Ultrasonic Testing on Duplex Stainless Steel

Calibration Block

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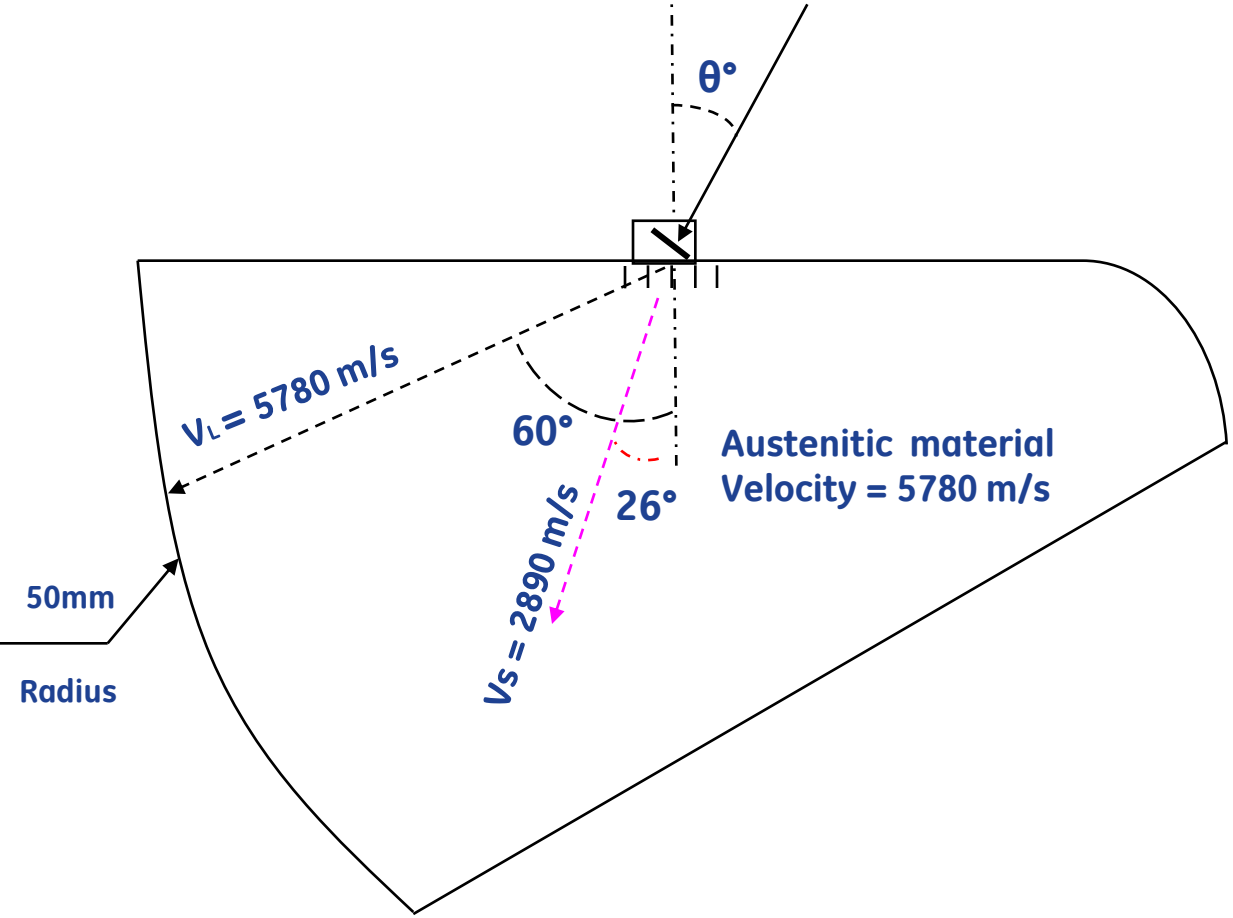
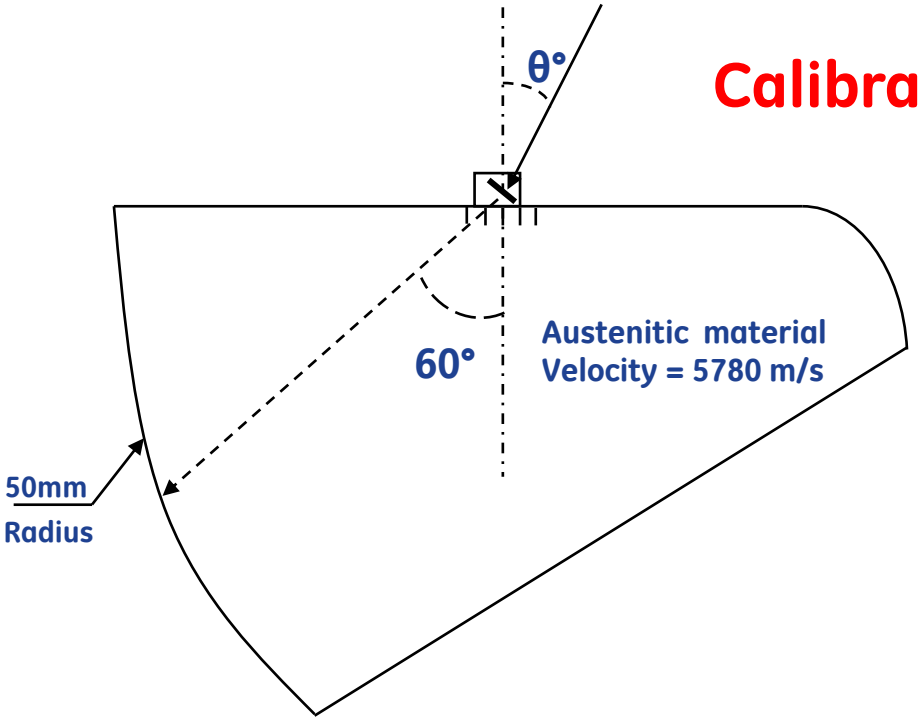
GE imagination at work

vetcogray
a GE Oil & Gas business



Calibration Block for UT Equipment

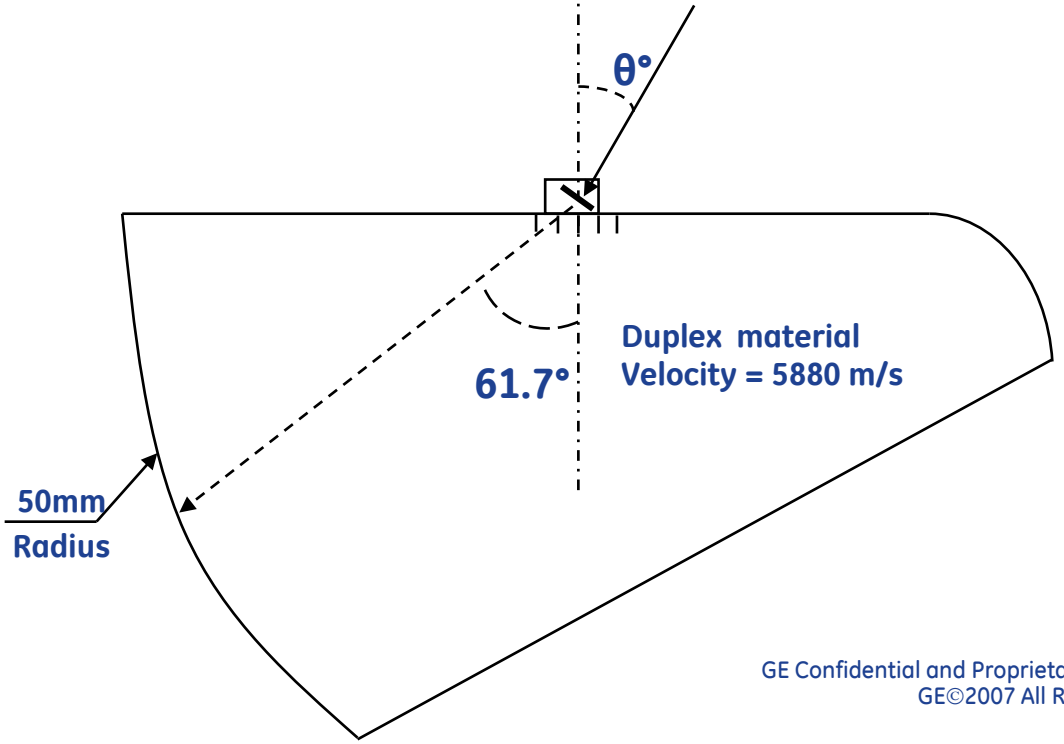
Calibration Block for UT Equipment



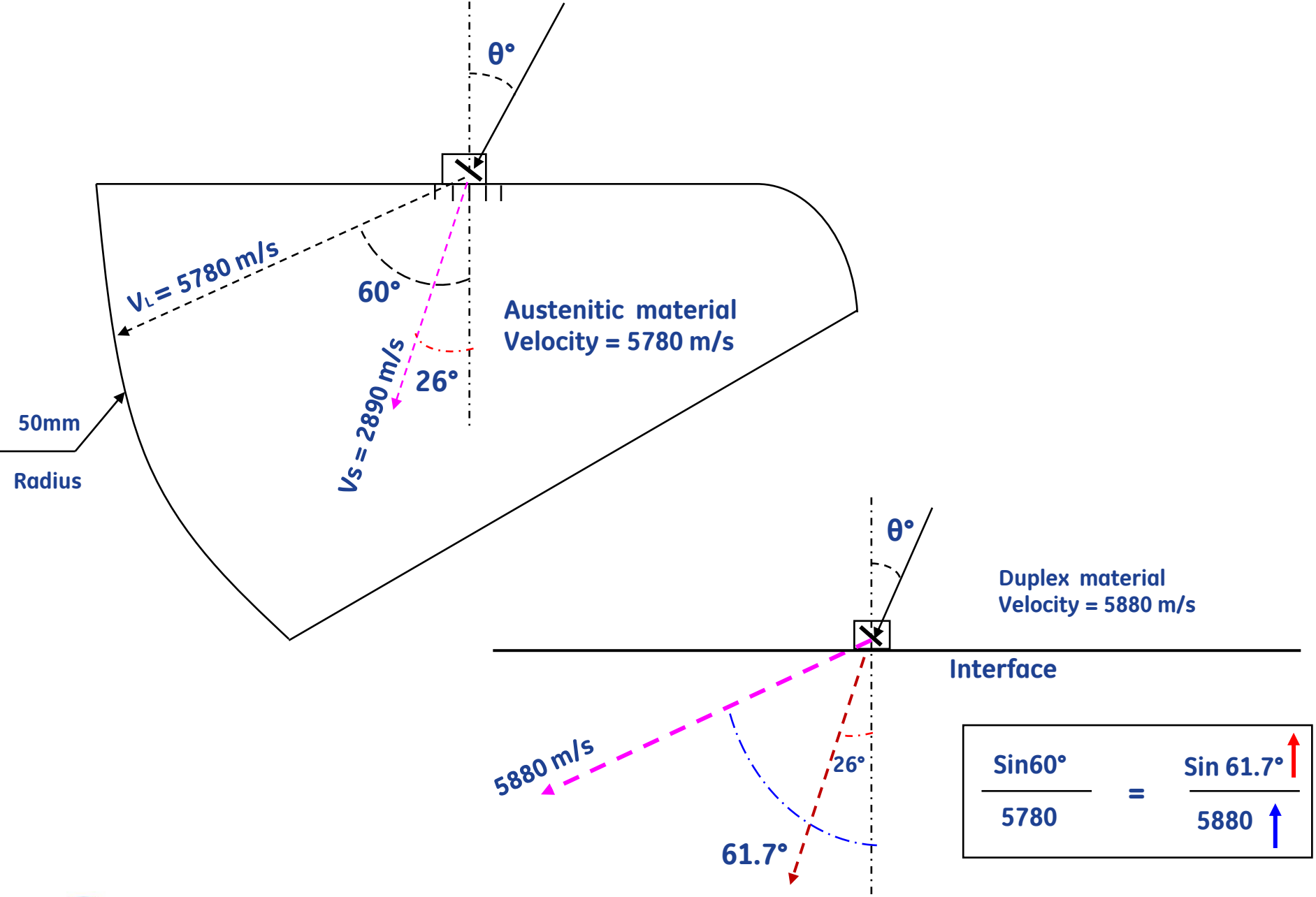
Calibration blocks shall as near as practicable, have the same acoustic properties as the material to be tested

(Reference: DNV-OS-F101, para. 204, page- 201)

$$\frac{\text{Sin}60^\circ}{5780} = \frac{\text{Sin } 61.7^\circ}{5880}$$



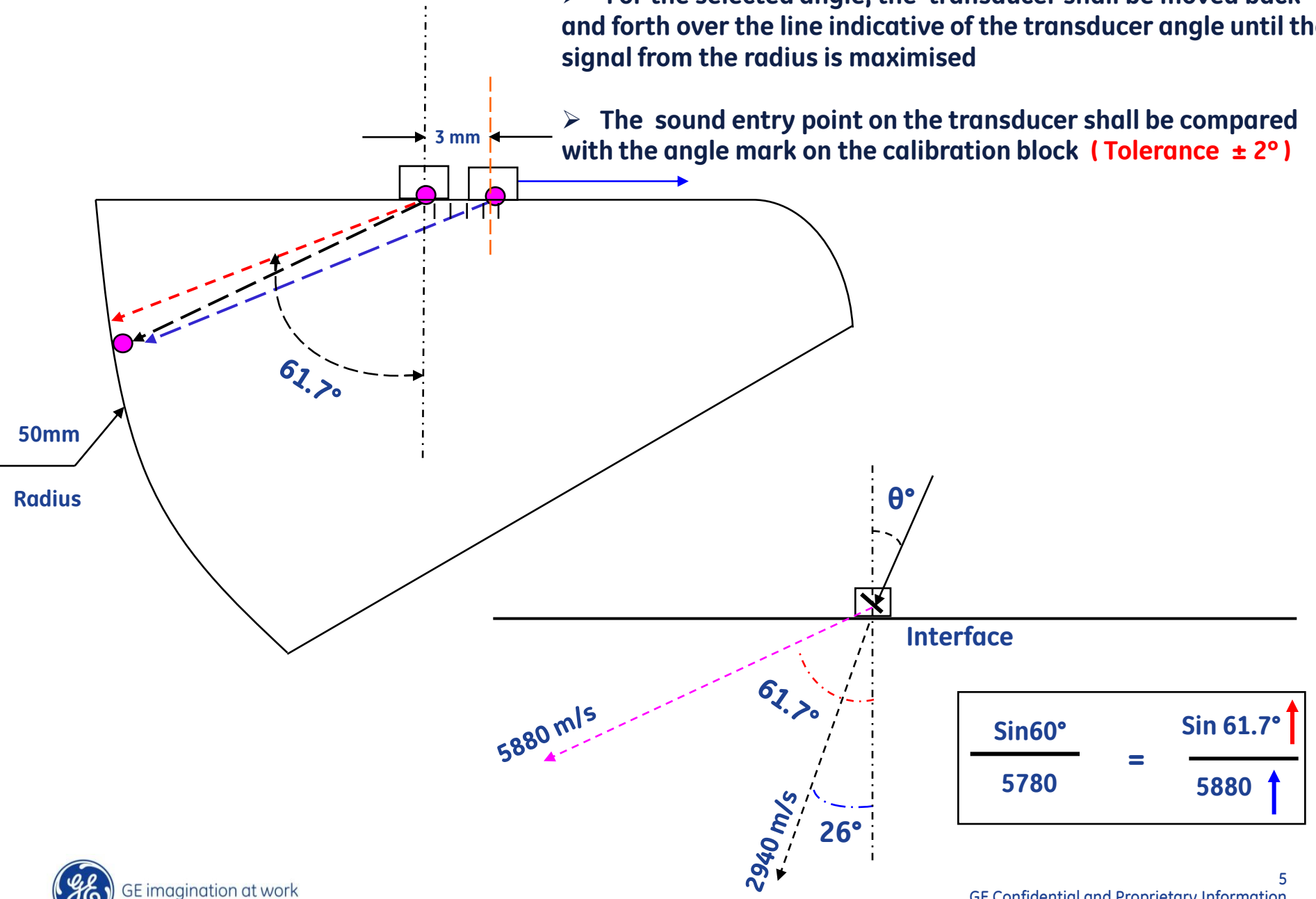
GE imagination at work



GE imagination at work

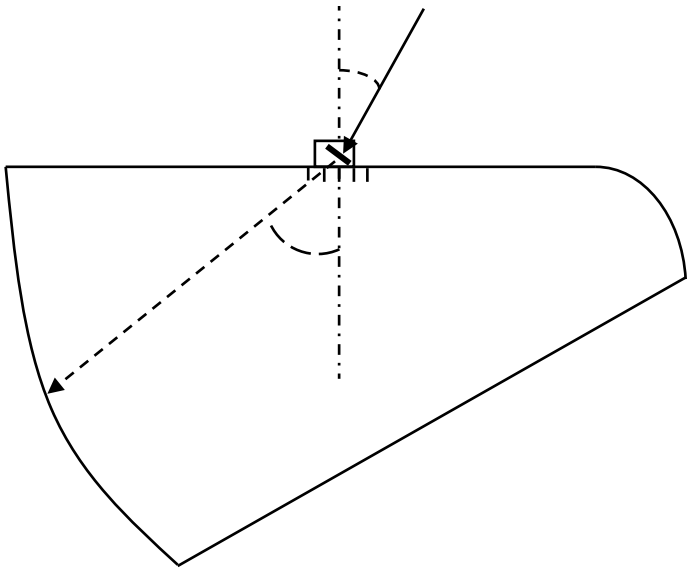
- For the selected angle, the transducer shall be moved back and forth over the line indicative of the transducer angle until the signal from the radius is maximised

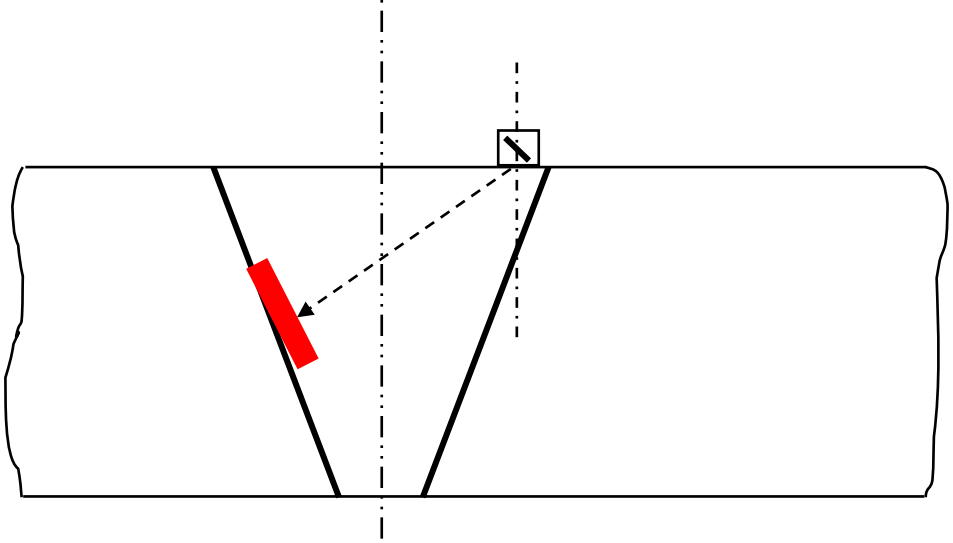
- The sound entry point on the transducer shall be compared with the angle mark on the calibration block (Tolerance ± 2°)

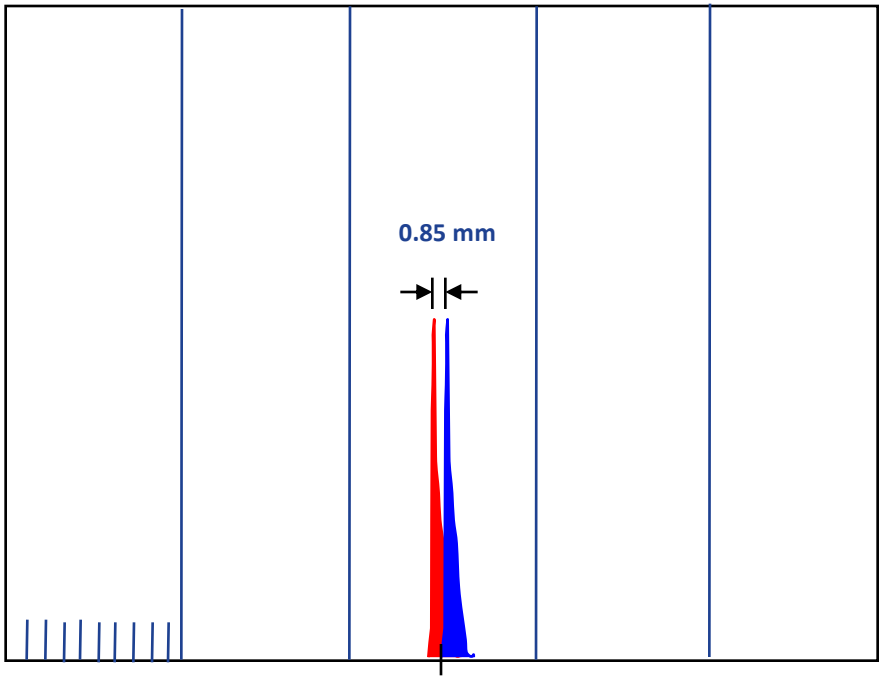


$$\frac{\text{Sin}60°}{5780} = \frac{\text{Sin } 61.7°}{5880}$$

GE imagination at work







Austenitic Stainless Steel

Calculation: Length travelled = 50 mm
Velocity (Austenitic Stainless Steel) = 5780 m/sec
Time Taken to travel 50mm = 8.6505×10^{-6} second

Duplex Stainless Steel

Velocity (Duplex Stainless Steel) = 5880 m/sec
Time Taken to travel 50mm = 8.5034×10^{-6} second

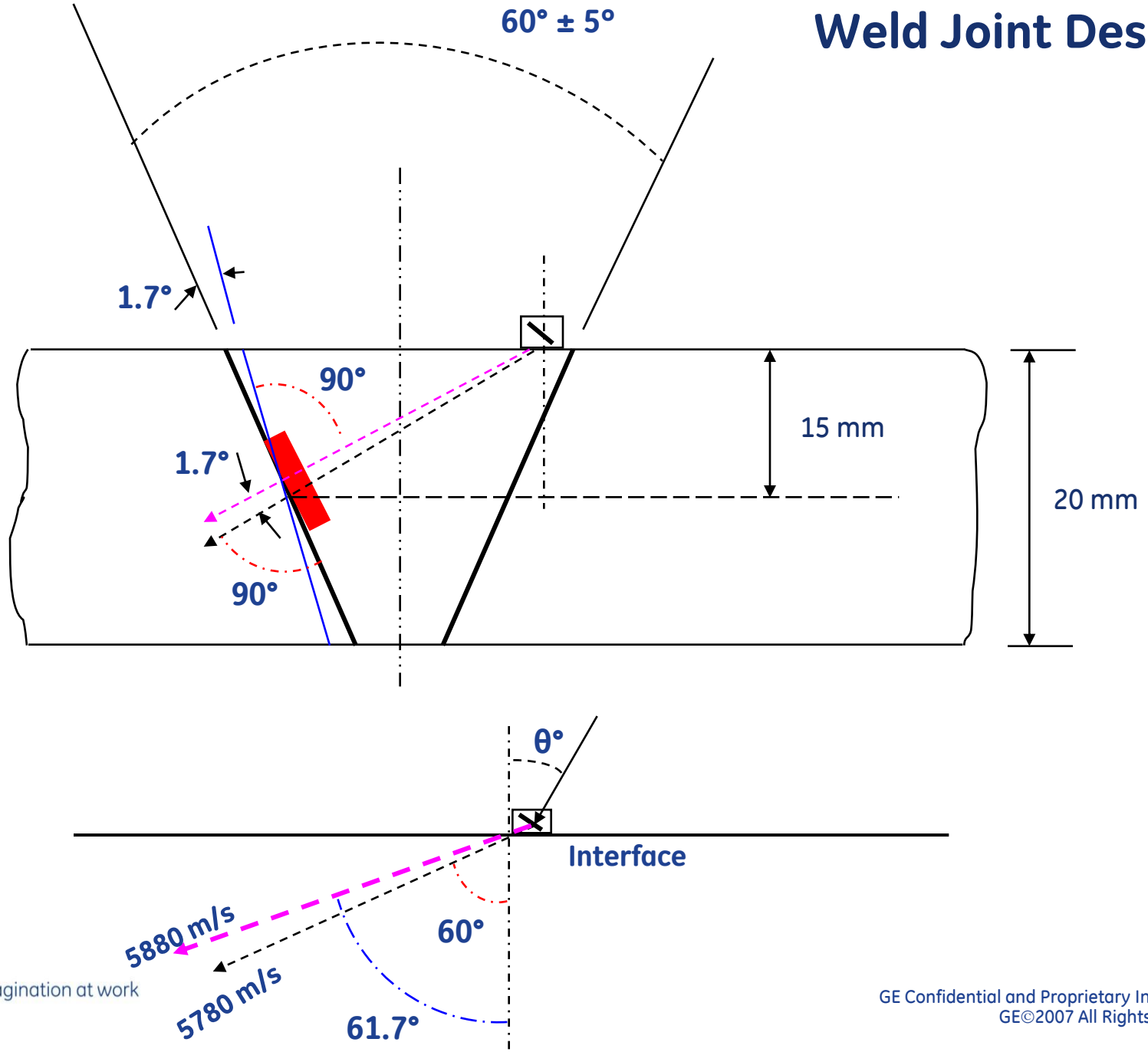
Equivalent length travelled in Duplex Stainless Steel with reference to Austenitic Stainless Steel:

$$= \frac{50}{8.6505 \times 10^{-6}} \times 8.5034 \times 10^{-6}$$

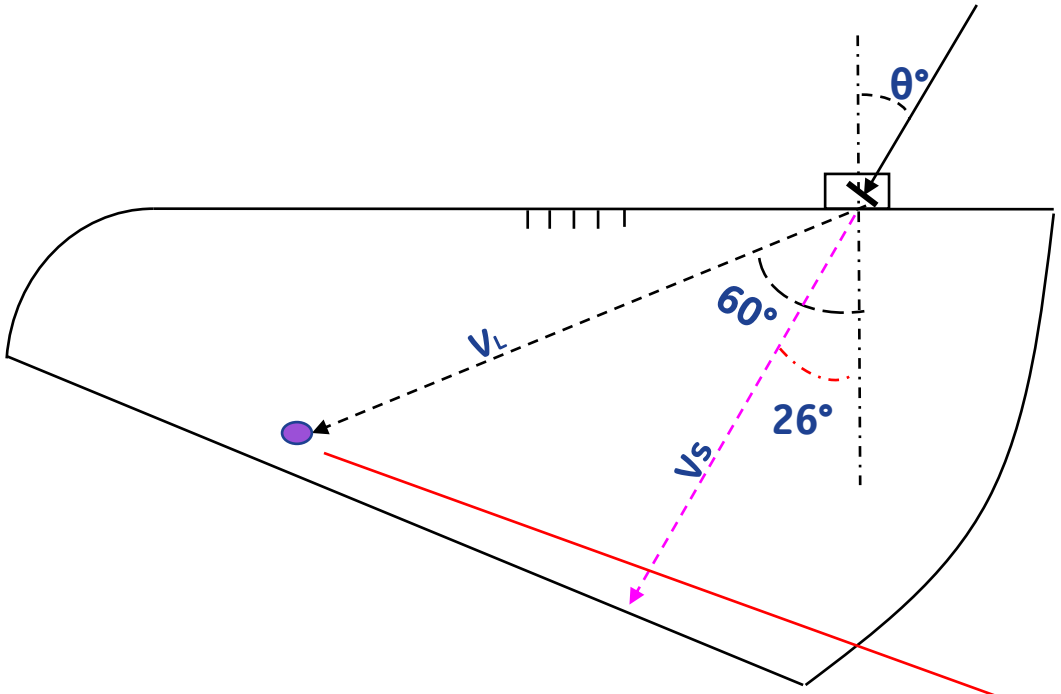
$$= 49.15 \text{ mm}$$

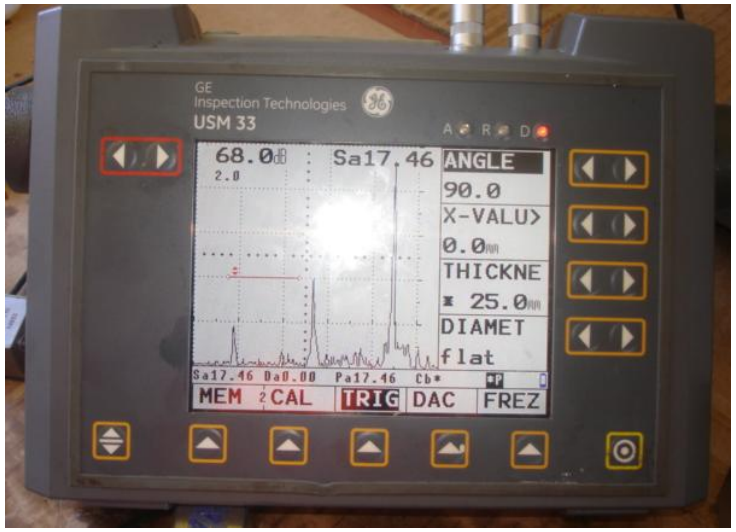
Difference in time base scale = 50.0 – 49.15 = **0.85mm**

Weld Joint Design



Amplitude or Sensitivity Calibration





Summary

✓ The material used for calibration blocks, have the same acoustic properties as the material to be tested. (Reference: DNV-OS-F101, para. 204, page- 201)

- The metal velocity difference is only 100 m/sec

- Austenitic Stainless Steel material Velocity = 5780 m/sec
- Duplex Stainless Steel material velocity = 5880 m/sec

- The difference in the position of indications at time base scale is only 0.85mm , which can be ignored

✓ For Amplitude or Sensitivity Calibration, reference reflector (SDH) in the reference block has been used.

Thanks