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## Development of ultra-high performance green concrete using fly ash and rice husk ash

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**Introduction & Aim:** Technology advancement in concrete industry and expanding interest for high quality construction materials require to compensate the current structural deficiency worldwide had prompted to the development of Ultra-High Performance Concrete (UHPC). Despite of many advantages gained using UHPC, however, its conventional design posed many concerns especially on sustainability issues. Producing UHPC requires high amount of cement content and in most cases the compositions are not optimized causing an increase in materials and energy cost thus limiting its applications. The cement production alone represents about 7% of the total CO<sub>2</sub> emissions. Hence, one of the key sustainability challenges for concrete industry is to produce concrete with lower CO<sub>2</sub> emissions while providing same reliability with an improved durability. In this research Rice Husk Ash (RHA) and Fly Ash (FA) used as cement replacement materials together with locally available coarse aggregates was proposed to minimize economic and environmental disadvantages of current UHPC.

**Methodology:** An experimental program was carried out to evaluate the effect of RHA and FA on mechanical strength of UHPC. The cement was replaced by weight with RHA at various fractions of 10% to 40% with and without FA. In this work, a total of 8 UHPC mixes were prepared and its effect on compressive strength was studied.

**Results & Conclusion:** With a view to reduce the sustainability and high cost issues of UHPC, efforts have been directed to incorporate both RHA and FA as cement replacement and locally available aggregates in the mix. The strength was observed to increase to up to 10% with an inclusion of both RHA and FA replacing up to 40% of cement without affecting its fresh properties. The efficient use of materials and recycling wastes in the production of green UHPC are necessary to meet the needs for future generations.

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