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Recycling and Reuse of Waste Concrete as Aggregate and Filling Material

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***Abstract:** This report provides some applications on the current state of waste concrete management play worldwide. In some countries a near full recovery of concrete is achieved. However, in many parts of the world the potential to recover excess manufactured concrete is overlooked and it ends up as unnecessary waste in landfill. Recycling or recovering of concrete has three main advantages: (1) it reduces the use of new aggregate and the associated environmental costs of transportation. (2) it reduces unnecessary landfill of valuable materials that can be recovered and redeployed and (3) the waste concrete is new find to the replacement of aggregate as murum filling or during manufacture of concrete. The main objective of this report is too aware about concrete recycling as an issue and to encourage thinking in this area. The report ultimately promotes a goal of "full landfill" by waste concrete. However, it needs to be noted that cement producers can have an indirect role in supporting this goal. With good initial planning and design, well considered advanced and managed demolition, sustainable development using waste concrete is achievable. The report recommends that all players adopt sustainable thinking when it comes to concrete. This paper includes various detailed studies about generation of waste concrete and its sources. also, it suggests various adequate solutions to overcome the problem of waste concrete. It also includes various activities which promote the efficient use of waste concrete which is tremendously generated now a day.*

***Keywords:** Recycling, Waste Concrete, Sustainable, Demolition, Landfill etc.*

I. INTRODUCTION

As concrete is everywhere, it is the second most used material after water and it shapes to build our environment. Homes, schools, hospitals, offices, roads, dams and runways all make mass use of concrete for their construction. Concrete is extremely durable and can last for hundreds of years in many applications.

However, human needs change and waste is generated – more than 900 million tons per annum in Europe, the US and Japan alone, with unknown quantities elsewhere. Concrete recovery is achievable. concrete can be crushed and reused as aggregate in new projects.

In the near future a substantial amount of concrete from construction undertaken during the economic growth of the 1960s and 1970s will reach its end of life and the generation of demolished concrete is expected to increase rapidly.

II. GENERATION OF WASTE CONCRETE

For minor projects or major construction where Ready Mix concrete (RMC) is not under practice excess amount of concrete is manufactured during the process execution.

During this execution the excess concrete sometimes get hardened due to passing of its setting time and hence it cannot be used for concreting and therefore the same is dumped as waste concrete.

There is some minor quantity of waste concrete generated during renovation and maintenance of existing old structure. This quantity is not considered as waste but it contributes in mass development of waste if overlooked without handling. Also, the mass quantity of waste concrete is generated mainly due to the demolition of an old structure. During the demolition the steel from the structure can be recycled as there is scrap value for steel but the problem remains of concrete of the structure as it remains as dead material which is of no use and has no scrap value

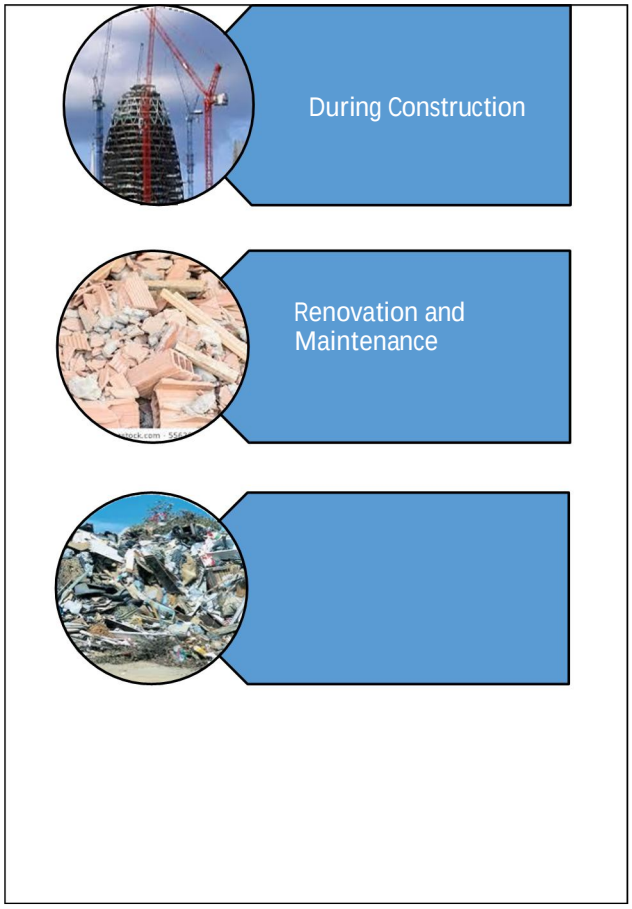

Fig-1 Activities involved in Waste Concrete Generation

III. IMPACT OF WASTE CONCRETE

As concrete is a non-degradable material, it creates various impacts on different parameters such as,

A. It remains as dead weight on Earth's surface.
B. If it is not handled properly, it may clog the flow of natural water bodies.
C. The Growth of heaps of waste Concrete also causes aesthetical discomfort.
D. It also produces concrete dust which causes air pollution.
E. Reinforced concrete has steelre-baring which causes handling problems and require heavy machine for handling the same.
F. The presence of some substances in concrete including useful and. unwanted additives can cause health concerns

IV. APPLICATIONS OF WASTE CONCRETE

1) *Landfilling:* For unevenly levelled grounds the waste concrete can be used as a filling material for levelling the same.
2) *For Roads:* The base course of road work can be replaced by waste concrete which provides better stability and strength to the road. The waste concrete can directly use as pavement material for temporary roads in water bound macadam(WBM) the waste concrete can be used in some percentage as a replacement for filling material like murum. To improve soil strength and stability waste concrete can be used as a stabilizer.
3) *Aggregate Replacement:* The waste concrete can indirectly use as aggregate for brand new concrete after crushing process if it is free from contaminates. The size of waste concrete can be brought within required size by conducting this process on it.
4) *Rip-rap revetments to control stream bank erosions:* Larger pieces of crushed concrete can be used as a rip-rap revetment which are very effective methods for controlling stream bank erosions. Instead of stone the waste concrete can be used for pitching to reduce the erosion of soil

V. ADVANTAGES OF WASTE CONCRETE

1) *Save environment:* There is no excavation of natural resources & less transportation. Also less land is required.
2) *Cost Efficiency:* There are no harmful effects on concrete & it is expected that the increase in the cost of cement could be avoided by the lower cost of Recycled Concrete Aggregate (RCA).
3) *Save Time:* There is no waiting for material availability hence the market feasibility cannot affect the progress of work.
4) There is less emission of carbon due to less crushing.
5) It can be used to reduce the impact of waste concrete on environment.

VI. DISADVANTAGES OF WASTE CONCRETE

A Less quality as it is a waste material (e.g. compressive strength reduces by 10-30%).
B Duration of procurement of materials may affect life cycle of project
C If the waste concrete is having contaminates then it cannot be used as an aggregate in fresh concrete.

VII. CONCLUSION

A. Due to use of waste concrete in construction, energy & cost of transportation of natural resources & excavation is significantly saved. This in turn directly reduces the impact of waste material on environment
B. Recycled concrete can solve the problem of lack of stone aggregates as well as protect their quarries.
C. In the present work a guidance of tests and limits of RCA is proposed in order to be used as a basis for pilot and long scale works where the use of RCA can be estimated as more economic and friendlier to the environment.
D. Contractors, engineers and architects look for ways to make the most of recycled concrete achieving significant mechanical performances.

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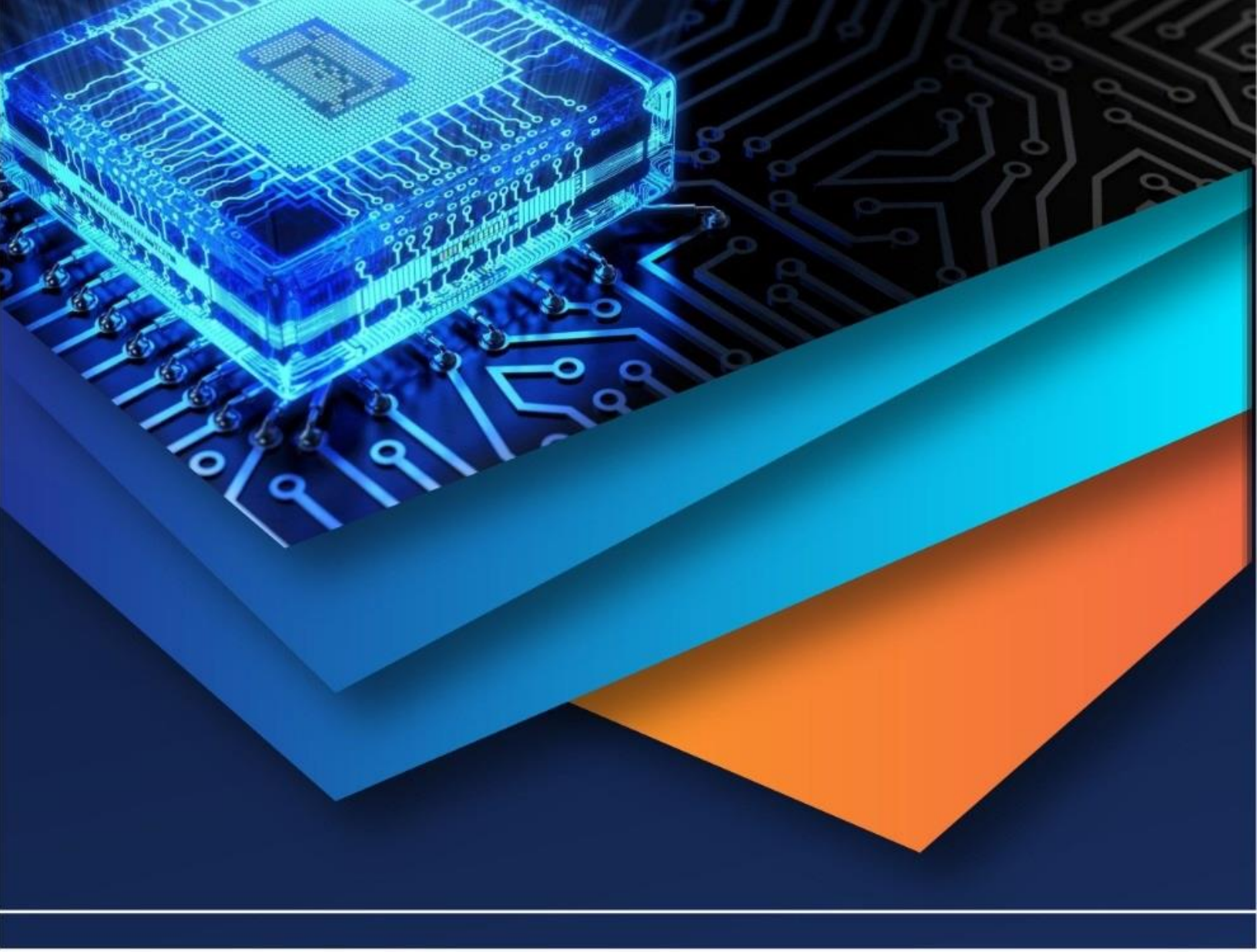

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