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USE OF MICROFINES IN HIGH PERFORMANCE CONCRETE

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ABSTRACT
In Concrete Construction " saysFrom technical, economic and ecological points of view, siliceous by-products are now recognized and accepted as desirable and vital constituents of concrete. Current specifications for such materials tend to be restrictive to some extent, however, and in many countries there are separate standards for each admixture. These in turn inhibit the wider use of these mineral additions to concrete. This paper presents a review of the more important aspects of current standards for siliceous admixtures in this context. It is shown that there is not only a lack of uniformity in the requirements of these standards, but also wide variations in the limits set for a given requirement. It is suggested that these variations reflect not only the industrial or agricultural background of the by-products but also the inevitable wide range of compositions arising from it.

KEYWORDS: concrete, admixture.

INTRODUCTION
High-performance concrete (HPC) is usually produced using high quality materials. These high quality constituents drastically increase the initial cost of HPC, hence hindering its more widespread use. Therefore, the main goal of this research project was to produce HPC by using Ultrafine Fly Ash. In this way, a significant reduction in the use of Portland cement, as well as that of scarce natural resources, would be obtained. The project mainly aims to determine the role and behaviour of micro fines for strength and durability in HPC. The project also aimed to determine whether the workability and durability both increases significantly when fly ash partially replaced Portland cement.

SCOPE OF THE PROJECT
The main objective of the project is to study & investigate the suitability of microfinesas a substitute for cement in concrete applications in the construction Industry. It includes:

- Literature study of the various research work done on Microfines and Admixtures.
- Physical characteristics of Admixtures.
- Characterizing and comparing the properties of concrete.Workability,compressive strength being the main criteria.
- Checking the concrete from durability point of view by carrying out durability test.

MINERAL ADMIXTURES
Mineral admixtures are finely divided siliceous materials whichare added to concrete in relatively large amounts, generally inthe range 20 to 70 percent by mass of the total cementitiousmaterial.

A-Fly ash
Fly ash is also known as flue-ash,it is one of the residues generated in combustion, and comprises the fine particles that rise with theflue gases. Ash which does not rise is termed bottom ash. In an industrial context, fly ash usually refers to ash produced during combustion of coal. Fly ash is generally captured by electrostatic precipitators or other particle filtration equipment before the flue gases reach the chimneys of coal-fired power plants, and together with bottom ash removed from the bottom of the furnace is in this case jointly known as **coal ash**.

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Depending upon the source and makeup of the coal beingburned, the components of fly ash vary considerably, but all fly ash includes substantial amountsosilicon dioxide (Si_2)(both amorphous and crystalline) and calcium oxide(CaO),both being endemic ingredients in many coal-bearing rock strata.

Pozzolans ensure the setting of concrete and plaster and provide concrete with more protection from wet conditions and chemical attack.Somehave expressed health concerns about this.

In some cases, such as the burning of solid waste to create electricity ("resource recovery" facilities a.k.a. waste-to-energy facilities), the fly ash may contain higher levels of contaminants than the bottom ash and mixing the fly and bottom ash together brings the proportional levels of contaminants within the range to qualify as nonhazardous waste in a given state, whereas, unmixed, the fly ash would be within the range to qualify as hazardous waste.

METHODOLOGY

Flexural Test

Standard beams of size 150 x 150 x 700mm are supported symmetrically over a span of 400mm and subjected two points loading till failure of the specimen.

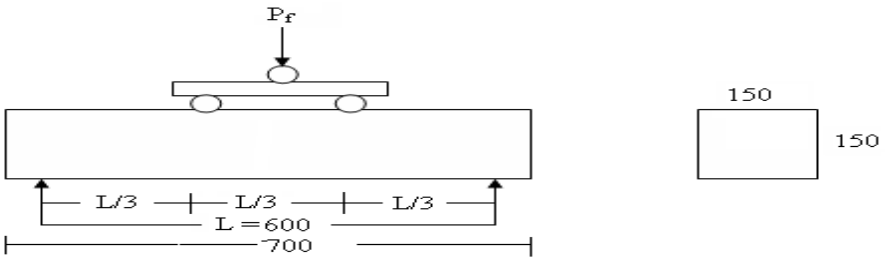

Fig 2 Two point loading setup in flexure test

The flexural strength is determined by the formula

$$f_{cr} = P_f L / bd^2$$

Where, f_{cr} = Flexural strength, MPa

P_f = Central point through two point loading system, KN
L = Span of beam, mm
b = Width of beam, mm
d = Depth of beam, mm

RCPT Test

Reinforced concrete structures are exposed to harsh environments yet are often expected to last with little or no repair or maintenance for long periods of time (often 100 years or more). To do this, a durable structure needs to be produced. For reinforced concrete bridges, one of the major forms of environmental attack is chloride ingress, which leads to corrosion of the reinforcing steel and a subsequent reduction in the strength, serviceability, and aesthetics of the structure. This may lead to early repair or premature replacement of the structure. A common method of preventing such deterioration is to prevent chlorides from penetrating the structure to the level of the reinforcing steel bar by using relatively impenetrable concrete. The ability of chloride ions to penetrate the concrete must then be known for design as well as quality control purposes. The penetration of the concrete by chloride ions, however, is a slow process. It cannot be determined directly in a time frame that would be useful as a quality control measure. Therefore, in order to assess chloride penetration, a test method that accelerates the process is needed, to allow the determination of diffusion values in a reasonable time.

ISAT test

The ISAT test specified in BS 1881 part 5 was originally developed as a laboratory method of measuring the porosity of concrete.Where carried out on oven dried concrete, the results are reasonably comparable between

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materials. Where the test is carried out on site the results are greatly influenced by the existing moisture conditions as well as surface cleanliness.The test consists of the measurement of water flow into the test specimen through a known surface area. The contact area is defined by a plastic cell sealed onto the surface. Measurement of the volume flow is obtained by measurement of the length of flow along a capillary of known dimension.

CONCLUSION

Admixtures are used to give special properties to fresh or hardened concrete. Admixtures may enhance the durability, workability or strength characteristics of a given concrete mixture. Admixtures are used to overcome difficult construction situations, such as hot or cold weather placements, pumping requirements, early strength requirements, or very low waste cement ratio specification.Reduce cost of concrete construction.Achieve specific concrete properties more effectively.Ensure quality of concrete during mixing, transporting, placing, and curing in adverse weather condition. Overcome emergencies during operations.

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