RECYCLING PLASTICS IN CEMENTITIOUS MATERIALS

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Motivation and Background

- This research investigates the effects of the addition of various plastics into cementitious materials and determines the effect on its mechanical properties.
- The use of plastic materials as filler or aggregate replacement in concrete has the potential to reduce the environmental impact without compromising its structural integrity.
- This project aims to determine the practicality of this idea through compression strength testing to discern if the addition of plastics compromises the integrity of the concrete.

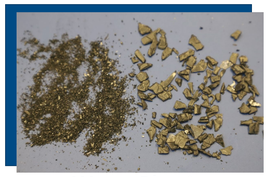
Objectives

- Develop a processing method for post waste plastics for use in concrete
- Determine the physical attributes of concrete with plastics incorporated into the mix
- Determine the realistic amount of plastic that can be added to concrete mixes

Conclusion

Overall, there was a loss of compressive strength with the addition of the plastic material, however initial testing shows promising results for certain applications which include Pavers, Sidewalks, low strength foundations, etc..

Methodology


Waste Plastic


Waste Plastic Magnified


Normal Concrete Sample


Sample With Plastic

Idea Development
What issues are addressed with the addition of plastic material in Cement?

Background Research
Explore previous work done with the inclusion of Plastic material in Cement

Mix Designs and Testing Plans
The creation of several mix designs with varying amounts of plastic that will be tested

Sample Creation and Testing
Mixing the different batches of UHPC and the testing of the samples for compression strength

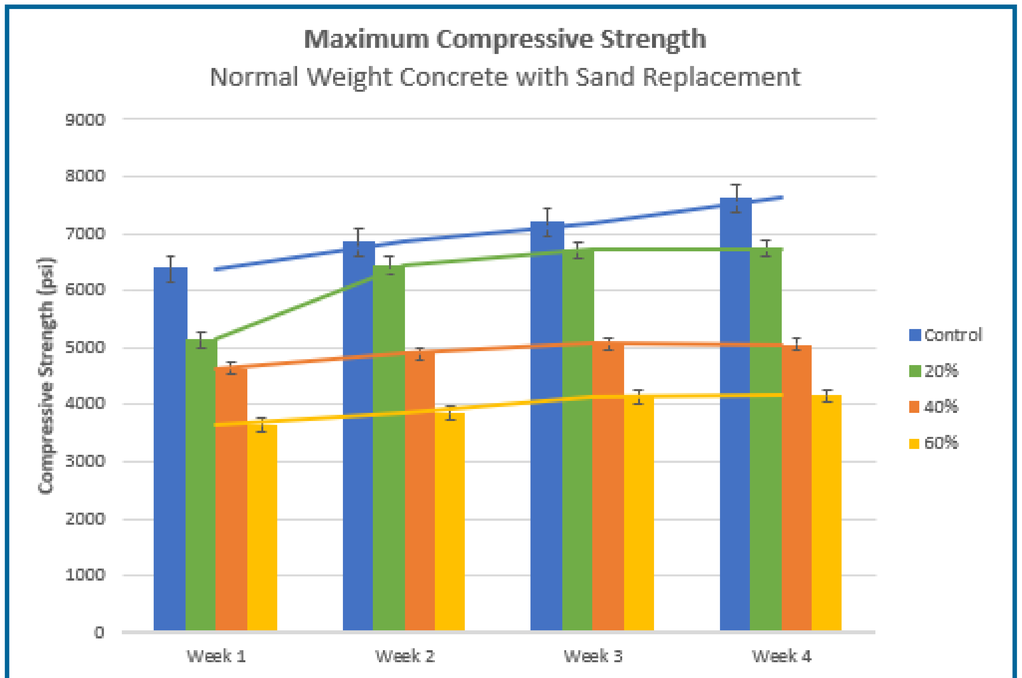
Data Interpretation
Averaging the compressive strength of the samples to compare the effect of different plastic amounts

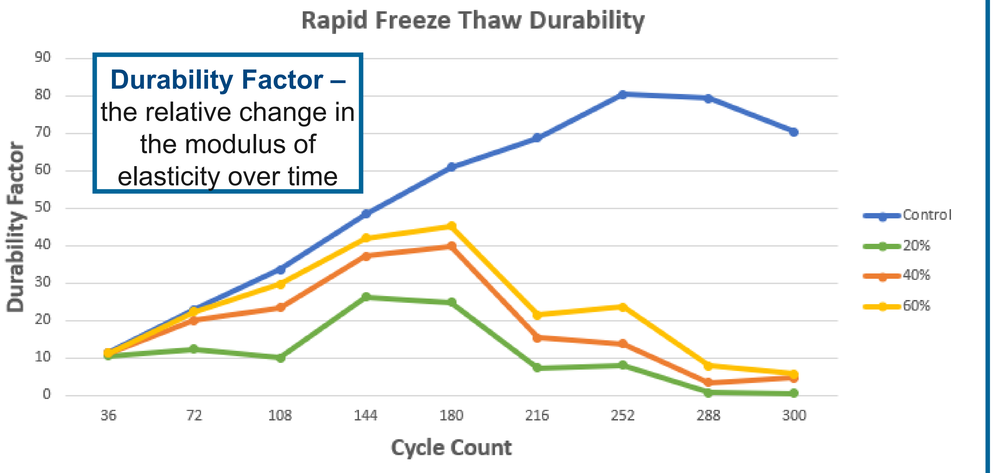

Burning Plastic


Humboldt Concrete Compression Machine


Wet Plastic Sand Mix

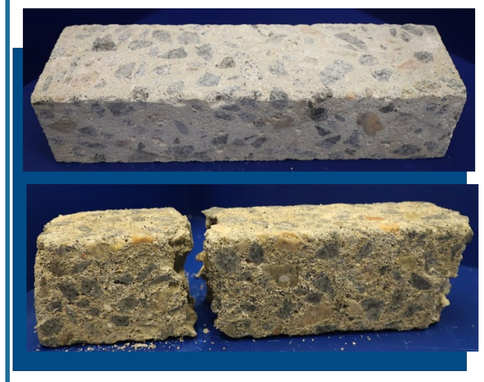

Slump Testing Wet Mix





Durability Factor – the relative change in the modulus of elasticity over time


Before and After Compression Test


Before and After Rapid Freeze Thaw Test

Resonance Gage used for Freeze thaw Testing

Acknowledgements *University of DE Center for Composite Materials (CCM). Thermoset polymer materials were provided by Eco Plastic Products of Delaware.*