1-1-2013

MECHANICAL CONCRETE

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DOI: 10.5703/1288284315757

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EMERGING CONSTRUCTION TECHNOLOGIES

Civil - Composite Materials & Technologies

http://dx.doi.org/10.5703/1288284315757

The Need

Most roadway and site related failures to support loads are due to failure of the soil or aggregate material to support internal or external generated lateral forces. The quest for solutions to this challenge has spawned the geo-synthetics industry with its wide range of products to improve this condition including geocells, fabrics, grids, reinforcing straps, etc.

Globally approximately 1.4 billion waste tires are generated annually, 300 million in the USA. Finding ways to reuse these waste tires is an ongoing challenge. Since the rubber is mainly hydrocarbons most, over 50%, are burned as fuel. Between 30 and 40% are broken down and recycled through grinding and other processes and used in a variety of recreational and construction products and processes. However, not effective reuse of the tire structure as originally engineered and manufactured has been discovered until now with the development of Mechanical Concrete®.

The Technology

Mechanical Concrete® is a way of binding crushed stone aggregates together into a load bearing cellular building unit. The Mechanical Concrete® unit can support compressive loads and resist lateral soil pressure. It is basically a compressive material. Mechanical Concrete® confines the stone within a Mechanical Cement®, stay-in-place, cylinder. This tire-derived-cylinder performs functions similar to the cement / water mixture, the rebar and the formwork in hydraulic cement concrete. It actually improves the load supporting capacity of the aggregate material be it sand, stone or sandy clay. Stones confined in this manner can function in load supporting foundations, earth retention structures i.e. walls and dams, slope and channel erosion protection i.e. as ditch and channel liners.

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FIGURE 1 TIRE-DERIVED-GEO-CYLINDER(TDGC) WASTE TIRE W/ BOTH SIDEWALLS REMOVED

FIGURE 2 MECHANICAL CONCRETE® GEOCYLINDER STONE FILLED TDGC

A Mechanical Cement® cylinder is a thin-walled cylinder which is made of a single material or of composite material. For example, the cylinder can be made of steel or plastic. It can be designed and made from any suitable material of adequate size and tensile strength to resist the lateral pressure generated when the crushed stone is placed under load. It is the tensile strength of the Mechanical Cement® cylinder that generally defines the overall strength of Mechanical Concrete® and not the crushed stone. The preferred cylinder is made from a recycled auto or truck tire with both sidewalls removed. The tire-tread cylinder is no longer a tire but through remanufacturing becomes a tire-derived-cylinder, TDC.

THE BENEFITS

Increased load carrying capacity

The tire-derived-cylinders have a maximum operating pressures of approximately 45psi plus a design factor. When used at low pressures as in Mechanical Concrete®, i.e. around 12 psi for an AASHTO Truck Wheel Loading, it can be used effectively and economically in nearly all construction, on-road or off-road applications for a maximum wheel loading of 50,000lbs. The results of Mechanical Concrete® 50,000 lbs. column lab load tests are available on this website.

Application of Mechanical in different soil types

Mechanical Concrete® road bases have been on constructed on soft Appalachian clays and soft southwest US desert sands and a wide range of soils in between. On the soft clay and sand, woven separation fabric

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was laid and then the tire-derived-cylinders were placed and filled. Our research shows that confining the aggregate in the tire-derived-cylinders actually improves its load supporting capacity by double or more.

Overcoming road problems

Nearly all road problems come from base failures. The Mechanical Concrete® tire-derived-geo-cylinders filled with stone aggregates economically create a virtually indestructible base so it basically eliminates most road maintenance problems, including:

- Potholes & Ruts
- Ditch Wall Collapse
- Shoulder Erosion
- Soft Sub-grades
- Ditch & Channel Scour
- Slips and Slides

Almost anyone can build a superior road base using Mechanical Concrete®. Its fast, uses simple equipment and is ready to instantly support loads and resist erosion.

For more benefits, please visit http://centuryroadsolutions.com

STATUS

Mechanical Concrete® is sold through authorized distributors, licensed contractors and Mechanical Concrete® manufacturers. Distributorships as well as project, contractor, government agency and manufacturing patent licenses are available throughout the USA and globally.

POINTS OF CONTACT

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REFERENCES

http://centuryroadsolutions.com

http://dx.doi.org/10.5703/1288284315757

Reviewers

Peer reviewed as an emerging construction technology

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Publisher

Emerging Construction Technologies, Division of Construction Engineering and Management, Purdue University, West Lafayette, Indiana

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