

# Developments in Ultrafine Cementitious Materials

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## In Quest of Quality Concrete



### President's Message

Ready Mix Concrete Manufacturer's Association (RMCMA) is pleased to publish the new issue of its Bulletin "Developments in Ultrafine Cementitious Materials". The issue highlights that the results obtained from ultrafine materials such as UFFA, UFS, metakaolin and rice husk ash can be used as a viable substitute for silica fume. If the advantages of these materials are exploited in the concrete mix design, the initial rate of strength development may be the same or similar to those of silica fume mixes. At later stages, however, the pozzolanic activity of these materials leads to higher compressive strength values and enhanced durability. The use of UFFA and UFS, which are recent innovations, as an alternative to silica fume can be effective in enhancing the properties of concrete, both in its fresh and hardened state. The UFFA and UFS are also cost effective as compared to silica fume, metakaolin and RHA. UFFA and UFS offer exciting opportunities to the design of high performance concrete. With their unique properties, there are other additional applications that will certainly benefit the use of these materials, to name the few are: Specialist Grouts, Precast Concrete, Flooring made of Self-Compacting Concrete (SCC), etc. RMCMA is glad to inform that it's CTI Training Programs which were initiated to upgrade the knowledge of RMC professionals and their customers will also be playing a greater role in government departments including their contractors and quality professionals. Municipal Corporation of Greater Mumbai has agreed to hold training programs for their engineers and contractors under the aegis of RMCMA to upgrade their technical knowledge especially in the field of quality concrete. We welcome and thank this initiative of MCGM which will pave the way for knowledge sharing with other Government Departments in the field of Concrete and Construction practices. We hope this bulletin will be informative and useful for our readers.

Ramesh Joshi  
(President, RMCMA)

### INTRODUCTION:

The ultrafine cementitious materials with particle size in the range of 3 to 5 micron and below have become indispensable part of high strength and high performance concrete. These materials in concrete improves durability to thermal cracking, durability to chemical attack, impermeability and in some cases workability and strength of concrete at early and later ages. Internationally silica fume, metakaolin and rice husk ash have been used as ultrafine materials but recently Indian innovation has added two more materials viz. ultrafine slag and ultrafine fly ash in this category. In this article the ultrafine materials are discussed with special emphasis on Ultrafine Slag (UFS) and Ultrafine Fly Ash (UFFA) with respect to their advantages in concrete production and performance.

### Choice of Ultrafine Materials:

The following Ultrafine materials are available in India for use in concrete.

- a) Silica fume
- b) Metakaolin
- c) Rice husk ash
- d) Ultrafine slag
- e) Ultrafine fly ash

Each material is derived from different source but they are being used for the same purpose to improve impermeability, strength and performance of concrete. These materials are briefly described in the succeeding paragraphs.