Hollow recycled polymer blocks for human habitation

Researchers at Monash University and the University of Western Australia have jointly developed innovative hollow, fillable building blocks, referred to as osteomorphic blocks, which can be stacked to form stable structures. These blocks can be manufactured from recycled plastics and, in turn, are re-usable. This invention allows simple, low-cost construction of temporary dwellings and rapidly deployable civil and military structures with high energy efficiency and nearly full recyclability.

Monash University and the University of Western Australia have developed hollow osteomorphic blocks designed to be manufactured from recycled polymers. The blocks can be stacked to form a range of stable structures.

Applications
These novel building blocks can be used in a wide range of infrastructural projects such as:

- temporary accommodation in regions affected by major disasters or in developing countries
- barricades and anti-riot barriers
- levees and other flood-protection structures
- pavements
- pontoons
- any other low-cost structures where rapid deployment is important

Advantages
The benefits of using the osteomorphic blocks in temporary or permanent structures include:

- low cost of manufacture
- ease and low cost of transportation
- possibility of filling with a wide range of phase-change materials such as water or paraffin, for heat storage and release
- can be manufactured from recycled plastic, particularly plastic bottles where the plastic resin is already ideal for blow moulding structures.

Technology
Hollow osteomorphic blocks can be produced from recycled plastics by established polymer processing techniques, including blow moulding. Common polymers such as polyethylene, polyethylene terephthalate or polypropylene (or copolymer), or any other suitable recycled plastic can be used to manufacture the blocks. The uniquely designed shape of the blocks makes it possible to stack them atop each other without a need for binder or connectors, as each block is held within the structure by virtue of the geometry of interfaces with the neighbours (see figure). Using specific arrangements of the blocks, a variety of structures can be built, including protective walls or entire buildings, floating structures, pavements etc. The blocks can be made inflatable and fillable. In particular, they can be filled with sand, water, or a phase-change material, such as paraffin, for storing heat during the day and releasing it at night to provide stored warmth.

Opportunity
Industry partners are sought for further development of this technology with a view to licensing and commercialisation. Aid agencies and government bodies that provide temporary, emergency accommodation in particular will value this new technology.

IP Status
The technology is owned jointly by Monash University and University of Western Australia and is protected by provisional patent 2014202583. Monash University has responsibility for commercialising the technology.

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