



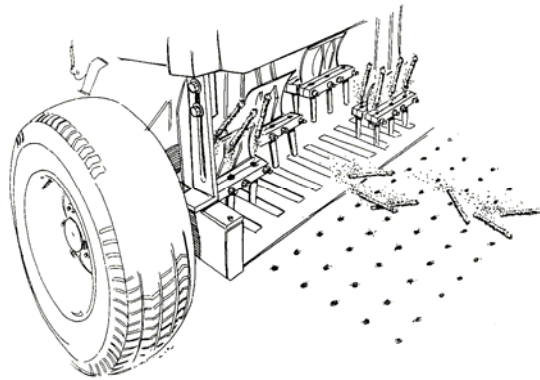
Reel Mower TERMINOLOGY

Part No. 09171SL

DEFINITION OF TERMS

Aerate —

Process of coring, spiking, slicing, or other methods to introduce air from the atmosphere into the soil and thatch without destruction of the turf; synonymous with aerify.



After cut Appearance —

The general appearance of the cut path after mowing. This would include both the quality of cut and other subjective measures such as marks, dispersion, streaks, stripes, etc..

Annual Bluegrass —

Annual bluegrass (**POA ANNUA**) is widely dispersed as a winter annual in both cool-season and warm-season turfs. It is also used as a perennial turfgrass on intensively cultivated sites in the cool temperate and subarctic climates. Within a few years after establishment, closely mowed and intensively irrigated bentgrass fairways will have some encroachment of annual bluegrass. Annual bluegrass may also become a dominant component of a fairway polystand within five years. Many older golf courses are basically composed of annual bluegrass, primarily the perennial types.

Backlapping—

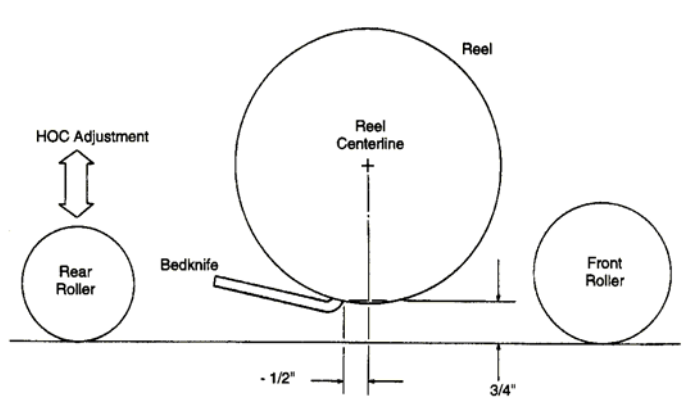
A method to simultaneously sharpen the cutting edges of the reel blades and bedknife. Backlapping is done by reversing the rotation of the reel from the normal mowing direction. A abrasive paste (slurry) is applied the to the rotating reel blades with a long handled brush to aid in the sharpening process. There are different grit pastes and grades depending on need.

Bedbar —

The supporting structure to which the bedknife is attached.

Bedknife Attitude

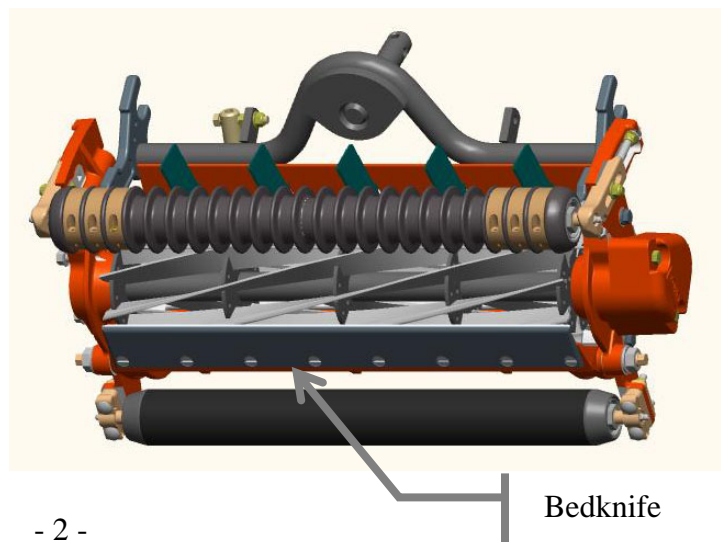
The angle between the bottom of the bedknife and the ground plane under the cutting unit. As the bedknife attitude is changed, it is important that the reel to bedknife shear point changes relative to the center line of the reel. This can change the after cut appearance of the grass. The result may be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

Bedknife —

The lower cutting member on a reel type mower. The bedknife is attached to the bedbar, and the assembly is mounted to the main frame in one of two ways. One allows for paralleling and adjusting the bedbar (bedknife) up to the reel, while in others the bedbar is fixed and the paralleling and adjustment are made by moving the reel.



Bentgrass (cool-season turfgrass) —

Creeping bentgrass is the main turfgrass used on greens, tees, and intensively maintained fairways in cool climates. Creeping bentgrass succeeds at cutting heights of less than 0.8 inches (20 mm), mowing at one to two day intervals, heavy irrigation, moderate fertilization and the use of fungicides. Colonial bentgrass is sometimes used with creeping bentgrass as a polystand.

Bermudagrass (warm-season turfgrass) —

Bermudagrass is adapted to a wide range of soil conditions. Although not very cold tolerant, several new cultivars have been developed which respond better in cooler temperatures. The improved Bermudagrass cultivars have excellent wear, heat, and drought tolerance plus a rapid recuperative rate. Their most common problems are a potential for thatching, shade intolerance, and susceptibility to insect pests.

Bobbing —

An undesirable cutting unit movement that leaves an unacceptable wave-like appearance. Sometimes referred to as marcelling.

Brushes or Combs —

Attachments generally installed on the cutting unit to lift the grass blades resulting in a cleaner cut. They also promote a more vertical growth and prevent or correct grain in the grass.

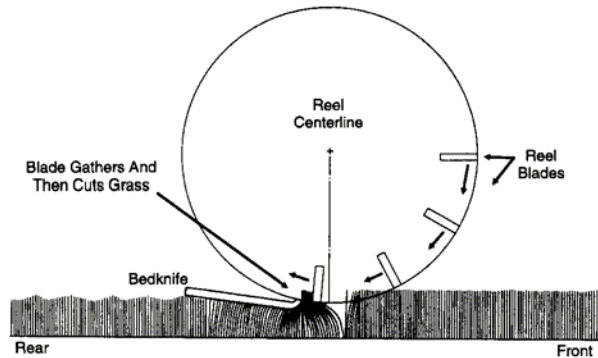
Clip (Clip Distance) —

The distance between shear points. Factors which affect clip include:

- The number of reel blades
- The ground speed
- The rotational speed of blades

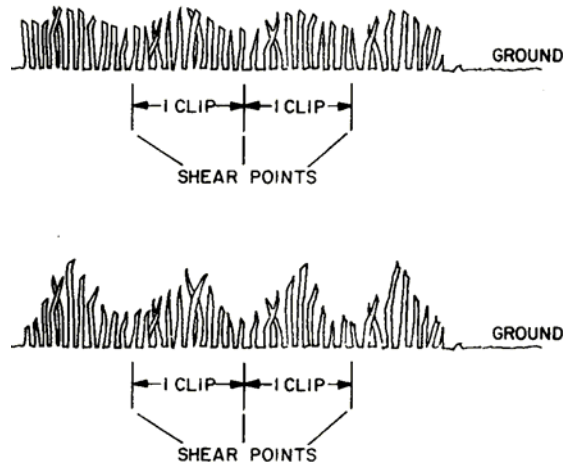
Under close examination grass that has been properly cut with a reel mower will have a uniform wavy appearance.

This is because of the gathering action of grass caused by the combined forward motion of the bedknife and the pulling action of the reel blade. When the three factors above and height of cut are in a proper relationship, then the normal clip marks will be difficult to see and the cut will usually be judged as good. If the factors are out of proper relationship, there can be a noticeable corrugated appearance.



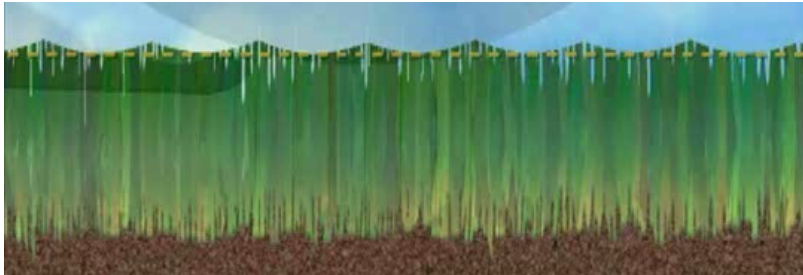
Clip vs. Height of Cut —

The general rule of thumb concerning height of cut versus clip is that the best visual appearance occurs when the clip distance is close to the height of cut.



Clip Marks —

A description of the aftercut appearance of the turf where clip pattern is very visible. Sometimes referred to as corrugation, washboarding or wave cut.



Clumping —

The discharge of clippings into unsightly lumps or rows. Excessive clippings besides being unsightly may smother the grass or act as incubators for disease.

Combs or Brushes —

Attachments generally installed on the cutting unit to lift the grass blades resulting in a cleaner cut. They also promote a more vertical growth and prevent or correct grain in the grass.

Compaction —

Soil particles pressed closely together. Soil compaction prevents adequate water and air penetration and reduces turfgrass root growth.

Cool-season Turfgrasses —

Cool-season grasses grow best within a temperature range of 60 to 75 F. Their environmental adaptation is limited primarily by the intensity and duration of seasonal heat and drought stresses. Cool-season grasses are generally adapted to temperate and subarctic climates. Examples: Annual bluegrass (**POA ANNUA**), bentgrass, Kentucky bluegrass, fine-leaved fescues.

Corrugation —

See Clip Mark.

Counterbalance —

Refers to the transfer of weight between the cutting units and tractor to achieve desired traction and/or contour following. Counterbalance is usually achieved with springs or hydraulic cylinders. Transferring weight between traction unit and cutting units can increase traction and stability, reduce c/u ground drag and steering effort, and minimize scalping. There may be a compromise between good traction and good contour following.

Crown —

The thickened part of the grass plant closest to the soil from which roots extend down and blades shoot up.

Cultivar —

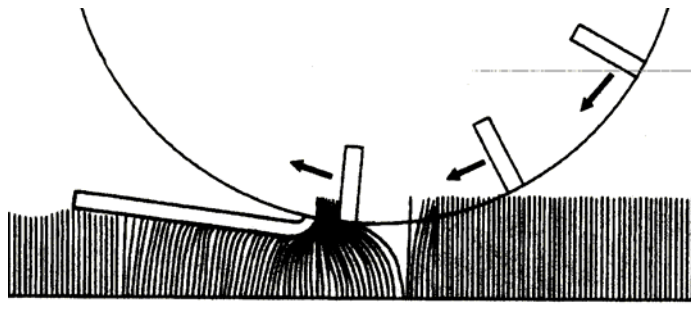
A plant of a single species that differs from another in specific characters such as disease resistance, leaf width, insect resistance.

Cultivation —

A mechanical procedure such as spiking, grooving, water injection, or core-removing on established turf to improve its characteristics.

Cutting Action —

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



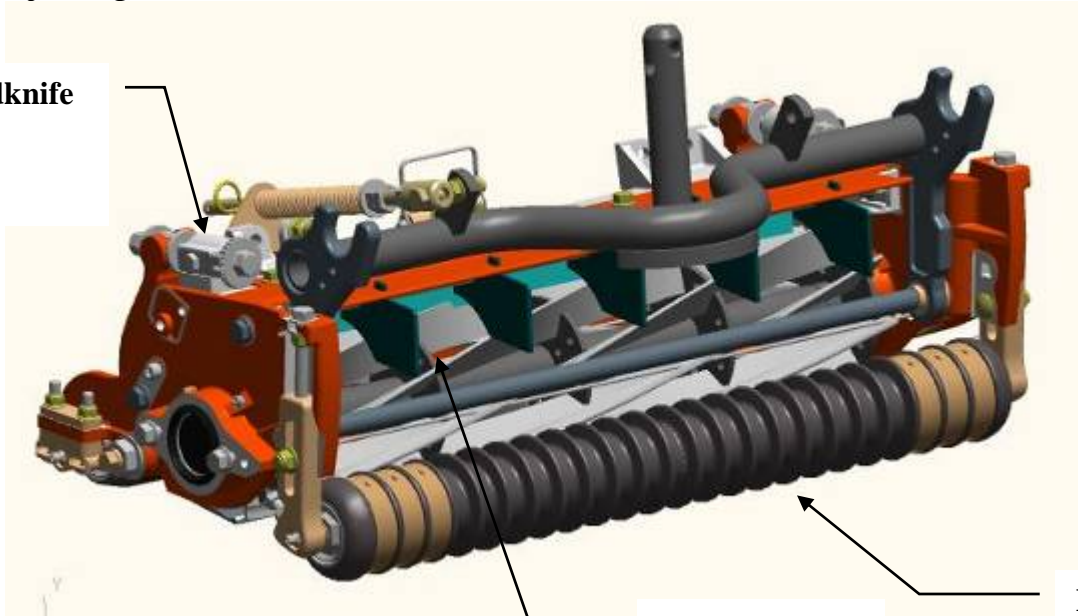
Cutting Height —

See Height of Cut

Cutting Unit —

The cutting unit consists of a reel, front and rear rollers, a bedbar/bedknife assembly, and related adjusting mechanisms.

**Bedbar/bedknife
Adjusting
mechanism**

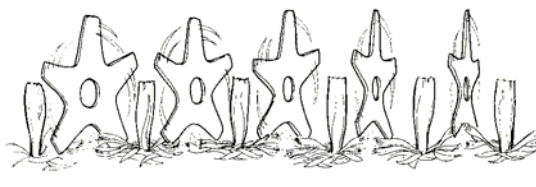


Reel

Front Roller

Dethatching, Thatching or Verticutting—

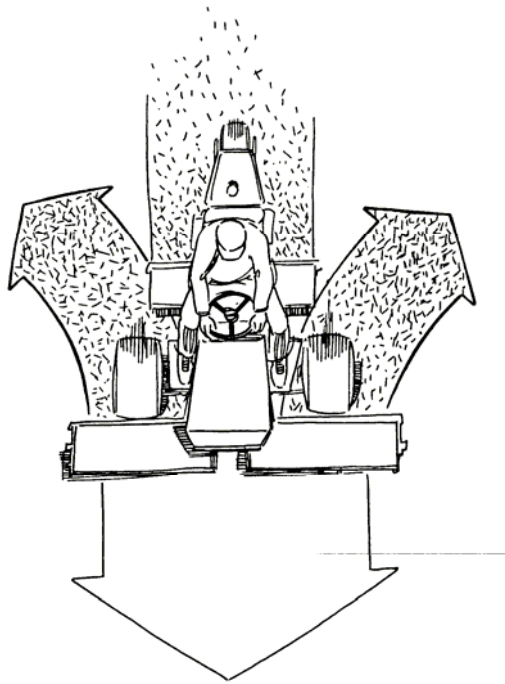
The thinning of turf grasses by blades or wire tines which cut perpendicular to the soil surface.



Dispersion of Clippings —

The pattern of how clippings are thrown (dispersed) from the cutting area by the moving reel blade. Unsightly clipping dispersal is an issue with golf course managers.

The grass will be deflected to the right or left depending on the helix of the reel. All reel blades are generally curved either to the right or left. Some machines have reels that curve to the right; some have reels that curve to the left and some have a mixture of both right and left curving reels. There is also an after-market chevron (herringbone) reel that deflects to both right and left. Selection of forward or rear throw is achieved on most Toro fairway mowers by simple deflector shields.



Fairway —

Fairways are typically mowed at heights between 0.25 and 0.75 inches, depending on several factors. A typical eighteen-hole golf course has a total fairway area of 30 to 60 acres, the average being approximately 50 acres.

Fairways are cut lengthwise with contour or straight line. They can also be cut at various angles called cross-cutting or a combination of cutting styles.

Fine-leaved Fescues —

Fine-leaved fescues perform best on well-drained, moderately shaded sites and droughty, infertile, acid soils. They are intolerant of wet conditions and high fertility. Fescues are used in seed mixtures (polystands) with Kentucky bluegrass or colonial bentgrass in cooler temperate and subarctic climates and with perennial ryegrass for overseeding warm-season turfs in subtropical climates for winter play and color.

Grain —

The tendency for grass and runners to grow horizontally. Most turf grasses grow horizontally in one direction. The horizontal growth occurs because of influences such as sun, wind, water, mowing or rolling the grass in the same direction.

Grass as a Lubricant—

Lubrication is required to help prevent heat build-up due to friction between the bedknife and reel blades. This lubrication is normally provided by the grass that is being cut. Without lubrication, excessive heat build-up will cause uneven bedknife wear and poor quality of cut. Therefore, the reels must be disengaged whenever the mowers are not cutting for lengths of time longer than normal turnarounds.

Grinding —

Back grinding (single blade) - the grinding wheel engages one blade at a time and passes down the length. The blade can be ground with a relief angle so that the amount of land is reduced.

Cylindrical - the reel is rotated as the grinding wheel passes down the reel, creating a true cylinder. It is not possible to create a relief angle while using a cylindrical grinder.

Height of Cut (H.O.C.) —

BENCH SET: The height at which the top edge of the bedknife is set above a flat level surface that contacts the bottom of both the front and rear roller

EFFECTIVE HEIGHT OF CUT: The height of cut on the turf. This will usually be higher than the bench setting because the rollers/wheels will not sink into the turf to the ground level.

NOTE: Two different cutting units set at the same **BENCH SET HEIGHT OF CUT** may have a different **EFFECTIVE HEIGHT OF CUT** because they have different total weights, rollers, skids and bedknife attitudes. For example: A bench setting of 1/2 inch (13 mm) may result in an effective or actual cutting height of 9/16 inch (14 mm) because of the plant material that elevates the rollers.

Generally, within the H.O.C. range for a given species or cultivar, mowing too closely weakens the plant, causes shallow rooting, lowers resistance to drought, increases susceptibility to fungus diseases, and encourages thinning of turf. In addition, close mowing brings more light to the ground surface and encourages the germination and growth of weedy grasses and broadleaf plants.

Hydroseeding —

A high pressure spray technique for applying seed, mulch and fertilizer in a water slurry over a seedbed.

Intermediate Rough —

A border between the fairway and the rough that is cut higher than the fairway and lower than the rough. It is also called the junior rough or step cut. It is generally 60 - 84 inches wide or one pass of a trim mower.



Kentucky Bluegrass (cool-season turfgrass) —

A highly variable group of cultivars. The cultural intensity varies from medium high to low depending on the cultivar. Kentucky bluegrass in general must be mowed at higher cutting heights than other fairway grasses. The nitrogen requirement, thatching tendency, and irrigation needs are generally less than for bentgrass. The Kentucky bluegrass used on fairways generally has fewer disease problems than bentgrass and annual bluegrass.

Kentucky Bluegrass Polystands —

Kentucky bluegrass is typically combined with the fine-leaved fescues in the northern part of the cool humid region. It is combined with perennial ryegrasses in the southern part of the cool humid region. These polystands require a higher cutting height than either annual bluegrass or bentgrass. Both the fine-leaved fescues and perennial ryegrasses establish quicker than Kentucky bluegrass. The fine-leaved fescues lack heat and disease tolerance needed to survive in the more southerly portions of the cool humid region. Most perennial ryegrass cultivars are prone to low-temperature injury and snow mold diseases in the more northerly portions of the cool humid region.

Lapping —

See Backlapping

Marcelling —

See Bobbing

Mismatch —

The difference in height of cut of two adjoining cutting units. This may occur between units in a multiple cutting unit machine, or between passes by a single machine.

Mismatch is caused by dissimilar HOC settings or rollers that are not parallel to the reels.

Monostand —

A turf composed of one cultivar.

Mower Capacity —

The area cut in a given time period. It is commonly expressed in acres per hour.

Manufacturers often publish this information as part of the product specifications.

However, because specific applications ultimately determine the maximum mowing speed, these calculations usually reflect straight-ahead mowing at an assumed speed with no allowance for overlap, stops, turns, etc. The following formulas can be used to provide a reasonable base to approximate the acres per hour if the average ground speed is known, or the average speed if the acres per hour are specified.

$$\text{Acres per hour} = \frac{\text{inches of cut} \times \text{speed in mph}}{100}$$

$$\text{Speed in mph} = \frac{\text{acres per hour} \times 100}{\text{inches of cut}}$$

Mowing Direction —

Mowing directions are generally alternated each time a given area is cut.

Mowing Speed —

Mowing speed is related to the finish level, the type of terrain, flotation and suspension of the cutting unit. Features which improve the suspension and stability of the cutting unit usually allow increased ground speed while maintaining a high level of finish. (Also see clip.)

Overseed —

To sow seed over an area which is sparsely covered with some kind of vegetation.

Southern Bermuda grasses go dormant in cool months and golf course areas may be seeded with cool-season grasses for winter play.

Polystand —

A turf composed of two or more cultivars and/or species.

Quality of Cut —

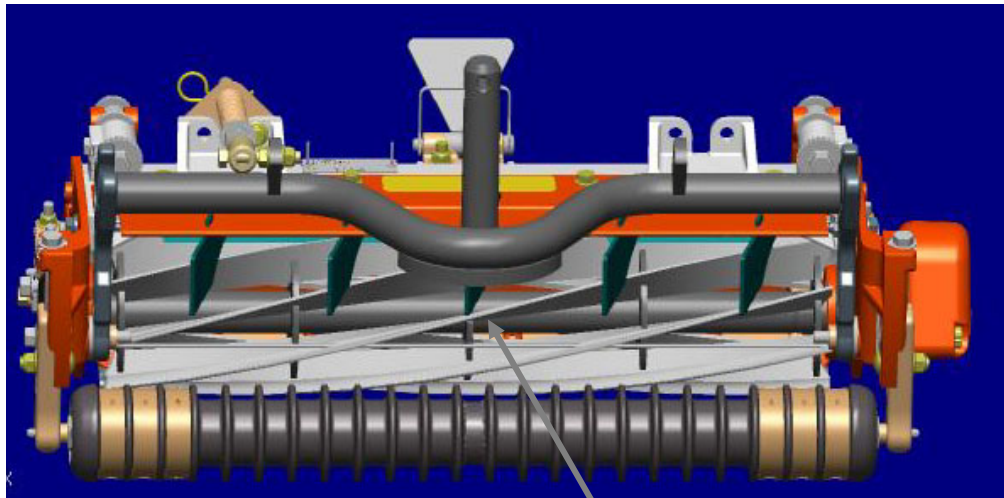
A measure of how well the cutting unit cuts the grass. Quality of cut typically includes the number of stragglers and the quality of the shear – the clean cut of the grass blade. All other measures such as clumping, mismatch, etc., are examples of aftercut appearance.

Recuperative Rate —

The rate at which turf grasses recover from injury.

Reel —

The reel consists of varying numbers of helix-shaped blades. The blades are attached to support spiders which are mounted on a rotating shaft. The reel contacts the bedknife to perform a scissors-like cutting action.

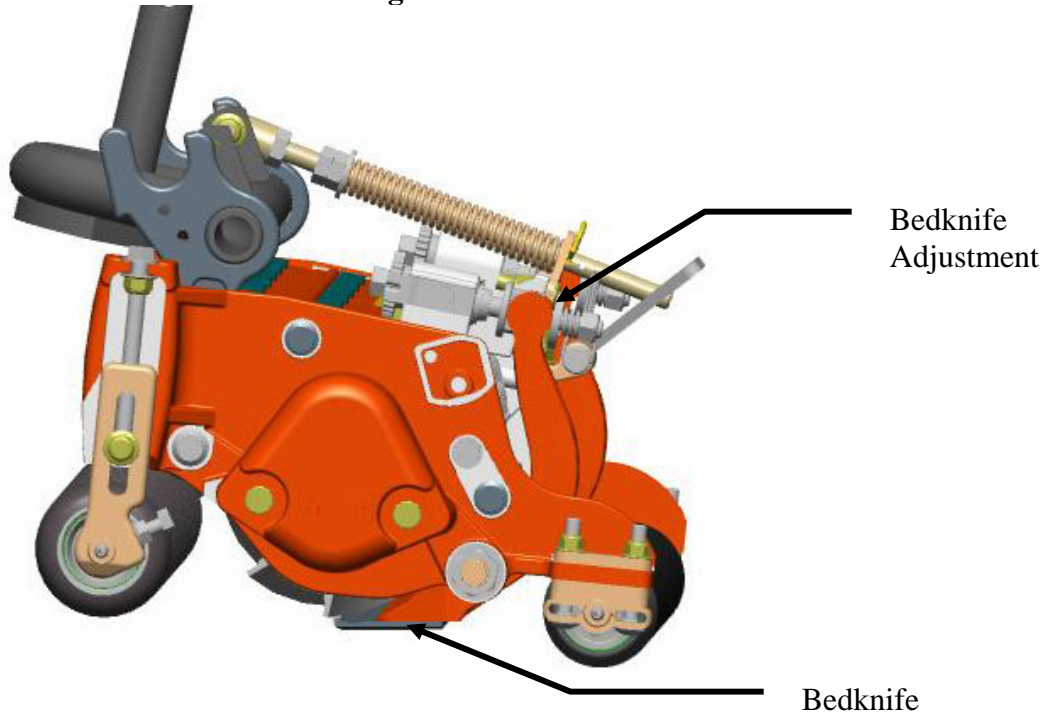


Helix-Shaped
reel blade

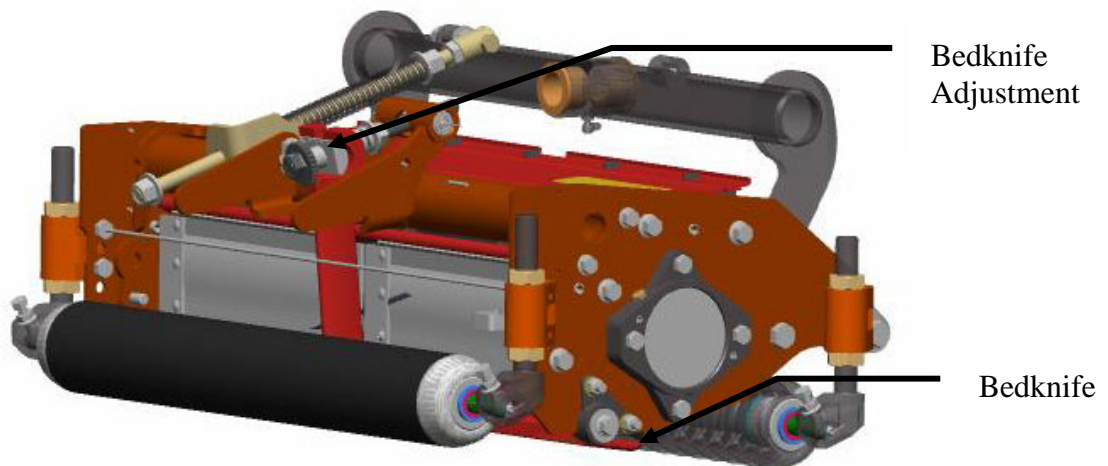
Reel to Bedknife Adjustment —

Adjusts the distance between the reel blades and the bedknife. A gap causes the grass to be pinched rather than cut cleanly, and promotes dulling of the blades and bedknife. Excessive contact causes the cutting edges to wear quickly or rifle and may require more power. In order for the bedknife and reel materials to be worn away at an even, constant rate, the reel to bedknife adjustment should be frequently checked and adjusted for light contact. Continuous light contact helps maintain sharp cutting edges on the reel and bedknife.

DPA Cutting Unit

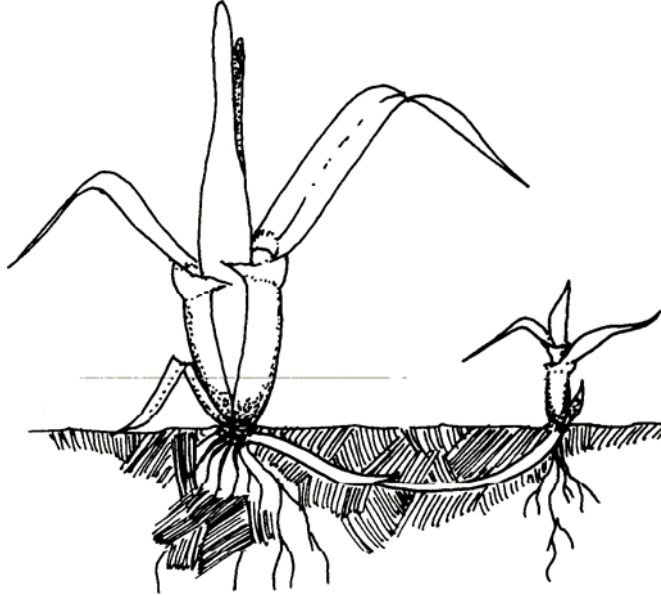


SPS Cutting Unit



Rhizome —

An underground, horizontally growing stem of a plant. Rhizomatous turfgrasses include Kentucky bluegrass, creeping red fescue, and Bermudagrass.



Rifling —

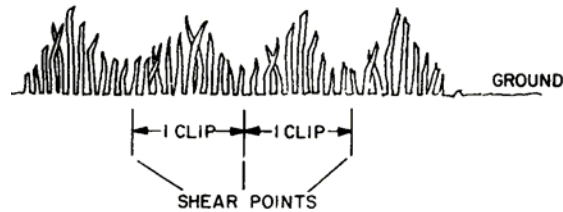
Uneven or wavy wear of a reel and bedknife. A cutting unit which is rifled will not cut acceptably due to the variance of contact as the reel turns (a rifle cut or streak.) The most common cause for uneven bedknife and reel blade wear is due to heavy or hard contact between the reel and bedknife due to over tight adjustment. Several heavy contact points generally develop across the knife and/or reel and create greater amounts of wear in these areas. A rifled mower can only be corrected by regrinding of the knife and reel.

Scalping —

Mowing the grass at a low height thereby removing too much blade surface and exposing brown stems and crowns. Reel mowers are prone to scalp only where the center of the turf area is higher than the supporting cutting unit ends. Scalping is caused by inability to follow contours as a result of excessive speed, improper skid or roller adjustment, too low a HOC, bumpy terrain, rough soil. Scalping also refers to the turf preparation done for overseeding.

Shear Point —

The point where the reel blade and the bedknife make contact and the grass blade is actually cut.

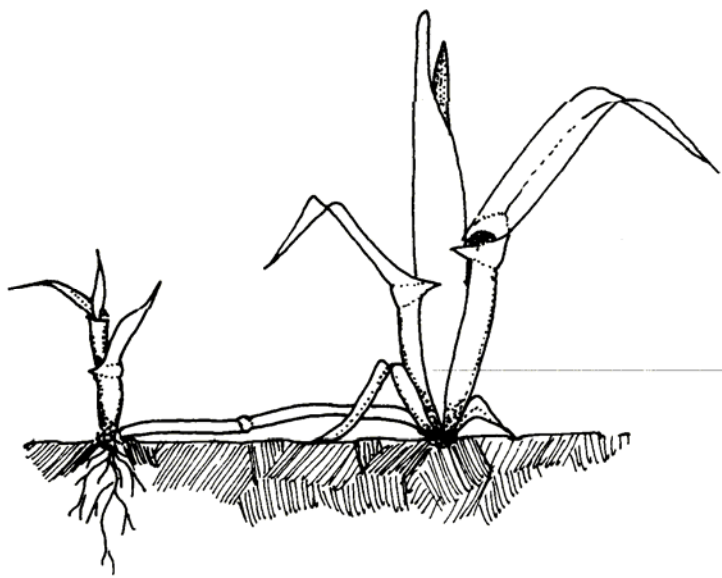


Stems —

The upward growing axis of a plant which bears leaves.

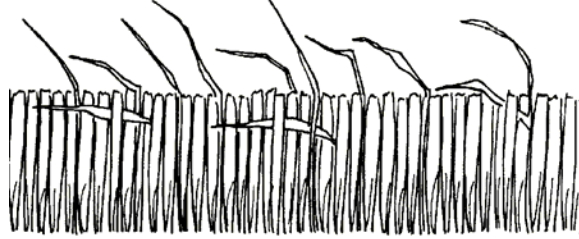
Stolon —

Creeping runners which are located above ground. They may produce new roots and stems for propagation. Creeping bentgrass and zoysiagrass are stoloniferous turfgrasses.



Stragglers —

Scattered uncut grass blades throughout the cutting unit path. The uncut blades stand above the general line of the effective height of cut.



Streak —

A line of taller grass that has not been cut. Single streaks are the result of a bent or nicked bedknife. Multiple streaks are more often the result of rifling due to heavy contact between the reels and bedknife. Streaks may also occur in the areas of overlap between cutting units or where a tire rolls down an area before it is cut.

Striping —

Alternating color pattern caused by cutting adjacent rows of turf in different directions.



Thatch —

A tightly intermingled layer of both living and dead material that develops between the green vegetation and the soil surface. A slight amount of thatch is desirable, but too large an amount will cause increased disease and insect problems. In general, the thatch thickness should not exceed the height of cut of the grass, but also should not be less than about an eighth of an inch.



Thatching, Dethatching or Verticutting—

The thinning of turf grasses by blades or wire tines which cut perpendicular to the soil surface.

Topdressing —

A prepared mixture of soil (preferably sterilized) usually containing a desired specification of silt, clay, sand and organic matter. It also may contain physical conditioning materials, nutrients, and pesticides which are spread over turfgrass areas for improving the surface, adding to the nutrient supply of the soil, or applying pesticides. It is used for leveling, smoothing, covering, and as an aid in controlling thatch.

Trimability —

Related to the maneuverability of the tractor, but also a function of the mower attachment design. The size of the uncut circle and cutting unit offset are measurements of this factor or indicators of the mower's ability to trim.

Verticutting, Thatching or Dethatching—

The thinning of turf grasses by blades or wire tines which cut perpendicular to the soil surface.

Warm-season Turfgrasses —

Warm-season grasses grow best at temperatures between 80 and 95 F. They are limited in their range by the intensity and duration of cold temperatures. Warm-season grasses are primarily used in tropical and subtropical areas. Examples: Bermudagrass and zoysiagrass.

Washboarding —

See Clip Marks

Wave Cut —

See Bobbing.

Windrowing —

The discharge of clippings creating a visibly unacceptable trail of cut grass.

Zoysiagrass (warm-season turfgrass) —

Zoysiagrass is adapted to a wide range of soil conditions but grows best on well drained, slightly acid, medium textured soils of moderate fertility. Zoysiagrass is very tolerant of drought, heat, and cold. It is slow to green up in spring, and late-season straw coloring begins with the advent of 50 to 55 F temperatures. Another feature that limits its use is its slow establishment rate. Zoysiagrass is however, successfully used as a fairway grass in transitional climates where some cool-season and other warm-season grasses encounter the limits of their adaptation.

Fairway Turfgrass Species				
Cultural intensity	Extent of use	Cool Climate	Warm Climate	Transition Climate
Medium to low maintenance	Wide	Kentucky bluegrass	Common bermudagrass	Common bermudagrass
		Annual bluegrass (Poa annua)		
	Limited	Colonial bentgrass	Zoysiagrass	
		Red fescue		
		Perennial ryegrass		
High maintenance	Moderate	Annual bluegrass (when uses an a perennial	Improved bermudagrass	Improved bermudagrass
		Creeping bentgrass		

Machine Terms That Are Often Used Incorrectly

None of the following words are interchangeable; each designates a very specific meaning.

Mower —The mower consists of two functional sections: the traction unit and the mowing components. The mowing components consist of the carrier frames, lift arms, cutting units and cutting unit drives.

Lift Arm — The lift arm is a structural unit which lifts and lowers the cutting unit.

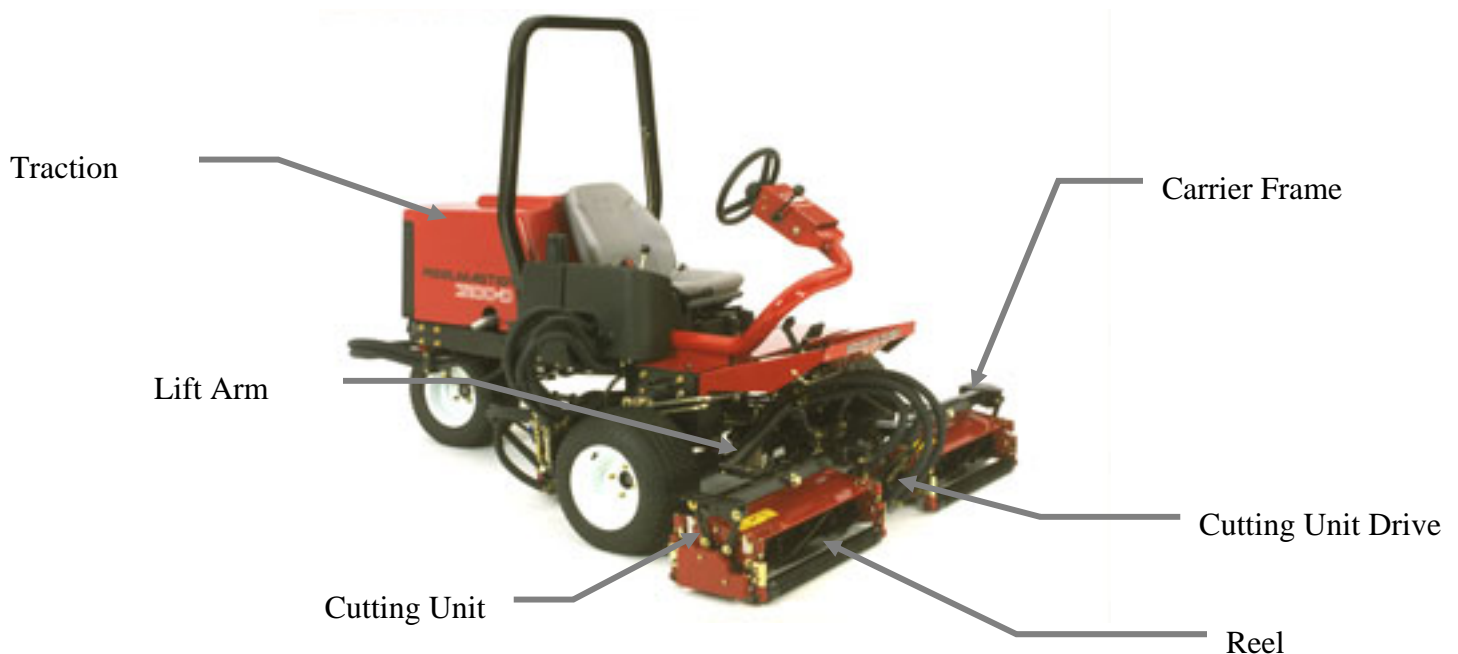
Carrier Frame —The carrier frame connects the lift arm to the cutting unit and allows the cutting unit to pivot and follow ground contours.

Cutting Unit — The cutting unit consists of a reel, front and rear rollers, a bedbar/bedknife assembly, and related adjusting mechanisms.

Cutting Unit Drive —Power for the cutting unit is provided by a belt and pulley system, hydraulic motor, electric motor, or ground driven wheels.

Reel — The reel consists of varying numbers of helix-shaped blades. The blades are attached to support spiders which are mounted on a rotating shaft. The reel contacts the bedknife to perform a scissors-like cutting action.

Typical Mower



Misleading Terms That Deal With Unacceptable After Cut Appearance

Bobbing — An undesirable *cutting unit movement* that leaves an unacceptable wave-like appearance. Bobbing refers to the machine movement not the aftercut appearance. As a general rule, mowing slower should lessen the problem.

Overlap Marks (or Stripes) — An unacceptable after cut appearance of stripes that occurs in the area of the cutting unit overlap.

Clumping — The discharge of clippings into unsightly lumps or rows. Excessive clippings besides being unsightly may smother the grass or act as incubators for disease.

Streak — A line of taller grass that has not been cut. Single streaks are the result of a bent or nicked bedknife. Multiple streaks are more often the result of rifling due to heavy contact between the reels and bedknife. Streaks may also occur in the areas of overlap between cutting units or where a tire rolls down an area before it is cut.

Mismatch — The difference in height of cut of two adjoining cutting units. This may occur between units in a multiple cutting unit machine, or between passes by a single machine. Mismatch is caused by dissimilar HOC settings or rollers that are not parallel to the cutting units.

Stragglers — Scattered uncut grass blades throughout the cutting unit path. The uncut blades stand above the general line of the effective height of cut. Cutting unit sharpness adjustment, clip versus grass length, and resiliency are the key factors affecting this condition.

