



Ready to compete?

MINI PRESTRESSED BEAM COMPETITION

Regional – There is no advancement to a Society-wide national competition for this competition.

Overview

Prestressed Concrete is concrete with its primary reinforcement consisting of steel strand that has been put into tension which results in compression of concrete. This is similar how you tune a guitar string.

Objective

Teams will use bass guitar strings to act as the prestressing force within a concrete beam. Each team will have control over the ultimate shape of the beam but defining factors such as length, width, and height of the formwork, as well as the amount of concrete material that will be provided dictate the final product.

Eligibility

Teams are not limited by the number of students allowed for the building team, however only three (3) students are allowed to be present for testing. Each team should designate a team captain. Each university can have one team and only one beam will be scored.

Procedures

Teams will arrive at the designated competition location on Friday, March 22nd to construct their Mini Prestressed Beam. Each team will build the beam onsite at the symposium. Testing and scoring will be conducted on Saturday, March 23rd. The finalized report will need to be submitted at the time of testing/scoring of the beams.

Teams are required to bring the following items with them to the competition location:



- One standard tarp – at least 8' x 6' in size
- Paper and a writing utensil
- Safety glasses and PPE
- Pliers
- Wire cutters
- 3/8" wrench or adjustable wrench
- Box cutters
- Philip screwdriver
- Straight screwdriver
- Tape measurer
- Tape
- Caulk
- Drill bits and drills
- Drywall screws – 1/14"

The following material will be provided by the competition judges at the time of the competition:

- Casting form
- 4 packs of bass strings – (Dia .100, .080, .065, .045)
- 1 aluminum L bracket (12"x1"x1") – for anchoring
- 16 machine screws – for tuning
- 1 sheet ¼" marine plastic – for bridge and saddle
- Concrete mix (by volume)
- 2 sheets (24"x24"x1") polystyrene foam – to create beam shape)
- Release agent
- ½" x 3/16" x 12" aluminum bar – for bridge & saddle if needed

Construction

The beams must be constructed in full on March 22nd. Only materials provided by the competition judges may be used for beam construction. The beam must use the guitar/bass string to act as the prestressing strand/reinforcement in the beam. The beams must conform to the maximum depth, width, and length of the formwork provided. Students may use various tools (measuring devices, guitar tuner, glue, etc) at their discretion to aid in constructing the beam. Concrete must be poured by 3 PM on March 22nd.

Constraints

1. The teams must only use the materials and tools provided at the competition.
2. Beams must maintain the length of the formwork provided. Beams shorter than the provide formwork will be disqualified.
3. All concrete must be poured by 3 PM on March 22nd.
4. Member size is constrained as follows:
 - No greater than 12" in width
 - No greater than 6" in height
5. The beam shall stand freely on a flat surface.



5. Beams will be required to maintain a maximum of 6" of bearing on each end.
5. Beams will be constructed in such a manner that will allow for the member to be loaded either directly on top of the beam (flat top surface required) or using a strap provided by the competition judge.

Loading

The beams will be loaded at 3" from the edge of the bearing surface until shear cracks develop in the beam. The judges will visually determine when shear cracks begin to develop. The loading will be done in predetermined increments. The beams will then be loaded at midspan until failure. Failure will be determined once one of the below criteria happens. Beam fails to hold weight added for more than 5 seconds or deflection of more than $L/360$ occurs.

Judging

Teams will be ranked in order of Lowest Overall Score. Each team will be ranked in descending order for each of the five test categories (prediction of prestressing, prediction of camber, load at shear crack, prediction of load at midspan for failure, load achieved at midspan for failure). The team with the lowest score at the end of the competition will win.

Important Dates

- Release of Student Symposium Competition Rules and Regulations on October 1, 2023.
- 2024 Southeast Student Symposium Regional Competition March 21-23, 2024 in Orlando, FL.
 - Competition time and location will be released closer to event.

Questions

Requests for information (RFI) must be sent to 24southeastsym@gmail.com with the subject line "Mini Prestressed Beam Competition RFI".