High Early Strength Concrete Cube Competition (HESCCC)

Competition Rules

1.0 General Rules and Eligibility Requirements

- The maximum cementitious content allowed to be up to 500 kg/m^3.
- Coarse aggregates must be 20 mm of maximum size and fine aggregates must be 0.0475 mm – 4 mm.
- Fineness Modulus: Fine Aggregate = 2.6, Coarse Aggregate = 7.2.
- Specific Gravity: Fine Aggregate = 2.8, Coarse Aggregate = 2.6.
- Cubes will be tested after 24 hours of casting.
- Participants are required to prepare three (3) cubes which will be subject to normal curing method (water or air).
- All groups will be monitored by the appointed person from the organisers.
- Each group is only allowed to mix the concrete once. No trial mixes will be allowed.
- Only manual compaction using tamping rod is allowed.
- Time of 24 hours will be counted from the start of concrete mixing.
- All participants to attend compulsory induction before mixing commences.
- Entries not complying with the rules and regulations of the competition will be disqualified.

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2.0 Highest Early Strength Concrete Cube

Highest early strength concrete cube referred in this competition is a concrete cube that possesses the highest compressive strength after 24 hours or less of casting. Concrete is reported to have a compressive strength value at least 12 hours after casting but the compressive strength values may be influenced by many factors such as water/cement ratio, materials used, mixing process, and curing techniques.

2.1 Materials

- All teams can bring their own concrete mix design.
- The principal materials used must comply with the standard definition of concrete.
- All standard materials: Cement, aggregates (fine and coarse) and water will be provided by the organiser.
- All groups will be provided with the maximum 3 kg of Portland cement as per MS EN 197-1 CEM I, to produce six (6) litres (6L) of concrete.
- There is no limit on the usage of aggregates and water.
- There is no restriction on the type of aggregates used.
- All reinforcement types and systems are **not allowed**.
- Industrial waste and innovative/commercial cementitious materials are **not allowed.**
- Additives **are** allowed in this competition. Teams must bring their own additives and disclose it in their presentations.
- Polymer and geopolymer based materials **are** allowed in this competition. The utilisation of any type or component of the materials should only be possible with the standard equipment provided in this competition and its use should not require additional equipment or cost in mass production of such concrete.
- Additive(s) **allowed** (as one or in combination) to be used in the concrete mix:
    - Supplementary cementitious materials.
    - Innovative aggregates.
    - Plasticiser or super plasticiser.
    - Addition of fibers is allowed provided the reason is explained in the presentation.
- Additives **not allowed:**
    - Any chloride-based admixtures are **not allowed**.

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2.2 Concrete mixing and curing

- All groups will be provided with the following:
    - Principle concrete materials: Cement, fine and coarse aggregates, and water
    - One set of concrete hand-mixing tools
    - Three cube moulds of size 100 x 100 x 100 mm
    - One weighing container
    - One set of washing tools
- All groups will be given 45 minutes only to conduct their tasks including:
    - Weighing materials
    - Preparing moulds
    - Concrete mixing
    - Casting
    - Compaction (manual)
    - Finishing (manual)
    - Curing (normal/air)
    - Cleaning
- In any case, no extra time will be allowed.
- All groups will be monitored by the appointed Head of Batch.
- The Head of Batch will record the time for each group complete the mixing.
- Each group is only allowed to mix the concrete once. No trial mixes and repetition of concrete mixes are allowed.
- Only manual compaction using a tamping rod is allowed.
- Time of 24 hours will be counted from the start of concrete mixing.

2.3 Highest Strength Cube

- Highest concrete cube strength will be determined through compressive cube test using compression machine in room SPB016 & SPB017, Springfield Campus, School of Architecture and Built Environment, University of Wolverhampton and certified by the personnel appointed by the organiser.
- Mean value of strength from the three concrete cubes will determine the highest compressive cube strength.
- In case of tie among the groups, the standard deviation of the results and the density of the specimens will become the criteria to determine the winner.

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3.0 Presentation

- Each group is required to prepare a digital presentation displaying materials used and mix formulation designed. **This is limited to a maximum of 3 slides. If more than 3 slides are presented, scores will be deducted.**
- Verbal presentation by the members of the group is required.
- Approximately three judges will be appointed by the organiser to judge the presentation of each group.
- Judging will be based on:
    - Design
    - Content
    - Communication
    - Presentation
    - Discussion (answering the Q&A)
    - Economy of the mix design and its constituents
    - Sustainability of materials
    - Concrete Preparation
    - Originality
- No objection will be entertained on the marks given by the judges.

4.0 Selection of the Winner

- Winner of highest early strength concrete cube competition will be determined based on the highest marks obtained from average strength of the three cubes.
- Winner for best presentation will be determined based on the marks obtained from the presentation.
- The ICE ECN WM committee reserves the right to add, delete or amend any of the rules and regulations that it deems necessary.