



INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact Factor: 6.078

(Volume 8, Issue 4 - V8I4-1191)

Available online at: <https://www.ijariit.com>

Utilization of scrap tires for reinforced subgrade

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ABSTRACT

This paper presents an innovative concept in Geosynthetic materials, supported using old car tires as a geocells in construction. it's a awfully exceptional idea for the development engineering. With adoption of this we are able to fulfil the utilization of geocells in roads and highway construction. Which has more benefits with this total construction cost are reduced and optimize the rubber waste on the world and it reduces pollution. aims at evaluating the advantages and identifying the constraints. the chance to use this technology direction for each different road type, the optimization of building trajectories through the employment of the most effective tire section, further on maintain the elasticity of road. Those must be composed with the building cost, extra strength issues within the heavy traffic.

Keywords: Rubber Waste, Material, Reduces Pollution, Strength

1. INTRODUCTION

Tires don't seem to be desired at landfills, because of their large volumes and 75% void space. Tires can trap methane gases, causing them to become floating, or bubble to the surface of earth . This 'bubbling' effect can damage landfill liners that are installed to assist keep landfill contaminants from polluting local surface and water. Shredded tires are now getting used in landfills, replacing other construction materials, for a light-weight back-fill in gas venting systems, leachate collection systems, and operational liners. Shredded tire material may additionally be wont to cap, close, or daily cover landfill sites. Scrap tires as a back-fill and canopy material also are more cost effective, since tires may be shredded on-site rather than hauling in other fill materials.

1.1 Scrap Rubber Tire

Tire Recycling, or Rubber Recycling, is that the process of recycling rubbish tires that aren't any longer suitable to be used on vehicles because of wear or irreparable damage. These tires are a challenging source of waste, because of the big volume produced, the sturdiness of the tires, and also the components within the tire that are ecologically problematic.

Because tires are highly durable and non-biodegradable, they will consume valued space in landfills. If waste tires are improperly managed they will cause rubber pollution. In 1990, it absolutely was estimated that over 1 billion scrap tires were in stockpiles within the u. s.. As of 2015, only 67 million tires remain in stockpiles. From 1994 to 2010, the eu Union increased the number of tires recycled from 25% of annual discards to just about 95%, with roughly half the end-of-life tires used for energy, mostly in cement manufacturing. Pyrolysis and devulcanization could facilitate recycling. apart from use as fuel, the most end use for tires remains ground crumb rubber.

1.2 Machine to remove sidewalls from tires

To removing sidewalls from end-of-life tires: the Sidewall Cutter. But why would you would like to get rid of the sidewalls? What would you are doing with the leftover tread? Both the sidewall and therefore the tread is reused during a sort of applications.

Once a tire hits the tip of its life, what does one do with it? Once there's sidewall damage on tires, there's not much you'll do. Replacement is commonly the sole option. When an end-of-life tire is shipped to recycle, sometimes it's pulled apart to be reused.

1.3 How does the Tire Sidewall Cutter works

Whole tires are dropped at the Sidewall Cutter machine which then picks them up, cuts the sidewalls employing a alloy steel grade cutting blade, and deposits the cut tire back onto the bottom. After this process, you're left with two sidewalls and one tread section. With safety guards built into the Tire Sidewall Cutter, it's been designed with the security of the operator 100% in mind, preventing any injury during operation. additionally, as a results of there being no have to lift these potentially heavy tires, the chance of back injury is minimal. an impression system that needs the user to use two hands behind the guards means the operator is standing safely out of the way while operating the machine. For one more layer of safety, the Sidewall cutter is supplied with 3 Emergency stop buttons.



Figure 1: Tire Side Wall Cutter Machine

2. HEAVY DUTY SAPLER

A staple gun or powered stapler may be a hand-held machine accustomed drive heavy metal staples into wood, plastic, rubber, or masonry. Staple guns are used for several different applications and to affix a range of materials, including insulation, house wrap, roofing, wiring, carpeting, upholstery, and hobby and craft materials. These devices are called trigger tackers. A stapler may be a computer that joins pages of paper or similar material by driving a skinny metal staple through the sheets and folding the ends. Staplers are widely employed in government, business, offices, work places, homes and schools. Most staplers are wont to join multiple sheets of paper. Paper staplers are available two distinct types: manual and electric. Manual staplers are normally hand-held, although models that are used while assail a desk or other surface aren't uncommon. Electric staplers exist in a very type of different designs and models. Their primary operating function is to affix large numbers of paper sheets together in rapid succession. Some electric staplers can coverage to twenty sheets at a time.



Figure 2: Heavy Duty Stapler

2.1 Types

- 1.pneumatic (Compressed air) Power staple
2. Electric Hand Stapler

There are generally three differing types of staple guns distinguished by the facility source wont to operate the gun: manual, electric (From a cord or battery), and pneumatic (Compressed air). Power staple guns can set staples at a somewhat quicker rate than hand-powered models, but their main advantage is that they'll be used continuously for hours with comparatively little fatigue. Some staple guns have a protracted nose that permits the staples to be applied into recessed corners. Another special feature could also be wire guides for wiring to confirm that the staples won't pierce the wire. The "forward action" staple

gun includes a handle that points toward the trigger end, within the wrong way of the normal staple gun. These tools are easier to squeeze and better place pressure at the front of the tool where the staple is ejected. the primary so called "forward action" staple gun was introduced about 1934. A hammer tacker could be a device somewhat almost like a staple gun, except that the energy from the user's muscles is stored like a hammer as momentum of the gun itself, instead of as compression of an interior spring. this sort of stapler is often used for insulation, roofing and carpeting. For most purposes square end staples are used; but some staplers can take rounded end staples for holding cables against a surface. Typical staple leg lengths are 1/4", 5/16", 3/8", 1/2", 17/32", and 9/16", or 6, 8, 10, 12, and 14 millimeters.

2.2 Use of Stepler to joint rubber tires

In this project we are going use an electrical staple gun which is often cheaper than pneumatic tools Any kind of staple or nail gun are often dangerous if misused, and workers should know what safety precautions are necessary. make sure the work area is restricted to only those people necessary to try and do the task. With the electrical gun we are joint the car tires with one another continuously as per road width and length. it's quit easy to joint number of car tires with each and other. it makes work fast and easier and more efficient.



Figure 3: Jointing Tires Together By Using Heavy Duty Stapler

3.CONSTRUCTION METHODOLOGY

3.1 Site Preparation:

- Prepare the location to the planning specifications (grade, Geometry, soil compaction, etc.).the world should then be dressed to be freed from soil clods, roots, stones or vehicle Imprints of any significant size. Any voids should be filled so as to get a smooth laying surface allowing scrap tires to suit flush against the bottom surface contours. As Shown In Fig. 18.



Figure4 : Site Preparation

3.2 Installation

After site preparation you need to cheek the surface of the road if their any undulation or any uneven slop if their give the correct slop to that . After this start the laying car tires on the paved surface in horizontal position. Tires are placed together with width of the road simultaneously length of the road. Keep cheek the their should be no gap between tires it's placed in such away the tires are up-to-date with one another. If there's any gap between the it create troubles at the time of jointing one another. The anchorage trench at the highest could also be crammed with any suitable fill material. If possible, backfill with concrete to scale back the ditch embedded length. The placement of tires shouldn't be during a line it should be in cross zig-zag line As Shown in **figure 19**.



Figure 5: Installation

3.3 Jointing

• After the successful installation the tires should be jointing with one another with the pneumatic heavy duty stapler. Each two tires comprises two staple pins. It required skilled labors. As Shown In Fig.20



Figure 6: Jointing tires with the staple

3.4 Infilling the Tires

Infilling are often performed manually or administrated using mechanical plant like a front-end loader, backhoe bottom dump bucket or a conveyor system. • Tires is full of Course materials, or the other material like Murum, gravel or perhaps concrete etc., betting on the ultimate aesthetics and traffic requirements. • The fill material shall be placed to approximately 20mm above the highest of the Tires and so lightly tramped and levelled to the peak of the tire As Shown In Fig.21



Figure 7: Infilling material

4. RUBBER TIRES

Rubber Tires will be wont to great advantage considering that

1. Geocells and car tires are the sole prefabricated three-dimensional geosynthetics with significant dimension properties;
2. they're easily transported as flat strips welded width-wise at regular intervals, and logistics for giant quantities isn't a Problem;
3. car tires are easy to put in and don't require skilled labor. they will be installed in any weather condition;
4. The in-fill has essentially to be non-cohesion material, however the fabric can be recycled material;
5. Solutions considering used car tires as an answer for any applied science / geotechnical issue always proves to be cost effective with reduced and economic usage of valuable natural resources, including metal / aggregates, sand, cement, etc. the price savings are often as substantial the maximum amount as 30% for building and also the time saving is the maximum amount as 50%;
7. Considering all of the above, scrap tires help reduce carbon foot-print; since atomic number 6 is a necessary ingredient of the HDPE, scrap tires indirectly foster carbon sequestration.

5. CONCLUSIONS

The results of this study were aimed to save lots of the environment from the negative impacts of Tires waste that damaged the environment ashore, sea, and pollution because of the burning of Rubber waste. The results of the analysis using Praxis showed that the geocell of Rubber tires waste could increase the bearing capacity up to 11,94%. this might be another to extend the efficiency up to 65% by reducing capping layer thickness. Therefore, geocells from automobile tire waste could provide an answer to save lots of granular materials, which consequently reduce the transportation cost of materials from quarries to project site and as another for Car tire waste management to forestall the environment pollution.

The following conclusions may be made of the summary presented during this paper:

- 1) Car Tires increased the bearing capacity and stiffness of granular bases. The degree of improvement trusted the sort of infill material and therefore the degree of geocell confinement.
- 2) Car Tires reduced the creep deformation of RAP bases. the quantity and rate of creep deformation of the RAP bases decreased with a rise within the degree of geocell confinement and a decrease within the applied vertical stress.
- 3) Car Tires improved the performance of the bases by reducing the permanent deformation, reducing the vertical stress at the interface of base and subgrade, and increasing the elasticity of RAP bases. The degree of improvement trusted the sort of infill materials and also the degree of geocell confinement.
- 4) Car Tires reduced the desired thickness of the bottom course to realize the identical performance of the unpaved road over weak subgrade.
- 5) the planning methods were proposed to style geocell-reinforced unpaved roads. More research is required to validate these design methods

6. ACKNOWLEDGEMENT

We feel privileged to acknowledgement with deep sense of gratitude to our Project guide **Prof. S. S. Manekari**. for his valuable suggestions in selecting his topic for the project. His timely advice and valuable suggestions helped us to place our efforts in satisfactory manner and for completion of the report. We are thankful to our principal **Dr. U. S. Mugale**. and head of department **Prof. A.A. Patil**. for providing all the specified facilities which helped us in our work. Last but not the smallest amount we thank all people who have helped directly or indirectly for the completion of our report.

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