This is an application to register for the 2020 EPDACI Student Beam Competition, to be held at Widener University, Chester, PA, on April 4, 2020. This competition is for undergraduate student teams. One form is required for each entry. **Completed Part I must be received no later than March 9, 2020.**

**2020 EPDACI STUDENT BEAM COMPETITION OFFICIAL ENTRY FORM**

**PART I**

Date of Application: ________________________________

Name of School: __________________________________________

Faculty Advisor: __________________________________________

Phone: _________________________________________________

E-mail: _________________________________________________

**Student Team (2 to 5 students) (Please Print) Email Phone No.**

1. ______________________________________________________

2. ______________________________________________________

3. ______________________________________________________

4. ______________________________________________________

5. ______________________________________________________

**SIGNATURE OF THE FACULTY ADVISOR:** ____________________________________________

**TEAM NAME:** ________________________________________________

**PLEASE SUBMIT THIS FORM BY EMAIL TO:** steve.a.cole@verizon.net
2020 EPDACI STUDENT BEAM COMPETITION
OFFICIAL ENTRY FORM
PART II

This form must be submitted after the beam specimen and control cylinders have been cast. Completed PART II must be received no later than March 30, 2020.

DATE: ________ SCHOOL: ________________________ TEAM NAME: ____________

Name (Please Print) Degree/Graduation Date Signature
1. ________________________ _________________________ ________________________
2. ________________________ _________________________ ________________________
3. ________________________ _________________________ ________________________
4. ________________________ _________________________ ________________________
5. ________________________ _________________________ ________________________

DATE OF CASTING BEAM & CYLINDERS: ________________

MIX DESIGN FORM

<table>
<thead>
<tr>
<th>Material</th>
<th>Description (Brand &amp; Type)</th>
<th>Batch Weight (lb)</th>
<th>Specific Gravity</th>
<th>Absolute Volume (ft³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica Fume</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td></td>
<td></td>
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<tr>
<td>High-Range Water Reducer</td>
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<tr>
<td>Accelerator</td>
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</tr>
<tr>
<td>Fibers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Weight (lb) = ________ Yield (ft³) = ________

Cylinder Size  Cylinder 1  Cylinder 2

28-day cylinder strength test data (psi): ________ ________ ________

Size (length & diameter) of fibers used: ________________

TO BE SIGNED BY THE FACULTY ADVISOR:
To the best of my knowledge, this information is correct. The students have adhered to the official rules of the contest, and the specimens have been made and cured in compliance with the rules.

Name: ______________________________
Signature: ________________________ Date: __________________________

PLEASE SUBMIT THIS FORM BY EMAIL TO: steve.a.cole@verizon.net
EPDACI STUDENT COMPETITION
CONTEST RULES - 2020

1. THE CHALLENGE
1.1 Design and construct a fiber reinforced concrete beam spanning 3'-0" and weighing not more than 50 pounds to support the highest possible concentrated load at mid-span.
1.2 Comply with the contest rules.
1.3 Teams must submit the following:
   • Official Entry Form Part I by March 9, 2020
   • Official Entry Form Part II by March 30, 2020
   • Beam Sketch showing the beam cross-sectional dimensions by March 30, 2020.
   • Pour Video showing the ingredients being mixed and poured by March 30, 2020.

2. THE STUDENT TEAMS
2.1 Each team must have a faculty advisor who will see that the student team complies with the rules of the contest. The team includes the faculty advisor.
2.2 Each team must consist of not less than two and not more than five students currently enrolled in an undergraduate program at any college or university worldwide. Although there are no restrictions on the geographical location of the school, all members of a given team must be from the same school. A student may not be a member of more than one team. A faculty member is permitted to advise more than one team.
2.3 At least one team member (student) must be present during the testing of beams at the time and location specified for this competition. Attendance by additional team members and faculty advisor is permitted and encouraged.
2.4 Each school will be permitted to send no more than three teams to the competition. From a specific school, the first three properly completed applications (Parts I, Parts II, Beam Sketch & Pour Video) will be accepted as the entries from that school. Additional teams will only be accepted if an earlier entry from the same school withdraws from the competition.
2.5 Each team must complete and submit Parts I and II of the Official Entry Form, a Beam Sketch & a Pour Video.

3. THE BEAM SIZE AND MATERIALS LIMITATIONS
3.1 The beam shall be 40” long as shown in Figure 1. The dimensional tolerance is ±1/4”. Beams not meeting this requirement will be disqualified.
3.2 The beam shall not weigh more than 50 pounds. Beams that exceed 50 pounds will be disqualified.
3.3 There is no restriction on beam depth and width except that the beam cross-section must be uniform along the entire length of the beam. Beams that vary in depth, width or cross-section shape along the length will be disqualified. Teams are free to select what they believe to be the most efficient beam cross-section (such as rectangular, square, U-shaped, T-shaped, trapezoidal, etc.). Teams must submit a Beam Sketch showing the beam cross-sectional shape and dimensions.
3.4 Concrete mix may be any combination of the following seven ingredients:
   i. Portland Cement per ASTM C150
   ii. Silica Fume per ASTM C1240
   iii. Sand - any type but only one type may be used
   iv. High-Range Water Reducing Admixture per ASTM C494
   v. Accelerating Admixture per ASTM C494
   vi. Fiber Reinforcing - any type but only one type may be used
   vii. Water
3.5 Teams must provide the actual measured batch weights of all materials included in their concrete mix in the Mix Design Form on Part II of the Official Entry Form.
3.6 The mix cannot be a pre-blended proprietary mix. All seven individual ingredients must be mixed by the students immediately prior to pouring. The mix must be flowable and be poured into the beam form. No hand, trowel or machine placement of the mix in the beam form is allowed. No advance
placement of fiber reinforcing in the form prior to pouring of the mix is allowed. Compaction of the mix by vibration of the form is allowed. Teams must take a video (Pour Video) of the mixing and pouring operations, and submit it with Part II of the Official Entry Form.

3.7 Any type of sand may be used. However, only one type of sand (material & gradation) shall be used in the mix. Mixing of different types of sand is not permitted.

3.8 Any type of fiber reinforcement may be used. However, only one type of fiber (material & size) shall be used in the mix. Mixing of different types of fiber is not permitted.

3.9 No steel bar reinforcement is permitted. No epoxies and other polymers, glues, and binders is permitted.

3.10 Curing shall be at atmospheric pressure, and the curing temperature must not exceed the boiling point of water at atmospheric temperature.

3.11 No beam shall be more than 56 days old at the time of the test.

3.12 At the center of the top of the beam, a large "X" shall be painted on a flat area on the compression side where the concentrated load will be applied. In addition, an identifying Team Name must be painted so as to be clearly visible on both sides of the beam. Teams may also apply decals of their school logo. No other paint or surface treatment shall be permitted.

4. THE TESTING PROCESS:

4.1 Before testing:
- Each beam will be weighed by the Competition Committee for conformance to the 50 pounds maximum weight requirement. Beams that exceed 50 pounds will be disqualified.
- Each beam will be measured by the Competition Committee for conformance to the 40" length requirement and for uniform cross-section per the dimensions on the team’s Beam Sketch. The dimensional tolerance is ±1/4". Beams not meeting this tolerance will be disqualified.

4.2 The beam specimens judged acceptable by the Competition Committee will be positioned in the testing apparatus, which will apply a midspan concentrated load by means of a loading plate measuring not less than 2” by 2”. The clear span is 36” and reaction forces are through bearing surfaces measuring not less than 2” by 2” and providing no restraint against rotation at the ends of the beam specimen, see Figure 1.

4.3 Once seated in the testing apparatus with a seating load of 200 lbs, additional load will be applied until the beam specimen fails. The loading rate shall be determined by the Competition Committee. In lieu of obvious physical signs of failure, failure will be assumed to have occurred when total load on the beam has decreased to 75% of the maximum load achieved by that beam specimen. Midspan deflection will be monitored throughout the loading process.

4.4 The actual ultimate load, without deduction of the seating load, will be recorded as the maximum load achieved.

5. THE EVALUATION PROCESS:

5.1 Teams must provide the measured weights and descriptions of all materials in the concrete batch used to cast their beam. This information must be entered in the Mix Design Form.

5.2 Teams must submit a Beam Sketch of their beam showing cross-sectional dimensions. The cross-section must be uniform along the entire length of beam.

5.3 Teams must submit a Pour Video showing the concrete batch being mixed and poured into the form.

5.4 No school may enter more than one beam of the same design in the competition. Beams will be considered to be of the same design if they have the same concrete mixture proportions and cross-section geometry. The judges will not test more than one beam of the same design from any school.

5.5 A panel of judges will be appointed by the EPDACI Competition Committee. Interpretations and decisions made by the judges will be final, and appeals will not be considered.

6. THE PRIZES:

6.1 FIRST PLACE: $1,500 for the beam that supports the highest ultimate load.

6.2 SECOND PLACE: $1,000 for the beam that supports the second highest ultimate load.

6.3 THIRD PLACE: $500 for the beam that supports the third highest ultimate load.
7. TIME AND LOCATION FOR TESTING:
   7.1 The beam competition will be held at the Structures Lab, Widener University, 17th and Melrose, Chester, PA on April 4, 2020 at 11:30 AM.

8. ADDITIONAL INFORMATION:
   8.1 The mailing address for all entry forms and for additional information is:

   Steve Cole  
   EPDACI Student Beam Competition Chairman  
   1218 June Road  
   Huntingdon Valley PA 19006  
   Tel: (267)-280-2997  
   Email: steve.a.cole@verizon.net

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**FIGURE 1**

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