State of Illinois
Department of Transportation
Bureau of Operations

Specifications and Questionnaire for Carbide Insert Type Blades for Graders & Under-Body-Snowplows

September 2002

This specification and questionnaire covers requirements for dual-insert tungsten carbide blades for mounting on motor graders or under-body plows or scrapers. These blades will be used by the Department of Transportation Division of Highways Operations during winter snow removal operations and in the maintenance of earth and rock shoulders. The snowplow blade sections shall be high-quality steel blades fitted with two (2) tungsten carbide inserts on the facing of the blade, complying with the following detailed specifications.

Bidders quoting on the specified products must submit with their bid written proof of the following:

1. The carbide insert blades proposed are equal to, or exceeds that specified in all respects including size, operating features, and expected life-cycle.

2. The manufacturer of the equipment proposed has been actively involved in the manufacture of the carbide style blades called for in the Proposal for a period of not less than 4 years.

3. Service for the products proposed is readily available from within the State of Illinois.

It is the responsibility of each bidder to complete and return this questionnaire with the bid.

Unless otherwise specified, the proposed equipment shall be complete in all parts and ready for immediate use upon delivery.

Proposed with this bid:

Make: _____

Model: _____

Manufactured by: _____

_____

_____

_____

Telephone: _____ / _____ - _____

Contact: _____

Blade Section:

The blade sections shall conform to the dimensions as shown on the attached drawing for the length as called for in the "Proposal".

Complies: Yes ___ No ___

If No, Describe: _____

_____

_____

The hole punching of the cutting edges shall be as shown in the attached drawing. The holes shall punched to an 11/16” diameter and countersunk to receive 5/8” diameter grade 8 blade bolts. The center of the holes shall be within 1/16” of the established centerline of the blade.

Complies: Yes ___ No ___

If No, Describe: _____

_____

_____

Each blade section shall be manufactured from flat, hot rolled, finished steel meeting or exceeding specifications for A36 or SAE 1020 rated steel, with a finished thickness of 7/8”.

Complies: Yes ___ No ___

SAE Steel #: _____

The groove for the tungsten carbide inserts shall be milled to accommodate a .38 and a .32 thick carbide segments placed one in front of the other and securely bonded to each other. The thickness from the rear of the insert to the back of the blade shall be approximately 0.250”.

Width of Groove: _____ “

Thickness in rear: _____ “

The tungsten carbide inserts shall be secured using a silver solder type material with sufficient strength to securely hold the dowel type inserts while being impacted during snow removal operations.

Complies: Yes ___ No ___

Describe solder material used: _____

_____

_____

_____

The completed blade sections with inserts installed shall be free of warpage and longitudinal deviation. Blade sections exceeding .125” in a 4-foot section will be rejected.

Complies: Yes ___ No ___

Tungsten Carbide Inserts:

Only virgin materials shall be used to create the inserts used in these blades.

Complies: Yes ___ No ___

Reclaimed or scrap carbide will not be used in any portion of the manufacturing process.

Complies: Yes ___ No ___

These blades shall be formed with dual carbide inserts, one in front of the other, bonded to each other and to the softer steel blade they are mounted in.

Complies: Yes ___ No ___

The front (face) carbide insert shall be composed of high shock, WC Grade tungsten carbide. The insert shall equal grade SP341 formulated using Macrocrystalline type WC using the menstrum manufacturing process, yielding a stochiometric composition of the facing segments.

Complies: Yes ___ No ___

If No, Describe: _____

_____

The physical properties of the front (face) inserts shall include:

- 13.25 to 13.65 grams/cubic centimeter.
- 83.5 to 85.0 Rockwell "A" scale hard.
- 330,000 psi min. Transverse rupture.

Complies: Yes ___ No ___

If No, Describe: _____

_____

_____

The front inserts shall be trapezoidal in shape with the following dimensions:

Height (long side)	0.750" ± 0.005"
Width	0.310" ± 0.010"
Length	2.0" Nominal

Complies: Yes ___ No ___

If No, Describe: _____

_____

The center (rear) carbide insert shall be composed of high shock, WC Grade tungsten carbide. The insert shall be formulated using 11% to 12.5% cobalt.

Complies: Yes ___ No ___

If No, Describe: _____

_____

_____

The physical properties of the center inserts shall include:

- 14.1 to 14.6 grams/cubic centimeter.
- 87.5 to 89.0 Rockwell "A" scale hard.
- 350,000 psi min. Transverse rupture.

Complies: Yes ___ No ___

If No, Describe: _____

_____

_____

The center inserts shall be trapezoidal in shape with the following dimensions:

Height (long side)	0.635" ± 0.005"
Width	0.365" ± 0.010"
Length	1.0" Nominal
Bottom Angle	25°
Nose Radius	.0625" Minimum

Complies: Yes ___ No ___

If No, Describe: _____

_____

_____

Note: The bidder shall furnish samples of both front and center carbide inserts if requested by the Department of Transportation.

Finish and Markings:

Each blade section, with the exception of the cutting edge, shall have a minimum of one coat of a rust resistant paint or coating.

Complies: Yes ___ No ___

The cutting edge portion of the blade section shall be unpainted and taped with an easily removable product to facilitate inspection of the cutting edge.

Complies: Yes ___ No ___

All blade sections shall be plainly marked to indicate the front edge of the blade to avoid improper mounting.

Complies: Yes ___ No ___

Each and every blade section shall be stamped with the manufacturers name, or recognizable monogram. The stamping shall be located on the front and in an area not subject to wear from use.

Complies: Yes ___ No ___

Note: Failure to comply with this portion of the specification will result in immediate rejection of product at any delivery location.

If No describe: _____

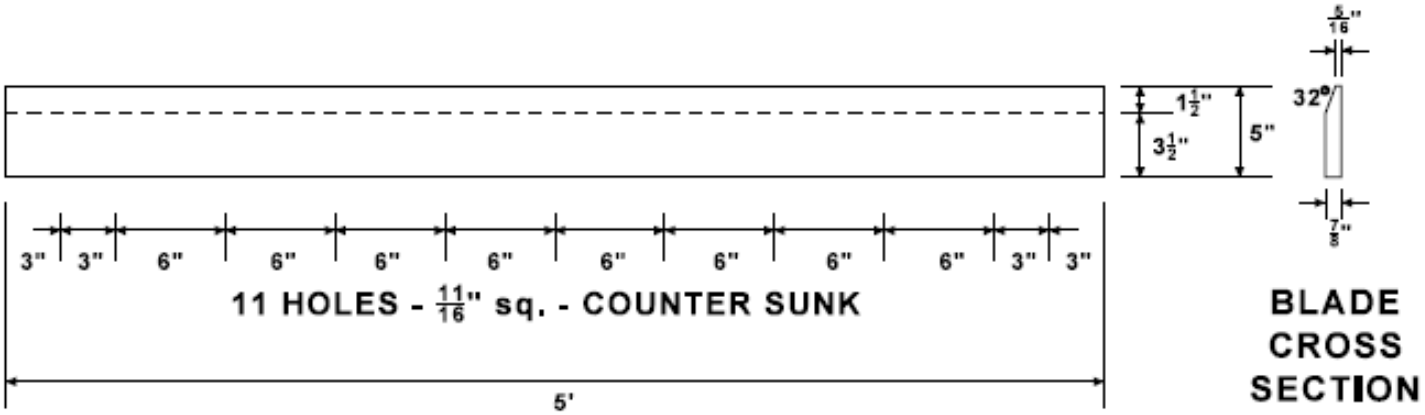
_____

_____

Bidders shall submit (as required below) two copies of each of the following with the bid response.

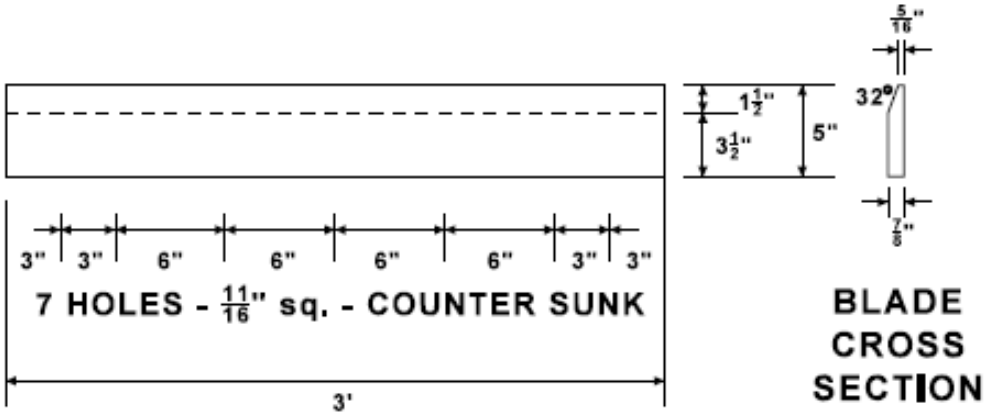
a) Bid Document
b) Specification Questionnaire
c) Detailed and Dimensioned Shop Drawings (if requested)
d) Descriptive Literature and Specifications Clearly Marked to Indicate the Composition of the Blade Sections

DUAL CARBIDE INSERT BLADE FOR GRADERS & UNDER-BODY SNOWPLOWS



BLADE CROSS SECTION

FIVE FOOT BLADE SECTION



BLADE CROSS SECTION

THREE FOOT BLADE SECTION

DATE: MAY 4, 1993
REVISED: SEPT 12, 2017