Tensile Test

IE220 Homework Report

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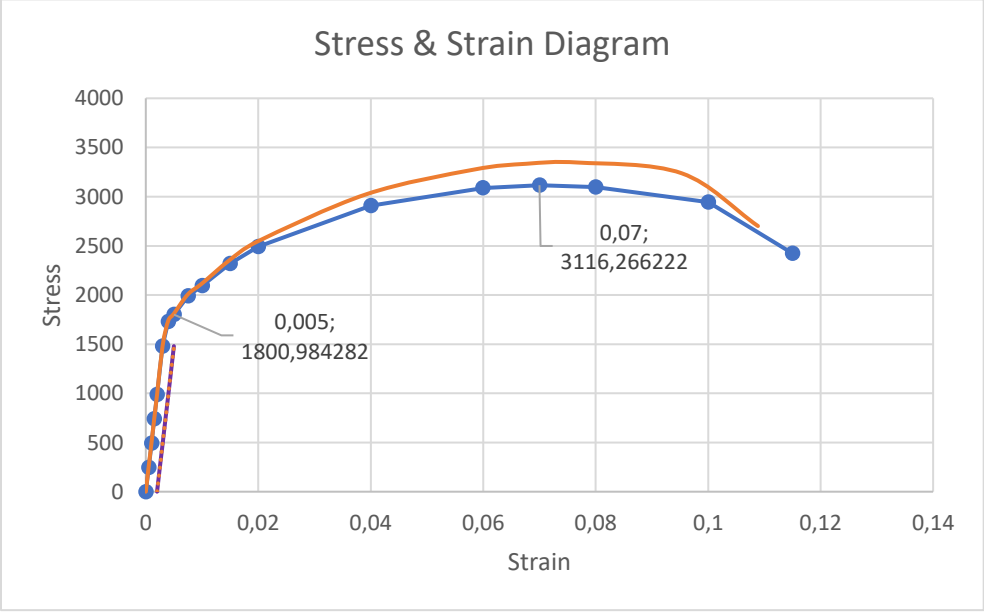
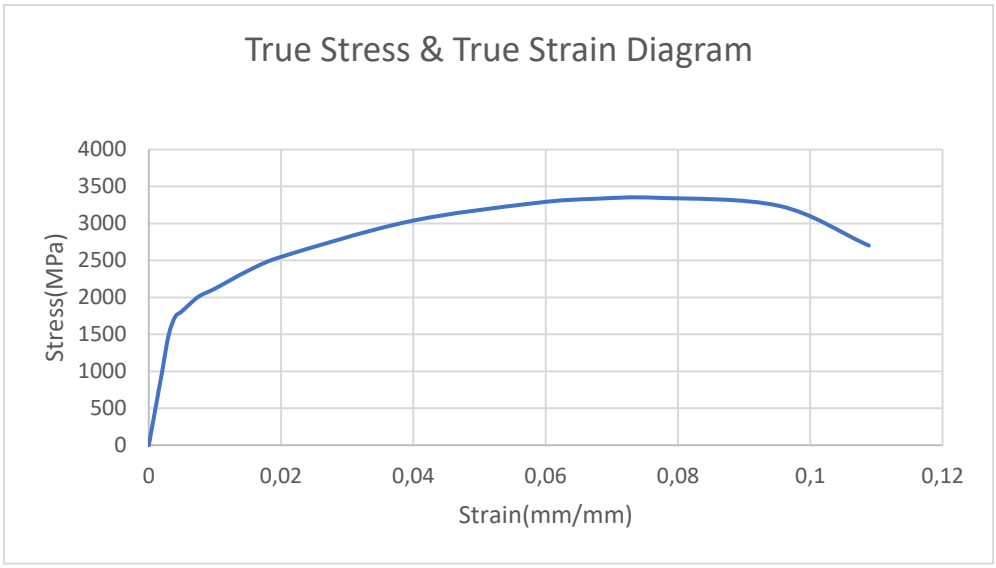
Summary

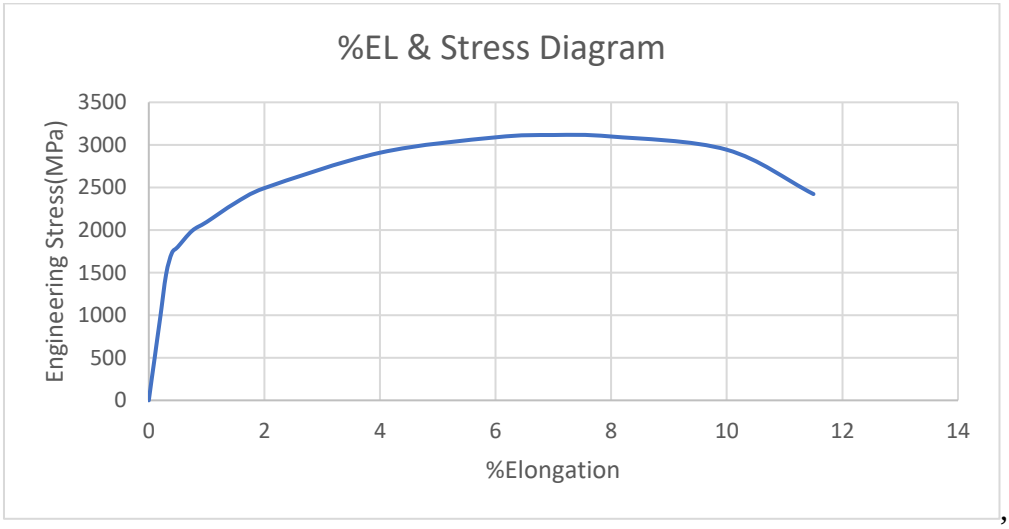
A tensile test is a scientific test process involving the application of tension to a specimen until it fractures. It is an important type of test for determining a material's tensile strength, yield strength and ductility It measures the force required to break a composite or plastic specimen and the extent to which the specimen stretches or elongates to that breaking point. . These standardized tests are often performed on electromechanical tensile tester machines Tensile testing of composites is generally in the form of basic tension or flat-sandwich tension testing in accordance with standards such as **ISO 527-4, ISO 527-5, ASTM D 638, ASTM D 3039, and ASTM C 297**. Such tests produce stress-strain diagrams used to determine tensile modulus.

Aim of the Study

We are using the datas to measure the material's properties and to learn how to use xthose datas of the tensile test for plotting its strain stress diagram.




True Stress & True Strain Diagram
Stress(MPa)
4000
3500
3000
2500
2000
1500
1000
500
0
0
0,02
0,04
0,06
0,08
0,1
0,12
Strain(mm/mm)


%EL & Stress Diagram
Engineering Stress(MPa)
3500
3000
2500
2000
1500
1000
500
0
0
2
4
6
8
10
12
14
%Elongation

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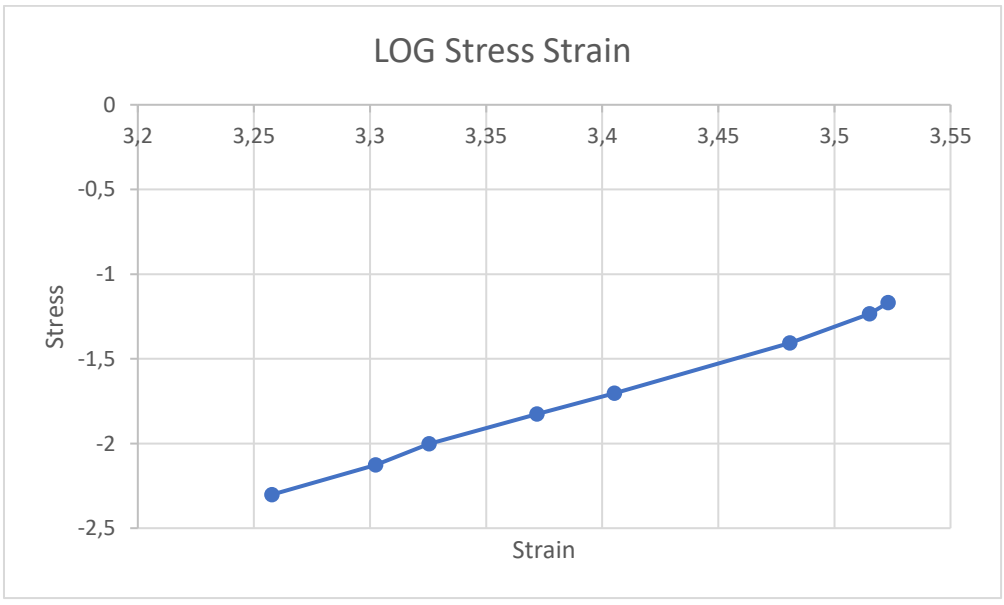
LOG Stress Strain
Stress
0
-0,5
-1
-1,5
-2
-2,5
3,2
3,25
3,3
3,35
3,4
3,45
3,5
3,55
Strain

	slope(n)	0,1846564
logK	1,026650527	
K	10,63287056	Mpa

Technical Data Table

Characteristics	Values	Units
Yield stress	1800,98	Mpa
Yield strain	0,005	
Young modulus	360,196	gigapascal
Ultimate tensile strength	3116,266	megapascal
Ultimate elongation	7	%
Fracture strength	2,422683279	gigapascal
Fracture elongation	13,77952756	mm
Ductility based on % total elongation	11,5	-
resilience	9,0049	-
strain hardening exponent	1,026650527	-
strength coefficient	10,63287056	-

Results

Our material is ductile. Its yield stress is approximately 1800MPa and yield strain is 0.005. When we use the Logarithm formula, we can see that our material's strength coefficient is approximately10,633.

References

https://www.nextgentest.com/blog/how-to-perform-a-tensile-test/

https://www.sciencedirect.com/topics/engineering/tensile-testing#:~:text=Tensile%20testing%20is%20a%20destructive,elongates%20to%20that%20breaking%20point.