

AGRICULTURE TECHNICAL GUIDES SERIES

Guide to Rotary Mower Blade Sharpening in Agricultural Settings

01 July, 2019

When should blades be sharpened?

Agricultural rotary mower blades generally should be sharpened at least every 100 hours of operation, or once annually, whichever comes first.

The first cutting of the year uncovers 6 months' worth of sticks, stones, and dirt clods, so most of the wear is from the first cutting of the year. This is why blades should be sharpened annually even if less than 100 running hours have accumulated.

If narrow lines of grass stems which are cut, but 1-3" above the intended height, appear- the blades are dull.

If the tractor engine is working noticeably harder to cut the same grass, the blades are dull.

Types of rotary mowers used in agricultural settings

Finish Mowers:

These machines are designed to remove less than 3" of height from plants in one pass, and leave a neat, attractive cut. They can be identified by each blade being fixed to the spindle such that the blade cannot rotate independently of the spindle. Generally, mowers with a discharge chute are finish mowers.

Rotary Cutters:

More popularly known as a "Brush Hog", which is a proprietary name, these machines are designed to cut anywhere from 3" to 24" of plant material in one pass. They can also cut small trees up to 1.5" in diameter. Rotary cutters have hinged blade mounts, so the blades can swing around their mounting point. Aside from dulling the blade, running over an object such as a rock, fence post, or tree stump, will not damage a rotary cutter. If there are no rubber belts anywhere in the driveline, a mower is of this type.

Mower Type ID Checklist

Finish Mower

- Blades are fixed to spindle

- Blade mount is in center of blade, cutting edges on both ends

- May have a discharge chute

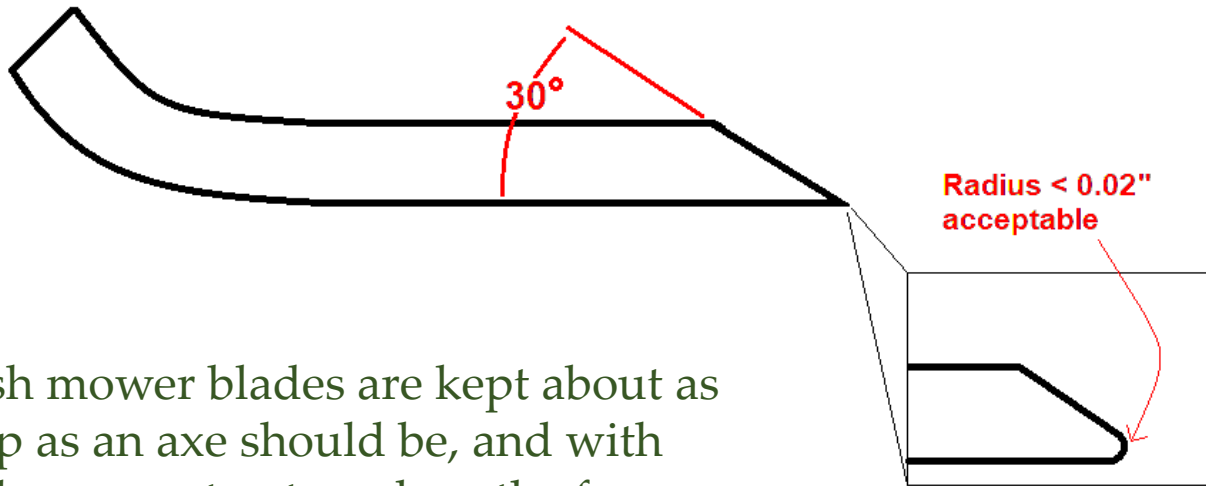
Rotary Cutter

- Blades are hinged

- Blade has only one cutting edge, and is mounted on its end

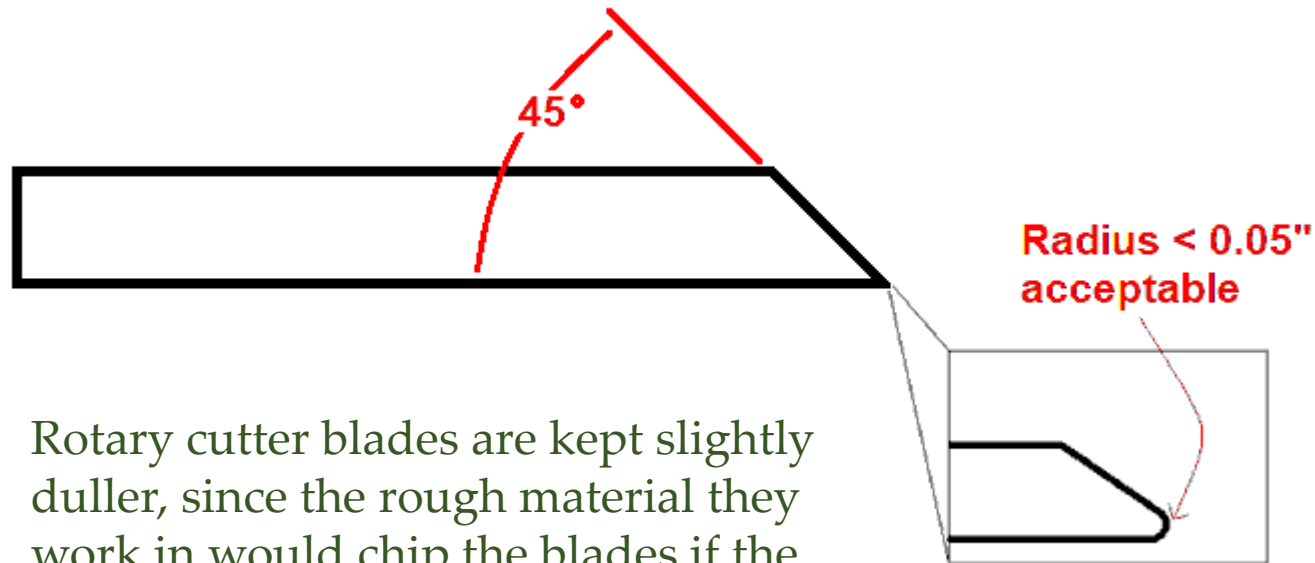
- No rubber belts in the driveline

Proper Blade Geometry- Finish Mowers



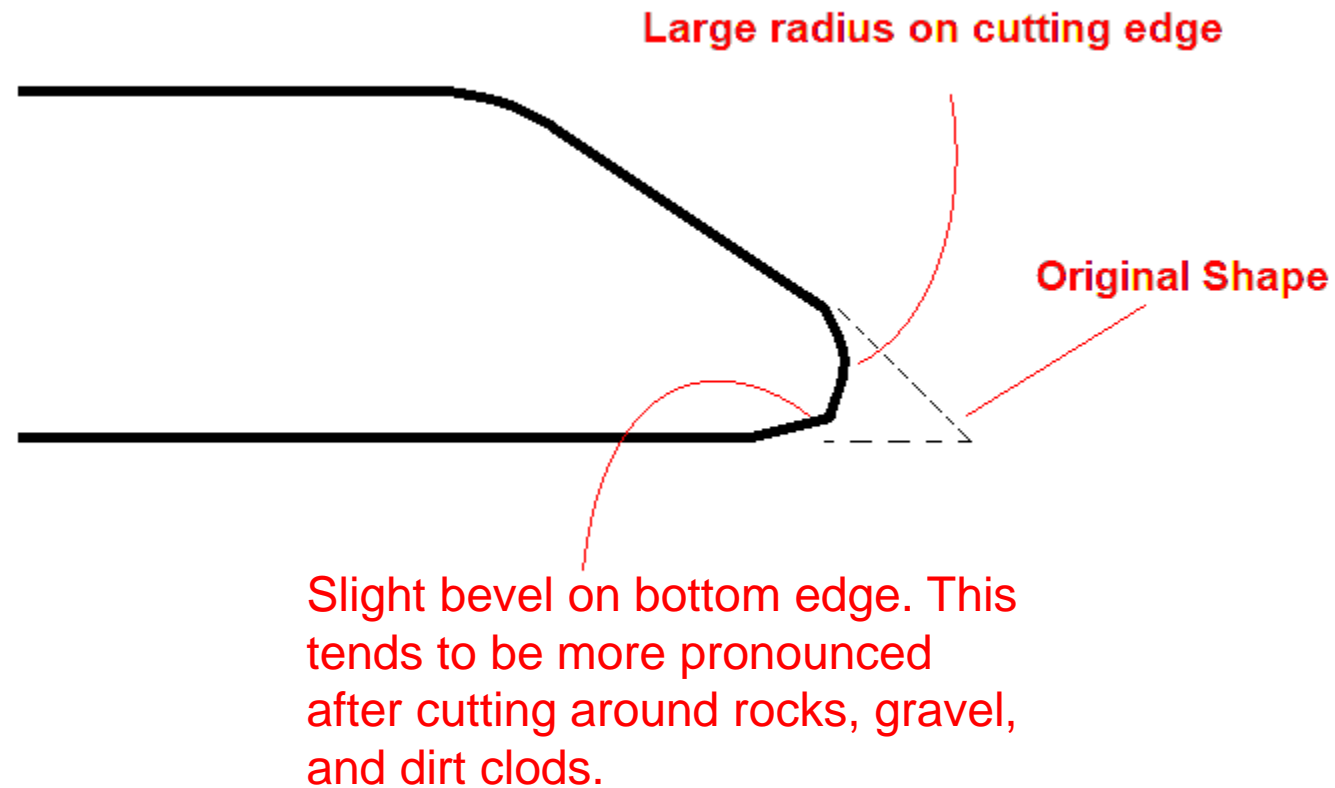
Finish mower blades are kept about as sharp as an axe should be, and with similar geometry, to reduce the force needed for cutting. Since they turn at high speed, this is necessary in order to make effective use of engine power.

Proper Blade Geometry- Rotary Cutters

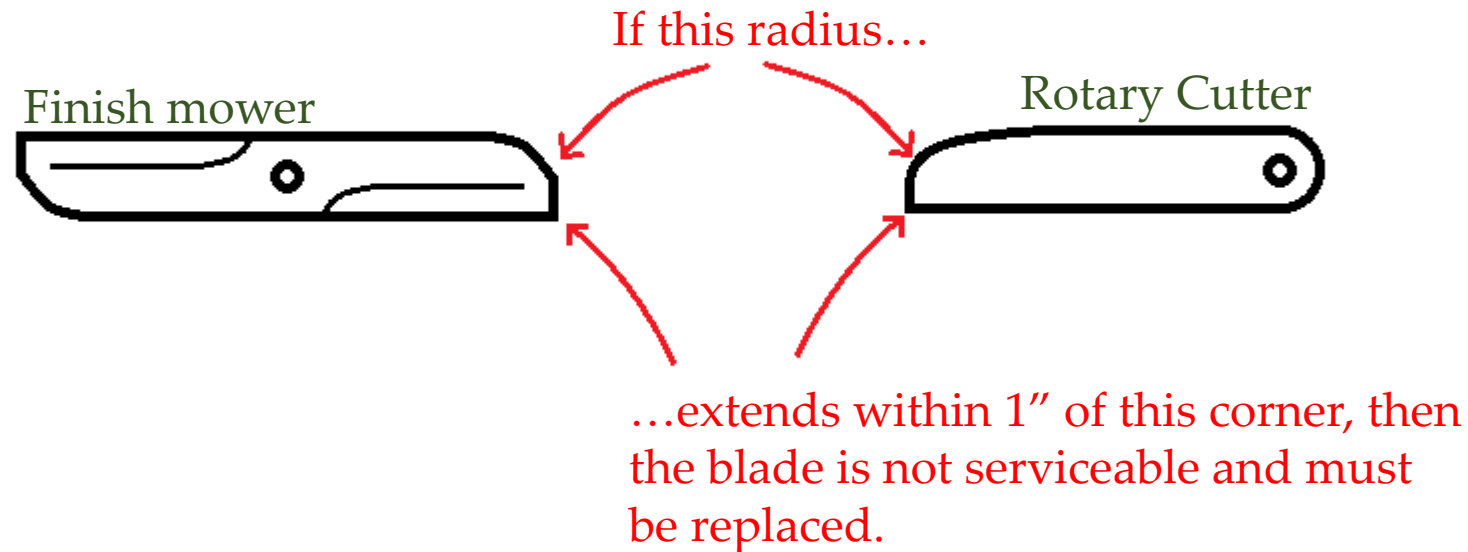


Rotary cutter blades are kept slightly duller, since the rough material they work in would chip the blades if the edge were thinner. They turn at a much lower speed, so it is practical to use more input force for each foot of blade travel.

Typical Wear for Agricultural Rotary Mower Blades

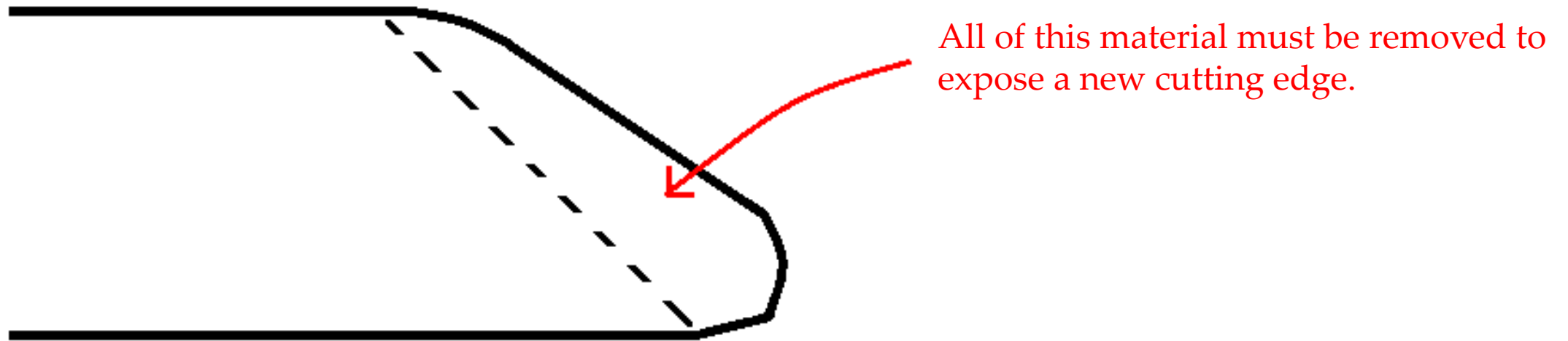


Can the blade be sharpened?



Additionally, if a rotary cutter blade is bent, it must be replaced. Finish mower blades are made of soft steel and can be returned to service after being straightened.

Our Objective in Blade Sharpening



How we'll do it: Tools & equipment needed

(2) Jack stands at least 12" high

Suitable wrench for removing blades (See next slide)

4.5" angle grinder*

*Landscaper-type bench mounted blade grinders are not suitable for agricultural applications. They are meant to remove less than 0.10" of material at a time and take too long to sharpen agricultural blades.

Step 1: Remove the blades

Finish mower:

If possible, leave the mower attached to the tractor. Raise the deck(s) as high as it will go, then use the jackstands to prop it up safely. If a tractor isn't available, use a regular automotive jack. Use an impact wrench and socket to remove the blades from underneath the mower. If an impact wrench isn't available, use a box wrench and repeatedly hit the end with a small hammer until it comes loose (Pro tip: leave the PTO attached and in gear if using this method).

Rotary cutter:

Blades are typically removed from the top. There will be an access cover somewhere within 18" of the spindle gearbox. Remove this cover. Unscrew the lock bolt using an impact wrench and socket. Remove any clips (sometimes a hammer or prybar is necessary) and pins, and then either:

- Remove the blades through the access hole, or
- Let them drop, then drive the mower away and pick them up

Safety Note

Whenever working on or underneath mowers which are connected to a tractor, or which are equipped with their own engine, put the key in your pocket and don't give it to anyone until you're finished with the job.

If the machine can be started without a key, disconnect the battery.

Step 2: Check for straightness

Lay the bottom of the blade on a flat surface (oriented as it would be in the mower) and check that it's straight. This can be confusing, since some blades are curved intentionally, so it's best to compare to a new blade, or to compare two blades to each other. If the blade is bent, use a vise and hammer to straighten it before sharpening.

The blade is acceptably straight once no part of it is more than 0.25" beyond where it was when the blade was new.

Sometimes the blade can't be straightened acceptably, so it's best to do this before sharpening.



Step 3: Place the blade in a vise. Clamp the jaws over the mounting hole, leaving the cutting edge facing up and hanging over the side. Face the top of the blade toward you and the bottom toward the bench.

Grinding creates vibration, so for best results, use your body weight to close the jaws very tightly.

If your vise swivels, some people find it easier to work with the jaws at a 45-degree angle to the bench.



Step 4: Find the edge of the radius

On agricultural blades, typically the radius extends further on the bottom of the blade than on the top, so look at the back of the blade to see how far down to go. Typically, where the shiny steel turns black again (indicated by the pen in this picture) is how far you'll need to go.



Step 5: Grind off the radius

Hold the grinder perpendicular to the bottom side of the blade, and move back and forth along the length of the blade, evenly removing material until at least 90% of the length of the cutting edge has no radius left. Try to keep the edge straight.

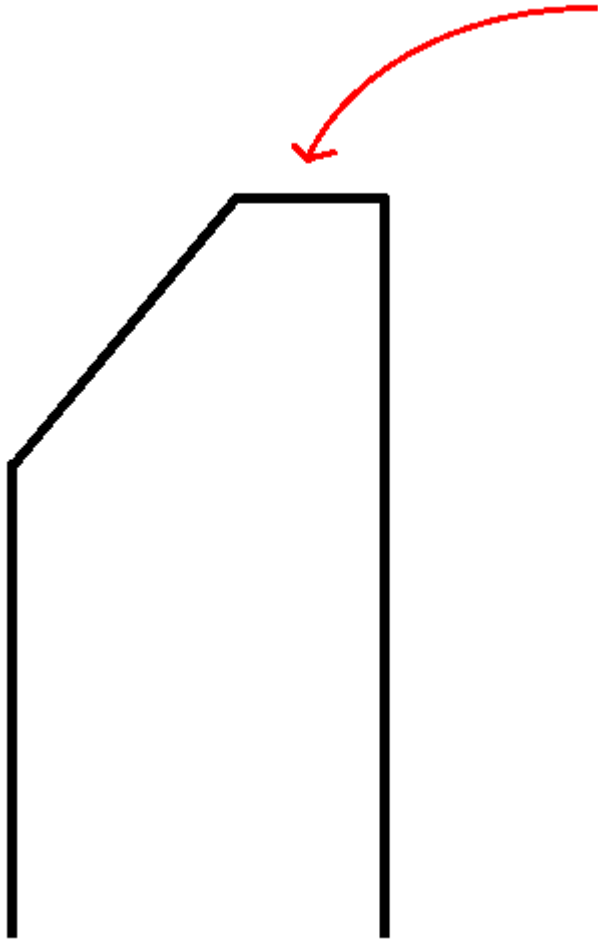
Nicks and chips less than 0.25" wide can be ignored. These small imperfections are acceptable on agricultural blades, and removing them every time the blade is sharpened is sometimes impractical. If a larger chip exists, it is acceptable to curve the new cutting edge to the shape of the chip. Over repeated sharpenings, it will eventually disappear.

What about the tip?

Usually the outside tip of the blade will be rounded off from wear. On agricultural blades, this is acceptable. At your convenience, either keep the worn shape, as in the picture below, or extend the radius toward the mounting hole slightly so as to reduce the rounding over repeated sharpenings.

Do not attempt to remove the rounded corner entirely, as this will involve removing up to 25% of the blade per sharpening. This is impractical and does not benefit mower performance.





Step 6: Measure the width of this new edge.

If it's less than 0.10" along most of the length of the cutting edge(usually the case for finish mower blades), proceed to step 8.

If it's wider than that along most of the blade (typical for rotary cutter blades), proceed to step 7.



Step 7: Rough material removal

Use the edge of the grinder disc to cut slots that end within 0.02" or so (the thickness of two business cards) of the intended new cutting edge. Use the grinder guard as a fulcrum, and use two hands to steadily rotate the grinder into the metal. Try to cut the slot so its bottom is at the intended angle for the final cutting edge (30 degrees for finish mower blades, 45 degrees for rotary cutter blades). Keep the slots as close together as possible.

Be careful not to let the slots get too deep and extend through to the bottom side of the blade. Removing too little is better than not removing enough.

This step greatly speeds the process of removing material when blades are very dull, as is often the case on farms.



Another view



Keep cutting slots until you get to the end of where the cutting edge originally was (you may have to use your best judgement here). Try not to let the cutting edge get shorter over repeated sharpenings, as this leaves a rougher cut while taking more engine power.



...and the hard part's done!



Step 8: Re-bevel

Hold the face of the grinder disc against the blade at the intended new edge angle, and move side-to-side along the length of the cutting edge while keeping slight forward pressure on the grinder...



... Keep going until the slots ground in Step 6 (if applicable) are mostly gone, and the new edge is sharp and straight. Work slowly and patiently, having a neat edge helps the mower cut better.



All done!

Step 9: Re-attach blades

If available, apply a pea-sized drop of anti-seize lubricant to the bolt threads and clips beforehand. This aids removal next time.

Unless otherwise specified by the manual, blades don't have to be super-duper, nuclear-grade tight. 85 foot-pounds (slightly more than typical human can apply with a box wrench by hand) is usually sufficient for blade bolts.

Tighten the blade as far as you can with a box wrench, then hit the wrench once or twice with a small hammer.

Using an impact wrench isn't necessary, but it's acceptable if you're careful not to overtorque the bolt. Most ½" impact wrenches supply around 550 foot-pounds maximum, so only hit the trigger for short bursts.

Re-attach any shields and access covers removed earlier.

Lastly, remember to remove the jackstands before driving away.

Thanks for watching, and have a happy and safe growing season!

For more information on mowers, blade sharpening, or anything else with moving parts on your farm, call 732.693.8312 or visit www.solanum-service.com

Compiled 01 July, 2019 by Curtis McKittrick for Solanum, LLC.

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