

CONCRETE SHIELD

In the time of the roman empire, a legionary or auxiliary warrior's shield was an essential element of the warrior's uniform. Uniformity in shield shape and structural integrity ensured effectiveness in combat, while the shield graphic displayed elements and colors significant to the Roman Empire and the individual.

General Rules:

Chapters will be tasked with creating a shield that meets traditional roman shield dimensions and coloring, and will test flexural strength, protective abilities, and, all while considering the weight of the shield.

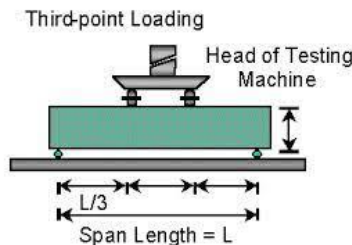
- This competition is for undergraduate students only. General guidance from other sources is encouraged but all the work is completed by undergraduate students.

Dimension Requirements:

- Height: 3ft minimum, 3.5ft maximum
- Width: 2ft minimum, 2.75ft maximum
- Thickness: 2in max
- Reinforcement must have a minimum of 0.5 inches of coverage on both sides
- Reinforcing cannot exceed 3/8in diameter per member and total reinforcement area cannot exceed 0.7% of given cross section.
- Reinforcement fibers and meshes are allowed and encouraged for safety.

Cross Section Loading Requirements:

- Along with the final shield, students will provide a cross-section for structural loading.
- Flexural strength estimates will be submitted before structural loading, and percent accuracy will affect the final score.
- Span Length (L): 18"
- Width: 6"
- Thickness: (Thickness of Shield at Center)
- Cross Section Loading will be judged using Strength/Weight of Cross Section
- Cross Sections will be loaded in third points



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Aesthetic Judging and Student Voting:

- Aesthetic designs will be judged. Creativity is highly encouraged. The idea here is to make a shield that would fit into a roman era
- Must tie into this year's conference theme (Building Rome)
- Average student ranking (15)
 - Students cannot vote for their own school
- One submission per school
- Profanity and Explicate designs will be immediately disqualified

Field Judging:

- The "Field" portion of the competition will utilize a water balloon fight
- Two (2) students from each participating chapter will utilize their concrete shield as protection
- Once "hit", the student is eliminated. Last team standing wins!

Memo:

- A professional concise 2 (two) page memo report must be turned in at time of competition. This memo must describe your design, flexural strength estimate, construction, and overall cost to make the shield. For cost, please include a section for materials, construction cost, and labor of all items including the mold. (Generally assume: Student = \$10/person/hr, Contracted Professional = \$100/person/hr, Steel = \$60/tonne = \$0.027/lb, Concrete = \$90/cu. yard) Include concise and professional calculations and photos of the construction process in the appendix of the report (this is not included in the 2 page limit).
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- Points will be given on a variety of factors (see Table 1). As engineers, it is important to always find the most efficient solution to a problem, therefore factors include cost, weight, batting effectiveness, and professionalism will be judged.