CENTER FOR BY-PRODUCTS UTILIZATION

CONCRETE BRICK AND BLOCK MANUFACTURING USING WOOD ASH GENERATED FROM WISCONSIN PULP AND PAPER INDUSTRY

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Department of Civil Engineering and Mechanics
College of Engineering and Applied Science
THE UNIVERSITY OF WISCONSIN-MILWAUKEE
Title of Project: Concrete Brick and Block Manufacturing Using Wood Ash Generated from Wisconsin Pulp and Paper Industry

Researcher: Dr. Tarun R. Naik

Award Year: 2001-2002

Amount of Award: $45,817

Project Description (Please limit each description to 3-4 sentences using non-technical language):

A. Objectives of the project:

The major objective of this project was technology demonstration and transfer of technology for use of wood ash in brick and block manufacturing to enhance economic development for Wisconsin pulp and paper mills. The objective was to introduce concrete products manufacturers to the use of wood ash as a cost effective source of materials for the production of cast concrete products. This project formed a mutually beneficial economic tie between the pulp and paper industry and concrete products manufacturers.

B. Results of the project:

A total of 18 different concrete mixtures for bricks and blocks were manufactured at a plant in Racine, Wisconsin. Nine mixtures were for concrete blocks and an additional nine mixtures for concrete bricks. The type and amount of wood ash was varied for each mixture. A maximum of 35% wood ash was used in these concrete brick and block. Four block and four brick mixtures were also used in combination of wood ash and coal ash with up to a 50% reduction in the cement normally used in brick and block making. Brick or block specimens cast from each mixture were evaluated for compressive strength, water absorption, and resistance to freezing and thawing cycles and compared with standard ASTM requirements. Test results indicate that concrete block mixtures may successfully incorporate up to 35% wood ash. Concrete block mixtures that contained a combination of wood ash and coal ash with up to 50% cement reduction also met strength requirements. Concrete brick mixtures containing wood ash and a combination of wood ash with coal ash also met requirements when moderate strength and durability properties are specified.

C. Relationship of the project to the Wisconsin economy:

Wisconsin paper industry produce the most paper than any state in the U.S. As a part of the paper manufacturing process, mills burn wood (or combined wood and coal) to produce steam. In order to keep the pulp and paper mills competitive into the future, uses for wood ash must be developed rather than spending money to throw it away in landfills. Wisconsin mills alone generate approximately one million tons of wood ash per year, most of which goes to landfills. The results of this project, when fully implemented, could eventually save the Wisconsin pulp and paper industry up to $30 million dollars per year in avoided disposal costs. In addition, the concrete products industry in Wisconsin would save significant production costs using wood ash with up to 50% less cement.