Precast Concrete Basement Wall Panels

Kistner Concrete Products of East Pembroke, NY, is manufacturing a precast basement foundation system, which has a number of advantages compared with other systems. The required thermal insulation properties are obtained currently by a styrofoam insert, which compromises the manufacturing efficiency.

A research project has as its objective the improvement of the thermal insulating properties of the basement wall panel, while making increased use of recycled materials.

The thermal properties can be improved by using two approaches. First, a foaming agent is added to the concrete mix to produce the desired degree of porosity, while at the same time reducing the unit weight of the material. Second, the addition of recycled carpet fibers to the concrete mix has proved to be very effective. There are basically three advantages associated with using recycled carpet fibers:

- the hollow nylon fibers reduce the thermal conductivity of the concrete;
- the fibers serve as reinforcement, effectively increasing the low tensile strength and fracture toughness of the concrete matrix;
- old carpets pose a serious disposal problem in the United States.

Two million tons of carpets need to be recycled or deposed of each year nationwide. DuPont has developed a technology to reprocess the nylon fiber from used carpets and is prepared to supply the required quantities.

Precast basement panels, in field assembly

Initial results indicate that it is possible to increase the R-value of the concrete (i.e. its thermal insulation property) with a proper combination of recycled carpet fiber and foaming agent, while keeping all mechanical material properties within specifications.

Research Sponsor

- New York State Energy Research and Development Authority