

Boomilever

Division B/C

Georgia Tech Event Workshop Series
2024-25



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The Rules Sheet

Both Division

Only made from wood and any adhesive

MIDDLE of block 40-45 cm away from wall

Scoring = (Weight held + bonus)/ weight of boomilever

Division B

20 cm non-bonus
15 cm bonus

Between 4 cm lines

Division C

15 cm non-bonus
10 cm bonus

Outside 4 cm lines

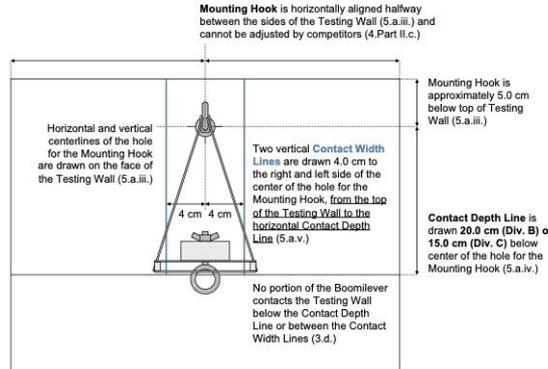
BOOMILEVER

Sample Boomilever & Testing Wall
Diagram Front View - 2021



The Boomilever must be a single structure, with no separate, loose, sliding, or detachable pieces, constructed of wood, and bonded by adhesive (3.a.)

The Boomilever pictured here is only one possible configuration that satisfies rules.



Testing Wall (provided by the Event Supervisor) is a vertical, solid, rigid surface at least 30 cm high, 40 cm wide and 3/4" thick (5.a.i.)

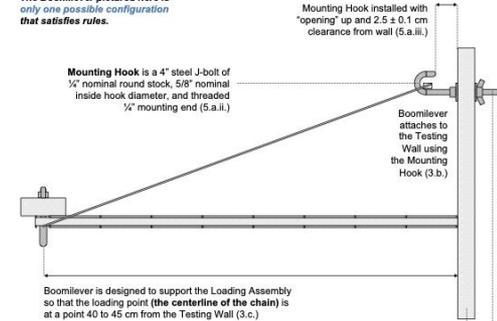
BOOMILEVER

Sample Boomilever & Testing Wall
Diagram Side View - 2021

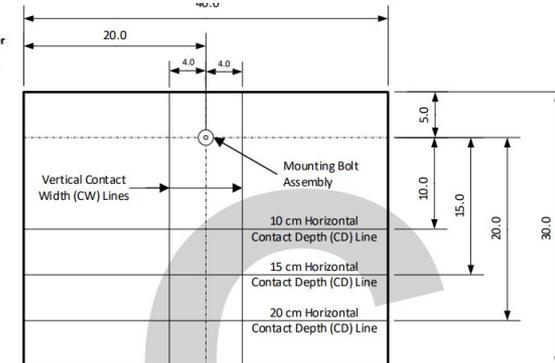


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THE INFORMATION HERE SHOULD NOT BE INTERPRETED AS AN EXTENSION OF THE RULES. THE OFFICIAL RULES IN THE CURRENT RULES MANUAL TAKE PRECEDENCE. © SCIENCE OLYMPIAD INC.



The image features a grid of windows, likely in a modern building, with a blue background. Each window pane is filled with a pattern of white binary code (0s and 1s). A semi-transparent blue rectangular box is centered over the grid, containing the text "Materials + Physics (very fun)" in white, bold, sans-serif font.

Materials + Physics (very fun)

Topic 1: Balsa and Bass Wood

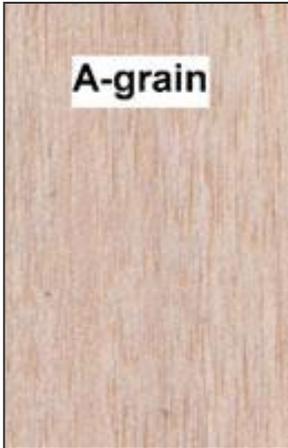
Balsa Wood

- Density varies a ton on the lower ends 5-15 lbs/ft³
- Good for compression

Bass Wood

- Density varies very little on the higher ends 25-35 lbs/ft³
- Good for tension

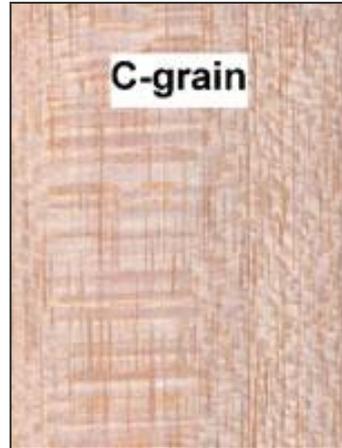
A-grain



B-grain



C-grain



Topic 2: Adhesives

- Ca glue brands

Bobsmith (my favorite), loctite, and sunbelt

Set quickly

Different viscosity: super thin, thin, medium, and thick

- Wood glue

Stronger but heavier

Takes a bit to set

- Epoxy

Very strong

Takes a bit to set

Can be toxic

Topic 3: forces + Euler's

- Division B

20 cm 29.1 kg tension 27.3 kg compression

15 cm 43.7 kg tension 41 kg compression

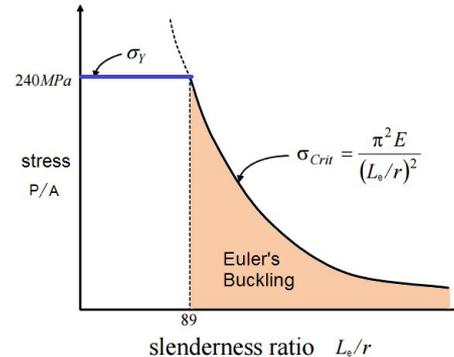
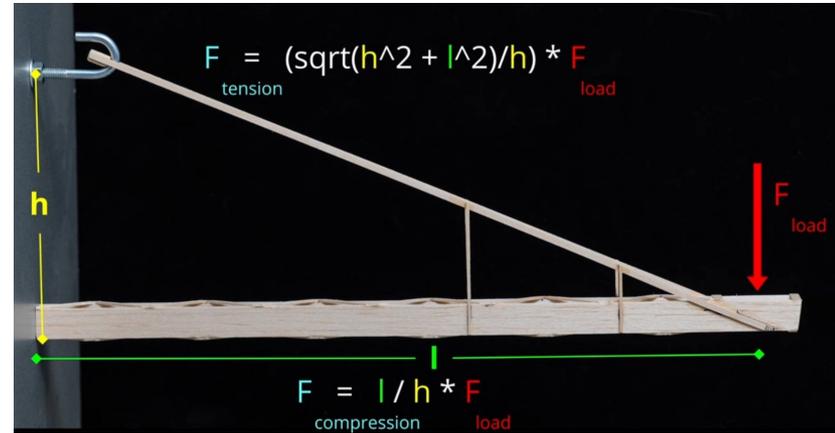
- Division c

15 cm 43.7 kg tension 41 kg compression

10cm 63.3 kg tension 61.5 kg compression

Euler's Critical Load Law

Essentially at half the length 4x the buckling strength



$$P_{cr} = \frac{\pi^2 EI}{(KL)^2}$$



COMMON Designs

Division B Design 1

Compression

Sides 1/8in main beams + 1/16 supports

1/16 crossmembers

Tension

1/16 x 1/16 beam

Unknown bass wood block



Division B Design 2

Compression

Sides $3/32 \times 15\text{mm}$

$1/32 \times 2.5\text{mm}$ crossmembers

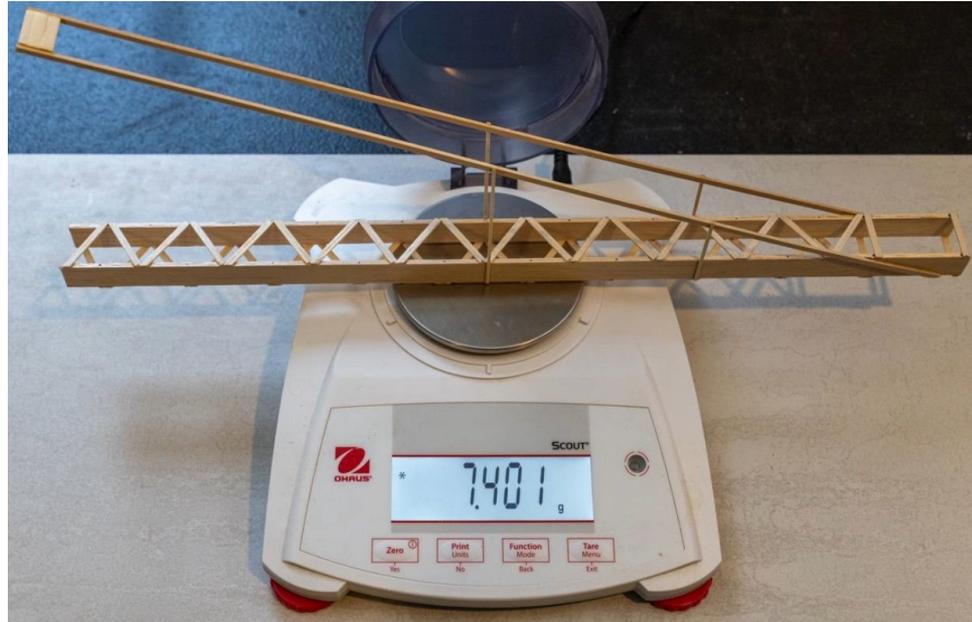
Tension

$1/16 \times 3/32$ tension beam

3 of $1/8 \times 3/16$ block

Verticals

$1/32 \times 1/16$



Division C design 1

Compression

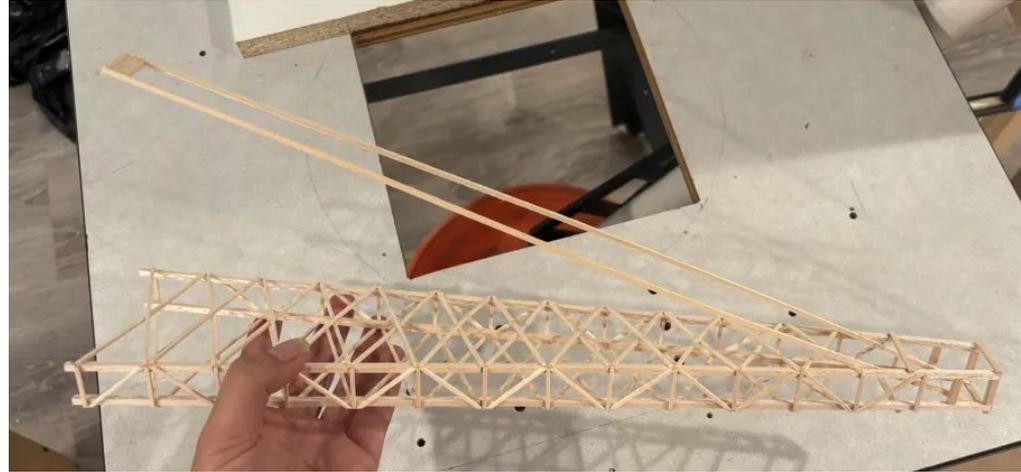
Sides 1/8in main beams + 1/16 supports

1/16 crossmembers

Tension

1/16 x 3/32 beam

4 of 1/16 x 3/32



Division C design 2

Compression

Sides $\frac{3}{32} \times 15\text{mm}$

$\frac{1}{32} \times 2.5\text{mm}$ crossmembers

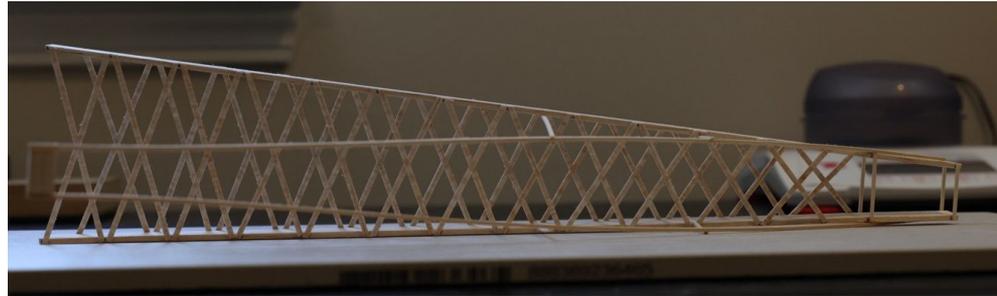
Tension

$\frac{1}{16} \times \frac{3}{32}$ beam

3 of $\frac{1}{8} \times \frac{3}{16}$ block

Verticals

$\frac{1}{32} \times \frac{1}{16}$



Tips from a Veteran

- Building and logging

Choosing wood

Make tons of joints

Take measurements of everything and log them

- Preparing for competition

Practice setting up the boomilever with someone timing you

Practice handling the boomi

- During competition

Ask questions

Calm down

Additional Resources

**“Balsa Engineering”
on Youtube**

**“Science Olympiad Balsa
Event Autoloader”
On Youtube**

Boomilever Guide



Resource 4

THANKS!

