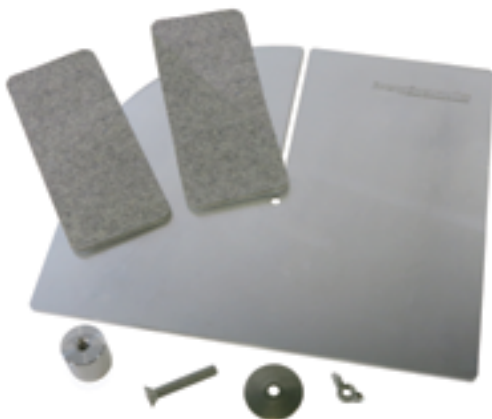


1. Contents



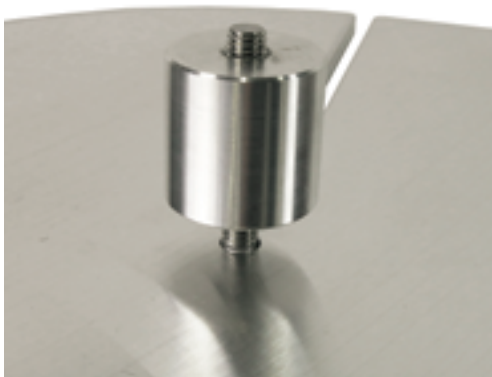
Thank you for purchasing the icengineworks® aluminum U/J-Bend cutting plate. This product, when used along with any icengineworks® cutting spacer and most vertical band saws, will simplify the cutting of tubing J- or U-bends or weld elbows curved sections. It will yield precise cuts, always perpendicular to the centerline, for easy welds and smooth and free-gas flowing transitions in your exhaust header/manifold runners.

Included are the following:

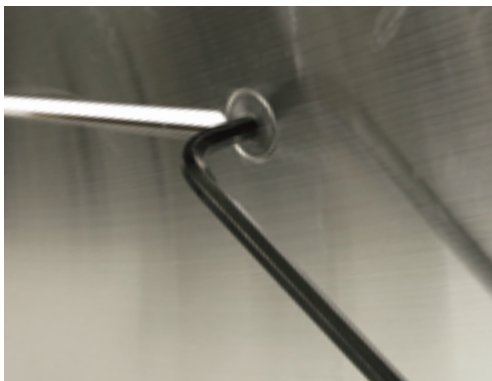
- 1x aluminum icengineworks® worktable
- 1x locating stud + 1x stainless steel conical washer (size depending product family: EH-, NP- or FE Series)
- 1x 3/8"-16 stainless steel flat head bolt and 3/8"-16 wing nut
- 2x felt pads

Please read this manual before assembling or using the cutting plate.

2. Assembly of the icengineworks® Aluminum Cutting Plate



Install the 3/8"-16 flat head bolt through the back of the cutting plate to the front side and catch it by threading it into the supplied cylindrical aluminum stud. The aluminum stud is symmetrical so either end works.

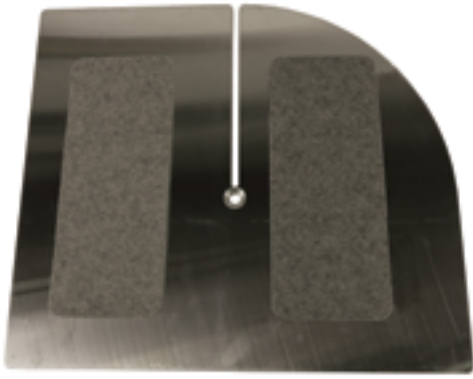


Using a 7/32" Allen wrench or ratchet, slowly tighten the bolt from underneath. Do this by holding the stud with your hand only while turning the bolt with the other.

NOTE: Do not use any wrenches around the stud, as this will severely damage its finish and roundness, which is critical for the smooth spinning of the cutting spacers during the metal-cutting setup and operation. Do not over tighten.

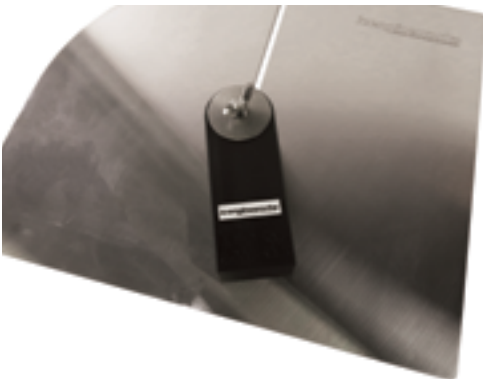
Made in USA.

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The actual design of the icengineworks® modeling blocks and the information and procedures described on the website and in this manual are subject to change without notice.



With the stud securely in place, turn the Cutting Plate over and place the felt pads on the back of the table distributed evenly over the entire area. Peel off partially the back paper in each felt pad and center it before applying pressure. Peel off the rest of the back paper and press on the rest of the felt pad. Repeat for the other side. These pads, along with a clean, (waxed if possible) workplate in your vertical band saw will help you gently glide the assembly carrying the tubular metal bent sections into the cutting blade and thus, having a more control over the feeding rate of the tubing material into the saw. More on the actual cutting process is presented in the sections below.

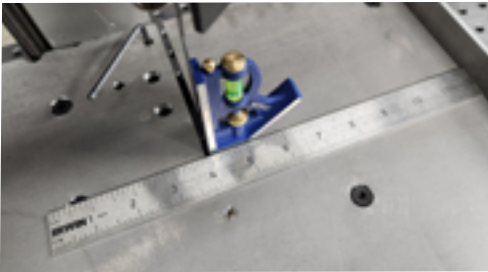
3. Using the icengineworks® Aluminum Cutting Plate



Section A

As a precaution and to keep surface scratches to a minimum, always wipe the cutting plate clean before using. Drop the intended icengineworks® cutting spacer around the aluminum stud as shown and push it all the way to the bottom. Make sure it is free to spin around the stud. Initially, some slight effort may be required to rotate it until the surfaces are broken in.

The cutting spacer is slightly taller than the aluminum stud by design. This feature is what allows locking it firmly in place at the desired position without damage. Install the conical washer and the wing nut.



Before cutting metal tubing for the first time, the rip fence position needs to be adjusted in your vertical band saw.

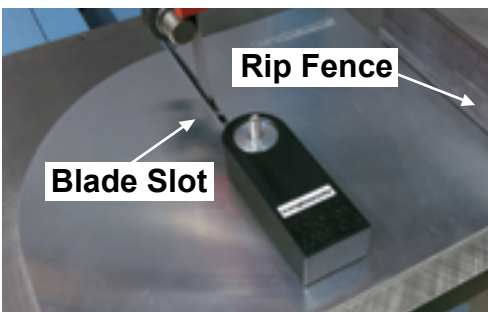
Note: Please familiarize with the vertical band saw manufacturer's use guidelines before use.

If using a portaband saw with a Portaband Tube Cutting Station- Ensure that the blade is 8" from the edge of the fixed fence and is parallel and perpendicular to the blade slot in the table (See photos). Once complete, proceed to section B.

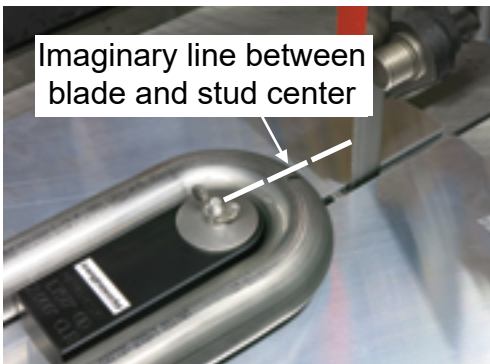


If utilizing a traditional vertical saw-

Loosen up the locking screws for the rip fence. Move the rip fence away from the blade so that the cutting plate can be set on the saw's work area. Align the blade slot on the cutting table with the band saw blade. Bring in the rip fence against the right edge of the cutting plate. For maximum precision and before locking the rip fence in place, make sure the cutting plate travels on a line parallel to the blade path. Take into consideration as well the blade thickness when choosing the cutting side of the blade. Adjust accordingly.



For a smoother operation, it is highly recommended to wax the band saw's worktable surface. It is easier to control the cutting process and feed rate if the cutting plate slides gently over that surface.



Section B

The icengineworks® cutting spacer system is based on manual and visual adjustments.

The travel path of the cutting plate should follow an imaginary line between the blade and the center of the aluminum stud (see photo). If necessary, readjust the rip fence keeping in mind the blade thickness.

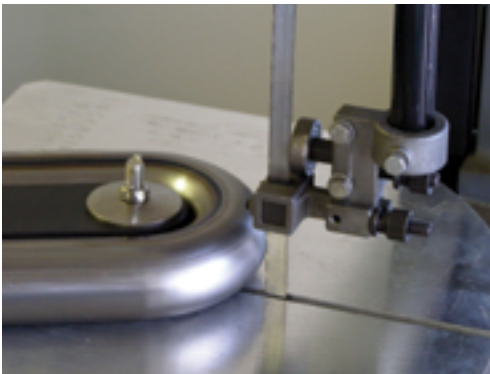
To start cutting any given section modeled with blocks, whether a control sheet is being followed, or directly from the plastic design model, begin by reproducing such plastic section with spare blocks. Make sure the block arrows in the plastic assembly are aligned and the assembly sits completely flat. Install the matching cutting spacer around the stud.



Bring the plastic block assembly and wrap it around the cutting spacer and eliminate any gaps along between the blocks and the spacer.

At this point, the vertical band saw should remain off. Slide the cutting plate into the blade to where it is in the path of the block assembly. Spin the spacer and plastic assembly until the end of the block section gently touches the blade. This is the angle of cut; lock the wing nut tight to secure it.

Slide the plate back and remove the plastic block assembly. Install the metal U-bend to be cut closing any gaps around the cutting spacer.



The icengineworks® cutting spacer are precision machined slightly under the theoretical dimensions of the U-bend. In some cases, due to metal spring back in the metal bending process among others, the actual U-bends may not be as accurate as desired.

In this case, we recommend using a set of adjustable carpenter's C-clamps with soft jaws to further secure the U-bend to the spacer. Clamp the U-bend along the straight parallel legs of the bend.

This approach is also highly recommended when cutting sections off of a "drop", or previously cut U-bend (leftover from other project) that only has one leg. Bear in mind the torque applied by the blade when choosing a location so the metal tube remains stable and safely secured when cutting.



With the metal U-bend securely tight around the cutting spacer it's time to make the cut.

The feeding rate and blade rpm will depend on the specific blade in your band saw and the material type and thickness of the tubing you intend to cut. Consult the band saw's manual for more information. We recommend setting it to the slowest speed possible, for stainless steel, 90-100sfpm. This will work well also for mild steel.

In order to always have the maximum support safely possible during the cutting process, when sourcing two or more sections in your project from the same U-bend it is suggested that you make the first cut that is closest to either straight sections of the bend. This will minimize the tendency of the bend to want to twist later when making the cut for the second section.

As the cut progresses and depending on the metal and its thickness, vibration will be experienced and you may need to adjust the manual feeding rate by slowing down a bit. It's always safer to go more slowly.

Also, observe caution when the cut is about to be completed. The blade may run into the cutting spacer. This is a situation that is expected to happen occasionally but should be kept to a minimum.



The icengineworks® cutting spacers are designed for strength and durability, and are capable of withstanding accidental cuts made to them as long as they do not go through into the aluminum stud. This type of cuts does not compromise the service and precision they provide.

The cutting plate is specifically designed to produce precision cuts around the curved sections of typical J- and U-bends. To cut straight sections, use your vertical band saw or other cutting devices such as regular horizontal band saw or a chop saw.



The icengineworks cutting spacers highlighted in green are compatible with the small PIV2000 cutting plate when using the Portaband Tube Cutting Station. Those not highlighted can still be cut with the Portaband Tube Cutting Station, but require the larger PIV1000 plate.

1625EH	1750EH	1875EH	2000EH	2250EH	1250NPS	1500NPS	2500FE	3000FE
1-5/8" OD x 2" CLR	1-3/4" OD x 2" CLR	1-7/8" OD x 2" CLR	2" OD x 3" CLR	2-1/4" OD x 3" CLR	1-1/4 NPS x 1.25" CLR	1-1/2 NPS x 1.5" CLR	2-1/2" OD x 3" CLR	3" OD x 3" CLR
1-5/8" OD x 3" CLR	1-3/4" OD x 3" CLR	1-7/8" OD x 2.5" CLR	2" OD x 4" CLR	2-1/4" OD x 4" CLR	1-1/4 NPS x 1.88" CLR	1-1/2 NPS x 2.25" CLR	2-1/2" OD x 3.5" CLR	3" OD x 4" CLR
1-5/8" OD x 4" CLR	1-3/4" OD x 4" CLR	1-7/8" OD x 3" CLR	2" OD x 6" CLR	2-1/4" OD x 6" CLR			2-1/2" OD x 4" CLR	3" OD x 5" CLR
	1-3/4" OD x 6" CLR	1-7/8" OD x 4" CLR					2-1/2" OD x 5" CLR	3" OD x 6" CLR
		1-7/8" OD x 5" CLR						