Photos: Ben White and Josh Giumelli

Cutting edge deburring tools

There are many ways to cut metal these days, including laser profiling, but most produce burrs or sharp edges in varying degrees. It is always good practice to remove burrs off anything you fabricate, to reduce the risk of future injuries. By **Josh Giumelli**

Any repair or fabrication project involving cutting, drilling or machining metal can produce sharp edges capable of significant injury.

Burrs are produced whenever metal is cut but the severity depends largely on the method used. Grinding processes are the worst offender, often producing razor sharp edges capable of deep skin laceration. Machining will produce burrs, but generally cutting metal produces less burrs than grinding.

The prevalence of laser cut components on modern machinery also produces edges which can be surprisingly sharp. Anyone who has ever had any thin steel plate laser profile cut will be familiar with just how sharp the edges can be.

Sharp edges are not only a safety risk. Paint will struggle to adhere to sharp edges, leaving them poorly protected against corrosion. Check out any machinery with laser-cut plate that has been outside. Chances are rust has started at the edges of the plate.

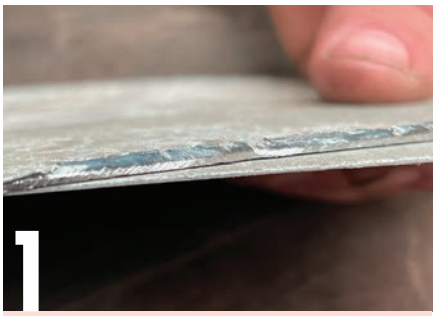
PRIDE IN A JOB WELL DONE

Nothing spoils an otherwise good job more than sharp, unfinished edges, and it takes only minutes to rectify the problem. Ultimately, you cannot have pride in your work if you are prepared to leave rough edges which may injure someone.

Deburring or chamfering edges can be done in a number of ways, including mechanical removal and grinding. Commercially, sharp edges are treated by tumbling parts, or even chemical pickling.

Most of us will have various burr removal tools in the workshop, but there are a few new products that are worth considering if you want to speed up the process and improve the results.

HAND TOOLS FOR DEBURRING



Sheet metal is one of the main offenders for producing razor-sharp burrs when cut. But the choice of cutting methods will play a large part in the severity of the burr. Pictured above are the results of cutting with an angle grinder and 1mm abrasive disc (top), and workshop sheet metal guillotine (bottom).

This sheet metal deburring tool costs less than $20 and can quickly cut the burr off both sides of a sheet metal edge. Note the two cutting discs which need to be adjusted up together. They can be rotated and also reversed as they wear out.

The tool is simply run along the edge of the sheet as shown. The guard over the handle will protect the hand from coming into contact with the rough edge.

There are many styles of deburring tools with cutting blades, including small pen-sized tools that can be carried in a pocket, and telescopic deburring tools as pictured. The hardened steel hook-style cutting blades do wear out, but often the tools have spares stored in the handle.

The tool is simply drawn along the edge in a scraping motion to cut the burr as shown.

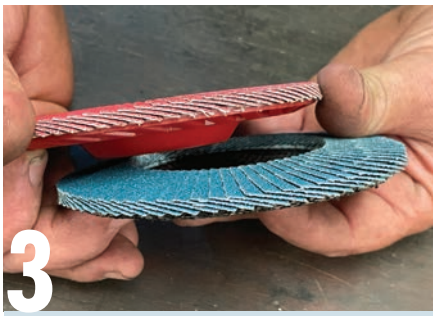
This Toolmaster deburring set should have you covered for most manual deburring jobs, and costs $99 from www.machineryhouse.com.au. It includes both standard blade style and sheet metal deburring tools, plus two handles, a range of blades, scrapers, a countersink and extension pieces.

Of course there is nothing wrong with using a good old hand file to deburr metal, it just takes a little longer. A bastard-cut file is generally the best choice.

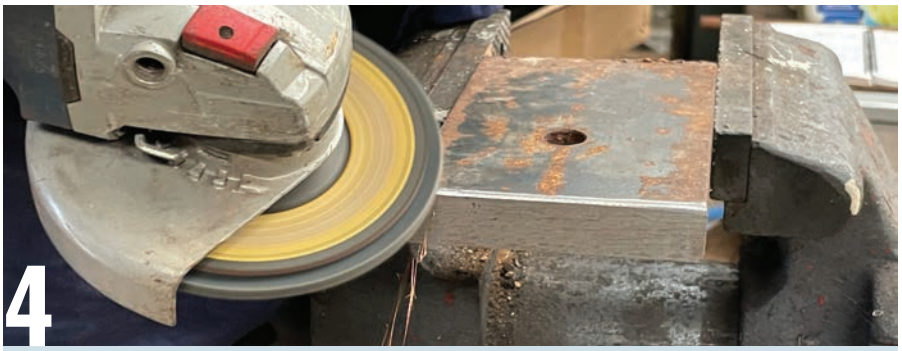
USING ABRASIVE DISCS

As mentioned previously, the choice of cutting method plays a big part in the surface finish and severity of the burr produced. Cold-cutting saws and metal bandsaws will produce the cleanest edge on thicker steel sections compared with abrasive disc drop-saws and angle grinders. The steel bar above only has a minor burr on the bottom edge from the bandsaw.

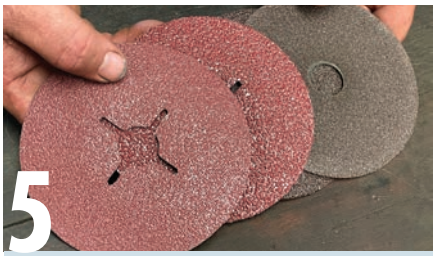
An abrasive flap disc fitted to an angle grinder is a great choice for smoothing sharp edges and removing burrs. While they typically come in abrasive sizes of 40, 60, 80 and 120 grit, the 120 will be the best choice for rounding edges and removing burrs without removing too much material.



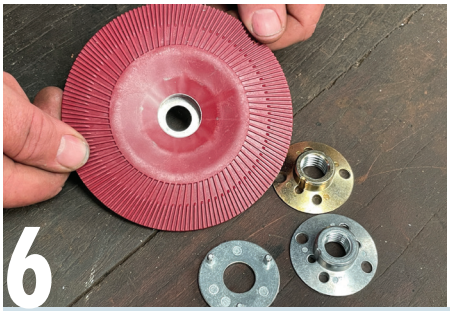
When purchasing flap discs, try to get a disc with an angled face (bottom) as opposed to a flat face (top). You will find the angled face disc requires less pressure to remove material quickly. This is more of an issue for bulk metal removal than simply rounding a few edges.

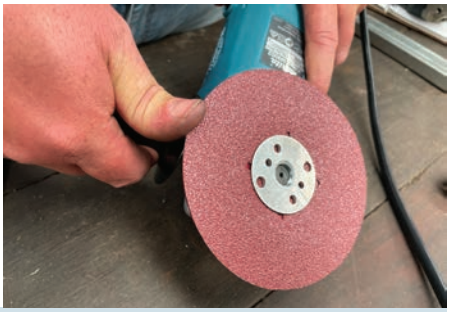


The beauty of flap discs over a standard grinding disc is they are flexible and can deform around the edge, helping create a rounded edge in the process. But they do wear quickly and at around $8 a disc it can add up on big jobs.



A potential cheaper option is to use fibre discs, as they are also flexible, and cheaper to purchase than flap discs. Single discs typically cost around $3 but purchased in bulk the cost can drop to less than a dollar if you shop around. Grit sizes are similar to those available with flap discs and 125mm is the most common size.





To use a fibre disc with an angle grinder you will need a flexible backing pad, which will often include a couple of adapters for different size angle grinder spindle threads. Often the angle grinder guard will need to be removed to use the disc affectively, so extreme care needs to be taken while operating the tool, and where sparks are directed.

Choose a finer grit such as 60 for rounding edges and removing burrs. Coarser grit discs (such as 36 on the left) are more suited to bulk metal removal, smoothing welds and edge preparation for welding.

Use the fibre disc in the same way you would a flap disc. The backing pad should allow some deformation of the disc surface for smoothing and rounding over edges. Fibre discs are also ideal for rust removal.

There is a range of new abrasive options on the market utilising ceramic particles instead of abrasive grit (typically aluminium oxide). These ceramic discs (red coloured, above) are 'self-sharpening' to a degree as they wear, exposing new cutting edges. Manufacturers claim the ceramic media is faster cutting, longer lasting and cooler running, and initial tests shows this is indeed the case. Naturally, they are also more expensive. Next month's *Workshop* will focus on welding edge preparation, as well as a review of ceramic abrasives.

Laser cut parts can have very sharp edges, especially on thinner plate. Even the edge on this 6mm laser-cut plate is too sharp for general handling or painting.

This small, compressed air-powered grinder is often used with 50mm surface cleaning discs for removing old gasket material from engine components. But 50mm sanding discs are also available, and are ideal for cleaning up edges on smaller components.

CHAMFERING TOOL

Possibly a better option is this air-powered chamfering tool, which costs around $100 (we purchased ours online from ebay.com.au). For cleaning and chamfering the edges on laser-cut plate, the tool is absolutely ideal, and leaves a very neat 45-degree chamfer.

The small pilot bearing at the end of the spindle runs along the edge of the steel in the same way the pilot bearing on a router bit bears against the edge of a piece of timber. The rotary collar controls the depth of cut, or the protrusion of the cutter. The cutter itself is simply two indexable carbide lathe cutting tips (right). Note they can be rotated three times before they require replacement.

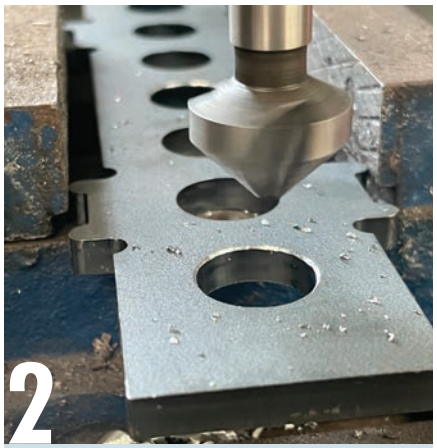
The rotating depth collar is locked into place with a grub screw. You need very little protrusion to do a good job – even 0.5mm is probably sufficient. You may need to check the graduations on the collar actually correspond with the protrusion of the cutter head (this can be adjusted if not).

To use the tool, set the depth of the cutter and run it along the edge as shown. It works best if the travel direction is against the cutter direction, otherwise the cutter tends to dig in. Keep downward pressure against the part so the guide sits perfectly flat on the surface. While the tool produces no sparks, it does throw tiny sharp metal particles everywhere, so it pays to wear gloves in addition to standard protective gear.

The pilot bearing controls the depth of cut, but will also reproduce any edge irregularities in the finished chamfer. The advantage of the pilot bearing is that once the depth of the bevel is reached, the tool will not cut any deeper if it is run back over the surface.

DEBURRING HOLES

Holes require deburring or chamfering, even if it is only to help insert fasteners or ease installation of a tight-fitting part. This six-piece countersink set costs about $74 and covers hole sizes from 1.5 to 20.5mm. It leaves a 45-degree chamfer on the edge of a hole.



While the bits are designed for countersinking holes, they are also ideal for chamfering and deburring in the drill press, or even in a hand-held drill with care. Simply touch the bit carefully into the hole. It will tend to self-centre the part, so leave the part secure but moveable (for example, place in the drill vice but don't bolt the vice to the drilling table).

The air-powered chamfering tool can also be used for internal deburring as long as the hole is larger than the diameter of the pilot bearing. Run the tool around the inside edge of the hole opposite to the direction of the cutter rotation. Compare the chamfered and un-chamfered holes (bottom).

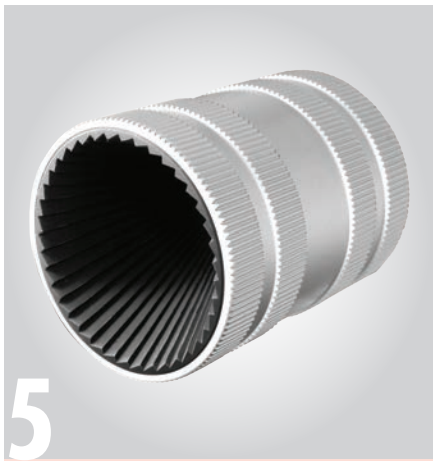
EXTERNAL DEBURRING

This eternal deburring tool is a little bit like a pencil sharpener for metal, and is placed in the chuck of a hand drill.

Simply touch it down over the end of a rod clamped in the vice and remove once the desired chamfer has been formed. These chamfering tools are also ideal for tidying up the end of threaded rod.

There are also deburring tools for pipe which work in much the same way and are hand-operated. The blue unit is designed for copper and PVC pipe so that fittings can slip easily over the end of cut pipe. It also includes internal deburring blades on the opposite side.

Simply place over the end of the pipe and rotate back and forth a couple of times. This Irwin brand tool costs about $20.



You can get external deburring tools suitable for steel, but they cost a bit more. This unit is double-ended for internal and external deburring and costs about $84 from www.machineryhouse.com.au

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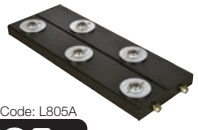

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BTT-450 Ball Transfer Conveyor

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- Steel bell rollers
- Powder coated frame

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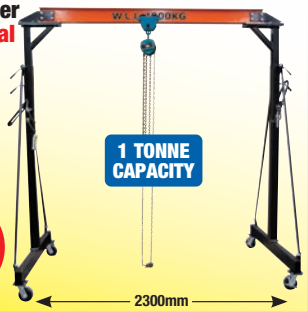

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