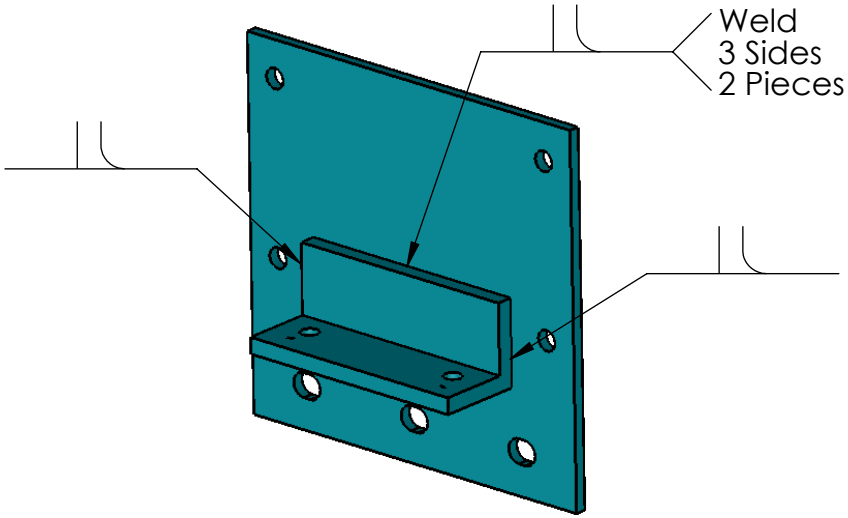
| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Plain |

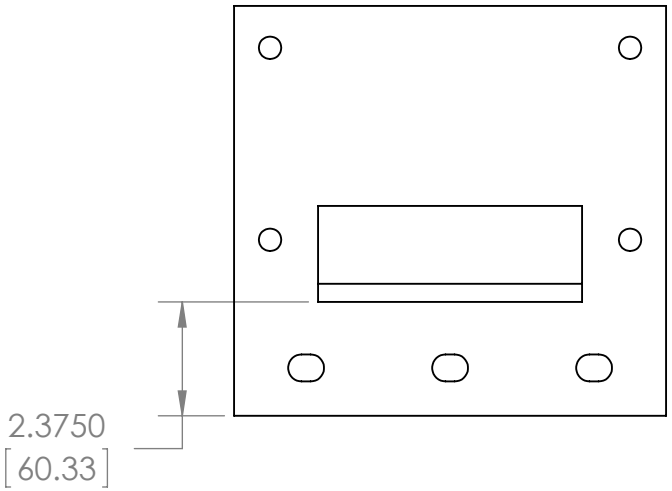
TOLERANCES: + 0.025 - 0.025

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/20/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.07 | SHEET 1 OF 1

# Quantity: 2

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TITLE:

## Gear Reducer Side Mount SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Material <not specified> | Plain |

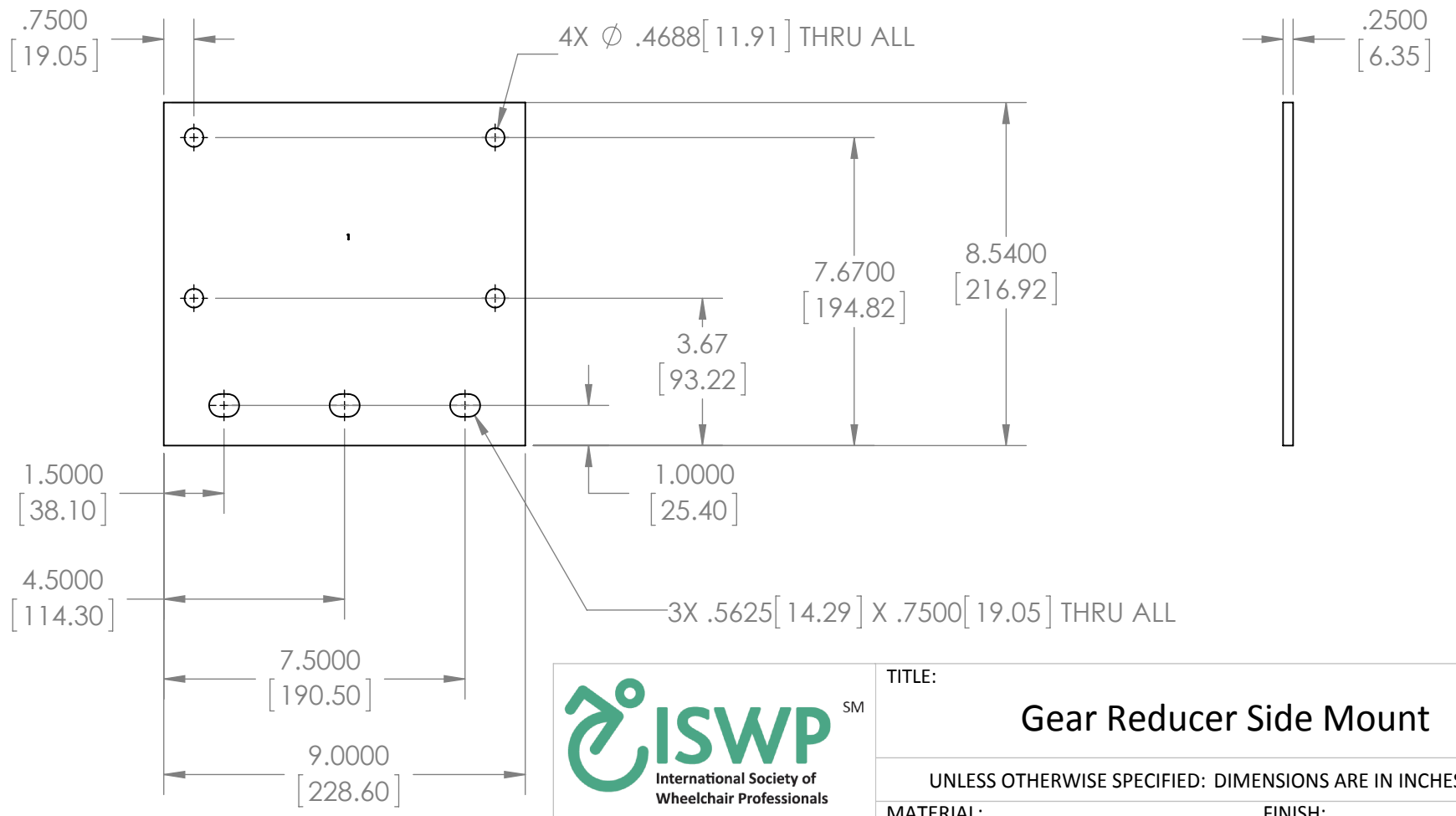
TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 3/12/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 2.77 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 2

## 1/4" A36 Steel Plate

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TITLE: Gear Reducer Side Mount

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

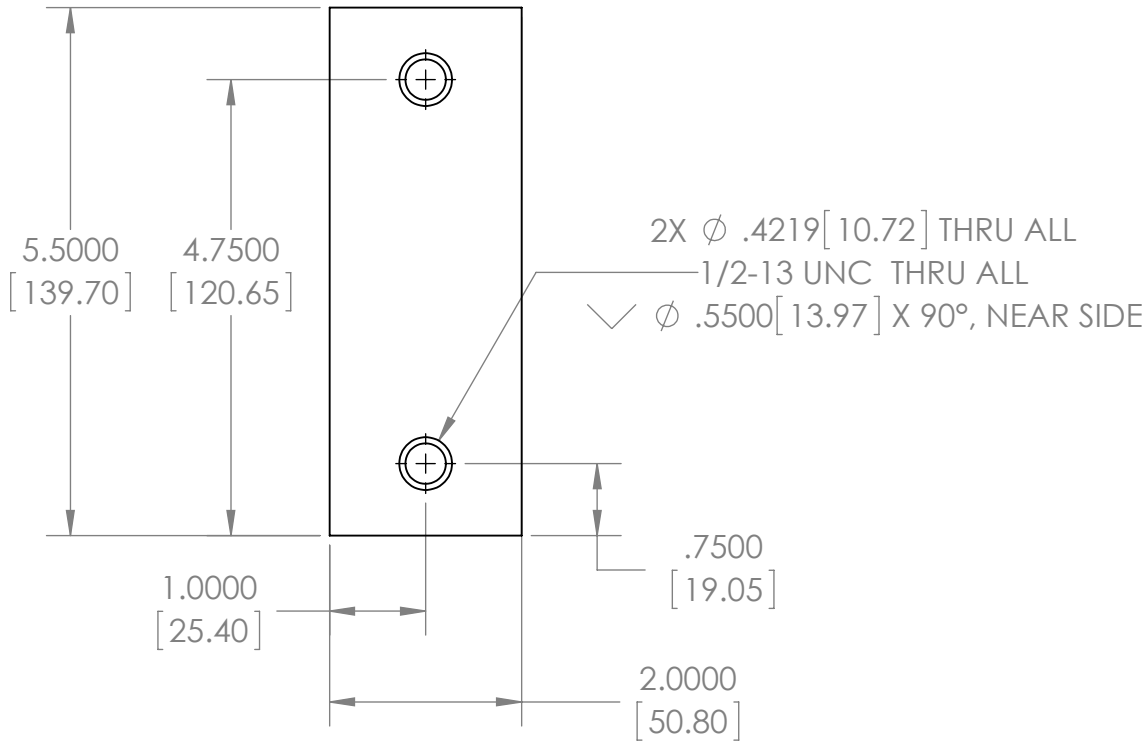
TOLERANCES: + 0.025 - 0.025

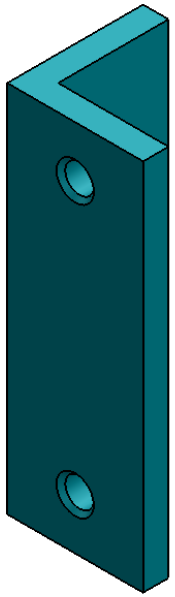
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 2/19/2018 | 2 |

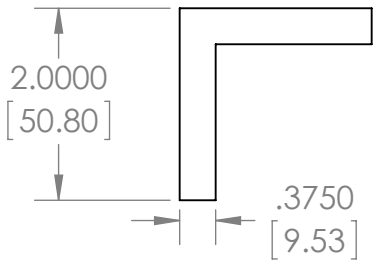
DO NOT SCALE DRAWING | WEIGHT (LBS): 5.33 | SHEET 1 OF 1

# Quantity: 2

## 2"x2"x3/8" A36 Steel Angle Iron



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TITLE: Gear Reducer Side Mount 2

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

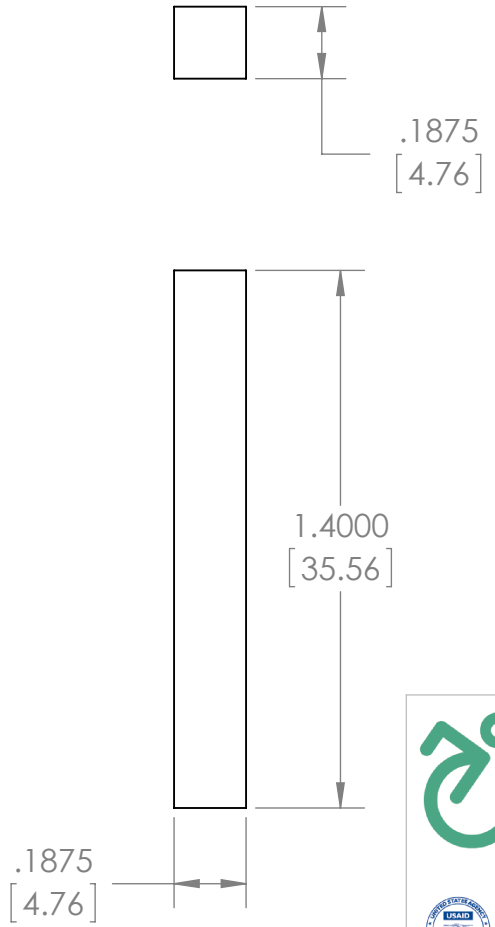
TOLERANCES: + 0.100 - 0.100

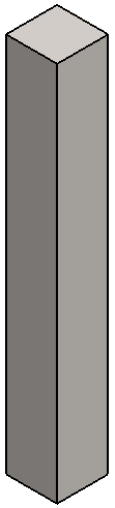
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 2.09 | SHEET 1 OF 1

# Quantity: 1

## 3/8" Square Zinc-Plated Steel Machine Key Stock



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TITLE: Love Joy to Motor Key

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Zinc Plated |

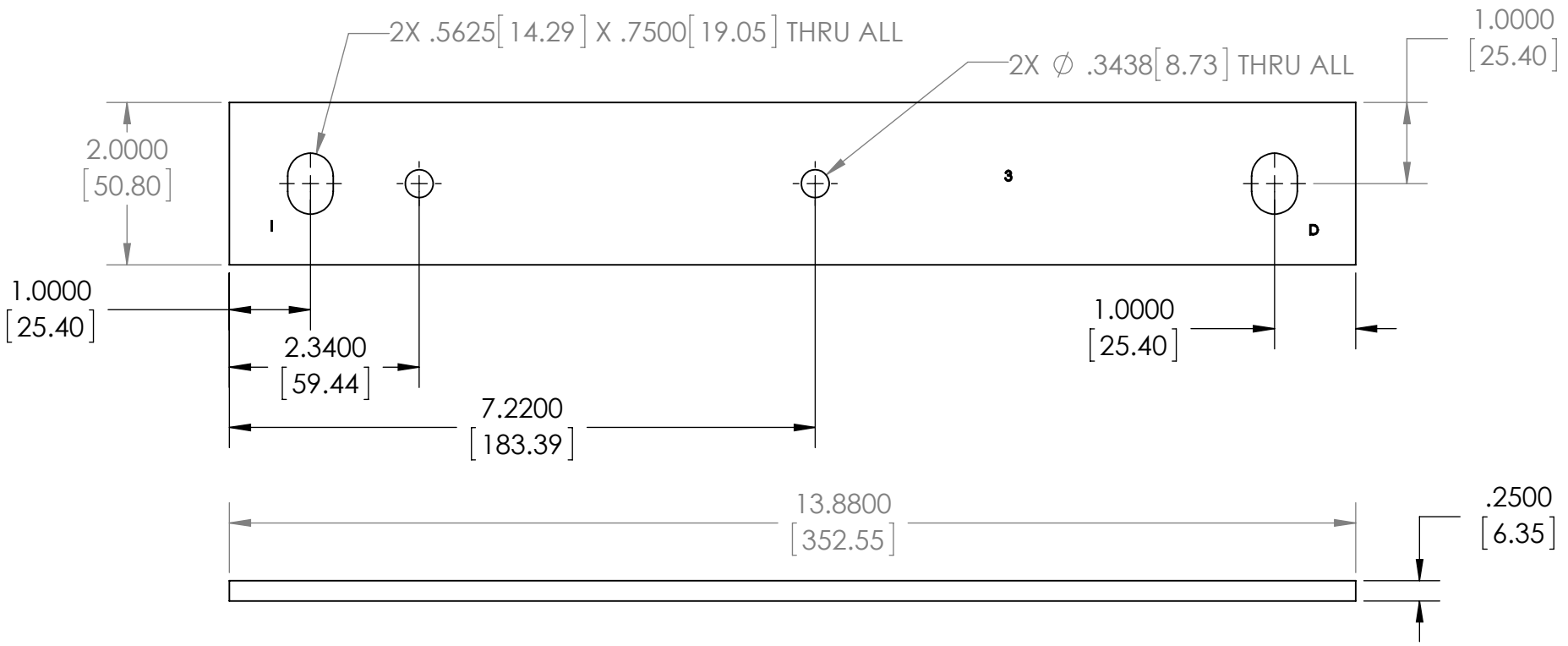
TOLERANCES: + 0.025 - 0.025

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/20/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.01 | SHEET 1 OF 1

# Quantity: 2

## 1/4" x 2" Hot Rolled A36 Steel Flat Stock

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TITLE: Motor Mount to Frame

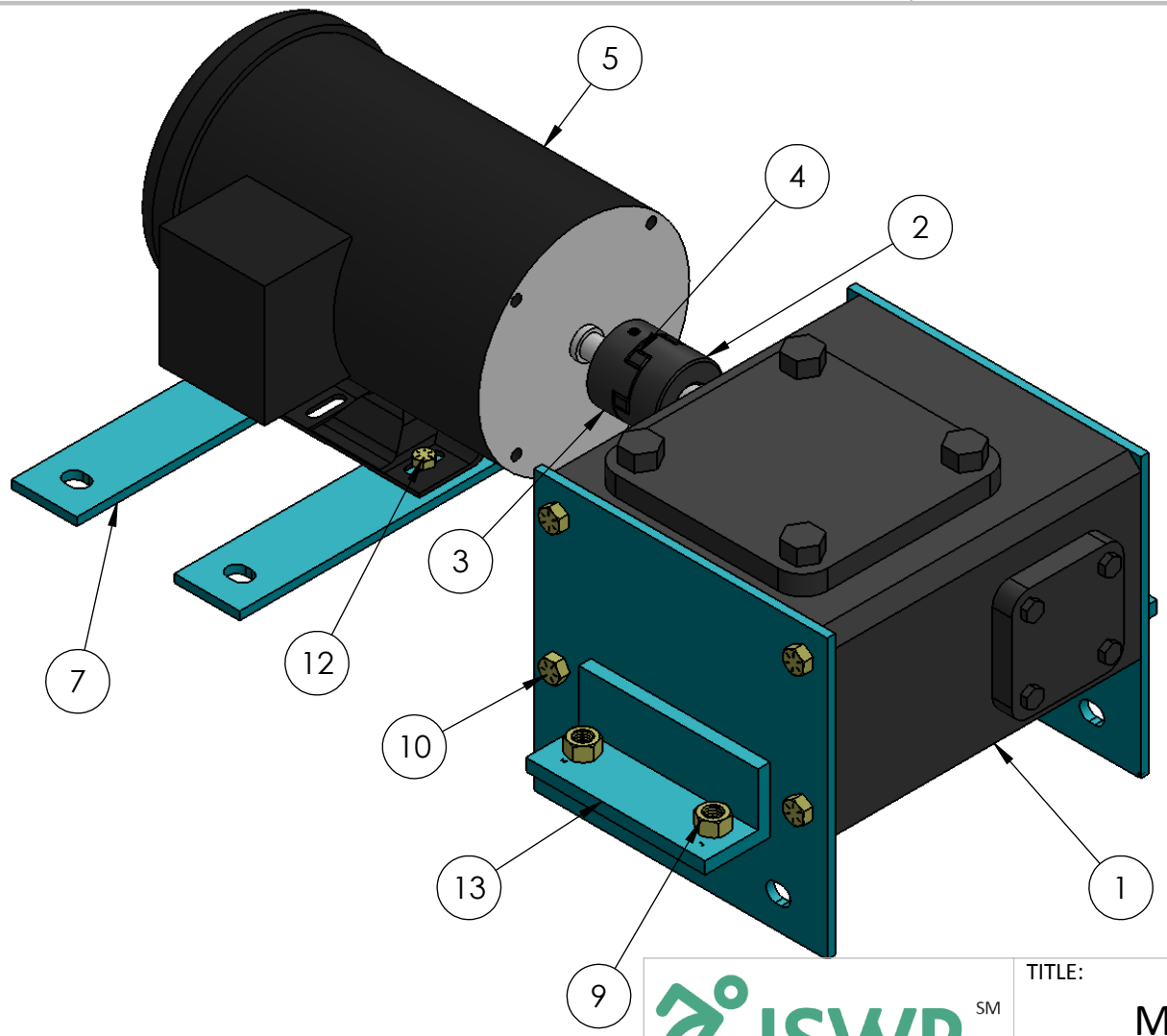
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

TOLERANCES: + 0.025 - 0.025

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 1.90 | SHEET 1 OF 1




# Quantity: 1

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Gear reducer 325 series | 1 |
| 2 | Love Joy for GR Input | 1 |
| 3 | Love Joy for Motor | 1 |
| 4 | Love Joy Spider Motor to GR | 1 |
| 5 | 3 phase motor MTR-1P5-3BD18 | 1 |
| 6 | Love Joy to Motor Key | 1 |
| 7 | Motor Mount to Frame | 2 |
| 8 | Gear Reducer Input Key | 1 |
| 9 | 1/2-13 Hex Nut | 4 |
| 10 | 7/16-14 x 0.75 HHS | 8 |
| 11 | 5/16-18 Locknut | 4 |
| 12 | 5/16-18 x 0.875 HHS | 4 |
| 13 | Gear Reducer Side Mount SubAssembly | 2 |

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TITLE:

## Motor-Gear Reducer Assembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

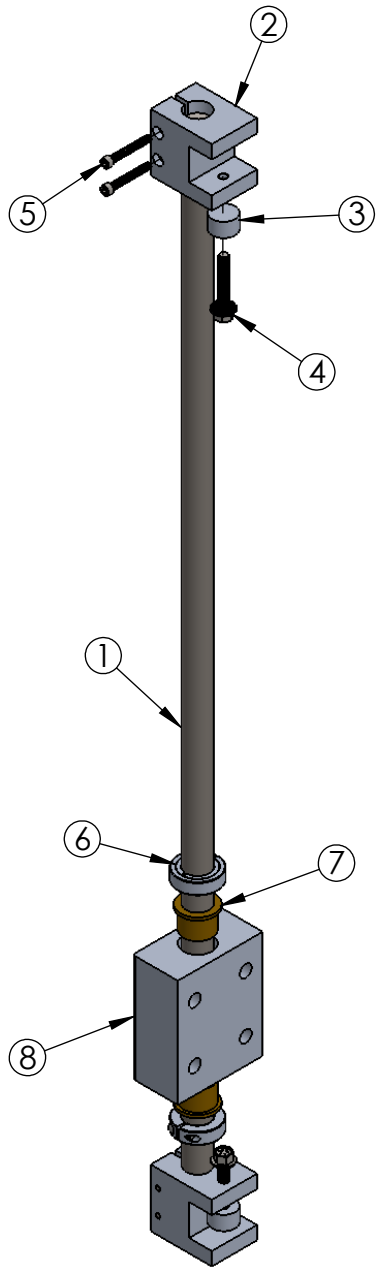
FINISH: Plain

TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 4/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 136.57 | SHEET 1 OF 1

# Arm Drawings




# Quantity: 4

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Arm Support Rod | 1 |
| 2 | Arm Support Clamp | 2 |
| 3 | Arm Support Clamp Round Piece | 2 |
| 4 | 3/8-16 x 2 Flange HHS | 2 |
| 5 | 1/4-20 x 1.75 SHS | 4 |
| 6 | 1in Shaft Collar | 2 |
| 7 | Arm Flange Bushing | 2 |
| 8 | Arm Holder | 1 |

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TITLE:
## Exploded 8020 Arm Support SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

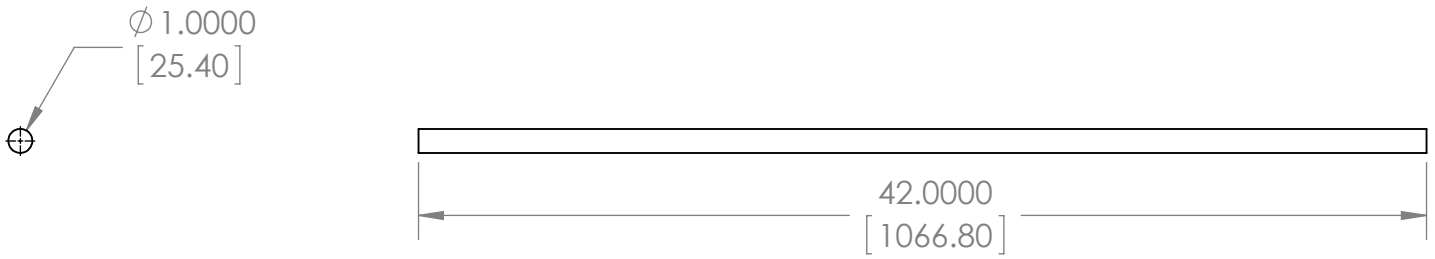
TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:6 | A | 2/27/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 14.58 | SHEET 1 OF 1

# Quantity: 4

## 1" Dia High-Strength 4140 Alloy Steel Rod

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TITLE: Arm Support Rod

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 4140 Alloy Steel | Plain |

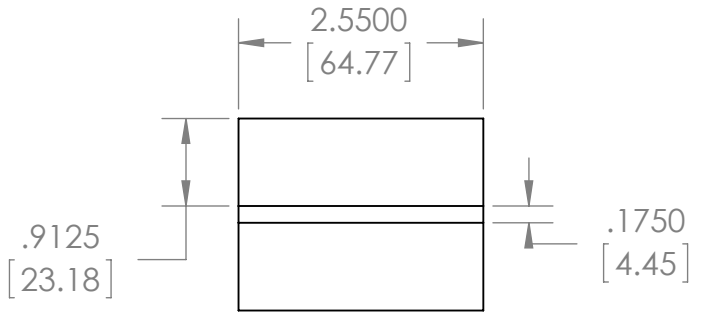
TOLERANCES: + 0.100 - 0.100

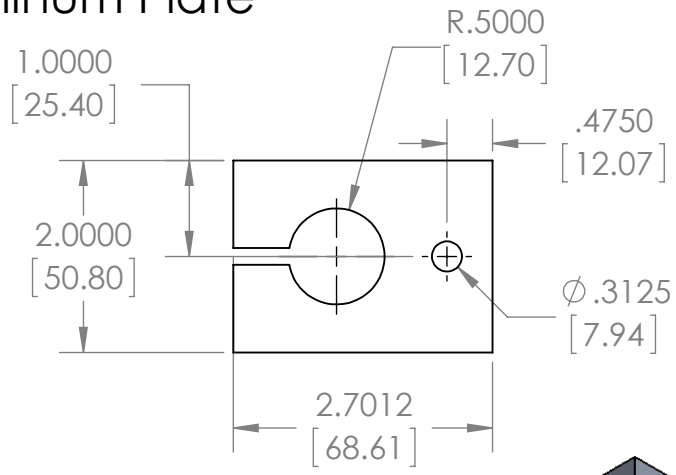
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:8 | A | 2/16/2018 | 2 |

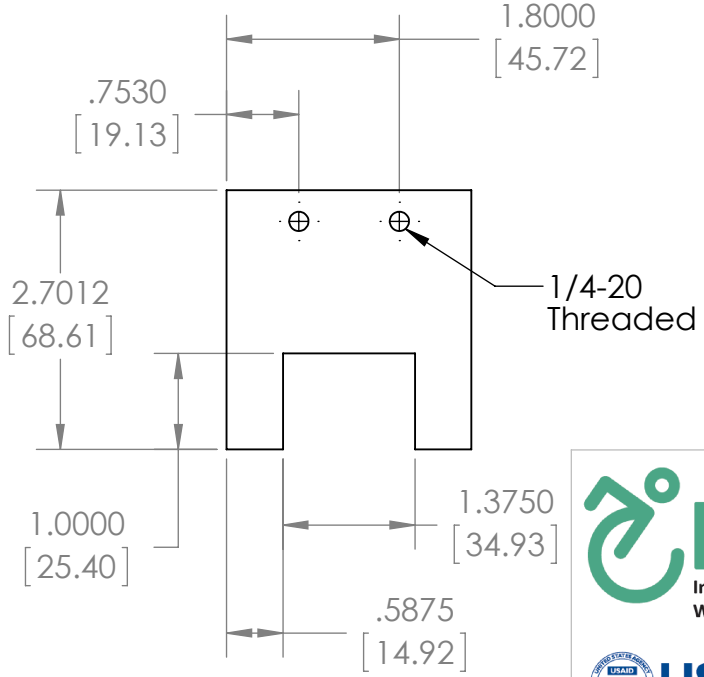
| DO NOT SCALE DRAWING | WEIGHT (LBS): 9.36 | SHEET 1 OF 1 |
|---|---|---|

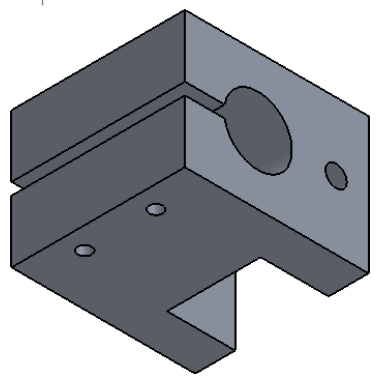
# Quantity:8

## 2" Thick 6061 Aluminum Plate



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TITLE: Arm Support Clamp

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

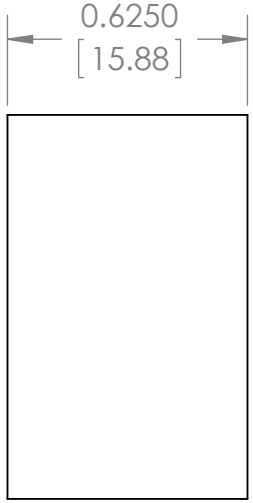
TOLERANCES: + 0.050 - 0.050

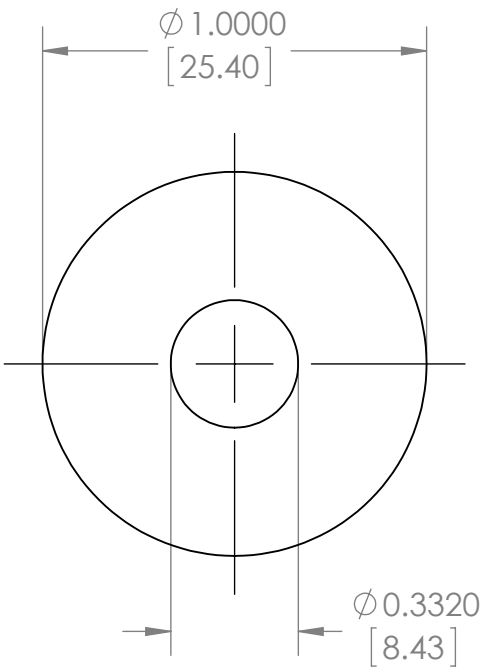
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 3/1/2018 | 2 |

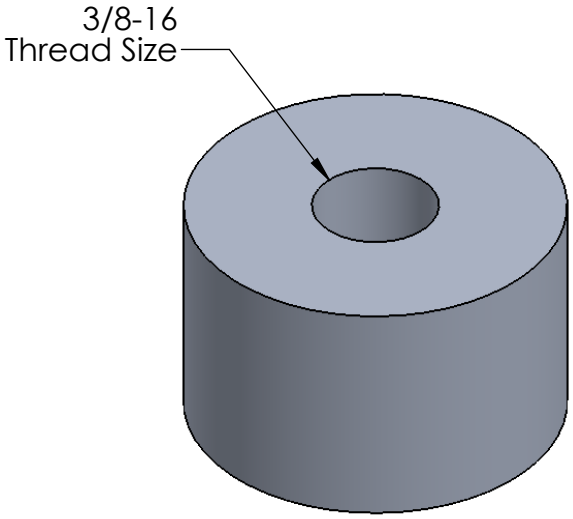
DO NOT SCALE DRAWING | WEIGHT (LBS): 0.83 | SHEET 1 OF 1

# Quantity: 8

## 1"x4" 6061 Aluminum Flat Bar

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TITLE:

**Arm Support Clamp Round Piece**

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

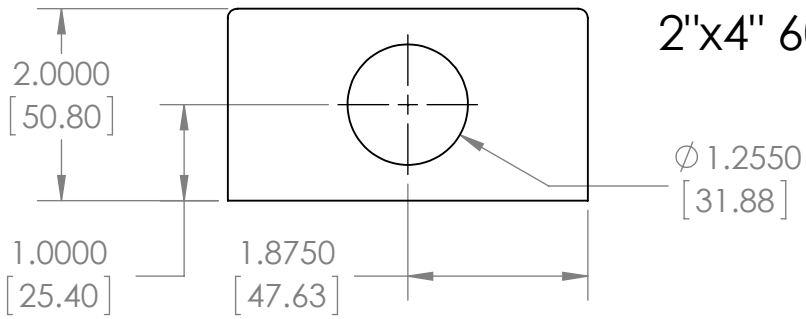
TOLERANCES: + 0.050 - 0.050

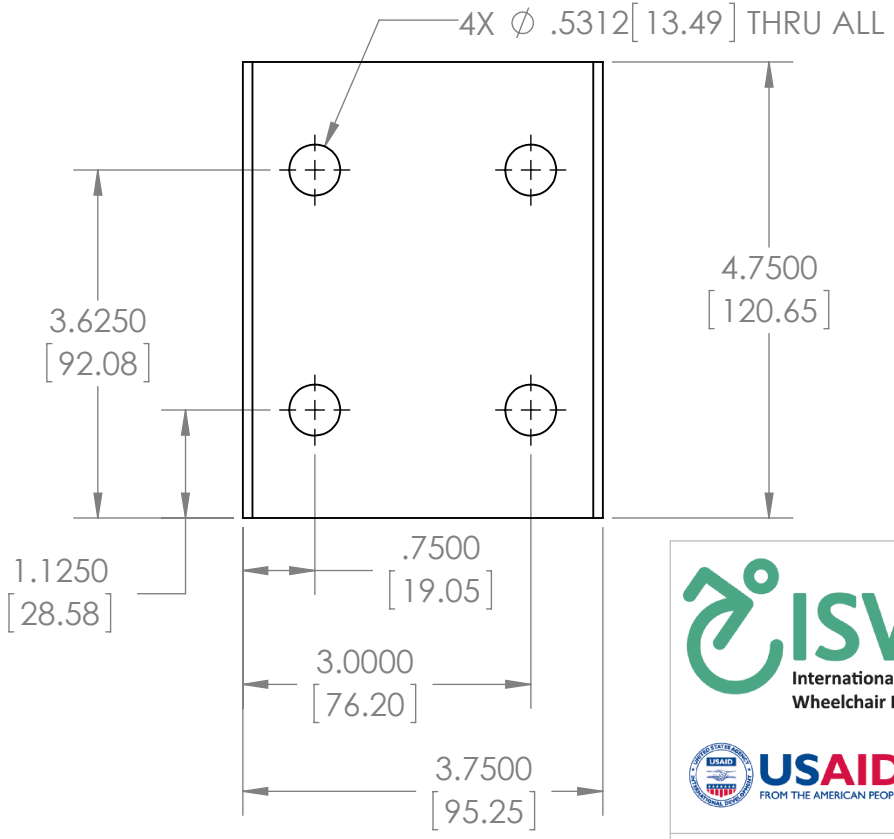
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 4/4/2018 | 2 |

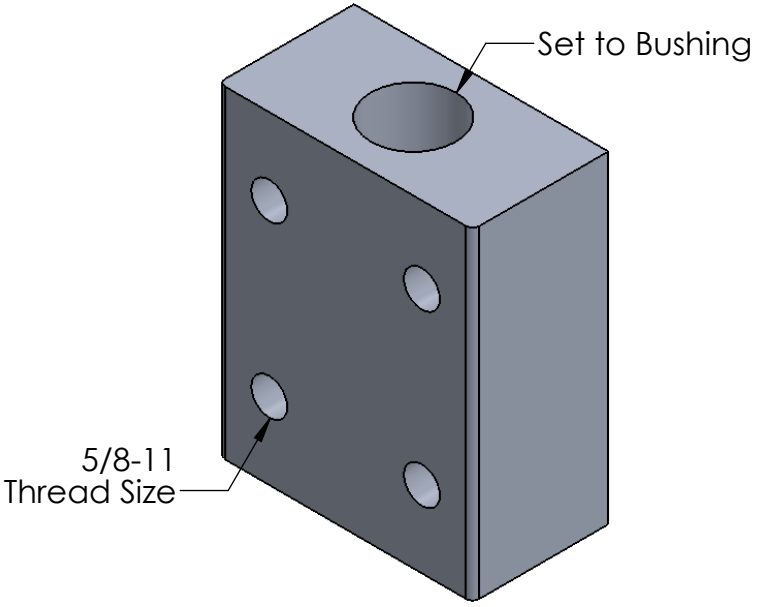
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.05 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 4

## 2"x4" 6061 Aluminum Bar

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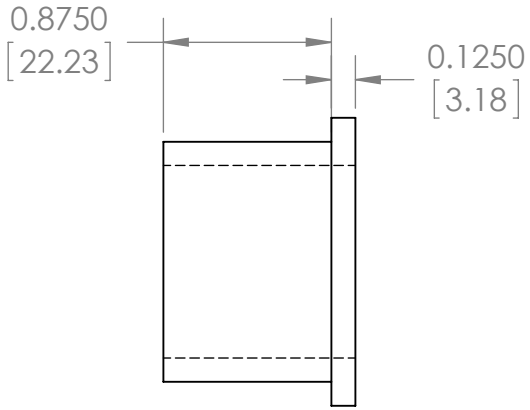
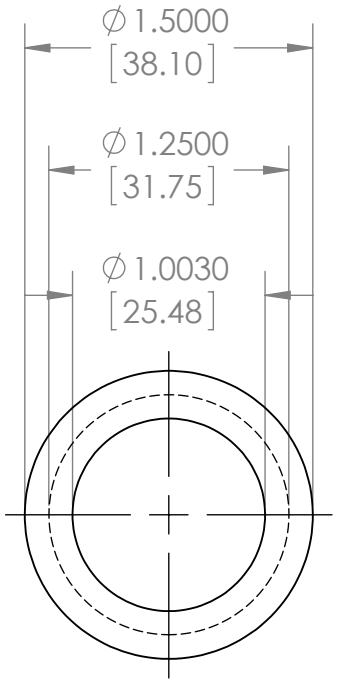
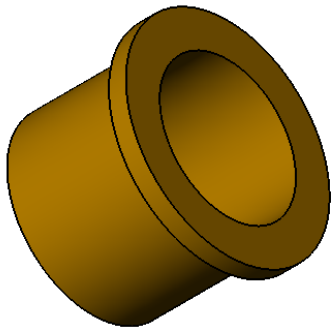
| | | | |
|---|---|---|---|
| TITLE: Arm Holder | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: 6061 Alloy | | FINISH: Plain | |
| TOLERANCES: | + 0.050 | - 0.050 | |
| SCALE: 1:2 | SIZE: A | DATE: 4/13/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 2.73 | SHEET 1 OF 1 |

# Quantity: 8

## Oil-Embedded Flanged Sleeve Bearings with PTFE



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TITLE: Arm Flange Bushing

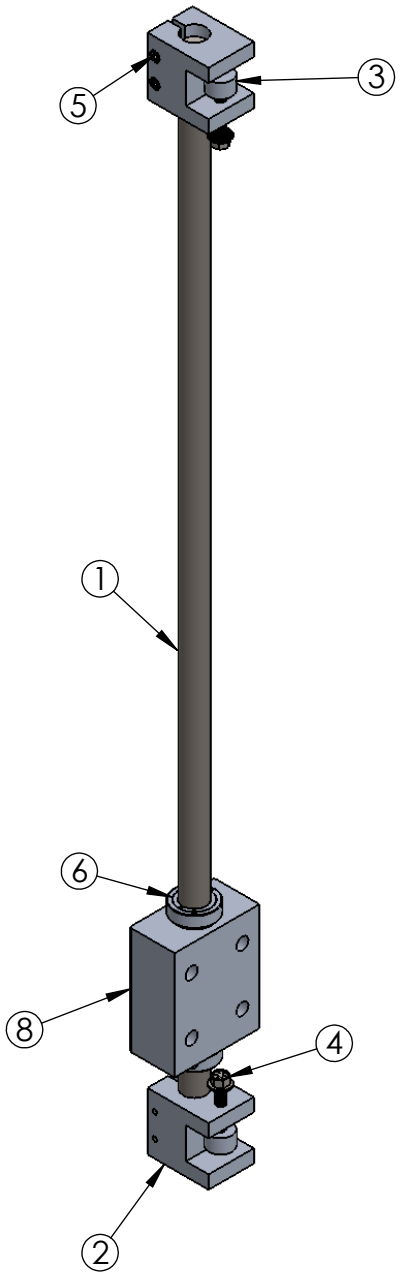
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| SAE 841 Bronze | Plain |

TOLERANCES: Manufacturer Spec

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/16/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.159 | SHEET 1 OF 1 |
|---|---|---|




# Quantity: 4

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Arm Support Rod | 1 |
| 2 | Arm Support Clamp | 2 |
| 3 | Arm Support Clamp Round Piece | 2 |
| 4 | 3/8-16 x 2 Flange HHS | 2 |
| 5 | 1/4-20 x 1.75 SHS | 4 |
| 6 | 1in Shaft Collar | 2 |
| 7 | Arm Flange Bushing | 2 |
| 8 | Arm Holder | 1 |

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TITLE:

## 8020 Arm Support SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

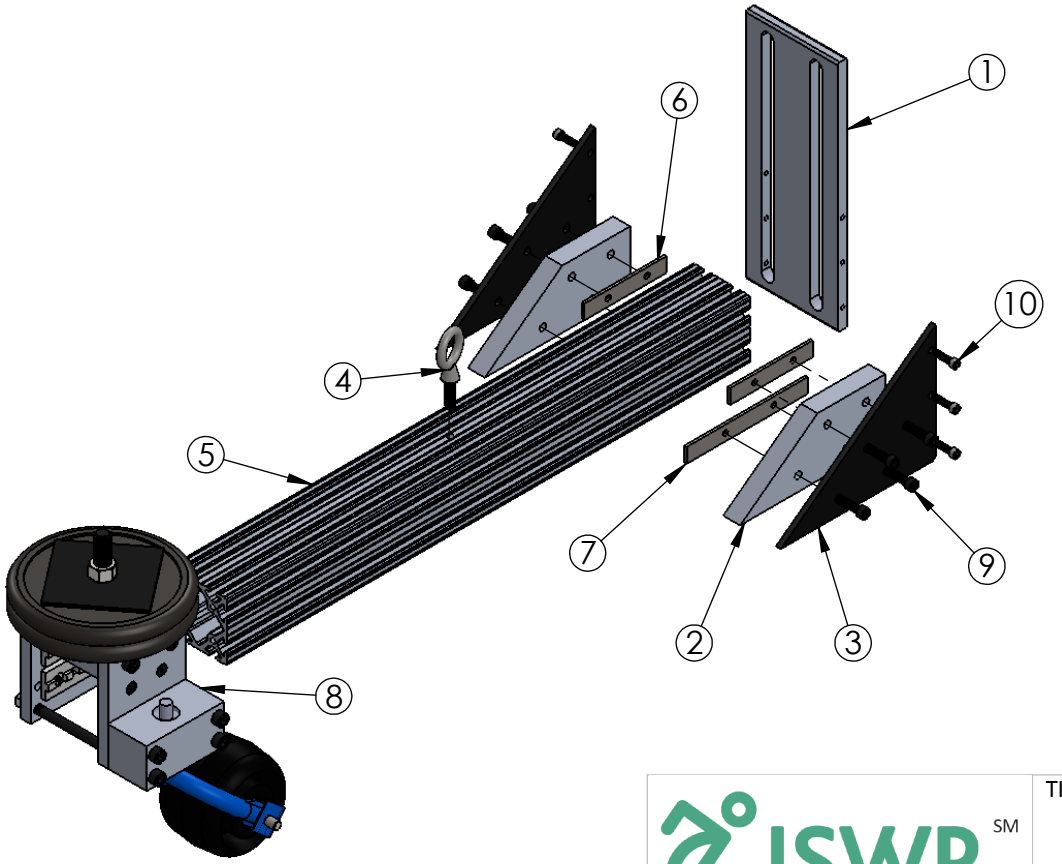
FINISH: Plain

TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:6 | A | 2/27/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 14.58 | SHEET 1 OF 1

# Quantity: 4




| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Arm Attachment | 1 |
| 2 | Gusset Spacer | 2 |
| 3 | Plate Gusset | 2 |
| 4 | 1in Eye Bolt | 1 |
| 5 | 3in Square 8020 Bar | 1 |
| 6 | Gusset Spacer Mount Short | 2 |
| 7 | Gusset Spacer Mount Long | 2 |
| 8 | 8020 Arm Clamp SubAssembly | 1 |
| 9 | 5/16-18 x 1.375 SHS | 8 |
| 10 | 1/4-20 x 0.875 SHS | 6 |

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TITLE:

## Exploded 8020 Arm Assembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

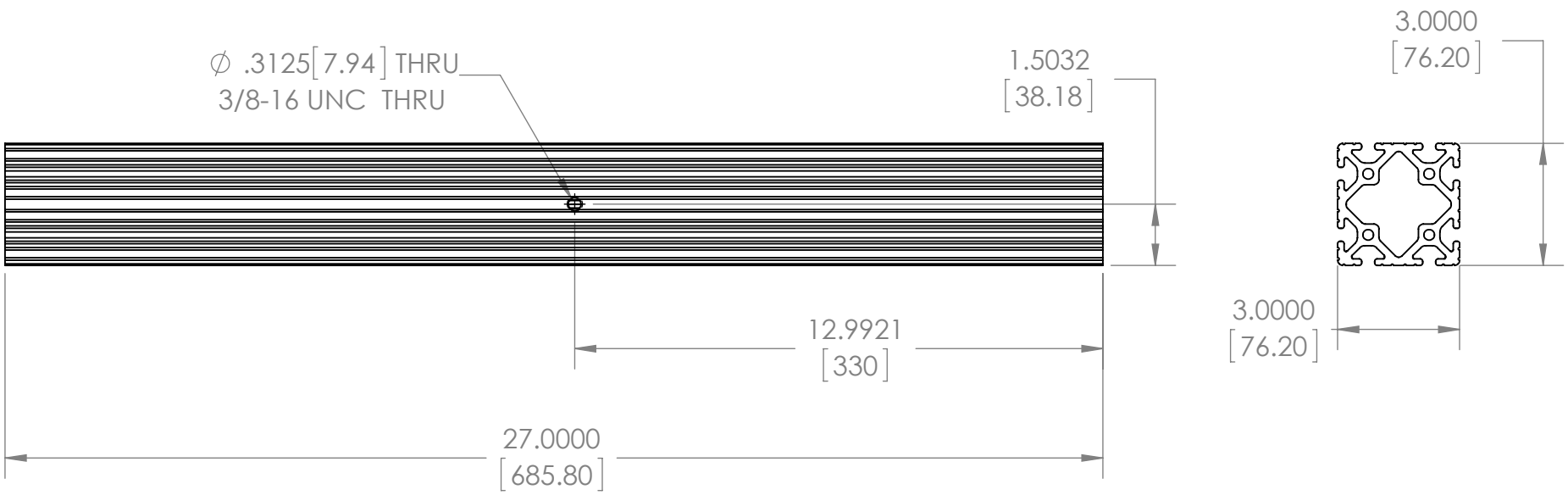
TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:7 | A | 2/27/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 57.44 | SHEET 1 OF 1

# Quantity: 4

## 3in Square Aluminum Bar, T-Slotted Profile

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TITLE: 3in Square 8020 Bar

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6105-T5 Aluminum | Anodize #204-R1 |

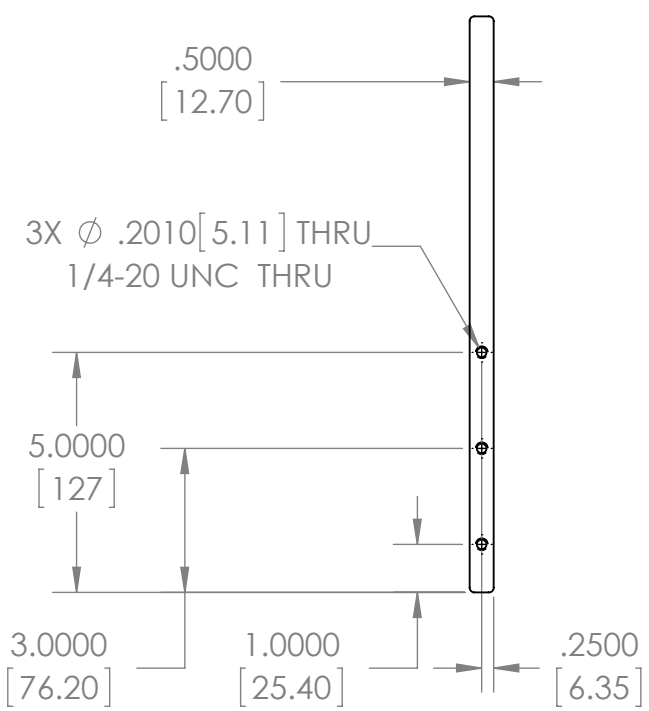
TOLERANCES: + 0.100 - 0.100

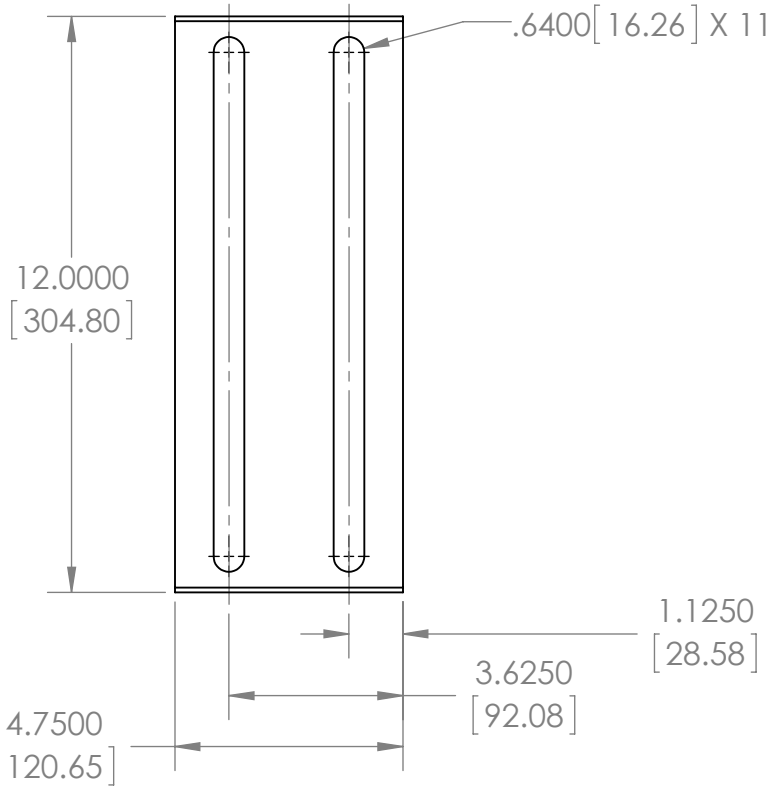
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:8 | A | 2/16/2018 | 2 |

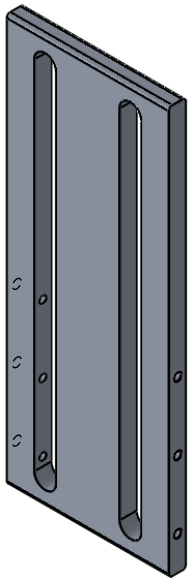
DO NOT SCALE DRAWING | WEIGHT (LBS): 8.85 | SHEET 1 OF 1

# Quantity: 4

## 1/2" Thick 6061 Aluminum Plate



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TITLE: Arm Attachment

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

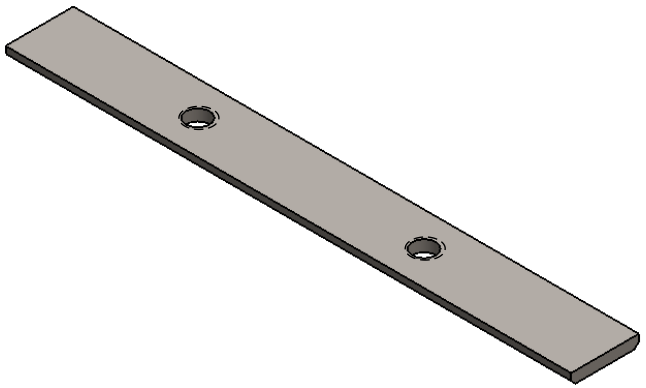
TOLERANCES: + 0.050 - 0.050

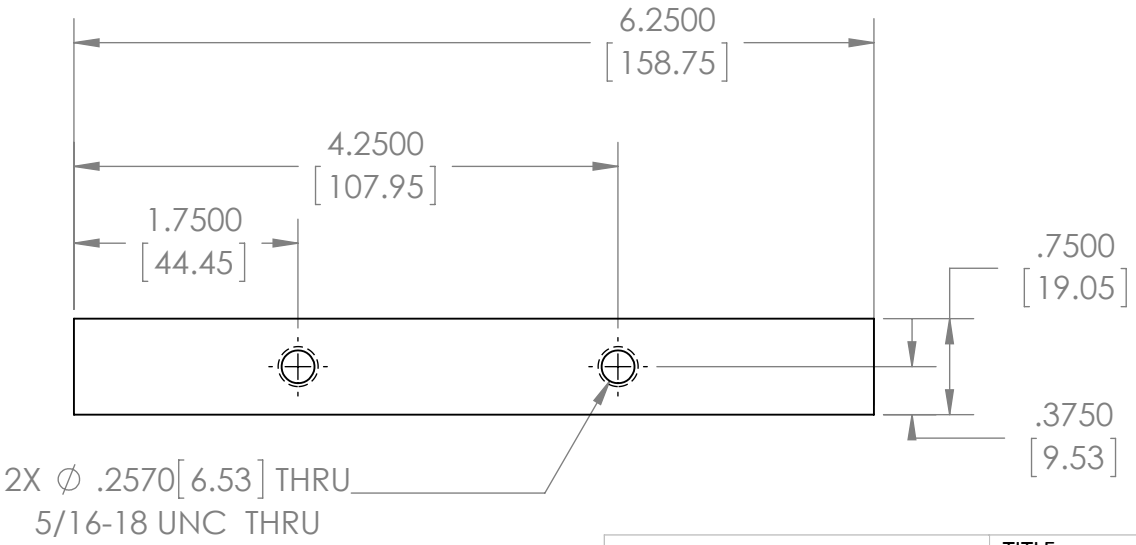
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 2/16/2018 | 2 |

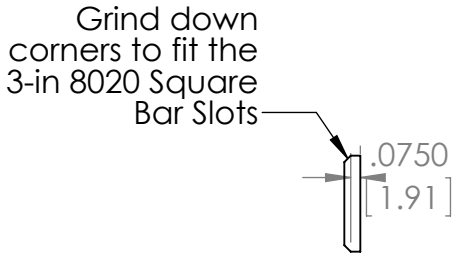
DO NOT SCALE DRAWING | WEIGHT (LBS): 2.07 | SHEET 1 OF 1

# Quantity: 8

## 1/8" x 3/4" Hot Rolled Steel Flat Stock



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TITLE: Gusset Spacer Mount Long

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

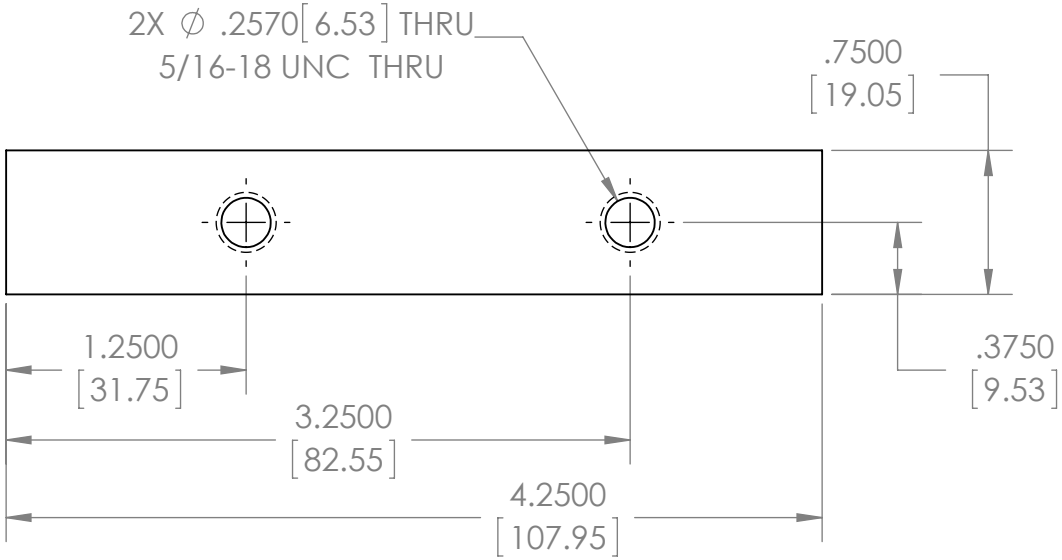
TOLERANCES: + 0.050 - 0.050

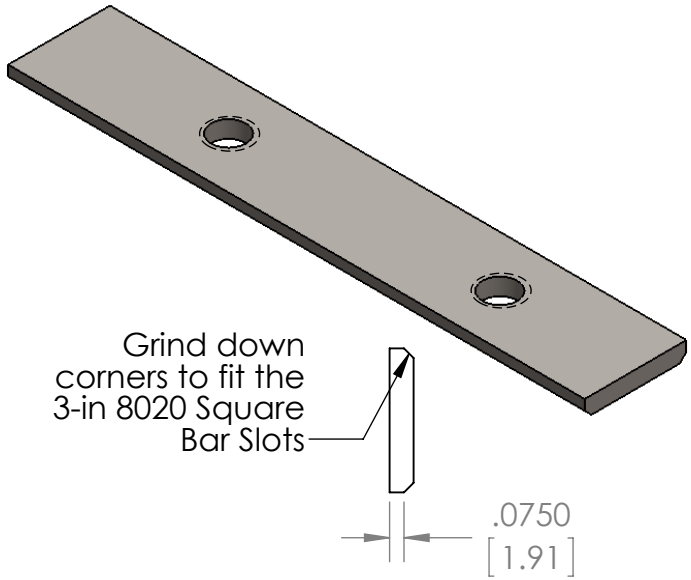
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:3 | A | 3/15/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.16 | SHEET 1 OF 1

# Quantity: 8

## 1/8" x 3/4" Hot Rolled Steel Flat Stock

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TITLE: Gusset Spacer Mount Short

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| ASTM A36 Steel | Plain |

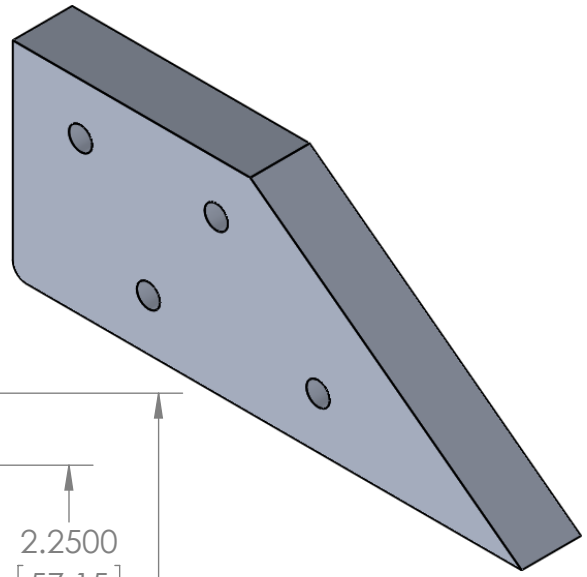
TOLERANCES: + 0.050 - 0.050

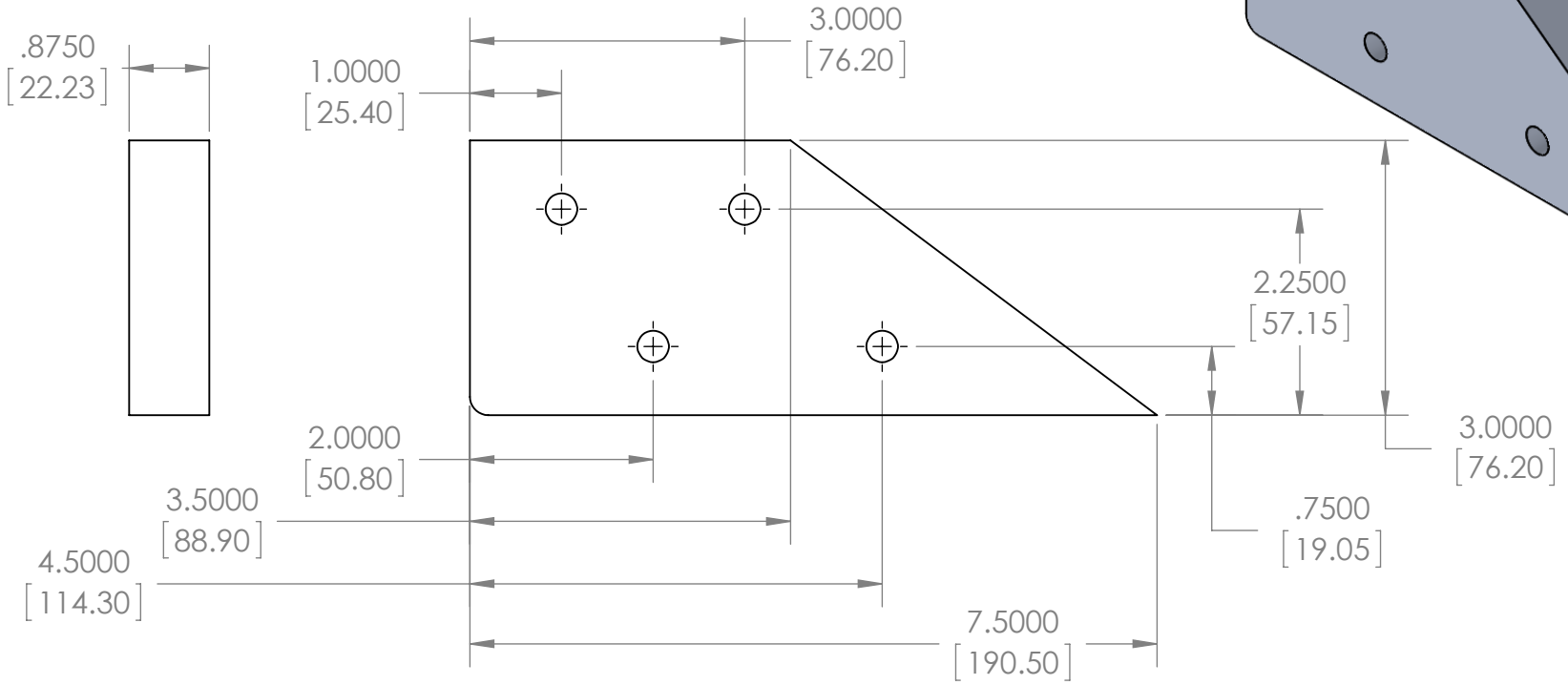
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/27/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.11 | SHEET 1 OF 1

# Quantity: 8

## 7/8" 6061 Aluminum Plate



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TITLE: Gusset Spacer

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

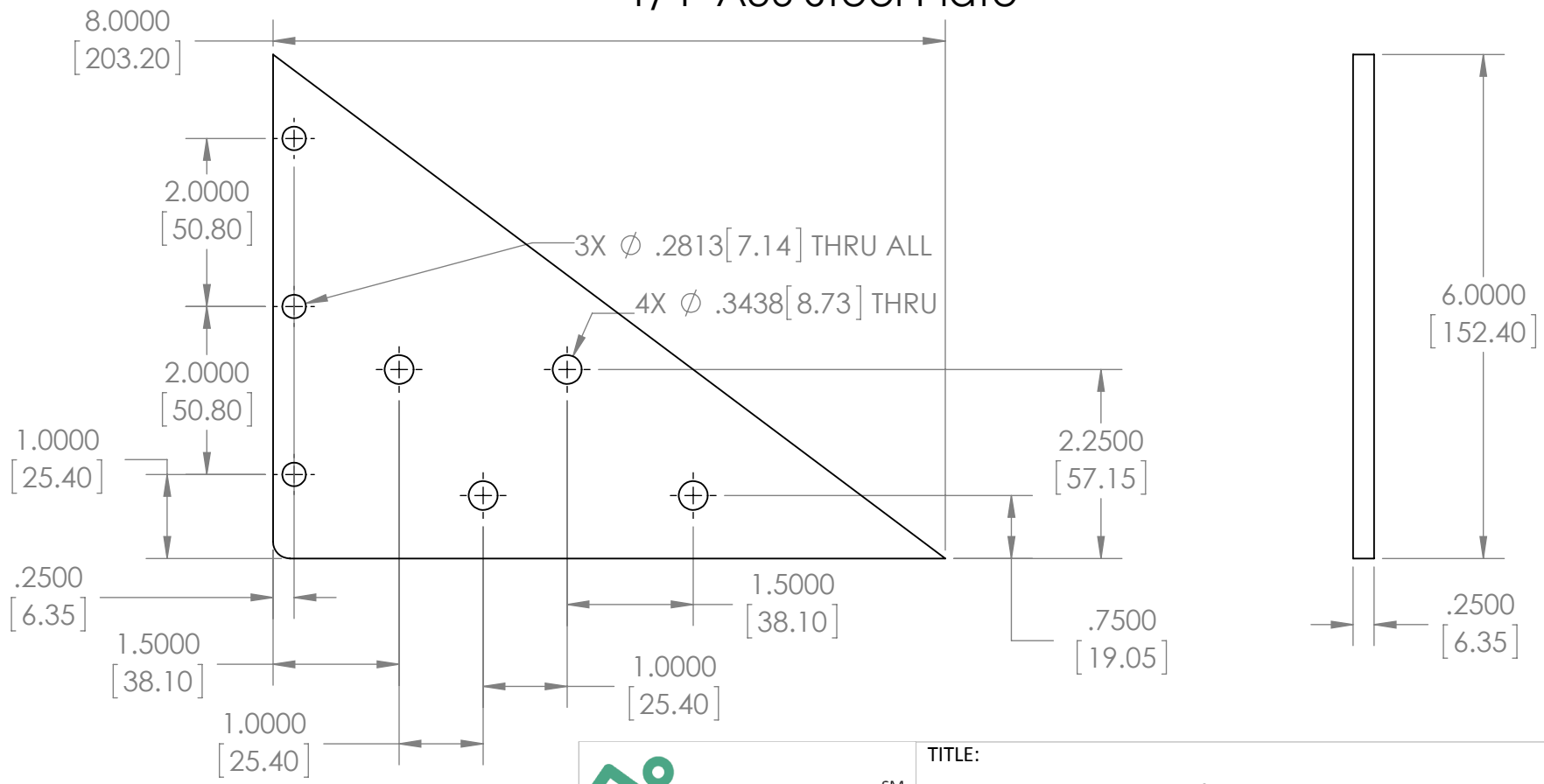
TOLERANCES: + 0.050 - 0.050

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 1.38 | SHEET 1 OF 1

# Quantity: 8

## 1/4" A36 Steel Plate

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TITLE: Plate Gusset

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

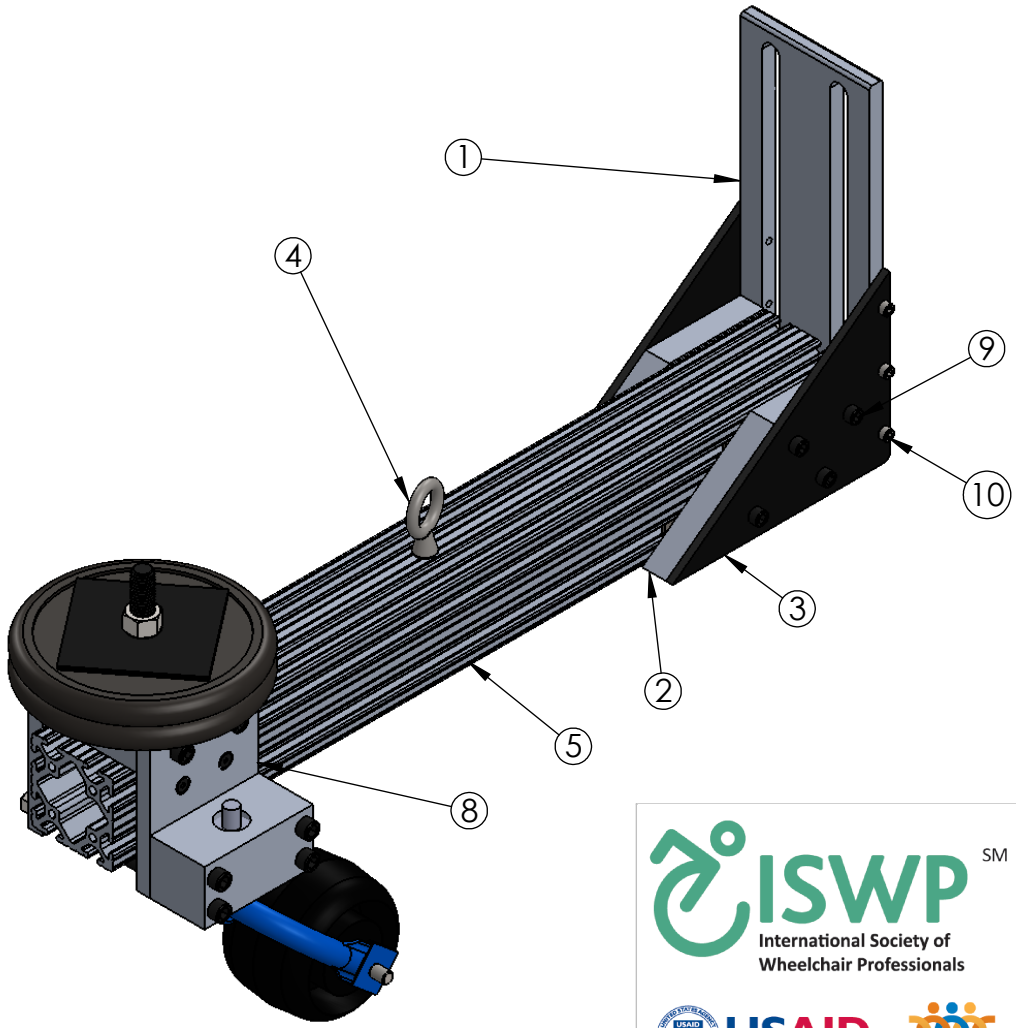
| MATERIAL: | FINISH: |
|---|---|
| AISI 1020 Steel, Cold Rolled | Plain |

TOLERANCES: + 0.050 - 0.050

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 1.67 | SHEET 1 OF 1

# Quantity: 4




| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Arm Attachment | 1 |
| 2 | Gusset Spacer | 2 |
| 3 | Plate Gusset | 2 |
| 4 | 1in Eye Bolt | 1 |
| 5 | 3in Square 8020 Bar | 1 |
| 6 | Gusset Spacer Mount Short | 2 |
| 7 | Gusset Spacer Mount Long | 2 |
| 8 | 8020 Arm Clamp SubAssembly | 1 |
| 9 | 5/16-18 x 1.375 SHS | 8 |
| 10 | 1/4-20 x 0.875 SHS | 6 |

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TITLE:

## 8020 Arm SubAssembly

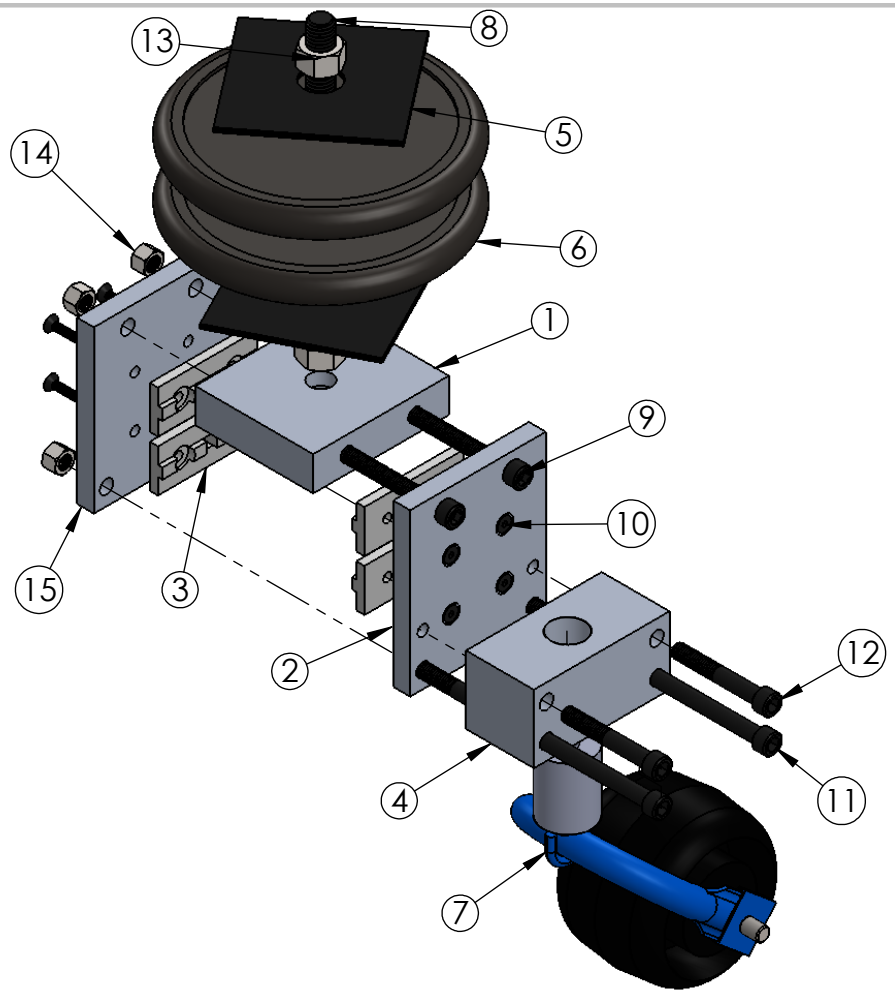
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Material <not specified> | Plain |

TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:5 | A | 2/27/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 57.44 | SHEET 1 OF 1 |
|---|---|---|




| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Clamp Weight Block | 1 |
| 2 | Clamp Side Plate (Hub Side) | 1 |
| 3 | Clamp Bearing | 4 |
| 4 | Adapter for Casters | 1 |
| 5 | Rubber Square | 2 |
| 6 | Weight | 2 |
| 7 | Caster | 1 |
| 8 | 5/8-11 x 4 SHS | 1 |
| 9 | 3/8-16 x 5 SHS | 2 |
| 10 | 10-32 x 0.875 FHS | 8 |
| 11 | 3/8-16 x 7 SHS | 2 |
| 12 | 3/8-16 x 2.5 SHS | 2 |
| 13 | 5/8-11 Hex Nut | 2 |
| 14 | 3/8-16 Hex Nut | 4 |
| 15 | Clamp Side Plate (Default) | 1 |

# Quantity: 4

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TITLE:

## Exploded 8020 Arm Clamp SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

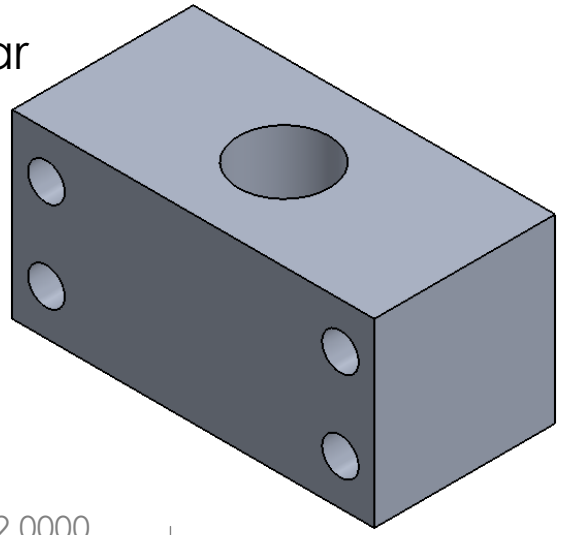
TOLERANCES:

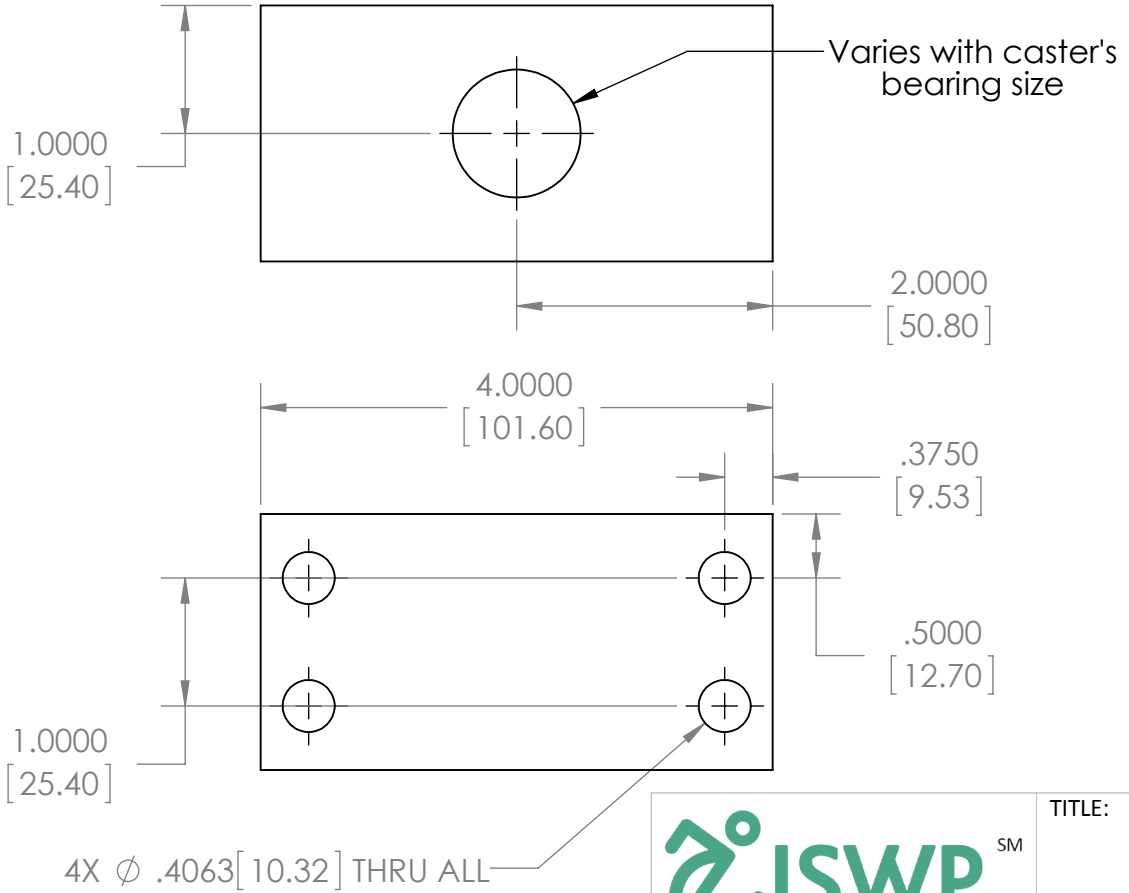
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:4 | A | 2/28/2018 | 2 |

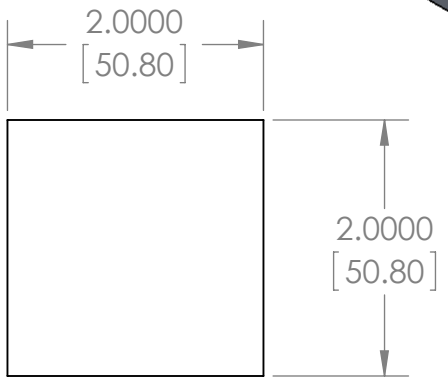
DO NOT SCALE DRAWING | WEIGHT (LBS): 39.36 | SHEET 1 OF 1

# Quantity: 4

## 2" 6061 Aluminum Square Bar






Blocks are cut to form blanks. The center hole is then drilled out to custom fit a caster's bearings.

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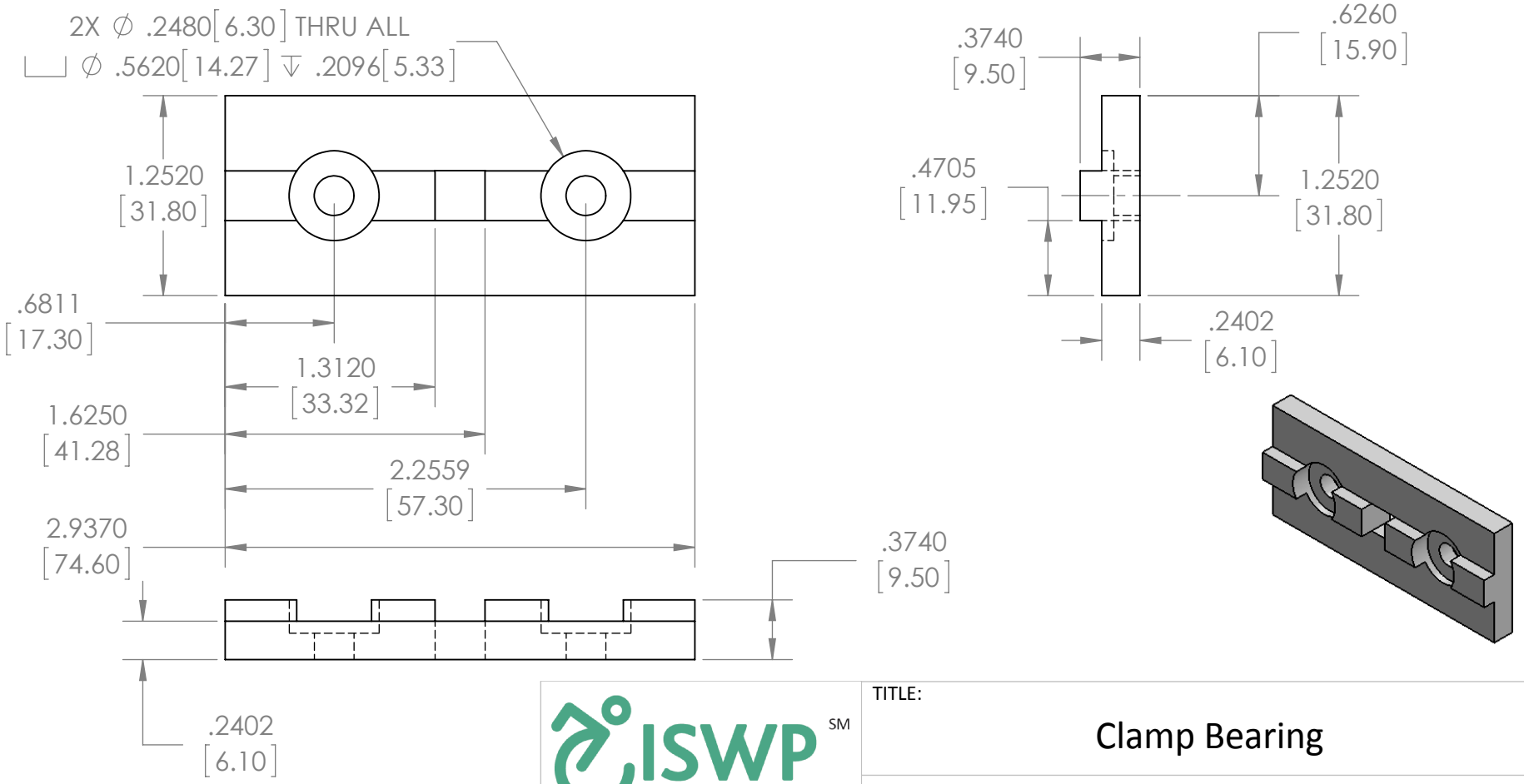
| | | | |
|---|---|---|---|
| TITLE: Adapter for Casters | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: 6061 Alloy | | FINISH: Plain | |
| TOLERANCES: | + 0.050 | - 0.050 | |
| SCALE: 2:3 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 1.31 | SHEET 1 OF 1 |

# Quanitity: 16

## 8020 Single-Keyed High-Cycle Linear Bearing Pad



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TITLE: Clamp Bearing

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| UHMW PE | Smooth |

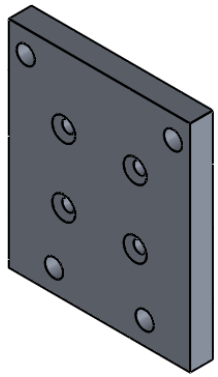
TOLERANCES: Manufacturer Spec

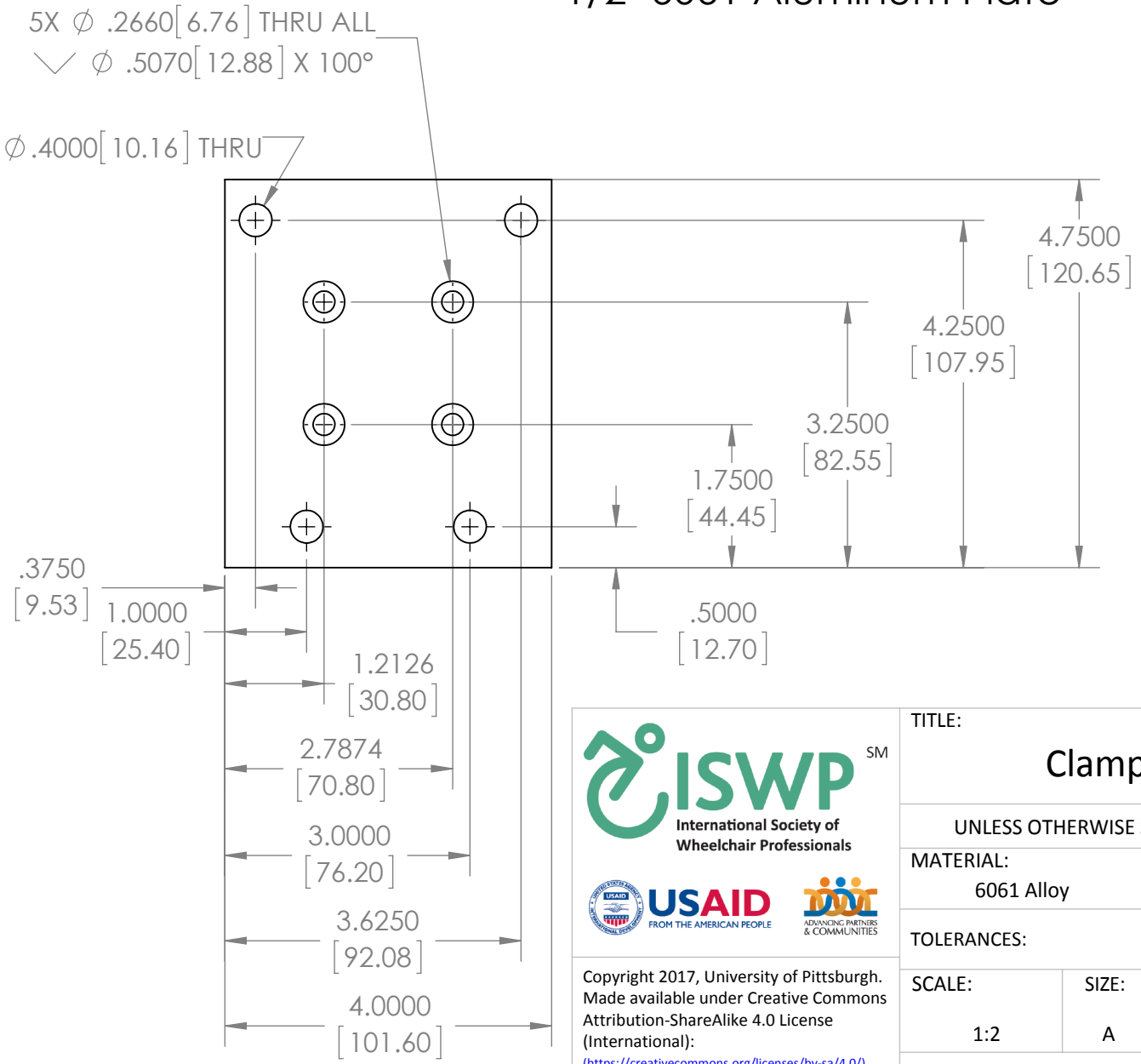
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/16/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.03 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## 1/2" 6061 Aluminum Plate



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TITLE:

# Clamp Side Plate (Default)

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

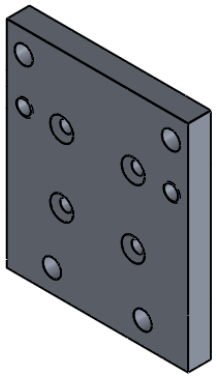
TOLERANCES: + 0.050 - 0.050

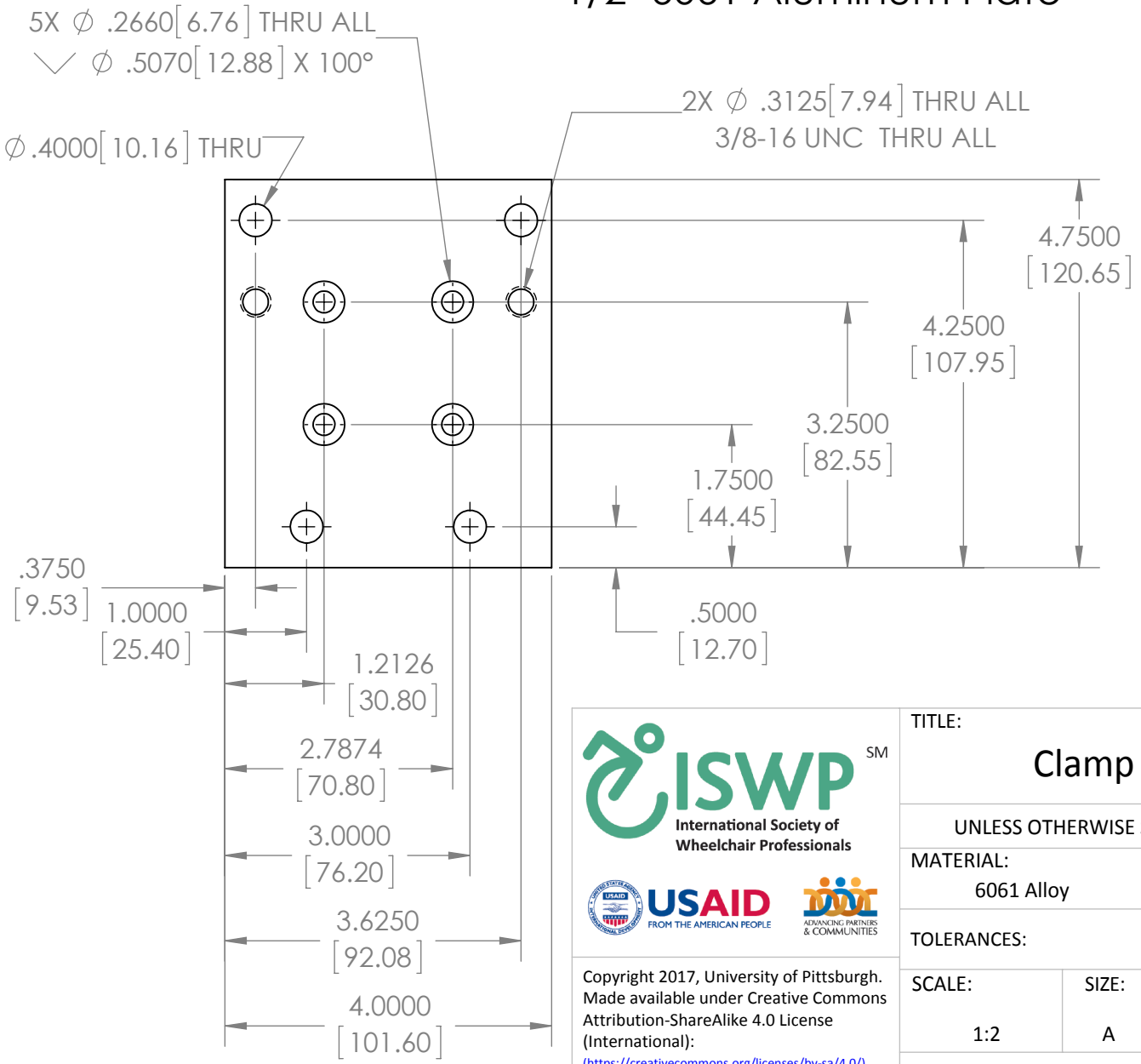
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/28/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.88 | SHEET 1 OF 1

# Quantity: 8

## 1/2" 6061 Aluminum Plate



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TITLE:

# Clamp Side Plate (Hub Side)

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

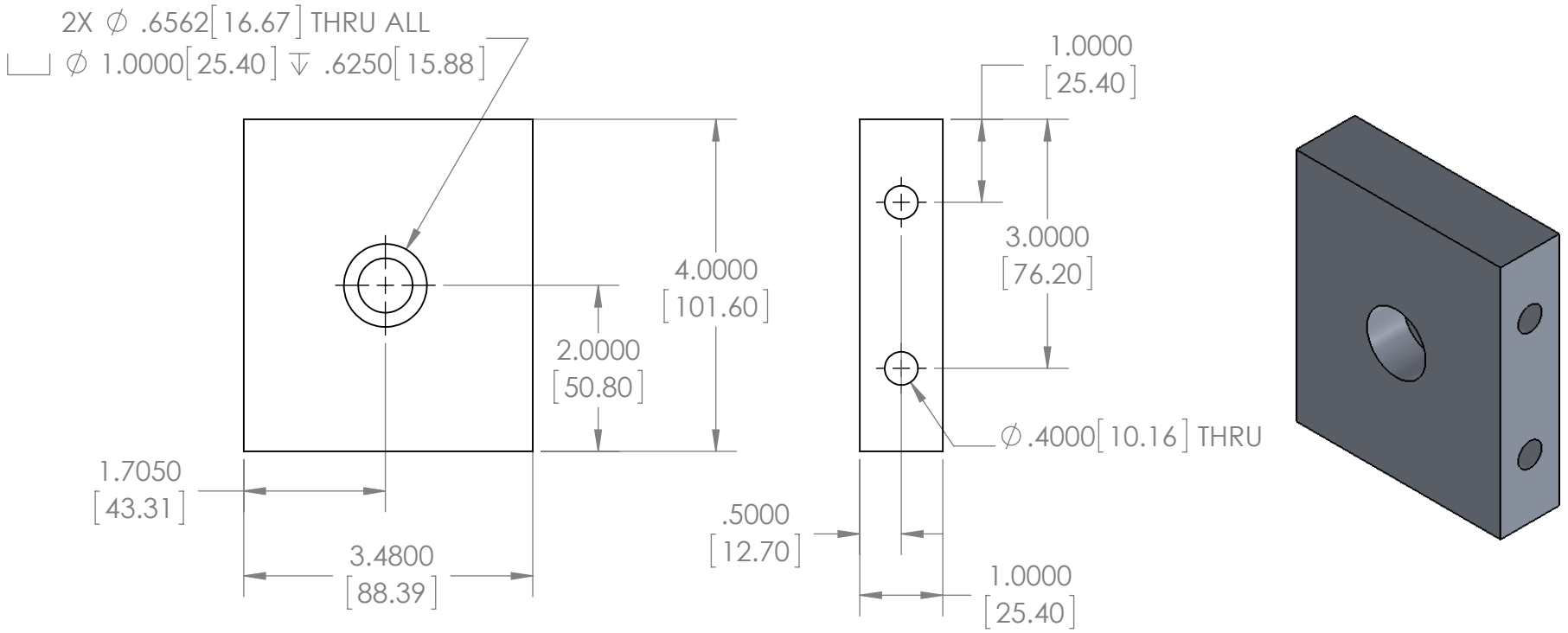
TOLERANCES: + 0.050 - 0.050

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/28/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.88 | SHEET 1 OF 1

# Quantity: 4

## 1" x 4" 6061 Aluminum Flat Bar

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TITLE: Clamp Weight Block

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 6061 Alloy | Plain |

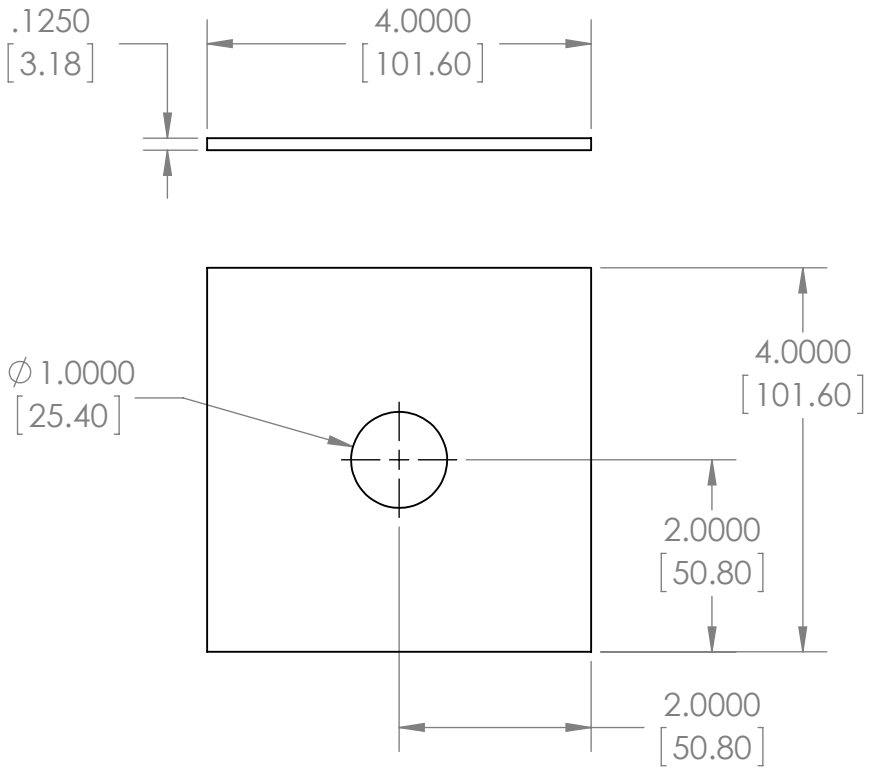
TOLERANCES: + 0.050 - 0.050

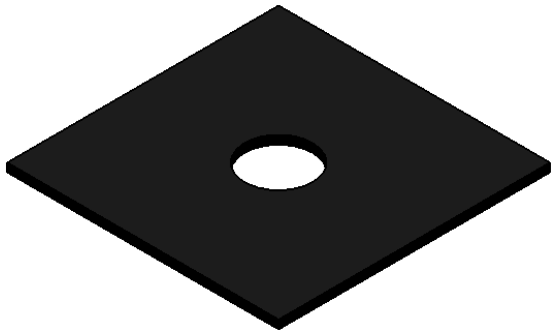
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 1.21 | SHEET 1 OF 1

# Quantity: 8

## Vibration-Damping Pad for Heavy Machinery



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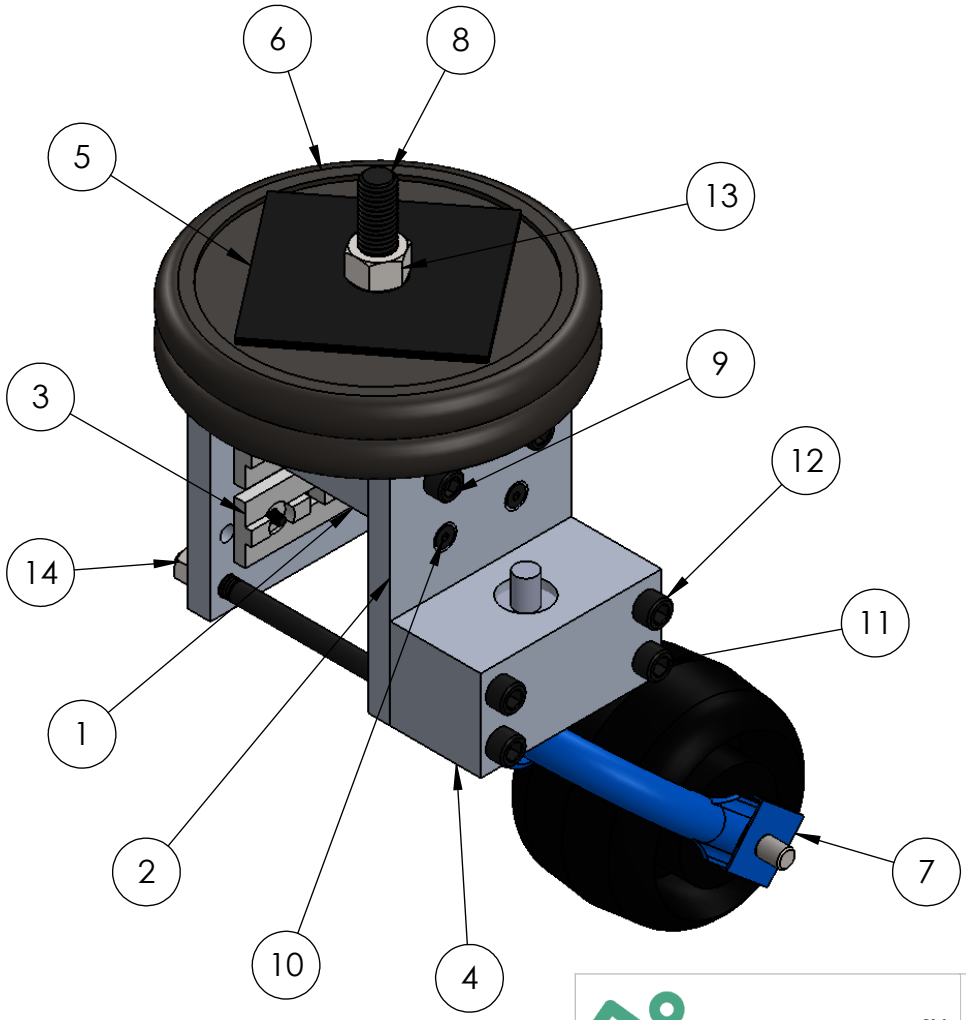
| | | | |
|---|---|---|---|
| TITLE: Rubber Square | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: NBR | | FINISH: Textured | |
| TOLERANCES: | + 0.050 | - 0.050 | |
| SCALE: 1:2 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.08 | SHEET 1 OF 1 |

# Quantity: 4




| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | Clamp Weight Block | 1 |
| 2 | Clamp Side Plate | 2 |
| 3 | Clamp Bearing | 4 |
| 4 | Adapter for Casters | 1 |
| 5 | Rubber Square | 2 |
| 6 | Weight | 2 |
| 7 | Whirlwind RR Caster | 1 |
| 8 | 5/8-11 x 4 SHS | 1 |
| 9 | 3/8-16 x 5 SHS | 2 |
| 10 | 10-32 x 0.875 FHS | 8 |
| 11 | 3/8-16 x 7 SHS | 2 |
| 12 | 3/8-16 x 2.5 SHS | 2 |
| 13 | 5/8-11 Hex Nut | 2 |
| 14 | 3/8-16 Hex Nut | 4 |

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TITLE:

## 8020 Arm Clamp SubAssembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

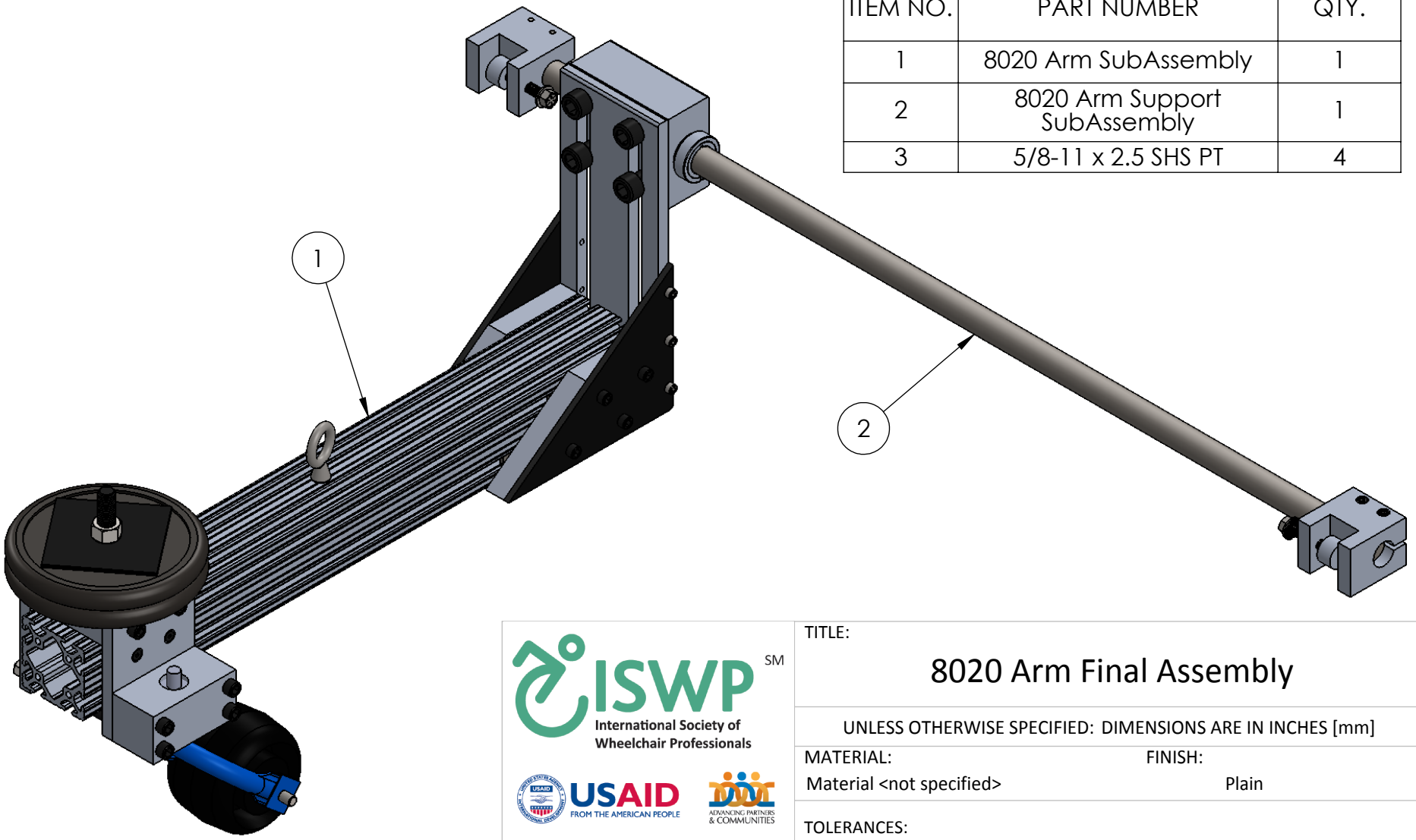
TOLERANCES:

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:3 | A | 2/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 39.35 | SHEET 1 OF 1

# Quantity: 4

| ITEM NO. | PART NUMBER | QTY. |
|---|---|---|
| 1 | 8020 Arm SubAssembly | 1 |
| 2 | 8020 Arm Support SubAssembly | 1 |
| 3 | 5/8-11 x 2.5 SHS PT | 4 |

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TITLE:

## 8020 Arm Final Assembly

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Material <not specified>

FINISH: Plain

TOLERANCES:

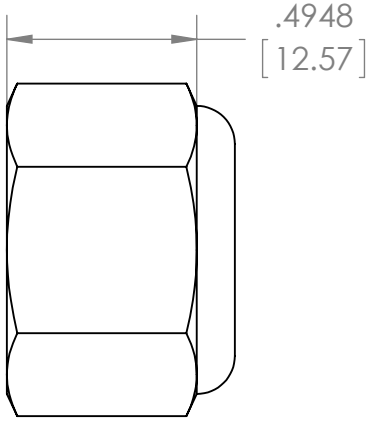
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:5 | A | 2/27/2018 | 2 |

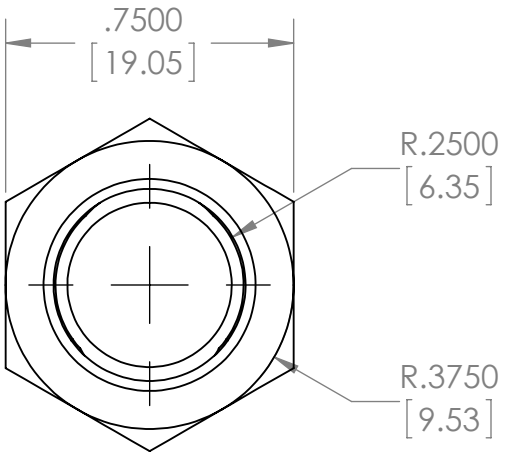
DO NOT SCALE DRAWING | WEIGHT (LBS): 73.15 | SHEET 1 OF 1

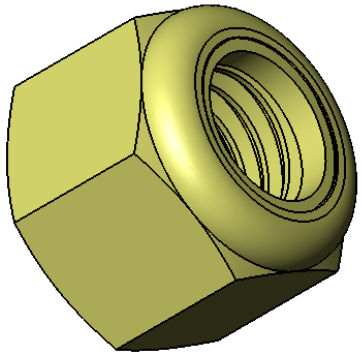
# Hardware Drawing

# Quantity: 88

## 1/2-13 Grade 8 Yellow Zinc NE Steel Nylon Insert Locknut



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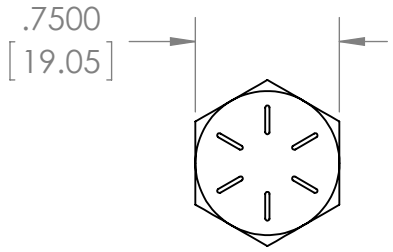
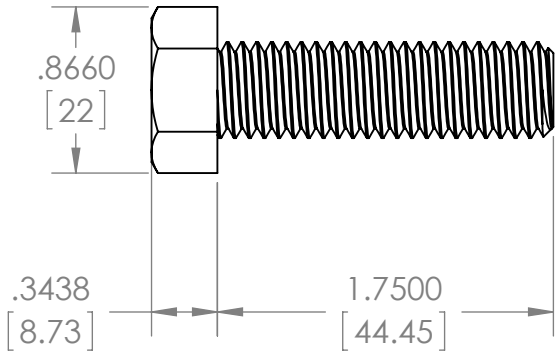
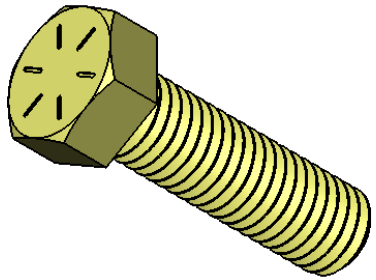
| | | | |
|---|---|---|---|
| TITLE: 0.5-13 Locknut | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Plain Carbon Steel | | FINISH: Yellow Zinc | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 2:1 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.050 | SHEET 1 OF 1 |

# Quantity: 52

## 1/2-13 x 1.75 Grade 8 Yellow Zinc Hex Head Screw



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TITLE: 0.5-13 x 1.75 HHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Plain Carbon Steel

FINISH: Yellow Zinc

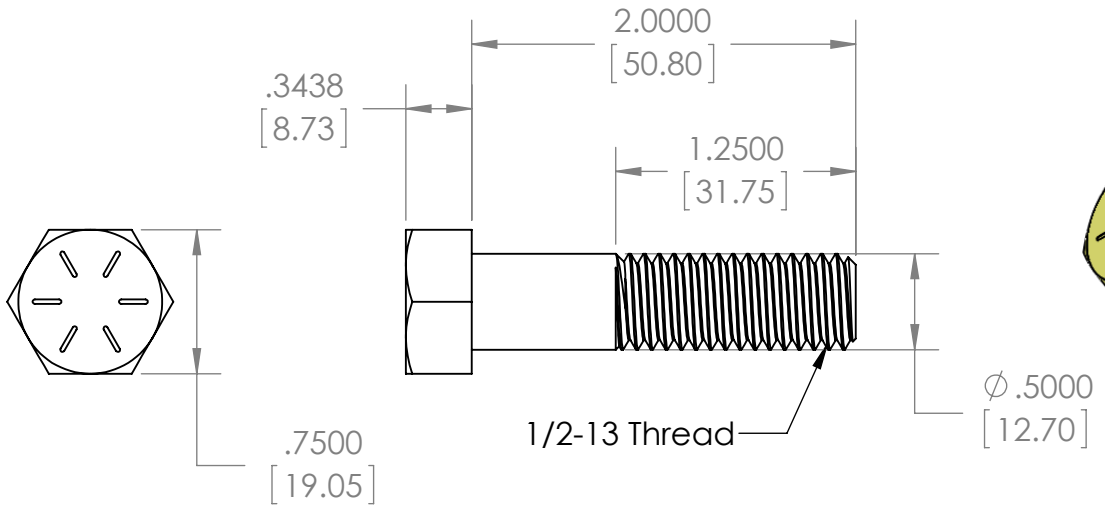
TOLERANCES: Manufacturer Specs

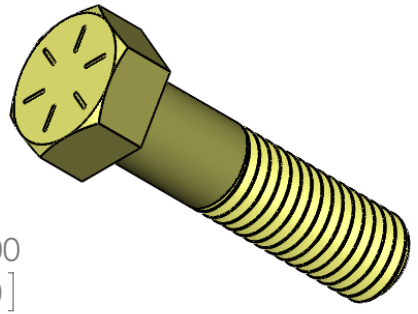
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.13 | SHEET 1 OF 1

# Quantity: 8

## 1/2-13 x 2 Grade 8 Yellow Zinc Hex Head Screw



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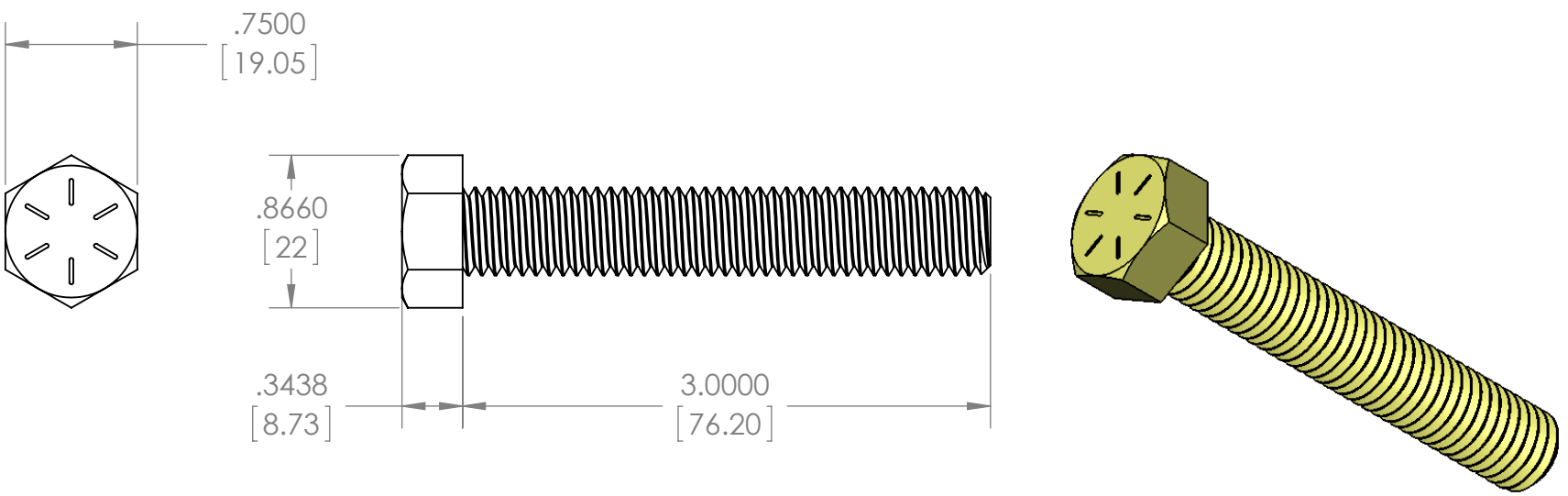
| | | | |
|---|---|---|---|
| TITLE: 0.5-13 x 2 HHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Plain Carbon Steel | | FINISH: Yellow Zinc | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 1:1 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.14 | SHEET 1 OF 1 |

# Quantity: 30

## 1/2-13 x 3 Grade 8 Yellow Zinc Hex Head Screw

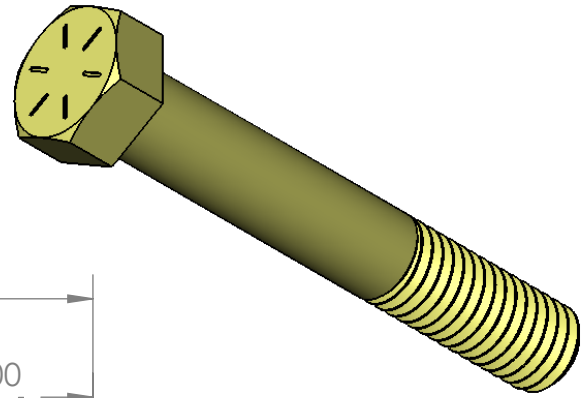


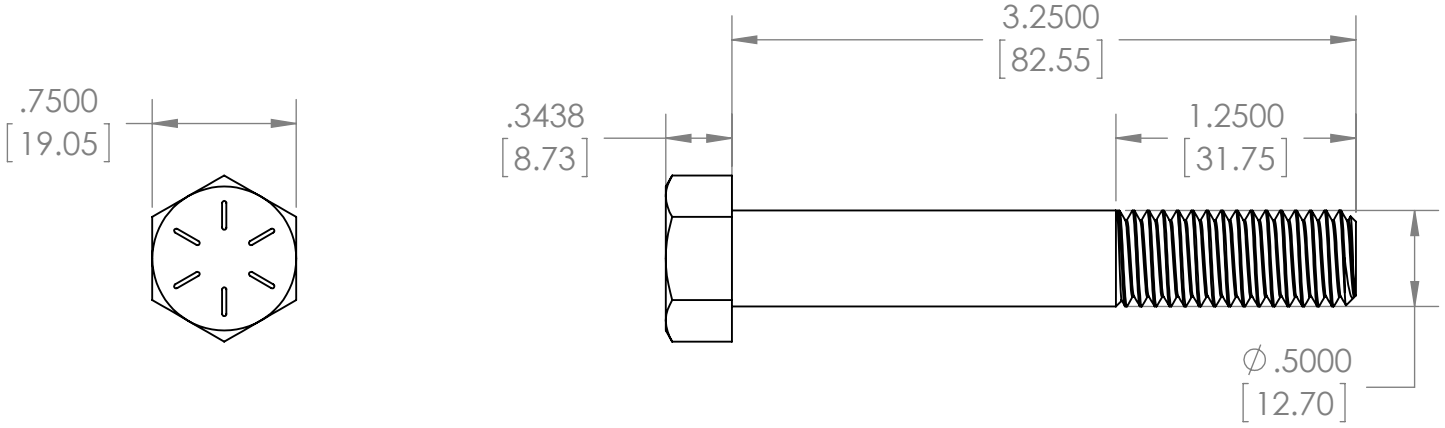



| | | | |
|---|---|---|---|
| TITLE: 0.5-13 x 3 HHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Plain Carbon Steel | | FINISH: Yellow Zinc | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 1:1 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.18 | SHEET 1 OF 1 |

# Quantity: 4

## 1/2-13 x 3.25 Zinc Yellow-Chromate Plated Grade 8 Steel Hex Head Screw



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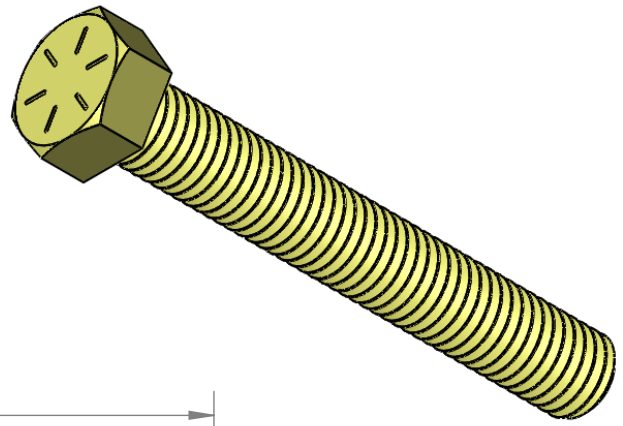
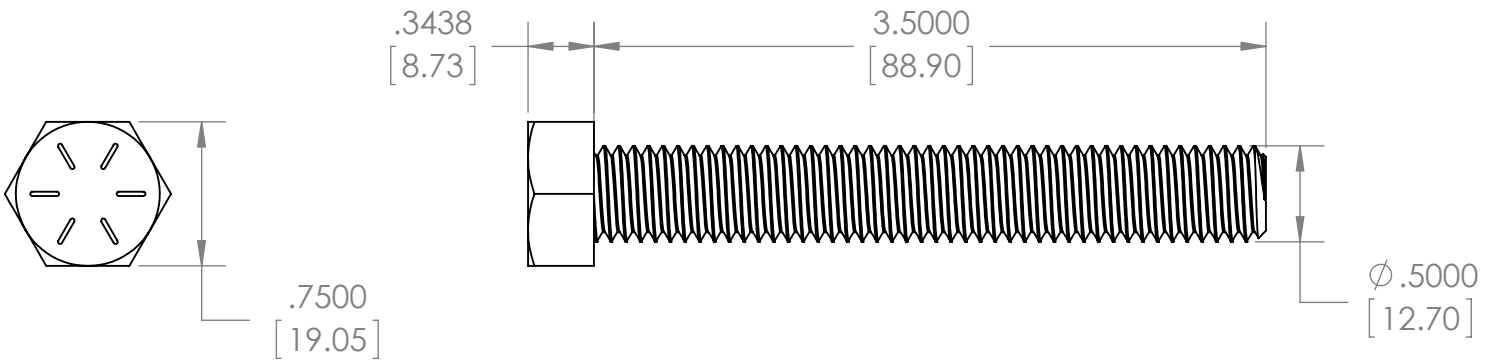
| | | | |
|---|---|---|---|
| TITLE: 0.5-13 x 3.25 HHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Plain Carbon Steel | | FINISH: Zinc Yellow Chromate | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 1:1 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.21 | SHEET 1 OF 1 |

# Quantity: 2

## 1/2-13 x 3.5" Zinc Yellow-Chromate Plated Grade 8 Steel Heax Head Screw



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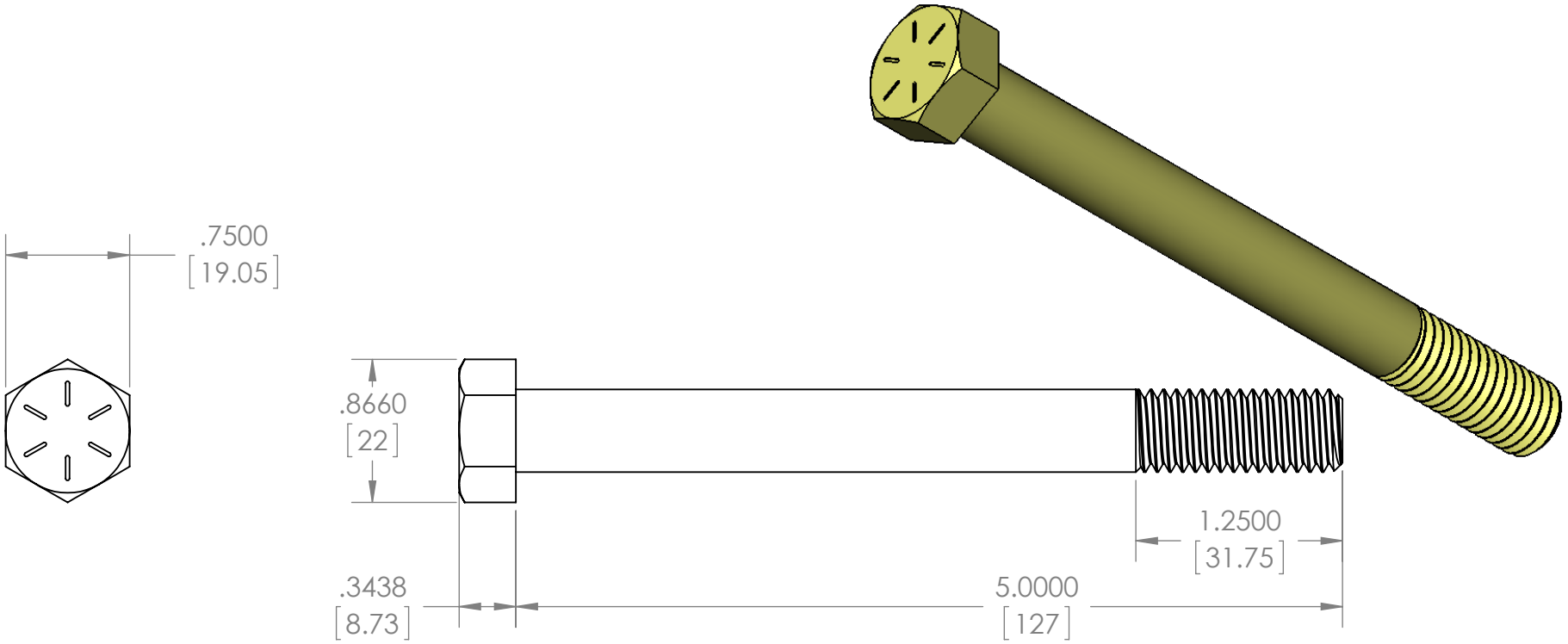
| | | | |
|---|---|---|---|
| TITLE: 0.5-13 x 3.5 HHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Plain Carbon Steel | | FINISH: Zinc Yellow-Chromate | |
| TOLERANCES: Manufacturer Spec | | | |
| SCALE: 1:1 | SIZE: A | DATE: 2/23/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.20 | SHEET 1 OF 1 |

# Quantity: 4

## 1/2-13 x 5 Zinc Yellow-Chromate Plated Grade 8 Steel Hex Head Screw

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TITLE: 0.5-13 x 5 HHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Plain Carbon Steel

FINISH: Zinc Yellow Chromate

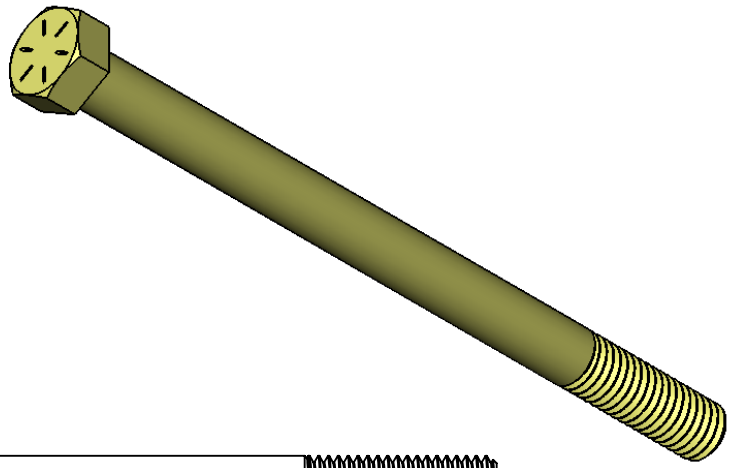
TOLERANCES: Manufacturer Specs

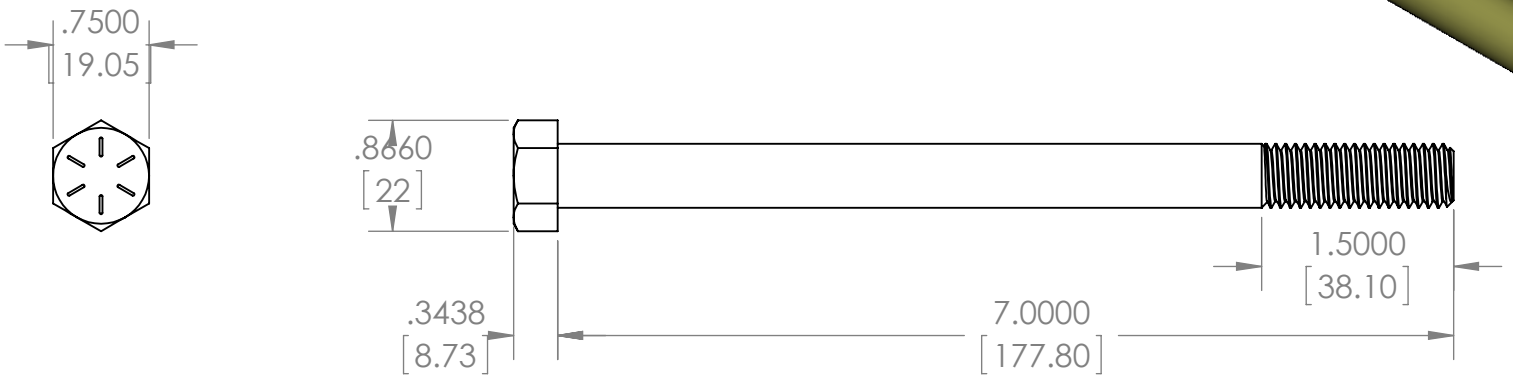
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.31 | SHEET 1 OF 1

# Quantity: 2

## 1/2-13 x 7 Zinc Yellow-Chromate Plated Grade 8 Steel Hex Head Screw



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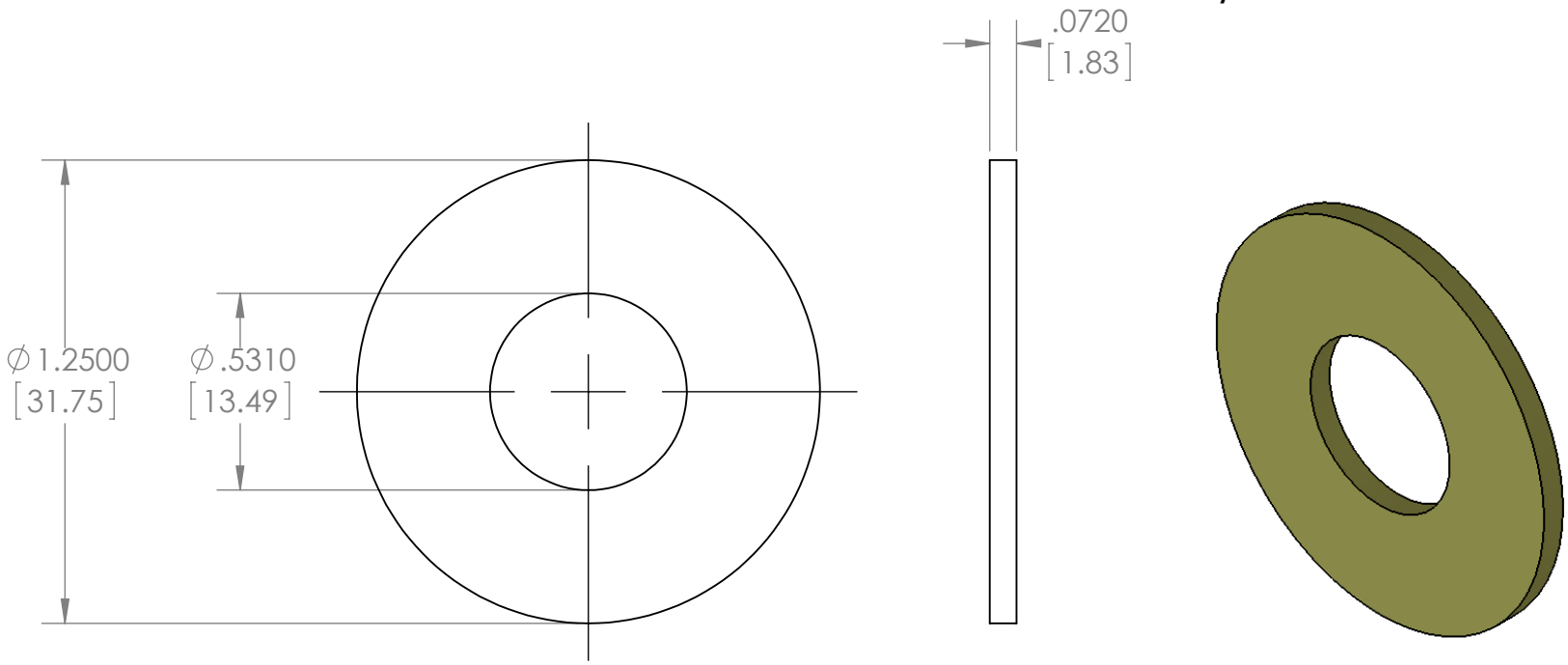
| | | | |
|---|---|---|---|
| TITLE: 0.5-13 x 7 HHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Plain Carbon Steel | | FINISH: Zinc Yellow Chromate | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 1:2 | SIZE: A | DATE: 2/16/2018 | REV: |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.42 | SHEET 1 OF 1 |

# Quantity: 70

## 1/2" Flat Washer

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TITLE: 0.5in Washer

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Yellow Zinc |

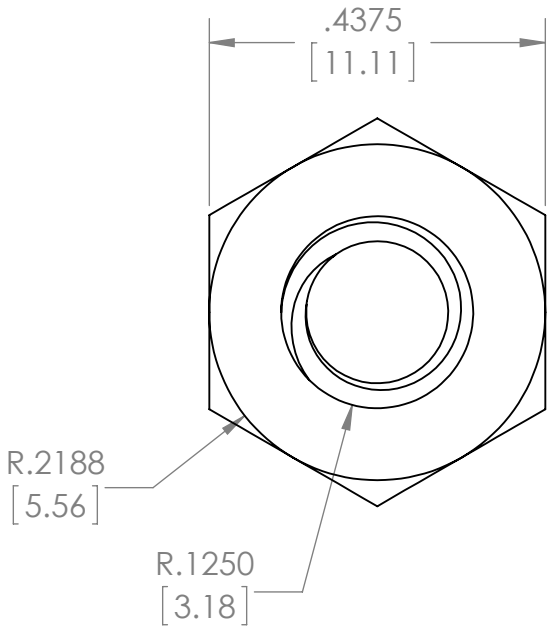
TOLERANCES: Manufacturer Specs

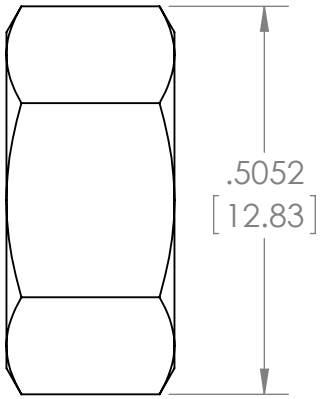
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/16/2018 | 2 |

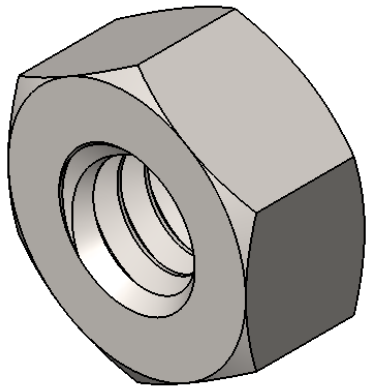
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.02 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 7

## 1/4-20 High-Strength Steel Hex Nut



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TITLE: 0.25-20 Hex Nut

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Plain |

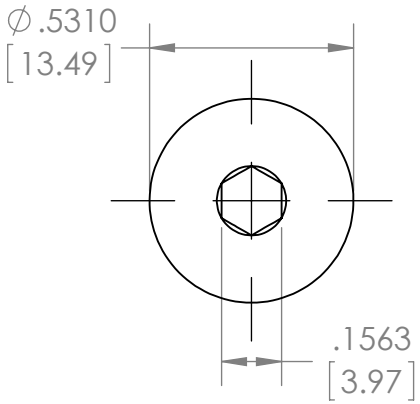
TOLERANCES: Manufacturer Specs

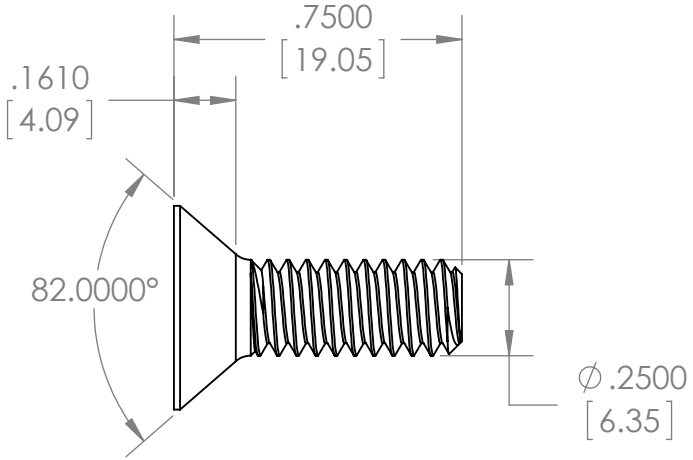
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 4:1 | A | 2/16/2018 | 2 |

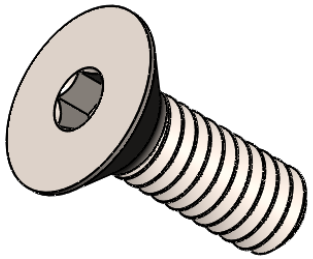
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.008 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 4

## 1/4-20 x 0.75" 316 Stainless Steel Hex Drive Flat Head Screw



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TITLE: 0.25-20 x 0.75 FHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: AISI Type 316L stainless steel

FINISH: Plain

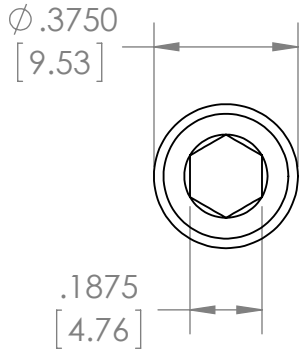
TOLERANCES: Manufacturer Spec

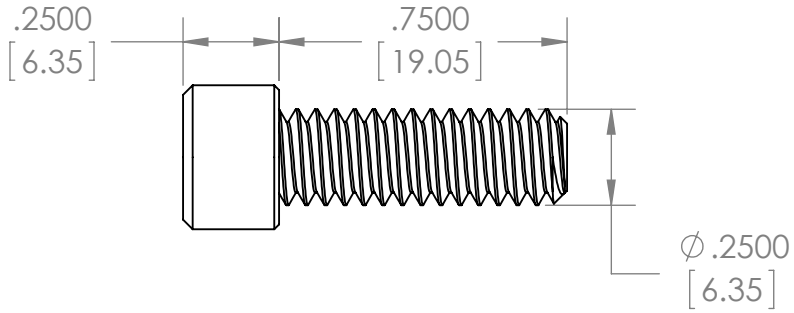
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/23/2018 | 2 |

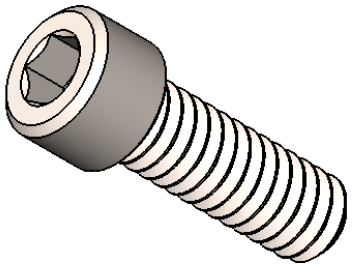
DO NOT SCALE DRAWING | WEIGHT (LBS): 0.012 | SHEET 1 OF 1

# Quantity: 4

## 1/4-20 x 3/4 Grade 18-8 Stainless Steel Socket Head Screw



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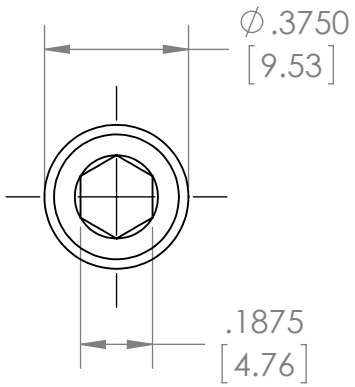
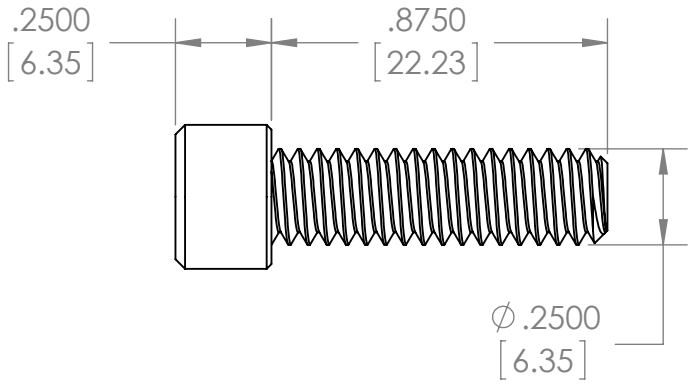
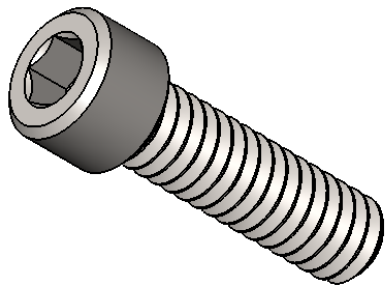
| | | | |
|---|---|---|---|
| TITLE: 0.25-20 x 0.75 SHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Stainless Steel (ferritic) | | FINISH: Plain | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 2:1 | SIZE: A | DATE: 2/19/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.01 | SHEET 1 OF 1 |

# Quantity: 24

## 1/4-20 x 7/8 Grade 18-8 Stainless Steel Socket Head Screw



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TITLE: 0.25-20 x 0.875 SHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| AISI 304 | Plain |

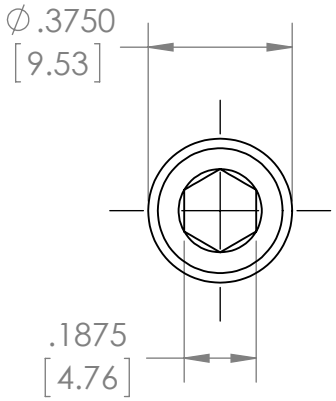
TOLERANCES: Manufacturer Specs

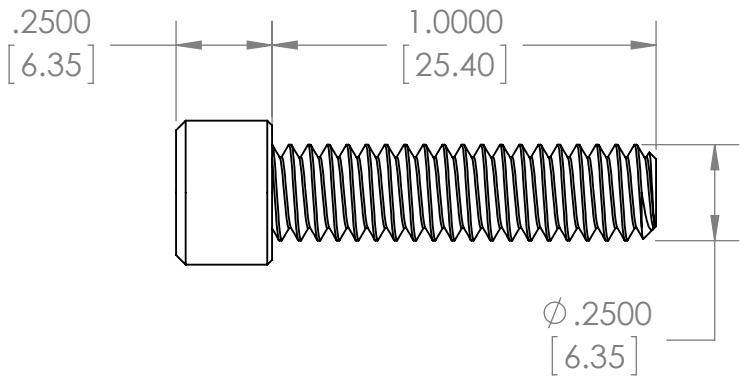
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/16/2018 | 2 |

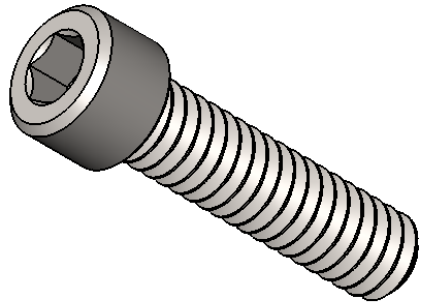
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.02 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 1/4-20 x 1 Grade 18-8 Stainless Steel Socket Head Screw



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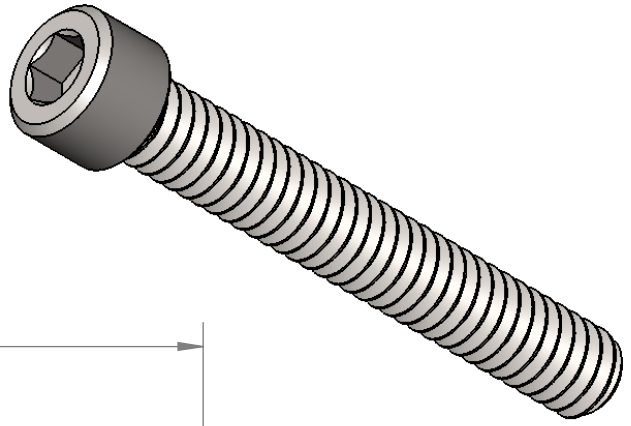
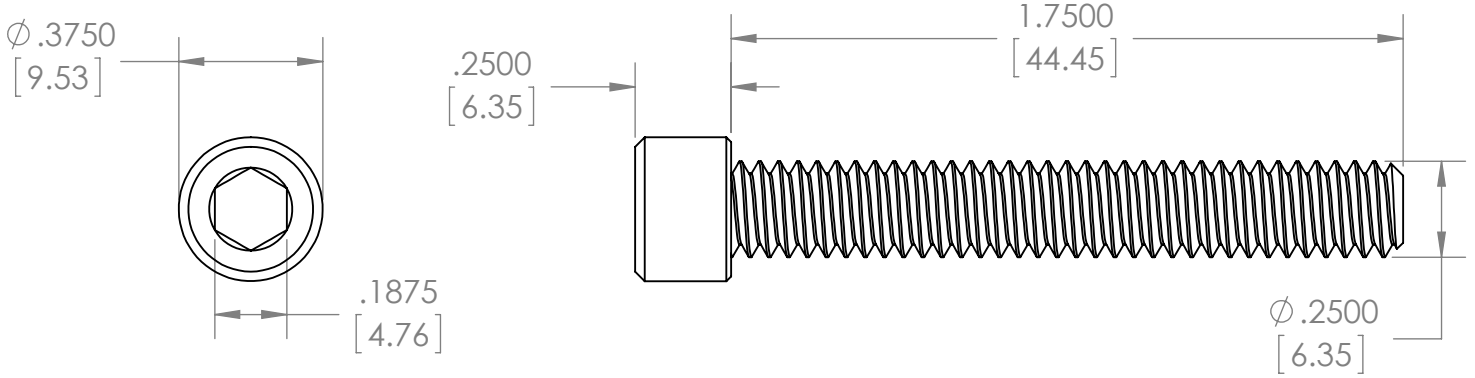
| | | | |
|---|---|---|---|
| TITLE: 0.25-20 x 1 SHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: AISI 304 | | FINISH: Plain | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 2:1 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.02 | SHEET 1 OF 1 |

# Quantity: 16

## 1/4-20 x 1.75in Grade 18-8 Stainless Steel Socket Head Screw



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TITLE: 0.25-20 x 1.75 SHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| AISI 304 | Plain |

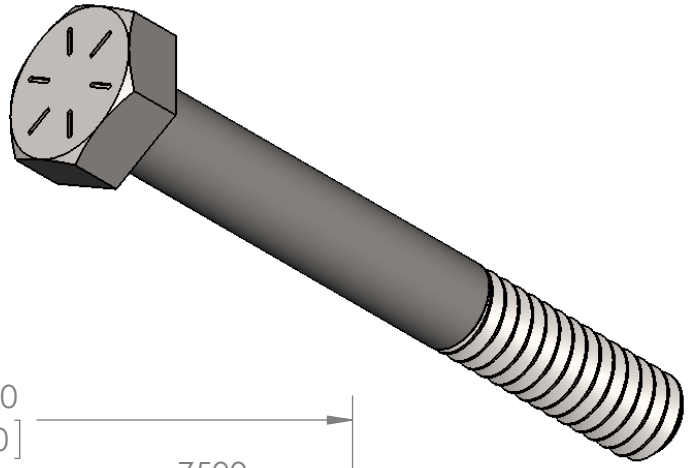
TOLERANCES: Manufacturer Specs

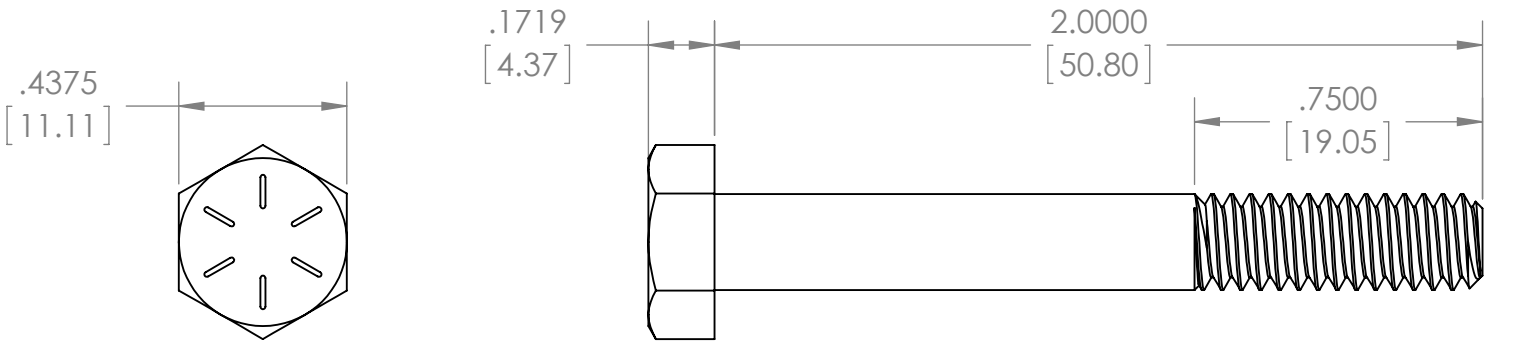
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/16/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.03 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 3

## 1/4-20 x 2in Grade 18-8 Stainless Steel Hex Head Screw



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TITLE: 0.25-20 x 2 HHS PT

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| AISI 304 | Plain |

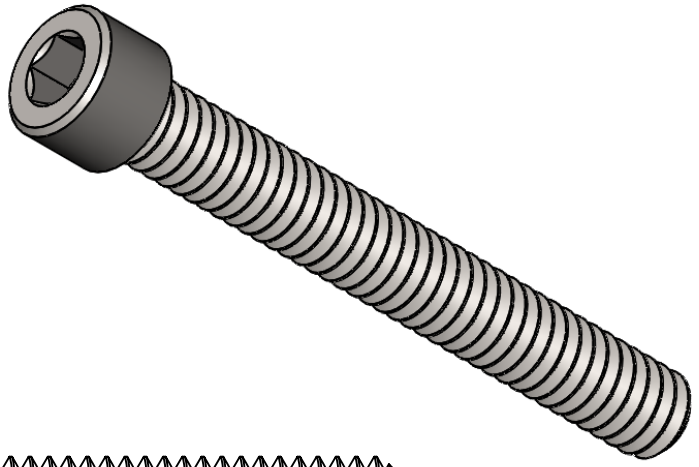
TOLERANCES: Manufacturer Specs

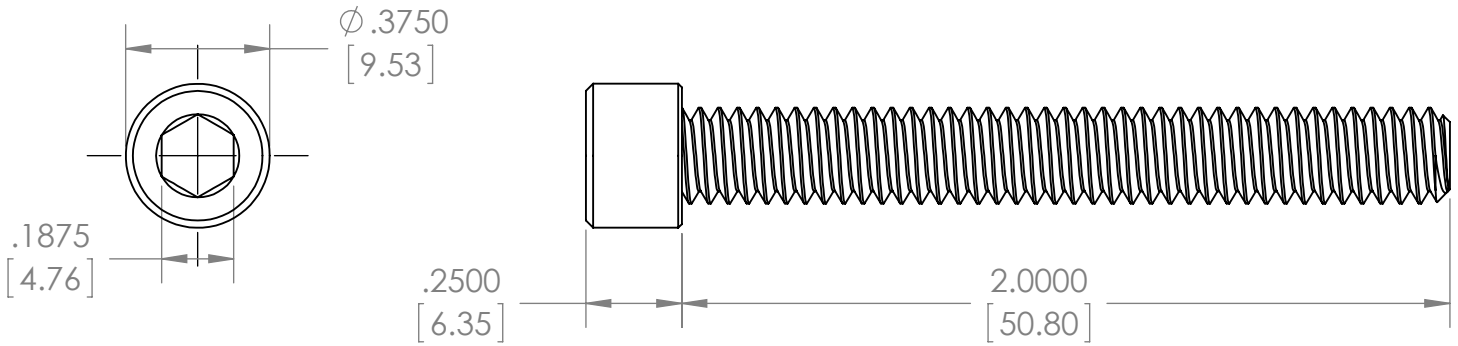
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/19/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.03 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 3

## 1/4-20 Grade 18-8 Stainless Steel Socket Head Screw



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TITLE: 0.25-20 x 2 SHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: AISI 304

FINISH: Plain

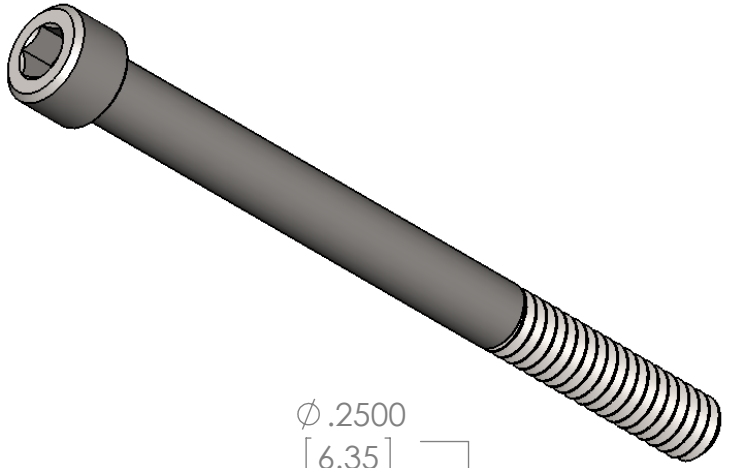
TOLERANCES: Manufacturer Specs

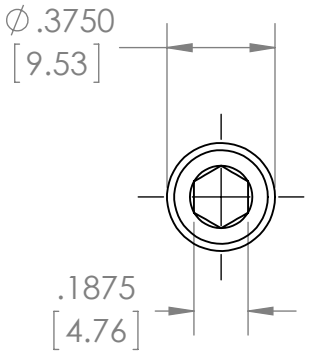
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/16/2018 | 2 |

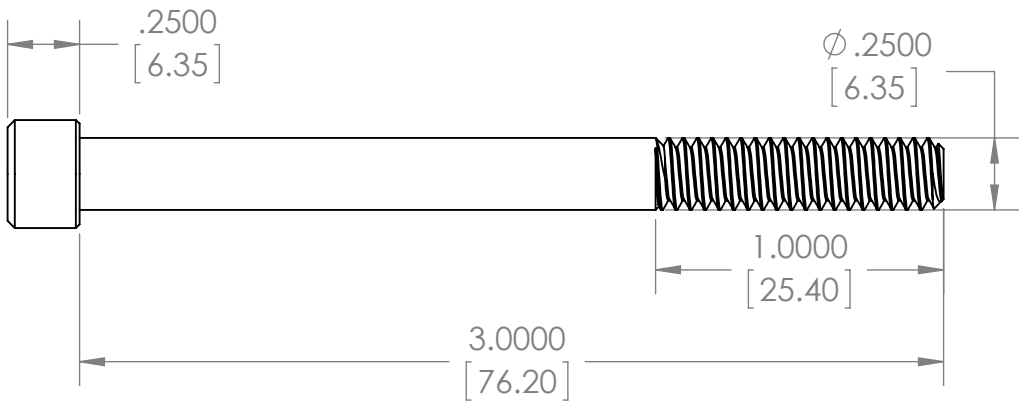
DO NOT SCALE DRAWING | WEIGHT (LBS): 0.03 | SHEET 1 OF 1

# Quantity: 5

## 1/4-20 x 3in Grade 18-8 Stainless Steel Socket Head Screw



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TITLE: 0.25-20 x 3 SHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| AISI 304 | Plain |

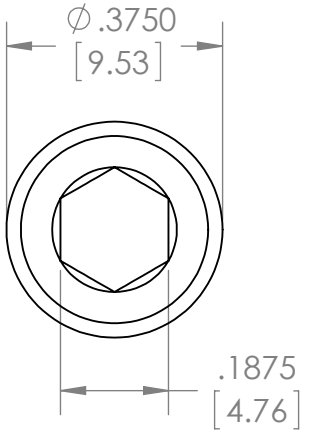
TOLERANCES: Manufacturer Specs

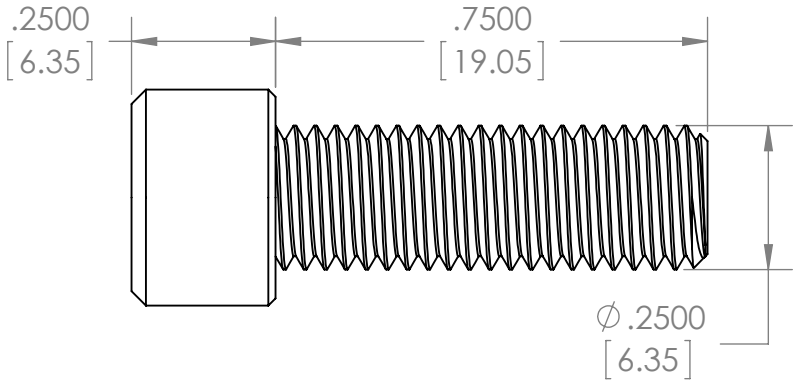
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 3:2 | A | 2/19/2018 | 2 |

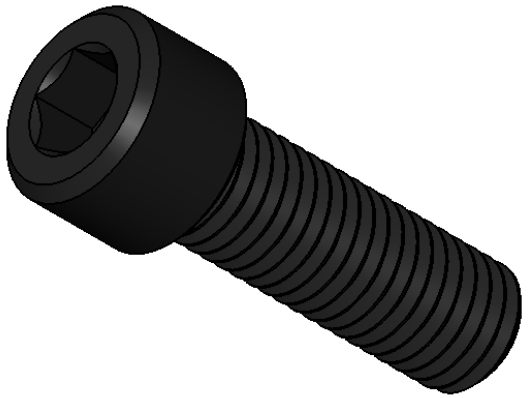
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.05 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 2

## 1/4-28 x 3/4 Black Oxide Alloy Steel Socket Head Screw



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TITLE: 0.25-28 x 0.75 SHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Alloy Steel | Black Oxide |

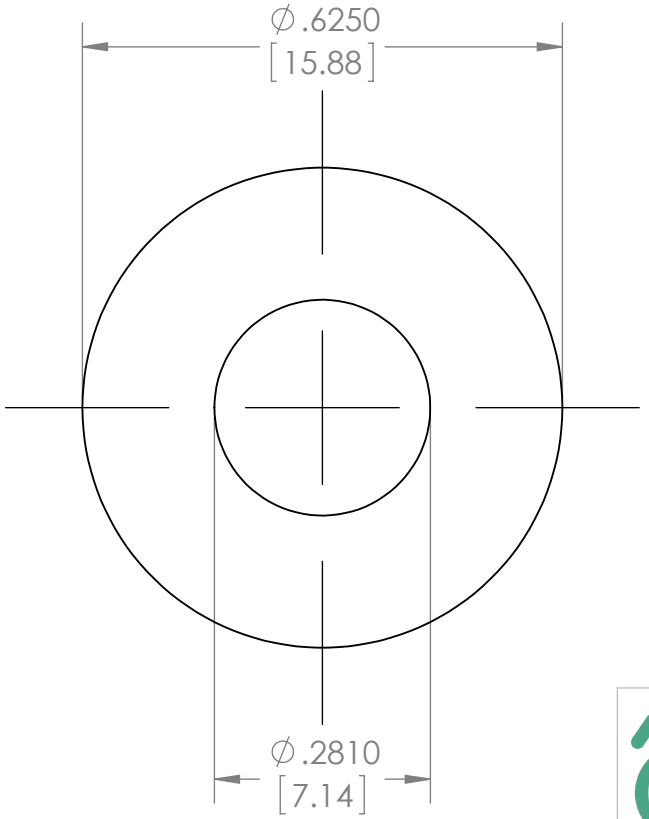
TOLERANCES: Manufacturer Specs

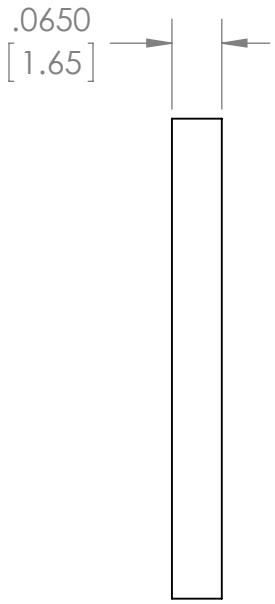
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 3:1 | A | 2/16/2018 | 2 |

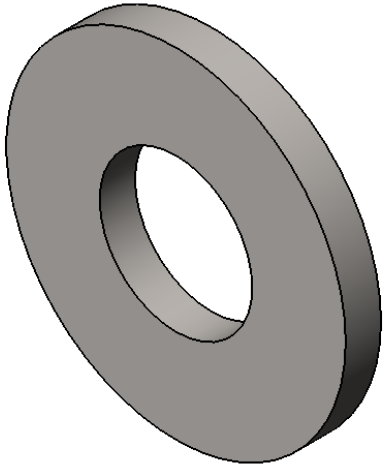
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.01 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 13

## 1/4" Grade 18-8 Stainless Steel Flat Washer



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TITLE: 0.25in Washer

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| AISI 304 | Plain |

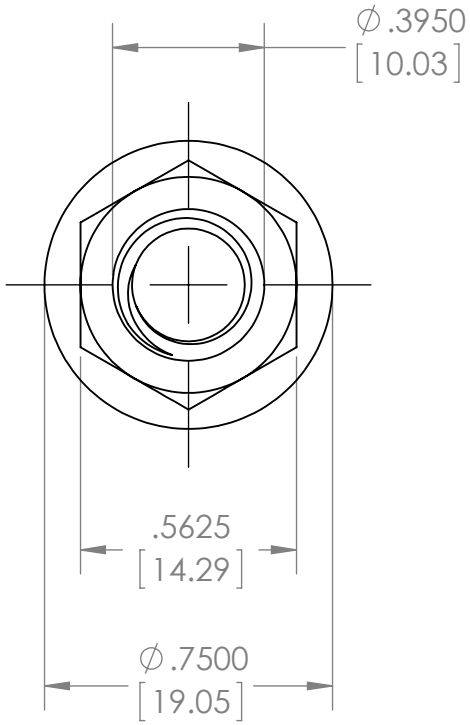
TOLERANCES: Manufacturer Specs

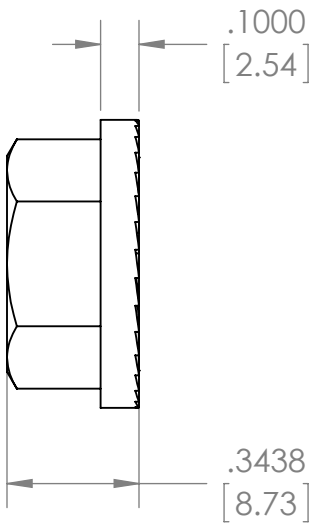
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 4:1 | A | 2/16/2018 | 2 |

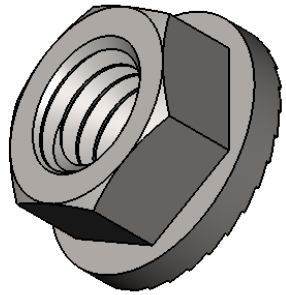
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.00 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 16

## 3/8-16 Grade 18-8 Stainless Steel Serrated Flange Locknut



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TITLE: 0.375-16 Flange Locknut

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| AISI 304 | Plain |

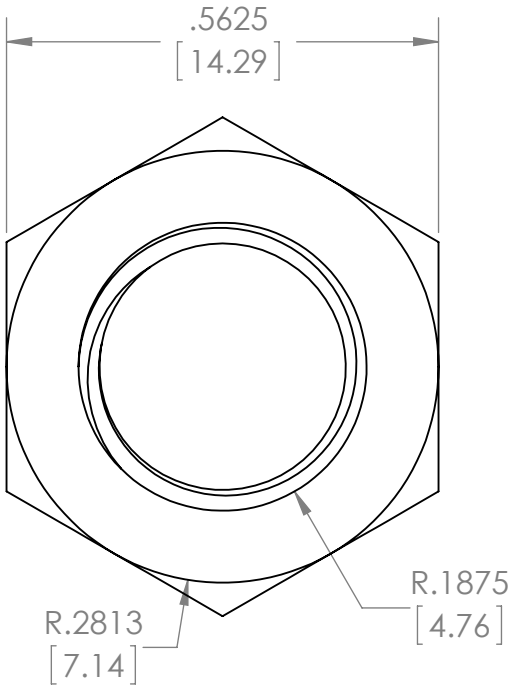
TOLERANCES: Manufacturer Specs

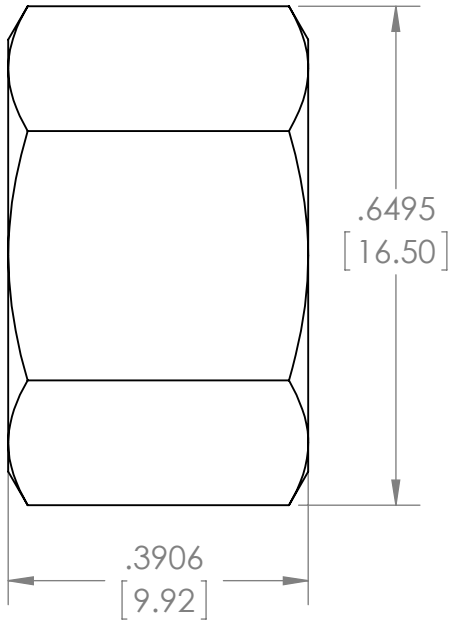
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/16/2018 | 2 |

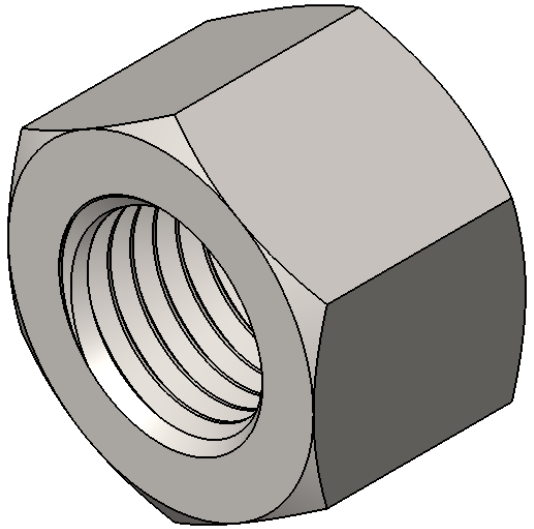
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.02 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 16

## 3/8-16 High-Strength Steel Hex Nut



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TITLE: 0.375-16 Hex Nut

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Plain |

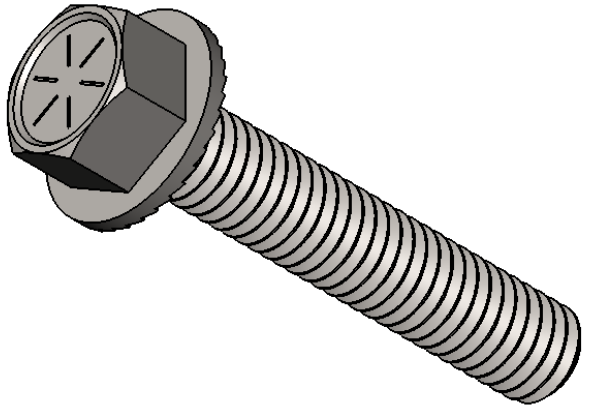
TOLERANCES: Manufacturer Specs

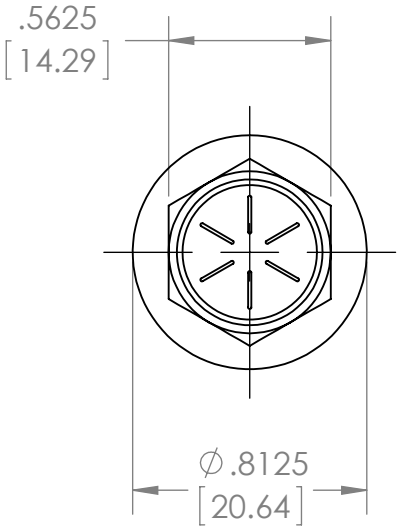
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 4:1 | A | 2/19/2018 | 2 |

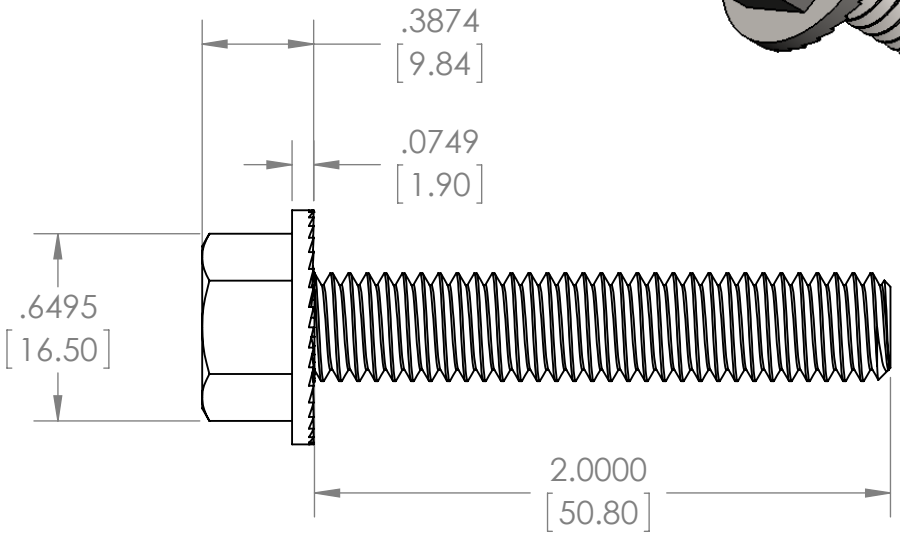
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.019 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 16

## 3/8-16 x 2 Grade 18-8 Stainless Steel Serratied-Flange Hex Head Screw



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TITLE: 0.375-16 x 2 Flange HHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| AISI 304 | Plain |

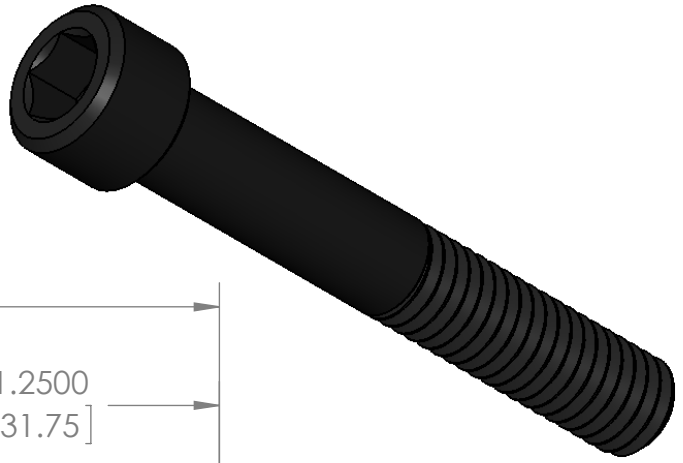
TOLERANCES: Manufacturer Specs

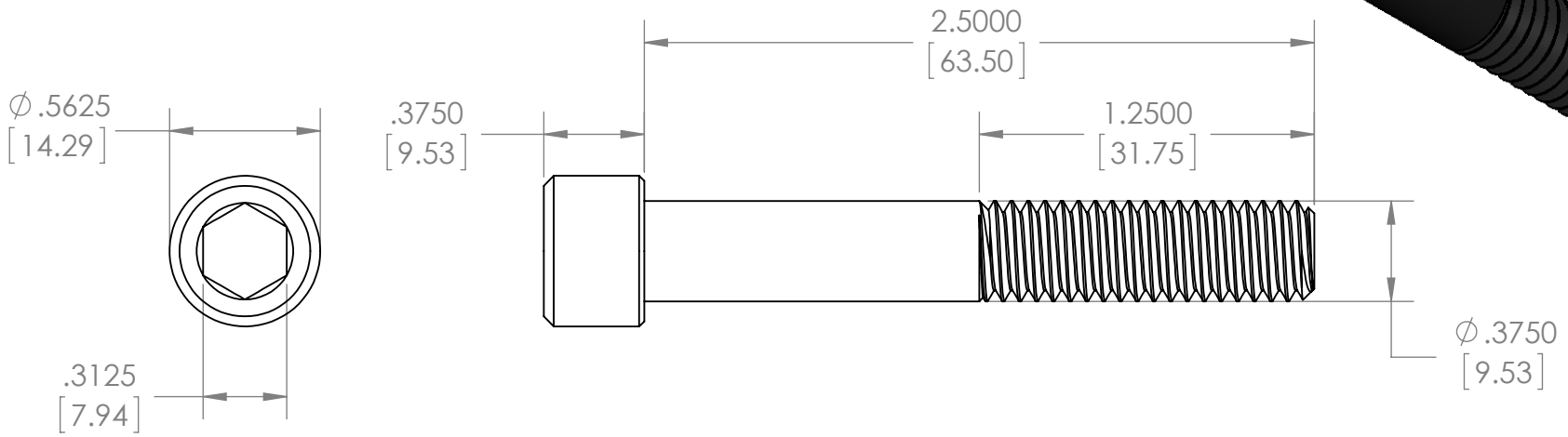
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 3:2 | A | 2/19/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.085 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## 3/8-16 x 2.5 Black-Oxide Alloy Steel Socket Head Screw



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TITLE: 0.375-16 x 2.5 SHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Alloy Steel

FINISH: Black Oxide

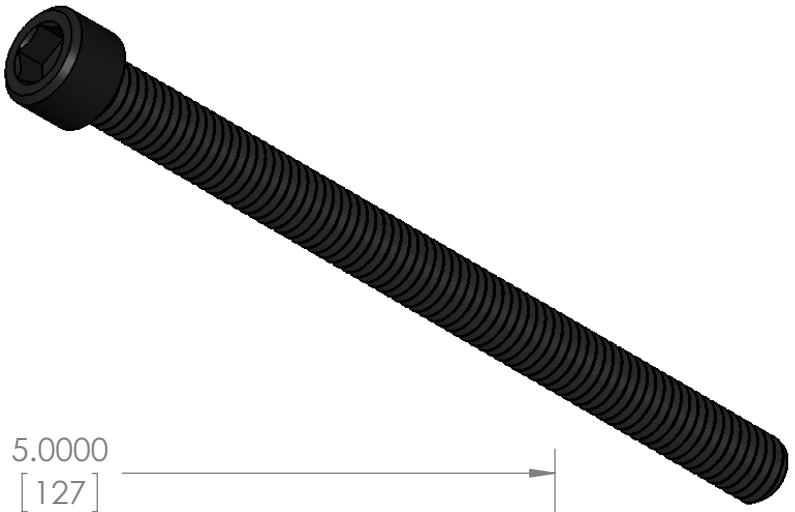
TOLERANCES: Manufacturer Specs

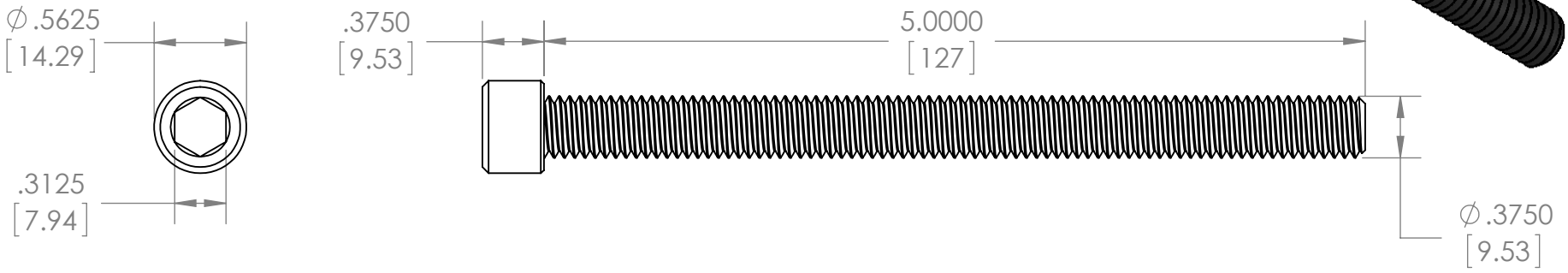
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 3:2 | A | 2/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.09 | SHEET 1 OF 1

# Quantity: 8

## 3/8-16 x 5 Black-Oxide Alloy Steel Socket Head Screw



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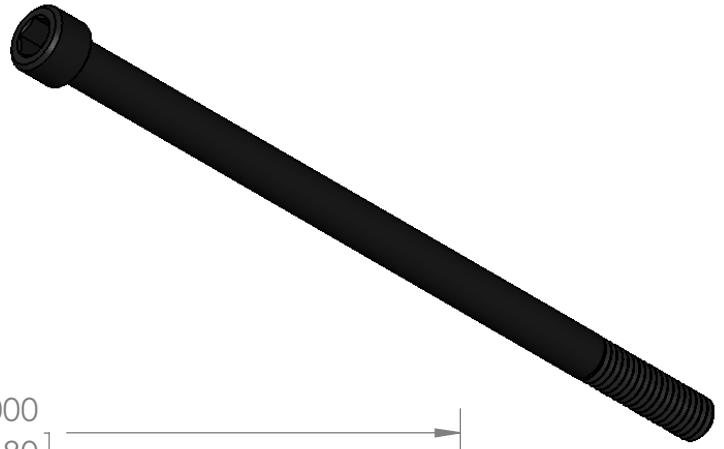
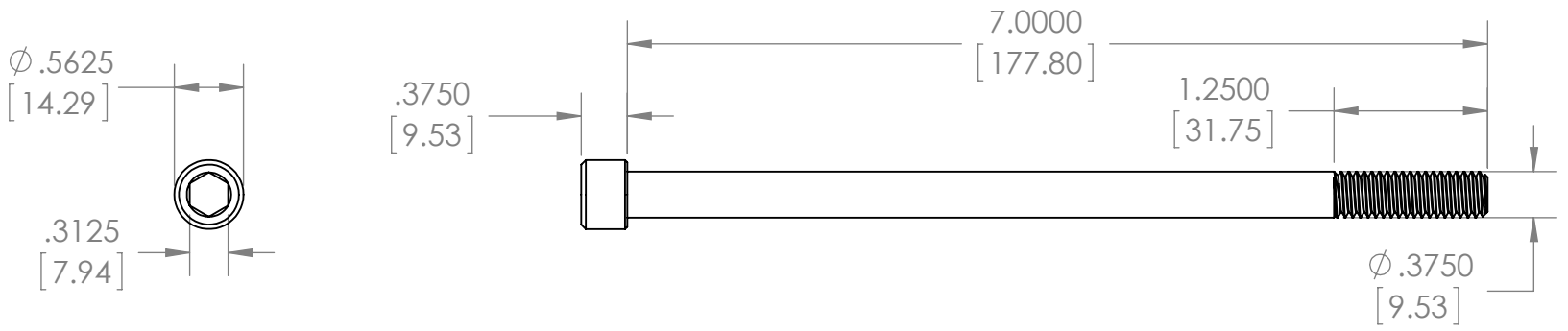
| | | | |
|---|---|---|---|
| TITLE: 0.375-16 x 5 SHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Alloy Steel | | FINISH: Black-Oxide | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 1:1 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.14 | SHEET 1 OF 1 |

# Quantity: 8

## 3/8-16 x 7 Black-Oxide Alloy Steel Socket Head Screw



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TITLE: 0.375-16 x 7 SHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: Alloy Steel

FINISH: Black Oxide

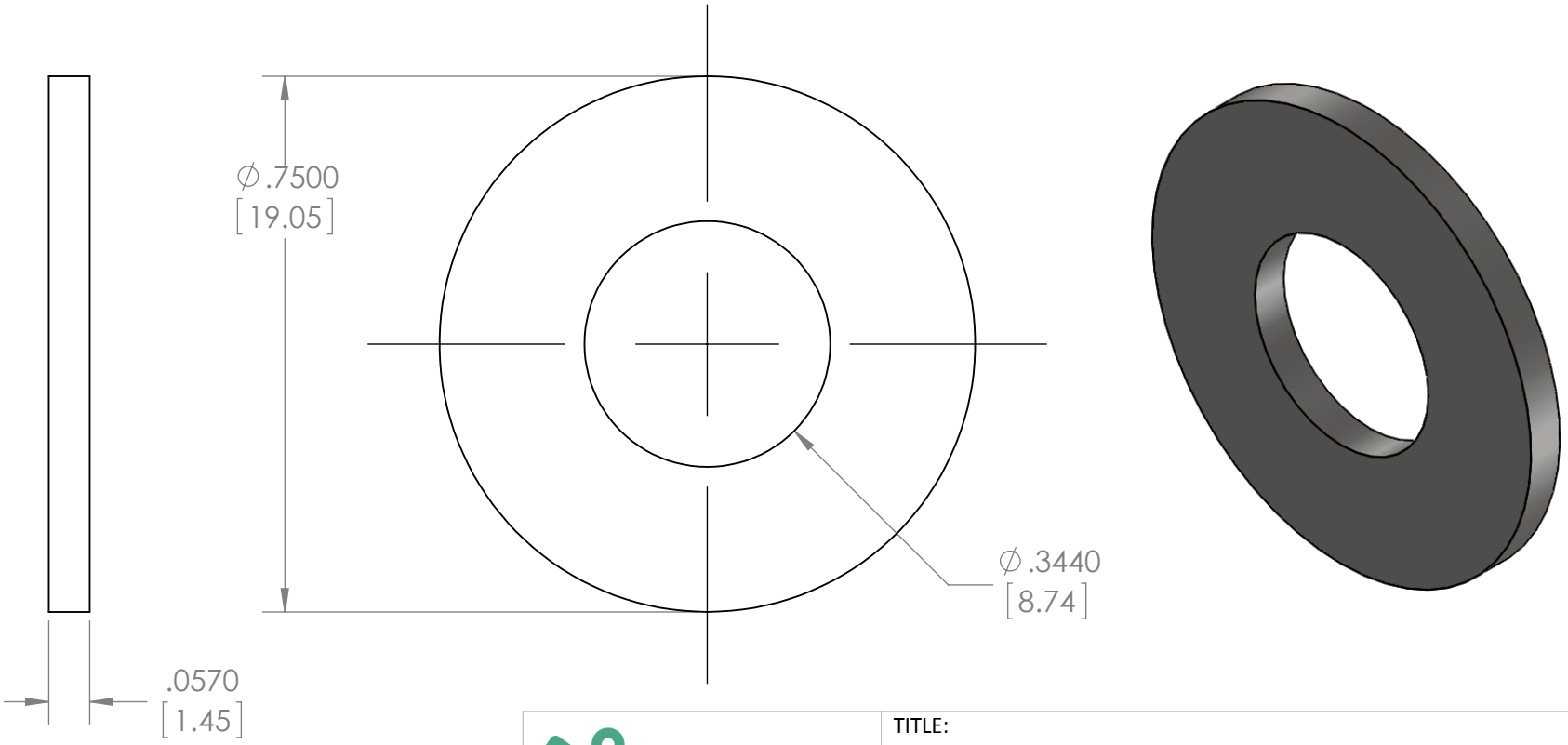
TOLERANCES: Manufacturer Specs

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:3 | A | 2/16/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.23 | SHEET 1 OF 1

# Quantity: 16

## 5/16" ID Grade 18-8 Stainless Steel Flat Washer

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TITLE: 0.3125in Flat Washer

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| AISI 304 | Plain |

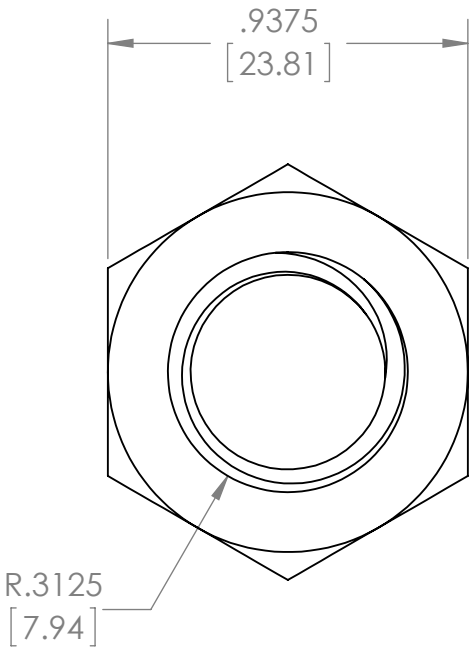
TOLERANCES: Manufacturer Specs

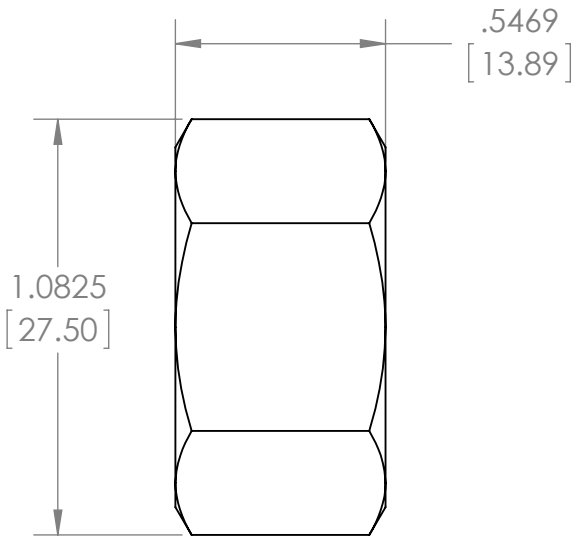
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 4:1 | A | 2/16/2018 | 2 |

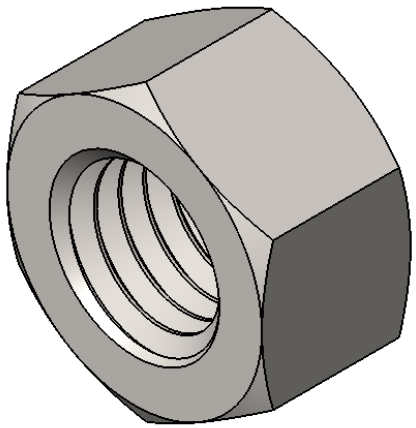
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.01 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## 5/8-11 High-Stength Steel Hex Nut



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TITLE: 0.625-11 Hex Nut

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Plain |

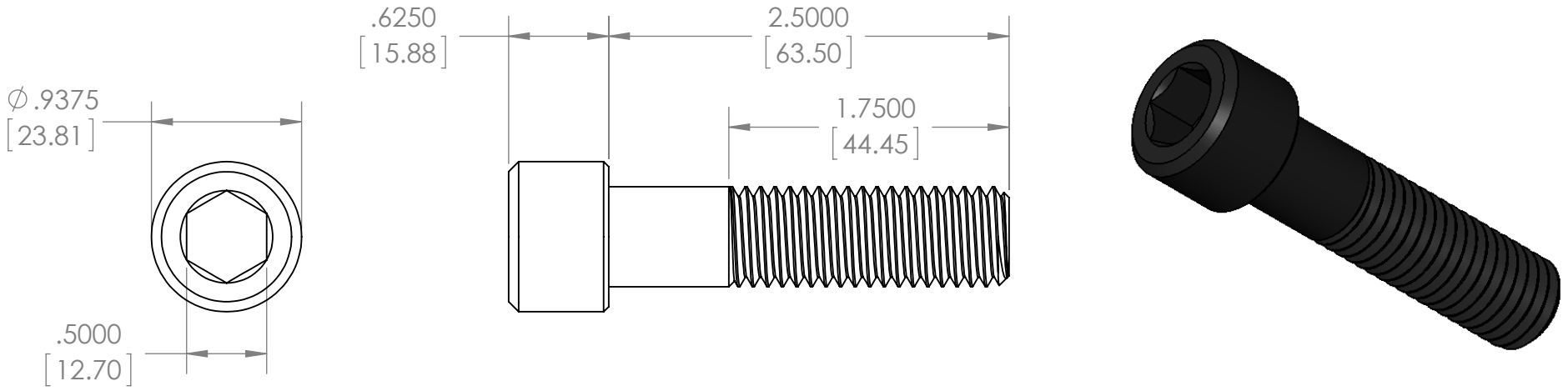
TOLERANCES: Manufacturer Specs

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/19/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.077 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 16

## 5/8-11 x 2.5 Black-Oxide Alloy Steel Socket Head Screw



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TITLE: 0.625-11 x 2.5 SHS PT

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Alloy Steel | Black Oxide |

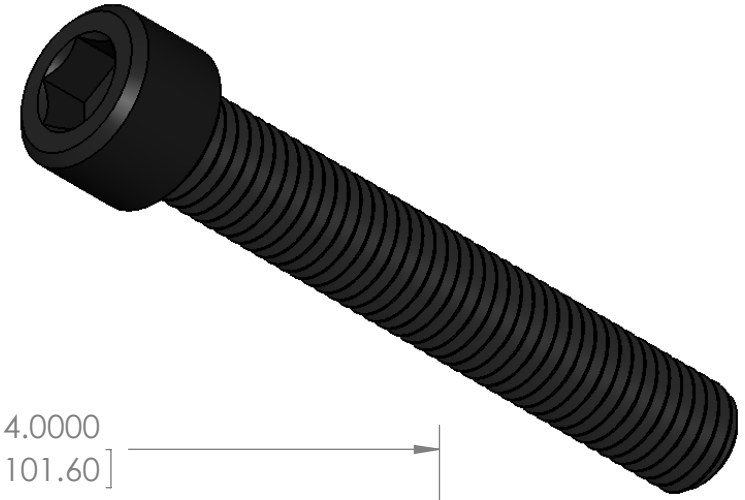
TOLERANCES: Manufacturer Specs

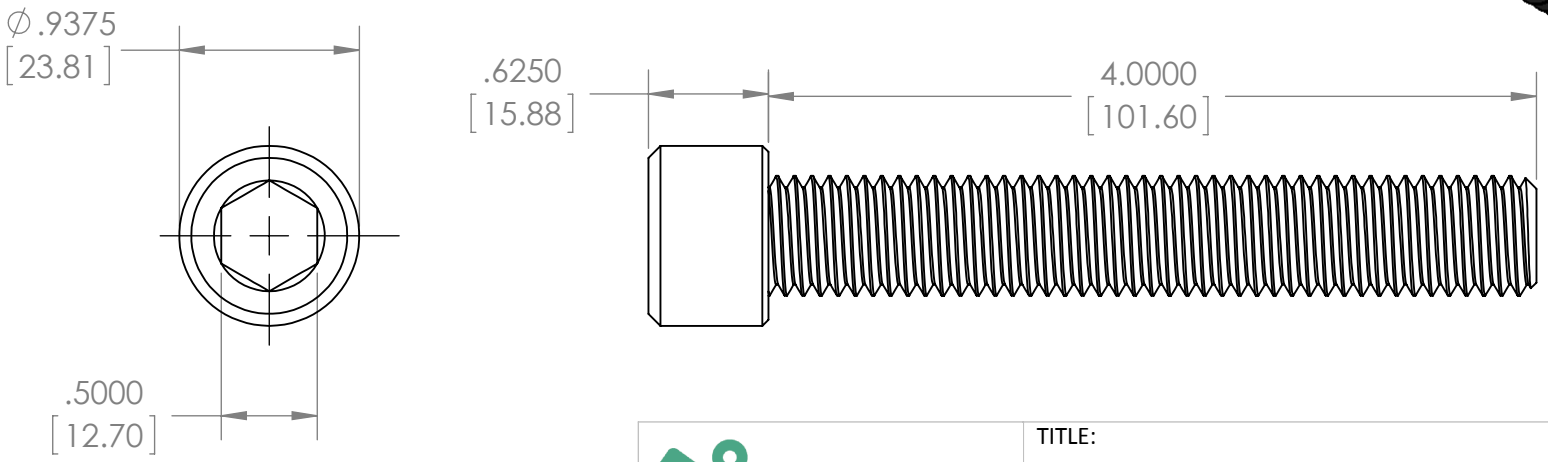
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/16/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.28 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 4

## 5/8-11 x 4in Black-Oxide Alloy Steel Socket Head Screw



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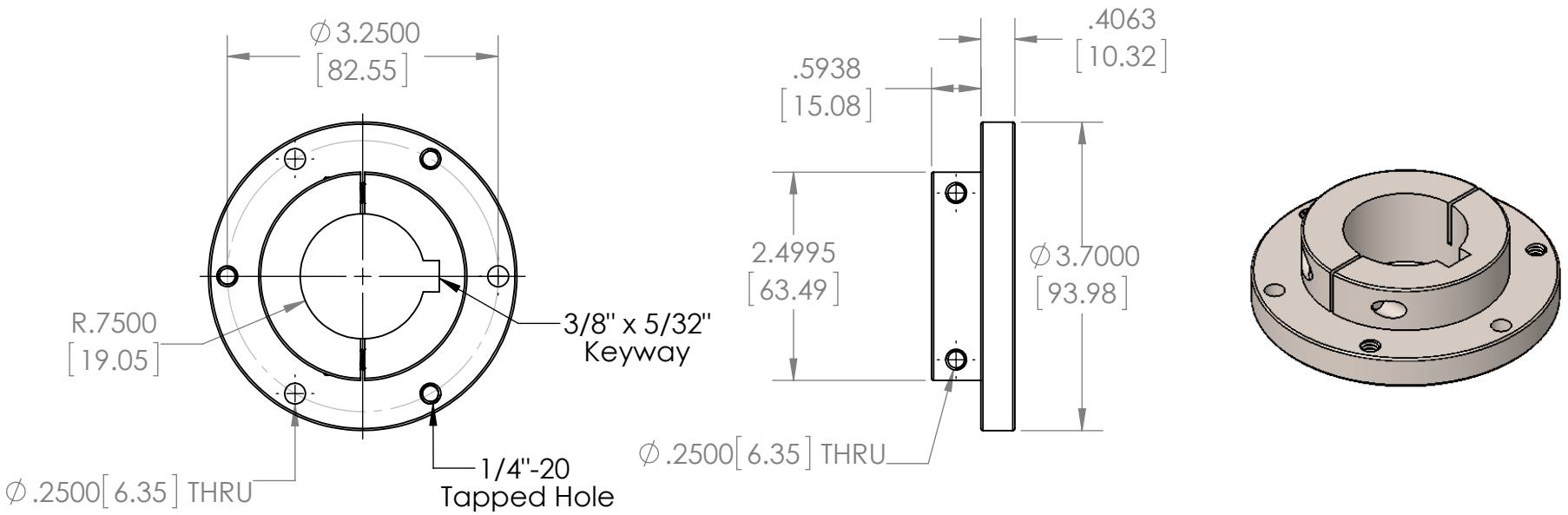
| | | | |
|---|---|---|---|
| TITLE: 0.625-11 x 4 SHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Alloy Steel | | FINISH: Black Oxide | |
| TOLERANCES: + - | | | |
| SCALE: 1:2 | SIZE: A | DATE: 2/19/2018 | REV: |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.38 | SHEET 1 OF 1 |

# Quantity: 2

## 1.5" Flange-Mount Shaft Collar



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TITLE: 1.5in Shaft Flange

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Stainless Steel (ferritic) | Plain |

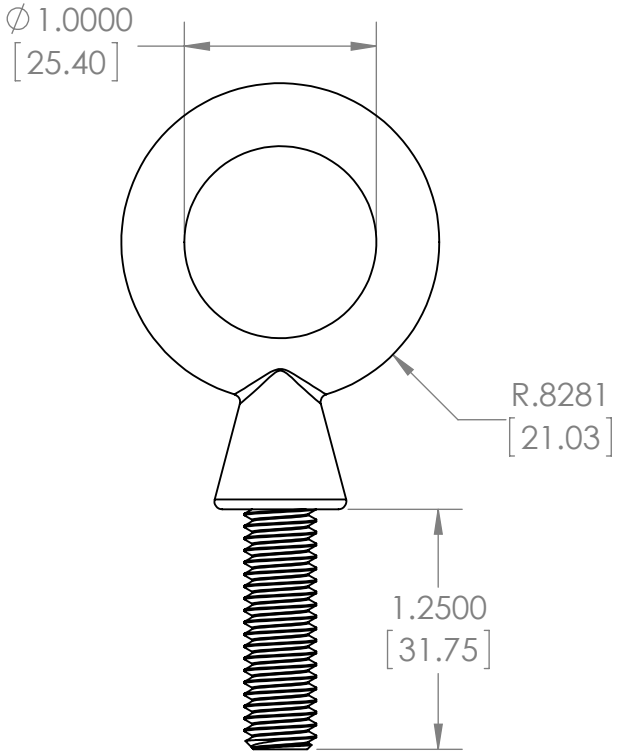
TOLERANCES: Manufacturer Spec

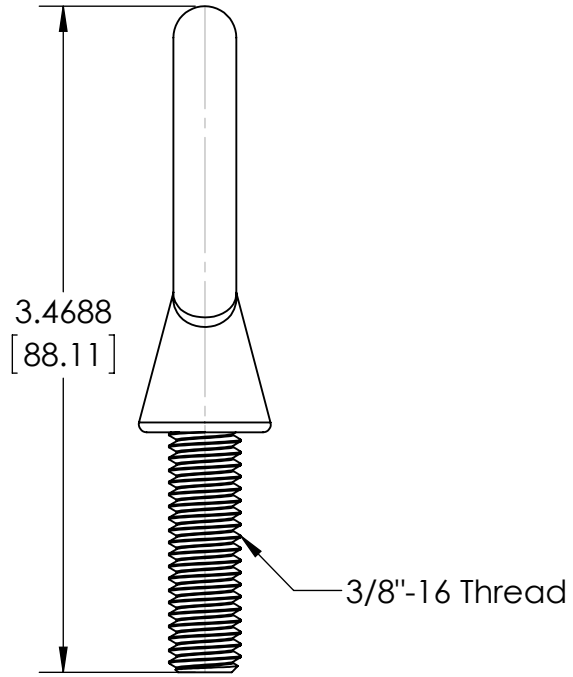
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

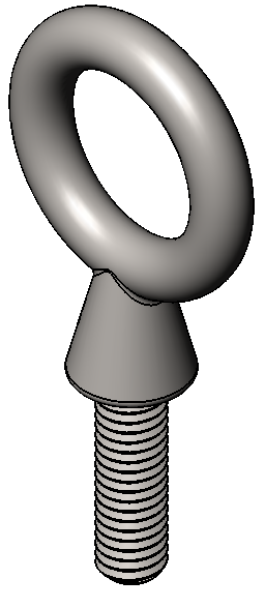
| DO NOT SCALE DRAWING | WEIGHT (LBS): 1.47 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## 1" Steel Eye Bolt with Shoulder, 3/8-16 Thread



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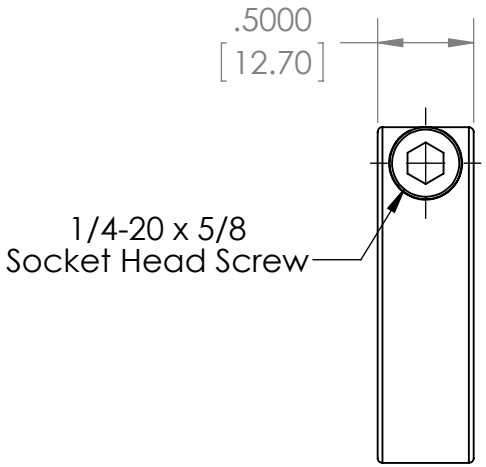
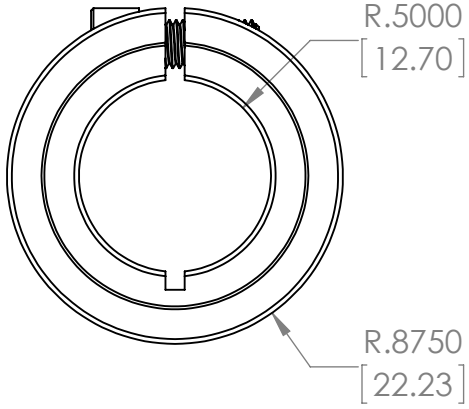
| | | | |
|---|---|---|---|
| TITLE: 1in Eye Bolt | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Plain Carbon Steel | | FINISH: Plain | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 1:1 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.17 | SHEET 1 OF 1 |

# Quantity: 8

## 1" 2024 Aluminum Clamping Shaft Collar

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TITLE: 1in Shaft Collar

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| 2024 Alloy | Plain |

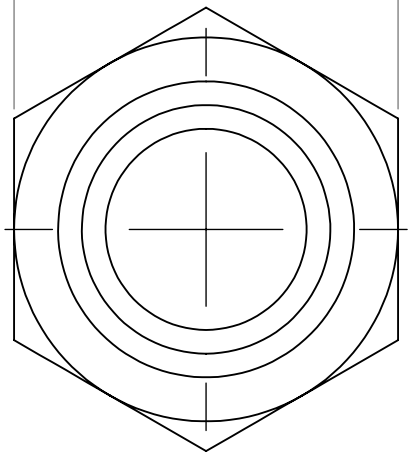
TOLERANCES: Manufacturer Specs

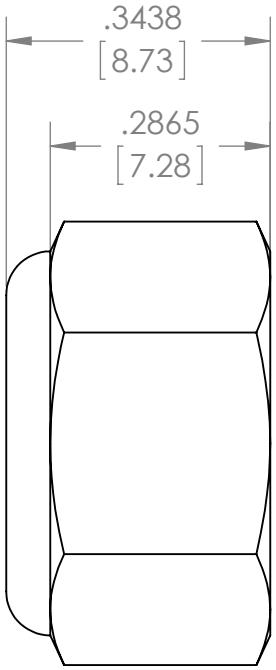
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/16/2018 | 2 |

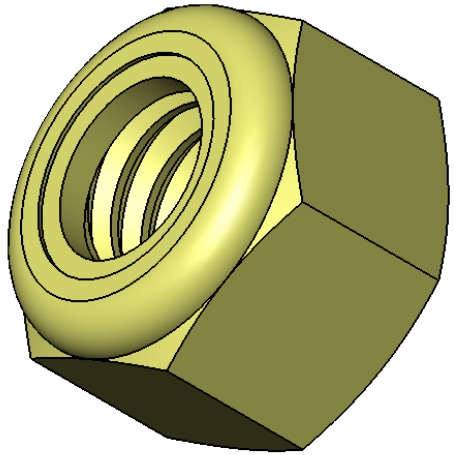
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.08 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 4

## 5/16-18 Grade 8 Yellow Zinc Steel Nylon Insert Locknut



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TITLE: 5-16-18 Locknut

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Yellow Zinc |

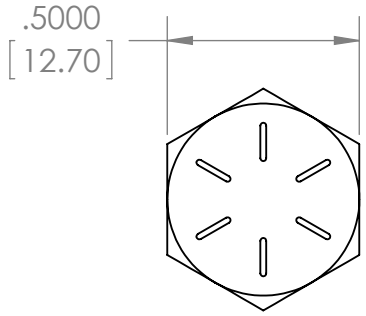
TOLERANCES: Manufacturer Specs

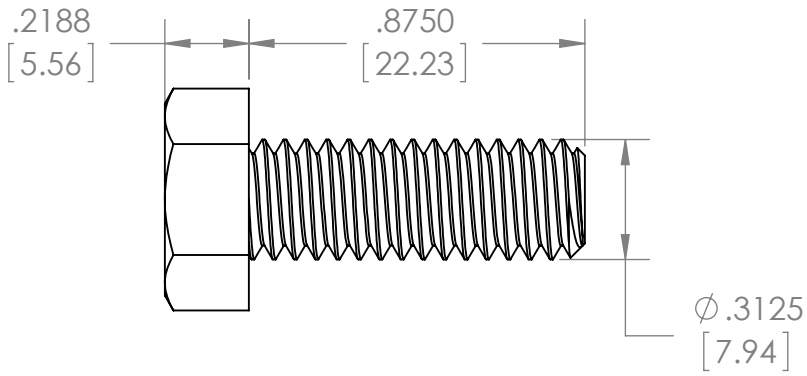
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 4:1 | A | 2/19/2018 | 2 |

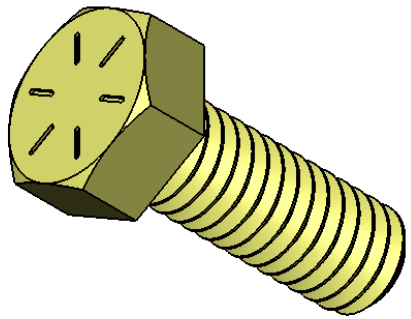
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.014 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 4

## 5/16-18 x 7/8 Zinc Yellow-Chromate Plated Grade 8 Steel Hex Head Screw



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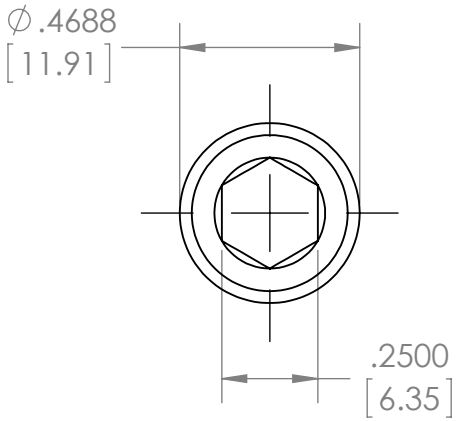
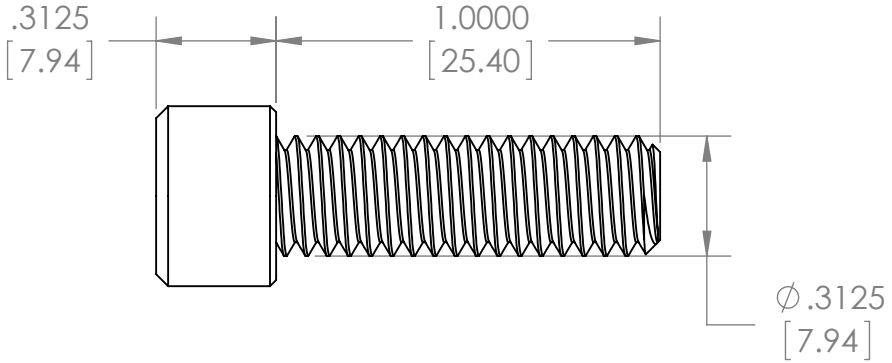
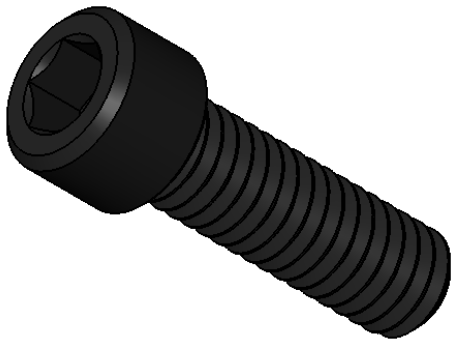
| | | | |
|---|---|---|---|
| TITLE: 5-16-18 x 0.875 HHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Plain Carbon Steel | | FINISH: Zinc Yellow-Chromate | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 2:1 | SIZE: A | DATE: 2/16/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.03 | SHEET 1 OF 1 |

# Quantity: 16

## 5/16-18 Black Oxide Alloy Steel Socet Head Screw



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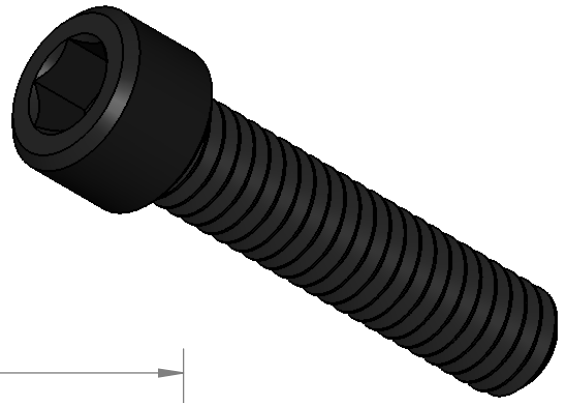
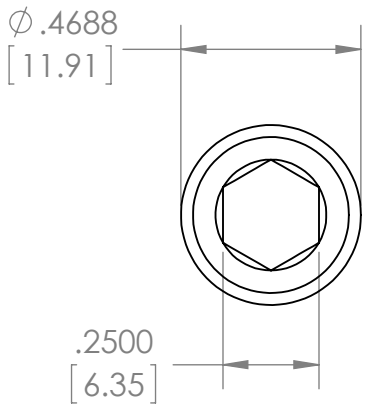
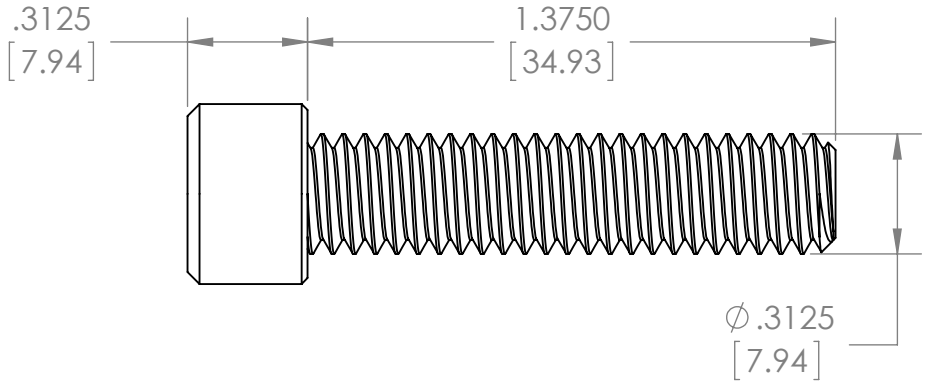
| | | | |
|---|---|---|---|
| TITLE: 5-16-18 x 1 SHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Alloy Steel | | FINISH: Black Oxide | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 2:1 | SIZE: A | DATE: 2/19/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.03 | SHEET 1 OF 1 |

# Quantity: 32

## 5/16-18 x 1.375 Black-Oxide Alloy Steel Socket Head Screw



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TITLE: 5-16-18 x 1.375 SHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Alloy Steel | Black Oxide |

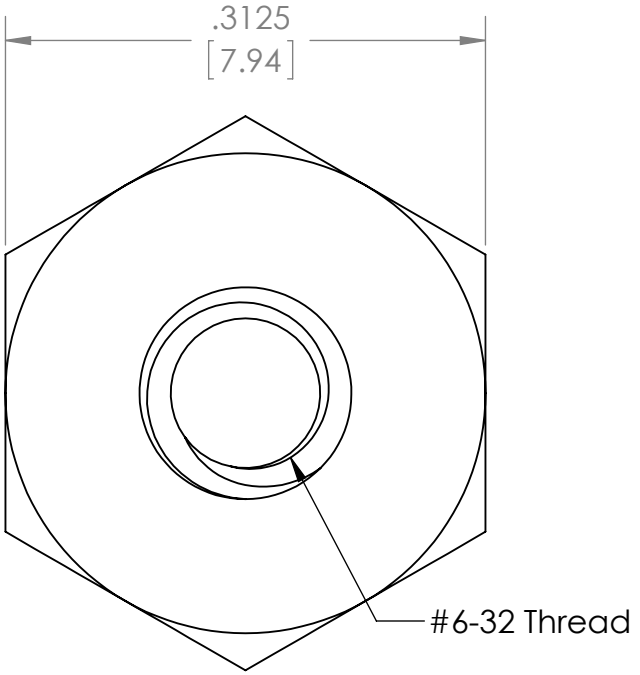
TOLERANCES: Manufacturer Specs

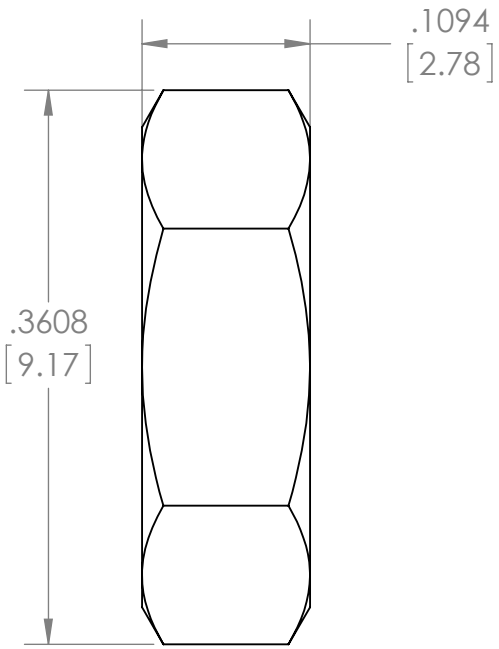
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/16/2018 | 2 |

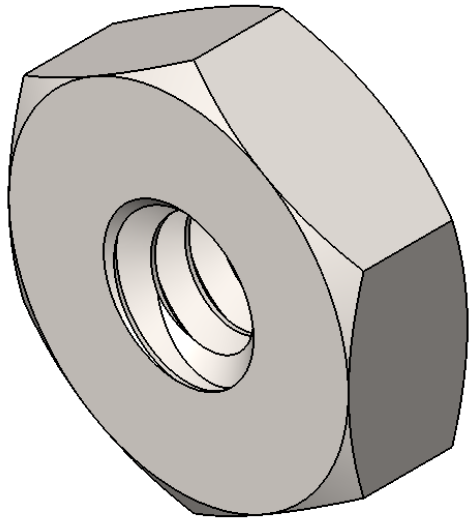
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.03 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## 6-32 Zinc Plated Low-Strength Steel Hex Nut



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TITLE: 6-32 Hex Nut

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Zinc |

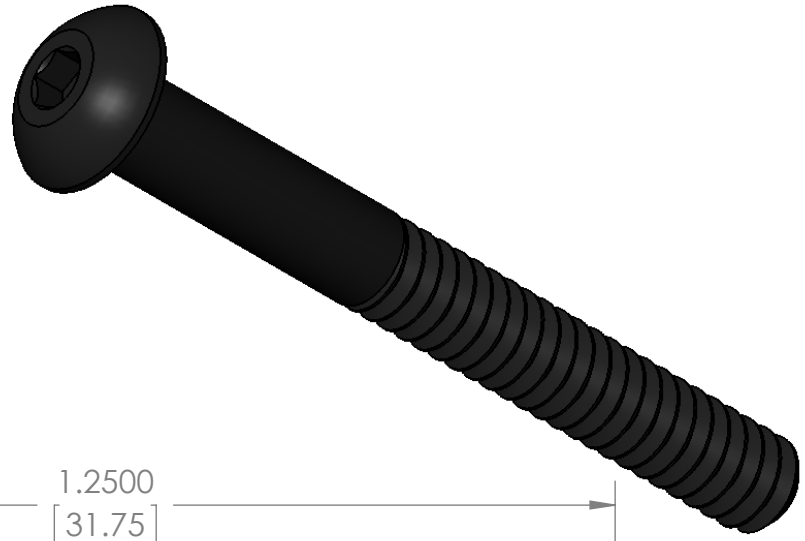
TOLERANCES: Manufacturer Specs

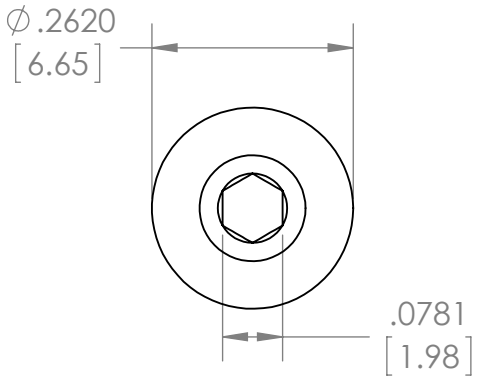
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 8:1 | A | 2/16/2018 | 2 |

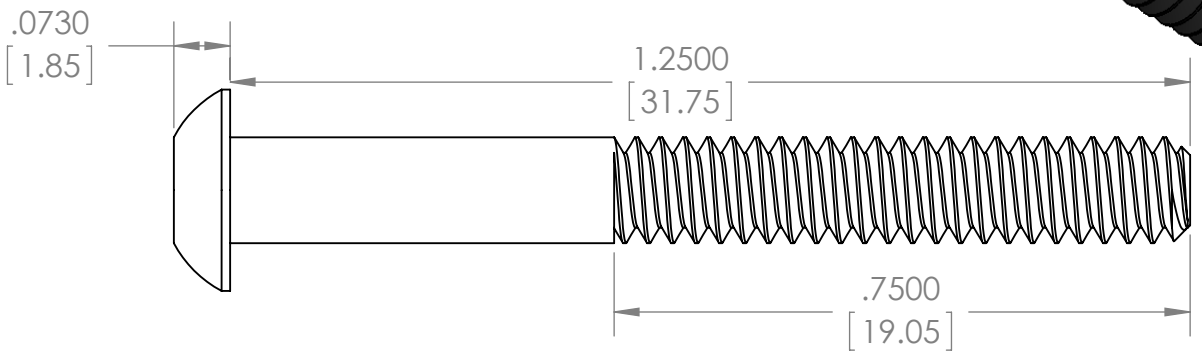
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.00 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## 6-32 x 1.25 Black-Oxide Grade 18-8 Stainless Steel Button Head Screw



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TITLE: 6-32 x 1.25 BHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Stainless Steel (ferritic) | Black Oxide |

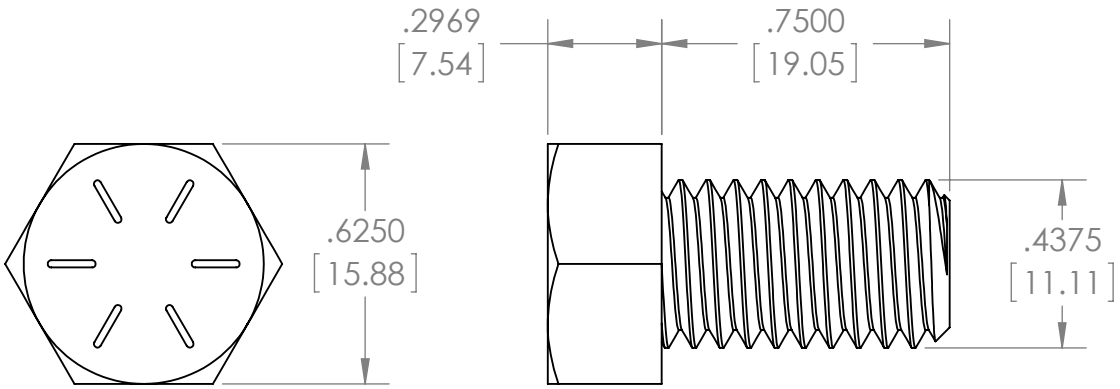
TOLERANCES: Manufacturer Specs

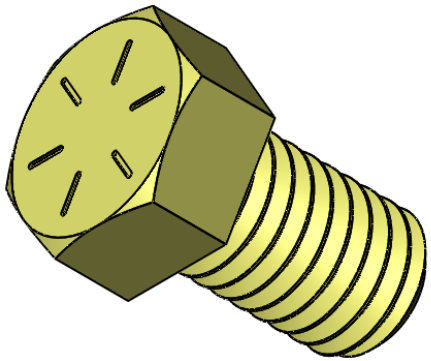
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 4:1 | A | 2/16/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.005 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## 7/16-14 x 0.75in Zinc Yellow-Chromate Plated Grade 8 Steel Hex Head Screw



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TITLE: 7-16-14 x 0.75 HHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Zinc Yellow-Chromate |

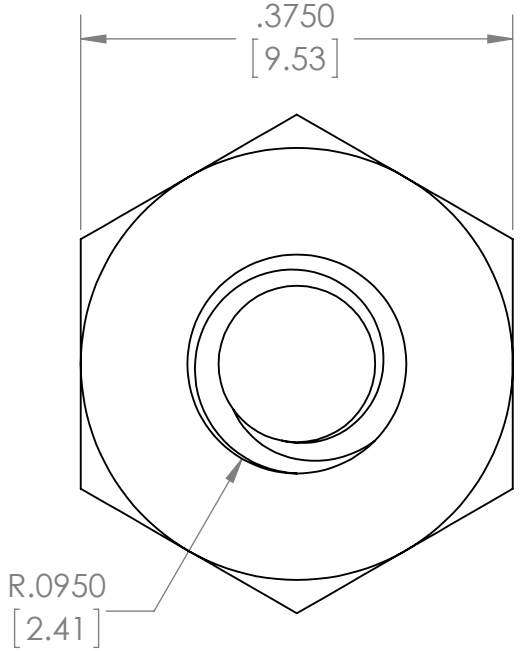
TOLERANCES: Manufacturer Spec

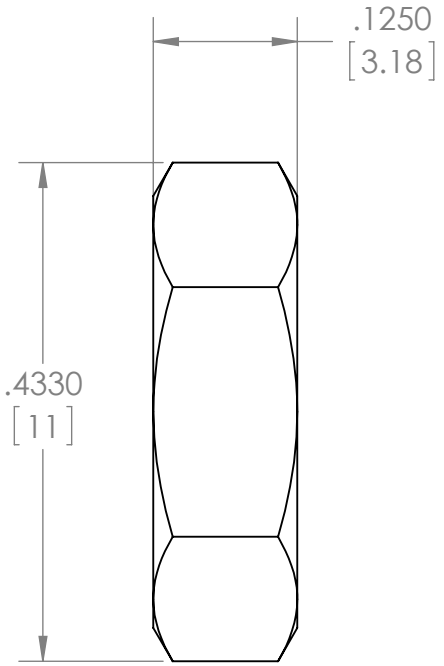
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/19/2018 | 2 |

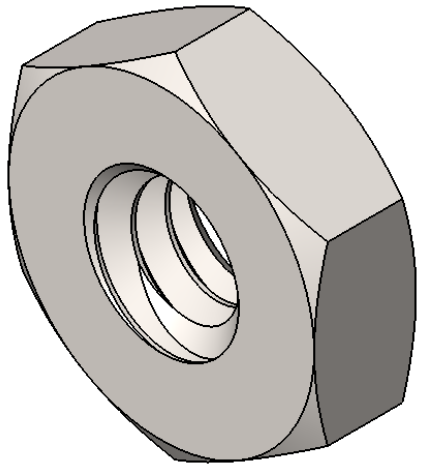
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.05 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 4

## 10-24 Zinc Plated Low-Strength Steel Hex Nut



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TITLE: 10-24 Hex Nut

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Zinc |

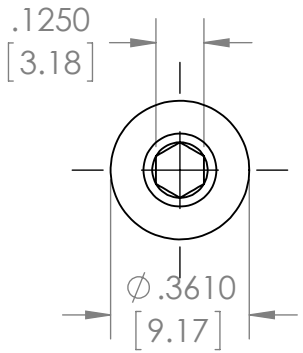
TOLERANCES: Manufacturer Specs

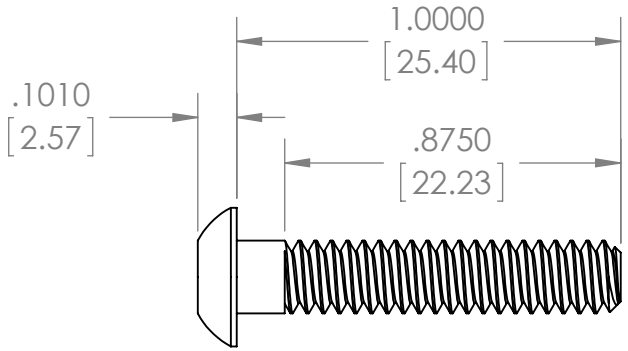
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 6:1 | A | 2/19/2018 | 2 |

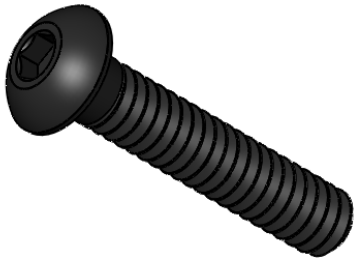
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.00 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## 10-24 x 1in 18-8 Stainless Steel Black Oxide Button Head Hex Drive Screws



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TITLE: 10-24 x 1 BHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| AISI 304 | Black Oxide |

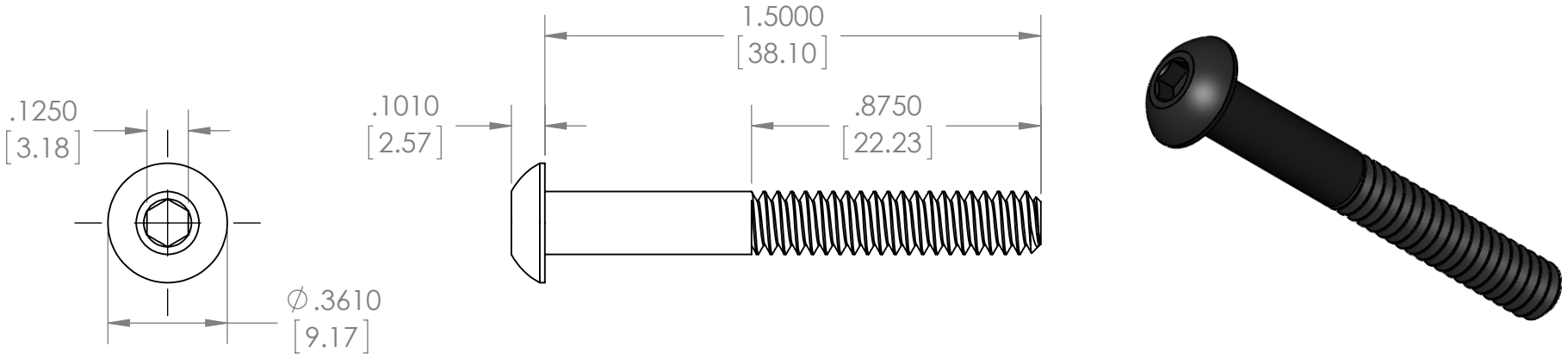
TOLERANCES: Manufacturer Specs

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 4/10/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.008 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 4

## 10-24 x 1.5 18-8 Stainless Steel Black Oxide Button Head Hex Drive Screws

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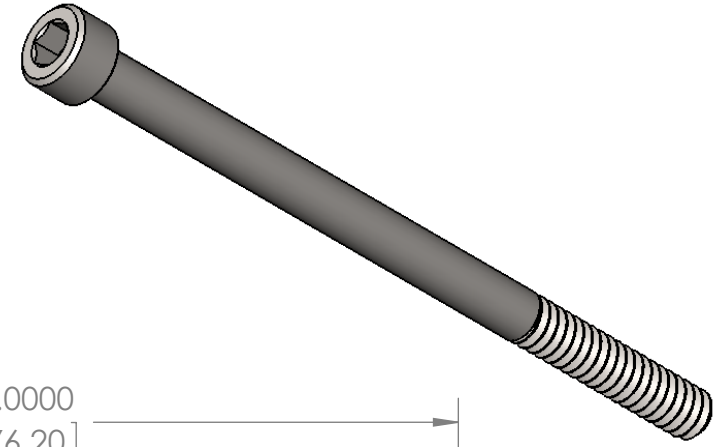
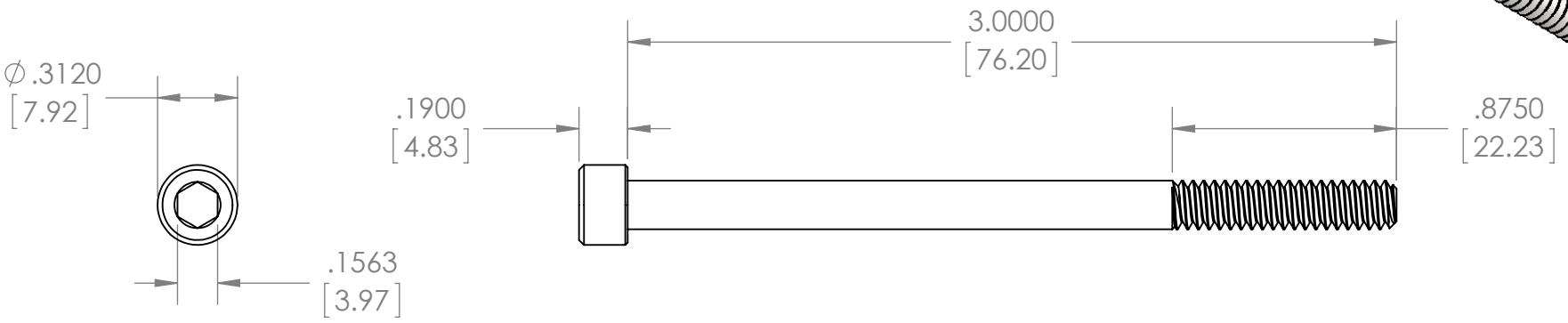
| | | | |
|---|---|---|---|
| TITLE: 10-24 x 1.5 BHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: AISI 304 | | FINISH: Black Oxide | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 2:1 | SIZE: A | DATE: 4/10/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.012 | SHEET 1 OF 1 |

# Quantity: 4

## 10-24 x 3 Grade 18-8 Stainless Steel Socket Head Screw



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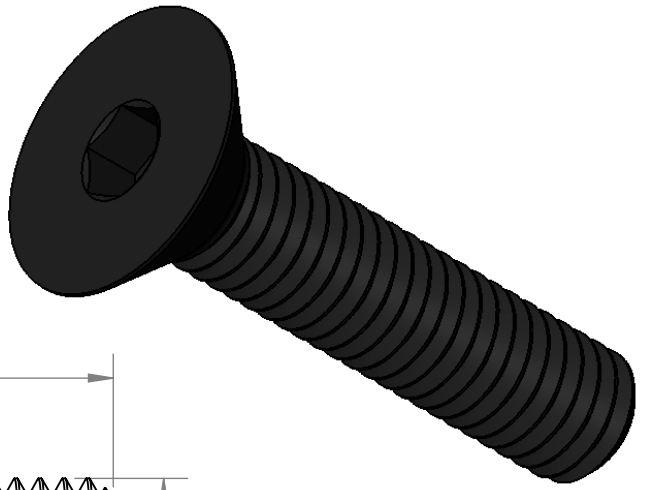
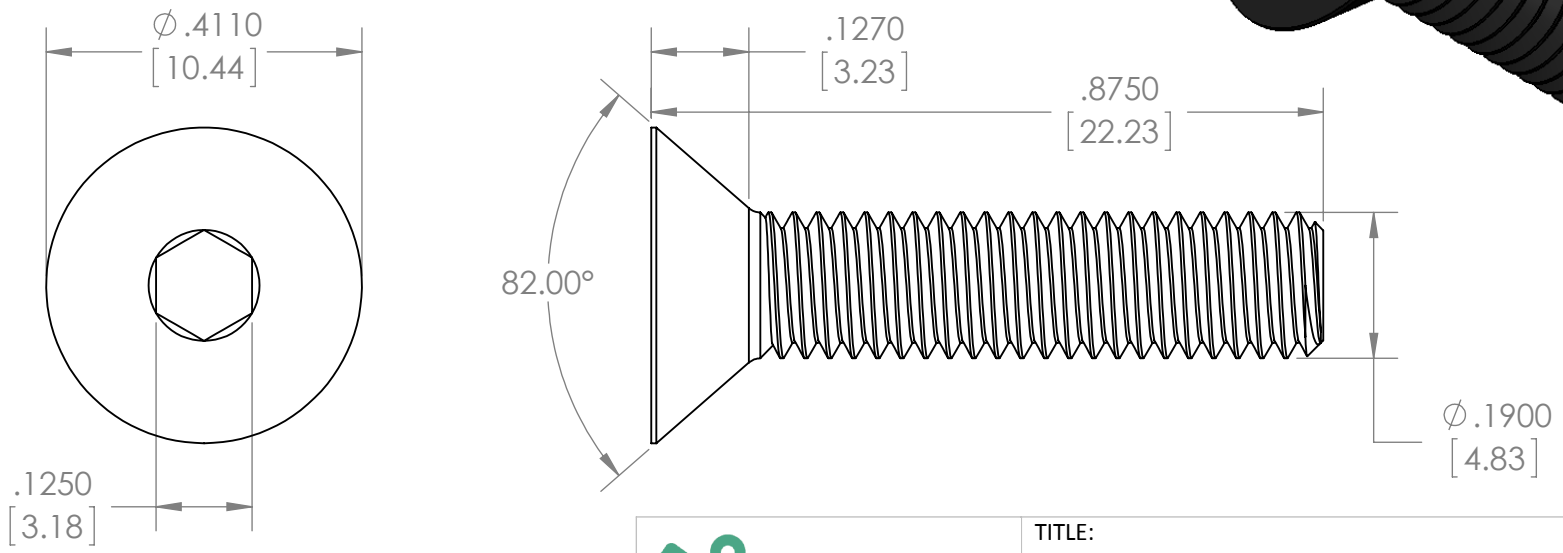
| | | | |
|---|---|---|---|
| TITLE: 10-24 x 3 SHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: AISI 304 | | FINISH: Plain | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 3:2 | SIZE: A | DATE: 2/19/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.03 | SHEET 1 OF 1 |

# Quantity: 32

## 10-32 x 7/8 Black-Oxide Alloy Steel Flat Head Screw



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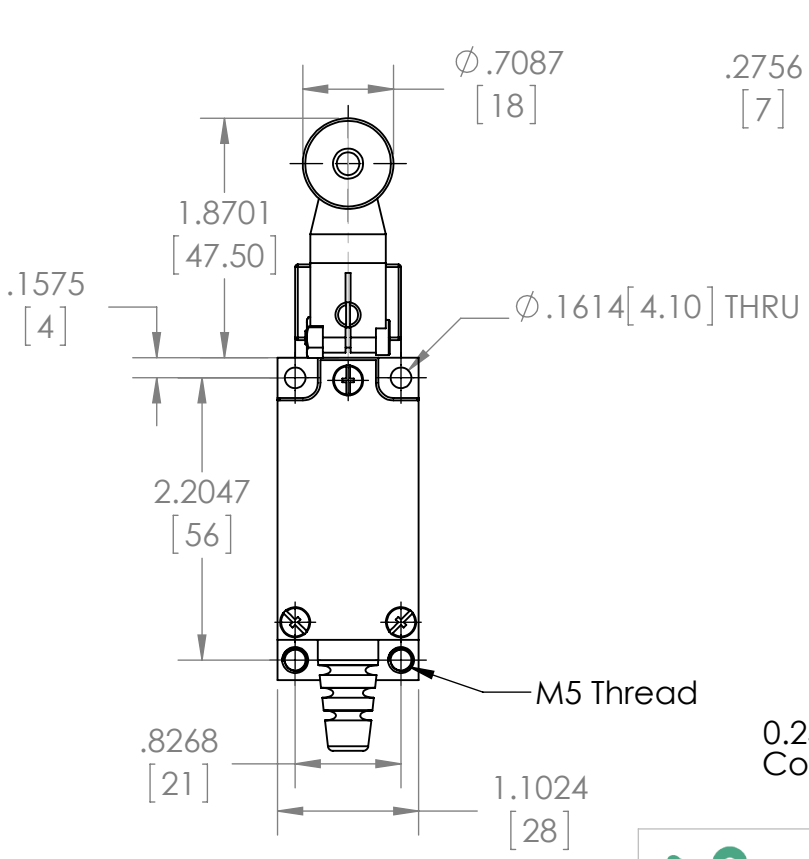
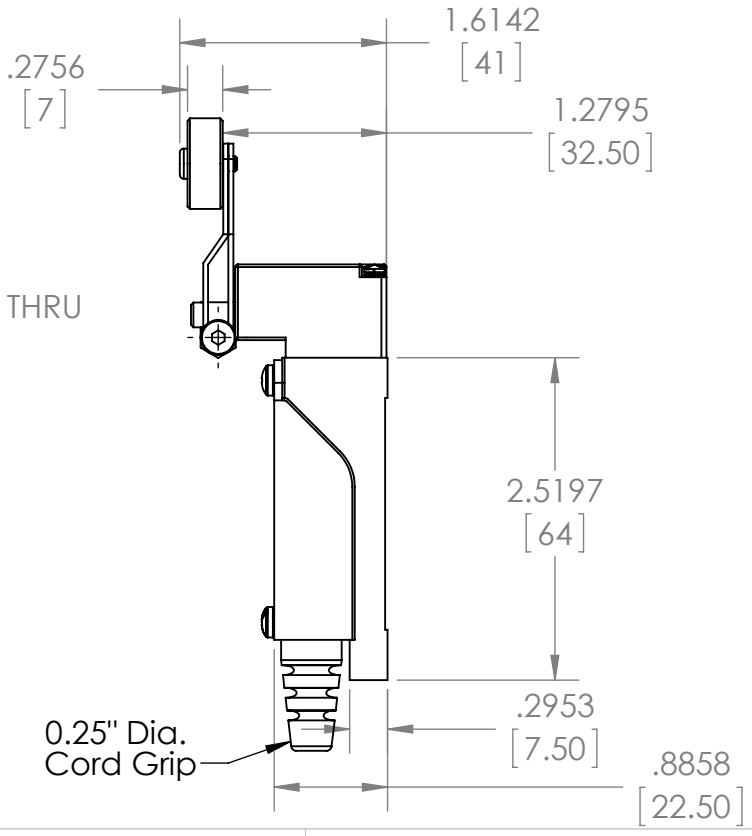
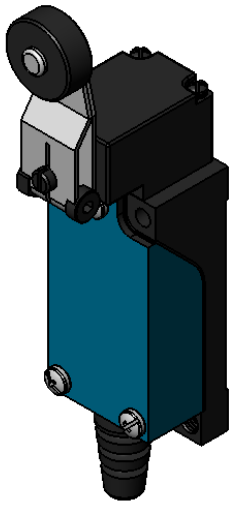
| | | | |
|---|---|---|---|
| TITLE: 10-32 x 0.875 FHS | | | |
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm] | | | |
| MATERIAL: Alloy Steel | | FINISH: Black Oxide | |
| TOLERANCES: Manufacturer Specs | | | |
| SCALE: 4:1 | SIZE: A | DATE: 2/19/2018 | REV: 2 |
| DO NOT SCALE DRAWING | | WEIGHT (LBS): 0.007 | SHEET 1 OF 1 |

# Quantity: 4

## Roller Lever Actuator Limit Switch



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TITLE:

# Compact Limit Switch

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Varies | Plain |

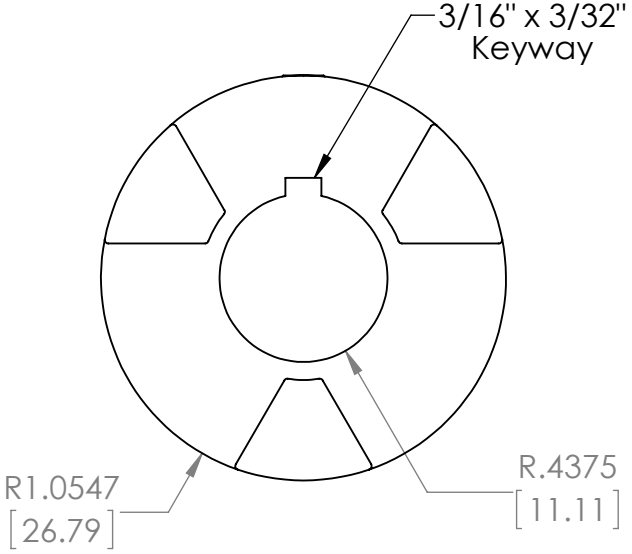
TOLERANCES: Manufacturer Specs

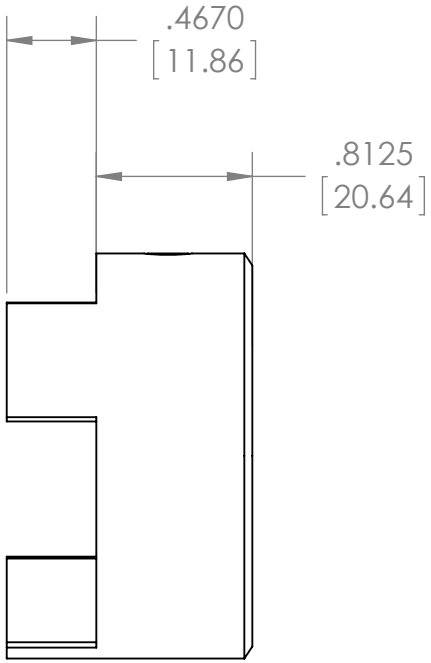
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

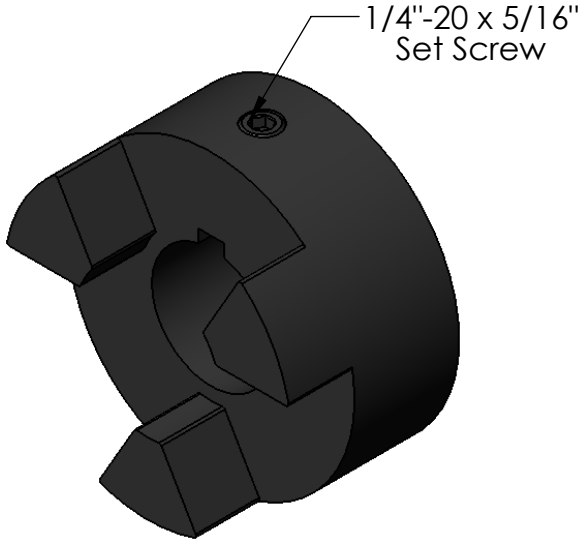
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.11 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## Flexible Shaft Coupling Iron Hub

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TITLE: Love Joy for GR Input

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Ductile Iron | Plain |

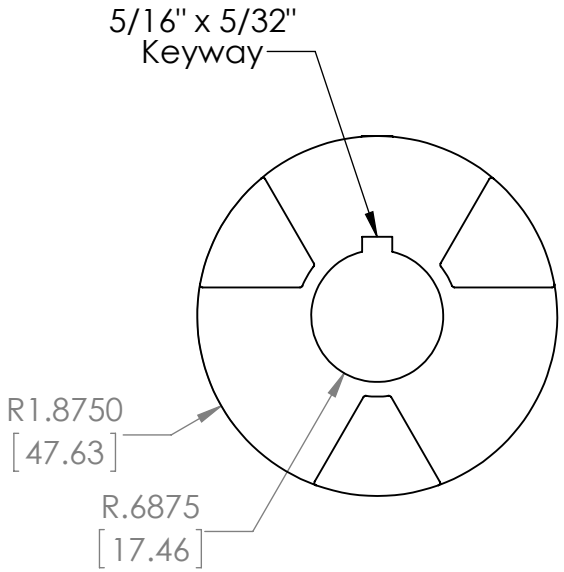
TOLERANCES: Manufacturer Specs

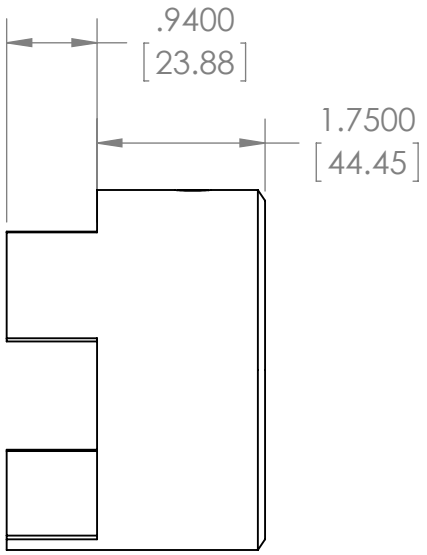
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/19/2018 | 2 |

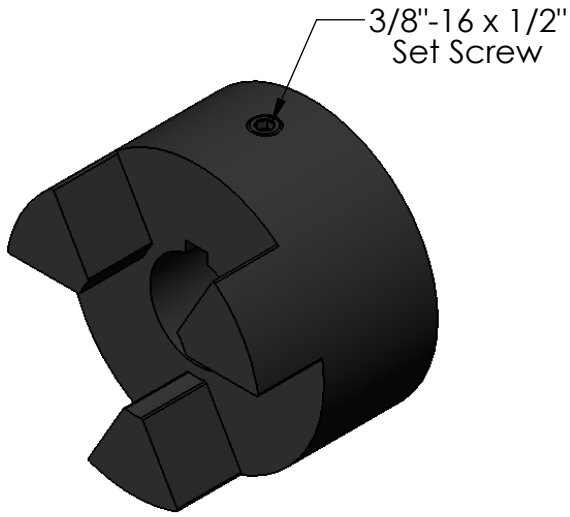
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.681 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## Flexible Shaft Coupling Iron Hub

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TITLE: Love Joy for GR Output

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Ductile Iron | Plain |

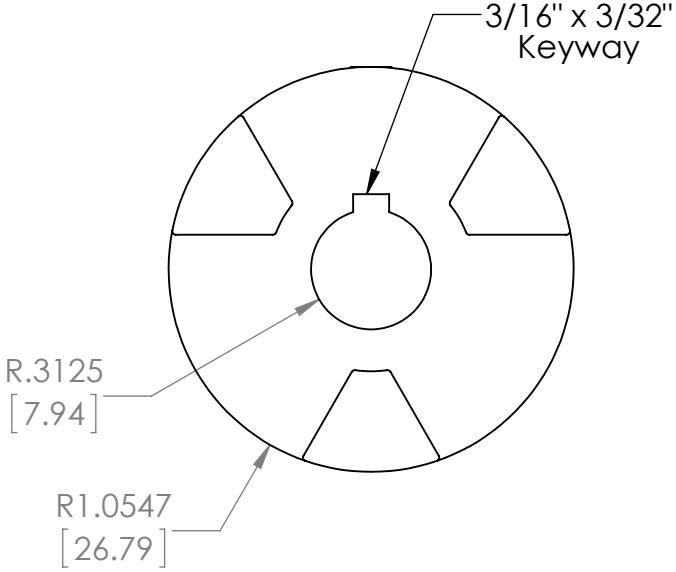
TOLERANCES: Manufacturer Specs

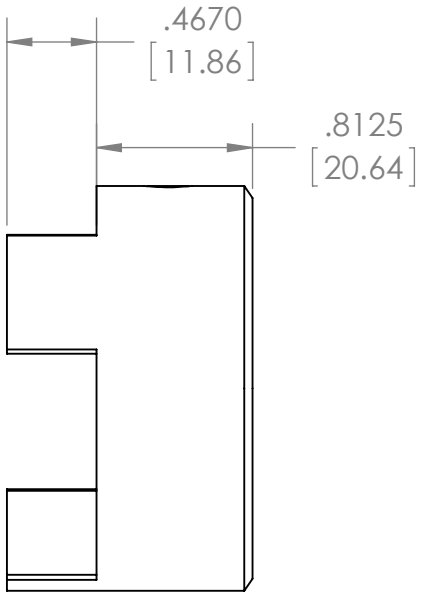
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

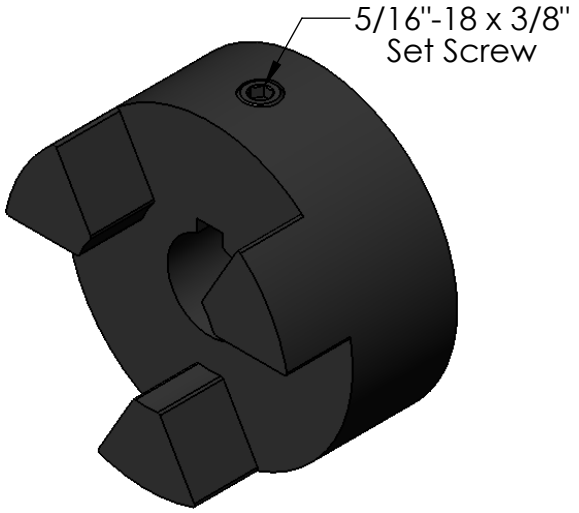
| DO NOT SCALE DRAWING | WEIGHT (LBS): 4.851 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## Flexible Shaft Coupling Iron Hub

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TITLE: Love Joy for Motor

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Ductile Iron | Plain |

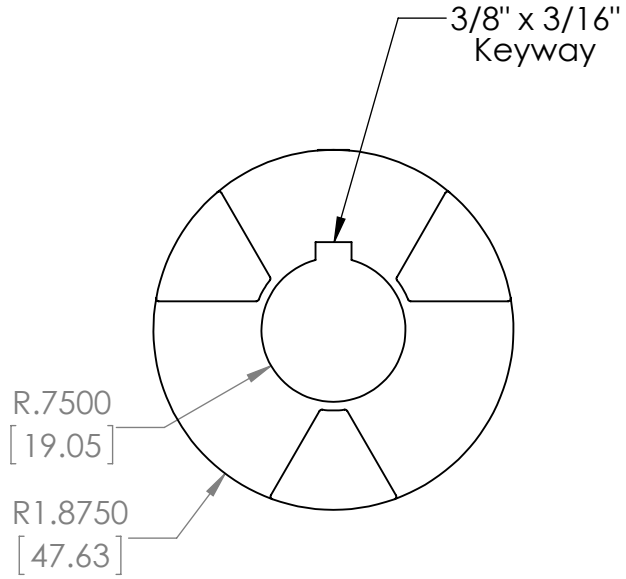
TOLERANCES: Manufacturer Specs

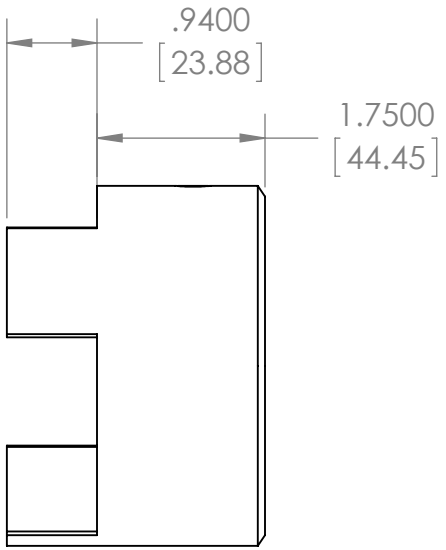
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/19/2018 | 2 |

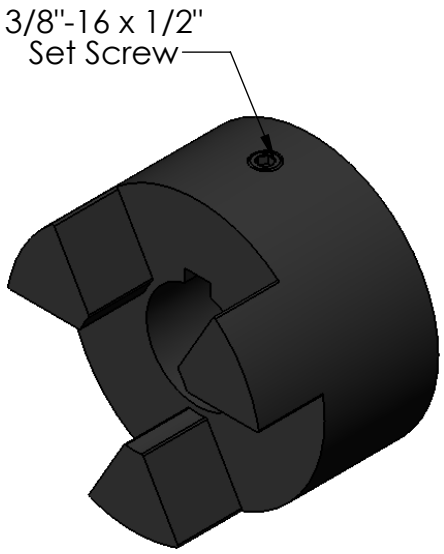
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.741 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## Flexible Shaft Coupling Iron Hub

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TITLE: Love Joy for Top of Shaft

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Ductile Iron | Plain |

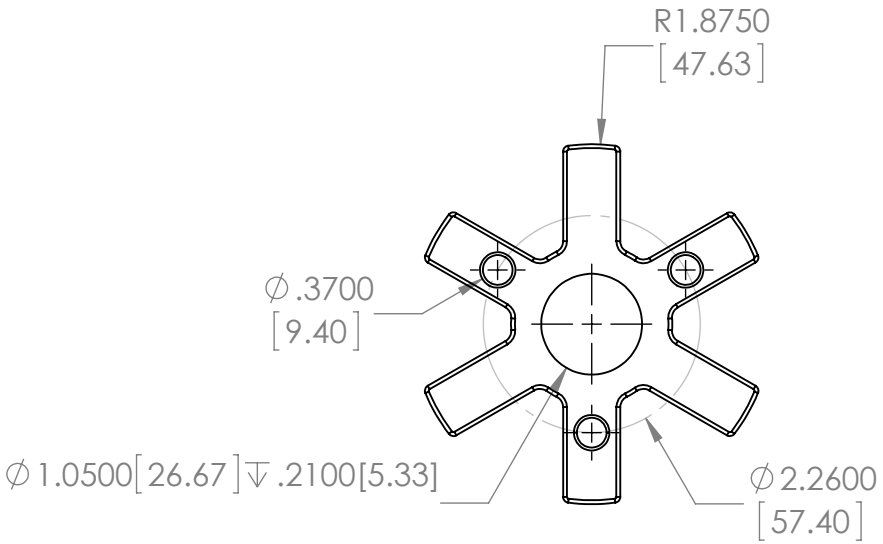
TOLERANCES: Manufacturer Specs

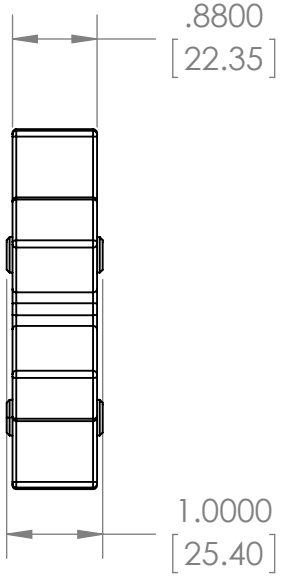
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

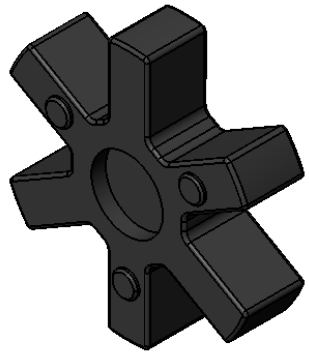
| DO NOT SCALE DRAWING | WEIGHT (LBS): 4.718 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 3600 rpm Hytrel Rubber Spider



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TITLE:

Love Joy Spider for Shaft to GR

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Hytrel Rubber | Plain |

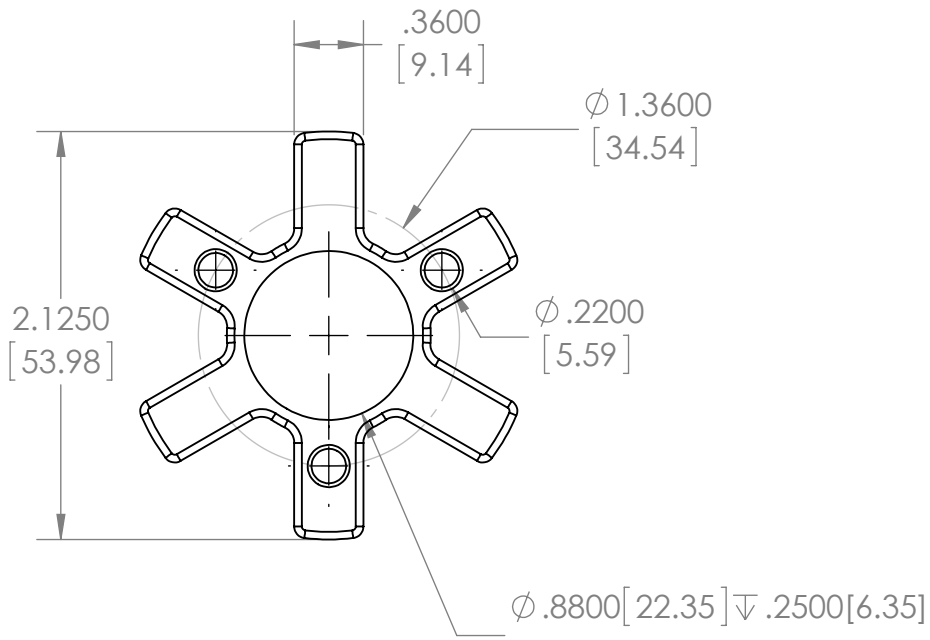
TOLERANCES: Manufacturer Specs

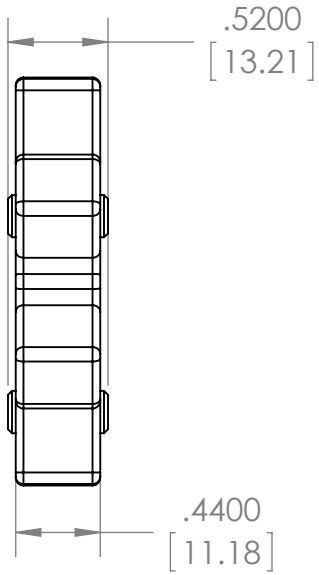
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:2 | A | 2/19/2018 | 2 |

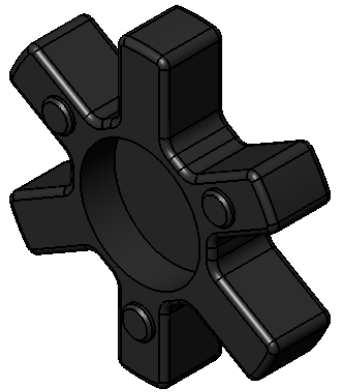
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.177 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## 9000 rpm Buna-N Rubber Spider



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TITLE: Love Joy Spider Motor to GR

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| NBR | Plain |

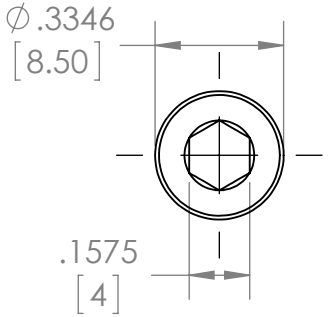
TOLERANCES: Manufacturer Specs

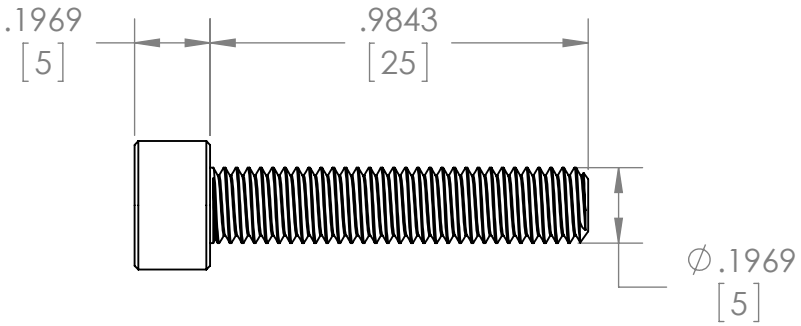
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/19/2018 | 2 |

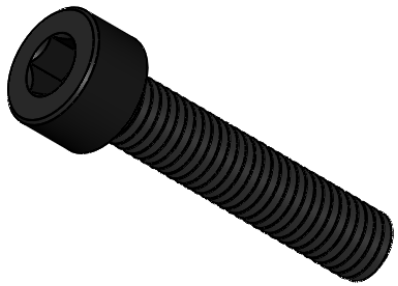
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.031 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## M5 x 25mm Black Oxide Alloy Steel Socket Head Screw



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TITLE: M5 x 25mm SHS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Alloy Steel | Black Oxide |

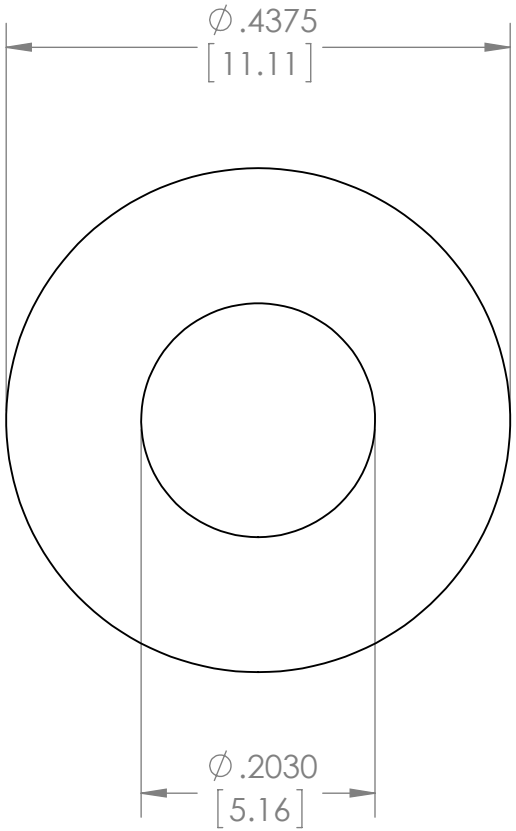
TOLERANCES: Manufacturer Spec

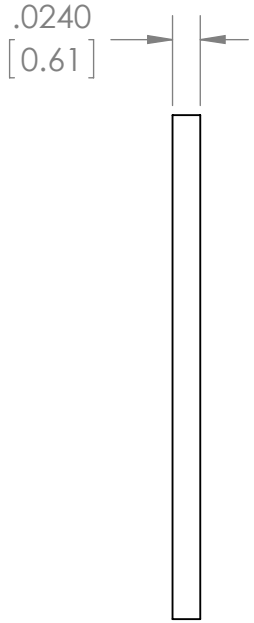
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 2/20/2018 | 2 |

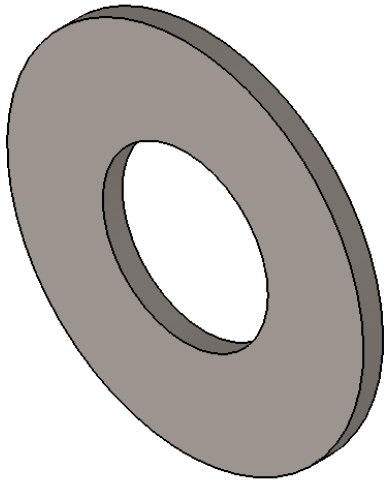
| DO NOT SCALE DRAWING | WEIGHT (LBS): 4.90 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 8

## No.10 316 Stainless Steel Flat Washer



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TITLE: No.10 Washer

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

MATERIAL: AISI Type 316L stainless steel

FINISH: Plain

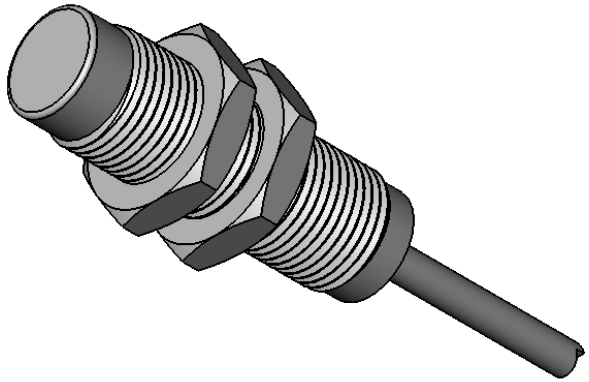
TOLERANCES: Manufacturer Specs

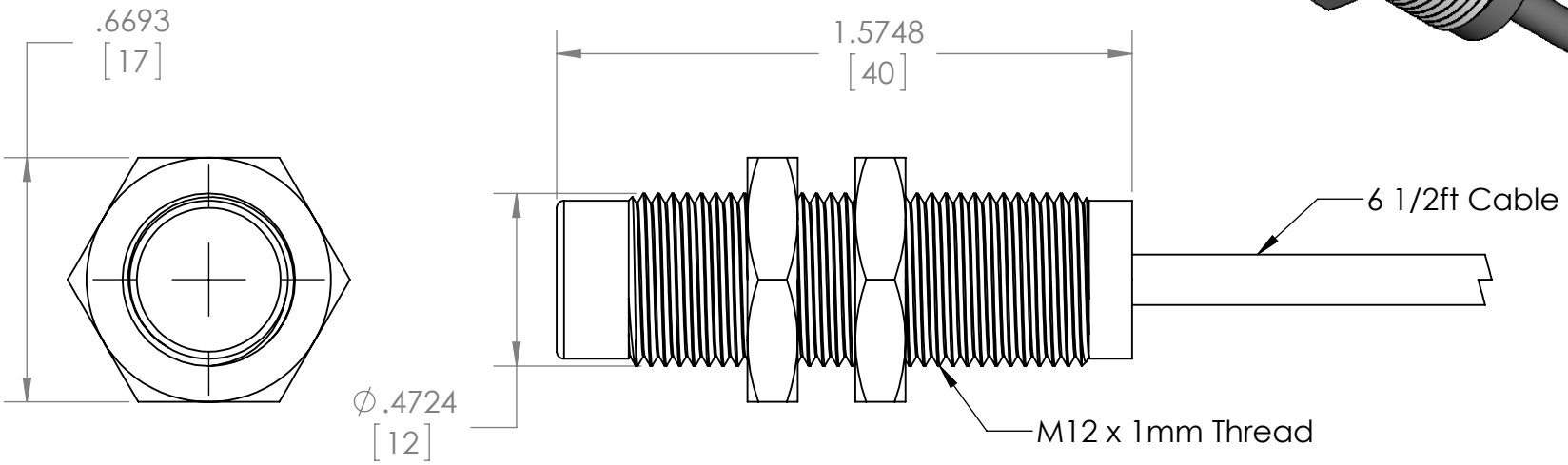
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 6:1 | A | 2/19/2018 | 2 |

DO NOT SCALE DRAWING | WEIGHT (LBS): 0.00 | SHEET 1 OF 1

# Quantity: 1

## DC 12mm Dia. Proximity Switch



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TITLE: Proximity Switch

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Brass | Nickel |

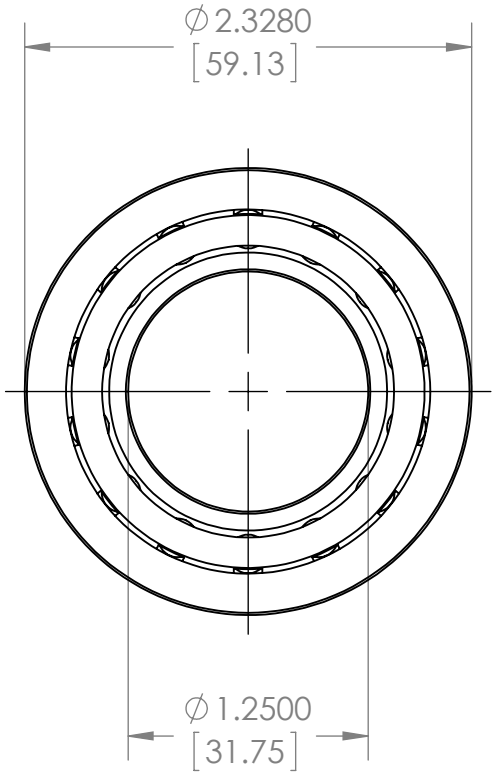
TOLERANCES: Manufacturer Specs

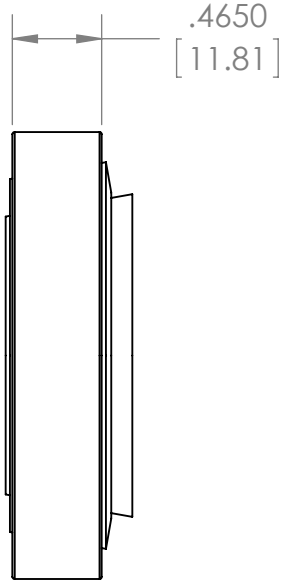
| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 2:1 | A | 4/13/2018 | 2 |

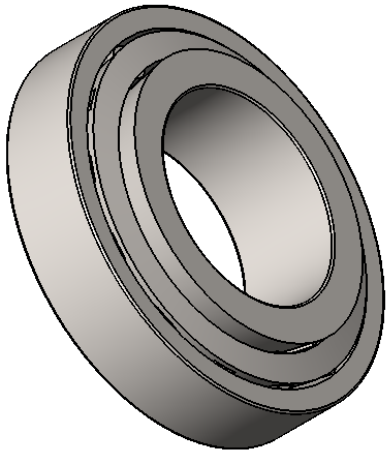
| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.09694646 | SHEET 1 OF 1 |
|---|---|---|

# Quantity: 1

## Zinc-Alloy Tapered-Roller Bearing for 1-1/4" Shaft Dia.



ISWP SM
International Society of Wheelchair Professionals

USAID FROM THE AMERICAN PEOPLE

ADVANCING PARTNERS & COMMUNITIES



TITLE: Thrust bearing

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [mm]

| MATERIAL: | FINISH: |
|---|---|
| Plain Carbon Steel | Plain |

TOLERANCES: Manufacturer Spec

| SCALE: | SIZE: | DATE: | REV: |
|---|---|---|---|
| 1:1 | A | 2/19/2018 | 2 |

| DO NOT SCALE DRAWING | WEIGHT (LBS): 0.42 | SHEET 1 OF 1 |
|---|---|---|