A Review Paper on Alternate Use of Composite Railway Sleepers

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Index Terms **- About four(minimum) key words or phrases in alphabetical order, separated by commas.**

1.INTRODUCTION

Railway track system has various kind of material are used for the producing of sleepers. In railway track durability and strength performs an important function in railway. Now a day Concrete, metal is material use for current improvement of sleepers, it is generally used in countries. In India more than two billion sleepers are used for set up of railway track device. The uses of concrete sleepers provide high gauge retaining capacity than the other, but this sleeper is heavy in weight as compare to wooden sleepers. Many railway infrastructures companies have long been trialing concrete and steel for replacing timber sleepers in existing railway tracks. However, this maintenance strategy has gained limited success.

These materials did not prove to be a viable alternative to timber sleepers. Worldwide most of the maintenance and construction of railway tracks still utilised timber sleepers despite the increasing reliability and effectiveness of alternatives such as steel and concrete. These problems have resulted in more premature failures and higher replacement rates of timber sleepers. It is special purpose product use under the track of railway. Effective material for replacing traditional sleepers. Hence, the use of composite sleepers has emerged as a potential alternative. Composite sleepers are environment friendly, highest in performance in comparison to other sleepers and provide an outstanding value to its rail customers.

Composite sleepers use decreases maintenance cost of track and increases its lifespan up to 50 years. Indian railways use composite sleepers for construction of railroad bridges. As evaluate to this all we should slight new generation for the Indian railway track system i.e., composite railway sleeper that's environmentally friendly and suitable overall performance in assessment of different railway sleepers.

The Railways has decided to use the composite sleepers in a limited way. It is being used mainly on girder bridges," a senior Railway. Ministry official told IANS, Composite sleepers were first used by the Railways in the Muradabad division in 2003.

The technology of composite railway sleeper has been advanced in several exclusive components of nations. The composite railway sleepers are the satisfactory opportunity for timber sleepers. The composite railway sleeper improve green footprints and it is green in concept as well because it includes 3R (Reuse, Recycle, Reduce) method of reduced waste.

2 TRADITIONAL MATERIALS USE FOR RAILWAY SLEEPERS

2.1 STEEL

Steel sleepers are tolerably utilized. Steel sleepers can be intermixed with the current track however in a fixed intermixing example to lessen the variety in the track geometry and forestall the administration

disappointment of sleepers. A steel sleeper is lighter in weight than timber sleeper which makes it simple to handle just as having a life expectancy known to be in overabundance of 50 years. In any case, steel sleepers are being utilized distinctly on all the more gently voyaged tracks and are viewed as reasonable just where rates are 160 km/h or less. Steel sleepers require more consideration during establishment and packing because of their reversed through profile which makes them unacceptably pressed with weight. Perceptions of rail redirections under forced vehicle track stacking have indicated that the steel sleepers' settlement is more noteworthy in sum than the timber sleepers, demonstrating that the steel and nearby timber sleepers are not conveying an even extent of the forced wheel stacking. Besides, steel sleepers are uneconomical and are utilized just less in number in light of the fact that of the dread of consumption. Another issue with steel sleepers is weakness splitting in the attaching gaps brought about by moving trains.

2.2 TIMBER

Timber sleepers have proved to be effective and reliable in performance in the railway environment. Timber sleepers are differentiated from their flexibility. They can be adjusted in all type of railway track. Timber sleepers are viable, easy going, easy to replace and needs no complicated assembly equipment. This is particularly attractive in high speed or high-density lines where track time is both limited and restrained by the ability to bring in large scale production. Their tractability to mechanical and biological degradation leading to failure is their major disadvantage. Cleaving of timber at the ends is also common as railway sleepers support very large transverse shear loadings. However, the most typical problem that the railway is now facing is the diminishing availability of quality timber for railway sleepers. Use of chemical preservatives to timber sleepers is affecting environment as well as causing health hazards. Creosote impregnated timber sleepers were in trend in history of railway industry. This industry is still depending on these sleepers in the absence of satisfactory substituted to timber. Efforts have been made to confine the use of creosote impregnated timber sleepers and to tighten regulations on the production process due to environmental concerns. Reports worldwide suggest that the disposal to landfill of preservative-treated timber sleepers is at present an acceptable option. Re-use of sleepers exist such as in-home garden applications, but these are only for untreated timber sleepers. Industries are also unwilling to recycle chemically impregnated timber products due to concerns over workers safety and environmental problems. Combustion or incineration is also not an acceptable option due to the toxicity of the ash. Clearly, an environment-friendly material should be developed as an alternative to chemical impregnated timber railway sleepers.

2.3 CONCRETE

Pre-stressed concrete sleepers have become chiefly and successfully recognized for railway sleeper usage especially in high speed lines. Their economic and technical benefits are the consequences of longer life cycles and lower maintenance costs. With their heavy weight, concrete sleepers assure maximum permanence and stability even for traffic at high speeds. Many pre-stressed concrete sleeper technologies have now been developed and successfully tested. Monoblock pre-stressed concrete sleepers are the most commonly used. Twin-bloc, on the other hand, is gaining popularity because it weighs less compared to Monoblock sleepers. Twin-bloc sleeper is made up of two concrete parts supported by steel reinforcements. However, handling and placing of twin-bloc sleepers can be difficult due to the tendency to twist when lifted. The rails are supported continuously on the concrete members, which distribute the load longitudinally thereby reducing the need for ballast maintenance. Further developments in the technology of concrete sleepers have since seen the introduction of low-profile concrete sleepers. New sleeper has similar dimensions to an existing timber sleeper. This is of great benefit to the railway infrastructure owners who want the long-term benefits of concrete but cannot (because of size restrictions) use the traditionally designed concrete sleepers. This sleeper is specifically designed to be intermix with timber sleepers in existing timber tracks or to replace timber sleepers that have reached the end of their useful life. However, this sleeper is limited to only mainline sleeper replacement as it has specific pattern to hold track gauge. The problem with concrete sleepers is their heavy weight which requires complicated machinery during laying and installation. The initial cost of concrete sleepers is almost double that of hardwood timber sleepers. Concrete sleepers

are stiffer, and their design requires greater depth than the existing timber sleepers. Concrete sleepers are also sensitive to rail seat corrosion resulting from the absence of a resilient rail pad and the concrete.

3. LITERATURE REVIEW

1. Rajendran R. et. al., (2015), "Study on behavior of composite sleepers." This was concluded that the strength of composite sleepers is comparable to existing sleepers also they require less maintenance.
2. Saurabh rao et. al., (2018), "Composite plastic sleepers in Railways." This was concluded that composite sleepers are suitable to use in bridges since it dead load and in railway crossings due to change in load from one track to another to overcome accidents.
3. Wahid Ferdous et. al., (2015) "Composite railway sleepers' recent developments, challenges and future prospects." This was concluded that composite sleepers have better properties than existing sleepers property.
4. Amir Ghorbani et. al., (2013) "Polymeric composite railway sleepers. " This was concluded that composite sleeper has good property such as corrosion and chemical resistance, environmental durability. They will create ecological benefits due to their recyclability.
5. Chirag jain et. al., (2016) "Composite material for Railway sleepers in railway track." This was concluded that Adoption of composite sleepers prove to be less distractive to forest & easily installation, repair and maintenance and save from landfill and greenhouse effect.

4 RAW MATERIALS USING FOR COMPOSITE SLEEPER

4.1 HDPE

The composite sleepers consist of sand, mixture of shredded HDPE, rubber form whole post-consumer tyres, rubber from retreaters, other waste materials, chemical additives, fiber as reinforcement and fillers. The composite sleeper may include following materials.

High-density polyethylene (HDPE) or polyethylene high density (PEHD) is a thermoplastic polymer made from the monomer ethylene. With a high energy-to-density ratio, HDPE is used within the manufacturing of plastic bottles, corrosion-resistant piping, geomembrane and plastic lumber.

Density: 940 kg/m3
Melting point: 130.8 C°
Crystallinity: 60%

4.2 WASTE RUBBER

Reinforced rubber merchandise combines a rubber matrix and a reinforcing fabric, so excessive energy to flexibility ratios can be done. The reinforcing material, generally a form of fibre, gives the strength and stiffness.

4.3 GLASS FIBER

An individual structural glass fiber is each stiff and strong in tension and compression—this is, alongside its axis. Even though it might be assumed that the fiber is weak in compression, it's far honestly simplest the long element ratio of the fiber which makes it seem so; i.e., because an average fiber is long and narrow, it buckles without problems. However, the glass fiber is weak in shear—this is, throughout its axis. Therefore, if a set of fibers can be organized completely in a preferred direction inside a material, and in the event that they can be prevented from buckling in compression, the material could be preferentially sturdy in that direction.

5. CONCLUSION

This have a look at depicts that composite sleeper are good opportunity for wooden and urban sleepers. It has good power than the other conventional sleepers. Composite sleepers are powerful load transferring without any reduction. Plastic are exceedingly resistance towards degradation from climate influence, therefore, it could be recycled and used as a beneficial product. Hence, it supports for green environment. More in general, to provide right track stiffness from a point of view of damage and vibration composite sleepers can provide a terrific solution.

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