

Carbide-tipped blade systems offer numerous benefits for maintenance grading operations. This document is prepared as a primer for operators not familiar with the rotating carbide-tipped blade. Minor adjustments to the techniques used with traditional straight blades will allow the blade to perform at maximum potential. The rotating carbide-tipped blade can be used for ditch and shoulder work also. Those activities will be the subject of future technical bulletins. Presented here is the road surface grading sequence using a rotating carbide-tipped grader blade:

1. Scratch the Road Surface
2. Restore Proper Cross-Slope
3. Spread the Material
4. Groom the Road
5. Compact

### 1. SCRATCH THE ROAD SURFACE

The first step in grading is to loosen the entire surface of the road. The shallow grooves created by a carbide-tipped blade eliminate shear planes and act as anchor points, greatly improving binding of the newly graded material.

Typically one pass in each direction is sufficient to loosen the material and prepare the center of the road to receive material. When scratching the surface, stay on one side of the crown and off the centerline (see Figure 1). Scratch/loosen the road material to the depth of the deepest point in the road cross-section. It is particularly important to cut the road (cross-sectional profile) to the bottom of any washboards or shallow holes. This may require additional passes.

Deeper holes should be cut to the bottom with a grader-mounted scarifier or other equipment (backhoe) to destroy the shape of the hole and reduce the potential for the hole to recur. Failure to scratch the center of the road when attempting to rebuild/repair crown is a recipe for potholes and washboarding (see Photo 1).

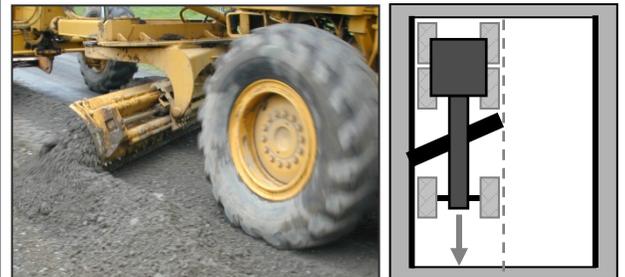


Figure 1



Photo 1

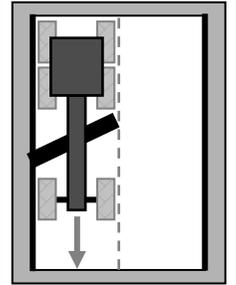
## 2. RESTORE PROPER CROSS-SLOPE

The accumulation of material along the outside edge of the road is a natural result of traffic. Pulling this material back into the center of the road is an important step in re-establishing the centerline crown and eliminating water following the wheel tracks. Evenly blending the material is critical. If the large segregated aggregate is brought back to the center of the road without re-establishing a proper mixture of coarse and fine material, the road will unravel very quickly, generating dust and potholes.

During this phase the blade carrier should be vertical with the carbide teeth pointed forward about 25 degrees (see Figure 2). Having the moldboard rolled forward causes the material to ride up the blade and fall onto itself, which helps to mix the large material back into the fines.

If major rebuilding of the crown is required, it may be necessary to cut the road several times in each direction. These repetitive passes:

- accumulate sufficient material to rebuild the crown
- cut the holes or washboards deeply enough to delay their return
- recover fine aggregate particles to replace the fine particles lost to erosion, dust, and traffic action



**Figure 2.** Large aggregate that has accumulated on the shoulder is pulled to the center of the road and mixed with fine aggregate particles as it rides up the blade. Excess aggregate is deposited in a windrow in the center of the road. Note the high moisture content of the graded material.

On roads where centerline crown is desired, the road center end of the grading blade is kept at or slightly above the final elevation desired. This technique allows the grader to compact deposited aggregate with each pass and reduces the amount of aggregate to be spread in the next step.

## 3. SPREAD THE MATERIAL

Aggregate accumulated in the center of the road needs to be spread. Straddle the windrow of material with the blade straight and pitched forward slightly. Spread the material leaving the center of the road 1" or 2" higher than the elevation desired at completion (see Figure 3). After this pass the road will have a slightly high flat center with a notch on both sides.



**Figure 3.** The material is knocked down (above) leaving the road with a high flat center (far left).

#### 4. GROOM THE ROAD

The final passes with this blade system to groom the road are the most critical. Properly done, these two passes have the same effect as raking the road without separating the aggregate. On these passes, turn the grader blade the opposite direction from earlier scratching and cutting segments (as if plowing snow).

The grader stays in the lane and off the centerline. Pitch the blade forward sufficiently to see the material feeding out between the teeth. The road center side of the blade should be kept at the final elevation of the centerline and the road edge side of the blade kept at an elevation such that little if any material runs off the edge of the blade (see inset above right). A flat “A” shaped crown is desired. During these passes, the grader will not be carrying a lot of material (see Figure 4). Any large rocks, roots, or chunks of vegetation should ride down the blade to the edge of the road. Avoid spreading the material too thin along the outside edge of the road.



Figure 4.

#### 5. COMPACT

The final stage of maintenance grading is compaction. Rolling should begin from the road edge and work toward the centerline. The center of the road should be rolled; however, take care to avoid straddling the crown with the roller. In normal grading operations, only a couple of inches of aggregate are shifted and a large roller or vibratory roller is unnecessary. It is more valuable to roll the road with the equipment available than to avoid rolling for lack of ideal equipment. A rubber tired roller or a loaded truck works well for this purpose (see Figure 5).

Carbide-toothed blades perform best under moisture conditions that would be too wet for grading with a traditional blade. In order to achieve the maximum benefit from a carbide-blade system it is important to grade under high moisture conditions. Strategies for adding moisture to optimize compaction and minimize aggregate separation will be the subject of a future technical bulletin.



Figure 5. Here the grader was used to partially compact the groomed road. Slightly offsetting the wheels on an articulating grader allows the operator to compact twice as much area with each pass.