

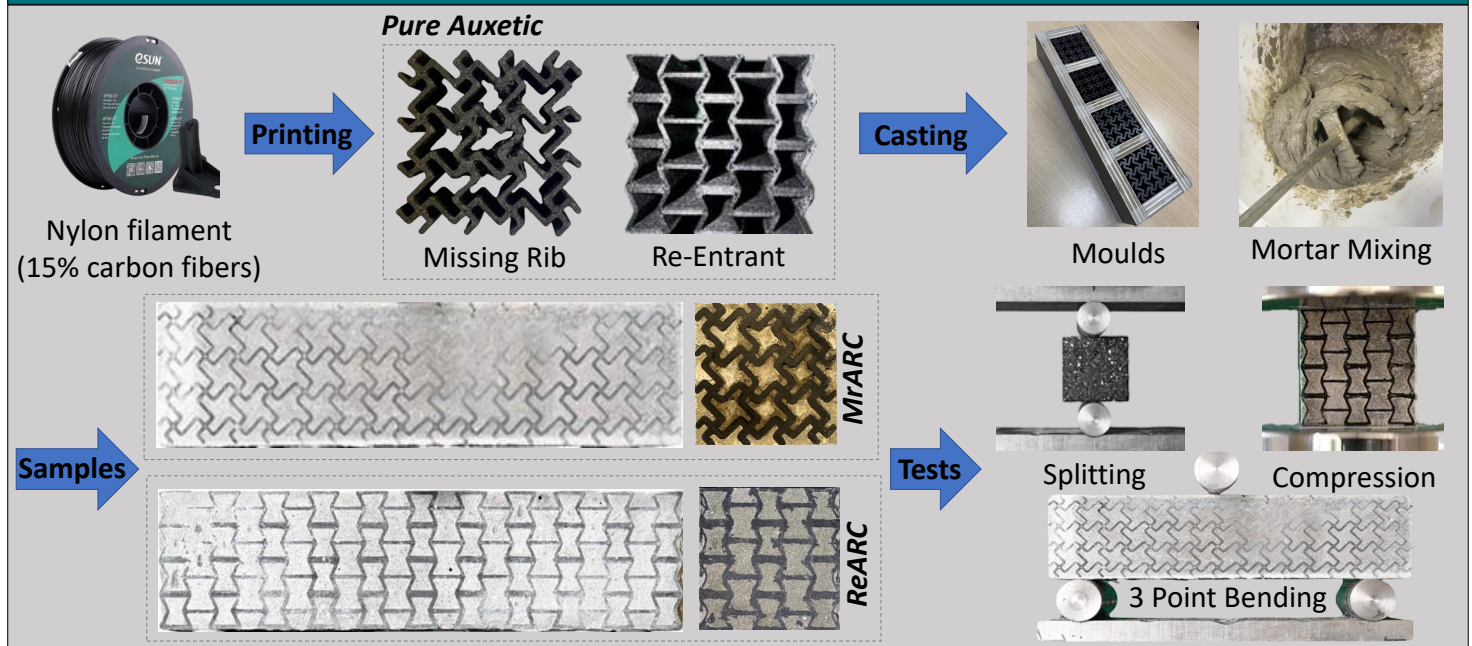
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Development of Auxetic Reinforced Cementitious Composites

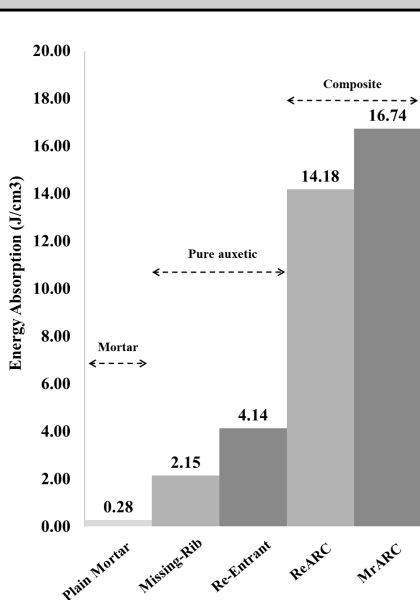
This research aims to develop a novel lining for pressurized underground structures.

Sample Preparation and Laboratory Tests

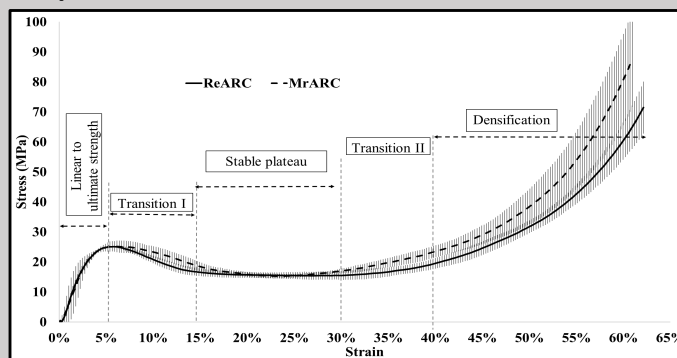


Notable Results

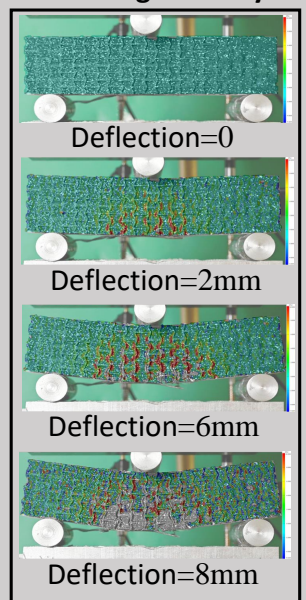
Energy Absorption:



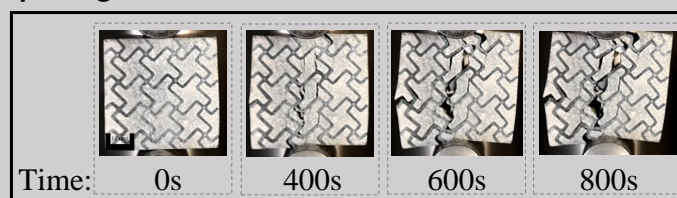
Compression Stress-Strain Curves:



3 Point Bending Ductility:



Splitting Behavior:



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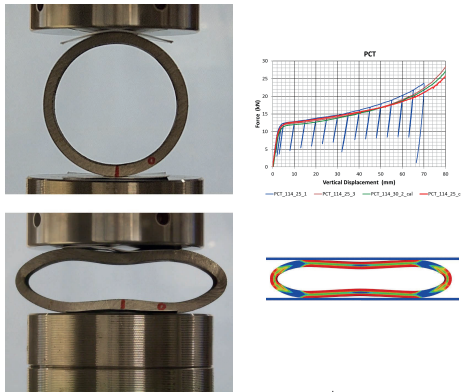
- **Research Focus:** Rock Engineering, Machine Learning
Underground Energy Storage, Seismic Risk assessment,
- **Research partners (logos):**



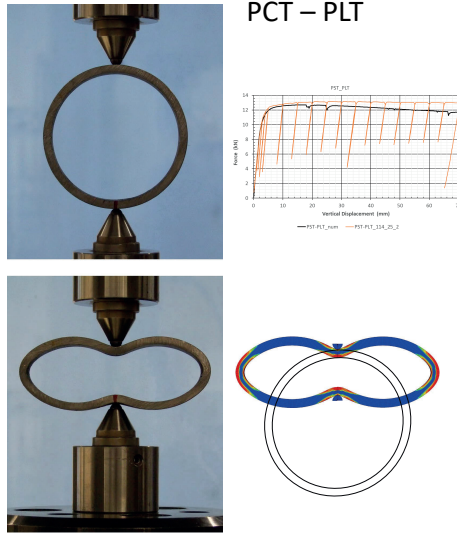
Design of a Testing Device for Pipe Umbrella Tubes

Experimental Calibration of Material Parameters for Numerical Simulation

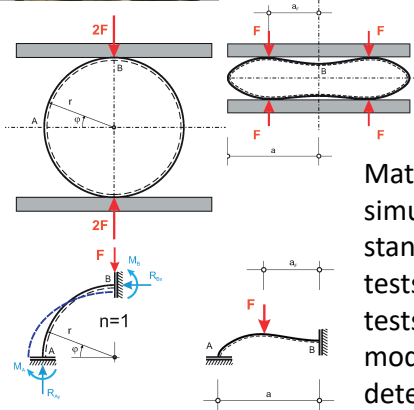
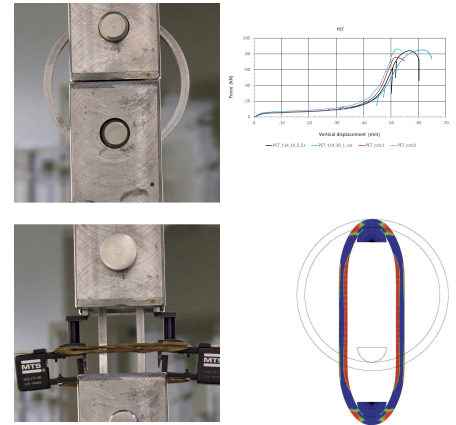
PCT – Pipe Compression Test



PCT – PLT

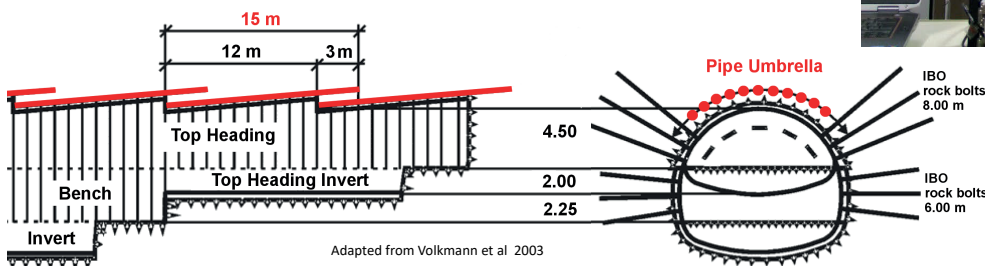


PET – Pipe Extension Test

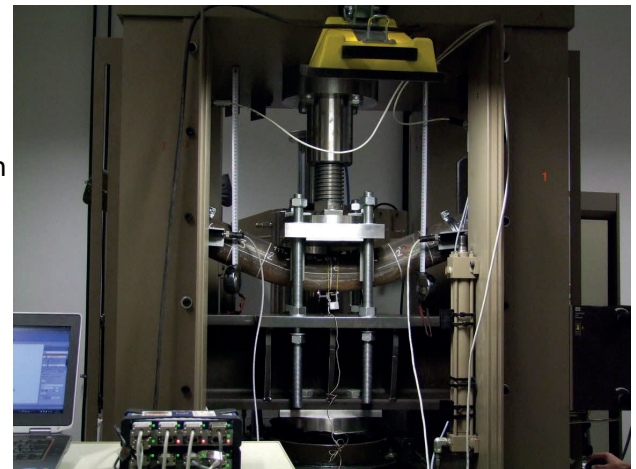


Material parameters for numerical simulation were calibrated using standard tensile test, pipe compression tests (PCT / PCT-PLT), and pipe extension tests (PET). The calibrated Strainsoft model in Flac3D was then used to determine the maximum force required for the pipe bending test (PBT).

A complementary analytical estimate based on plastic hinge theory provided a lower-bound prediction of the load-bearing capacity.

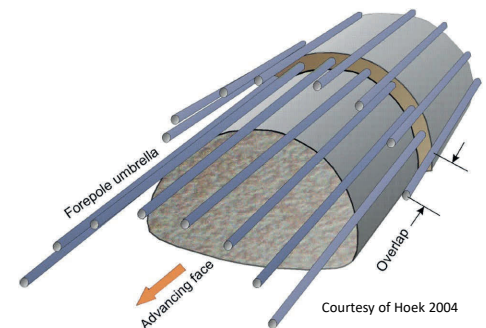


Adapted from Volkmann et al 2003



PBT – Pipe Bending Test

The advance of shallow tunnels using pipe umbrellas increases excavation stability and reduces surface settlements. The pipes and connections are tested in bending tests (PBT) to assess their suitability.



Courtesy of Hoek 2004



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