



Commercial Products

Fundamentals of Reel Mowers

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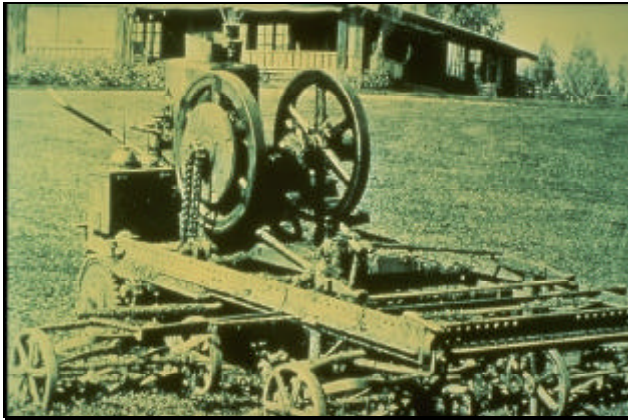
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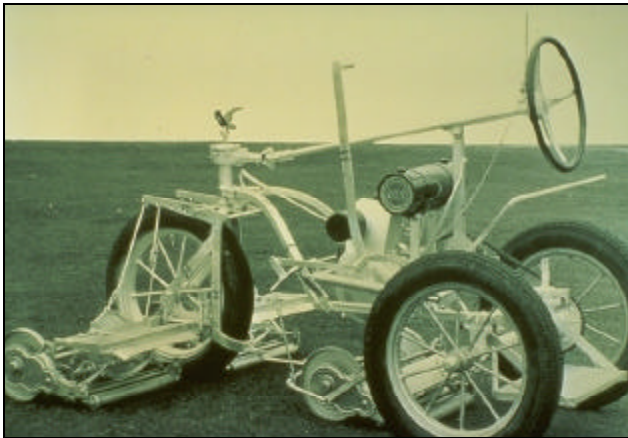
Historical Background



The concept of the reel mower goes back to the 1800's. It evolved out of a need for groomed turf areas being maintained on a regular basis.



Golf course development during the 1920's and 30's brought about design improvements in engines and mower drive systems.



These improvements continued, allowing for lighter weight and easier to use equipment.

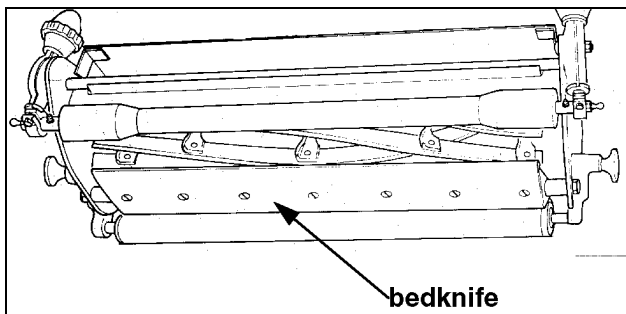


The development of hydraulics during the 50's and 60's improved the reliability, safety, operator comfort and lowered maintenance costs.



Although dramatic improvements have been made in reel type mowers, some of the same frustrations that developed working with reel cutting units years ago are still present today. If reel mowers unique characteristics are not understood and responded to, the end result will be a poor quality of cut and expensive down time and repairs.

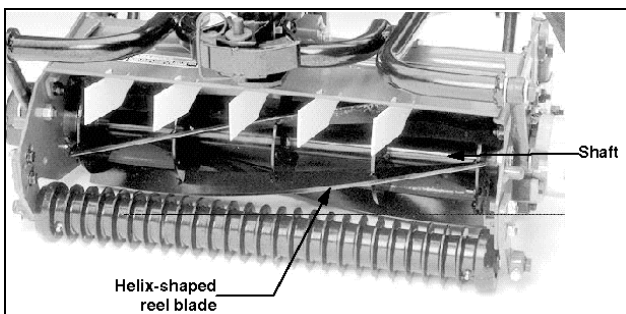
Theory of Operation



There are three main structural members in a reel cutting unit:

The REEL consists of varying numbers of helix shaped blades attached to support spiders which are mounted on a rotating shaft.

The BEDKNIFE is attached to the bedbar and the assembly is mounted to the main frame in a manner that allows for paralleling and adjustment to the reel.



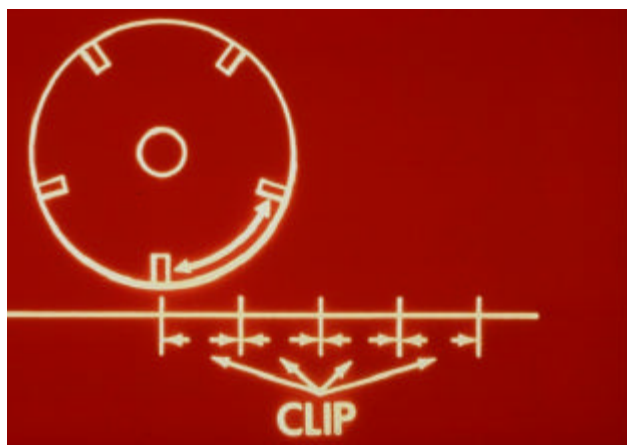
The FRAME supports the rollers, the bedbar assembly and reel with its drive mechanism, which can be hydraulic, belt driven or ground driven.

A reel mower cuts grass with a scissors-like shearing action as the moving helix shaped blades pass over the stationary bedknife. The cutting action requires that the bedknife and reel blades be sharp, matched, and in close relationship with each other.

When properly maintained and operated, reel mowers provide superior quality of cut. It cannot be overstated that reel mowers are precision tools. It is essential that they be adjusted and operated with this in mind.

Reel Mower Clip

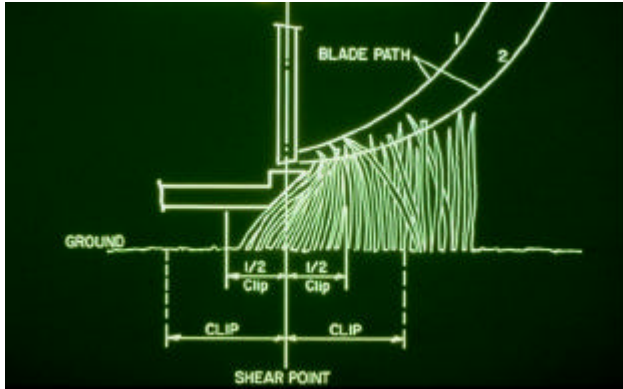
To understand reel cutting theory, you must understand the concept of clip and the shear point. A shear point is any single point of contact made between the reel blade and bedknife.



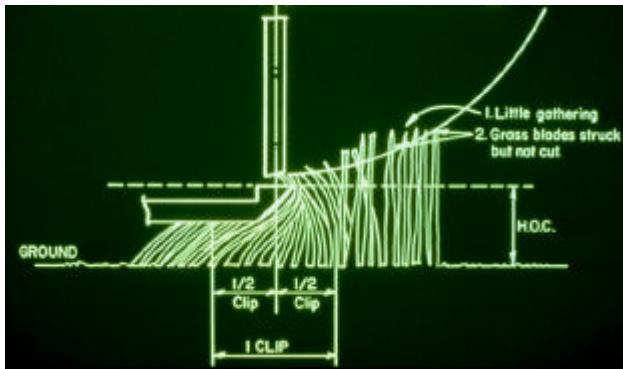
Clip is the forward distance traveled between successive blade contacts at one shear point.

Factors Affecting Clip

- The diameter of the reel
- The number of reel blades
- The speed of the reel
- The ground speed.

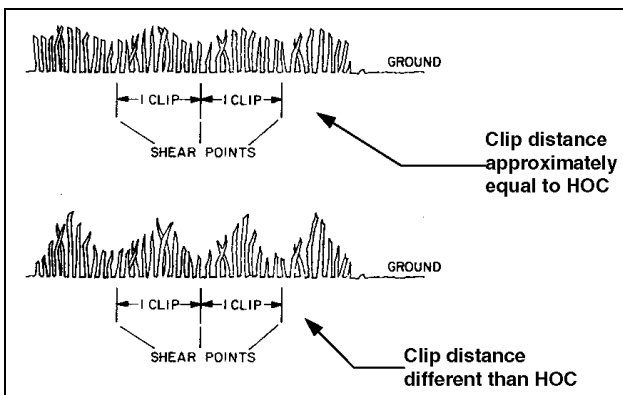


By following the blade path through two “clips” as the machine moves forward we can illustrate the actual process of cutting grass. The bedknife pushes grass toward the shear point while the reel blade gathers it in front. Each blade path has one-half clip in which to cut all the grass



Note that the grass outside of the forward half clip is not easily gathered. The general rule of thumb concerning height of cut vs. clip is that both measurements should be within 20% of each other. The best results will be obtained when height of cut is equal to or close to the clip.

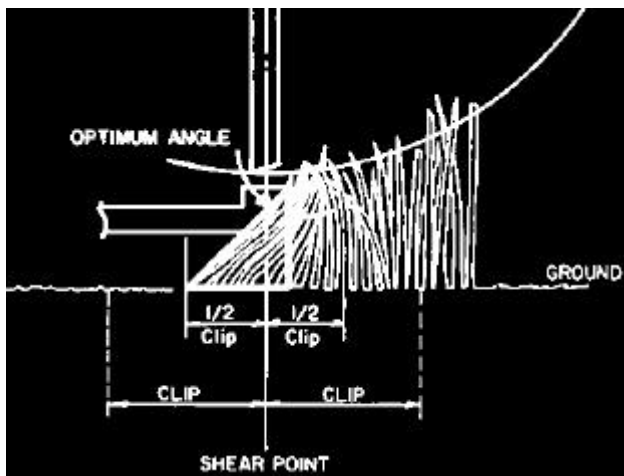
Grass extending beyond the forward half clip, yet tall enough to be within the blade path is less likely to be cut. Reel blades may contact the grass in this area several times prior to the actual gathering of the grass. This is the so called “fanning” process. This process is more a mechanical striking of the grass that it is of the commonly thought effect of a blowing action.



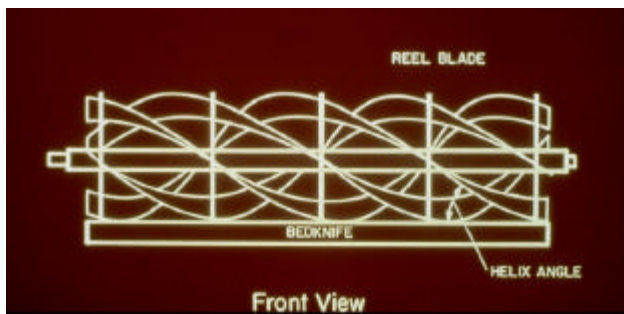


This is an extreme case corrugation. Because of an imbalance between height of cut and clip, the grass is cut with extreme valleys and peaks.

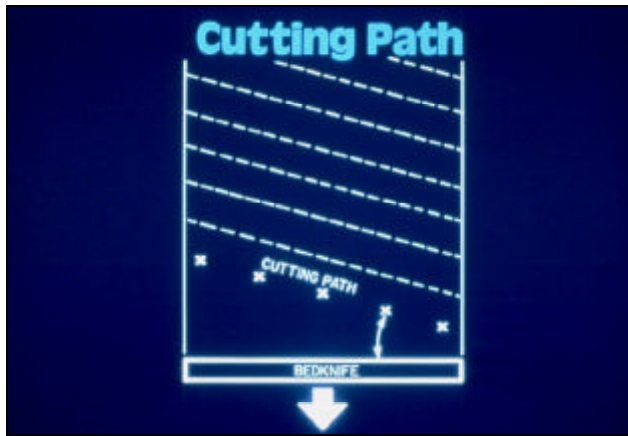
NOTE: If you change equipment or height of cut you may notice some corrugation after the first mowing. This will go away after the grass is maintained at the new height of cut over a period of time.



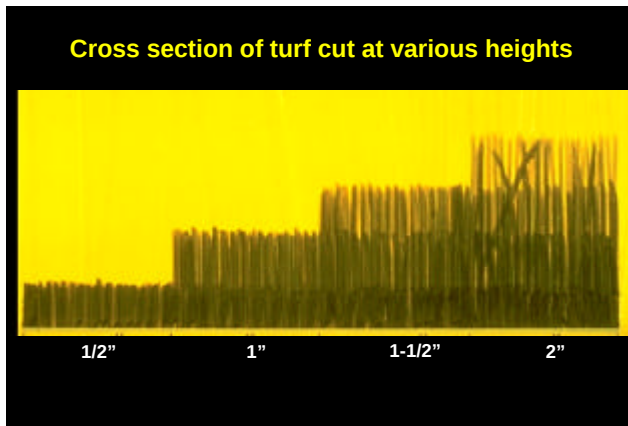
The importance of the bedknife front angle is visible from the side view. Note that the proper angle allows the grass behind the bedknife front edge to be more effectively cut.



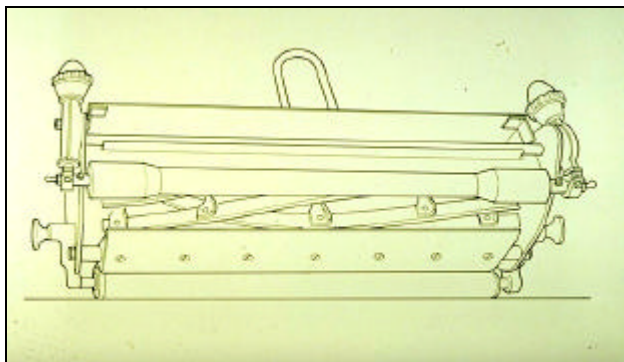
A front view illustrates the angle between the bedknife and the reel blade which is called the helix angle.



Another term known as “the cutting path” is the result of the helix angle and the forward motion of the cutting unit. The shear point moves down the bedknife as the bedknife moves forward. The grass is physically cut at an angle to the bedknife.



Other factors which affect reel mowing are the grass density and the grass acclimation or grain. Grass tends to thicken at the normal maintained height of cut. The denser the grass, the easier it is for the bedknife and reel to gather it. Grass density and grain can often override other factors we have discussed regarding the cutting action.



The basic requirements for good performance of reel mowers are:

- The cutting edges on the reel blades and bedknife must be straight and sharp.
- The bedknife must be exactly parallel with the reel.
- The bedknife should be positioned against the reel with light contact.

These requirements will be discussed in more detail later.

Importance of the Operator

The Operator has a significant influence on the quality of cut that a reel mower can deliver.



The large investment in specialized mowing equipment cannot be jeopardized by unqualified operators. Before an operator can be considered qualified to operate a piece of equipment, there should be a significant effort by the supervisor towards their training and familiarization with each piece of equipment.

Make sure the operator reads and understands the Operator's Manual. Have the operator watch the Operator Training Video, then explain any unique methods or procedures used on your grounds.



A supervisor should play a key role in establishing the proper attitude and behavior patterns toward operating turf equipment. A supervisor should not create the impression that a few minutes orientation on a piece of equipment will qualify the operator.

Operators and service technicians play a significant role in determining quality of cut, down time, and life of mowing equipment. Make a commitment to train and familiarize staff with each product. Remember, that each type of mowing equipment will have specific operating characteristics, and noise qualities. Operators should become familiar with the product and listen for any unusual changes. Concerns should be reported to the service technician before significant problems develop.

Preventive Maintenance

To get the most out of your equipment investment, it is important to have a good preventive maintenance program.

REELMASTER® 223-D, 5100-D and 5300-D Daily Maintenance Check List							
Daily Maintenance: (duplicate this page for routine use)		Unit Designation: _____ TORO ID#: _____					
Maintenance Check Item	Daily Maintenance Check For Week Of						
	MON HRS	TUES HRS	WED HRS	THURS HRS	FRI HRS	SAT HRS	SUN HRS
✓ Safety Interlock Operation							
✓ Brake Operation							
✓ Engine Oil & Fuel Level							
✓ Cooling System Fluid Level							
Drain Water/Fuel Separator							
✓ Air Filter/Pre-Cleaner Condition							
✓ Radiator & Screen for Debris							
✓ Unusual Engine Noises ¹							
✓ Unusual Operating Noises							
✓ Transmission Oil Level							
✓ Hydraulic System Oil Level							
✓ Hydraulic Filter Indicator ²							
✓ Hydraulic Hoses for Damage							
✓ Fluid Leaks							
✓ Tire Pressure							
✓ Instrument Operation							
✓ Reel-to-Deckknife Adjustment							
✓ Height-of-Cut Adjustment							
✓ Cutting Units Shear Pin							
Lubricate All Grease Fittings ³							
Touch-up damaged paint							

¹ = Check glow plugs and injector nozzles, if hard starting, excess smoke, or rough running is noted.
² = Check with engine running and oil at operating temperature.
³ = Immediately after every washing, regardless of the interval listed.

Notation for areas of concern: _____ Inspection performed by: _____

Item	Date	Information
1		
2		
3		
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6		
7		

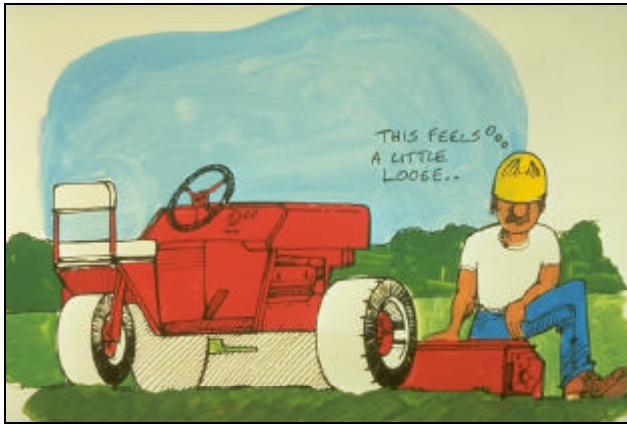
(See Operator's and Service Manual for specifications and procedures)

Doing scheduled maintenance and adjustments will prolong the life of your equipment, help prevent expensive downtime, and give the best possible quality of cut and performance. Experience has shown that a high percentage of problems that occur in turf equipment have developed over a period of time and could have been prevented by adjustment, lubrication, or other required maintenance.

Follow the maintenance and adjustment recommendations listed in the Operator's Manual. Some products may also have a Quick Reference maintenance decal on the machine. Recommended maintenance intervals should be considered minimum requirements. If the equipment is operated in particularly harsh conditions, such as very hot weather, during the "grow in" period after construction, or on topdressed greens, these procedures may have to be performed more often.



Use original Toro parts when doing maintenance or repairs. These parts have been tested and designed for this specific, very demanding, application. "Will fit" parts may look the same and fit, but they can give totally different performance. Don't take a risk on your important equipment investment by saving a little money now that can cost you expensive repairs or increased maintenance intervals later.



The operator and service technician should make a thorough visual examination of the product each day. This can identify oil leaks, low oil levels, loose or bent components and abnormal noises.



The maintenance charts and Operator's Manuals should be used for reference to identify specific areas requiring ongoing scheduled maintenance. Service Manuals and Training Guides are also available for many models.

Information about Service Education Materials, Maintenance Schedules, Service Bulletins and more is also available on the Internet at:

www.toro.com/golf/custsvc.html

Keep Thinking and Be Aware !

Mowing equipment is designed for a specific application and should be operated keeping those restrictions in mind. Accidents and personal injuries can be minimized if persons will keep thinking and be aware in their every day work habits.

Set-up and Adjustments

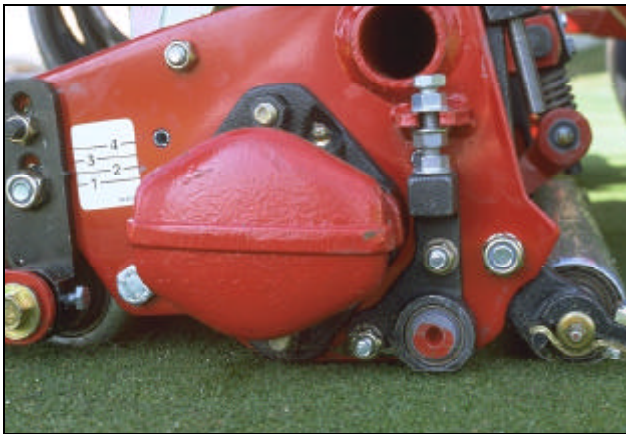
Reel mower performance depends on proper set-up and adjustment procedures. An error of .010 inch or .25 mm, in height end-to-end, or from one cutting unit to another, is visible as a mismatch on many golf course greens. Although there are design variations in cutting units, most require the same basic procedures. A surface plate, accurate height of cut tools and proper instruction are essential for setting up a cutting unit.

Factors that affect quality of cut

- Tire pressure
- Engine governed speed
- Reel bearing condition/adjustment
- Reel and bedknife sharpness
- Bedknife parallel to reel
- Bedknife to reel contact
- Bedknife attitude (angle)
- Roller(s) parallel to reel
- Height of cut (bench set vs. actual)
- Correct bedknife
- Cutting unit alignment and ground following
- Roller and roller bearing condition
- Reel speed
- Traction speed
- Cutting unit drop speed and sequence
- Cutting unit counterbalance or down pressure setting

There are many factors that can affect quality of cut, including condition of the mowing equipment and agronomic factors. Turf conditions such as excessive thatch, “sponginess” or attempting to cut off too much grass height may not always be overcome by adjusting the machine. It is important to remember that the lower the height of cut, the more critical these factors are.

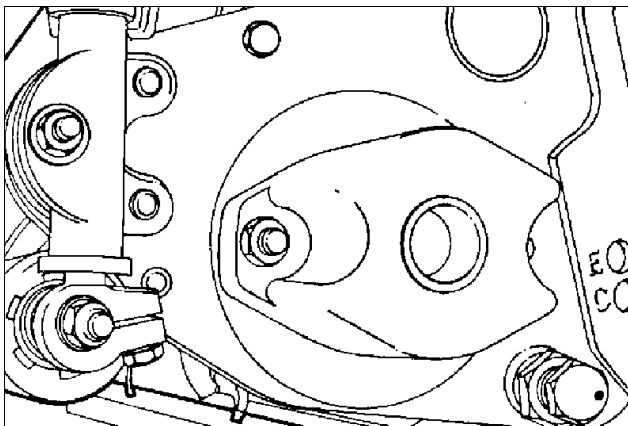
Remember that the “effective” or actual height of cut depends on cutting unit weight, cutting unit accessories and turf conditions. Effective height of cut will be different than the bench set height of cut.



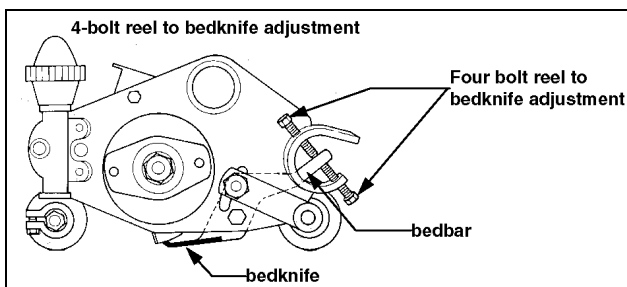
Effective height of cut is the actual height the grass has been cut. Making an accurate height measurement on the turf is difficult due to many variables. A true base is simply not present. If the surface is uneven, spongy or varies in density, color variations in the turf may appear in the form of a streak. This is due to the effective height of cut being too low for the existing turf conditions. To correct problems, start or change a cultural practice, change cutting unit configuration or raise the bench set height of cut. The lower your height of cut, the more predictable and smooth the turf surface must be.

To accurately maintain height of cut and performance, routinely check the following components:

- Reel Bearings
- Bedknife to Reel Adjustment
- Attitude Adjustment
- Roller Parallelism
- Height of Cut

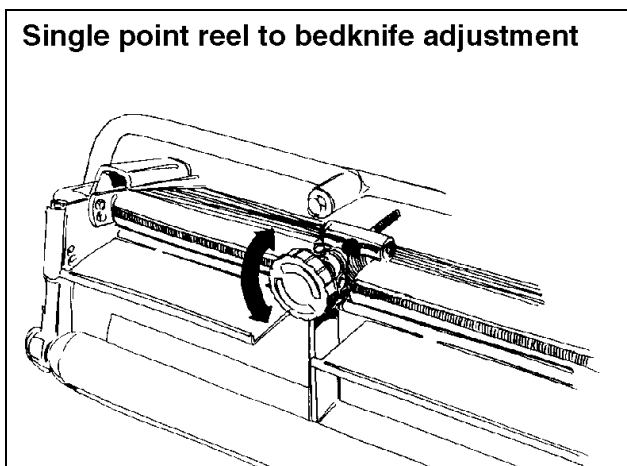


Check reel bearings for play and roughness. Replace if necessary. If adjustable (tapered roller bearing), adjust to "no" lash while maintaining free rotation of the reel.

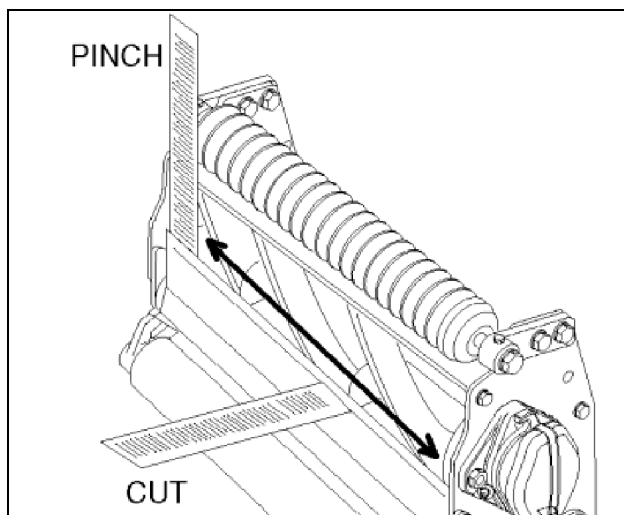


Before performing any set-up procedures, it is critical that the reel and knife cutting edges are straight and sharp. Lap or grind as necessary. Adjust as needed to ensure the knife and reel contact their full length with LIGHT contact and free reel rotation.

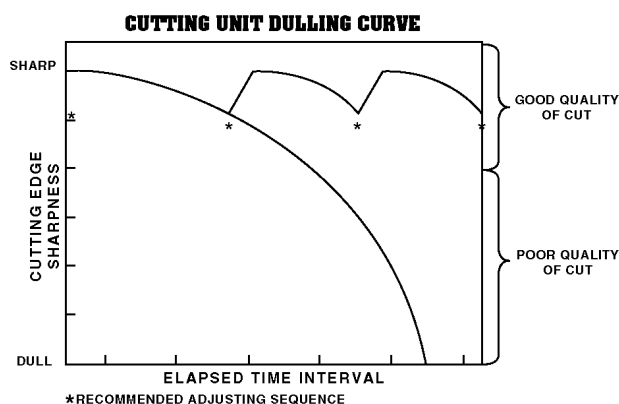
Note that different cutting unit models have different methods of adjusting reel to bedknife contact. The top illustration shows a four bolt style adjustment mechanism. The bottom illustration shows a single point adjustment mechanism.



Single point adjust cutting units also have an adjustment mechanism on one end of the bedknife for adjusting the bedknife parallel to the reel (not shown). This bedknife leveling mechanism could be an eccentric pivot bolt on one end of the bedbar, or a capscrow / jam nut assembly.

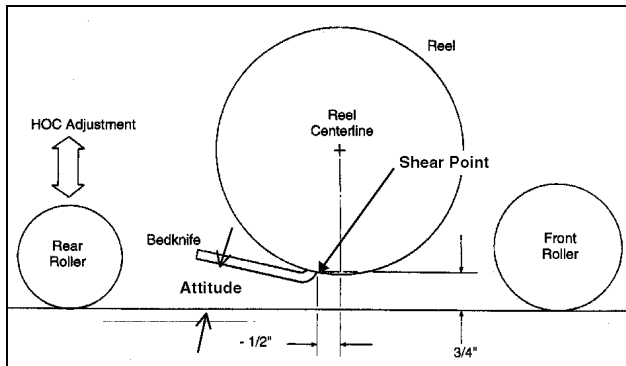


Adjust the bedknife against the reel to **EVENLY** pinch one paper thickness across the entire width of the bedknife, then cut paper strips to check blade sharpness. Put the cutting unit on the turf and check for light bedknife to reel contact and free reel rotation. Do a final adjustment of bedknife to reel contact if necessary.



Properly adjusting the bedknife to the reel is one of the most effective preventive maintenance practices for reel mowers. The amount of contact and how frequently it is checked are major factors in performance. A light contact adjustment, if maintained, will help keep cutting edges sharp on the reel and bedknife. This requires that the adjustment be checked frequently at a predetermined time interval. Dulled cutting edges cannot be corrected immediately by adjustment or over-tightening.

Do not wait until the quality of cut has deteriorated to check the bedknife to reel adjustment. If the cutting edges on the reel blades and bedknife are not straight and sharp the mowing results may not be acceptable. This is true even if all other set-up procedures are correct.

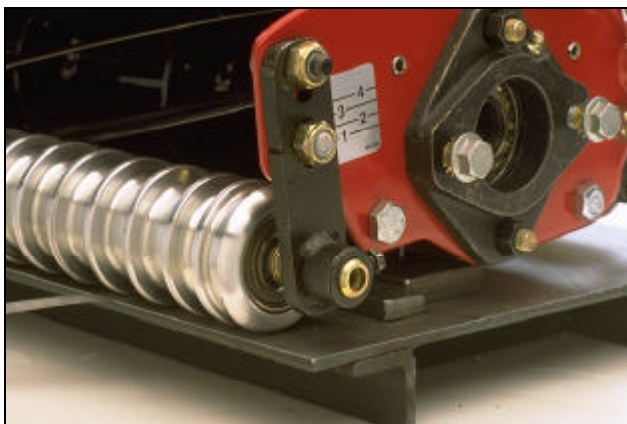


The cutting unit attitude is the angle between the bottom of the bedknife and the ground plane under the cutting unit. As the bedknife attitude is changed, it is important to note that the reel to bedknife shear point changes relative to the center line of the reel. This can change the after cut appearance of the grass. The result may be better or worse depending on several factors.

Bedknife attitude is adjusted by changing the height of the front, rear, or both rollers. A height of cut change is NOT necessarily part of a change to the bedknife attitude. A large angle is also referred to as an aggressive bedknife attitude. A small angle (flat attitude) can have most or all of the bedknife riding ON the turf. This can influence after cut appearance.

It will normally be an advantage to have the front or the cutting edge of the bedknife lower than the back. This help prevent the bedbar from contacting the ground surface in very low heights of cut. It will also prevent the streaking or ruffling of the turf after it has been cut and passed over by the bedbar.

There is a limit on how much of a forward angle the bedbar can be positioned to. If the rear is positioned too high the reel position can become lower than the cutting edge, tearing the grass and giving a poor quality of cut.



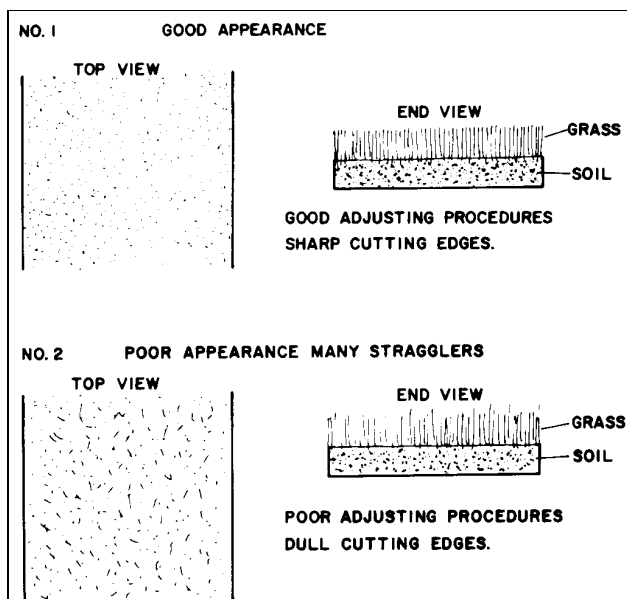
To achieve an acceptable quality of cut the rollers must be parallel to the reel. Before adjusting roller parallelism, check for loose roller bearings. Adjust or replace the bearings as necessary. First parallel the front or rear roller, which ever is NOT used for setting the height of cut. This paralleling roller is set to match the reel using a surface plate fixture. With the reel blades resting on a raised bar on the plate, use a piece of paper as a feeler gauge along the bottom of the roller between the roller and plate.



Set the height of cut to the desired height using an accurate tool. This procedure must be done exactly the same on each cutting unit. Before doing this adjustment the bedknife and roller not used for height of cut adjustment must be parallel to the reel as described on previous slides.

As reel cutting unit design and configuration continue to evolve, height of cut settings may need modifying to retain visual and playability goals.

Remember, the setting you are making here, the “bench set height of cut”, is different from the effective or actual height of cut in the turf.

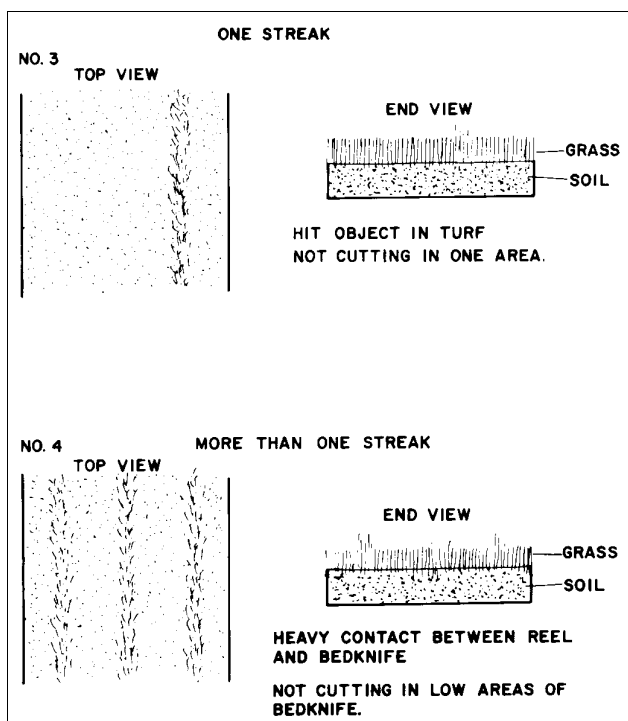


There are some basic patterns that can appear on turf maintained with a reel mower.

The first pattern illustrates good adjustment procedures and properly maintained cutting edges.

The second pattern shows many stragglers. This can be caused by:

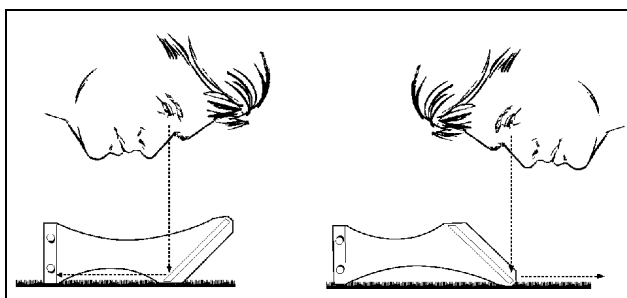
- Incorrect bedknife to reel adjustment
- Dull cutting edges
- Mowing outside of the optimum clip rate
- Not using preparation devices
- Inconsistent turf texture and density
- Using the wrong type of roller



The third pattern illustrates a single streak. This can be caused by:

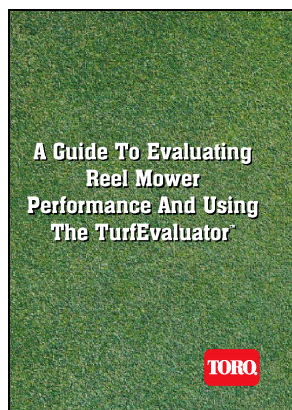
- Rifled or uneven wear on bedknife
- Damaged area on bedknife from hitting an object(s)
- Loose bedknife screws
- Bent reel blade

The fourth pattern shows multiple streaks. This can be caused by heavy contact between the bedknife and reel, resulting in a "rifled" or wavy bedknife.



It is normal for the mower to leave after-cut directional light and dark color paths. These overall color paths are due to the turf being rolled down in the direction the mower is traveling. A cut path going away from you will usually be lighter in color than the path coming toward you. Smaller, individual color variations can be due to differing turf types, density variations and straight line mower marks. A spongy area is evident by the momentary impression left by feet on the surface.

Many turf discrepancies are subtle and require closer examination. In these instances, the TurfEvaluator grass viewing tool is helpful. It can assist turf managers in determining causes for poor reel mower performance and comparing the effective height of cut of one mowed surface to another.



Turf Evaluator Tool - Model 04399

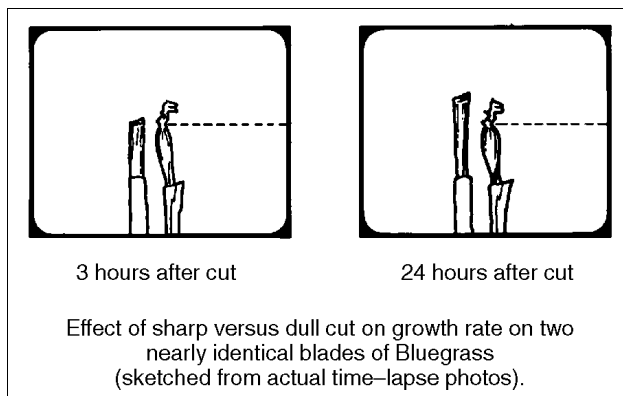
Guide to Evaluating Reel Mower
Performance and Using the
Turf Evaluator - Part. No. 97931SL

Sharpening

How can you tell if sharpening is necessary?

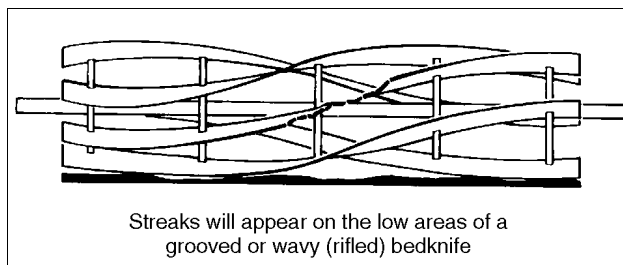
- The grass is not cut cleanly
- Streaks.
- Stragglers.
- The cutting unit is noisy.
- "Its that time of year".

One sure way to determine the answer to this is by actually checking the cutting edges of the reel and bedknife to see if they are dull, nicked, bent or being run without light contact against one another.

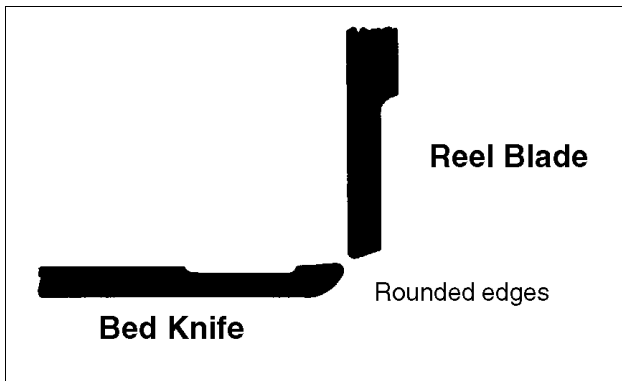


Cutting units should be kept as sharp as possible to:

- Promote growth of healthy grass.
- Optimize cutting unit performance.
- Extend the life of the mower.
- Maximize operator mowing time.
- Allow the tractor to run most efficiently.
- Provide excellent finished appearance of the turf.

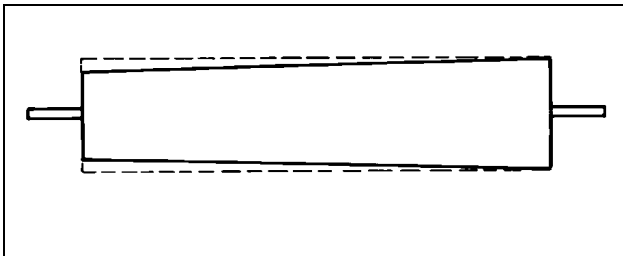


A grooved or wavy (rifled) reel or bedknife is most often caused by operating the cutting unit with heavy bedknife to reel contact. This condition can only be corrected by grinding the reel and bedknife – BACKLAPPING WILL NOT CORRECT THIS CONDITION.



Reel blades, and the edge of the bedknife should be checked for damage visually and by carefully feeling the edges. Of course, this should only be done when it is certain that the reel cannot be started, and never slide your fingers down the edges lengthwise.

Rounded edges on the reel blades and bedknife will cause the grass blades to be pinched and torn, rather than sheared off cleanly. When light contact is not maintained, dull edges will soon result.

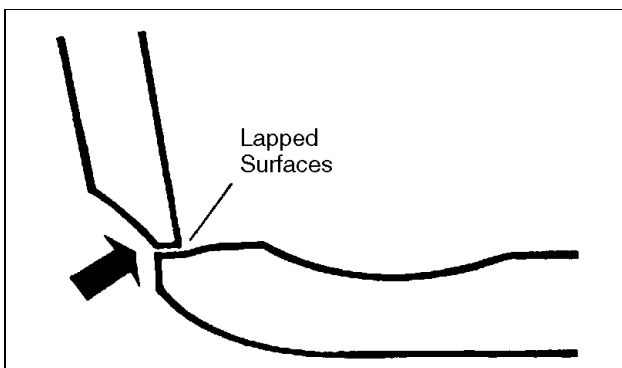


Sharpening will also be required if the reel is "cone shaped" (tapered). All reels eventually become tapered with use. If the reel is not adjusted or ground to a cylinder shape again, a mismatch in the height cut between adjacent reels can result.

Sharpening Methods

- Maintain proper **ADJUSTMENT**
- **BACKLAP** the bedknife and reel
- **GRIND** the reel and bedknife

There are several methods that may be used to sharpen a cutting unit. The one that you choose will depend upon the condition of the cutting unit. It should also make the most sense for the anticipated use. For example, if you are about to mow greens that have been core aerated or topdressed, you may not want to grind the reels and install new bedknives.



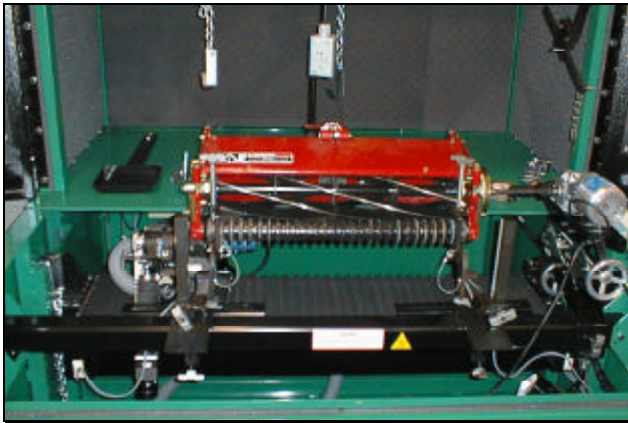
As the reel blades run against the bedknife a slight burr will appear at the front cutting edge surface the full length of the bedknife. Occasionally run a file or facing grinder across the front edge to remove this burr to extend the cutting performance of the machine.

Lapping must be done after single blade grinding. This is done to establish a "land area" and to insure a perfect match between the bedknife and the reel edge.

Lapping is not intended to be a reconditioning process to correct severely nicked or rounded blades, rifling or taper. If, after 5 minutes of lapping, the edge is not restored, it is time to grind the reel.

**WARNING:**

Always use a brush with an extended handle to apply the lapping compound to the rotating reel. Using a short handle brush could cause your hand to be pulled into the reel, and cause serious injury. Keep your hands, feet and clothing away from moving parts !



Before a reel can be sharpened correctly, the reel has to be prepared (cleaned, checked for loose blades, etc.). The reel bearings must be in good condition, with no end play evident. Make sure the cutting unit frame and roller brackets are true and not bent or damaged from impacts with trees, posts or cart path edges. The cutting unit must be aligned so the grinding wheel will travel parallel to the reel shaft. This will result in the reel being ground to the desired cylinder shape.

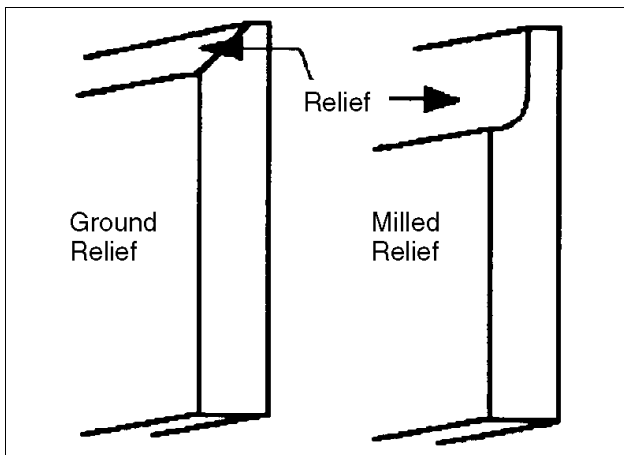
Follow the grinder manufacturer's instructions for set-up and operation of the grinder. When grinding, be careful to not overheat the reel blades. Remove small amounts of material with each pass of the grinder.

After completing the grinding process, do a complete set-up and adjustment procedure.

WARNING !

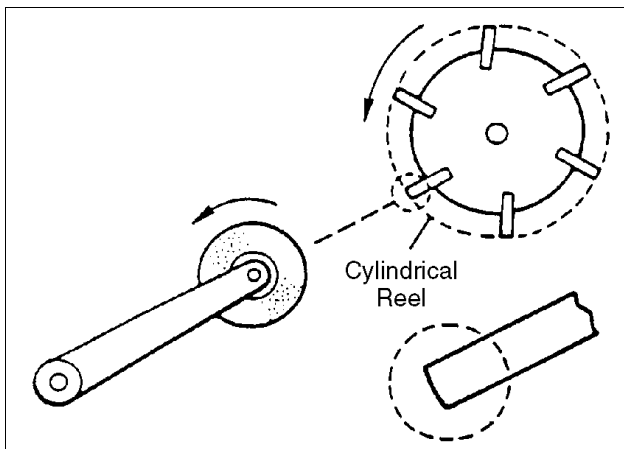
Always wear a face shield or safety glasses when grinding or backlapping.

Remember to always wear a face shield or safety glasses when grinding or backlapping.



It is important to understand that Toro reel mowers are designed and manufactured to optimize available power from the engine and hydraulic systems. To help do this, we put a “relief” on every reel blade to reduce the width of reel blade that contacts the bedknife. This has been proven to reduce power requirements, as well as allow the machine to operate more efficiently. This can be very important, depending on the terrain, type of grass and amount of grass being cut.

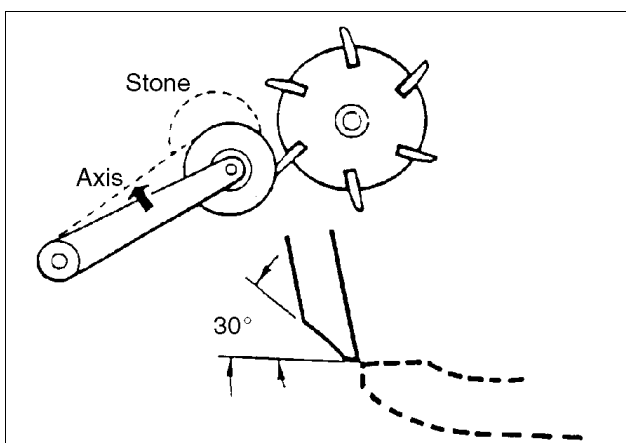
Toro has two different methods of manufacturing reel blades with a “relief”. The reel blades are made from straight stock steel and then are either relief ground or the relief is milled in. Either way, there is a relief on the blade when it is manufactured. A small ground relief is also put on milled relief blades during manufacture.



There are two methods of grinding reels. This slide illustrates Spin Grinding (which is also known as “Flat Grinding”).

With this method, both the reel and the grinding stone are turning as the reel is being sharpened. It is sometimes stated that backlapping is not required after spin grinding, because the reel is a perfect cylinder when grinding is completed. This depends on proper alignment of the reel in the grinder before sharpening. Also, the bedknife and bedbar must be straight and perfectly parallel to the reel when it is mounted. Backlapping will remove burrs and rough edges, producing a honed edge that will cut grass evenly.

If using a spin grinder to sharpen straight stock reel blades (such as on fairway mowers) some or all of the relief will be ground off. If you are going to restore the relief that was on the blade when it was manufactured, you will need to also use the other method of grinding (single blade “relief” grinding). It is recommended to do the relief grinding first, then spin grind to restore the reel to a cylinder shape.



This slide illustrates Single Blade Grinding (which is also known as "Relief Grinding" or "Back Grinding").

Toro recommends a 30 degree relief angle on each reel blade. The angle itself is not critical. You can put as little or as much angle on the blade as you think is proper. A larger angle will take off more steel and the reel may have to be replaced sooner. With a smaller angle, you may have to grind the reel more often to maintain a relief.

Sequence for a 5 Blade Reel

START

END

1 – 2 – 3 – 4 – 5 – 1

2 – 3 – 4 – 5 – 1 – 2

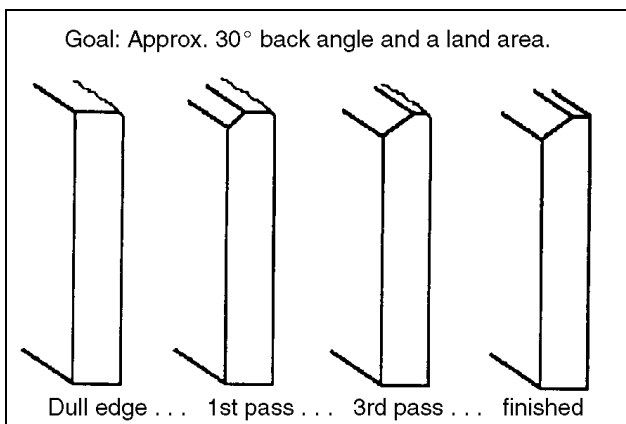
3 – 4 – 5 – 1 – 2 – 3

4 – 5 – 1 – 2 – 3 – 4

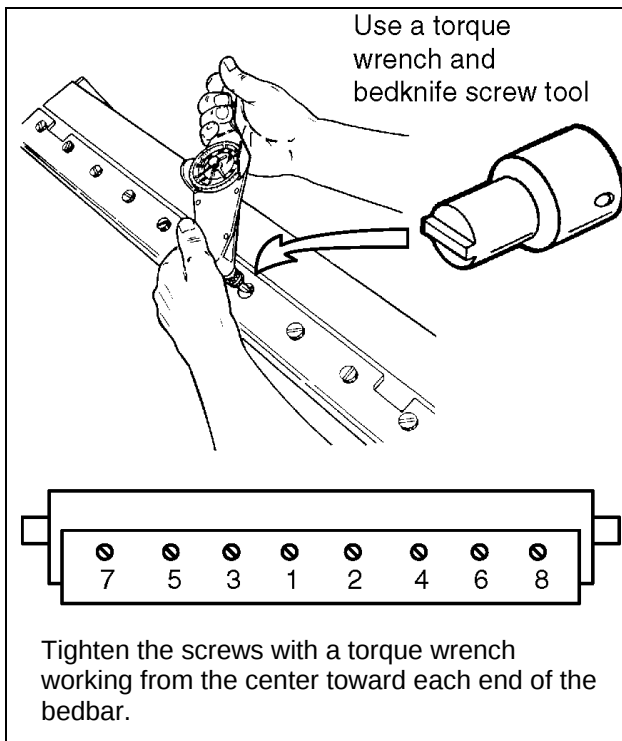
5 – 1 – 2 – 3 – 4 – 5

... and so on until finished.

It is a good idea to follow a blade grinding sequence during the single blade grinding process so that the reel ends up as close to a cylinder shape as possible. This will reduce the amount of backlapping needed after grinding is completed. The numbers shown in the illustration indicate one example of the sequence that may be used. Remember that a final grind in a spin grinder, and/or some backlapping will get the reel into a true cylindrical shape.



It will normally take several passes across each reel blade to renew the sharp edge and remove the taper from the reel. This example may have required 4 or 5 passes and then was completed with a backlapping job to create the land area. NOTE: It is acceptable practice to grind in both directions across the blades. The goal is approximately a 30 degree back angle and a land area.



If replacing the bedknife it is important to use the following procedures:

- Remove all rust, scale and corrosion from the bedbar surface before installing new bedknife.
- Make sure the bedbar threads are clean.
- Use new Toro screws. Apply anti-seize lubricant to the screw threads before installing.
- Tighten the screws working from the center toward each end of the bedbar. **DO NOT** use an impact wrench

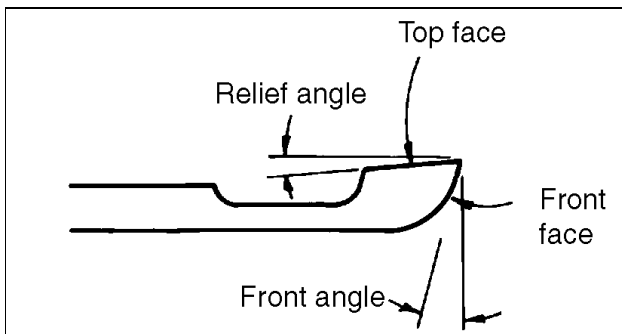
Fairway/utility mowers:

250 – 300 in.lb. (288 – 345 KgCm)

Greensmowers:

200 - 250 in.lb. (230 - 288 KgCm)

Since there can be variations in the mounting surface of the bedbar, a new bedknife may not be perfectly flat after it is installed. Because of this, it is necessary to backlap or grind a new bedknife after installing it to the bedbar. Follow the existing angle that was ground into the bedknife and grind only enough to make sure the top surface is true.



When regrinding a bedknife it is important to use the following procedures:

- Remove the bedbar and bedknife assembly from the cutting unit before attempting to grind a used bedknife.
- Keep the bedknife fastened to the bedbar when grinding.
- When grinding, be careful to not overheat the bedknife. Remove small amounts of material with each pass of the grinder.

When regrounding a cutting unit reel or bedknife, use the specifications from the **Toro Reel and Bedknife Grinding Guidelines**. See the bedknife diagram on the previous page and the reel diagram on the following page for illustrations of each characteristic listed in the charts below. If the reel diameter is less than the service limit shown, it must be replaced.

Toro Reel and Bedknife Grinding Guidelines					
Characteristic	GR 105, 500	GR 800, 1000, Flex 21, 3000, 3100, 3200, 3050	RM 223, 5100, 5200, 5300, 5400	RM108	RM 216, 2000 2300, 2600, 3100, Grounds Pro 2000
Nominal Reel Diameter	3.5" (88 mm)	5" (126 mm)	5" (126 mm)	7" (178 mm)	7" (178 mm)
Number of Blades	9	5, 8, 11	5, 8	5, 6	5, 8
Service Limit Reel Dia.	3.2" (82 mm)	4.5" (114 mm)	4.5" (114 mm)	6.2" (158 mm)	6.2" (158 mm)
Blade Relief Angle	30°	30°	30°	30°	30°
Relief Angle Range	20° - 40°	20° - 40°	20° - 40°	20° - 40°	20° - 40°
Blade Land Width	.040" (1.0 mm)	.040" (1.0 mm)	.040" (1.0 mm)	.060" (1.5 mm)	.060" (1.5 mm)
Land Width Range	.030 - .060" (.7 - 1.5 mm)	.030 - .060" (.7 - 1.5 mm)	.030 - .060" (.7 - 1.5 mm)	.050 - .090" (1.3 - 2.3 mm)	.050 - .090" (1.3 - 2.3 mm)
Maximum Allowable Reel Diameter Taper	.040" (1.0 mm)	.040" (1.0 mm)	.040" (1.0 mm)	.060" (1.5 mm)	.060" (1.5 mm)
Bed Knife Top Angle	0°	3° *	3° **	5° **	5° **
Top Angle Range	-	-	-	2° - 7°	0° - 5°
Bed Knife Front Angle	30°	13°	13° **	30° **	30° **
Front Angle Range	26° - 34°	13° - 17°	13° - 17°	20° - 35°	20° - 35°

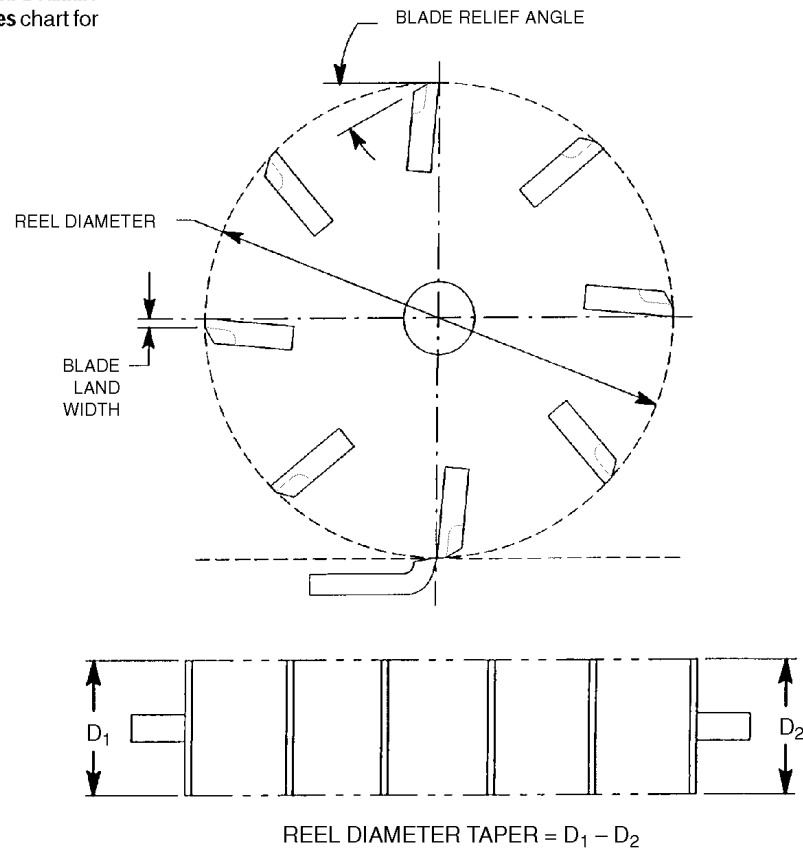
Toro Reel and Bedknife Grinding Guidelines (continued)					
Characteristic	RM 5500, 6500, 6700	TURF PRO HTM 175	SPARTAN RM 11	SPARTAN RM 5 & 7	RM 335, 3500, 450, 4000, 4500
Nominal Reel Diameter	7" (178 mm)	7" (178 mm)	7" (178 mm)	8" (206 mm)	8" (206 mm)
Number of Blades	5, 11	5, 7	11	5, 7	5, 7, 11
Service Limit Reel Dia.	6.2" (158 mm)	6.2" (158 mm)	6.2" (158 mm)	7.2" (182 mm)	7.2" (182 mm)
Blade Relief Angle	30°	30°	30°	30°	30°
Relief Angle Range	20° - 40°	20° - 40°	20° - 40°	20° - 40°	20° - 40°
Blade Land Width	.060" (1.5 mm)	.060" (1.5 mm)	.060" (1.5 mm)	.060" (1.5 mm)	.060" (1.5 mm)
Land Width Range	.050 - .090" (1.3 - 2.3 mm)	.050 - .090" (1.3 - 2.3 mm)	.050 - .090" (1.3 - 2.3 mm)	.050 - .090" (1.3 - 2.3 mm)	.050 - .090" (1.3 - 2.3 mm)
Maximum Allowable Reel Diameter Taper	.060" (1.5 mm)	.060" (1.5 mm)	.060" (1.5 mm)	.060" (1.5 mm)	.060" (1.5 mm)
Bed Knife Top Angle	5°	5°	5°	7°	5°
Top Angle Range	3° - 6°	3° - 6°	0° - 5°	0° - 7°	2° - 5°
Bed Knife Front Angle	5° ***	15°	30°	30°	30°
Front Angle Range	3° - 7° ***	13° - 17°	20° - 35°	20° - 35°	28° - 32°

* "Extended" bedknives: Top angle 7°.

** "Heavy duty" bedknives: Top and Front angle 10° (8° - 12°).

*** "Low cut" bedknife: Front angle 30° (29° - 32°)

See **Toro Reel and Bedknife Grinding Guidelines** chart for specifications.



The basic information provided in this manual should not only help you understand the “how” but also give some insight into “why” some operating, adjustment and maintenance procedures are so important.

Understanding that reel mowers are precision machines requiring regular maintenance and adjustment can help achieve attractive, consistent after cut appearance while reducing downtime and operating costs.

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