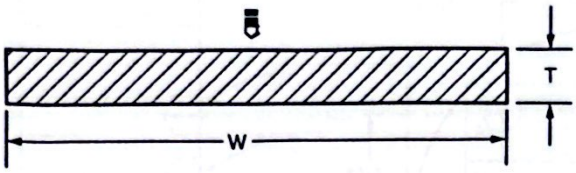
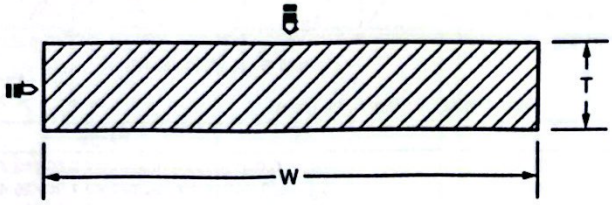
Plate and Flat Bar



Cross Section
T = Thickness
W = Width

Notes:
1. If W/T > 5, scan with a straight beam with the beam directed as shown
2. If W or T > 9 inches (228.6 mm), surface resolution requirements may require scanning from opposite side.

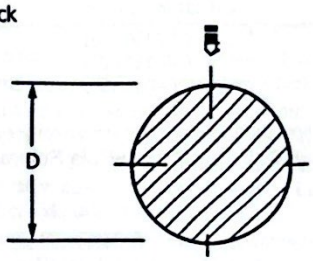
Rectangular Bar, Bloom, and Billets



Cross Section
T = Thickness
W = Width

Notes:
1. If W/T < 5, scan with a straight beam from two adjacent sides with the sound beam directed as shown
2. If T or W > 9 inches (228.6 mm), surface resolution requirements may require scanning from opposite sides.

Round Bars and Round Forging Stock



Cross Section
D = Diameter

Notes:
1. Examine by straight beam with sound beam directed towards the center of the bar as shown while bar is rotating to locate discontinuities at or near the center of the bar.
2. When specified in the contract documents purchase order, or engineering drawing scan with a circumferential angle beam technique per appendix A

FIG. 6 Sound Beam Direction for Various Shapes

minimum size discontinuity of the applicable class cannot be detected by examination from only one side.

7.4.2.3 When the length of any of the examination dimensions (distance sound beam travels through the material) exceeds 18 in. (457 mm) supplementary examinations may be additionally required to locate discontinuities that are not detectable by straight beam examination. This is based on the fact that it would be very difficult to detect discontinuities greater than 9 in. (228 mm) in depth for a Class A, or higher, examination. It shall be verified that the side walls do not give erroneous examination results.

7.4.3 *Scanning Speed*—The scanning speed shall not exceed the maximum scanning speed which provides for detection of the reference reflectors in the reference standards used to set up the examination.

7.4.4 *Ultrasonic Frequency*—Standardization and examination shall be performed at the ultrasonic frequency which will provide the penetration and resolution required for valid examination of the production material. Examination performed with transmitting and receiving search units of different frequencies shall be considered to be performed at the frequency of the transmitting search unit for broadband systems.

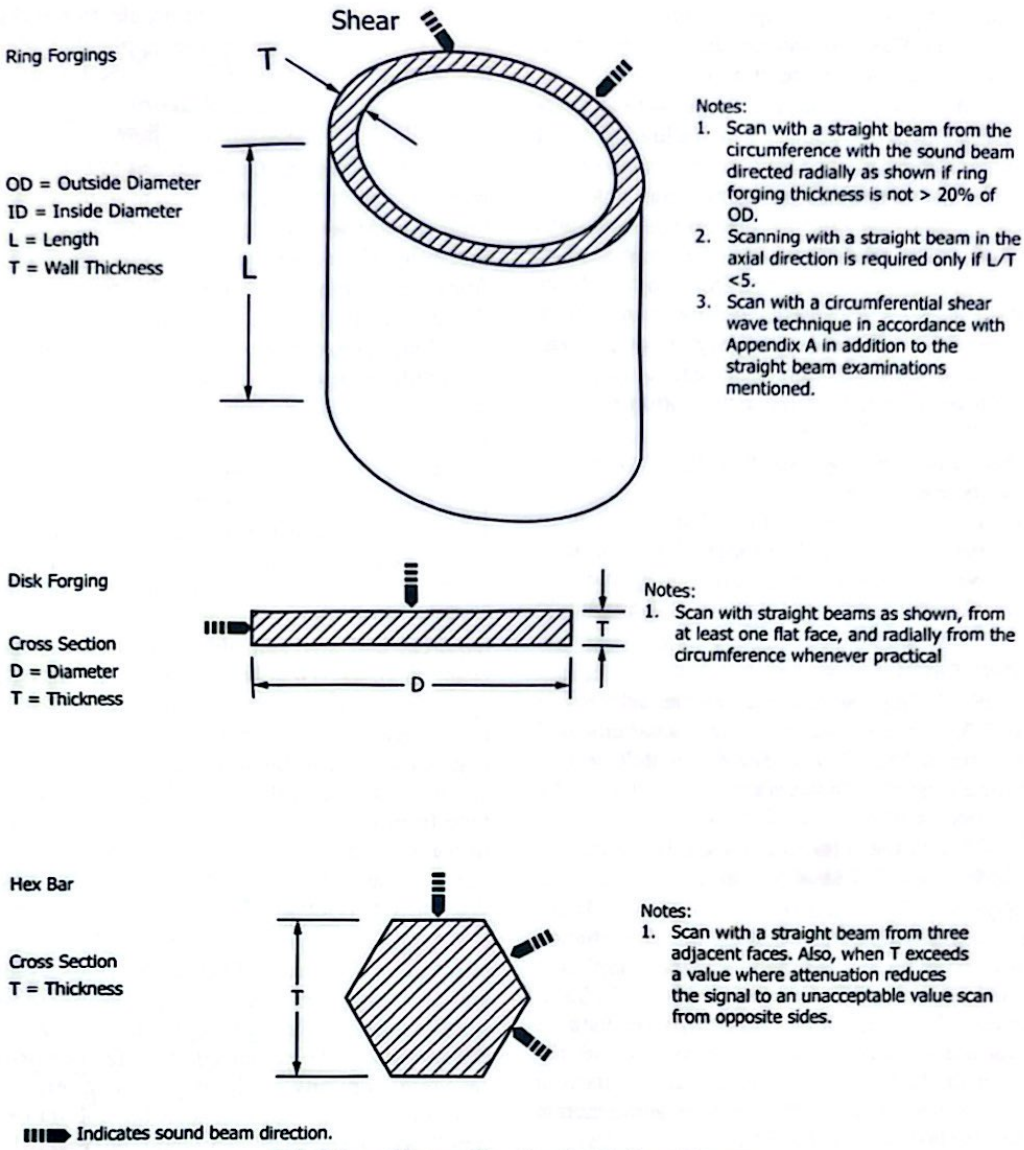


FIG. 7 Sound Beam Direction for Various Shapes

For tuned systems, the operating system frequency is established by either the transmitting or receiving system whichever is tuned.

7.4.5 *Water Travel Path for Immersion Method*—The distance from the face of the search unit to the front surface of a part shall be such that the second front reflection from the examination material does not appear between the first front and first back reflections. This distance (water travel) must be the same within ±0.25 in. (±6.35 mm) for standardization, initial scanning and final evaluation. When possible, examination shall be performed using water paths that result in examinations being performed in the far field of the search unit, or in the depth of field of a focused search unit approved by the cognizant engineering organization. When focused search units are used, the distance shall be such that the search unit focus is within the material at the depth required to meet front surface resolution requirements. For angle beam examination of curved or cylindrical parts the water path distance must be maintained at a length which does not vary during material examination or between standardization and examination by more than ±0.02 times the radius of curvature of the material.

7.4.6 *Lateral Position Stability for Examination of Cylindrical Parts*—During dynamic scanning, variation in position of the vertical centerline of a flat or focused search unit beam with respect to a radius perpendicular to that centerline shall not exceed ±0.02 times the radius of curvature.

7.4.7 *Reference Blocks*—Select reference blocks that have been prepared in accordance with 7.3 with flat-bottom-hole (FBH) diameters or reference reflectors for the applicable class (Table 1). Diameters other than specified may be used provided the diameters are within a factor of two and, after the response from the reflector is set to be not less than 80 % FSD, or other amplitude approved by the cognizant engineering organization,