

Mower Operation

Before starting up, always confirm that the area is free of people or pets and position the side discharge chute away from people or property, including buildings, windows, cars, sidewalks, and signs. It is also a good idea to use a recycler mulching deck to prevent accidents caused by thrown objects.

Starting procedures for ZTR mowers vary from model to model. Do not operate without first reading and understanding the Operator's Manual. Do not crank the engine continuously for more than five to ten seconds at a time. If the engine does not start, allow a thirty second cool-down period between start-up attempts. Failure to do this can burn out the starter.

ZTR Cold Starting Procedures

- You must be seated on the ZTR before you begin starting procedures.
- Engage the brake and put the blade engagement switch in the "DISENGAGED" position.
- Place the throttle midway between the "SLOW" and "FAST" positions and pull the choke to the "ON" position.
- Turn the ignition switch to the "START" position. Release the switch as soon as the engine starts.
- After starting a cold engine, and as the engine warms up, gradually return the choke to the "OFF" position.

ZTR Warm Engine Starting Procedures

Follow Cold Engine Starting Procedures, but:

- Position the throttle midway between the "SLOW" and "FAST" positions and pull the choke to the "OFF" position.
- Turn the ignition switch to the "START" position. Release the switch as soon as the engine starts.

ZTR Blade Procedures

The electric blade clutch's push-pull switch engages the cutting blades. Be sure that the area is clear before engaging the cutting blades. The operator must remain seated before the blades can be engaged.

- Set the throttle to the "MIDWAY" position.
- Pull outward on the switch to the "ON" position.
- Accelerate to "FULL" throttle to begin mowing.

Disengage Blades and Engine

Bring the ZTR to a full stop and disengage the cutting blades. Push in the switch to the "OFF" position and wait for the blades to stop.

- Move the motion control levers out to the "NEUTRAL" position.
- Set the parking brake and move the throttle to the "SLOW" position.
- Turn the ignition switch to the "OFF" position. Remove the key to prevent children or other unauthorized people from starting the engine.
- Close the fuel shut-off valve when the ZTR will not be used for a few days, when transporting, and when it is parked inside a building.

Cleaning Chute Procedures

The deflection chute area (between the grass catcher and mower blade housing) can become clogged with grass clippings. This will be more frequent when the grass is wet or is being cut too short. If the chute is clogged, grass clippings will not be fed into the grass catcher, and this can cause the engine to stall. To unclog the chute, follow this procedure:

- Stop the mower and shut off the engine.
- Disconnect the spark plug wire and make sure that the blades are stopped.
- Wearing gloves, raise the deflection chute or unlatch the grass catcher and clear out the clog.
- Pick up debris and reinstall the grass catcher.

Mowing on a Slope

Use extreme care when mowing on slopes. The maximum safe slope for a riding mower is 1-foot vertical to 4 feet horizontal, or a 25% slope. For any type of riding mower, mow up and down slopes that exceed 15 degrees. Specialty mowers may be used for 15 – 25% slopes.

Here are landscape alternatives for slopes that are too steep to mow.

- Moderate Slope (Slopes from 1-foot vertical to 4 feet horizontal, 25% to 1 foot vertical on 3 feet horizontal 33%): These gradients create banks where only hand movers are manageable.
 - Landscape Alternatives: Ground covers (with landscape fabric) over limit areas or where access is difficult.
- Steep Slopes (Slopes from 1 foot vertical to 3 feet horizontal 33% to 1 foot vertical on 2 feet horizontal 50%). These gradients create banks where only hand mowers are not easily manageable.
 - Landscape Alternative: Use a meadow grass seeding as it requires no mowing. Use in remote areas demanding little or no maintenance. Ground covers are generally used for holding slopes; use trees and shrubs with meadow grass and ground covers.

Mowing excessive slopes productively and safely can be challenging. There are several specialty mowers on the market designed to make frequent slope mowing profitable and safer. These may utilize self-leveling features to keep the engine and operator level; dual-hydrostatic or all-wheel drives; tilting decks; roll-over protection systems providing operator safety in case of accident; and/or automatic seat leveling to keep the operator stable, especially when used in slope conditions. Special precautions that must be taken when operating mowers on a slope include:

1. Mowers are designed to be pushed, rather than pulled. Do not pull the mower.
2. Mow across the slope, up and down.
3. Start at the top of the grade and work down the slope.
4. When changing directions, turn so the mower is always downhill to the operator.

Accidental Start – Ups

Mowers should be throttled down when going over a curb or approaching an obstacle. When clearing or de-clogging the deflection shoot of grass accumulation, the machine must be shut off, or an accidental start-up could occur. All that it takes for an engine to accidentally start is for the blade to rotate. The failsafe procedure to eliminate accidental starts is to disconnect the spark plug wire, making sure that the wire cannot contact the spark plug. Disconnect the spark plug wire if, for any reason, you must put your hand or feet in the blade area.

Refueling

Different pieces of equipment use different types of fuel. Confirm the proper fuel by referring to the Operator's Manual. To help distinguish between different fuel types, it is recommended that you use different types of approved fuel containers.

Start the day with a full tank and then refuel as needed. Try to refuel between jobs to allow the engine to cool, and to refuel on the trailer. However, if you need to refuel in the middle of a job follow this fueling procedure:

1. Shut the engine down and wait until the engine is cool.
2. Place the mower on level concrete or other hard surface. NEVER FUEL ON ASPHALT, TURF, OR LANDSCAPE BEDS.
3. Use a funnel and make frequent visual checks to prevent overfilling; avoid spilling fuel on the concrete. If fuel is spilled, clean it immediately.
4. After fueling, to avoid a fire hazard, move at least ten feet away from the fueling point before starting your engine.

Turfgrass Mowing

Good mowing and edging practices have great effect on the groomed appearance of the lawn and on the overall long-term health of the grass. Good mowing practice requires good equipment that is properly maintained. A sharp blade and proper length of cut are absolutely essential. Three injurious practices are mowing with a dull blade, mowing infrequently and mowing the grass too short.

Frequency

Grass should be mowed often enough so that you do not remove more **than one third of the length of the grass blade at each mowing**. This is not just a rule of thumb; it is a guideline that affects the health and vigor of the grass. Where the finest quality is demanded, for example at golf courses and theme parks, there is adherence to this guideline.

The frequency of mowing rule means that if you are mowing your grass at two inches, you should mow it before it reaches three inches. If your mowing height is three inches, then you should mow before the grass reaches four-

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and one-half inches. If you are mowing it at four inches, it should be mowed again before it reaches six inches. The higher the initial mowing height, the more the grass can grow in height before it needs to be mowed again.

Height

Generally, increasing the height of cut improves the energy efficiency of the lawn. Taller grass shades the soil surface. This keeps it cooler, and results in less water use, less weed competition (and thus less herbicide use), and less clipping volume. A simple adjustment to a higher mowing height during that part of the season when the grass is most vigorously growing can get you close to the rule of thumb. Optimum cutting height is determined by the growth habit and leaf width of the turfgrass species. A grass that spreads horizontally can usually be mowed shorter than an upright-growing, bunch-type grass. Grasses with narrow blades can generally be mowed closer than grasses with wide blades.

Patterns

Mowing patterns affect the efficiency and the end result. Perimeters should always be mowed first so that trimming and blowing work can commence. The property can be "squared-off" with bagging mowers to keep walks, drives and pools free of clippings. Another method used to reduce clippings clean-up without bagging is to discharge clippings away from critical areas and into the uncut turf. Mowers will rarely blow clipping further than a distance equal to four times the width of the mower deck. If the first four passes are discharged away from walks, then few, if any, clippings will be blown onto them when the mower changes directions for the fifth pass. If all clippings are to be collected, then discharge direction is of little consequence.

When grass is mowed in the same direction repeatedly, it tends to lean and grow horizontally in that direction. This is referred to as *grain* and is especially a problem on golf greens. Turf wear and compaction from the mower wheels is accentuated by mowing repeatedly in the same direction and pattern.

The direction and pattern for mowing landscape turf should be alternated to minimize formation of a grain. Further, many managers mow landscape turf diagonally to the street or longest property line. They, and many clients, feel that this provides a baseball field stripping and increases the perception of curb appeal. The direction of the diagonal is altered each mowing.

Turf can be mowed more efficiently, according to some sources, by mowing around the perimeter of the site and inward. This is often called a *hockey rink* mowing pattern. This eliminates sharp turnarounds and backtracking. However, the same continuous pattern results in grain, even if the mowing direction is altered.

Some manager's *double-cut*, mowing the property a second time in the opposite direction, so that the turf stands tall. This obviously increases the cost, but it creates a quality look. It will not damage the grass. Some firms alternate the size of equipment used on a site to keep from establishing tracks. They may use a 36-inch walk behind one week and a 52-inch rider the next.

Recommended Mowing Practices for Florida Turfs

Species	Height (inches)	Frequency (days)	Preferred Mower
Bahiagrass	3 – 4	7 – 17	Rotary/flail
Bermudagrass	0.5 – 1.5	3 – 5	Reel
Centipedegrass	1.5 – 2	10 – 14	Rotary
Seashore Paspalum	1 – 2	5 – 10	Rotary/reel
St. Augustinegrass*	2.5 – 4	5 – 14	Rotary
Zoysiagrass	1 – 2	10 – 14	Reel

**Dwarf St. Augustinegrass varieties: 'Seville,' 'Jade,' 'Palmetto,' 'Delmar' are the only cultivars that should be mowed at less than 3 inches*

Post Mowing Site Inspection

The work site should always look better when you leave than when you arrived. Before leaving a job site, inspect the finished project. Make sure that the dust and debris generated by the mower have been cleaned up. Any debris not suitable for blowing should be bagged and disposed of. The quality of the finished project depends on your attention to details.

Mowing Aids

Mowing aids reduce trimming around trees and objects in the landscape. Mowing aids range from brick or other permanent mowing strips along buildings and curbs, to weed-free bands around signs and lampposts. When all the trimming can be done with a mower; string trimming is eliminated entirely, reducing labor and maintenance costs.

In some landscapes the turf is removed around trees, signs, buildings, and other obstacles and replaced with mulch. This limits grass from growing up to the object and eliminates hand trimming. The use of steel, plastic or wooden edging around mulched landscape beds prevents encroachment of bunch-type grasses but does not prevent growth of rhizomatous or stoloniferous species into the beds.

Edgers and Trimmers

Edging and trimming provide a crisp edge that improves the appearance and curb appeal of the landscape. Both operations are finishing touches to turfgrass management. **Edging** is the cutting of turfgrass along a sidewalk, curb, or planted bed to create a delineating edge. It may be done by hand, or typically with a power edger using a vertical blade. Edging should not expose a wide strip of soil that can be invaded by weeds. **Trimming** is the horizontal cutting of grass around building, signs, trees, and other obstacles in the lawn area. However, much damage has been done to trees and shrubs by misuse of trimmers.

The frequency of edging and trimming depends on the maintenance level of the site, turf species and growth rate, and budget. Both operations may be conducted every mowing, sometimes needlessly. Trimming around objects in the lawn will require regular attention to keep the tufts of the turf from being noticed. Sidewalks, on the other hand do not generally require edging every week. Bermudagrass and other creeping grass may require more frequent edging, possibly every second or third mowing. Reducing weekly edging on a site is one way to reduce or negotiate a budget without affecting the visible quality.

Blowers

Typically the final task in the landscape mowing-edging operation is the use of a power blower to remove unwanted clippings from walks and parking lots. Power blowers have become an indispensable tool in management operations, replacing the push broom. However, they come with the cost of noise and emissions. Several municipalities and neighborhood associations, and condominiums have limited or banned their use because of noise. To safeguard the continued use of blowers in much of Florida, professional manners are a must. Here is a list of professional manners that effectively reduce noise complaints:

- Operate blowers at lowest possible throttle setting.
- Use blowers or noisy equipment at reasonable hours.
- Avoid early morning and late evening, or other times when people may be disturbed.
- Keep 10 feet away from doors and windows when using blowers.
- Avoid open windows where dust and noise might be a nuisance.
- Use only one blower at a time on small residential sites.
- Use full blower extension to work close to the ground.
- Keep dust at a minimum.
- Use rakes and brooms where appropriate.

New technology has been, and will continue to be, developed to significantly reduce noise levels of blowers, line trimmers and other landscape equipment. New blowers are about 73 percent quieter than machines introduced in the early to mid-1990's, and up to 123 percent quieter than the late 1980 models. The Environmental Protection Agency (EPA) has developed new, more rigorous non-road emission standards that will go into effect over an extended period.

Clippings should be left in place to help recycle nutrients in our sandy soils. The nutrients in clippings are pollutants when they end up in stormwater systems and water bodies. They should be removed only if large amounts are left on top of the grass. If clumping occurs, distribute the clippings by re-mowing or by lightly raking. You can also use a leaf blower to distribute clippings. But never direct clippings into bodies of water or onto impervious surfaces.



Remove clippings from impervious surfaces. These nutrients are going straight to a water body.
Photo courtesy of FDEP

Grass clippings are composed mostly of water. Clippings have significant nutrient value and decompose rapidly, returning some fertilizer and organic matter to the soil. Further, it is expensive, wasteful, and irresponsible to add yard waste to our decreasingly available landfill space. As a result of Florida's Solid Waste Management Act (1988), yard wastes have been handled separately from municipal solid waste since 1991. It makes sense to recycle as much of a site's landscape waste as possible on-site, which eliminates the need to use energy to move it.

Aeration

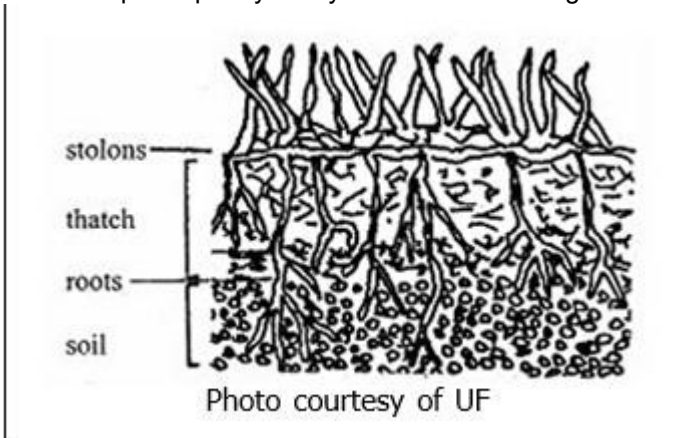
Mechanical aeration or cultivation is a common management practice for golf courses, sports fields, and other intensive use sites. It has become a standard and annual management procedure for commercial and residential sites suffering from heavy soils, significant thatch, compaction, or traffic problems. Several companies specialize in mechanical aeration as a major portion of their business. Mechanical aeration is one of the few maintenance practices that can improve soils under perennial turfgrass.

Thatch

Thatch is a common problem of many landscape sites. **Thatch** is an accumulation of living and dead plant material and organic debris above the soil level but below the grass blades. What causes the thatch layer to develop is not completely understood. A typical explanation is that thatch accumulates because of the production of stems, crowns and roots exceed the rate of

decomposition. Factors that suppress the rate of organic matter decomposition or promote excessive plant growth are thought to trigger the event.

Certain turf species and cultivars are more prone to thatch problems. Despite the common belief of some clients, grass clippings do not contribute to thatch. Clippings are 75 to 85 percent water and decompose quickly. They also contain little lignin.



The extent of a thatch problem is determined by removing a pie-shaped wedge of grass and soil and measuring the amount of organic matter accumulated. Sample several areas across the site, especially if the management programs differ. A small layer of thatch, less than one-half inch, is beneficial. It increases the grasses' resiliency, improves its tolerance to traffic, and insulates against abrupt changes in soil temperature. The turf's susceptibility to heat, cold, and drought damage increases with increasing amounts of thatch. Scalping during mowing, and insect and disease problems also increase because of thatch. Thatch is difficult to rewet after it has dried, so irrigation efficiency decreases, and localized dry spots increase. A thatch layer impedes movement of fertilizer, herbicides, and other chemicals.

Good mowing practices, combined with a good fertilization program and proper watering will help to reduce thatch development. Excessive thatch, over one-half inch, should be physically removed. Verticutting (or power raking in Bahia grass) is a method of mechanically removing much of the thatch. This process can moderately to severely injure the turf. Detailed information should be obtained for the specific grass before verticutting.

Mow the site closely before dethatching. Bag or rake clippings and remove the debris immediately. **The best possible time to verticut the lawn is when the grass is rapidly growing in the spring, if irrigation is available. If irrigation is not available, it is best to wait until the beginning of the summer rainy season.** After the verticutting procedure, the lawn should be thoroughly cleaned by raking or vacuuming immediately. Dethatching wet soil severely damages the turf and greatly reduces efficiency.

Even though mechanical dethatching produces a tremendous amount of material on the surface, it only removes a portion of the thatch in the turf. Some sources claim that power raking removes as little as 25 percent of the organic material where there has been substantial build-up. The cause of the thatch accumulation must be determined and solved, or the problem will return.

The fundamental Best Management Practices for turfgrass are:

- Keep your blades sharp.
- Cut only about 1/3 of the grass blade.
- If long grass must be cut, use the highest height-of-cut setting for the first mowing, and then cut