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Development of Concrete Through Sustainable Technology

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Abstract-
As green building material, fly ash is advantageous to solving the question of environmental protection and energy conservation. In this paper, combined with the author's research production, the latest development of studies and applications of activation techniques of fly ash is summed up, which is being looked forward to being useful to researchers and engineers. The latest researches show that when weight of fly ash reaches 20% 80% of cement, 325 grade cement or C40 concrete with high ash activating admixture in cement or fly ash concrete. such as adding some high-efficiency fly ash activating admixture in cement or fly ash concrete.
This paper was carried out to make cement with more strength. From the discussion of some acidences of concrete preparation taking place on site and the current situation of cement production, an argument is introduced that production of cement by another concept is beneficial to improvement of properties of cement and and sustainable development of cement industry. Some operation processes of concrete can be moved into factory. Keywords: Cement manufacture (E), Alternative fuels and raw materials, Grinding (A) Clinker substation CO, Fly Ash, Slag
Keywords:- *Sustainable Development, Cement Mangufacture, Clinker Substation, Fly-Ash, Slag*

I. Introduction

Lian Huizhen at all High volume fly ash concrete developed by Malhotra and his colleagues (2,5) is coming be well known in China. A typical example is the application of high performance concrete in the project of Shenzhen subway tunnel (3). The underground soil of Shenzhen contains moderately aggressive medium such as SO2- and Cl. The conventional concrete cannot satisfy the designed requirement of durability for the structure of Shenzhen subway. High volume mineral admixture concrete was suggested by Tsinghua University, firstly. A full-scale section mock up was constructed in 1999 to investigate practical possibility, mechanical properties and durability of this new type of concrete in aggressive coastal environment with hot and moist weather. The designed compressive strength class is C. The mix proportion of this concrete is: ordinary portland cement OF PO-425 (containing less than 15% of mineral admixture) 180 kg/m3, fly ash 180 kg/m3, ground granulated blast-furnace slag 80 kg/ m³, W/B 0.42. This concrete showed excellent workability, mechanical properties and durability. A barrier wall was built with this concrete for a vehicle terminal of Shenzhen subway in 2002.

Some time time ago we wrote a proposal to study the use of cementitious materials in residential construction. In that proposal we argued that concrete is a sustainable material for housing. However, we knew very little then about how to compute the environmental impact of a construction material The proposal was not funded, but it piqued our interest in how such a computation can be made. Since that time several computer programs for such computation have become commercially available, and we recently purchased such a program. ATHENA1 to use in a course on sustainable housing for civil engineering students. The purpose of this paper is to describe the computation of environmental impact. As an illustration, we use ATHENA to compare the environmental impact of ordinary concrete with that of concrete containing fly ash, and to compare the environmental impact of concrete with the

impact of steel. Through this computation we hope to answer the question posed in our earlier proposal-whether concrete causes less environmental damage than steel and therefore whether our claim that concrete is a sustainable material for housing was legitimate [7]

Cement and concrete are the most widely used building materials. For the purpose of realization of sustainable development, much more attention should be paid to energy saving resource conservation and environment protection. The recent progresses in the world was reviewed and the importance of full utilization of industrial wastes and improvement of the durability of concrete structures for sustainable development was emphasized. At the same time, many methods were suggested for the realization of the above goals [8]

Sustainability of Construction Materials

Each construction material is manufactured from some combination of raw materials, with someexpenditure of energy, and with associated wastes. Therefore manufacture is an essential element in computing the environmental impact, and manufacture is probably the element most widely cited when considering the environmental impact of construction materials. Are the raw materials renewable? Are they scarce? Are they important to the global environment? How much energy is required in the manufacture? How much waste is produced during the manufacture? What impact do these wastes have on the environment? These questions are very important and this phase probably receives the most attention, both from the general public and from the government [7]

Properties of Sustainable Concrete

Berndt says that The suitability of using more "sustainable" concrete for wind turbine foundationsand other applications involving large quantities of concrete was investigated. The approach taken was to make material substitutions so that the environmental, energy and CO,-impact of concrete could be reduced. This was accomplished by partial replacement of cement with large volumes of fly ash or blast furnace slag and by using recycled concrete aggregate Five basic concrete mixes were considered. These were conventional mix with no material substitutions, 50% replacement of cement with fly ash, 50% replacement of cement with blast furnace slag, 70% replacement of cement with blast furnace slag and 25% replacement of cement with fly ash and 25% replacement with blast furnace slag. Recycled concrete aggregate was investigated in conventional and slag-modified concretes. Properties investigated included compressive and tensile strengths, elastic modulus, coefficient of permeability and durability in chloride and sulphate solutions. It was determined that the mixes containing 50% slag gave the best overall performance. Slag was particularly beneficial for concrete with recycled aggregate and could reduce strength losses Durability tests indicated slight increases in coefficient of permeability and chloride diffusion coefficient when using recycled concrete aggregate. However, values remained acceptable for durable concrete and the chloride diffusion coefficient was improved by incorporation of slag in the mix. Concrete with 50% fly ash had relatively poor performance for the materials and mix proportions used in this study and it is recommended that such mixes be thoroughly tested before use in construction [9]. Based on field experience and tests, the properties of concrete, when compared to conventional portland cement concrete, can be summarized as follows:

1. Easier flowability, pumpability, and compactability..
2. Better surface finish and quicker finishing time when power finish is not required.
3. Slower setting time, which will have a corresponding effect on the jointcutting and lower power finishing times for slabs.
4. Early-strength up to 7 days, which can be accelerated with suitable changes in the mix design when earlier removal of formwork or early structural loading is desired.
5. Much later strength gain between 28 days and 90 days or more. (With HVEA concrete mixtures,the strength enhancement between 7 and 90-day often exceeds 100%, therefore it is unnecessary to overdesign them with respect to a given specified strength.)
6. Superior dimensional stability and resistance to cracking from thermal shrinkage, aurinkage shrinkage, and drying shrinkage. In unprotected concrete, a higher tendency for plastic shrinkage cracking
7. After three to six months of curing much higher electrical resistivity, and resistance to chloride on penetration, according to ASTM Method C1202

II. CONCLUSION

From the above paper we conclude that it is most important for civil engineering for sustainable development of concrete. It also important for environment of earth because the green house and carbon dioxide gas evaporation also less. The high-volume fly ash concrete system overcomes the problems of early strength to a great extent through a drastic reduction in the water-cementitious materials ratio by using a combination of methods, such as taking advantage of the superplactisizing effect of fly ash when used in a large volume, the use of a chemical superplactisizer, and a judicious aggregate grading. Consequently, properly cured high-volume concrete products are very homogenous microstructure, virtually crack-free, and highly durable. Because there is a direct link between durability and resource productivity, the increasing use of highvolume concrete will help to enhance the sustainability of the concrete industry.

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