



REEL VERSUS ROTARY MOWERS: *Strengths In Differences*

Reel mowers deliver the high-quality demanded by golf courses and other sports turf areas.
Photos courtesy: John Deere Company

By Steve and Suz Trusty

The first “lawn mowers” were grazing animals such as sheep, cattle, and rabbits. Following that, turf areas were maintained with manpower and the scythe — basically to keep grasses at “manageable” heights.

According to the booklet, “Lawns and Sports Turf History” by Beverly C. Roberts and Eliot C. Roberts (formerly with The Lawn Institute), the first patented lawn mower originated around 1830. It was a reel design, based on the spiral cutting mechanism used to shear napped fabrics in textile mills.

The first mowers were pushed by hand. Then, larger mowers were developed that were pulled by horses or donkeys, and guided by a person walking behind. Motor-driven units first appeared around the turn of the century.

Rotary mowers came on the scene around the 1930s — first as walk-behind units and later with mower decks suspended from tractors to cover larger areas.

Obviously, mowing has made major advances since those early stages.

Agronomic Perspective

It’s the nature of grasses that makes mowing an option in turf control. The growing regions of grass are located immediately above the nodes and in the leaf at the base of the sheaths and at the base of a blade. Grass vegetative growth consists mostly of leaves, with little elongation of stems. The stems and growing points (buds) are concentrated near ground level. This allows the mower to cut away the tips of the leaves without stopping their growth or hindering the formation of new leaves.

Lawns, golf courses, and sport turf are produced by the cultivation of large numbers of small plants of specific grass cultivars within a small space (eight to 10 plants per square inch). These close-grown plants are then clipped to the desired height to fit the needs of turf users.

Though the growth patterns of grass make mowing possible, mowing does alter natural conditions. Each mowing removes some of the grass blade, the leaf area which is necessary for photosynthesis (photosynthesis manufactures food for

growth and other life processes). As the mower cuts the grass, it inflicts a wound, increasing the susceptibility to certain insects and disease organisms. To minimize these effects, mower blades must be sharp to deliver a clean cut, rather than tear or shred the grass blade. Also, mowing should be done frequently so that as little of the grass blade as possible is removed. The “One-Third Rule,” cutting off no more than one-third of the grass blade at any one mowing, is recommended for all grass types.

Just as there’s no one grass to fit all turf needs, there’s no one mower right for all mowing situations. Each mower must ultimately deliver the desired cut quality at the desired turf height. No matter how impressive other features of a mower may be, if the cutting unit doesn’t deliver a cut that consistently meets standards, the mower will be unacceptable.

Various grasses have different tolerance to mowing. The blades of some grasses are easier to cut cleanly than the more fibrous blades of other grasses. Creeping, stolon-producing grasses, such



For parks and open spaces requiring cutting versatility, rotary mowers are a solid choice.

as creeping bentgrass or Bermudagrass, tolerate close mowing, while more upright growing grasses such as bluegrasses and ryegrasses need higher mowing heights to thrive. Another consideration is leaf texture. Fine-leaved grasses, such as certain Bermudagrasses and bentgrasses, can be mowed shorter than grasses having coarse leaf texture, like turf-type tall fescues.

The height of cut should be determined by the natural growth pattern of the specific grass variety (physiological characteristics) and the form and structure of the specific grass cultivar (morphological characteristics) in conjunction with the role the grass has to play, such as a park playground area, putting green, football field, or baseball infield.

For example, hybrid bermudagrass may have a suggested height of cut ranging from 1/4-inch to one-inch. Therefore, mowing should take place when the grass reaches a height of 3/8-inch for the 1/4-inch turf; a height of 1-1/2-inches for the one-inch turf.

Kentucky bluegrass varieties with a suggested height of cut of two inches should be mowed when the grass reaches a three-inch height.

The grass plant tries to balance its below-ground root growth to its above-ground growth. When a large portion of the top growth is removed in a low cutting height, the root system becomes more shallow in compensation. A shallow root system can impair the turf's ability to withstand stress.

Turf top growth helps insulate the growing points from temperature extremes. Too warm temperatures can drive a cool season grass to dormancy. Too cool temperatures will curtail the growth of warm season grasses.

Turf top growth also serves as a cushion of protection against wear and traffic damage for grass growth points. This is always a factor on high-use athletic fields where extreme wear occurs.

Reel Close-Up

The reel mower has fixed blades, which are part of a turning cylinder (reel) that moves down and back against

a stationary bedknife at the base of the mower. The blades are positioned on the reel at an angle so that they move across the stationary bedknife in a scissor-like action to produce a clean cut.

Rollers are positioned at the front and back of the cutting reel. Front rollers pass over the turf prior to mowing — they can be either solid or grooved. Optional roller scrapers can be used for cleaning the rear rollers to maintain a more consistent height of cut.

Reel mowers use individual cutting units that contain one reel per unit, combining multiple cutting units to cover a wider expanse of turf.

Walk-behind reel mowers will have a single cutting unit, whereas ride-on reel mowers may have one or multiple cutting units. Many options are available in reel mowing to meet individual needs while providing consistent quality.

A reel mower, with properly sharpened blades, gives a more precise, manicured cut than a rotary mower. A high-quality cut is delivered when the reel is pow-

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ered at a consistent rate in the pre-set reel-to-bedknife position with the cutting unit properly positioned for the terrain being mowed.

The cutting units should offer the option of being placed in fixed position for flat, even turf conditions or higher heights of cut, or in the "floating" position to adjust to uneven terrain. The reel power source should be able to deliver consistent power under a variety of mowing conditions.

To attain the desired close-cut precision, reel cutting units should be easy to adjust in small increments of 1/16- to 1/8-inch within a range of mowing heights. On reel mowers, the cutting height is measured from a flat, solid surface to the edge of the bedknife.

Reel mowers offer an option in the number of blades on the reel. Generally, the lower the desired height of cut, the greater the number of blades to the reel. For example, to maintain turf above one inch, use five blades; for 1/2- to one-inch turf, use six blades; and for

turf maintained below 1/2-inch, use seven or eight blades.

Reel mower cutting units may be quickly detached from the traction unit so that reels can be checked or ground, or adjustments can be made. Optional backlapping valve attachments allow sharpening in place, on the mower.

Reel mowers are frequently used to give the striping effect for added aesthetic appeal. To accomplish this, a specific mowing pattern must be used on an alternating basis — perhaps following a clock pattern from six to 12, then 10 to four, eight to two, and 12 to six.

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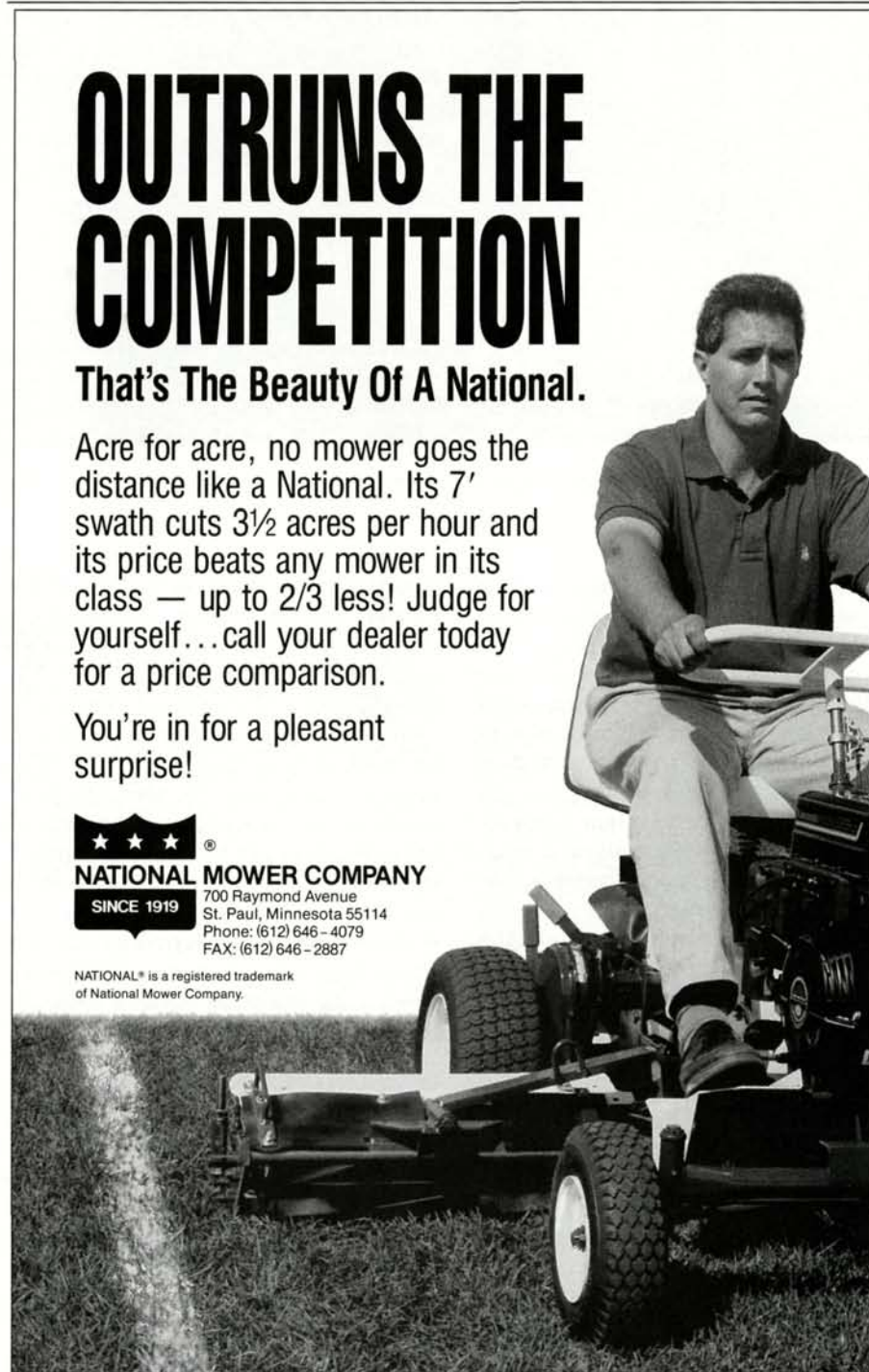


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Rotary Spin

A rotary mower has one or more horizontally moving, high-speed blades that operate within a mower deck. The sharpened tips of the blades cut grass by impact.

On rotary mowers, the blades' function is not only to slice bits of grass with the two sharpened tips of the blade, but to create a vacuum within the mower deck to pull the grass up for an even, clean cut. Where material discharge is desired, the mower must generate sufficient clockwise blade rotation to move cut material to the right and discharge it out the side (or back) of the mower deck.

The addition of second and third blades within the mower deck allow the rotary mower to cut a wider swath. With a two-blade deck, the two blades must overlap. The left blade is set in further from the drive wheel while the right blade placement remains about the same to facilitate discharge at the right side of the deck. With the discharge chute at the right side, the left side becomes the trimming side, the one closest to the landscape feature when a turn is made. Because of the slightly altered relationship of the blade to the wheel, the operator must make a little "star shape" pattern to achieve a smooth cut.

In large-deck mowers with the three-blade configuration, the middle blade is set out in front of the deck with the other two blades close to the right and left drive wheels. The closer the blades are to the drive wheels, the smoother the circle cut around a tree or other landscape feature will be.

Each blade takes its series of bites. Horsepower requirements increase as the bite size increases. Foliage removed by multiple-blade decks must move a greater distance to be discharged from the mower

deck, which also requires additional horsepower.

On rotary mowers, engine speed controls the blade speed. At full throttle the blades rotate 50 times per second, which translates to 175 miles per hour. The faster the mower moves forward, the larger the size of the bite taken.

Another variable in rotary mower performance is that lift can vary with the type of blade. Some blades have very little lift, while others provide a large amount that can create a tremendous vacuum or pulling action. Some mower decks have the option of changing blades to fine-tune the cutting and vacuum.

With mulching mowers, or mowers with the mulching option, the lift action of the blades combined with other mower features allow the blades to cut and recut the grass several times. The cut material is small enough to filter into the stand of grass and be hidden from view, where it slowly decomposes.

Rotary mowers can be walk-behind or ride-on units. With some ride-on units, multiple mower decks can be used. As with reel mowers, many options are available in rotary mowing machines to meet individual needs while providing consistent quality.

The rotary mower deck must follow the contour of the ground in order to put the blades in proper contact with the grass to be cut. With large-deck mowers, the wheel placement and the flexibility of motion should allow the deck to move or "float," both vertically and side-to-side, in response to the contour of the terrain to cut the turf without scalping grass or leaving uncut grass on one side of the mowing swath.

Correct set up and leveling of the rotary mower deck are extremely important for proper performance and good cut quality. With improper conditions, lift is reduced and too much of the blade comes in contact with the grass.

Cutting height adjustment allows crews to tailor the mowing to the needs of the turf. Height options should range from the lowest to the highest recommended heights for the grasses the mower will cut. The easier it is to adjust mower deck height, the more frequently the adjustments will be made. On rotary mowers, the cutting height is measured from a flat, solid surface to the cutting edge of the blades.

In general, rotary mowers are better for higher cutting heights and where control of grass is more important than

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aesthetic appeal. They are more versatile, better able to adapt to rough conditions, and can handle tough grasses and chop clippings well.

Rotary mowers usually are less complex mechanically and require less skill to operate and maintain than reel mowers.

Beyond Mower Choice

Maintaining quality turf doesn't end with mower selection. Whether working with a reel or rotary mower, proper setup and service of the mower and proper choice of the machine attachment options directly influence the quality of cut, and thus the perception of the quality of the mowing unit.

The mowing unit will face challenges introduced by the cutting environment, the place where the cut actually happens. Along with the type and height of the grass and the desired finished cut height, these challenges include the lushness or thickness of the grass, the moisture content, and general characteristics of the terrain like hills, bumps, and landscaping. The operator controls travel speed and direction and engine throttle setting. Mower choice, mower condition, machine operation, and the cutting environment combine to affect grass cutting quality. □

Editor's Note: Steve and Suz Trusty are the principals of Trusty Associates, horticultural consultants to the green industry in Council Bluffs, IA. They are frequent contributors to this magazine.



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