

Oliver Coulson Memorial Student Competition

Oliver was a president of Missouri and was avid competitor in the ACI competitions while he was a student. This competition is to honor his contribution to the concrete industry.

Cube Strength Competition - 2020

Objectives

The purpose of this competition is to develop a mortar meeting the requirements of Controlled Low Strength Material (CLSM) which will have a load at failure of less than 1200 psi or 4800 pounds for a 2 inch cube. The definitions of CLSM is given in ACI Terminology.

Prizes

The team which obtains the lowest score (i.e. average of the load of each cube closest to 4,800 pounds) wins the competition. The 1st place team will receive \$400, the 2nd place team \$300, the 3rd place team \$200.

Teams from the same school cannot win multiple prizes, regardless of final ranking. The school of the 1st place team will receive a plaque that will be given at the annual meeting in Rolla in 2021

Rules

1. Eligibility

- a. Each team must consist of students in high school, technical school, trade school, or undergraduate or graduate students of a college or university at the time of the competition. Undergraduate students on cooperative or internship work assignment are also eligible to compete. All members of a given team must be from the same school.
- b. A team can have as many members as desired. Each school may register a maximum of two (2) teams.
- c. Each team must have a supervising faculty adviser who will see that the student team complies with the rules of the competition. A signed letter by the adviser, stating that all students are enrolled full-time and that the team has followed the rules shall be sent to ACI- MO at the time of competition.

2. Material

All material requirements indicated below should be closely followed. The final mixture design of the mixture should be provided.

- a. The mortar must use cementitious materials as binder. Any other gluing constituent, such as epoxy or glue, is not permitted.

- b. The cubes shall not contain any reinforcement, whether metallic or non-metallic. Fibers of any kind are thus not allowed.
- c. The cubes shall have a 2" size. Cubes will be measured prior to testing. None of the cube's dimensions shall fall below 1.9". (*Hint: be careful with the cast surface and watch out for bleeding*)
- d. Not meeting the requirements in 2.a, 2.b and 2.c will lead to automatic disqualification of the team. The judges will evaluate cubes for any non-compliant material and dimensions.
- e. The teams are free to select cement, cementitious materials, fillers, aggregates (as long as the nominal maximum aggregate size is equal or smaller than the #4 sieve), water, admixtures, curing time and methods, etc.

3. Mixture design sheet

Teams are required to include a sheet containing the mix design (and thus all ingredients) of the mixture.

4. Testing

- a. The testing of the cubes will be performed at SCI in St. Charles , MO at 10:00AM on October 10, 2020
- b. Due to COVID-19, the competition will be testing only.
- c. Three cubes should be sent by October 7, 2020 to:

Pat O'Brien
415 Spring Valley Ct
Chesterfield, MO 63017

The submission must include three (3) cube specimens, the mixture design, and a signed memo from the adviser that the mixture design is accurate, and the entries are from the students from their university

- d. Following a randomized order as determined by the judges, two cubes of each team shall be tested.
- e. Following the procedure described in ASTM C109, the cubes shall be subjected to an increasing compressive load until failure. The maximum load at failure will be recorded in pounds.

5. Scoring

The load for each cube will be evaluated:

$R = \text{Absolute value } (4800 - F)$, where F is the recorded load in lbs.

The R value for each cube will be averaged to determine an average R -value

The team with the lowest average R -value wins the competition.

Note: If the Average of the two tested cubes exceeds 4800 pounds, the entry will be disqualified because it no longer meet the definition of a Controlled Low Strength Material (CLSM).

6. Judging

- a. The Judges will be appointed by the President and the Executive Director of the Missouri Chapter of ACI.
- b. The Judges will make the final determination on compliance with the rules. Disqualified entries shall not be included in the scoring or considered for awards. See section 8.
- c. The decision of the Judges will be final, and appeals will not be considered.

7. Registration

Advance notice of “intent to compete” must be e mailed by each team by September 28, 2020. The e mail should identify team member, team captain, and faculty adviser. This can be accomplished by emailing ACI - MO President, Pat O’Brien (pobrien@penetron.com).

- a. The competition will be SCI on October 10, 2020. Results will be emailed to the team captain and adviser by October 13, 2020
- b. If you have any questions, please contact Pat O’Brien at pobrien@penetron.com.