The Mechanical Integrity of Mycelium-Hemp Structures

Trenton Brooks

Center for Additive Manufacturing of Advanced Ceramics

THE WILLIAM STATES LEE COLLEGE OF ENGINEERING

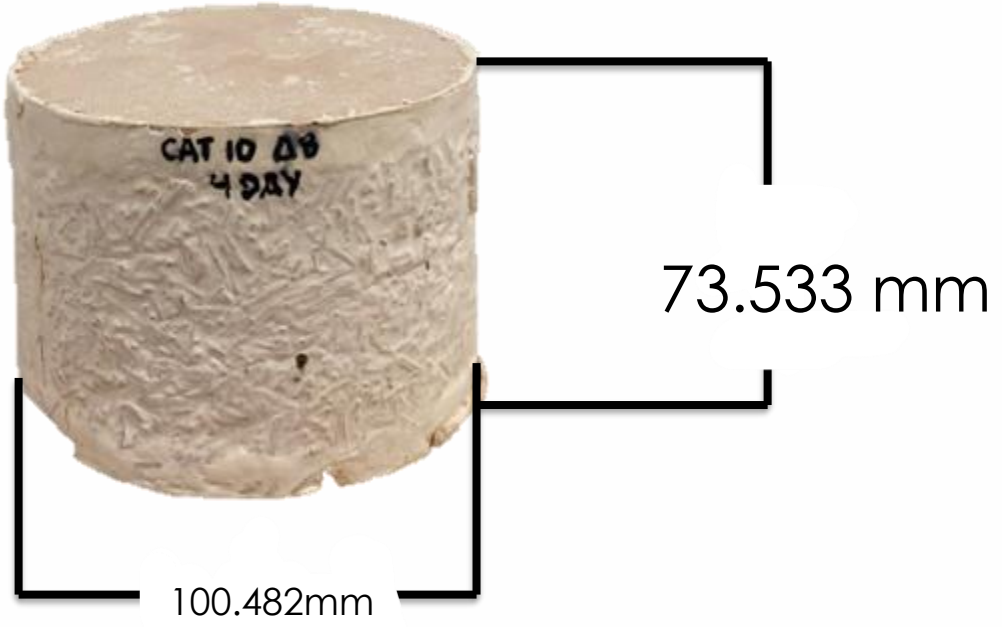
Materials are all around us, but rarely do we give it a second thought

Goal: Analyze the tensile stress and strain of the sample to see where tension is at its greatest

Material Science: Investigating relationships between structures and property of materials

Mechanical Design Properties

- Stiffness
- Strength
- Hardness
- Toughness



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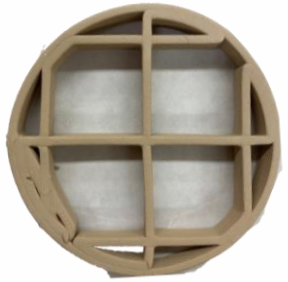
Ceramic Clay Infill Samples

40%	35%	25%	15%	
				Gyroid Infill Pattern
				Grid Infill Pattern
				Triangle Infill Pattern

Mycelium Mushroom-Hemp Samples

3 CT

99.7797mm AVG⌀
70.8237mm AVG⊕

3 CT

100.9904mm AVG⌀
73.7362mm AVG⊕

3 CT

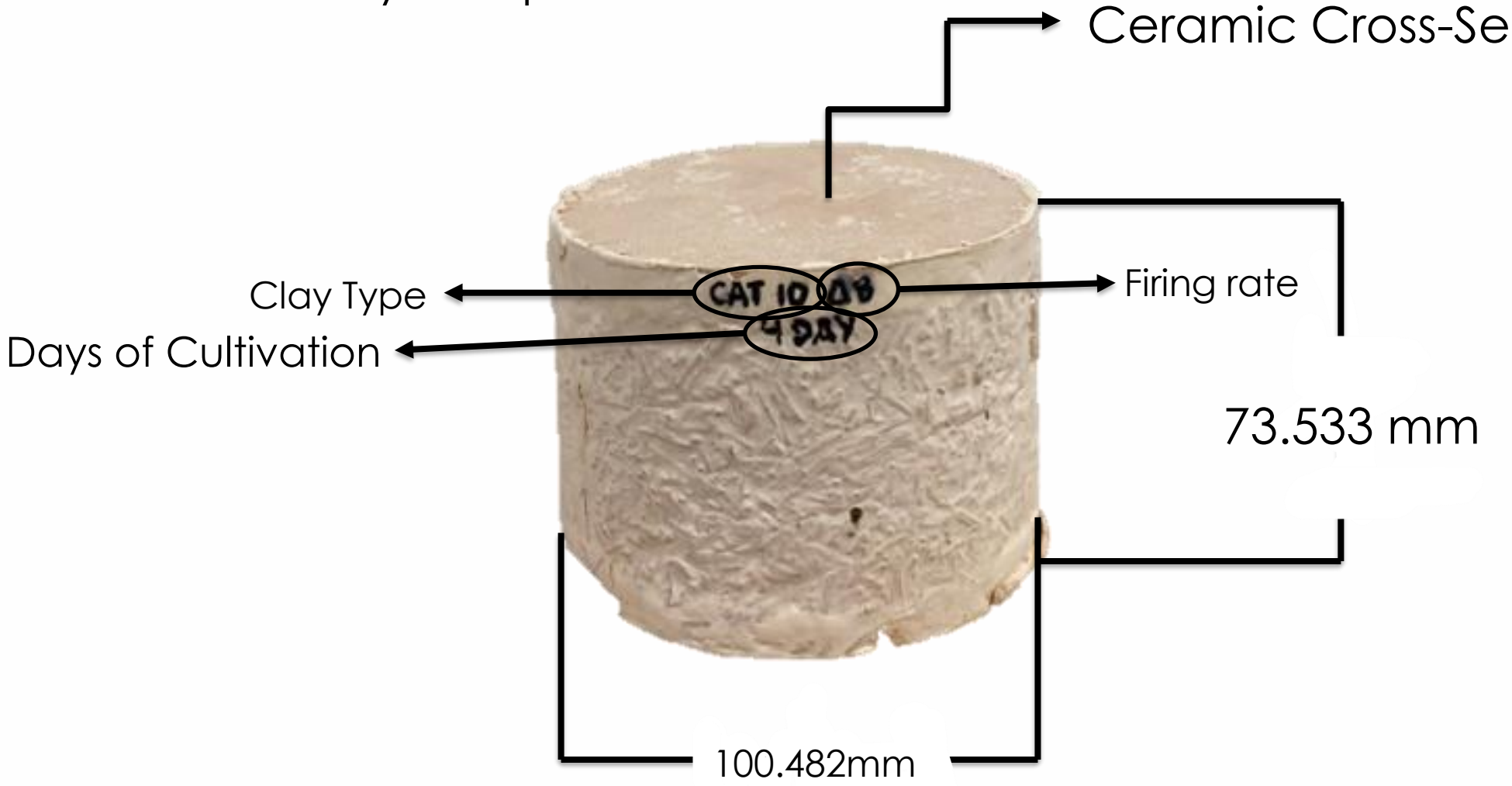
99.2039mm AVG⌀
72.7456mm AVG⊕

3 CT

99.6619mm AVG⌀
73.152mm AVG⊕

Project Aims and Objectives

CAT 10 Δ8 4 Day Sample 1



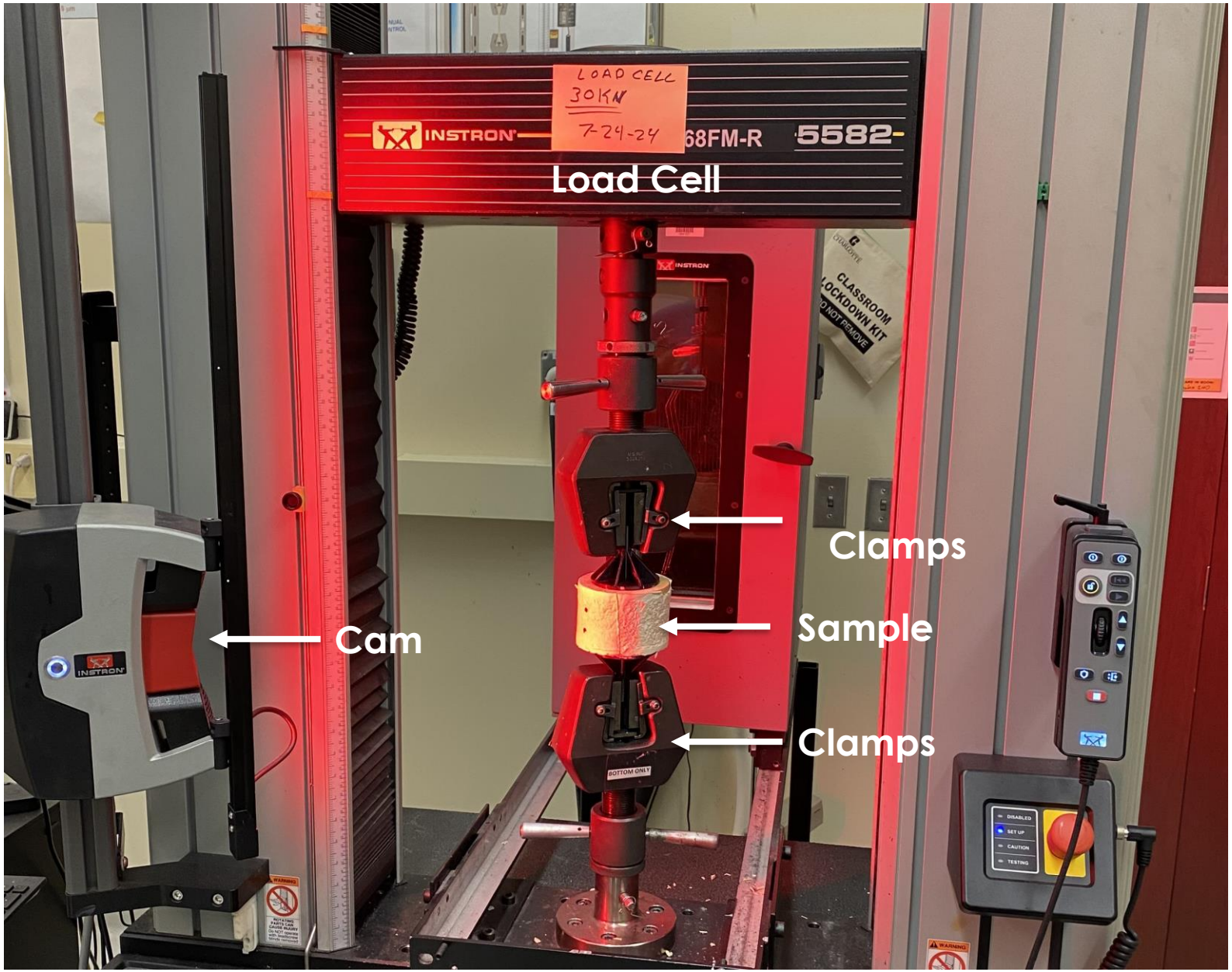

LOAD CELL
30KN
7-24-24
INSTRON
68FM-R
5582
Load Cell
Clamps
Sample
Clamps
Cam

Fig.1

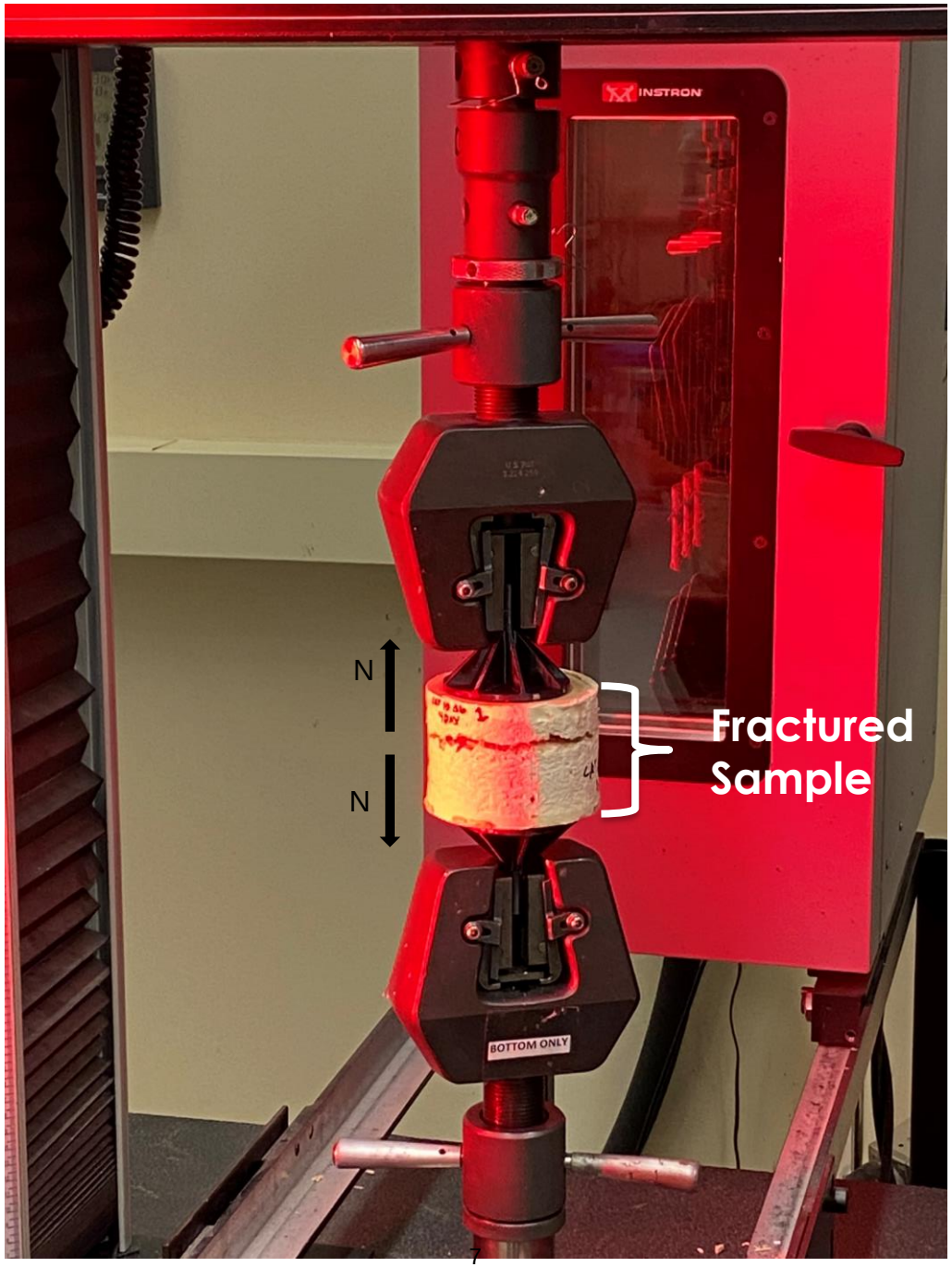
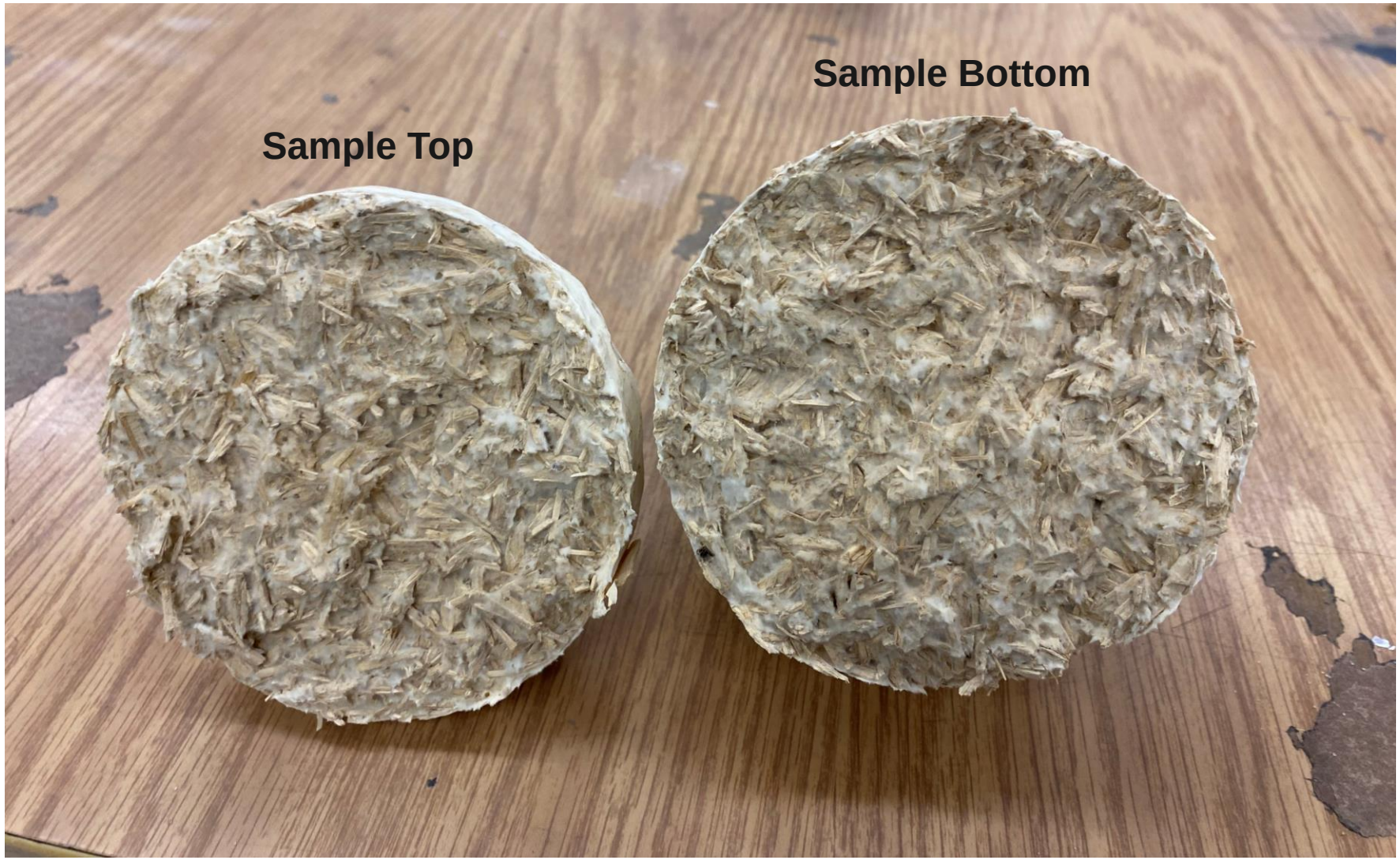


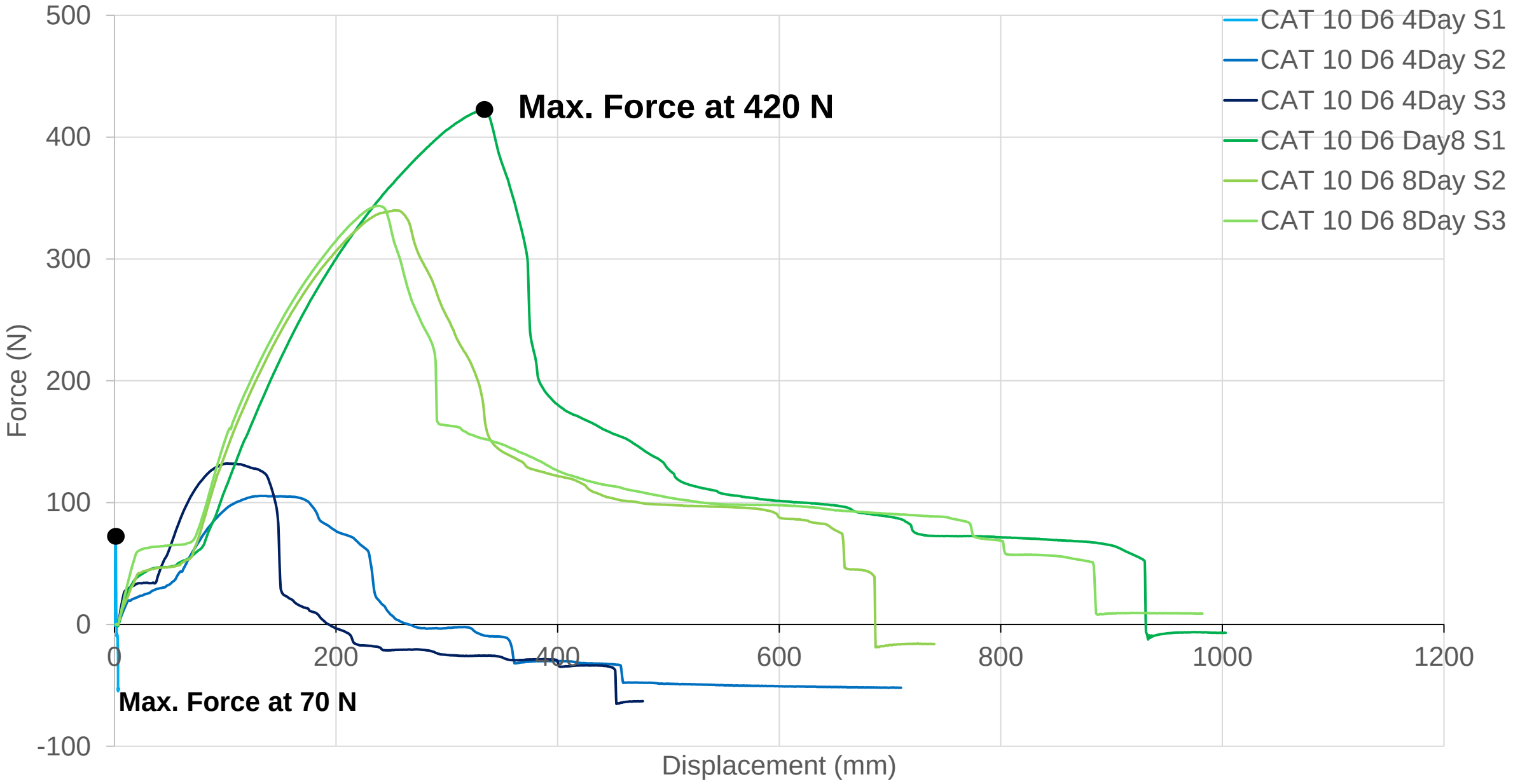
Fig.2

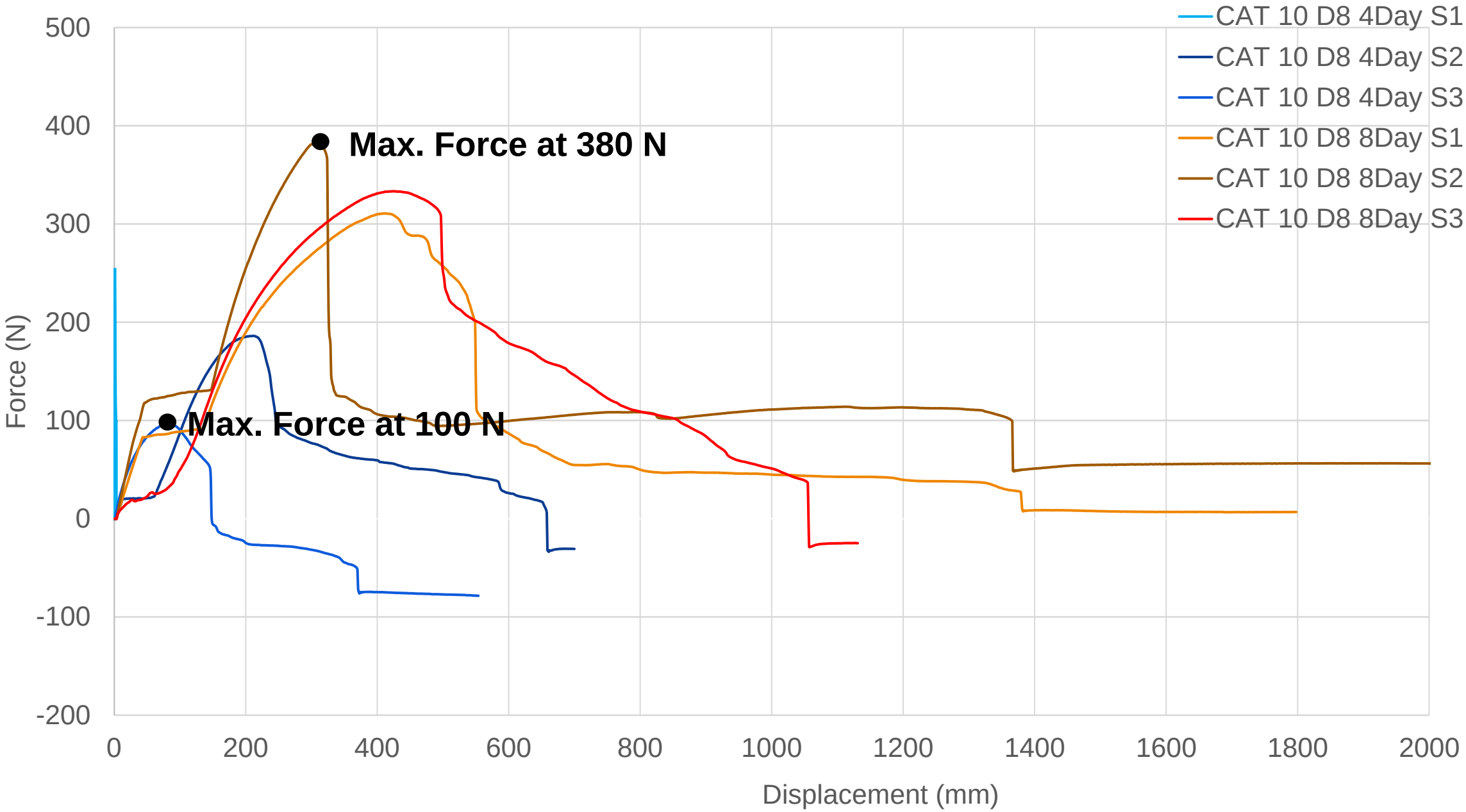
Fig.3

Fig.4

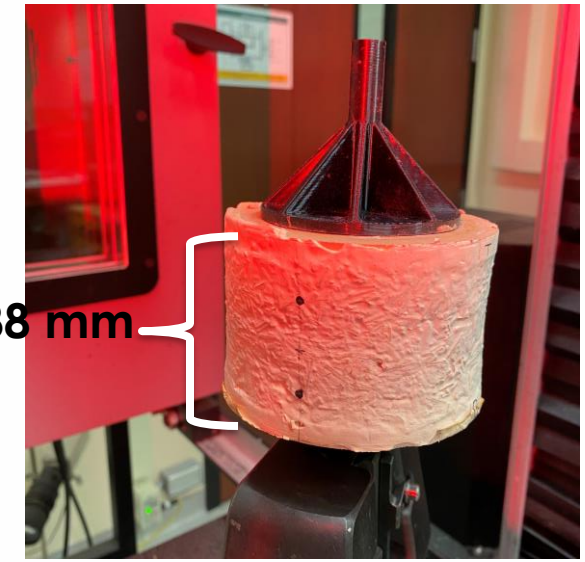


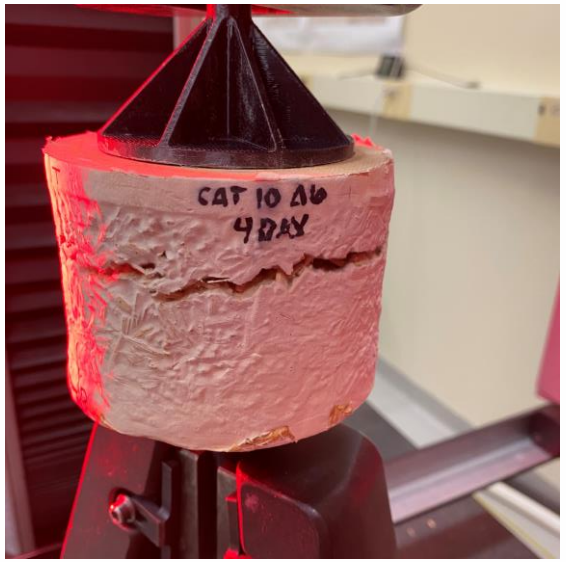
We can see that through this practice sample, it broke at the bulk leaving traces of the mycelium mushroom still embedded within it.


Max. Force at 420 N
Max. Force at 70 N
CAT 10 D6 4Day S1
CAT 10 D6 4Day S2
CAT 10 D6 4Day S3
CAT 10 D6 Day8 S1
CAT 10 D6 8Day S2
CAT 10 D6 8Day S3
Force (N)
Displacement (mm)
500
400
300
200
100
0
-100
0
200
400
600
800
1000
1200


CAT 10 D8 4Day S1
CAT 10 D8 4Day S2
CAT 10 D8 4Day S3
CAT 10 D8 8Day S1
CAT 10 D8 8Day S2
CAT 10 D8 8Day S3
Max. Force at 380 N
Max. Force at 100 N
Force (N)
500
400
300
200
100
0
-100
-200
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Displacement (mm)

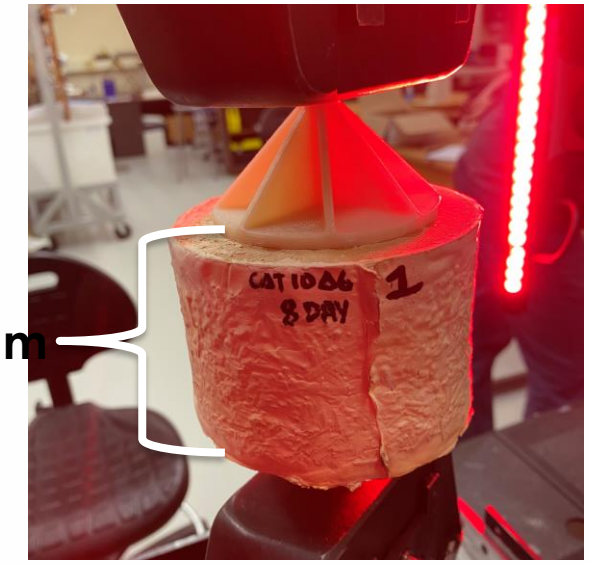
CAT 10 Δ6 4 Day Sample 1

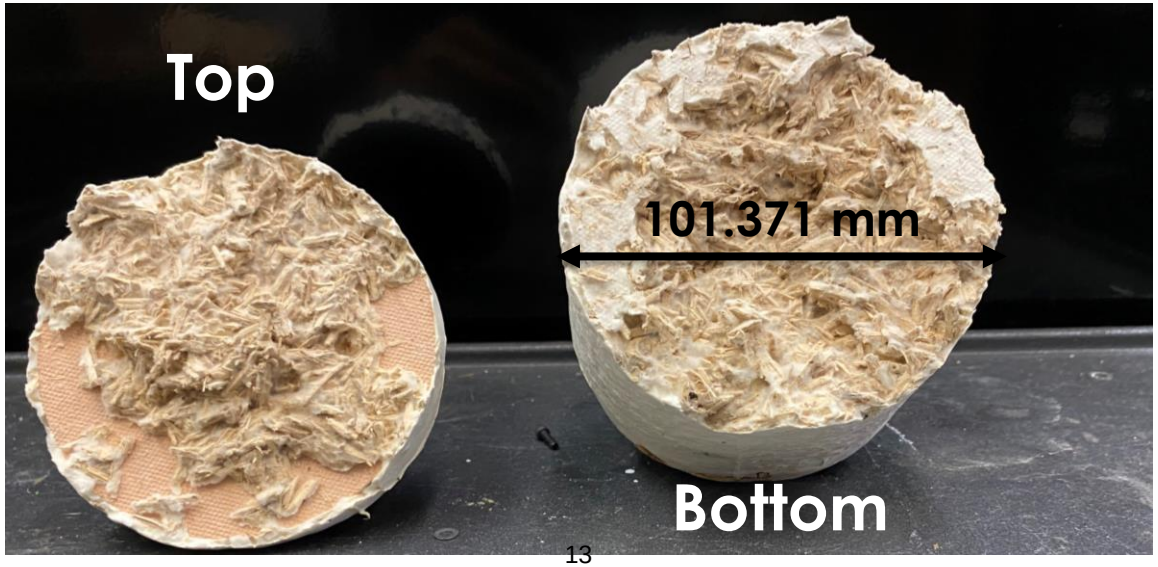




This is a result of our lowest-performing sample. With it breaking at the Bulk at only 70 Newtons.

CAT 10 Δ6 8 Day Sample 1





This is a result of our Highest-performing sample. With it breaking at the Ceramic interface at 420 Newtons. Based on these results a stronger stress yield is due to a long Mycelium Cultivation rate. The Longer the Mycelium has time to grow the stronger the bond holding it together will be.

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Citations

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