
Review on Effect of Recycled Coarse Aggregates on Properties of Concrete

Er. Rajan Vinayak, Er. Sandeep Maan, Vineet Garg
Baba Farid College of Engineering & Technology, Bathinda

ABSTRACT

Recycling is the system in which the waste material is used to make a innovative material. Aggregate is the hardest natural substance which is obtained by the crushing of mine rocks and to make conventional concrete. The feature of recycled coarse aggregates could be opposing by its predictable concrete because the predictable concrete was designed for its basis such as porous, long-lasting and high strength concrete. Recycled coarse aggregates can be replaced by natural coarse aggregates with different proportions which can further used in a new construction building.

Keywords: *Natural Aggregates, Recycled Aggregates, Waste Material, concrete.*

INTRODUCTION

In the present time-period, consumption of fossil fuels are enlarged in high amount due to which the global warming is greater than before in high ratio little by little and due to this there is the disturbance in the natural cycle. In construction work the concrete is very widely used construction material all over the world with the present calculated annual consumption of 6.2 billion tons a year. Concrete is made up of cement, fine aggregates, coarse aggregates and water; every so often admixtures are supplementary into the concrete to modify the properties of concrete. For stable the development, the construction works need to change the usage of new material with recycled material so that the natural resources can be saved.

LITERATURE REVIEW

Research work on recycled aggregate had been tested all over the world. There are few reviews by the different peoples on the Recycled coarse aggregate and recycled aggregate concrete are shown below:-

Mandal, S. et.al. (2002) presented the outcome of recycled concrete aggregate. This research shows that there was low difference in strength with the replacement of 30% of recycled aggregate by the natural aggregate but if little by little increased then strength becomes decreased as compared to the 100% natural aggregate concrete specimen.

Nik D.Oikonomou et.al. (2004) proposed the outcome of an “Recycled concrete aggregates”. This paper aims to use the high amount of raw materials, consumption of high amounts of energy for transport and production. The necessity for the re-use of Recycled coarse aggregate was to decrease the high volumes of fresh concrete and for friendly co-existence of man and nature was set. This study shows that the coarse aggregate upto 30% should meet the terms with the natural aggregates.

Jianzhuang Xiao et.al (2004) suggested the outcome of an “Mechanical properties of recycled aggregate concrete under uniaxial loading”. This paper deals with the environmental preservation and effective utilization of resources. The properties of Recycled concrete aggregate were checked by various proportions of 0%, 30%, 50%, 80% and 100%. This study shows that the compressive strength of recycled aggregate concrete was generally decrease with increase in recycled aggregate. The elastic modulus was reduced by 45%, peak strain was increased by 20% while 100% replacement of natural aggregate by recycled aggregate.

S.C kon et.al (2012) suggested the outcome of an “Construction and building materials”. This paper aims to use the recycled aggregate in concrete. In this study the effects of incorporating class F flyash in the concrete

mix design to mitigate the lower quality of recycled aggregate in concrete. The result shown that 28 days compressive strength of concrete mixtures decreased with an increase in recycled aggregate content due to adhered mortar content, higher water absorption of recycled aggregate. The carbonation depth was increased with an increase in the replacement ratio of coarse natural aggregate by recycled aggregate.

G. Murali et.al. (2012) proposed the outcome of an “Experimental study on Recycled aggregate concrete”. This research aims to recycling of construction and demolition wastes which has been used in production to decrease the usage of natural resources and to increase the consumption of waste material. This study reveals that the compressive strength was found 27.45 N/mm² of natural aggregates and 22.3 N/mm² recycled aggregates which clearly shows that the strength was decreased. Flexural strength was also decreased by 0.60 N/mm². The compressive strength, flexural, split tensile strength of recycled aggregate was found to be less than the natural aggregate.

Sudhir P.Patil et.al. (2013) presented the outcome of an “Recycled coarse aggregates”. This research reveals that the wastage of concrete material increased slowly consequently and evaluate the physical properties by the use of Recycled coarse aggregate (RCA) in fresh concrete, This study shows that the 12 % of compressive strength after 28 days was increased by adding 50% of Recycled coarse aggregate (RCA) and 50% of Natural coarse aggregate (NAC) in a fresh concrete and Split tensile strength was approximately the same. Slump of the normal concrete was observed to be less than the Recycled concrete.

Manjunath M et.al. (2015) suggested the outcome of an “Correlation between Flexural strength of natural aggregate concrete and recycled aggregate concrete”. This research shows that the concrete made of natural aggregate with different proportions of Recycled coarse aggregate (RCA) 0%, 10%, 20%, 30%, 40%, 50%, 80% and 100% in a mix design of M20, M30 and was tested flexural strength of Natural coarse aggregate (NCA) & Recycled coarse aggregate (RCA). This study shows the water absorption of Recycled coarse aggregate was increased in high amount than the Natural coarse aggregate. The co-efficient of correlation have higher value and may be preferred by its simplicity and suitability.

Tomas U.Ganiron Jr. et.al. (2015) presented the outcome of an “Recycling concrete debris from construction and demolition waste”. This paper aims to reduce the environmental impact of the building sector and to increase the aspects of recycling have to be included in the design phase. This study aimed to seek the important in the production of good quality construction products out of recycled material. This study shows that proportions of the recycled concrete affect the cement and water that it absorbed the most of water in the mixture. The recycled concrete was also obtained high value of slump and low compressive strength at its seventh day of curing.

Manjunath M. et.al. (2015) presented the outcome of an “Effect of replacement of natural aggregates by recycled aggregates derived from field demolished concrete on the workability and strength characteristics of concrete”. This research aims to experimental investigation on the effect of replacing natural aggregates by recycled aggregates at different percentages (0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100). This study is on the basis to achieve the major emphasis laid on the use of waste concrete or building material and by products in cement for new construction. This study shown the workability of concrete reduced when the percentage of replacement of Recycled concrete aggregate increased in place of Natural aggregate concrete. Also there was reduction in compressive strength, flexural strength and impact value with the increase in percentage of replacement of Natural aggregate concrete by Recycled concrete aggregate. The concrete produced with 100% replacement of Natural aggregate concrete by Recycled concrete aggregate then the flexural strength was decreased by 24.68%, compressive strength was decreased by 27.80% and impact value was decreased by 26.92%.

Gargi Kushwah et.al. (2016) proposed the outcome of an “Experimental study of recycled aggregate concrete”. This research reveals that the effects on its compressive strength by replacing the natural aggregates with recycled aggregates in different proportions after 7, 14 and 18 days by crushing. This study shows that the use of recycled concrete aggregate upto 33% in fresh concrete does not influence the compressive strength at a high rate and it can be used to construct low-rise structure, pavement design, road construction etc. and resolve the environment issue due to the demolition of old structure.

Conclusion:

As per the above literatures the recycled aggregates can be replaced with natural aggregates upto an extent limit which can be used for new construction. Investigation in this literature has been done on the basis of properties of aggregates and due to this cost has been decreased by replacing the natural aggregates with recycled aggregates by 20%. According to the literature, can be categorized the concrete by replacing the different percentage of natural aggregate concrete with recycled aggregate concrete. Various tests had been performed like split tensile test, Flexural test, Slump test to check the workability of concrete.

REFERENCES

- 1) Gargi Kushwah, Kirti Chanadraul, Manindra Kumar singh, “*Experimental Study Of Recycled Aggregate Concrete*”, IJRASET, Volume 4 Issue I, January 2016, pp.326-329.
- 2) Manjunath M, Prakash K B, “*Effect Of Replacement Of Natural Aggregates By Recycled Aggregates Derived From Field Demolished Concrete On The Workability And Strength Characteristics Of Concrete*”, IJES, Volume 6, No 2, 2015, pp-119-128.
- 3) Tomas U. Ganiron Jr, “ *Recycling Concrete Debris From Construction And Demolition Waste*” , IJAST, Vol.77 (2015), pp.7-24.
- 4) Manjunath M and Prakash K B, “*Correlation Between Flexural Strength Of Natural Aggregate Concrete And Recycled Aggregate Concrete*”, IRJET, Volume: 02 Issue: 06 | Sep-2015, pp.947-951.
- 5) Sudhir P.Patil, Ganesh S.Ingle, Prashant D.Sathe, “*Recycled Coarse Aggregates*”, International Journal of Advanced Technology in Civil Engineering, Volume-2, Issue-1, 2013, pp- 27-33.
- 6) G. Murali, C.M. Vivek Vardhan, Gabriela Rajan, G.J. Janani, N. Shifu Jajan and R. Ramya sri, “ *Experimental Study On Recycled Aggregate Concrete*”, IJERA, Vol. 2, Issue 2, Mar-Apr 2012, pp.407 -410.
- 7) Jianzhuang Xiao a, Yijie Huang a, Jie Yang a, Ch. Zhang “*Mechanical Properties Of Confined Recycled Aggregate Concrete Under Axial Compression*”, Elsevier, Construction and Building Materials 26 (2012), pp.591–603.
- 8) Nik. D. Oikonomou, “*Recycled Concrete Aggregates*”, Elsevier, Cement & Concrete Composites 27 (2005) pp. 315–318.
- 9) S.C. Kou, C.S. Poon, “*Enhancing The Durability Properties Of Concrete Prepared With Coarse Recycled Aggregate*”, Elsevier, Construction and Building Materials 35 (2012) pp. 69–76.
- 10) S. Mandal, S. Chakraborty, and A. Gupta, “Some studies on durability of recycled aggregate concrete” The Indian Concrete Journal, June 2002.