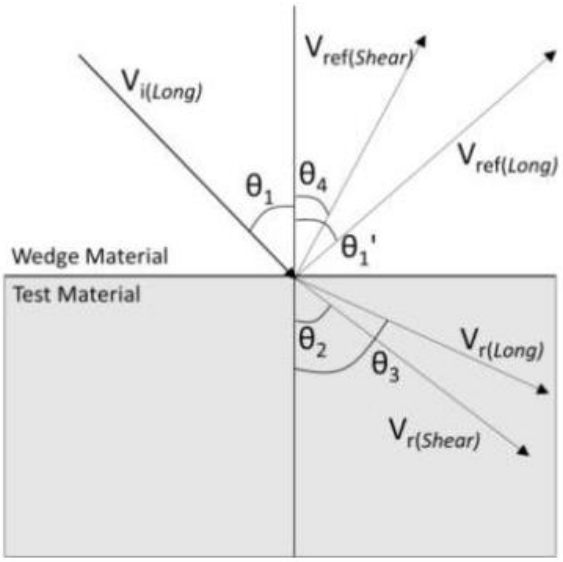

V i(Long)
V ref(Shear)
V ref(Long)
θ1
θ4
θ1'
Wedge Material
Test Material
θ2
θ3
V r(Long)
V r(Shear)

Fig. 1

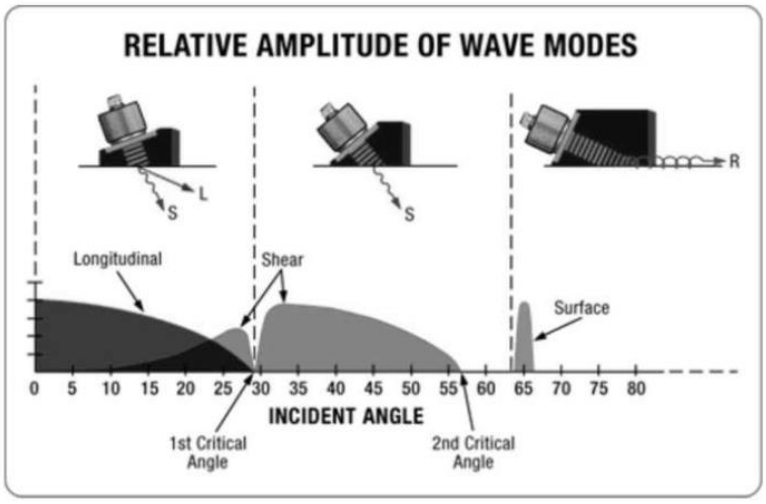

RELATIVE AMPLITUDE OF WAVE MODES
L
S
S
R
Longitudinal
Shear
Surface
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
INCIDENT ANGLE
1st Critical Angle
2nd Critical Angle

Fig. 2

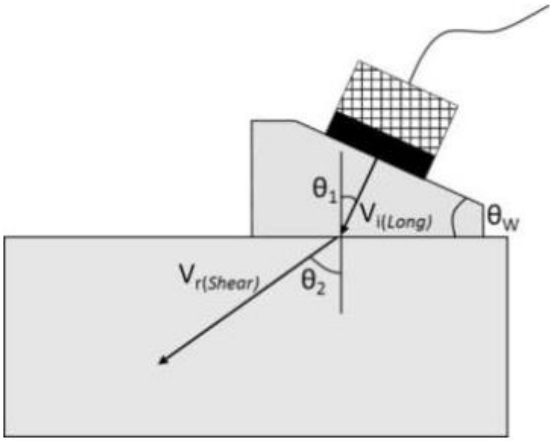



Fig. 3

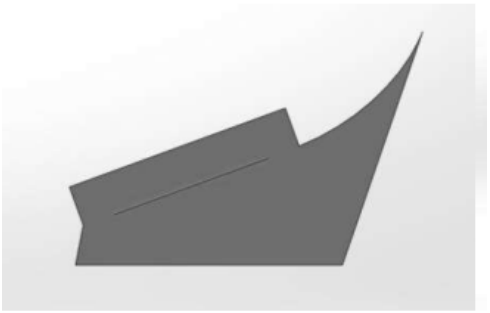


Fig. 5

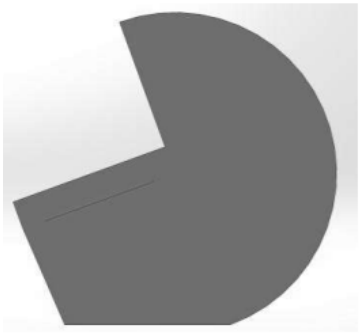


Fig. 4

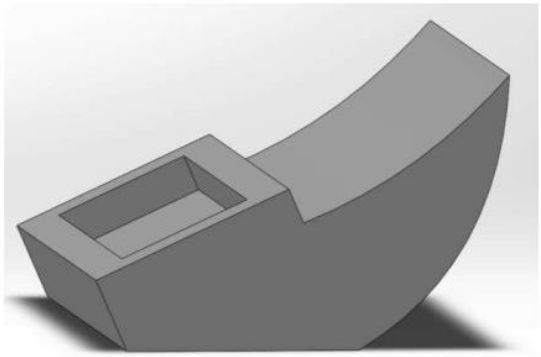


Fig. 6

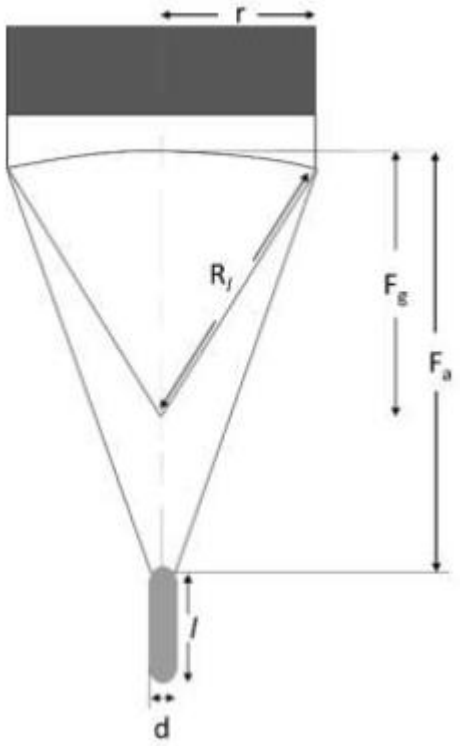



Fig. 7

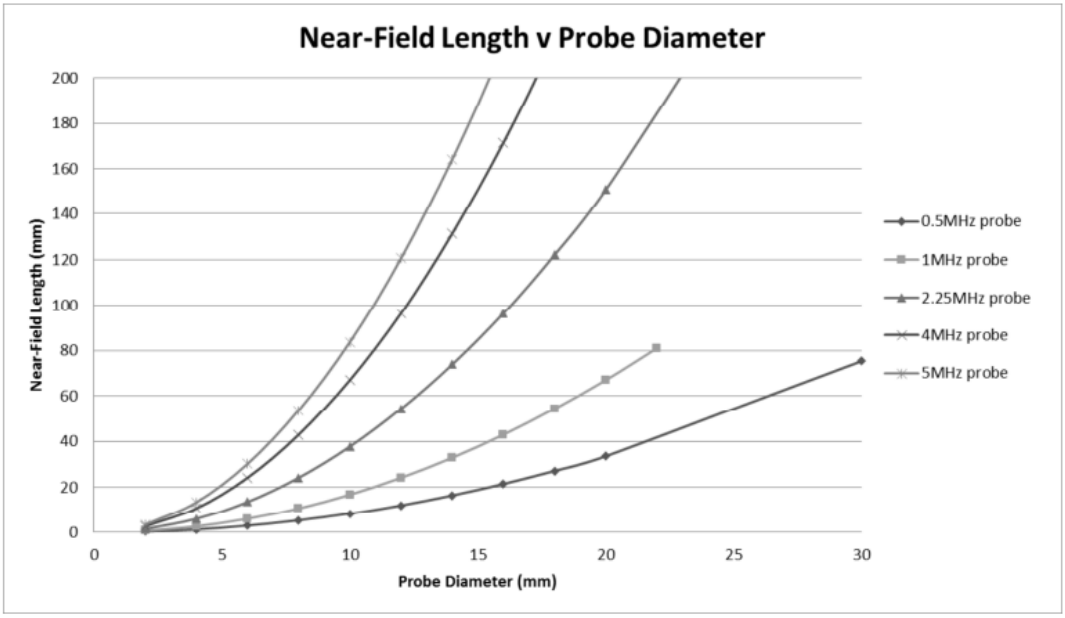

Near-Field Length v Probe Diameter
Near-Field Length (mm)
Probe Diameter (mm)
0
20
40
60
80
100
120
140
160
180
200
0
5
10
15
20
25
30
0.5MHz probe
1MHz probe
2.25MHz probe
4MHz probe
5MHz probe

Fig. 8

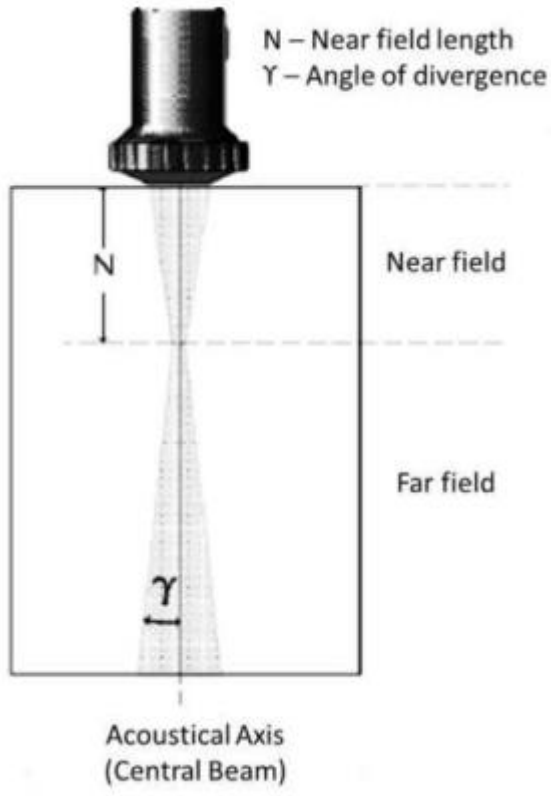

N – Near field length
ϒ – Angle of divergence
N
Near field
Far field
ϒ
Acoustical Axis
(Central Beam)

Fig. 9

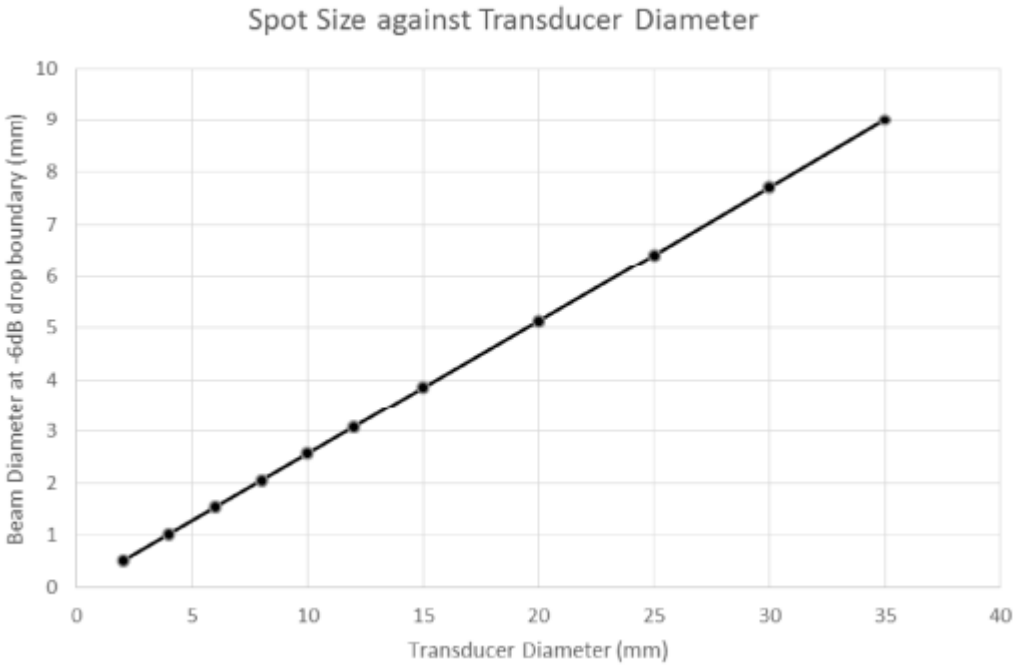

Spot Size against Transducer Diameter
Beam Diameter at -6dB drop boundary (mm)
Transducer Diameter (mm)
0
1
2
3
4
5
6
7
8
9
10
0
5
10
15
20
25
30
35
40

Fig. 10

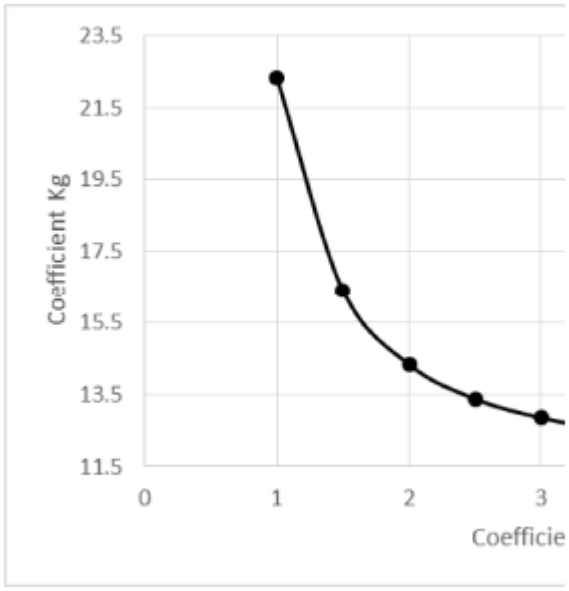

Coefficient Kg
Coefficie
23.5
21.5
19.5
17.5
15.5
13.5
11.5
0
1
2
3

Fig. 11

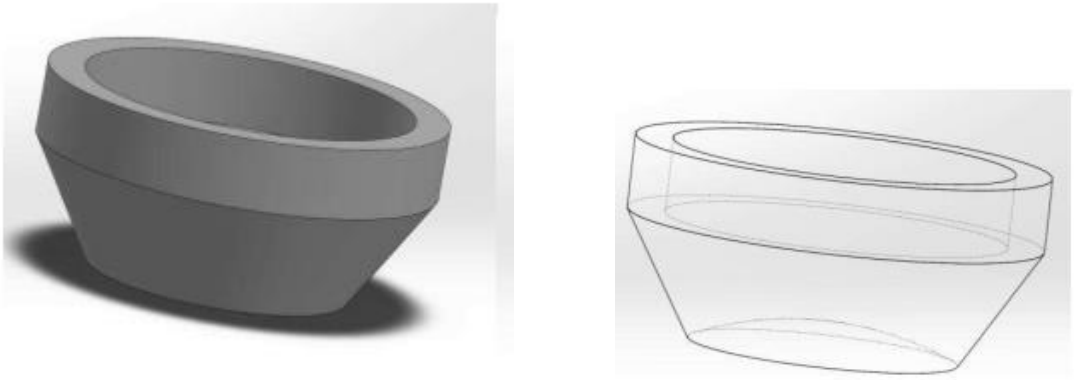


Fig. 12

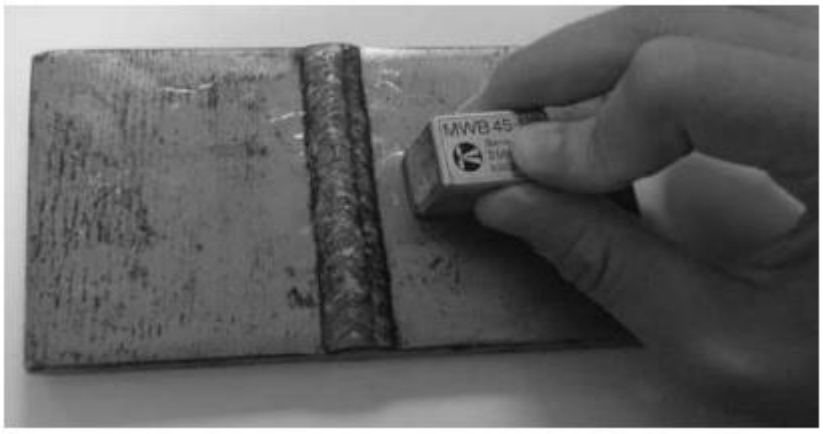



Fig. 13

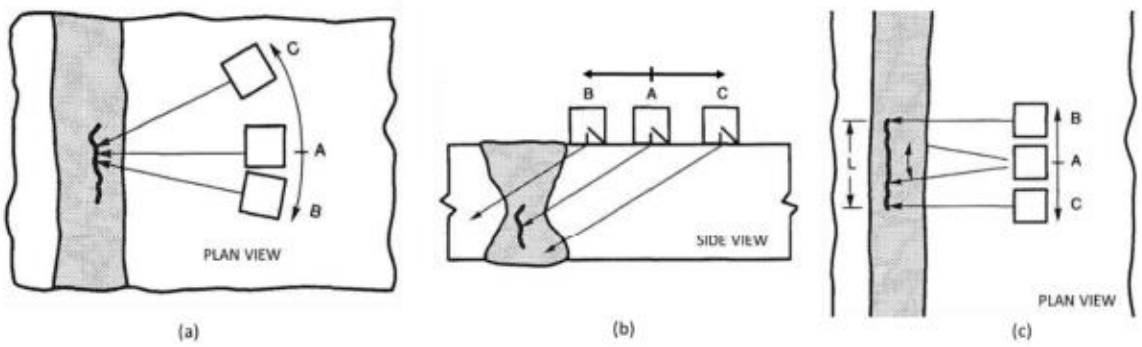


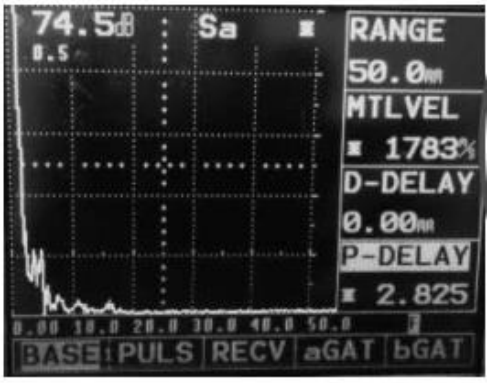

Fig. 14



Fig. 15


65.5dB
Sa12.65
0.5
0.00 8.00 16.0 24.0 32.0 40.

Fig. 16


74.5dB
Sa
RANGE
50.0mm
MTLVEL
1783%
D-DELAY
0.00mm
P-DELAY
2.825
BASE
PULS
RECV
aGAT
bGAT


74.5dB
Sa
RANGE
50.0mm
MTLVEL
1783%
D-DELAY
0.00mm
P-DELAY
2.825
BASE
PULS
RECV
aGAT
bGAT

Fig. 17





Fig. 18

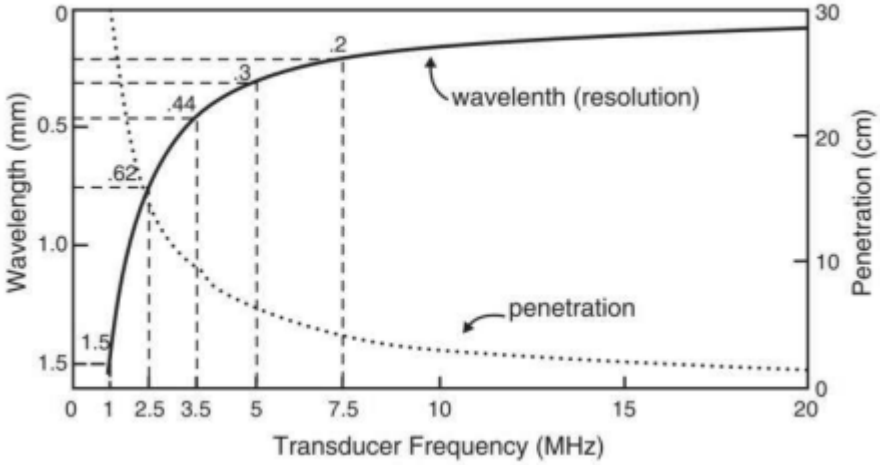

0
0.5
1.0
1.5
Wavelength (mm)
.2
.3
.44
.62
1.5
wavelenth (resolution)
penetration
30
20
10
0
Penetration (cm)
0 1 2.5 3.5 5 7.5 10 15 20
Transducer Frequency (MHz)

Fig. 19

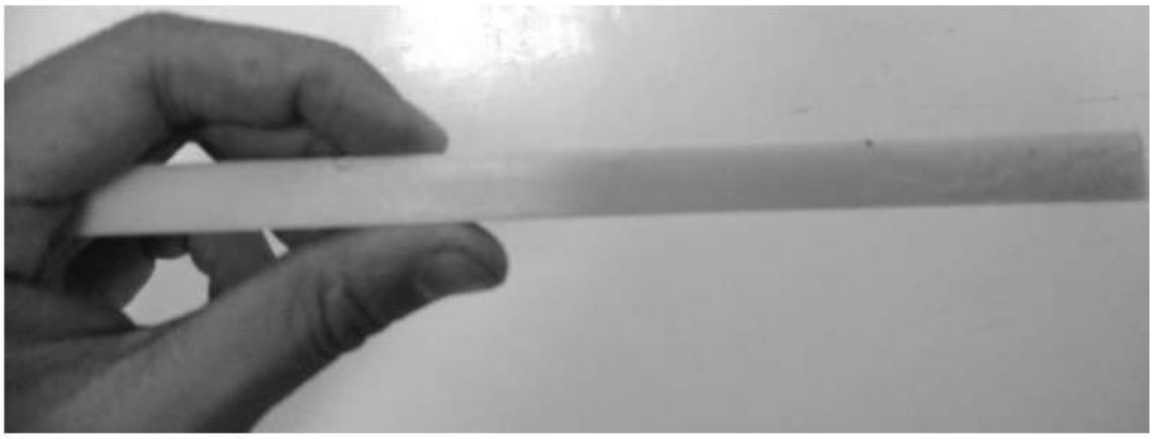


Fig. 20

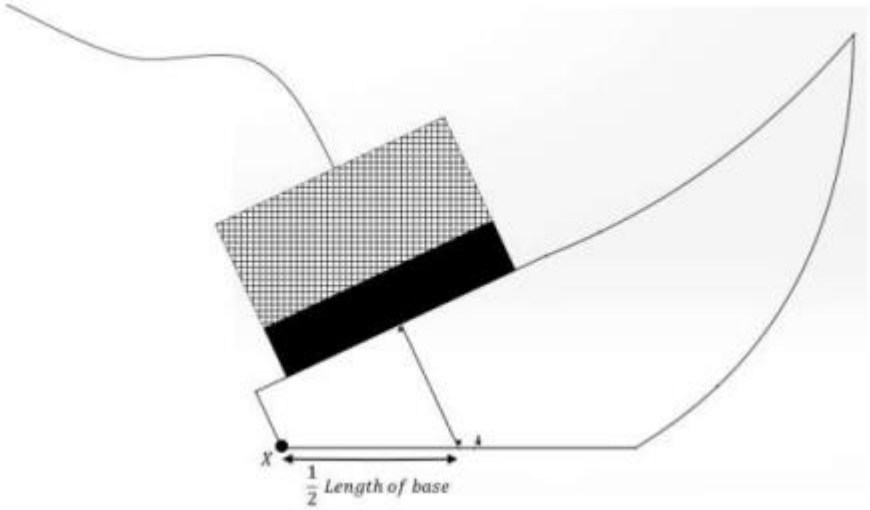



Fig. 21

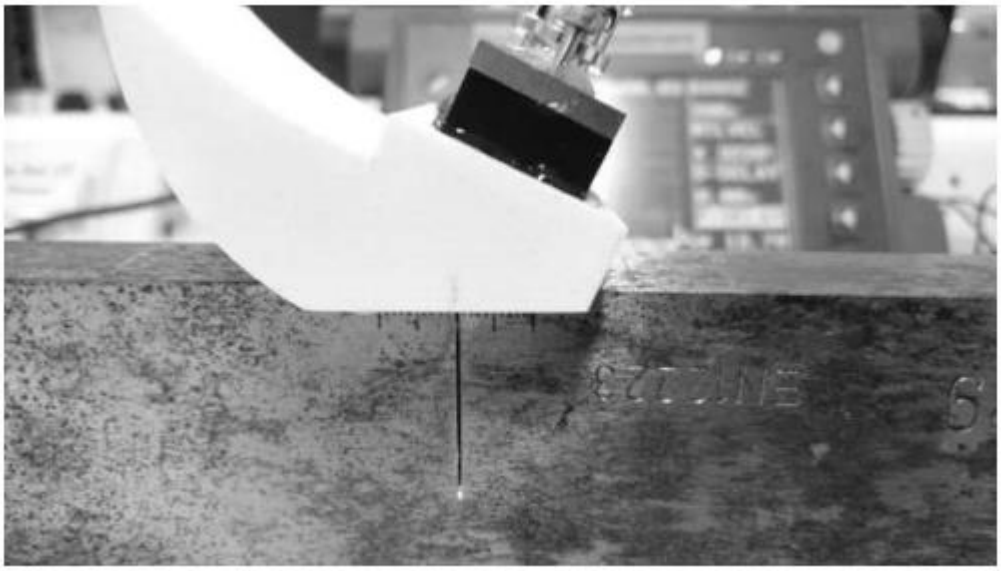


Fig. 22

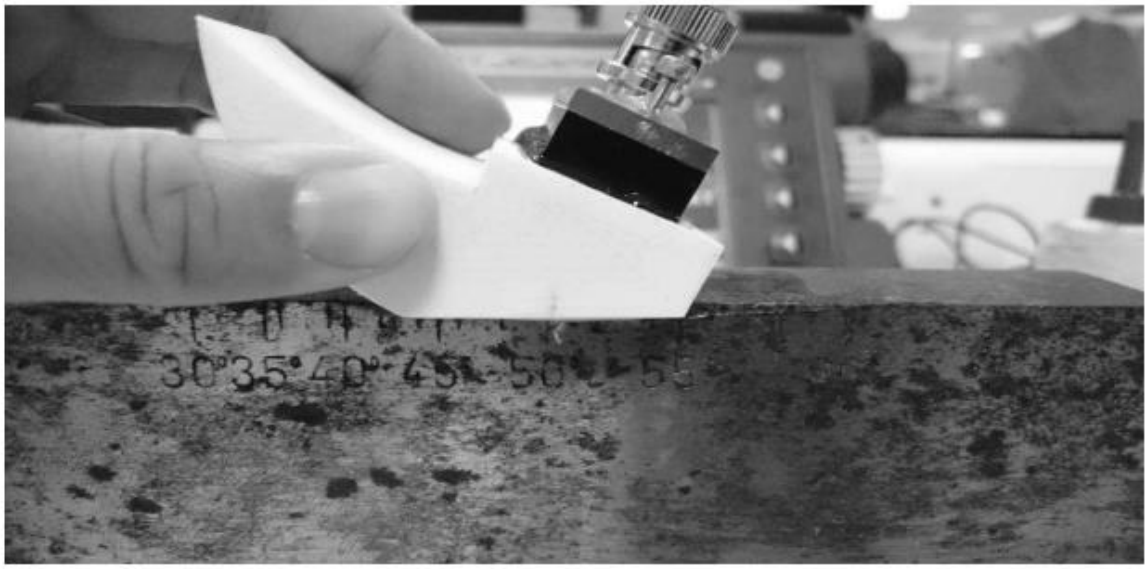
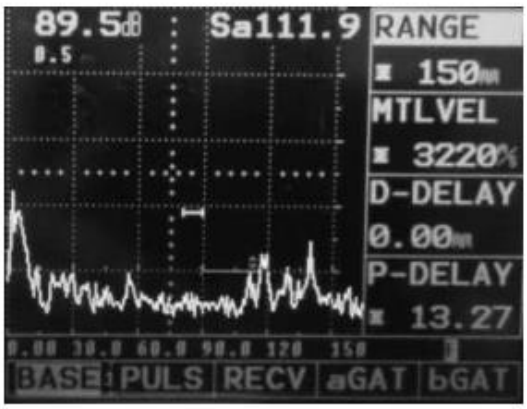



Fig. 23


84.0dB
Sa
0.5
RANGE
200mm
MTLVEL
3220%
D-DELAY
0.00mm
P-DELAY
13.79
0.00 40.0 80.0 120 160 200
BASE PULS RECV aGAT bGAT

Fig. 24


89.5dB
Sa111.9
0.5
RANGE
150mm
MTLVEL
3220%
D-DELAY
0.00mm
P-DELAY
13.27
0.00 30.0 60.0 90.0 120 150
BASE PULS RECV aGAT bGAT


65 0dB
Sa88.27
0.5
RANGE
200mm
MTLVEL
3220%
D-DELAY
0.00mm
P-DELAY
4.000us
0.00 40.0 80.0 120 160 200
BASE PULS RECV aGAT bGAT

Fig. 25

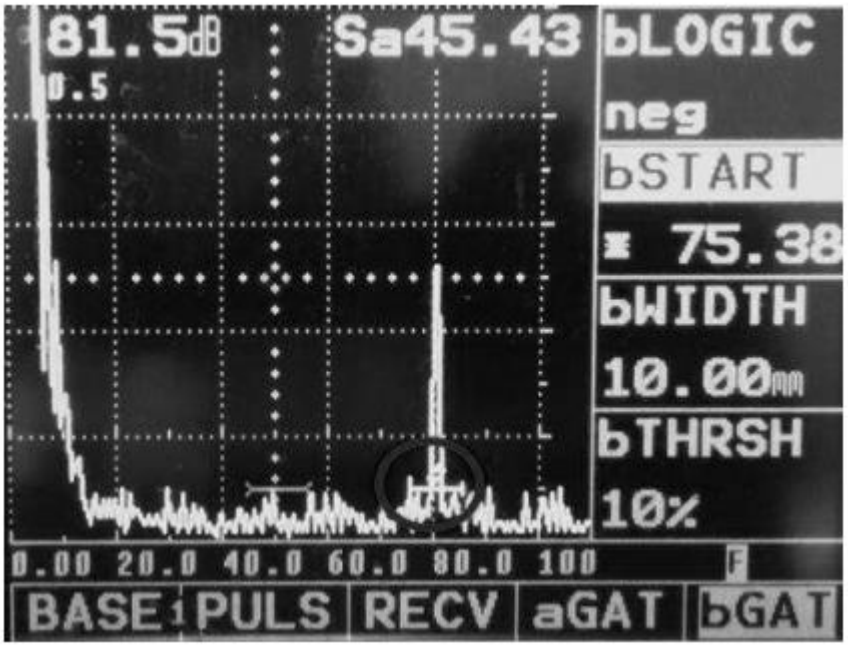

81.5dB
Sa45.43
0.5
bLOGIC
neg
bSTART
75.38
bWIDTH
10.00mm
bTHRSH
10%
0.00 20.0 40.0 60.0 80.0 100
F
BASE
PULS
RECV
aGAT
bGAT

Fig. 26

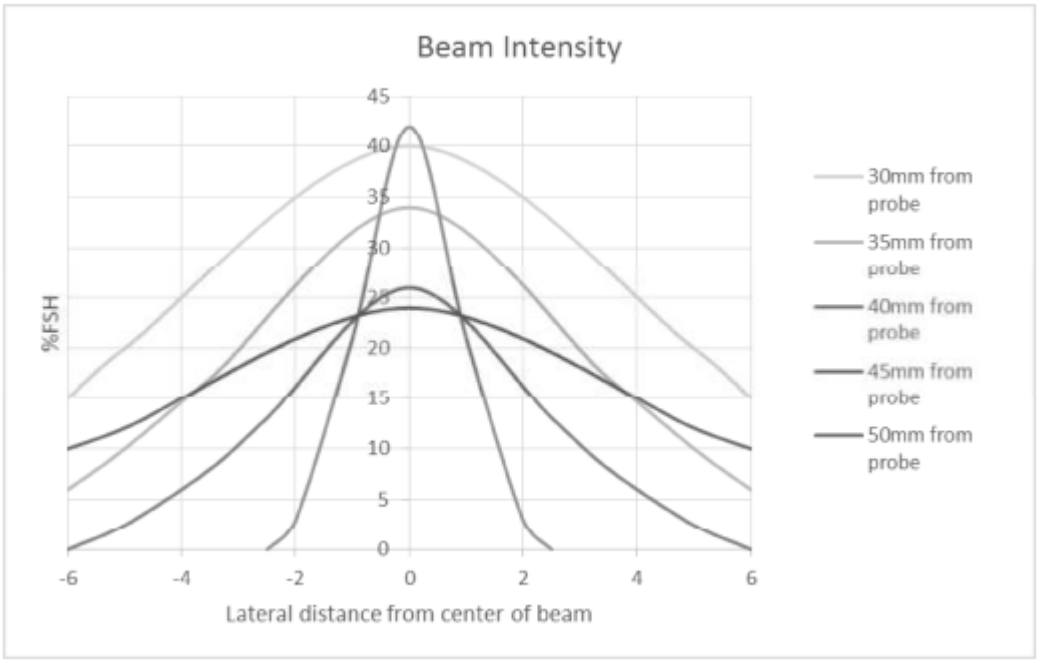

Beam Intensity
%FSH
45
40
35
30
25
20
15
10
5
0
-6
-4
-2
0
2
4
6
Lateral distance from center of beam
30mm from probe
35mm from probe
40mm from probe
45mm from probe
50mm from probe

Fig. 27

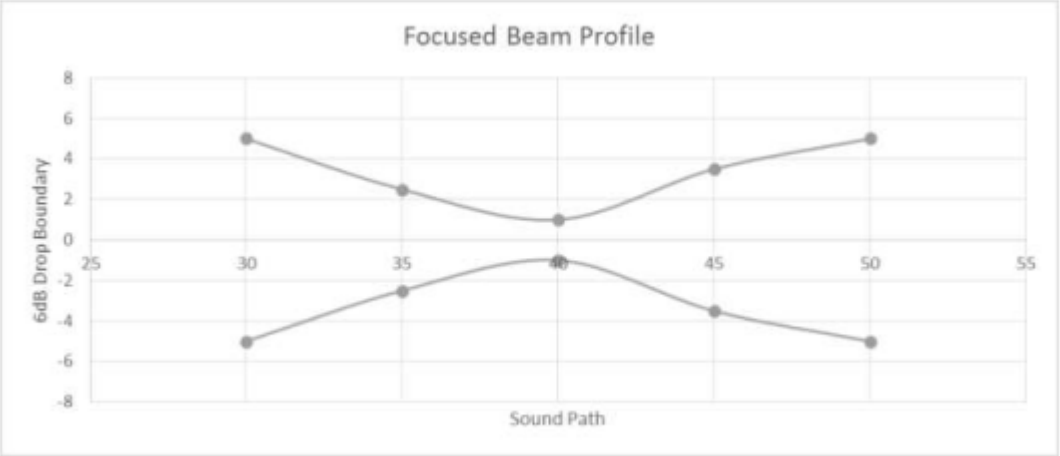

Focused Beam Profile
6dB Drop Boundary
Sound Path
8
6
4
2
0
-2
-4
-6
-8
25
30
35
40
45
50
55

Fig. 28

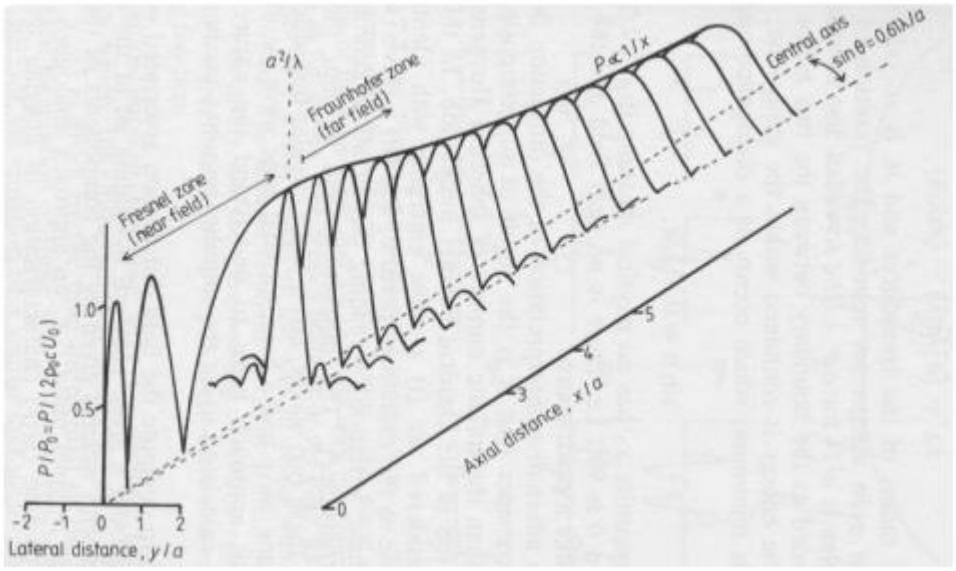

$a^2/\lambda$
Fraunhofer zone
(far field)
Fresnel zone
(near field)
$P \propto 1/x$
Central axis
$\sin\theta = 0.61\lambda/a$
$P/P_0 = P/(2\rho_0 c U_0)$
1.0
0.5
-2
-1
0
1
2
Lateral distance, $y/a$
0
3
4
5
Axial distance, $x/a$

Fig. 29

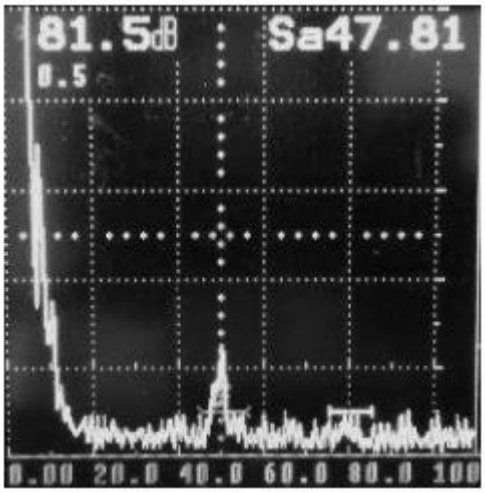
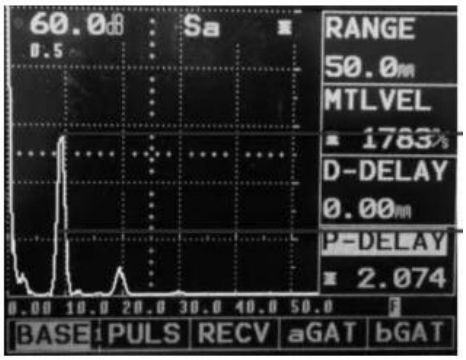

81.5dB
Sa47.81
0.5
0.00 20.0 40.0 60.0 80.0 100

Fig. 30


60.0dB
Sa
0.5
RANGE
50.0mm
MTLVEL
1783%
D-DELAY
0.00mm
P-DELAY
2.074
0.00 10.0 20.0 30.0 40.0 50.0
BASE PULS RECV aGAT bGAT

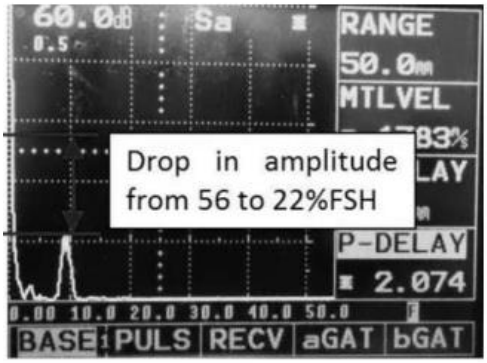

60.0dB
Sa
0.5
RANGE
50.0mm
MTLVEL
Drop in amplitude
from 56 to 22%FSH
P-DELAY
2.074
0.00 10.0 20.0 30.0 40.0 50.0
BASE PULS RECV aGAT bGAT

Fig. 31