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Project Summary

Technology Transfer Outreach Publication

Neutralizing the Adsorptive Effects of Carbon in Fly Ash for Use in Concrete

Researcher

Dr. David Hand
Professor
Department of Civil and Environmental Engineering

dwhand@mtu.edu
906.487.2777

Sponsor

University Transportation Center for Materials in Sustainable Transportation Infrastructure (UTC-MiSTI)

Project Title

Analyzing the Adsorptive Effects of Carbon in Fly Ash

Project Manager

Elizabeth Hoy
Assistant Director, UTC-MiSTI

Co-Investigators

Michigan Technological University
Dr. Larry Sutter, Ph.D.
Professor
Michigan Tech Transportation Institute

Melanie Kueber, P.E.
Graduate Research Assistant

Tianlu Shen
Undergraduate Research Assistant

Fly ash has been used as a supplementary cementitious material in concrete for decades. However, not all fly ash is beneficially used because of adsorptive properties of its carbon content. Our research will use industry techniques such as the foam index and foam drainage test to analyze admixture dosages. For this, it is necessary to evaluate each procedure published and establish the procedure, or combination of procedures, that has the optimal combination of low subjectivity, high reproducibility, and simplicity. Once established, these tests will be used to assess inhibitors. The goal is to find an inhibitor to mitigate the adsorptive properties of fly ash. Fly ash can then be a more reliable portland cement replacement in concrete.

Research Objective

- To establish a repeatable foam index procedure by examining the coefficient of variance over a matrix of tests. Once the test to be used is established it will be used to perform the inhibitor study.
- To produce data and methods to allow fly ash to be useful and ultimately make concrete manufacturing more sustainable.

Methodology

- Literature review-Conduct a concurrent literature review on the use of inhibitors.
- Laboratory study-Conduct a laboratory study to find repeatable foam index and foam drainage tests and study different methods of inhibitors to treat fly ash.
- Analyze research-Determine the best method to treat high carbon fly ash to render it useful in concrete.

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Michigan Technological University

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University Facts (2008-2009)

Total Enrollment	7018
Graduate Enrollment	984
Number of Faculty	445
Placement Rate	96%

Michigan Technological University is located in Houghton, Michigan on the south shore of Lake Superior. This rural area is known for natural beauty, pleasant summers, abundant snowfall, and numerous all-season outdoor activities. In addition, the University maintains its own downhill and cross-country ski facilities and golf course. There are numerous cultural activities and opportunities on campus and in the community. Michigan Tech has also been rated as one of the safest college campuses in the United States, and the local community provides excellent resources conducive to an outstanding quality of life.

For more information, visit the University's website.

www.mtu.edu

Research Findings

The anticipated research findings include:

- Development of a highly reliable method inhibiting adsorptive properties of carbon in fly ash.
- Determine which method is the best based on efficiency, cost, and sustainability.
- Document and report findings.

Anticipated Implementation

The goal is to contribute to the body of research which is hoped to ultimately forge a link between scientists who study the internal structure of concrete and concrete users. This can be accomplished by the development of a treatment method, which will lead to increased use of fly ash as a supplementary cementitious material. Find a company to partner in implementing inhibitors for industry use or sale.

Benefits to Society

Success in this research would allow more fly ash to be used as a supplementary cementitious material and this will contribute to the sustainability of the concrete industry. Two major benefits in increasing the use of fly ash as a recycled industrial material are; less need for the manufacture of traditional cement resulting in reduction of energy costs, and relief from the solid waste burden that unusable fly ash poses.

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