Dozer Capacity
—SAE J1265 FEB80

SAE Recommended Practice
Approved February 1980

S. A. E.
LIBRARY

THIS IS A PREPRINT WHICH IS
SUBJECT TO REVISIONS AND
CORRECTIONS. THE FINAL
VERSION WILL APPEAR IN THE
1981 EDITION OF THE SAE
HANDBOOK.

LAND
SEA
AIR
SPACE

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

PREPRINT

Report of the Off-Road Machinery Technical Committee, approved February 1980.

1. Purpose—The purpose of this recommended practice is to provide a uniform method for calculating the capacities of dozer blades. It is intended for relative comparisons of dozer blade capacity, and not for predicting capacities or productivities in actual field conditions. Such determinations would need to consider other parameters, such as efficiency of the blade design, tractor power, tractive effort, soil properties, terrain, operator technique, and duty cycle.

2. References

SAE J173, Specification Definitions—Dozers (May, 1970).

SAE J729a, Nomenclature—Dozer (June, 1977).

SAE J1057a, Identification Terminology of Earthmoving Machines (June, 1975).

3. Scope

3.1 This recommended practice applies only to straight, angling, semi-U, and U-blade dozers for crawler and wheel tractors. It applies to angling blade dozers only in the straight (not angled) position.

3.2 This recommended practice does not apply to angled blades or other tools used to side cast materials, nor does it apply to any blade with design features such as end plates extended beyond the blade face.

3.3 This recommended practice assumes the blade face to be flat and vertical, and does not consider the blade included volume (Fig. 1).

3.4 Although provisions are presented for some deviations, this recommended practice is intended for rectangular blades whose width/height ratios are at least 1.0.

4. Definitions

4.1 Straight Blade Dozers

4.1.1 Blade projected area (A_m, Fig. 2)—Blade area in square meters, exclusive of the end bit extensions, projected on a vertical plane parallel to the width of the blade. The blade is located in the mid-pitch position with the cutting edge at ground line.

4.1.2 Blade Width (W, Fig. 3)—The distance in meters from outside to outside of the blade, exclusive of the end bits. W corresponds to dimension G of SAE J173.

4.1.3 Effective Blade Height (H', Fig. 3)—The vertical height in meters that with W width, produces a projected area equal to A_m; ie: $H' = A_m/W$.

4.1.4 Effective Blade Contour (Fig. 3)—Simplified representation of the blade face for calculating the blade capacity. It is the vertical plane bounded by W and H'.

4.2 Semi-U and U-Blade Dozers

4.2.1 Blade Projected Area (A_m)—Identical to straight blade (paragraphs 4.1.1, 4.1.2, and 4.1.3).

4.2.2 Blade Width (W)—Identical to straight blade (paragraphs 4.1.1, 4.1.2, and 4.1.3).

4.2.3 Effective Blade Height (H')—Identical to straight blade (paragraphs 4.1.1, 4.1.2, and 4.1.3).

4.2.4 Effective Blade Contour (Fig. 4)—Simplified representation of the blade face for calculating the blade capacity. It is established by intersecting planes extending vertically from the cutting edge at ground line, with the blade in the mid-pitch position. The frontal dimensions are W and H'.

4.2.5 Wing Angle ($\propto$, Fig. 4)—Wing angle in degrees measured at the cutting edge at ground line with the blade in the mid-pitch position. This angle describes the orientation of the intersecting planes that establish the effective blade contour.

4.2.6 Wing Length (Z, Fig. 4)—Wing length in meters parallel to the blade width.

4.3 Angling Blade Dozers in the Straight Position

4.3.1 Blade Width (W, Fig. 5)—The minimum blade width in meters.

4.3.2 Effective Blade Height (H', Fig. 5)—Vertical height in meters with the blade in the mid-pitch position. H' corresponds to dimension F in SAE J173.

4.3.3 Effective Blade Contour (Fig. 5)—Simplified representation of the blade face for calculating the blade capacity. It is the vertical plane bounded by W and H'.

5. Capacity Formulas (Fig. 6)

5.1 Straight and Angling Blade Capacity:

$$V = V_s = 0.8\,W(H')^2 \qquad (M^3)$$

5.2 Semi-U and U-Blade Capacity:

$$V = V_s + V_u \qquad (M^3)$$

$$V_s = 0.8\,W(H')^2 \qquad (M^3)$$

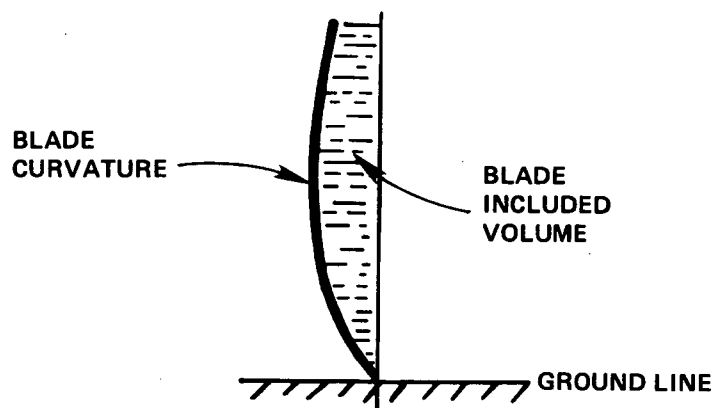$$V_u = ZH'\,(W-Z)\tan\propto \qquad (M^3)$$
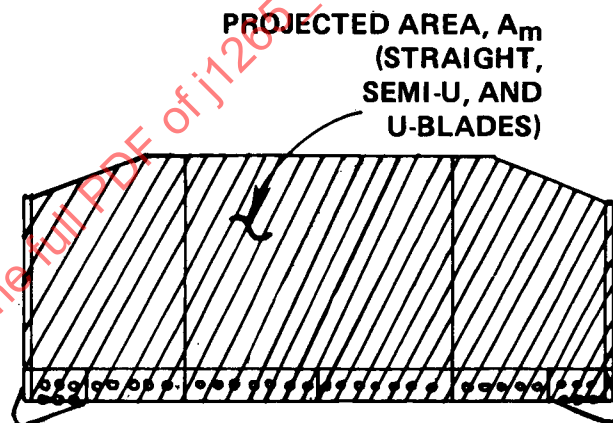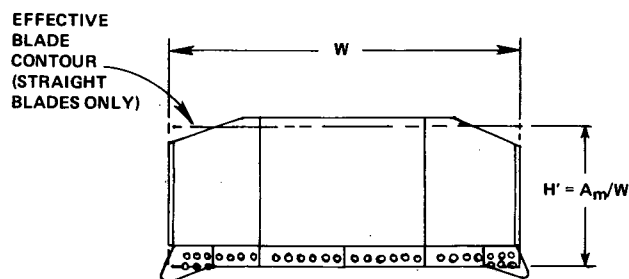

FIG. 1—BLADE INCLUDED VOLUME

FIG. 2—BLADE PROJECTED AREA

FIG. 3—STRAIGHT, SEMI-U, U-BLADE DIMENSIONS