



A Review on Influence of Manufacturing Waste (Carbon Black) on Properties of Concrete

Md Amir Raza¹, Afroz Vakil¹, Naziya Anjum¹, Tanveerul Gani¹, Prof Aquib Ansari²

¹UG Student, Civil Engg. Department, ACET, Nagpur, Maharashtra, India

²Assistant Professor, Civil Engg. Department, ACET, Nagpur, Maharashtra, India

ABSTRACT

From the beginning, concrete has been an essential building material in the construction industry. This concrete contains pores and micro-cracks which lead to less resistance of atmospheric attacks and acid intrusions. This can be resolved by making concrete denser by adding filler which will decrease permeability and increase durability and strength of concrete. So, an experimental attempt is made to fill these pores in concrete by adding Carbon Black Powder, obtained from waste of rubber industry which acts as filler in concrete. This paper presents a review of all such authors who had used

To suggest the optimum percentage of carbon black to be added in concretes with carbon black of different percentage were cast. A comparison of strength is made between conventional and non-conventional concrete blocks. It is observed that the strength gets dramatically increased with the addition of filler in the concrete and hence shows good performance in durability with addition of Carbon Black in the concrete. This paper presents a review of all such authors who had used Carbon Black in various forms for to determine its optimum doses and its various properties.

Keywords: Carbon black as a filler, Compressive strength

I. INTRODUCTION

Concrete is a composite material and is a vital material in construction industry. An ordinary concrete is composed by cement, aggregates and water in appropriate proportions. It is a porous material which contains air voids, capillary pores and gel pore of various sizes hence affects the property of concrete by intrusion of various acids and atmospheric attacks which makes the concrete weak. Moreover, the presence of pores decreases the compressive strength of the concrete.

To mitigate this problem, its determined that making the concrete denser by using filler to fill its pores. One of the filler that can be used and is eco-friendly is Carbon Black. Carbon black is a waste material which is obtained from rubber industries as rubber waste. It is in the form of colloidal particles whose particle size range from 8 nano meters to 100 nanometers. Its formation in huge amount creates problems in disposal and when it gets mixed with soil, it reduces its properties. It also contaminates the water which leads to water pollution. Specific gravity of carbon black was computed by density bottle method and it was

found to be 1.29 pH and it was determined to be 6. by this it is considered as utmost inert material.

The use of carbon black is effective as small size particles fill the pores in concrete and making it denser. Hence, we can say that use of carbon black as pores fillers in concrete reduces this problem effectively.



Figure 1. Carbon Black in powder form

II. LITERATURE REVIEW

1. Dr. G. Chitra, P. Vetri Selvi and Dr. D. Vijayalakshmi (2014)

In this paper authors included Carbon Black as an Additive in Conventional Concrete. Addition of carbon black beyond 8% is found to be not effective which was seen from the reduction of the performance of 12% and 15% samples. It was concluded that the addition of Carbon Black up to 5% as a filler will be very effective in concrete. Moreover, addition of 8% Carbon Black in the concrete shows excellent closure of pores and for water absorption.

2. Gaurav Navnit Nagavkar (2017)

Author studied the effect on properties of concrete with partial replacement of additives with cement. Additives used were Carbon Black in varied percentages. It was observed that the addition of waste material and other admixtures in cement concrete enhances the compressive, tensile and flexure strength on the other hand it also makes concrete more economical and eco-friendly.

3. B. Padma Priya, Mrs. K. Pandeewari (2016)

Author investigated the effects of compressive strength of concrete by addition of Carbon Black up

to 30%. Carbon Black was replaced by cement and proved to give higher value of compressive strength. The addition of PET (Polyethylene Terephthalate) lowered the strength of concrete and hence Carbon Black was added in order to increase the strength.

4. Perviz Ahmedzade and Tacetinn Geckil (2017)

The effect of carbon black on mechanical and electrical properties of asphalt mixture was investigated by the authors. Marshal stability test, creep stiffness, indirect tensile modulus and indirect tensile strength test were performed. Based on the value best result were obtained from the mixture with carbon black as filler. Result of investigation shows that carbon black improves both mechanical and electrical conductivity of asphalt mixture

5. M.H Kharitas Yousef And M. Alnassar,(2008)

To investigate the shielding property carbon powder was added to concrete made of hematite aggregate. Carbon powder was added in different percentage and it was found that the result of 6% (by wt) of concrete could increase the strength by 15% and shielding effectiveness decrease for gamma and neutron with adding more percentage of carbon powder.

6. A. Goldman And A. Bentur (1993)

Author replaced Silica fumes by carbon black as alternate micro filler. Result indicated that Carbon Black is effective in modifying basic concrete matrix strength to an extent similar to silica fumes

7. Sami Masadeh (2015)

Corrosion of steel reinforcement was studied after adding carbon black in concrete mix. It was achieved by inserting steel reinforcement in different concrete with different carbon black percentage. And sample was immersed in 3.5% chloride solution for next 6 month. It was observed that the corrosion rate decrease with increase in

carbon black percentage by making the concrete dense.

III. CONCLUSION

Based on literature review it can be concluded that

- ✓ Carbon black proves as an excellent additive from which higher compressive strength can be obtained.
- ✓ Carbon Black proves as good filler and fills the pores thereby making the concrete dense.
- ✓ Replacing Carbon black by 8% with cement proved to give better results than that of convention concrete at the same grade.
- ✓ Using Carbon Black as a filler and replacing it by 30% gave positive compression results.
- ✓ Strength of concrete containing Carbon Black in a specific % is at par with that of conventional concrete.

IV. REFERENCES

- [1]. B. Padma Priya, Mrs. k. Pandeeshwari .M.E (2016) 'Experimental Investigation on the Properties of Concrete with Carbon Black and PET', International Journal of Advanced Research, 4(4),
- [2]. Dr. G. Chitra, P. Vetri Selvi, Dr. D. Vijaylakshmi (2014) 'Carbon Black as an Additive in Conventional Concrete', International Journal of Emerging Technology and Advanced Engineering, 4(3)
- [3]. Gaurav Nagavkar (2017) 'Effect on properties of concrete with partial replacement of additives cement', International Journal of Engineering Sciences and Research Technology, 6(2),
- [4]. Perviz Ahmedzade & Tacetinn Geckil (2017) "The Effect Of Carbon Black On Mechanical And Electrical Properties Of Asphalt Mixture" Indian Journal On Engineering And Material Sciences, 4
- [5]. M.H Kharitas. Yousef And M. Alnassar (2008) "The Effect Of Carbon Powder Addition On The Properties Of Hematite Radiation Shielding concrete"
- [6]. A. Goldman And A. Bentur, 1993, Vol 23 "The Influence Of Micro fillers On Enhancement Of Concrete Strength", Cement And Concrete Research 23
- [7]. Sami Masadeh (2015), "The Effect Of Added Carbon Black To Concrete Mix On Corrosion Of Steel In Concrete", Journal Of Minerals And Materials Characterization And Engineering, 2015