

Chapter 4

Results and Discussion

4.1. Destructive test results (DT)

4.1.1. Compressive strength:

- i. **Objective:** Determine Compressive strength of materials.
- ii. **Material and machine:** Compressive machine, concrete cube
- iii. **Method Description:** the samples have been prepared , any concrete cube has been waited before the test ,and they have been Putted in center under the cylinder machine and be Sure that the load is applied on both sides of the cube ,Adjust the speed limiter starting percentage at rate cube machine pressure increased stresses , then the compressive strength has been read when the sample broke (collapse) and the results have been shown blew.
- iv. **The results:**

Table (4.1): show the results of compressive strength for samples

Sample	Force KN
1	180
2	180
3	180
4	180
5	180

- v. **Calculations:**

Area A=70 *70 mm²

Force (F) =180 KN

Determine Compressive strength

$$\text{Compressive strength} = \frac{F}{A} = \frac{180}{70*70} = 0.0367 \text{ KN/mm}^2 = 5323 \text{ Psi}$$

4.2. Nondestructive tests results (NDT)

4.2.1. Easy scanning results:

- i. **Objective:** Get the picture of atomic resolution and determine the distances between particles
- ii. **Material and machine:** The platinum tip, spring and platform, computer model, cement cubs.
- iii. **Method description:** The samples have been cut and prepared by using special cutter, then these prepared samples have been putted on platinum tip on spring plat form, this platinum tip generate waves which enter in the sample and gives data about sample, this data has been interpreted by using a computer model communicated with platinum tip and the interpretations has been shown blew in the results.
- iv. **Results:**

Sample No. (1)

It is pure from additive (0%)

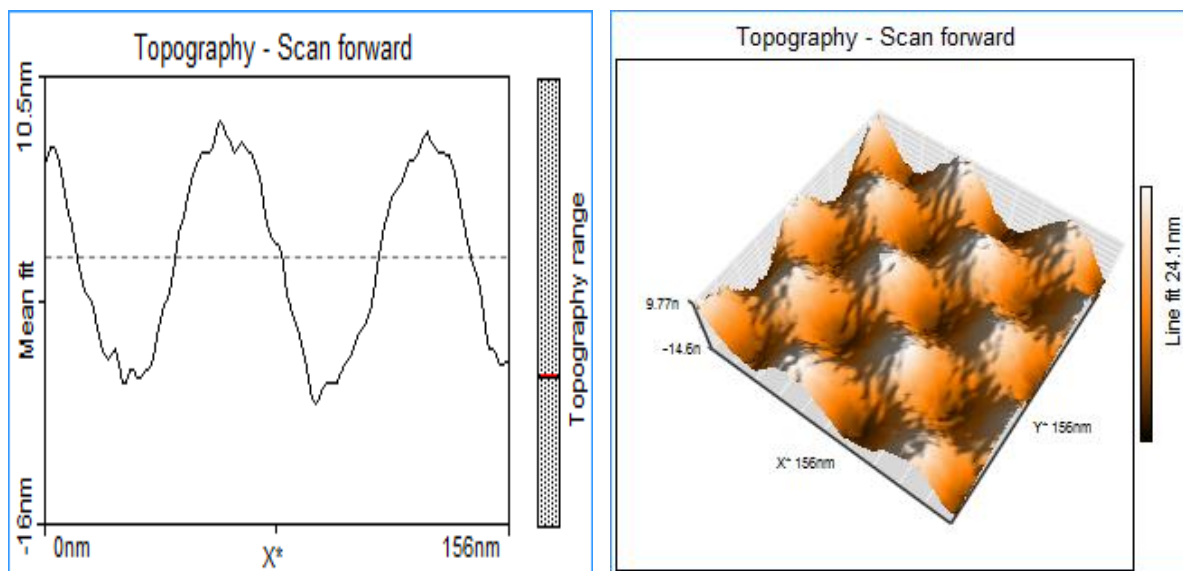
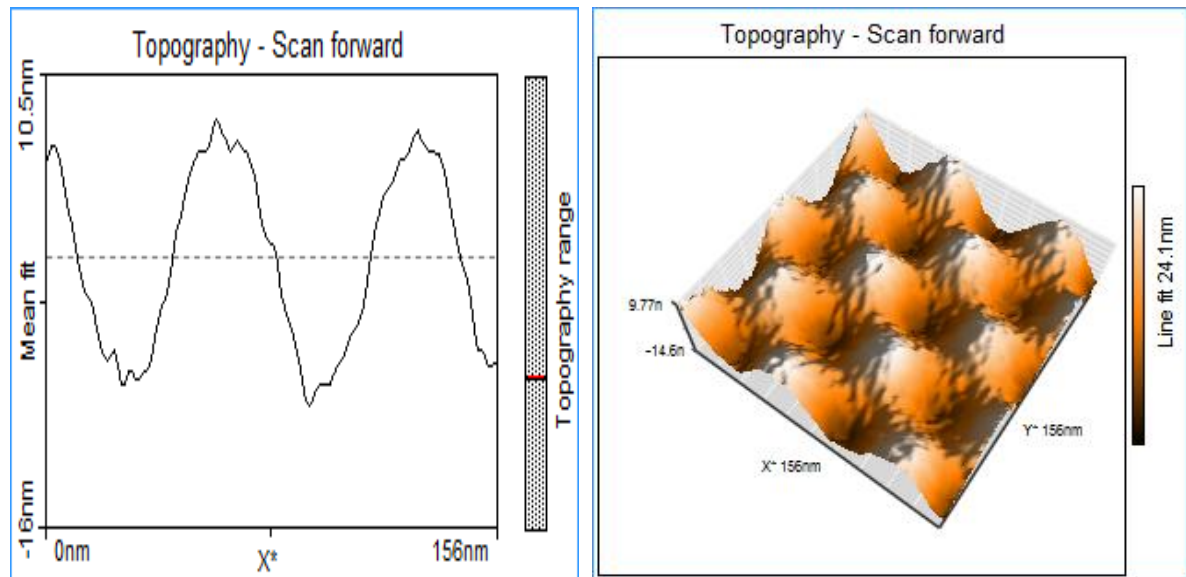


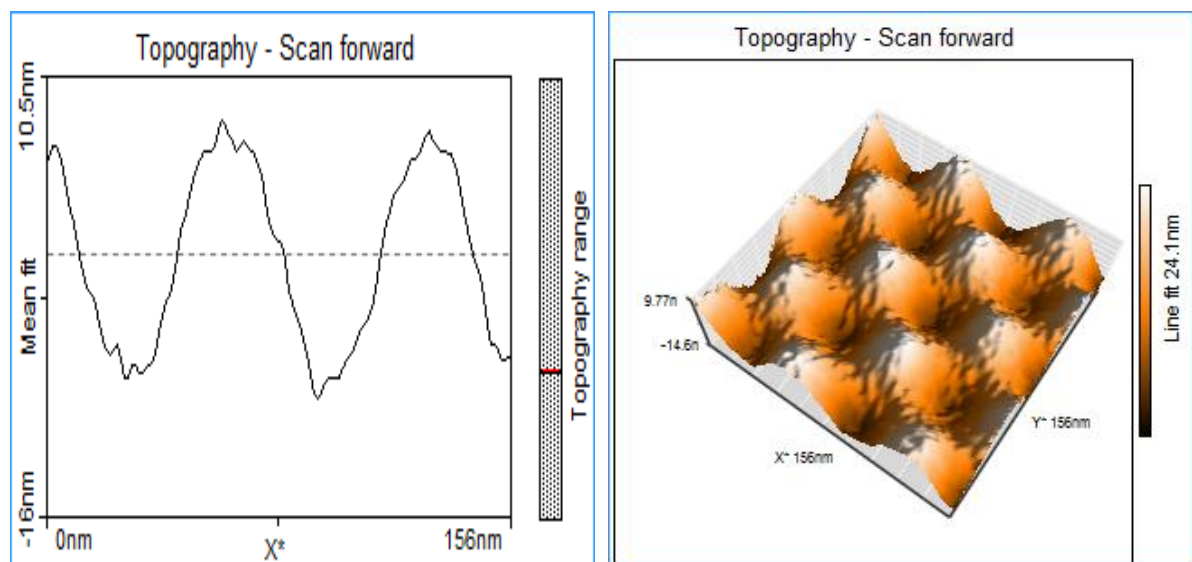
Figure (4.1): show scan in 3D for sample NO. (1)

Sample No. (2):

Contain 0.11% from additive

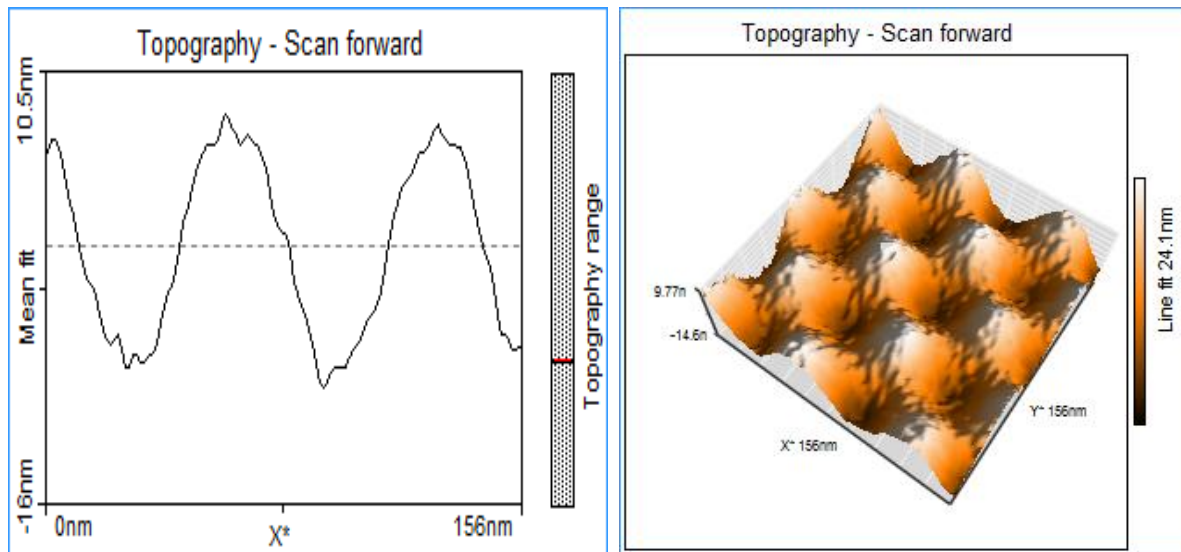
**Figure (4.2):** show scan in 3D for sample NO. (2)**Sample No. (3):**

Contain 0.22% from additive

**Figure (4.3):** show scan in 3D for sample NO. (3)

Sample No. (4):

Contain 0.33% from additive

**Figure (4.4):** show scan in 3D for sample NO. (4)**Sample No. (5):**

Contain 0.33% from additive

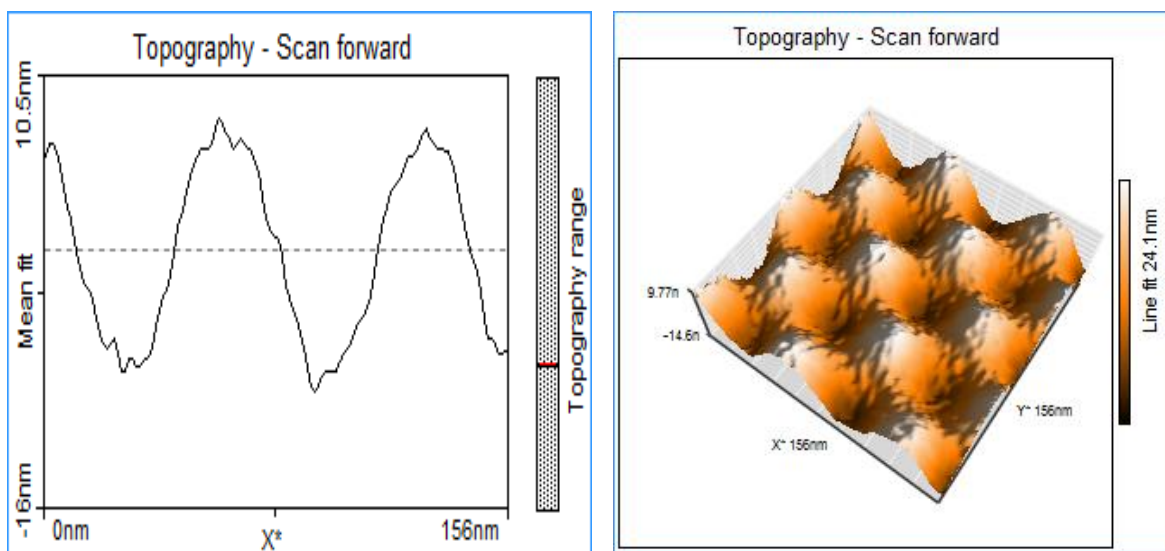
**Figure (4.5):** show scan in 3D for sample NO. (5)

Table (4.2): show the results of easy caning

Sample No.	Distance between particles, (μm)
1	32.12
2	32.12
3	32.12
4	32.12
5	32.12

4.2.2. Ultrasonic results:

- i. Objective:** Ultrasonic devices are used to detect objects and measure distances.
- ii. Material and machine:** Electrical source, Ultrasonic devices, cements concrete, wax.
- iii. Method description:** The samples have been prepared and the ultrasonic device has been steted up, the device send electromagnetic waves into the samples and the interpretation of the waves shown as figure in the device screen. The top of the samples have been waxed and by using the device index all samples have been tested and the result has been shown blew.

iv. Results:

Sample NO. (1)

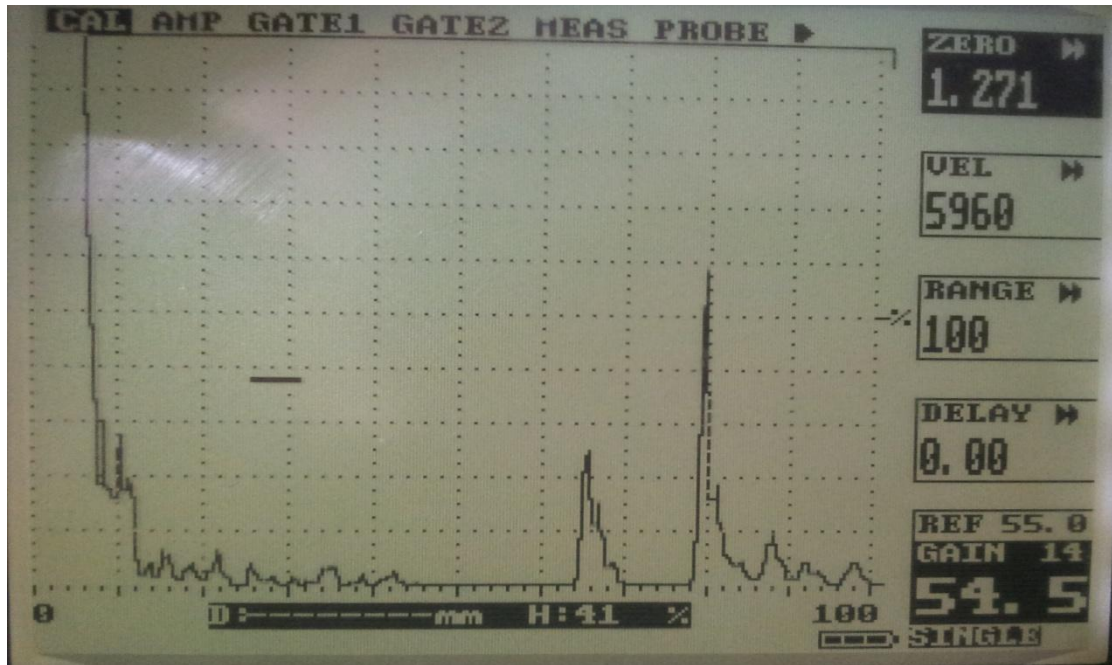


Figure (4.6) show the ultra sonic result for sample NO. (1)

Sample NO. (2)

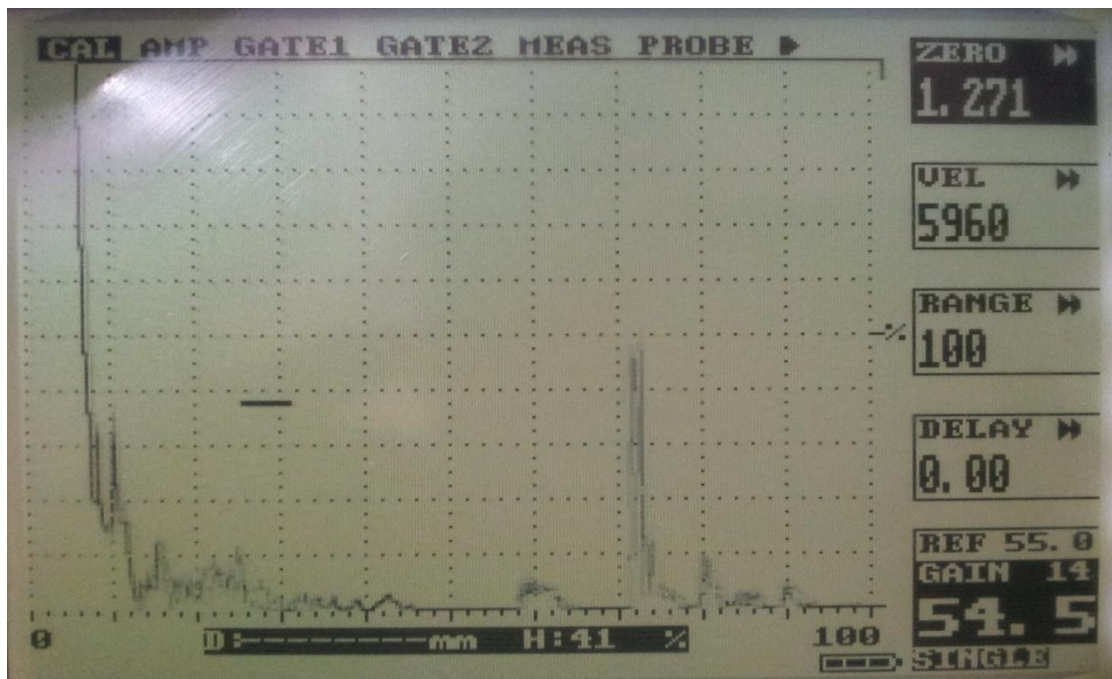


Figure (4.7): show ultra sonic result for sample (2)

Sample (3)

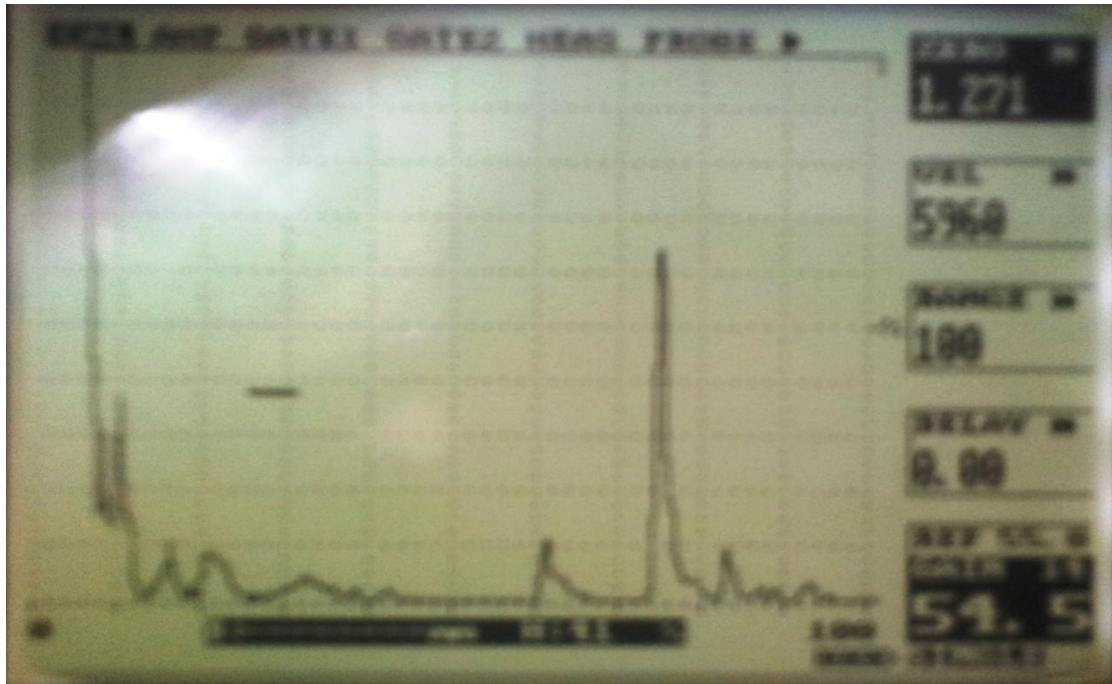


Figure (4.8): show ultra sonic result for sample (3)

Sample NO. (4)

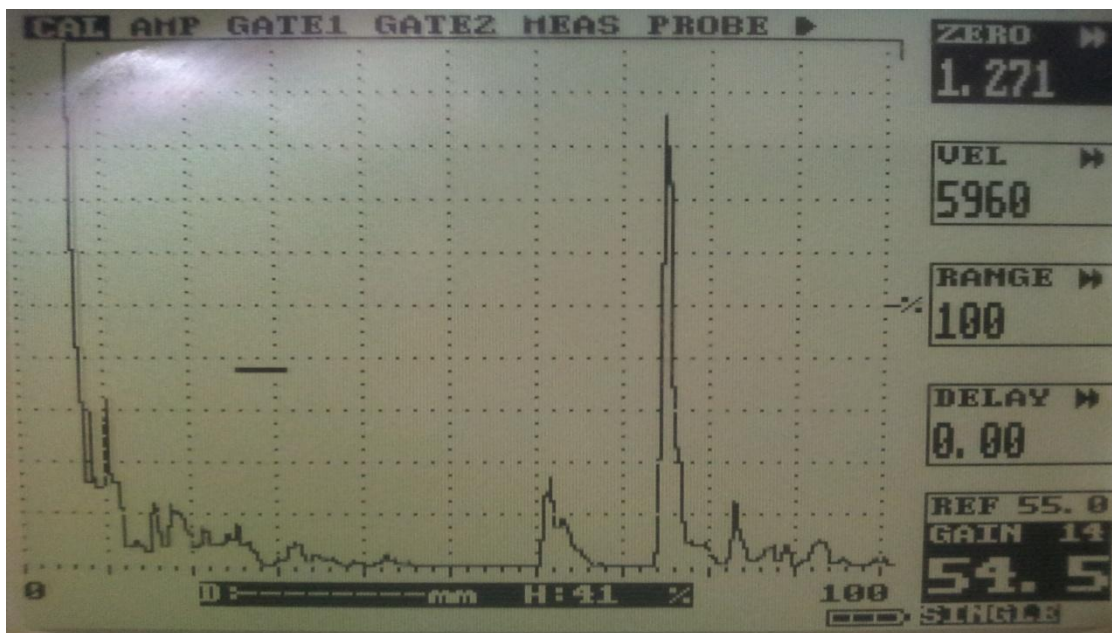


Figure (4.9): show ultra sonic result of sample NO. (4)

Sample (5)

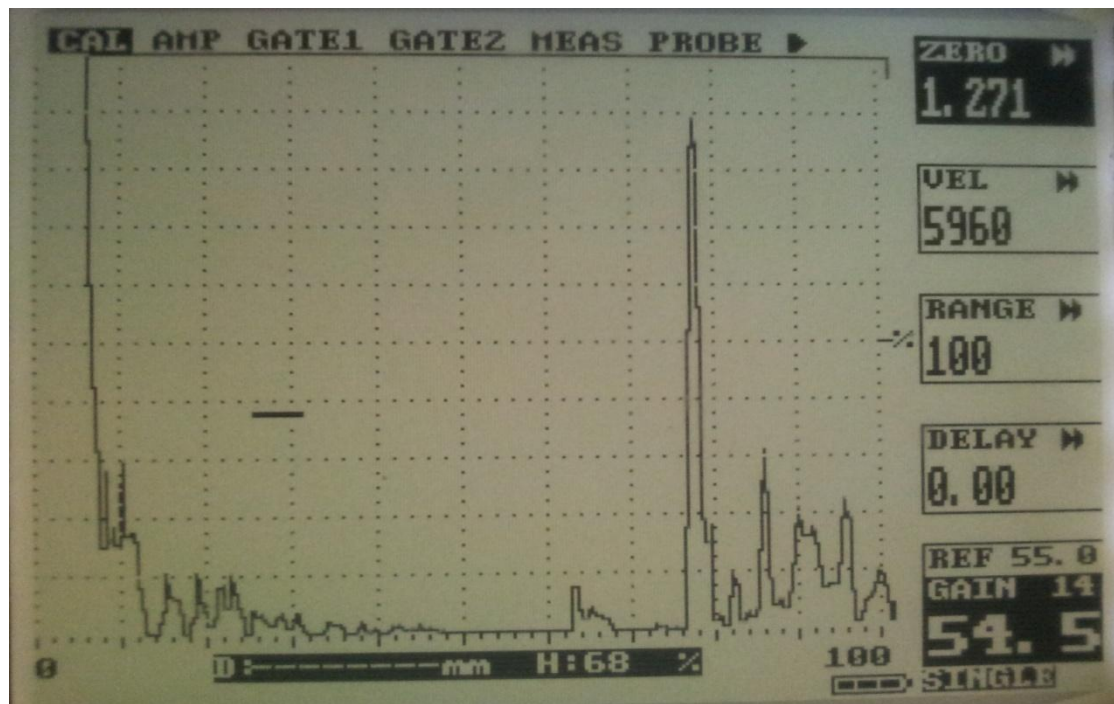


Figure (4.10): show ultra sonic result of sample NO. (5)

Table (4.3): show the results of ultra sonic

Sample NO.	Micro-crack Depth, (mm)	Micro-crack Length, (mm)
1	25	20
2	7	25
3	11	28
4	18	26
5	9	23

4.2.3. Inspection radiographic results:

- i. **Objective:** Inspection any defect in concrete.
- ii. **Material and machine:** Gamma ray device, electrical source, cements concrete.
- iii. **method description:** the samples have been prepared and by using the gamma ray device which generate ray, the gamma ray entered into the samples and gives radiographic images , and the results have been shown blew.
- iv. **results:**

Table (4.4): show the results of inspection radiographic

Sample No	Film position	Result	Number of cracks
1	0 —24	There is micro cracks	3
2	0 —24	There is micro cracks	5
3	0 —24	There is micro cracks	5
4	0 —24	There is micro cracks	4
5	0 —24	There is micro cracks	3

4.3 Analysis and discussion

i. Compressive strength test:

The compressive strength for all samples stay constant and = **5323 psi** and this result is the same standard result of compressive strength according to API the mesquite wood powder don't increase or decrease the standard compressive strength of the sample so there is no any effect for mesquite wood powder to compressive strength.

ii. Easy scan test:

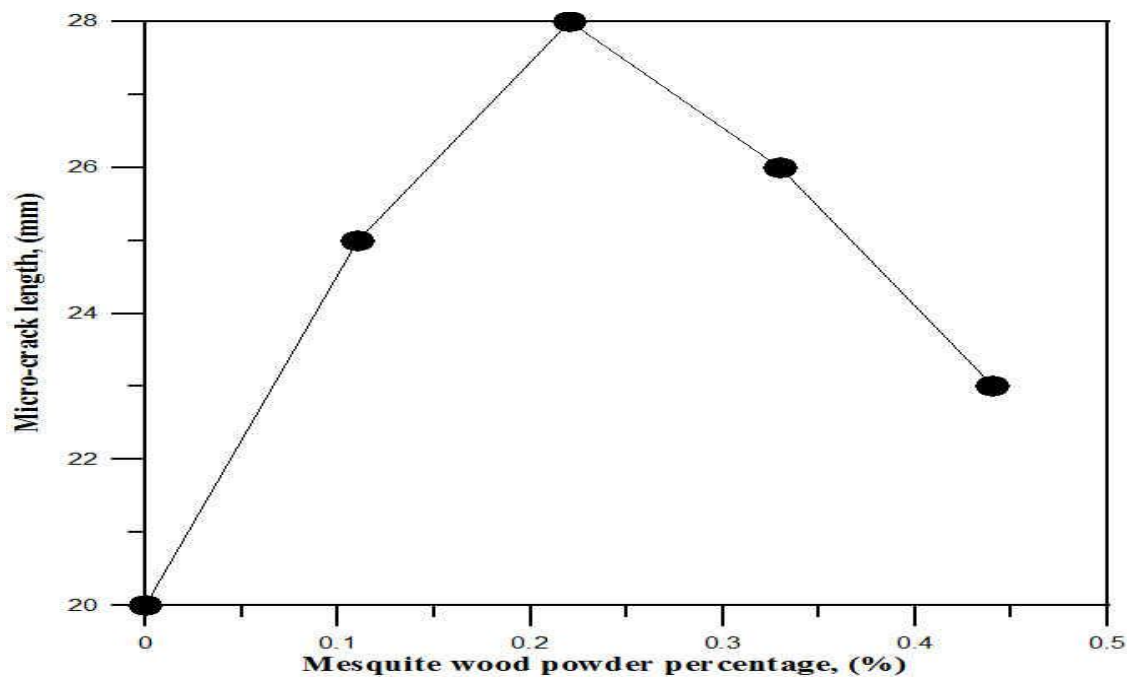
The distance between particles stay constant for all samples and = **32.12micro meter**, if the distance between particles decrease the concrete hardness is increase and cement micro-cracks begin very tiny or don't form but because of the constant amount of distance between particles for all samples so hardness of them is constant and mesquite wood powder don't effect.

iii. Ultrasonic test:

The ultra sonic test show that there is micro-cracks in all samples, these micro-cracks at different depth and length as shown in figure (4.11) below, and the length of micro-crack began to increase from sample no. (1) To sample no. (3) And then decreased until sample no. (5) So these different percentages of mesquite wood powder decreased the length after sample No. (3) Although there is increasing in length from sample No. (1) To No. (3).

Table (4.5): percentage of mesquite wood powder and micro crack length

Mesquite wood powder percentage, (%)	Micro crack length (mm)
0	20
0.11	25
0.22	28
0.33	26
0.44	23

**Figure (4.11): ultra-sonic results**

iv. Inspection radiographic:

The inspection radiographic test also shows that there is a lot of micro-cracks in all samples, the number of micro cracks increased from sample No. (1) To sample No. (3) And began to decrease after sample No. (3) To sample No. (5) As shown in figure (4.12) so the misquote wood powder decreased the number of cement micro-cracks after sample No. (3) Although there is increasing in number of micro-cracks from sample No. (1) To No. (3).

Table (4.6): percentage of mesquite wood powder and number of micro-cracks

Mesquite wood powder percentage, (%)	Number of micro-cracks
0	3
0.11	5
0.22	5
0.33	4
0.44	3

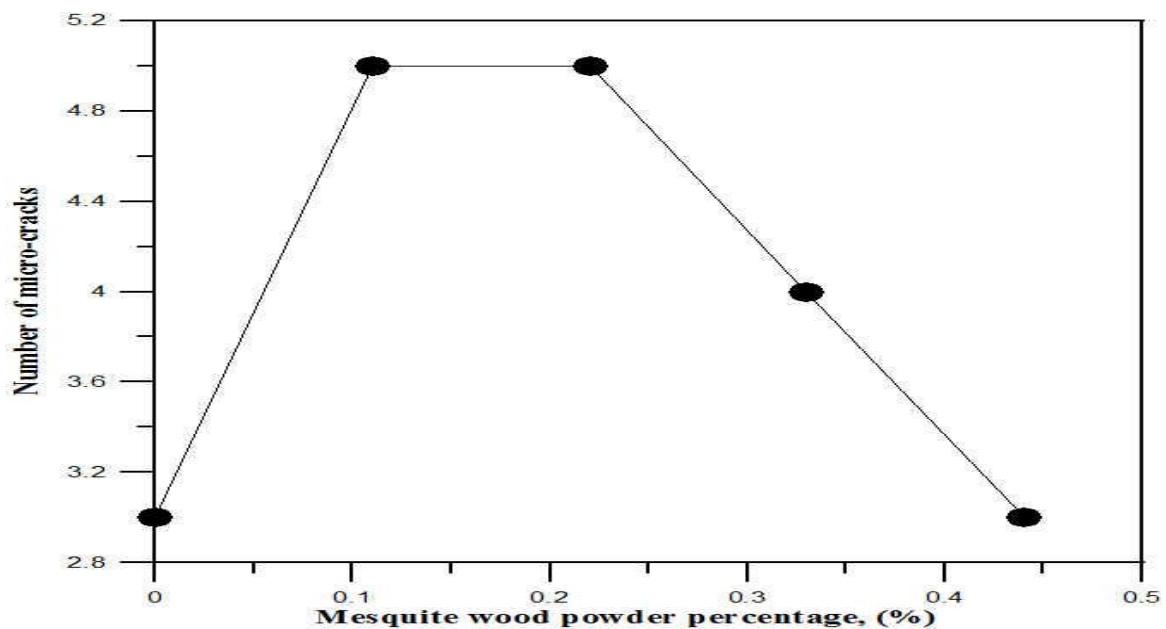


Figure (4.12): inspection radiographic results