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Conversion of Demolished Construction Waste into Recycled Aggregates

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ABSTRACT

Urbanization and industrialization go hand in hand affecting the change in life style of an individual. Demolition of old and non-economic structures and construction of new is the basic cycle humans are following. This is affecting the environment at an adverse rate due to wastage of recyclable materials and production of new raw materials. Construction industry is one of key producers of non-recyclable waste so it is our duty to find ways and methods to use the demolished waste from the construction industry and convert it into usable form. Demolished concrete is one of the key ingredients of this waste industry but with some mechanical procedures and alterations this can be converted into usable form sufficient to be used in construction process. This paper provides an overview of the mechanical process used for converting the demolished concrete into usable concrete and admixtures used for making this concrete more efficient.

Keywords: Demolished waste, Construction Industry, Recyclable Materials, Construction Engineering, and Admixture's.

1. INTRODUCTION

Urbanization growth rate in India is rapidly increasing due to industrialization. Growth rate of India is reaching 9% of GDP. Rapid infrastructure development requires a large quantity of construction materials, land requirements. For large construction, concrete is preferred as it has longer life, low maintenance cost & better performance. For achieving GDP rate, smaller structures are demolished & new towers are constructed. Protection of environment is a basic factor which is directly connected with the survival of the human race. Parameters like protection of natural resources, sustainable development, play an important role in modern requirements of construction works. Hence use of demolished waste in some form is the matter of concern. These demolished waste can be converted into recycled aggregate with the help of mechanical equipment's making it suitable for construction process. The only issue is that these recycled aggregates so produced lack the efficiency of new concrete hence cannot be used for high rise buildings. The recycled aggregate can be used to their best ability by adding admixtures such as micro fine and ultrafine which alters the properties the of construction materials making it available of advance use and causing less harm to the environment. By adding admixture to the recycled concrete the properties that the recycled concrete lacking can be compensated. The recycled concrete so formed adding admixture increases workability and strength which is of great use in construction of high rise buildings, it also increases life span of the buildings.

2. PRODUCTION OF RECYCLED AGGREGATES

2.1. Definition: Recycled aggregates come from reprocessing materials that have previously been used in construction. There are two methods of producing recycled aggregate:

At the Site of the Source: The benefits of this include saving on transport costs and the environmental benefits of reducing lorry movements in a central plant

At the Processing Unit: This is done by using machinery units in a specified production plant.

2.1.1 Processing of Recycled Aggregates

For construction through recycled aggregates it is important to convert the demolished aggregate into usable form. That can be done through:

- Collection of raw demolished waste.
- Segregation of the collected waste.
- Transporting the raw material to the plant
- Crushing
- Washing
- Scribing and Sizing

i. Collection of Raw Demolished Waste

Raw material for demolished waste is collected from the demolished sites that are of no use or are being renovated for future purpose.

ii. Segregation of the Collected Waste

The waste concrete so collected is segregated manually. The trash such as wood, paper etc are removed and metals such as iron are removed with the help of a magnet.

iii. Transporting the Raw Material to the Plant

The segregated waste concrete so obtained is loaded in a truck and transported to the plant where the actual process of converting the demolished aggregate into usable matter is done.

iv. Crushing

Concrete aggregate collected from demolished sites is put through a crushing machine. Crushing facilities accept only uncontaminated concrete, which must be free of trash, wood, paper and other such materials. Metals such as rebar are accepted, since they can be removed with magnets and other sorting devices and melted down for recycling elsewhere. The remaining aggregate chunks are sorted by size. Larger chunks may go through the crusher again. After crushing has taken place, other particulates are filtered out through a variety of methods including hand-picking and water flotation.

v. Washing

The product so obtained after crushing is washed thoroughly so that all the small impurities get flown away with the water and pure aggregate is left out.

vi. Scribing and Sizing

This is the final step of processing of recycled aggregate. In this step the aggregate so obtained are sieved thoroughly and classified accordingly for future use.

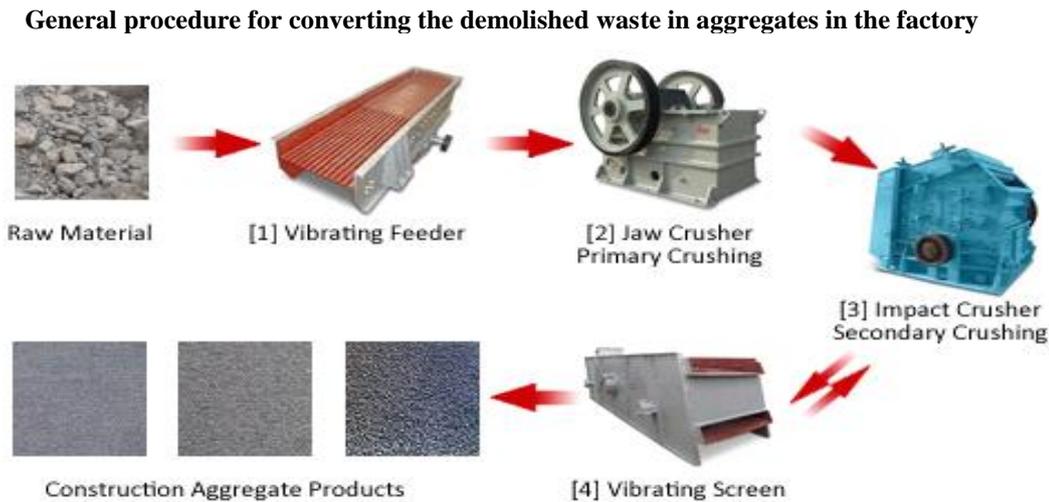


Fig: 1 General Procedure for Converting the Demolished Waste in Aggregates in the Factory
(<http://www.dscrusher.com/special-reports/05/process.jpg>)

3. EFFECT OF ADMIXTURES ON RECYCLED AGGREGATES: ALCOFINE 1203

The normal recycled aggregate so formed after processing can be used for construction to some extent but it has a lot of limitation. In order to enhance the properties of this aggregate so produced additives are introduced in the construction process so as to enhance the properties of the recycled aggregate. Alcofine 1203 is one of the most effective admixtures used in the construction industry for enhancing the properties of recycled aggregates.

I. Properties of ALCOFINE 1203

Alcofine 1203 is proprietary low calcium silicate based mineral additive. Controlled granulation process results in unique particle size distribution. Its latent hydraulic property and pozzolanic reactivity results in enhanced hydration process. Addition of Alcofine 1203 improves the packing density of paste component. This results in lowering water demand, admixture dosage and hence improving strength and durability parameters of concrete at all ages.

A. Application of ALCOFINE 1203:

- RCC residential, commercial structures
- High rise structures with challenging situations to pump the concrete with ease
- Temperature controlled mass concrete for raft and pile foundations
- Aluminium / tunnel form work with high flow or self-compacting concrete
- High performance concrete with extremely low water to binder ratio
- Shotcrete with improved cohesion and faster initial strength gain
- Precast concrete elements for tunnels, bridge, segmental construction, blocks, hollow core slabs, commercial precast units
- Post tension / pre stressed concrete slab
- Construction grouts, plasters, repair mortars
- LEED / GREEN compliant structures

B. Advantages OF ALCOFINE1203:

- Improves durability parameters of concrete by refined pore structure, reduces permeability
- Improves the resistance of concrete to aggressive environmental agents
- Maintains the pH of the concrete to protect steel reinforcement
- Improves pump ability of concrete
- Enhanced slump and extended slump retention without increasing the dosage of expensive chemical admixtures
- Faster removal of shuttering, quick rotation of forms in precast industry
- Enhanced rate of strength gain in concrete mixes with high pozzolanic material contents like fly ash, GGBS, etc.

4. CONCLUSION

The main purpose of this paper is to bring attention towards the waste generation through the construction industry and the methods which can be adopted to reuse the demolished waste generated from this industry. The demolished waste industry is really big and as time passes by this industry will get bigger. Hence it is really important to make use to these demolished waste as much as possible. But demolished waste has some limitations when used in construction industry, which can be compensated by addition of admixture which enhances the properties of demolished waste making it more suitable for construction contributing towards the environment and social life.

5. SCOPE OF RECYCLED AGGREGATE IN CONSTRUCTION INDUSTRY

Construction industry is one of the fastest growing industry in the world hence producing waste at a greater extent than expected. The waste so produced can be reused by converting it into usable form contributing directly or indirectly to the environment. Following are the scope of recycled aggregates:

- Decrease in the amount of disposal of demolished waste hence more availability of land.
- Recycled aggregate can be used as earth filling in road construction.
- Can be used in construction of rigid pavements.
- Recycled aggregates can be used as ballast in railways.
- Recycled aggregate with upgraded properties can be used as a replacement for natural aggregate.

6. REFERENCE

- [1] International Journal of modern Trends in engineering & research. Areview on Alcofine (Volume 02, Issue 8 August),Saurabh Gupta (ETAL) Civil department, Nitter Chandigarh.
- [2] International Journal of Scientific research and Education. Comparision between simple concrete cubes & Alcofine mixed concrete cubes (M20 grade, Vol 5, issued on 9 sept 2015)
- [3] International Research Journal of engineering & technology (IRJET) Recycled concrete aggregate (vol 2, issued on 6 sept 2015) Akansha Tiwari (Mtech student, IIT,Roorkee)
- [4] International Journal of Engineering Trends & Technology (IJETT) Study of recycled concrete aggregate (vol 13, issued on 3 july 2014) Jitendra Sharma (ETAL) (Student, civil engineering, MIT)
- [5] International Research Journal of engineering & technology (IRJET) Sustainable concrete made from recycled aggregates (vol 7, issued on 3 may 2016)
- [6] Science Direct Durability of recycled aggregate (vol 34, issued on 11 nov 2014) Prof.Almaida Prado (Brazalian concrete institute, Brazil)
- [7] American journal of engineering research (AJER) Influence of mineral admixture (Alcofine 1203) on proper ties of hybrid fibre reinforced concrete (vol 5, issued in 2016)