Recycled concrete aggregate (RCA) is produced using an internal curing process. Unlike conventional curing which only wets the top layer of the concrete, internal curing wets the concrete throughout, providing a reservoir of water as moisture is lost due to evaporation. Concrete can also be reinforced with natural materials such as sisal fiber and bamboo, as opposed to traditional steel, to increase the strength of the RCA while minimizing weight. The use of natural, sustainable, fast-growing reinforcement materials can help lower costs and streamline the construction process using locally available resources. Sustainable, inexpensive construction processes and materials are especially crucial for the recovery of developing areas hit by natural disasters.

Improved RCA will allow for design of cheap, interlocking panels that can be easily assembled onsite

The combination of internally cured RCA and integration of natural reinforcement materials allows for the production of concrete that is comparable to virgin aggregate as a construction material. RCA is particularly critical to developing nations that have been struck by natural disasters, such as hurricanes and earthquakes, which can leave millions of pounds of rubble and debris in their wake. The lack of infrastructure makes landfilling such massive amounts of building material impossible within a reasonable time span; thus, recycling this material is an ideal solution. Additionally, the reinforced concrete resulting from this technology will be able to be formed into interlocking panels, allowing for rapid modular construction.

The researchers tested internally-cured aggregates for compressibility, tensile strength, durability, and thermal stability. They found that when half of the virgin concrete was replaced by fully saturated RCA, the compressibility and tensile strength was comparable to entirely virgin concrete.

Applications:

- Infrastructural re-development in disaster area
- Novel sealing material (e.g. dams)
- Inexpensive pre-fabricated homes
- Emergency shelters
- Road construction
- Erosion control
Advantages:

- Reduces landfilling of material due to structural collapse
- Reuses material for construction, reducing overall costs
- Improves environmental sustainability of construction processes
- Takes advantage of naturally occurring resources
- Simplifies construction process through development of pre-fabricated interlocking pieces

Patent information:

Patent Pending

Licensing Status: Available for licensing and sponsored research support

Related Publications:

N/A

Inventors

Christian Meyer