

**TWELFTH ANNUAL
SUPER LIGHT WEIGHT
COMPOSITE BRIDGE BUILDING CONTEST
SAMPE 2009, MAY 19, BALTIMORE MD**

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 **650** grams. (Note: that is 100 grams lighter than last year and the only substantial change from last years rules.) 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. 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).
3. A kit consisting of fibers, fabrics, honeycombs, adhesives, foam cores, and epoxy resin will be shipped to all participants by mid March, 2008. The kits will specifically contain uni-directional and bi-directional 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 **650** grams. The roadway surface across a centered 3.5 inch width must be flat (across the width) and continuous 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. Finally, the end posts cannot support any horizontal force due to the vertical loading and helium may not be used to artificially reduce bridge weight.

6. The bridge weight, WT, will be measured immediately prior to test. The bridge will be mechanically loaded at center span. Deflection W 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 event occurs first.

7. Bridge efficiency is computed as P/WT . The bridge with the highest value of P/WT in each category shall be judged the winner. A loading machine having a 30000 pound capacity will be used.

8. Load testing will be conducted on the exhibition floor during open exhibition hours on Tuesday, May 20. 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 staff.*

11. Multiple prizes will be awarded for the best efficiencies in each category. In addition, prizes for best posters will be given out. All prizes will be awarded at the Wednesday morning student awards breakfast. All participants are invited to attend. Door prizes will be awarded on Tuesday 5 PM in a nearby area, to be determined. All participants are eligible.

12. The entry form along with a \$40 fee to defray contest costs must be received no later than March 20, 2009.

15. A useful website has been developed by P. Joyce at USNA. Please note that it was developed for earlier contests and there are differences with the present contest.

http://web.ew.usna.edu/~pjoyce/composites/em436/sample-bridge/Bridge_Web.html

Entry Form

Please enter the following team into the SAMPE 2009 ISSE
Super Light Weight Bridge Building Contest.

Name _____

Shipping Address _____

E-Mail (Required) _____

Student School _____ Advisor _____

\$40 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

Questions: Contact Howard Kliger at hskliger@comcast.net

