The 2024 Model Catwalk Competition Capital District's 44th Anniversary Celebration of National Engineer's Week Thursday, February 15, 2024

Model bridges to be tested February 3rd at C.T. Male Associates. Bridges will be available for pickup at the end of the testing day or will be returned to your school upon request.

The Model Catwalk Competition is open to full-time 7th and 8th grade school students. It involves building a model truss-type catwalk bridge out of balsa wood with the parts joined by **yellow carpenter's glue**. See page 3 for helpful hints and pages 4 and 5 for model dimensions and construction requirements.

Each model will be judged on its aesthetics (appearance and quality of construction), weighed and then loaded to failure by a testing machine. Model efficiency will be computed based upon maximum load at failure divided by the weight of the model.

Cash prizes will be awarded for first, second, and third places in categories of efficiency, load capacity, and aesthetics.

The contest is sponsored by: Capital District Engineer's Week
With support from:

- Structural Engineering Institute of the Mohawk-Hudson Section of ASCE.
- Enginuity Engineering and Design
- Expertise Project
- C.T. Male Associates

and our **Corporate Sponsors**

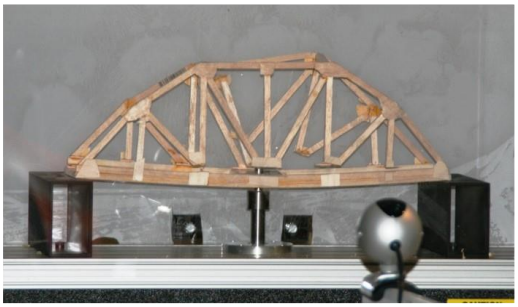
Basis for Competition:
Each model will be examined by a judging panel for aesthetically pleasing design and craftsmanship, weighed, and loaded to failure. Bridges will be scored for model efficiency ratio, maximum load, and aesthetics. The model efficiency ratio is the maximum load in pounds divided by the weight of the model in grams.

Prizes:
Cash prizes will be awarded at the end of competition for:

Team Bridge Prizes

Category	1st Place	2nd Place	3rd Place
Efficiency:	$325	$175	$70
Max. Load:	$100	$70	$35
Aesthetics:	$100	$70	$35

(Minimum of 9 bridge entries for Max Load Category Prizes)



Pre-registration:
Students planning to enter the competition are requested to pre-register by e-mail (individually or through their advisor) to the attention of Tim Schroder ModelBridgeComp@EnginuityDesign.com.
Please provide the following information: student name, e-mail, telephone number, school, and name of advisor/teacher.

Submitting Entries:
Bridge models shall be entered by completing an on-line form using the template below as guidance to gather the required information. Model entries shall be hand-delivered to the testing site after 8:30 a.m., but no later than 9:30 a.m., or mailed in advance in packaging to withstand the trauma of shipping to:

- Timothy Schroder (Contact us for options)
- Please write "2024 MBC" on outside of package.

Models shall be marked on the top of bridge deck with team bridge number.

2024 MODEL Catwalk CONTEST REGISTRATION

Go to www.EnginuityDesign.com/MBC for link to form

NAME _____ **BRIDGE NUMBER** _____
From Advisor

Personal Email so we can send you event updates

EMAIL _____ **TEAMMATES** _____

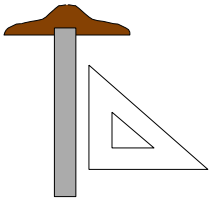
TELEPHONE (HOME) (____) _____- _____ **TEAMMATES** _____

AGE _____**GRADE** _____ **TEAMMATES** _____

ADVISOR NAME _____

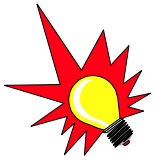
SCHOOL _____

Complete and hand-deliver this form with bridge model by 9:30 a.m. on day of testing or mail to the above address. **Deadline for receipt of models shipped is February 1st, 2024.**



Helpful Hints:

1. Draw a sketch of your bridge first. Try different designs and select a design that you are able to construct (See last page for examples of bridge types). Design counts towards the aesthetics awards.
2. Make sure your bridge meets the rules (See first and fourth pages).
3. Practice assembling the pieces of your model using clothes pins before gluing them together.
4. Top chord (horizontal) members of trusses will go into compression and tend to bend or buckle. These members should be large enough so they will not buckle too soon. They should also be straight and symmetrically aligned. Horizontal and diagonal bracing members between top chords will help resist buckling and increase load capacity.
5. Bottom chord (horizontal) members of trusses will go into tension. These can be smaller than top chord members.
6. Tension diagonals (webs) slope downward from the top chord towards the middle of the span.
7. Compression diagonals (webs) slope downward from the top chord towards the end supports. These should be larger than tension diagonals.
8. Connections tend to be the weak points. Compression members will push on connections while tension members will try to pull away. Reinforcing gusset plates glued to each member at connections will strengthen connections.
9. Wood is stronger parallel to its grain, weaker perpendicular to its grain. Align gussets with grain parallel to tension forces.
10. Clamp joints when gluing for stronger bond.
11. Load is greatest at midspan where the load is applied. Strong deck and connections are required here to transfer load from the load plate through the deck to the bottom chords and web members.
12. Try testing the strength of individual members by pushing down on them (compression) or by pulling on both ends at the same time (tension).
13. Use care and work safely while constructing your bridge. Craftsmanship counts towards the aesthetics awards.

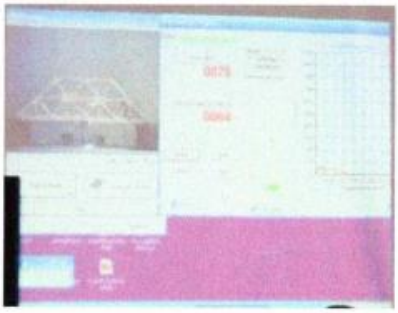


An Excellent Link on the Web: http://www.sciencebuddies.org
Go to the Project Ideas tab and select Civil Engineering (under "Engineering")
Go to Page 4 and select "The Design Process: Creating a Stronger Truss"

Reference Materials:

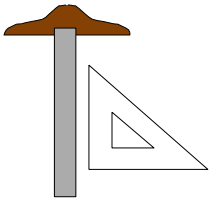
⇒ Trusses, A Study by the Historic American Engineering Record, National Park Service (excerpt attached).
⇒ Wood Engineering and Construction Handbook, 2nd Ed., by Keith F. Faherty & Thomas G. Williamson, McGraw Hill
⇒ Timber Construction Manual, 4th Ed. by The American Institute of Timber Construction
⇒ Understanding Wood by R. Bruce Hoadley, The Tauton Press

Questions?
Contact Tim Schroder at 877-436-4337 or by email ModelBridgeComp@EnginuityDesign.com.



For the most current information, schedule, and E-week program, please visit the Capital District E-week website: http://www.capitaldistricteweek.org/

Please join us Virtually on February 15, 2024. The excitement begins at 9:30 a.m. Have Fun and Good Luck!



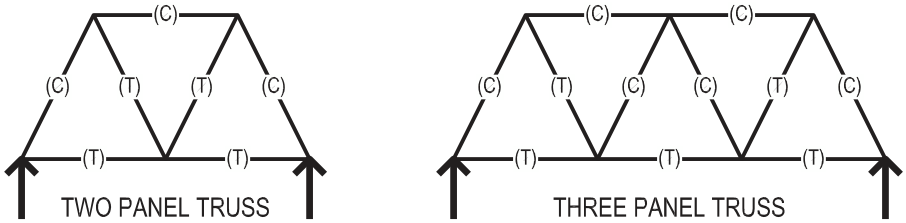
Details of Construction:

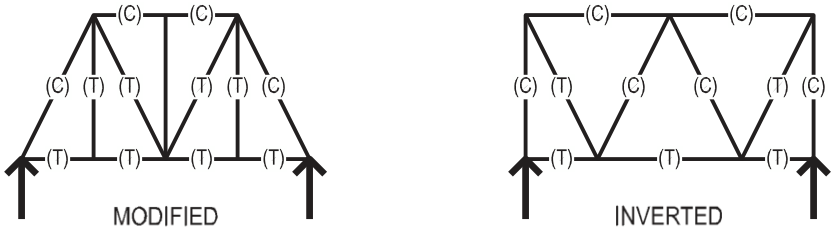
1. Models must be made solely by the student entrant.
2. Models **shall** be constructed entirely of **provided balsa wood** bonded only with Elmer's **yellow carpenter's glue**.

(acceptable glue)

(unacceptable glue)

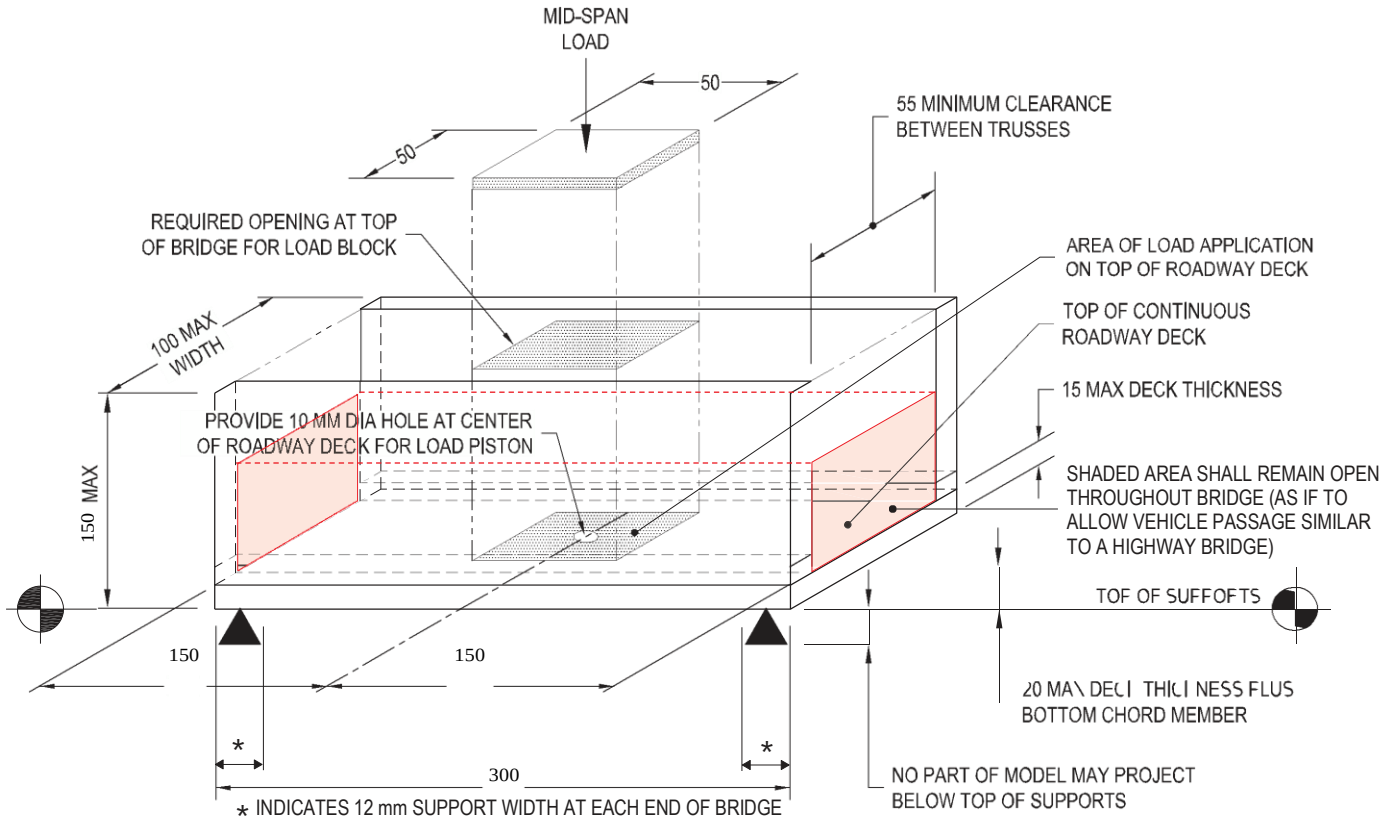
3. Decorative painting of the balsa wood members is acceptable, but no painting or other coating shall be applied over the glued joints. The **yellow carpenter's glue** must remain visible. "Dipping", soaking, or painting to add strength is **not** allowed.
4. Models shall be constructed as a truss bridge with each side containing at least two (2) panels. See the attached sketch for examples. No solid (one piece) models, or models carved from one piece of wood, are allowed.
5. Model dimensions and requirements shall be as follows and in the attached sketch.
   - The model shall be **300 millimeters (mm)** long, no more and no less. This is critical for the bridge to fit on the supports of the load test machine.
   - The model shall be no greater than **150 mm** high and no greater than **100 mm** wide.
   - The interior distance between the truss sides shall be at least **55 mm**.
   - The "walkway deck" shall be continuous without openings or gaps, and shall not be greater than **15 mm** deep. The
   - total thickness at the bottom chords shall not be greater than **20 mm** deep.
   - The area immediately above the walkway deck shall be clear for "pedestrian traffic" to pass as if the bridge were an actual catwalk bridge. Cross members between truss top chords are recommended, but any additional bracing between the side trusses shall not extend more than one-third of the distance from the top chord to the walkway deck.
   - Testing machine supports are **12 mm** wide at each end and will not support lateral thrust developed by the model.
   - No part of the model shall extend below the end supports that bear on the testing machine. **No exceptions.**
   - The model **must have an opening** centered in the top of the structure through which the loading plate can pass to bear on the "walkway deck". A **12mm** hole through the "walkway deck" shall be provided for the load piston. This hole must be at the center of the bridge (in width and length). This is critical for the bridge to accommodate the load mechanism of the test machine.
   - A load plate **50 mm x 50 mm** will be used to load the structure at mid-span. This is a common point for bridges to fail prematurely due to inadequate deck or connection strength. The "walkway deck" and its connection to the side trusses should be strengthened (reinforced) at this load point.





EXAMPLE TRUSSES

(T) = TENSION (C) = COMPRESSION



MODEL DIMENSIONS AND REQUIREMENTS

ALL DIMENSIONS ARE IN MILLIMETERS