

## ENDS 231. Cardboard Swing-Couch Design

**Date:** During class on Tuesday, February 5, 2008

*Pass-fail work*

**Location:** classroom

### Problem Statement:

The design involves the construction of a hanging structure of original design, constructed only of recycled single-ply corrugated cardboard, cloth, rope, and glue. The design is to be documented by a 4 page report that includes 1) a list of materials and quantities (*measured areas*) used, 2) an elevation drawing, 3) a side elevation drawing, 4) a plan drawing, 5) a cardboard joint detail drawing, 6) a short narrative of the design process, how it meets the specified criteria, and the construction process, and 7) a brief discussion of the anticipated behavior (deflections, flexing, etc) when loaded with sitting people.



The structures must permit two class members (to be designated) to sit upright *facing forward* without tipping or collapsing.

The project report and construction is to be completed with a team.

EVERYONE MUST BE PHOTOGRAPHED with their design (digitally). To identify each team, a sign must be displayed with the name of the entry noted in very readable block lettering in the photograph. The sign is to be no larger than letter size paper.

### Rules:

1. Each team will be allowed to use corrugated cardboard, cloth or canvas, rope, and glue of any kind. Laminating (layering cardboard sheets with glue) is strictly prohibited. No tape or mechanical fasteners will be permitted. Pre-manufactured tubing is also prohibited.
2. The structure is **not** to be assembled on the day during class. The components must be prefabricated, partially or fully assembled and transported on the day to the test site.
3. The structure will be subjected to two loads of approximately \_\_\_\_\_.
4. The chair must elevate the loads off the ground for an extended period of time, and the chair back may not tilt more than 30° when loaded or unloaded.
5. Each seat of the couch can be no smaller than 455 mm x 405 mm. The seat area must consist of a perimeter frame and a cloth base. Only one frame member is permitted within the perimeter and must be between the seats. *Any surfaces must be constructed of cloth. No flat sheets of cardboard are permitted for seats or seat backs.* The frame cross section (*through* the member) must not exceed the boundary of a 100 mm x 75 mm rectangular area. The seat frame members must be visible enough to permit observation.
6. Each seat back can be no smaller than 455 mm x 435 mm. It may or may not have a frame, but again, any flat surfaces must be constructed of cloth and cannot be constructed

of flat cardboard sheets. Arm rests are permitted under the same restrictions, but must be no taller than 200 mm.

7. The couch bottom, when empty, must be no higher than 500 mm above the ground surface, and cannot be lower than 350 mm off the ground surface when occupied.
8. The couch must be suspended by no less than 3 contact points and no more than 6 contact points with the rope to the support frame. Rope may be used anywhere in the structure *except in the seat base*. The ropes must be the correct length needed to satisfy Rule #7 when the carabineers to clip onto are 1.7 m above the floor. The ropes must have loops or clips **in place** (*no adjustments allowed*). Stretching of the rope must be anticipated as well.
9. **The couch cannot be constructed in any studio in the Langford Architectural Center without a *signed* statement from the studio professor allowing it and an affidavit certifying that all construction waste has been properly disposed of. Use of “cold” studio desks is strictly forbidden without this pre-approval and post-verification of proper studio use. \*Any project not properly disposed of will receive a failing grade.**

### Objectives:

The primary objective of the project is to construct a structure that will be subjected to loads of gravity, behavior of materials by shape and strength, and that LOOKS GOOD. The secondary objective is to work on a construction team, and produce a unique corrugated cardboard structure. In addition, the design-build will be advertised to, visible to, and scrutinized by the College of Architecture.

### Evaluation Criteria:

1. Completeness (30%)
  - a. Have you included the required report items? Is it easy to read and understand?
  - b. Have you followed the specifications given in Rules?
  - c. Do your behavior predictions have any basis in reality?
  - d. Are the cardboard materials quantified by area, not number of sheets?
  - e. Do the plan and elevations drawings have dimensions? Is the cardboard joint detail sufficient to identified location and assembly method? Are the locations of the rope and connections on the drawings?
2. Design Quality (35%)
  - a. Does the couch meet or exceed the minimum requirements for function?
  - b. Are the materials used appropriately?
  - c. Is too much material used?
  - d. Does it look pleasing or scary or “cookie-cutter” like?
3. Construction Quality (35%)
  - a. Was the work performed at the last minute or thought through before construction?
  - b. Is sufficient quantity of material used or connections reinforced where needed such that it will not come apart when used?
  - c. Is it painted up to cover any construction or material flaws?
4. Above and beyond (5% or more)
 

*This section is included for innovative and creative content or quality that I have not explicitly asked for.*