Maritime University of Szczecin

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Laboratory Manual

Determination of the ultrasound velocity

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Equipment:

1. The ultrasonic flaw detector DI-4 with the ZD-08 stabilizer.
2. Measuring head.
3. Measuring table.
4. Samples: standard and tested.
5. Caliper.

Exercise:

1. Check if the range of the flaw detector is set to 2,5 · 10 cm, gain is set to 50 dB and the measuring head is connected to the "T" socket.
2. Turn on the ZD-08 stabilizer first, then the flaw detector DI-4. Place the steel standard sample (with a thickness H_s = 50 mm and number 10) on the measuring table. Hold the measuring head against it and press it **lightly**.
3. Set the "DELAY" and velocity (m/s) potentiometers in such a way that the position of the zero echo coincides with the millimeter scale on the screen and n_s = 5 subsequent peaks took the positions 20, 40, 60, 80 and 100 mm. In the following part of the exercise **do not change** the position of these potentiometers.
4. Place the measuring head on the tested sample marked with number 1.
5. Record the number of observed echoes in the table (omitting the small peaks noise alongside the main peaks) and the x position of the last echo on horizontal flaw detector's scale. Use the caliper to measure the thickness H of the tested sample.
6. Calculate velocities of ultrasound in tested materials:

$$V = \frac{nH}{x}\,\frac{x_s}{n_s H_s}\,V_s$$

   where:

   V_s – velocity of sound wave propagation in steel (V_s = 5920 m/s).

7. Repeat steps 4 – 6 for the remaining samples, selecting in each case optimal gain.

Table:

Sample number	Material	h [mm]	n	x [mm]	V [m/s]
10	steel	50	5	100	5920
1					
2					
3					
4					
5					
6					
7					
8					
9					