

**SAMPLE BRIDGE RULES 2010**  
**13th ANNUAL**  
**SUPER LIGHT WEIGHT**  
**COMPOSITE BRIDGE BUILDING CONTEST**  
**SAMPE 2010, MAY 18, SEATTLE WA**

Rules:

1. The contest will be for students only. The objective is to design and build a single deck composite bridge using an assortment of cores, fabrics and other materials supplied in kit form. Minimum bridge dimensions will be 24 inches long by 4 inches wide. **Maximum bridge weight will be 600 grams.** (Note: that is 50 grams lighter than last year's bridge weight limit). During testing, the bridge will be supported by 2 posts placed 23 inches apart. The bridge will be loaded in the center of the deck. The most weight efficient bridges will be judged winners.

2. The contest is divided into four material categories. These are Kit and Non-Kit Carbon, Kit Glass, and Non-Kit Natural Fiber/Materials. "Kit" will be limited to the materials supplied in the kit or "equivalent materials" as allowed by the judging committee. Non-Kit will include any other materials available to the competing team. (Note: the non-kit carbon category can be made without carbon – but that may not be advisable.) The Natural Fiber/Material bridge cannot use any glass or carbon fiber. The GLASS bridge cannot use any carbon fiber. The CARBON bridge can use glass and carbon and natural fiber. No boron fiber is permitted. Natural fibers/materials, for the purpose of this contest, refers only to the reinforcement media. Natural fibers include hemp, flax, sisal, jute, cotton, and other fibers derived from plant growth. Other natural materials may include wood, leather, bone (if you can find a suitable donor), etc. The Natural fiber/material bridge may also use any resin to bind the reinforcement and also may use any of the core materials in the kits (balsa, foam, Nomex and aluminum). There may be some flax fiber prepreg available, but that will have to be requested separately and will be a special shipment.

3. A kit consisting of fibers, fabrics, honeycombs, adhesives, foam cores, and epoxy resin will be shipped to all participants by mid-March, 2010. The kits will contain unidirectional and bidirectional carbon and glass fabrics, and a variety of glass and carbon braids. No natural fibers will be shipped, except for the cardboard shipping container itself. It is anticipated that by mid-February, a list of all fiber products to be shipped will be made available to all registrants. The list will contain information sufficient for preliminary design calculations.

4. Materials: "Equivalent materials" for the kit class must be approved in advance of the testing by submittal of an equivalent materials list in writing. If the judging committee does not approve the equivalence, then the bridge becomes a Non-Kit entry (for the carbon category) where the use of any composite or non-composite material is permitted.

5. Bridge Geometry: The overall bridge envelope is given in the figures. Minimum bridge dimensions must be 24.0 inches (length) and 4.0 inches (width). Maximum bridge weight is 600 grams. The roadway surface across a centered 3.5 inch width must be flat (across the width) and opaque and must be constructed so as to support and allow continuous motion of a 3.5 inch wide by 4 inch long by 3 inch high vehicle. This wheeled vehicle may weigh 10 pounds and must be able to move from one end of the bridge to the other without damaging the road surface. The bridge may be arched but the roadway surface may not vary more than 2 inches vertically, across the span. Total bridge height from the end supports to the top of any supporting superstructure must be less than 9 inches. The width of any structure should be less than 6 inches to insure fit with end posts. There must be clearance in the center section of the bridge so that the machine arm and "vehicle" can be positioned for loading. Note

that “Structure below support points not specified”. Conceivably, one could have solid structure there, but then it would be a dam, not a bridge. The intent is to have a substantially open structure under the bridge, so that a “boat” could easily pass under. We will not allow any center span or quarter span posts. Also, the end posts cannot support any horizontal force due to the vertical loading. Finally, the use of closed beams to support the bridge loads is prohibited. Closed beams are defined as members having closed sections such as box or rectangular or trapezoidal or triangular or circular members that have reinforcing fibers in the perimeter surrounding a core or open area. T-beams, I-beams and channel beams are all acceptable. In case multiple channel, T-beam or I-beam sections are used, they must be separated by at least one-half inch of clear space between them along their entire length. Note: the roadway surface may be bonded to the top side of the multiple beams. The structural beam separation must be discernable.

6. The bridge weight,  $W$ , will be measured immediately prior to test. The bridge will be mechanically loaded at the center of the span. Deflection  $\Delta$  will be measured by crosshead motion. Maximum load  $P$  is defined as the mechanical load at failure, or the mechanical load at 1-inch crosshead deflection, whichever occurs first.

7. Bridge efficiency is computed as  $P/W$  ratio. The bridge with the highest value of  $P/W$  in each category shall be judged the winner. A loading machine having a 30,000-pound+ capacity will be used.

8. Load testing will be conducted on the exhibition floor during open exhibition hours on Tuesday, May 18. Each bridge will be loaded to failure once. No retests are permitted. A team may submit only one bridge for testing per entry fee. Multiple entries are permitted.

9. An identification sticker, approximately 2x3 inches, will be pasted on the visible surface of the roadway. The sticker will identify the team and testing results. Stickers will be supplied in the kits. After testing bridges will be on display at a nearby table.

10. All student team entries must also submit a poster presentation highlighting some material, process and/or design aspect of their bridge. Bridges without posters will be tested but will not be eligible for prizes. Each bridge requires a poster. **Maximum poster size will be 22 x 28 inches.** The posters must be submitted by 10 AM Tuesday at the “Bridge Prep” room near the conference registration area. The posters will be prominently displayed in the main registration area on Tuesday, Wednesday and Thursday. A committee will judge the posters, based on technical merit. General guidelines for poster presentations are available from the Business Office. *NOTE: Posters may not be removed until Thursday afternoon. If you want it to be returned but have left early, make sure your poster rolls up and please provide a shipping address to the SAMPE staff.*

11. Multiple prizes will be awarded for the best efficiencies in each category. In addition, prizes for the best posters will be given out. All prizes will be awarded at the Wednesday morning Student Prize Awards Ceremony breakfast. All participants are invited to attend. Door prizes will be awarded on Tuesday, May 18, at 5 pm in a nearby area (to be determined and announced during the tests). All participants are eligible to attend.

12. The entry form along with a \$45 fee to defray contest costs must be received no later than March 19, 2010.

## Entry Form

Please enter the following team into the SAMPE 2010 ISSE Super Lightweight Bridge Building Contest.

Name \_\_\_\_\_

Shipping Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

email address (Required) \_\_\_\_\_

Student School \_\_\_\_\_ Advisor \_\_\_\_\_

\$45 Fee Attached

Make checks payable to: SAMPE New Jersey Chapter

Mail to: J. Osterndorf, 20 Memorial Ct, #2C, Denville NJ 07834

Register on-line and pay by credit card at the SAMPE  
website: [www.SAMPE.org](http://www.SAMPE.org)

Questions: Contact Narendra Taly at [ntaly@exchange.calstatela.edu](mailto:ntaly@exchange.calstatela.edu)

