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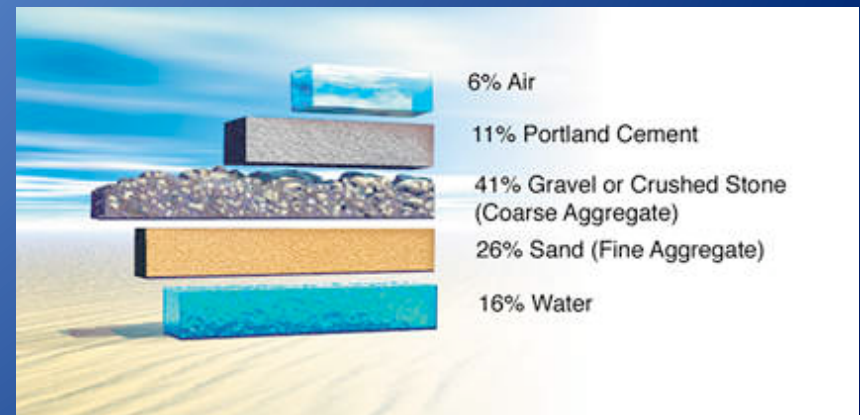
DESIGNING GREEN CONCRETE



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Concrete – The Basics

- ◆ A mixture of cement paste and aggregate in the right proportion
- ◆ Portland Cement
- ◆ Hydration
- ◆ Curing / Healing
- ◆ As time passes, concrete grows in strength.



The Common Misconception

- ◆ Cement is one component of concrete.
- ◆ The proper term is a 'concrete truck' not a 'cement truck.'



Our Goal

- ◆ To design a concrete mix that is both light weight and efficient as an insulating material.
- ◆ The concrete is to contain recycled materials, such as EPS beads or recycled concrete.
- ◆ Eventually, we plan on creating concrete building panels made of this material.

Mixing Concrete

- ◆ After calculating the w/c ratio, a/c and the percentage of EPS beads, we gathered the materials needed and weighed the contents.
- ◆ Placing the aggregates and cement into an industrial mixing bowl, we started the mixer and slowly added the water.



2" Cubes

- ◆ Taking your newly mixed concrete, and with a trowel, place the mixture into the 3 spaces of the 2" cube forms. Fill higher than the brim and then turn on the vibration table for consolidation.
- ◆ Refill to top completely and evenly.



Curing Process

- ◆ After filling the forms wrap them in seran wrap.
- ◆ Place into the curing chamber for 24 hours, then remove the cubes from the forms and place into the chamber for 6 days.



Density Testing

- ◆ First, we place the cubes of concrete in water-filled beakers and weigh them.
- ◆ Then place the cubes into an oven and heat them to over 100°C for 24 hours and then weigh them again.
- ◆ From these values, the density and water absorption values can be acquired.



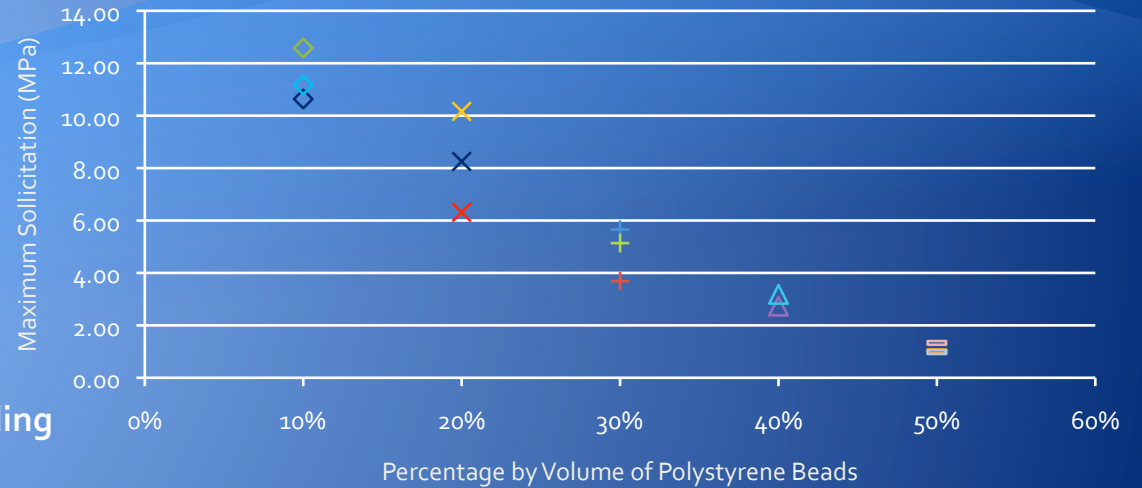
Compressive Testing

- ◆ For testing, one must place one of the 2" cubes at a time onto the lower layer of a Universal Testing Machine.
- ◆ Here we measured how many pounds of force the cubes could withstand until failure.

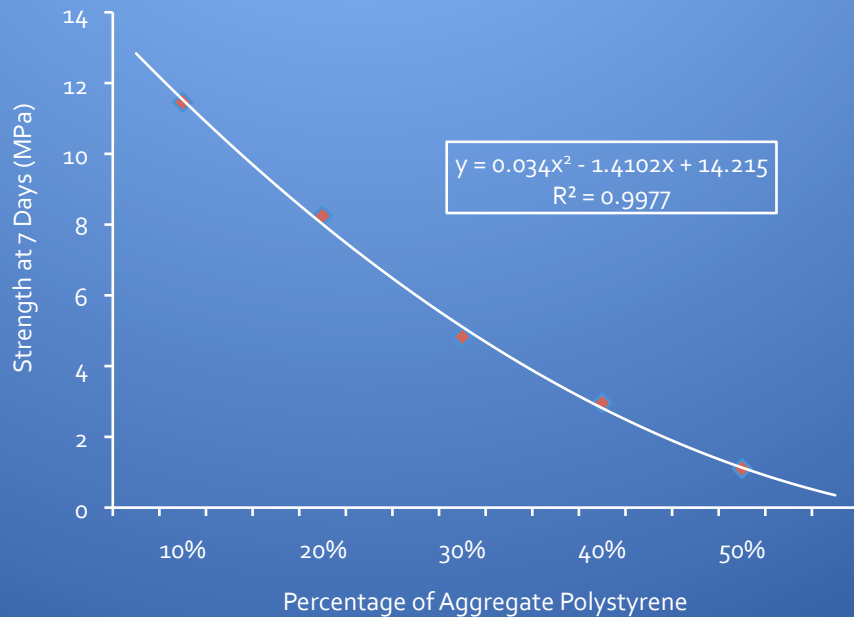


Results of Compressive Testing

Evolution of the Maximum Allowable Solicitation to Seven Days According to the Percentage of EPS



Evolution of Strength at 7 days as According to the Percentage of EPS

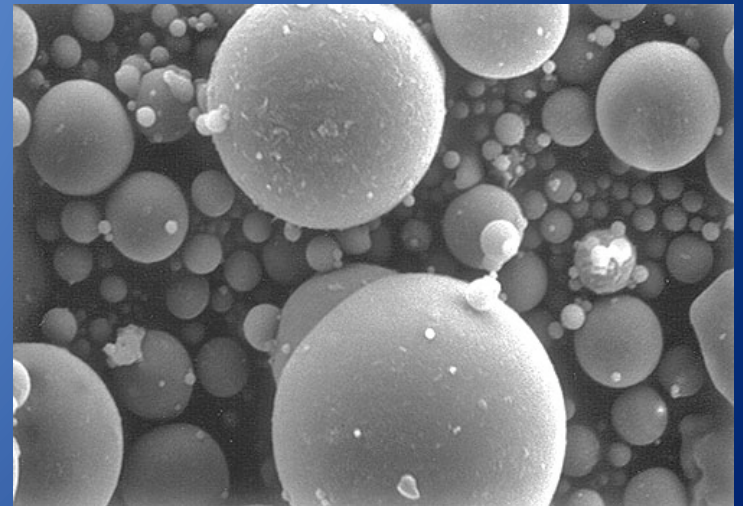


Conclusions

- ◆ Higher percentages of EPS create weaker mixtures
- ◆ Negative relation between EPS and compressive strength

Future Work

- ◆ Recycled concrete = aggregate?
- ◆ Physical characteristics of recycled concrete & fly ash
- ◆ Production for building panels?



References

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Thanks for listening