



# Reel grinding for turf health, beauty

by Don Lindenfelser

■ Reel mowers are precision machines that need daily maintenance to retain the turf-grass's well-groomed appearance. The scissor-like shearing action of a reel mower is only possible if the reel and bedknife are sharp and the proper reel-to-bedknife clearance is maintained.

Cutting action begins as the bedknife positions the grass to be cut at the cutting edge. The reel then pulls the grass toward the bedknife where it is sheared by the cutting edges as they pass one another.

For the grass to be cut at the proper height, it must contact a bedknife with the proper angle at the cutting edge, so you should grind a 5 percent relief angle on the front face of the bedknife. Without a relief angle, the blade of grass will contact the lower edge of the bedknife and bend over at too much of an angle prior to being cut. When mowing greens, where very small cuts are being taken, an improperly aligned bedknife may not capture the grass at all, and no grass will be cut.

Close examination of the reel-to-bedknife relationship reveals two square edges passing one another with approximately .002 of an inch clearance. This clearance is necessary because:

□ If the reel contacts the bedknife, the square (sharp) edge of the reel and bedknife will roll over, becoming dull.

□ Contact between the reel and bedknife generates heat which can distort the shape of the bedknife, and cause the bedknife to draw closer to the reel, resulting in the cutting surfaces rolling over more, and more heat being generated in the bedknife.

□ Drag produced by an improperly

adjusted cutting unit may result in an unacceptable clip ratio, undue strain on drive mechanisms and premature wear of the cutting unit.

**Reel and bedknife grinding**—Reel and bedknife grinding are used to:

□ restore the cylindrical shape of a reel that has become cone-shaped due to improper adjustment of the reel-to-bedknife clearance or due to worn reel bearings;

□ restore the edge when the grass is not being cut across the entire length of the bedknife due to nicked blades;

John Deere recommends relief grinding the reels before spin-grinding to:

□ Reduce the blade contact area, resulting in less friction, thus requiring less horsepower to drive the reel;

□ Ensure longer wear life;

□ Cut time required to backlap;

□ Reduce pulling and tearing of the grass as the unit becomes dull from use;

□ Provide an area for backlapping compound to be trapped to backlap reels more effectively;

□ Remove metal from the trailing edge of the blade forming an angle (the relief angle) to reduce the contact area of the cutting edge; and

□ Allow the operator to true a reel (make it round), when backlapping, if a blade is .001 inch to .002 inch too high.

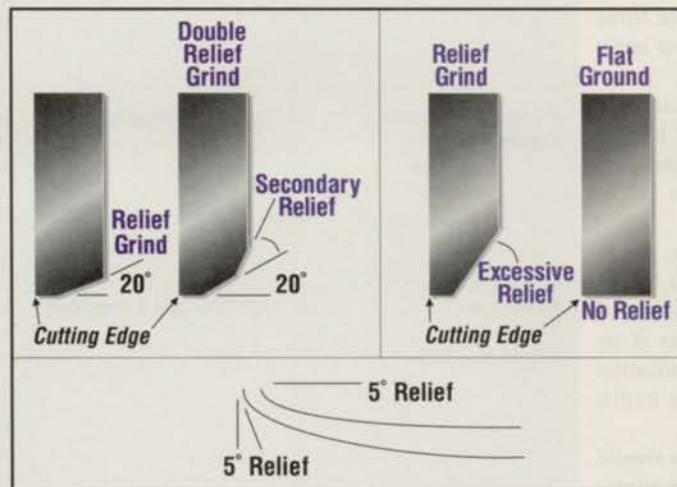
**Backlapping**—Backlapping is used to sharpen the cutting edges when grinding is not necessary. Backlapping, as compared to grinding, removes a very small amount of metal and requires less time.

The backlapping procedure is accomplished by spinning the reel backwards while applying special abrasive compounds to the reel. Usually, coarse compounds are used initially, followed by a finer abrasive for final honing.

John Deere recommends backlapping after spingrinding to remove burrs and rough edges left from the spingrinding procedure. Backlapping produces a honed edge that will cut the grass evenly and leave the tops of the grass with clean, straight edges.

The cutting unit should be inspected, backlapped, adjusted and checked daily for a uniform cut along the complete length of the bedknife. The adjustment should

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□ restore the edge when the lack of frequent backlapping allowed the edge to be rounded beyond the capability of the backlapping procedure to restore the edge; and

□ restore the edge when the reel-to-bedknife clearance has been improperly adjusted allowing the reel to contact the bedknife.

**Relief grinding**—Relief grinding restores the factory relief angle to prolong cutting unit life and promote fast between-grind sharpening (lapping). To grind a cutting unit without relief is doing half the job, and maintenance costs will increase due to the constant metal-to-metal contact of the "flat" ground reel blade.

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allow the reel to turn freely without dragging against the bedknife. Metal-to-metal contact will generate heat, causing the reel to expand, intensify the dragging and produce more heat. This vicious cycle will quickly "shut-down" the mower.

**Reel and bedknife sharpening—**Sharpening is necessary when the grass is not being cut cleanly due to dull bedknife and/or reel blade edges, or when turf streaking is apparent, caused by the bedknife and reel not cutting the full width of the blade due to nicks, bends or uneven wear.

Lap when the relief angle remains and edges are rounded only slightly. Grind when no, or very little, relief angle remains on the reel blade and/or the bedknife relief angle is minimal or non-existent.

**Precision grinders—**Many grinders on the market today provide an acceptable quality reel and bedknife grind, but this is not equivalent to a "factory" precision grind. At the John Deere, Horicon, Wis., factory, the reels and bedknives are ground on very precise industrial grinders that are mounted to an independent concrete bed over 12 feet deep to eliminate vibration. Though a grinder of this quality is too expensive for most golf course budgets, superintendents are demanding as close to a "factory grind" as possible to provide the highest quality turf for their players.

Therefore, it's important the reel and bedknife grinders be set up properly!

The grinders should be kept as clean as possible to prevent premature wear and maintain their precision design. A separate grinding room in the equipment maintenance building helps to protect the reel and bedknife grinder. Level the grinder on a flat concrete floor and bolt it down securely.

The capability of the reel grinder to perform relief and spin grinding operations is paramount to provide the highest quality cut and longest possible interval between grinding periods. Look for a precision grinder that has coolant to prevent overheating the metal, which could cause brittleness. The coolant also reduces the grinding dust. Among other key features to consider are plexiglass shields, machine "shutdown" capabilities, and cutting unit lift attachments.

To provide the best possible quality of turf, it's imperative that reel and bedknife maintenance operations be performed routinely with well maintained precision equipment and highly skilled operators. With tolerances of .001 to .002 of an inch between the reel and the bedknife, precision is a must.

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## Reel grinding tips

1) "Dress" the grinding stone (per the manufacturer's recommendation) and replace it regularly to ensure precision grinding.

2) Make sure the grinding stone is entering from the back side of the reel blades to obtain the proper grind.

3) Inspect and/or replace the reel bearings and seals before grinding.

4) Perform the relief grinding operation first and then spin grind. Follow the manufacturer's specifications when performing these grinds. John Deere recommends 20 degrees relief on the reel blades and 5 degrees relief on the bedknives' top face and front edge.

5) Avoid rapid, quick grinding as this procedure may not provide a sharp edge (square corner).

6) If the metal becomes discolored as you are grinding, too much material is being removed at one time.

7) After grinding, wash the cutting unit reel thoroughly to remove the grinding dust. It's essential the grinding dust be removed in the reel bearing journal areas to prevent premature reel bearing wear.

*—D.L.*

## Sharpening rotary mower blades

■ Rotary mowers cut grass as the blade's cutting tip, moving at a high velocity, impacts the grass blades. For a quality cut, the cutting edge of the mower blade must be sharp.

Commercial cutters should install new or resharpened blades at least once a day. This is required for a professional quality cut.

A blade's cutting edge varies in length but is usually several inches long. The first inch does most of the cutting. Assume you are mowing with a walk-behind mower with a blade at 3250 rpm. At this speed, the blade rotates at 54.17 revolutions per second. Also assume that the mower is going forward at 2 mph or 3 feet per second. With two cutting edges on the blade, the 54 rps equates to 108 cutting swaths per second. At 3 fps, each swath removed a 3/4th-inch strip of grass;

therefore the interior portion of the cutting edge contributes little to the cutting process. Since the first inch does most of the cutting, it is important to get a good edge on this area.

With some of the popular mulching blades, the extended cutting edge recuts the clippings during suspension. It is also felt that the increased ground speed of riding mowers makes it beneficial to increase the length of the cutting edge.

Once the mower blade has been removed for sharpening:

□ Check the blade to assure that it is not bent and that it has the correct "attitude" in relation to the mower housing and the ground surface. (To check this, place the blade on a perfectly flat surface.) The blade should be straight, with the cutting tips lower than the heel (center portion) of the blade.

□ Sharpen the blade by grinding the top surface only, maintaining the original cutting edge angle. Make sure all nicks are removed and that the cutting tips are smooth and sharp.

□ Make sure the blade is balanced. Use a commercial balancer or place the blade on a pin clamped in a vise. If one end of the blade swings downward, material must be ground gradually from the heavy end until the suspended blade will remain in a fixed position.

□ Properly reposition the blade on the mower. Tighten the retaining nut securely.

*—Contributed by Don Lindenfelser of John Deere, Horicon, Wis. and Devon McGee, product engineer at Encore Manufacturing Co., Beatrice, Neb.*