



Commercial Products

Aftercut Appearance

Troubleshooting Guide



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Using This Guide

This document is designed as a troubleshooting guide to assist you in correcting aftercut appearance issues. The following Toro® documents were used to compile the information in this guide:

- A Guide to Evaluating Reel Mower Performance and Using the TurfEvaluator™
- Reel Mowing Terminology

We highly recommended familiarizing yourself with these helpful and informative tools. Interchangeable terms are often used to describe various conditions. This publication will help to clarify and standardize the use of these terms and the conditions they reference.

Turf Conditions

Turf conditions play a dramatic role in the aftercut appearance. Consider turf conditions before attempting to fix a problem by adjusting your equipment. Equipment used strictly for mowing cannot remedy turf conditions but may be able to be adapted to a given turf condition.

The goal of turf equipment service personnel is to be in partnership with the turf grass manager to address appearance concerns by matching the equipment to current conditions. Most solutions are typically a combination of turf remedies and machine adjustments.

Turf is a living breathing organism and the same “fix” will not work for every turf condition and may not work for seemingly identical conditions. Warm and cool season grasses have different requirements and the cutting unit must be setup for the grass type and seasonal differences.

Cutting Units

A cutting unit incorrectly set up can cause more problems than resolutions. All cutting units must be checked and corrected to be the same for the following items:

- **Adjusters, Pivots, Bushings and Compensating Springs:** Lubricate if necessary, ensure tightness and good working order
- **Bedknife:** Correct for the application with sharp, flat and straight cutting edge
- **Bedknife Attitude:** Set to manufacturer recommendations
- **Bedknife Contact:** Set properly according to manufacturer recommendations
- **Reel:** Maintain a sharp cutting edge (relief or backgrind recommended) with less than .002 (0.05mm) run out. Always refer to manufacturer’s recommendations.
- **Reel Bearings:** Inspect for good condition with no end-play and proper adjustment
- **Reel Diameter:** Meets or exceeds the manufacturer recommended minimum diameter
- **Rollers:** Parallel to the reel and each other (see operators manual)
- **Roller condition:** Bearings should have no end-play, surface run out should be less than .015 (0.38mm) and centered in the frame. Always refer to manufacturers recommendations.
- **H.O.C. (Height of Cut):** set to obtain the correct *effective* height of cut
- **Wear factors:** Must be equal wear to eliminate differences. For instance, a new part on one unit and the same worn part on another unit can create issues.

Troubleshooting

When addressing aftercut appearance issues you may need to make physical changes to components of the cutting unit or traction unit. Use a systematic and scientific approach to troubleshooting issues in a timely and effective manner. **Make only one change at a time** and take careful notes of the result before making additional changes or adjustments (allow time for analysis), to isolate issues and determine possible corrective actions. Begin by following these actions:

- Define the issue by asking questions and making personal observations. The issue must be clearly defined before you can begin to correctly address it.
- Evaluate turf conditions for their contribution to the outcome (include weather trends such as extreme wet or dry and recent turf maintenance such as top dressing, etc.).
- Verify the traction unit is operating properly and in good condition (no switches jumped, proper RPM, maintenance is up to date, etc).
- Check and recheck the cutting units for accurate and proper setup.
- Understand and be able to duplicate the complaint or condition.

To begin, gather the following basic data for future reference:

Machine:

Model _____ Serial Number _____ Engine @ _____ RPM

Cutting Units:

Model _____ Serial Number _____

Number of Blades _____ Serial Number _____

Use: (describe – i.e. Fairways, Outfields, Greens etc.)

HOC _____ **Number of Blades** _____ **Type of Grass** _____

Over-seeded? _____ **Last Turf Maintenance Performed** _____ **Date** _____

Current Weather Pattern (i.e. Drought, Hot etc.) _____

Condition Found: _____

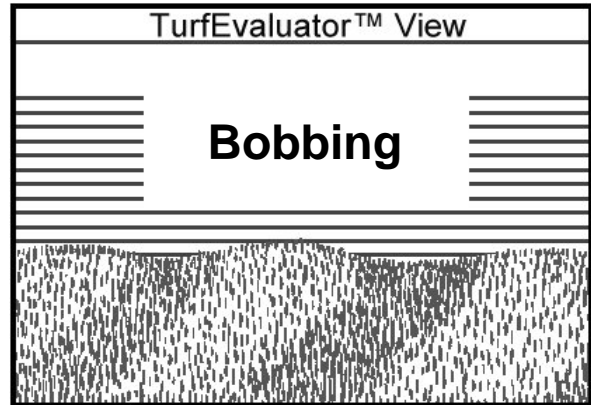
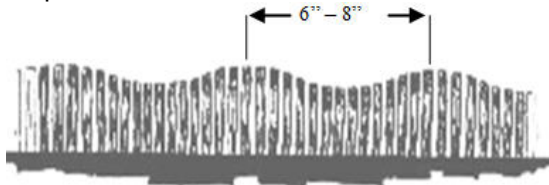
Condition Environment (when it happens, what needs done to duplicate the condition):

The following pages list causes and possible corrective actions. Although the suggestions listed are meant to be individually tested, a combination of two or more may be required to reach a final solution.

Bobbing

Description

Bobbing is a rocking movement of the cutting unit leaving an unacceptable wave like appearance. This could be all or one of the cutting units. Indications include color variations with the appearance of light and dark patches. This pattern is often identified by the wave tips being approximately six to eight inches tip to tip.



Causes of Bobbing:

- Ground speed is too fast
- Inconsistent turf density
- Ground is not level
- Grass build up on roller
- Cutting unit weight bias (not using or misadjusted turf compensation system)
- Counterbalance/down pressure set wrong (too light on ground)
- Out of round rollers
- Loose suspension of roller causes inconsistent forward speed
- Cutting unit is not tracking with traction unit
- Mowing in the same direction continuously
- Grain
- Using groomers on the cleanup pass

TIP
Bobbing can be misidentified due to differences in turf density or grass types causing a bobbing appearance. Verify there is a HOC difference in the area of the pattern.

Possible Corrective Actions:

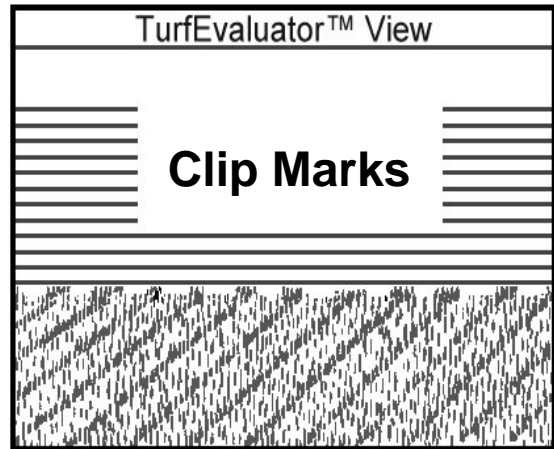
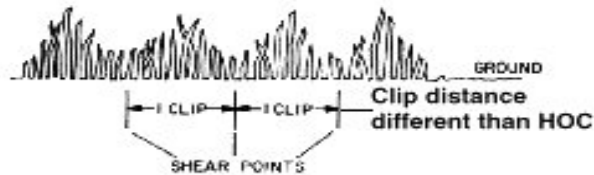
- Slow ground speed (allows cutting unit time to compensate for density changes)
- If turf density varies and matches the cut pattern, apply turf remedies for consistent density (dethatch, verti-cut and aerate)
- Limit access to turf when wet
- Verify roller condition, use scrapers or brushes to clean rollers
- Use (or adjust) turf compensation springs
- Adjust counterbalance/down pressure for more weight on turf
- Insure cutting unit suspension is in good working condition
- Insure the cutting unit is tracking parallel to traction unit travel
- Change mowing direction frequently
- See the section on Grain
- Use the Groomers in a straight line because turning while in use may cause the cutting unit to track incorrectly.
- Ensure cutting unit is tracking parallel to traction unit travel.
- Change the roller type to reduce rolling resistance.

TIP
Change the mowing direction 90°. If the pattern follows the mow direction, the bobbing may be caused by the cutting unit. If not, the pattern is likely due to turf variations.

Clip Marks

Description:

Clip marks are typically a wave or chopping pattern on the surface of mowed turf grass. This pattern is often identified by the wave tips being two or less inches tip to tip. The clip and the HOC, as a rule of thumb, should be approximately the same, but can be varied to achieve specific results.



Causes of Clip Marks:

- Engine RPM not set to specification
- Ground speed is too fast for the reel speed
- The reel speed is too slow for ground speed
- HOC too low for the number of cutting unit blades
- Reel diameter has worn beyond the range reel speed can be adjusted to compensate
- Reel motor not performing to specification
- Reel drive system slipping
- Hydraulic system performance degraded

Possible Corrective Actions:

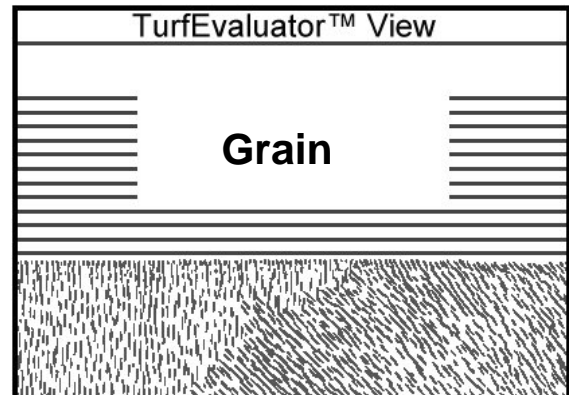
- Verify engine RPM
- Decrease ground speed
- Increase reel speed
- Ensure the proper cutting unit configuration and number of blades for the application
- Check that the reel diameter has not worn below minimum diameter
- Confirm reel motor performance
- Verify the reel drive performance
- Check hydraulic performance (pump output, relief settings etc.)

Grain

Description:

Grain is the tendency for grass or its runners to grow horizontally. Horizontal growth can be the result of recurring weather, water flow, wind, and sunlight direction.

Note: Some cultivars (i.e. Bent and Bermuda grasses) tend to naturally grow horizontally.



Causes of Grain:

- Consistent mowing direction
- Turf conditioning or maintenance incomplete
- Inconsistent turf density or texture
- Improper front roller (full)
- Environmental influences

Possible Corrective Actions:

- Establish a pattern of mowing that changes direction occasionally to avoid creating a grain
- Circle cutting
- Dethatch, verti-cut and aerate
- Using groomers, brushes and combs may be helpful
- Use Wiehle front rollers
- Protect area from the affects of weather

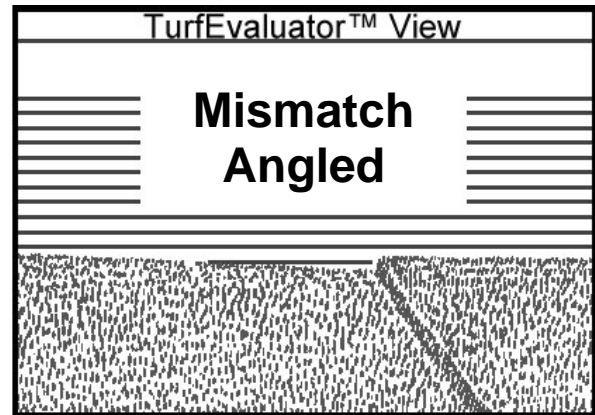
TIP

When addressing excessive grain issues, an aftercut appearance may worsen then gradually improve with continued maintenance.

Mismatch - Angled

Description:

Angled Mismatch occurs when cutting units of a mower running side by side cut at different heights. One cutting unit appears to be cutting lower on one side while all other points appear equal in height. This typically appears in one cutting unit with multiple blades.



Causes of Mismatched Angled:

- HOC set different from one end of the cutting unit to the other
- Rollers not parallel to the reel and to each other (vertical and horizontal)
- Different attitude/BCD from one end of the cutting unit to the other
- Mowing too fast
- Weight distribution of cutting unit is uneven
- Worn roller bearings
- Hose or cutting unit movement is restricted
- Variations in terrain
- Variations in turf density (thatch or grain)
- Cutting unit is not tracking straight

Possible Corrective Actions:

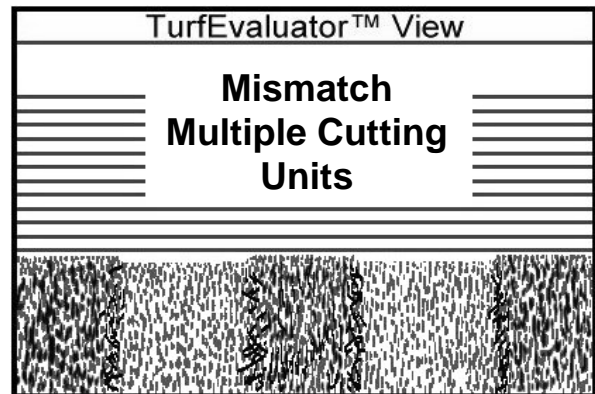
- Determine unit at fault
- Verify HOC settings on each side are equal
- Verify rollers are paralleled prior to setting HOC
- Verify attitude (blade being parallel to the ground) is the same on both ends of the cutting unit
- Mow Slower
- Ensure even weight distribution (use the proper counterbalance weight for the unit)
- Verify roller condition
- Correct hose routing or any other obstruction to allow full cutting unit movement
- If problem is intermittent, check the turf density between areas where the condition is most and least noticeable
- Verify the terrain is within the ability of the cutting unit to properly follow
- Dethatch, verti-cut, aerate
- Verify the cutting unit is tracking parallel to the traction unit direction

Mismatch - Multiple Cutting Units

Description:

This situation occurs when the cutting units on one line cut at a different effective HOC than cutting units on another line. This is a result of a HOC difference not a setting difference.

Pattern Repeats



Causes of Mismatch Multiple Cutting Units:

- Turf density (excessive thatch)
- Cutting off too much grass at one time
- Mowing too fast
- Counterbalance/down pressure settings
- Differences in ride height (frame height front to back and side to side)
- Reel speed differences

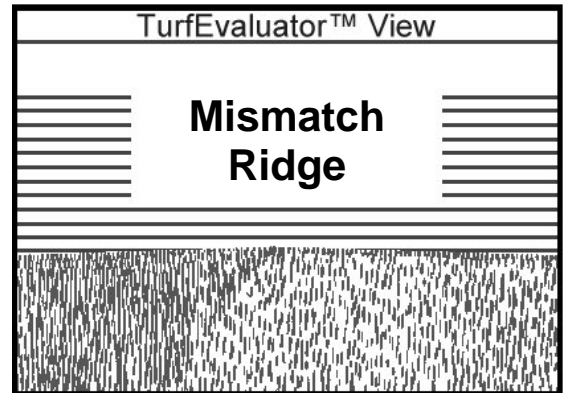
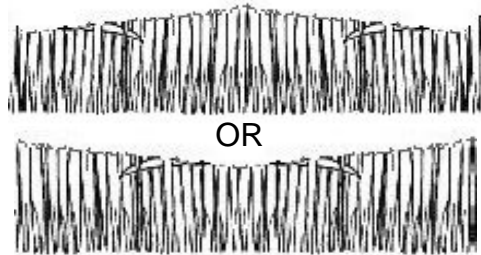
Possible Corrective Actions:

- Dethatch, verti-cut and aerate
- Change mowing direction frequently
- Mow more frequently
- Slow mowing speed
- Adjust counterbalance or down pressure system to even effective HOC
- Adjust ride height to allow for even lift arm placement
- Adjust air pressure
- Verify reel speed is consistent across all cutting units
- Roller profile can help stabilize effective HOC
- Adjust rear HOC to match the effective HOC of the front cutting units

Mismatch - Ridge

Description:

Ridge Mismatch can occur when two cutting units side by side are each cutting higher on one end. This can be viewed as a ridge or a trough depending on how the units are set up compared to the other.



Causes of Mismatch Ridge:

- Inaccurate HOC settings from one end of each cutting unit to the other end
- Rollers not parallel to the reel or each other (vertical and horizontal)
- Variations in terrain
- Variations in turf density
- Hose or cutting unit movement restricted
- Mowing too fast
- Counterbalance or down pressure springs worn or set improperly
- Worn roller bearings

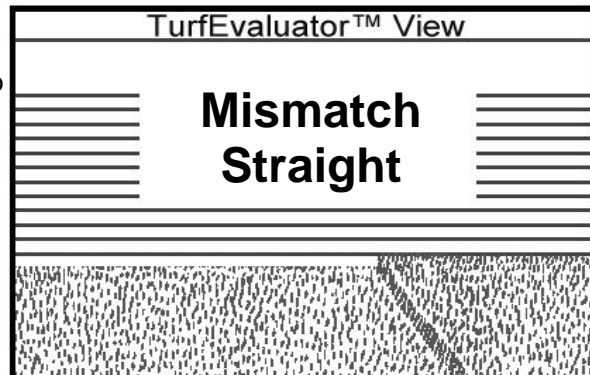
Possible Corrective Actions:

- Verify HOC settings on each side of all reels is equal
- Verify the rollers are parallel prior to setting the HOC
- If the condition is intermittent, check turf conditions in areas where mismatch ridge is noticeable compared to areas it is not
- Verify the cutting unit can follow the turf
- Dethatch, verti-cut, aerate
- Correct hose routing or any other obstruction to full cutting unit movement
- Slow mowing speed
- Verify counterbalance/down pressure system condition and adjustment is correct for conditions
- Verify roller condition

Mismatch - Straight

Description:

Straight Mismatch may happen when cutting units run a side by side cut at different heights. Each unit appears to be cutting well but this can show up when two different mowers are used on the same turf due to different effective HOC settings.



Causes of Straight Mismatch:

- Different HOC settings
- Different effective HOC
- Cutting edges dull
- Cutting off too much grass at one time
- Bedknife settings different for each of the affected units
- Different bedknife height (worn reel diameter)
- Improperly set counterbalance or down pressure systems
- Worn roller bearings
- Inconsistent turf density (excessive thatch/grain)
- Using different parts for each affected unit
- Rollers not parallel

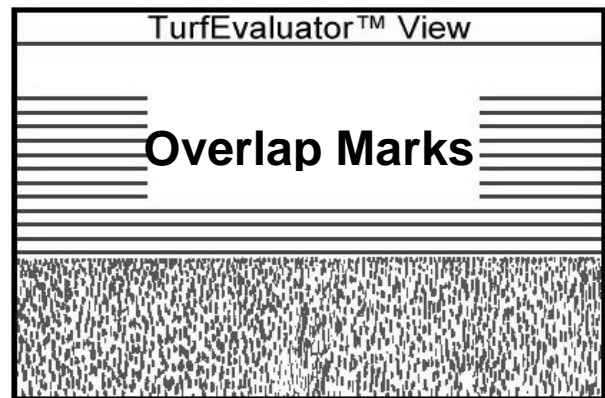
Possible Corrective Actions:

- Verify all HOC settings within .005 (0.12mm) of each other
- Verify the weight, roller options and other causes changing the effective HOC
- Sharpen reel and bedknife
- Increase mowing frequency
- Set bedknife attitude/BCD **the same on all units**
- Verify reel diameter (must be equal on all units)
- Set the counterbalance adjustment to obtain consistent effective HOC over all cutting units (may be different for each cutting unit)
- Set the down pressure system to obtain consistent effective HOC over all cutting units (can be different for each cutting unit)
- Check for worn or damaged roller bearings
- When patterns intermittently appear, check for differing turf conditions influencing effective HOC
- Dethatch, verti-cut, aerate
- Verify the parts being used are identical (type and brand)
- Parallel rollers (vertical and horizontal)

Overlap Marks

Description:

An overlap area is defined as the area where cutting units mow over the path of other cutting units causing various color variations to appear. This is the result of either individual cutting units within the path of a machine or where the paths meet (up and back with alternating directions). The grass is both rolled and/or cut at least twice in this area and appearance can be affected by either or both.



Exaggerated View



Causes of Overlap Marks:

- Being cut twice resulting in indentations or marks of lighter color
- Being rolled twice can create raised or darker marks, which generally dissipate within a few hours after mowing
- Excessive thatch or grain
- Color variations in canopy (Small green leaves on longer stem can increase overlap mark occurrence)
- Cutting off too much grass at one time
- Dull cutting units
- Cutting out of clip range
- Turf stresses due to weather conditions
- Turf compensation system improperly set

Possible Corrective Actions:

- Decrease the bedknife attitude/BCD
- Rollers with different end designs (shouldered roller), shorter front or rear rollers or install Collars
- Longer or shorter rollers to alter the roll effect in the overlap area
- Dethatch, verti-cut, aerate
- Increase fertilizer
- Mow more frequently
- Sharpen reel and bedknife
- Increase or decrease reel speed
- Adjust turf compensation system
- Change mowing direction frequently
- Adjust counterbalance of rear cutting units to be slightly different

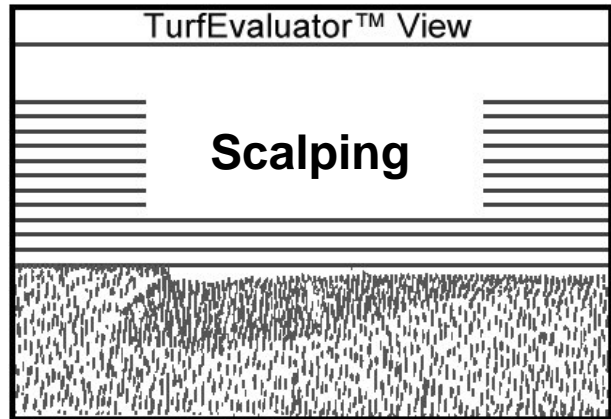
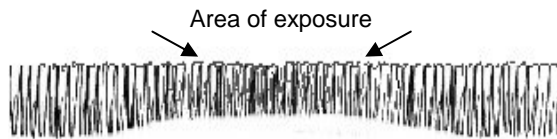
TIP

Colors change when observing the cutting coming toward you versus moving away. Always observe and compare results while looking at the same direction of travel.

Scalping

Description:

Scalping is typically a result of the cutting unit's inability to follow the turf. Mowing the grass at a low HOC exposes the stem or crown and produces a very light green color. In grasses with thatch buildup, this uncovers the thatch and appears light brown in color.



Causes of Scalping:

- Cutting below the normal HOC
- Uneven turf beyond the capability for the mower to follow
- Rollers set too far apart or rear roller too short
- Improper attitude for HOC(attitude/BCD too aggressive)
- Incorrect bedknife for the HOC
- Cutting off too much grass at one time
- Inconsistent turf density (excessive thatch or grain)
- Ruts created by cart or vehicle traffic when wet

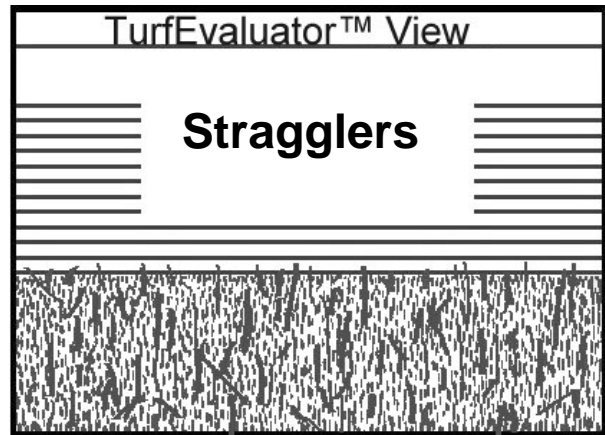
Possible Corrective Actions:

- While lowering the effective HOC, make changes gradually or in stages to allow the turf grass to adapt
- Verify the location of the scalp in relation to turf density, undulation or heavy thatch. Consider making a change in the mowing direction
- Roller fixtures or attachments to the cutting unit can cause the rollers to set wide apart. When the rollers are positioned closer to each other, the unit can more effectively follow uneven terrain
- Use the proper roller for the intended application
- Reduce bedknife attitude/BCD
- Verify the correct bedknife is being used for the application and HOC
- Mow more frequently
- Dethatch, verti-cut, aerate
- Restrict access to turf while saturated
- Set roller and/or skids to catch terrain variances

Stragglers

Description:

Stragglers appear as scattered uncut grass blades throughout the cutting unit path. The uncut blades stand above the general line of the effective height of cut. Key factors affecting this condition include cutting unit sharpness, adjustment, clip versus grass length, resiliency of grass, and bedknife attitude. Frayed leaves from poor cutting efficiency can also have the same effect.



Causes of Stragglers:

- Dull cutting edges (reel and/or bedknife)
- Bedknife Adjustment correct
- Bedknife attitude/behind center distance (BCD)
- Cutting unit out of clip range (reel speed too fast for HOC)
- HOC too high for roller or cutting unit suspension type.
- Incorrect roller used
- Cutting off too much grass at a time
- Grain in turf
- Inconsistent turf density or texture
- Grass wilted from weather stress

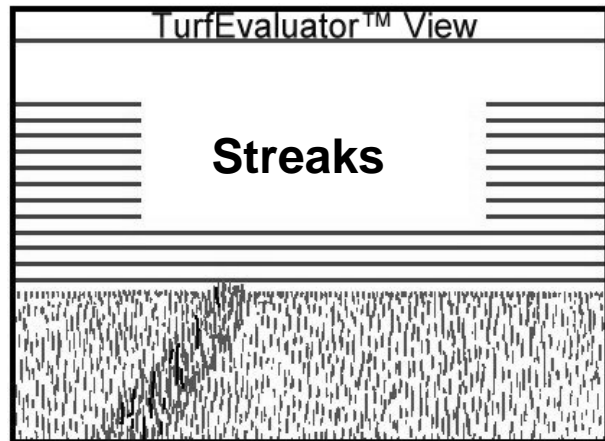
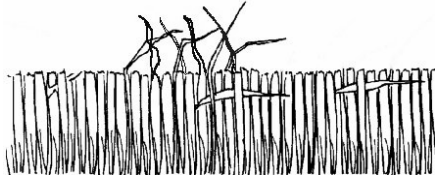
Possible Corrective Actions:

- Sharpen cutting unit (bedknife and reel)
- Adjust Bedknife (light contact is preferred)
- Increase bedknife attitude/BCD
- Increase forward speed (higher HOC)
- Decrease reel speed (higher HOC)
- Decrease forward speed (lower HOC)
- Increase reel speed (lower HOC)
- Verify the Roller is correct for application
- Mow more frequently
- Change mowing direction regularly
- See **Grain** in this guide
- Dethatch, verti-cut, aerate

Streaks

Description:

Streaks appear as a line of taller grass that has not been cut. Single, straight streaks are the result of a bent or nicked bedknife. Multiple straight streaks are more often the result of rifling due to heavy contact between the reels and bedknife. Half-moon Streaks may also appear as a result of turning or side hill operation.



Causes of Streaks:

- Damaged bedknife (picking up objects such as spikes)
- Rifled bedknife or reel (uneven wear)
- Loose or over torqued bedknife screws
- Bent reel blade
- Turning too aggressively (Streaks can show where the cutting units don't overlap each other around corners or on side hills)
- Bedknife ends tufting grass (from dragging or inconsistent bedknife contact)
- Wrong roller for application
- Tire marks
- Steering too sharply or operating on hill sides

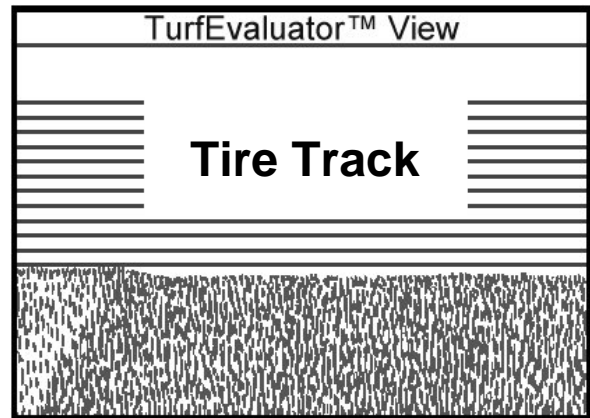
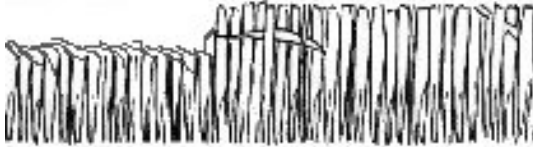
Possible Corrective Actions:

- Beware of objects that could get caught in the reel. Check area to be mowed for foreign objects prior to mowing
- Repair or replace damaged reel and bedknife (regrind if necessary)
- Always use a torque wrench to tighten screws evenly and to proper torque
- Change mowing pattern or approach to a particular terrain
- Find where streak orients from the cutting unit and correct the damage in that area
- Lock or unlock steerable cutting units as necessary
- Verify proper bedknife for application
- Verify proper adjustment of bedknife (attitude/BCD and light contact across entire knife)
- Correct roller for application
- Try to limit the turning radius and speed of turns while mowing
- See **Tire Track** in this guide

Tire Track

Description:

Tire tracks are caused by the tire rolling on the turf. When the tire rolls on the turf after the cutting unit has cut the turf, the effects usually dissipate over time.



Causes of Tire Tracks:

- Tire rolling turf prior to cut
- Traction unit weight
- Moisture content in or on turf
- Tire configuration (edge profile)
- Air pressure too high or too low
- Inconsistent turf density
- Cleanup pass ruts

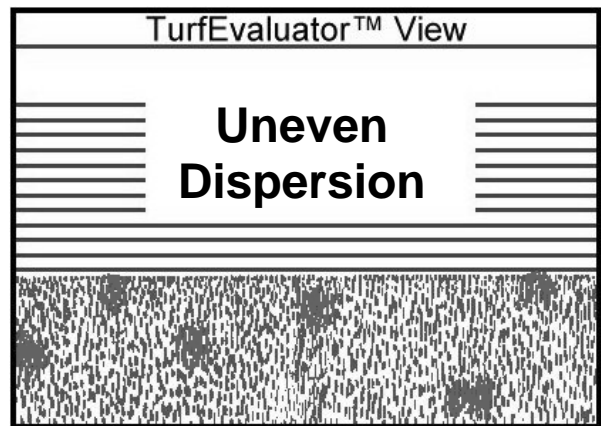
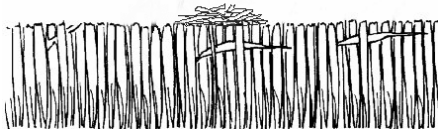
Possible Corrective Actions:

- Use brushes or combs if tire rolls the turf first
- Remove unnecessary weight such as cabs and accessories used in winter etc. (Four wheel drive if not necessary)
- Restrict vehicle access to turf during high moisture periods
- Mow later in the day when moisture has stabilized
- Change tire to a different profile (a wider, larger diameter is more effective)
- Adjust air pressure to maintain even contact on turf
- Dethatch, Verti-cut, and aerate
- Alter the clean up path by moving over a foot on alternating days or changing directions if cutting units are offset.
- Reduce clean-up pass frequency

Uneven Dispersion

Description:

When mowing, the cutting unit discharge should spread evenly over the turf. Clumping occurs when discharge collects and drops in piles on the turf. Windrowing is when the discharge gathers in a row at one side of the cutting unit. When the grass collects at the edge of the basket and falls out, it is called dribbling.



Causes of Uneven Dispersion:

- Cutting off too much grass at one time
- Mowing while grass is damp
- Grass collecting on rollers
- Scrapers improperly adjusted
- Grass collecting on frame members
- Grass collecting on bedknife heel
- Grass collecting on bedknife edge
- Not using baskets
- Grass missing baskets
- Cut off bar is misadjusted
- Clippings not being reprocessed
- Too much grass clipping volume for front discharge

Possible Corrective Actions:

- Mow more frequently
- Allow turf to dry out prior to mowing
- Use brushes or scrapers
- Adjust scrapers to lightly brush grass and have a slight clearance to roller
- Adjust cutting unit discharge (check for missing shields or deflectors)
- Reduce bedknife attitude
- Adjust bedknife contact (light contact is preferred)
- Use baskets or other collection devices
- Adjust cutoff bar and shields (see operators manual)
- Adjust discharge to front or rear throw for best dispersion

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