



THE IRON WORKHORSE

by Susan Woods, managing editor

Using an ironworker for weld prep can make a welder's job easier and more productive

“[The ironworker is] one tool welders would love to have in their shop because it can take the place of so many other operations.”

Scott Donahy, product manager, Piranha

Considered the workhorse of the steel fabricating industry, an ironworker can be an essential machine in a metal fabrication shop. The main advantage of an ironworker is versatility. It is a compact, multi-functional machine that can punch and shear and is typically available with more stations for other operations.

Piranha ironworkers from MegaFab have five integrated stations. On the front end, there is a punching and bending station for flat bar and angle iron from gauge up to 1 1/4-in.-thick plate and channel and beams. The bar shearing station is for round or square bar, and the flat shearing station is for flat bar and flat plate up to 24 in. wide. The angle iron shearing station can shear up to 6-in. angle iron. And the notcher on the back end can notch plate, angle iron and channel.

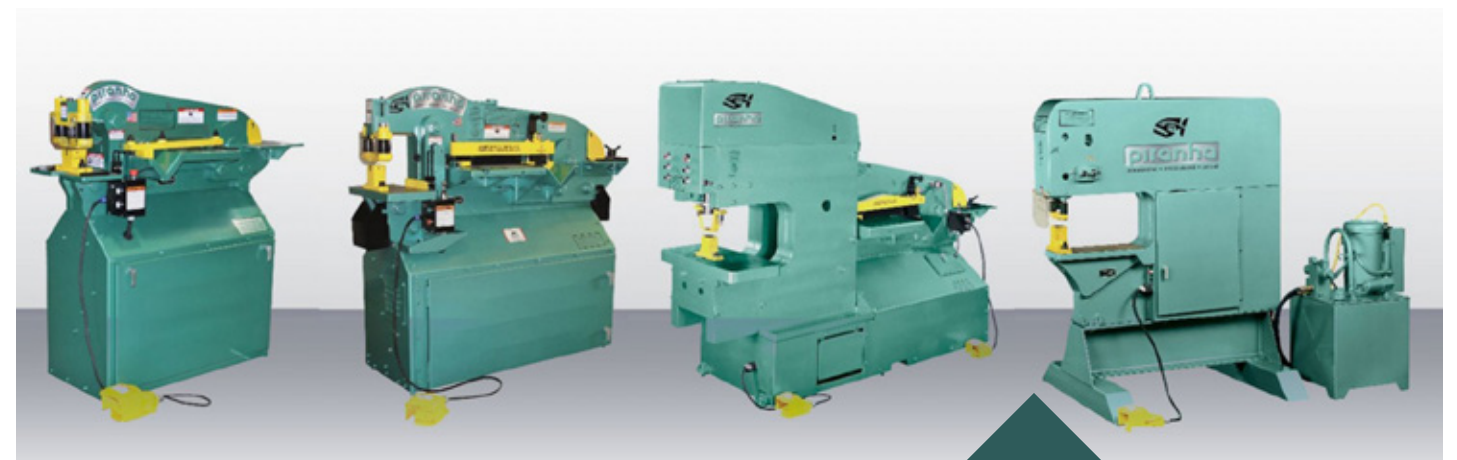
“Fabricators use an ironworker to prepare parts for welding onto a bigger structure or for producing finished individual parts,” says Scott Donahy, Piranha product manager. “Typically, it’s a clean enough cut that the part can go straight to the welding operation. The ironworker is taking the place of a grinder, saw or drill. A lot of grinding that welders do to remove fillet out of the angle iron, for example, can be done much more quickly on an ironworker.”

The factors that affect an ironworker so it can provide those clean cuts and perform optimally include the workholding, blade condition, blade gap, available tonnage and blade angle.

WORKHOLDING

Workpieces must be set up properly or it can result in parts with burrs or distortion. Piranha ironworkers have automatic urethane hold-downs for shearing so the operator doesn’t have to adjust the hold-down manually every time the material thickness changes.

“Without the urethane hold-down, the material is held mechanically and the operator has to tighten the holder down to the material every time he cuts, loosen it back up, move the material and tighten the holder again,” Donahy says. “Any gap left between the material and the hold-down allows the material to ‘kick up’ during ▶



Piranha ironworkers come in a variety of styles and offer a range of operations.



The urethane hold-down allows the operator to look over the hold-down bar and find the cut mark on the workpiece.



Piranha's ironworker building team.

shearing, resulting in an unsquared cut edge.”

With Piranha's system, the hold-down actually clamps the material to the table automatically. The operator shears the material and then as the blade moves back up, the hold-down releases the material from the table and he can freely slide in the next workpiece. The operator is just stroking the machine. The end result is a very straight, square cut.

For punching, a urethane stripper secures the material against the die as the punch operates.

“Whether you're punching a hole or stripping the punch out of the material prior to releasing it, it provides a nice quality punched part,” Donahy says. “The urethane stripper clamps material to the die block just around the area that you're punching a hole. It is not holding down the whole workpiece, just a localized area, but it does not allow the workpiece to move.”

The urethane hold-down also gives the operator a great line of sight over the hold-down bar.

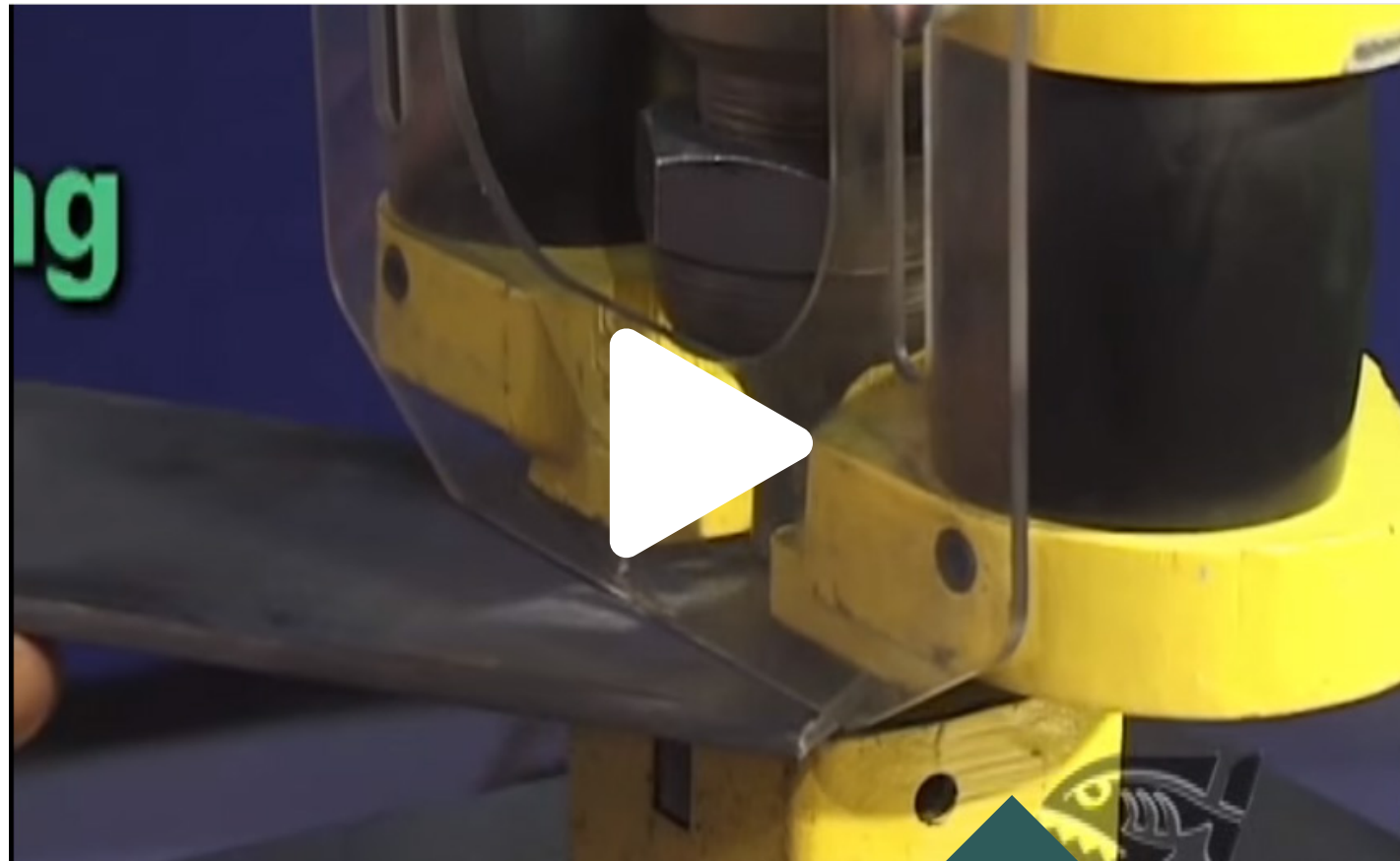
“Often times, the operator can't see the cut lines or layout markings on other types of ironworkers,” Donahy says. “This hold-down allows them to insert the workpiece into the machine and look over the hold-down bar, find their mark and make a cut quickly without having to measure anything.”

BLADE CONDITION AND GAP

Dull blades can produce burrs or distortion on parts. The same goes for a dull punch.

“Blades do dull over time, especially when cutting harder material,” Donahy says. “With shearing, you will notice the edge of the material start rolling over or becoming a little rounded to where it is not providing as good of quality. This is a good indicator that you really need to check your blade. You will probably notice it more when shearing thinner materials.”

Many blades, including Piranha's, have more than one side; some blades have as many as four. So if an operator notices a dull edge, he can rotate or flip the blade to utilize all four edges before needing to replace it. ▶



Learn more about Piranha's P-65 ironworkers by watching this video.

Blade gap, the space between the upper and lower blade at the end of the stroke, can create significant burrs. This is especially true with mild steels and other soft metals.

Too big of a blade gap can cause thinner material to roll over instead of being sheared and too tight of a gap can cause the blades to rub on each other, damaging them.

To solve these issues, Piranha uses a factory-set, or fixed, blade gap that can handle the entire ironworker's capacity rating. Piranha's blade gap typically measures between 0.007 in. and 0.010 in.

"For blade gap, we don't use any shimming," Donahy notes. "The blades come directly in contact with the beam without shimming. A lot of ▶



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Check out this video to learn how to perform a Piranha ironworker maintenance checkup.

The P-65 is Piranha's most popular ironworker. Workstations include punching, bending, bar shear, round bar shear, angle shear and notcher.



ironworkers don't have a precision machined frame so they take up the tolerances just by using shims or push bolts behind the blades to set how close they are together."

Similarly, at the punching station, a burr can occur in the hole if the clearance between the punch and die is too large.

TONNAGE AND BLADE ANGLE

The industry standard is to rate an ironworker based on its punching

tonnage. The rating determines the maximum hole diameter that can be punched through the maximum material thickness.

Piranha ironworkers range from 50 tons to 140 tons. A 50-ton ironworker punches a 13/16-in.-dia. hole through 3/4-in.-thick mild steel. A 140-ton ironworker punches a 1 3/8-in.-dia. hole in 1 1/4-in.-thick mild steel.

The combination of shearing tonnage and blade approach determines the maximum size and thickness of the profile that can be sheared. Pirhana has the ability to reduce the

rake angle because of the extreme leverage in the shearing section.

When shearing, the rake angle has a significant effect on part quality. A light-duty ironworker may provide the same capacity in the shearing station as a heavy-duty one, but it moves the rake angle. It is cutting a small portion of the material at a time to achieve that same capacity, but the section being sheared off has a lot of curl to it.

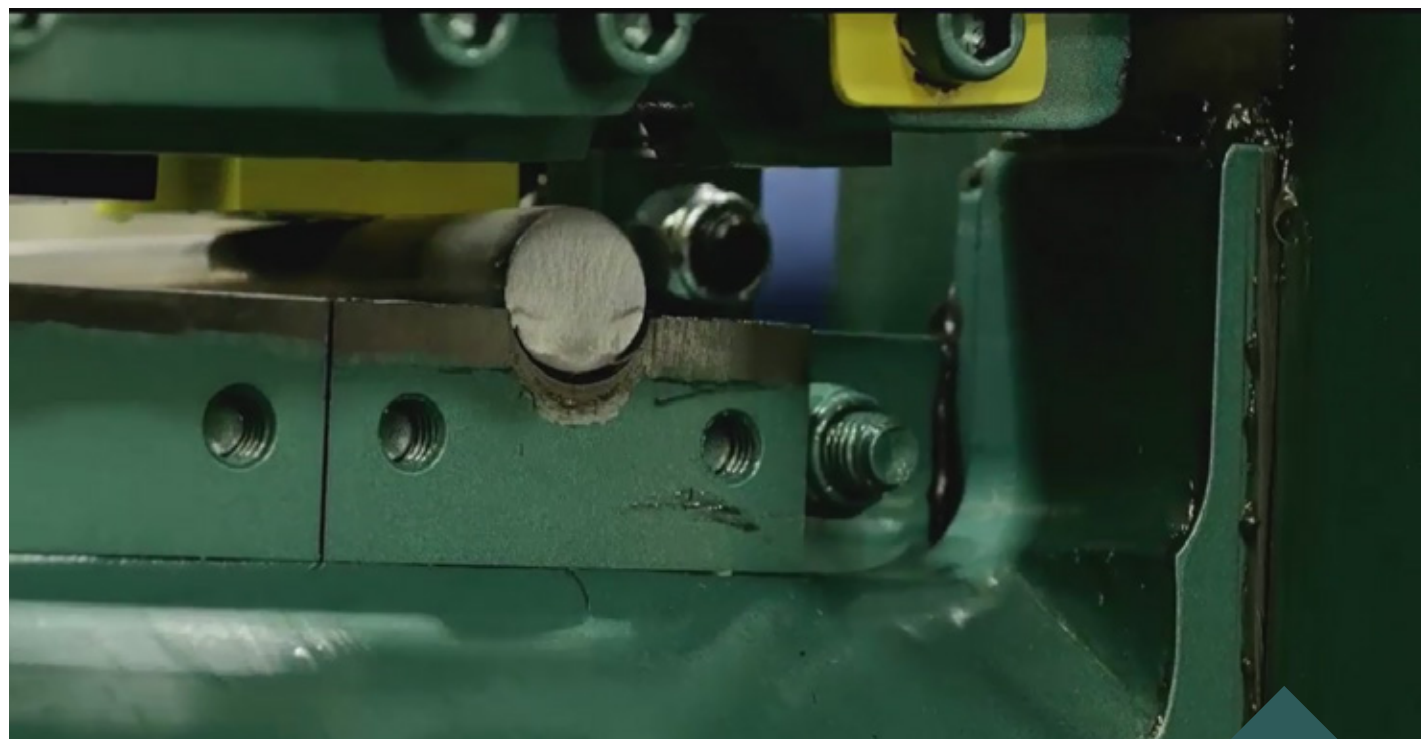
A high rake angle concentrates all cutting force at one point, instead of across the length of the cutting edge. Therefore, less force is required to cut the material.

For Piranha, however, a low rake angle is the optimum design for shearing. ▶

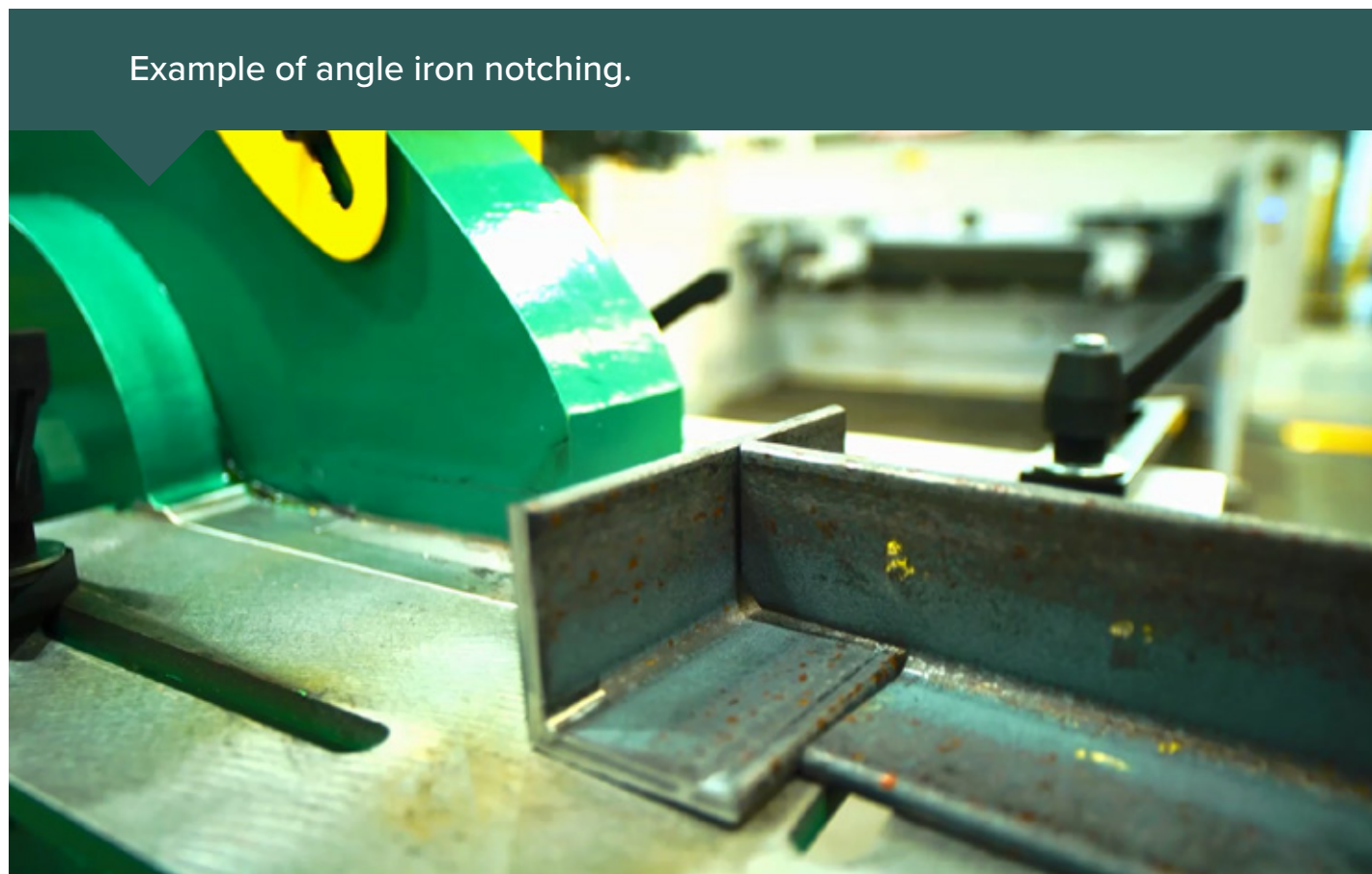
With the Piranha ironworker, the operator can remove the punch and put the bending attachment on in less than 1 min.

For punching, a urethane stripper secures the material against the die as the punch operates.





Example of round bar shearing.



Example of angle iron notching.

“With a low rake angle, you are cutting a large section of that material all at once so that dropped piece remains flat, even if it is a small piece, say 1/8 in. to 1/4 in,” Donahy says. “It requires a lot more force to do this, but the cut quality is greatly improved.”

So while a low rake angle can produce a clean cut, that tonnage requirement limits the material thickness. “You need a higher rake angle if the material is thick, say 1 in., if the machine does not have enough force to cut it,” Donahy says. “However, we build enough force into our ironworkers to maintain a low rake angle and still cut at full capacity on thick material.”

FEATURE APPRECIATION

Donahy notes that when he talks to welders in the industry, the ironworker is typically “one tool welders would love to have in their shop because it can take the place of so many other operations.”

One specific feature welders appreciate is the notcher on the back end.

“The ability to take a piece of angle iron and be able to notch a leg out to the angle and make a nice smooth cut that runs down and removes the entire fillet is very handy,” he adds.

Another feature Donahy says welders find useful is that the punch is mounted with a dovetail slide system. The operator can quickly remove the punch and put the bending attachment on in less than 1 min.

“Other ironworkers have this bending feature, but it takes about 15 min. to change over,” he explains. “And, more than likely, an operator is not going to bother.” ■

PIRANHA, A MEGAFAB COMPANY