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The effect of admixtures in concrete containing manufactured sand

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Abstract
This project investigates the effects that varying water cement ratios and superplasticiser have on concrete containing manufactured sand as a complete replacement for natural sand. Due to current levels of construction in India there is an ever decreasing availability of natural sands suitable for use as a fine aggregate in concrete. Manufactured sands which are a by-product of rock crushing operations offer a viable solution to the declining availability of natural sands. However there are a number of drawbacks to the use of manufactured sand, particularly the poor workability and finish obtained. This is caused by the High fines content (<75 microns) and the irregular particle shape of the manufactured sand. For these reasons manufactured sand has a very poor reputation in the construction industry.
An experimental approach has been taken to study the effect of the varying water cement ratios and the effect of the superplasticiser. This has be done by making a number of concrete mixes each with either a different water cement ratio or amount of superplasticiser added to the mix. The properties of these concrete mixes have been assessed by measuring both the fresh and hardened state properties of the concrete mix.
The results of the tests have shown that a reasonable workability and a medium strength can be achieved with a high water cement ratio in a concrete mix. The addition of a superplasticiser to a concrete mix allows the mix to achieve a high strength while also having a good workability.

Keywords: precast/prestressed concrete, equivalent monolithic, cost efficiency, high-seismic risks

Introduction
Concrete has been around for many centuries, the first known use of a material resembling concrete was by the Minoan civilization around 2000 BC. During the early stages of the Roman Empire around 300 BC the Romans discovered that mixing a sandy volcanic ash with lime mortar created a hard water resistance substance which we now know as concrete. The predominant type of cement used in modern concrete is Portland cement, other types of cement available include; Blended cement, which is similar to Portland cement but may contain materials such as fly ash slag or silica fume; High early strength cements, which as the name suggests gains strength a lot quicker than Portland or blended cements; Low heat cements, used when limits are placed on the heat of hydration of the concrete; Shrinkage limited cements; Sulphate resisting cements; Coloured cements; Masonry cement.
Portland cement is made by mixing calcium carbonate commonly found in limestone or chalk and silica, alumina and iron oxide found in clay or shale. The two ingredients are ground and mixed together in either a dry or wet state depending on the characteristics of the rocks being used. The mix is then placed in a kiln at temperatures as high as 1400 degrees Celsius, at this temperature the two rocks fuse together to form clinker. The clinker is allowed to cool and gypsum is added at around 1 – 5 percent. The mix is then ground to the required fineness and distributed to concrete batch plants. Portland cement derives its name from the Portland limestone because of the close resemblance of the finished concrete to the Portland Limestone
Concrete is one of the most popular materials for construction owing to the fact that it can be cast into just about any shape, it has good compressive strengths, is readily available just about anywhere and is relatively cheap in comparison to other materials available for construction, such as steel or fibre composites. Concrete is made from a mixture of cement powder coarse and fine aggregates, normally sand and crushed rock and water. It can be either mixed in a hand mixer or by a large batch plant
Manufactured sand offers a viable solution to the decreasing availability of natural sand. However, before manufactured sand can be widely used there are a few problems which need to be overcome. The first problem that needs to be overcome is the poor workability of manufactured sand. When this problem has been overcome then it will go a long way to giving manufactured sand a better reputation in the construction industry. The aim of this project is to study the effects that varying amounts of admixtures have on concrete containing manufactured sand instead of natural sand. Hopefully the results of the project will show that a concrete mix containing manufactured sand and no natural sand can achieve a high strength and a good workability through the use of a superplasticiser.
The main aims of this project are:
1. Determine the workability, the overall strength, as well as the rate of strength gain for varying water cement ratios of

concrete containing manufactured sand. Compare the results of the manufactured sand concrete to a conventional mix containing natural sand.
2. From the data collected in the previous objective choose a water cement ratio with poor workability and determine the required amount of superplasticiser to achieve a good workability. Also determine the overall strength, as well as the rate of strength gain of the concrete after the addition of a super-plasticiser
3. Conduct a cost analysis of all mixes and compare the costs of a mix containing manufactured sand to the cost of a control mix.
4. Determine flexural strength and young's modulus of concrete containing manufactured sand, and compare to the flexural strength and young's modulus of a control mix.

Literature Review

The higher fines content of manufactured sand has significant effects on the workability and the strength of concrete. The CAI's Guide to concrete construction states that aggregate combinations with excessive amounts of sand or excessively fine sands may produce uneconomical concretes because of the larger surface area of the finer particles. Hudson (1999) reported that "...Concrete manufactured with a high percentage of minus 75 micron material will yield a more cohesive mix then concrete made with typical natural sand. Hudson also reported that although the compressive strength and the workability may be superior to natural sand, the finish of the concrete containing manufactured sand is still a major drawback to its use.

The Cement and Admixtures Association, (1977) [2, 10, 12] reported that two things will happen when a surface active agent is placed into a suspension of cement particles.

1. The surface active agents 'tail' is absorbed on the surface of the cement particle with the negative charge protruding into the water. As a result the cement particles do not collect together and therefore more surface area is available for reaction with the water. At the same time water that may be trapped inside a cement particle floc is released. The combined effects improve the workability of the cement mix; this can be seen graphically in figure
2. Entrapped air is also more readily removed since orientation of the surface active agents prevents the air bubble from attaching to cement particles, seen in figure

Conclusion

We found from study that pre stress concrete anchoring devices influencing tremendously to the civil engineering decisions. It involve various process of pre stressed concrete which help us very much in understanding the mechanism of the working system & various tools are available to performing for structures called anchoring devices, Further we knew that structures by pre stress are more reliable, strong & reduced in size as compared to RCC . Hence we can say that by using anchoring devices better concrete structures can be made. Also pre stress beam can take more loads that are taken by RCC beam. It is one of the simple methods for anchoring the beam at cheaper rate.

References

1. Kulkarni PD. Textbook of Concrete Technology, 1983.
2. Cement Admixtures Association Concrete Admixtures: Use and Application, Construction Press, New York, 1977.
3. Hudson B. Concrete Workability with High Fines Content Sands, Quarry. 1999; 7:22-25.
4. Shetty MS. Admixtures and Construction chemicals, Concrete Technology, (New Delhi, S. Chand & Company Ltd, 2012, 124-217.
5. IS 10262 Recommended guidelines for concrete mix design, 2009?
6. Saeed Ahmad, Shahid Mahmood. Effects of crushed and Natural Sand on the properties of fresh and Hardened concrete, Our World in Concrete & Structures, 2008.
7. Shanmugavadivu PM, Malathy R. A comparative study on Mechanical Properties of concrete with Manufactured Sand" International Journal of Technology World, 2000.
8. ACI Committee 212 1993, Guide for the use of high range water reducing admixtures in concrete, American Concrete Institute, Michigan.
9. Guirguis S. Specification and use of Manufactured Sand in Concrete, 2008.
10. Concrete Structures in India by Concrete Association of India in, 1955, 1956.
11. Young JF. (et, al) The Science and technology of Civil Engineering Materials, Prentice Hall, New Jersey, 1998.
12. Cement and Concrete Association of Australia & Standards Australia. Guide to Concrete Construction, Cement and Concrete Association of Australis, Sydney, 2002.
13. Eglington MS. Concrete and its Chemical Behaviour, T.Elford, London, 1987.