**Middle School Level**

**SkillsUSA Nebraska**
**BRIDGE BUILDING**
**CONTEST REGULATIONS**

**Purpose:**

The objective of the contest is to design and build the most efficient bridge that will support a load over a given span using a given material. Bridges must be **built by the individual prior to** coming to SkillsUSA Nebraska Leadership and Skills conference. The Bridge Building contest will test to determine the efficiency of the design, not the maximum load carried. Bridges may be disqualified if they do not meet all the identified criteria.

**I.     Eligibility:**

Chapters are limited to 3 bridges

**II.   Materials of Construction:**

The bridge must be bonded together with a commercially available glue. Any type may be used.

The bridge must be constructed entirely of wood. Any kind of wood may be used as long as it is 3/16" x 3/16"or less in cross-section. No particle board, (gussets\*) or (laminated\*\*) wood may be used.

**\* Any triangular structure that completely fills the corner will be considered a gusset. (If daylight exists between the two beams constructing the corner the beam will be considered a structural member.)**

**\*\*Laminated wood is described as gluing two or more pieces of wood side to side or edge to edge. Even if the total cross-sectional area of the laminated pieces is less than 3/16" x 3/16".**

Maximum weight must not exceed 100 grams. Weight will be determined by the official conference scale.

Thread or other wrapping of joints is not permitted. You may not coat the bridge with any material. Splines or dowels are not permitted. Tension member, if used, must also be constructed of wood.

**III.  Scope of Contest:**

A.                 The bridge dimensions must be in accordance with the following:

1.                  The bridge must be long enough to support itself on the test platform. It must span a gap of 300mm and have a maximum length of 350mm.

The bridge must give a minimum inside width of 50mm.

3.                  Wood pieces added (outriggers) to the bridge only to satisfy dimensional constraints will not be allowed.

4.                The bridge must contain a “roadbed” with a minimum inside width of 50mm and a minimum length of 305mm. The top of the roadbed is not to be a solid surface. Maximum length of the substructure is 270mm and can be no more than 75mm below the top surface of the of the roadbed. **Except for the roadbed and substructure, there are no other height limitations**.

The roadbed must rest on the test platform. The maximum thickness of the roadbed will be no more than 3/8". Any part of the structure below the roadbed is to be considered the substructure and has to follow the guidelines and dimensions set up for the substructure.

5.                  No portion of the roadbed, loaded shall deflect, at maximum load, more than 20mm below the top of the test support.

6.                  The unloaded bridge must be symmetrical from side to side and left to right (not top to bottom). The bridge does not have to have sides or a top except the roadbed must support the load block (50mm x 50mm) and the bridge must fit the tester.

7.
  A drawing (2 or 3 view) with dimensions must accompany the bridge at time of contest.

The mass of the bridge will be determined by weighing at the time of testing.  Efficiency rating (maximum load supported divided by mass of the bridge) will be used to determine the winner.

**IV.     Testing:**

All construction requirements and dimensions will be checked prior to testing. **Bridges which do not meet all requirements may be disqualified.** Bridges must be at the test site at the starting time identified in the official program. Once testing has begun, no additional entries will be accepted. Bridges will remain the possession of the judges until they are released at the end of the testing.Load will be applied at the center of the bridge with downward force. The load will be applied through a metal block resting on the roadbed. The block will be exactly 50mm x 50mm x 10mm. Make certain the roadbed can support the block. The load will be applied to the loading block by a hydraulic loading rod. The rod will have a diameter of 13mm and will extend through the center of the roadbed. The bridge construction must accommodate the block and hydraulic loading rod. Bridges which do not meet this requirement will be disqualified.

Bridges will be tested until failure or the limits of the tester have been reached. Failure is defined as the inability of the bridges to carry additional load (Maximum load).

**V.  Scoring:**

A.                 The bridge structural efficiency (E) will determine the winners.

Maximum Load Supported (lbs.) X 454 (Grams per lb.)

Efficiency (E) = Mass of Bridge (Grams)

B.      The bridge(s) with the highest structural efficiency, ( E), will be the winner(s).

C.                 In case of a tie in E, the lightest bridge will be the winner.

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| **Criteria** | **Points** | **Contestant** |
| Efficiency | 80 |   |   |   |   |   |   |   |   |
| Drawings | 20 |   |   |   |   |   |   |   |   |
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| **Total** |   |   |   |   |   |   |   |   |   |