August 6, 2014

ME 101 Design project (Fall semester 2014)

Scope

Working in groups of six, students will design a proposed MÉC logo. After the design is finalized, each team member will independently build a prototype of the proposed logo. The group will make a final presentation to a committee for evaluation. Each individual team member will submit an independent final report along with her/his prototype.

The design process

Each member of the team shall first conceptualize a few designs and make freehand sketches of her/his ideas on plain paper using pencil. Please limit the number of ideas to what you can fit on one side of an A4 size paper. Each member shall propose a minimum of three ideas and a maximum of six. When the group meets, they will have six such papers full of ideas. At this stage, the group will discuss and choose three of the ideas based on a single criterion which is ñaesthetic appealò. These selected ideas should be sketched out by hand on one piece of A4 size paper using pencil. Do not discard the six original pieces of paper. File them away for the final evaluation.

Next, the group will discuss the chosen designs from the point of view of aesthetics, and manufacturability of the prototype.

Now, based on the constraints outlined below, the group will finalize one design. Reasons for discarding the other designs should be noted, as must reasons for choosing a design. Upon design finalization, the group will select the material out of which they plan to build the prototype. They may need to refine the design, modifying it as necessary for the sake of manufacturability based on the constraints specified below. If it turns out that the design is not manufacturable, or exceeds the costs, or violates other constraints specified, the group will return to the designs earlier discarded, select an alternative design, and repeat the process until they evolve a design that satisfies all the constraints.

Material choice constraints

The prototype is to be built out of one or a combination of the materials that the students are free to choose provided the prototype satisfies the other constraints specified below. Choose only those materials that can be relatively easily fabricated. Metallic materials, rocky materials such as stones, concrete and glass are not permitted. Styrofoam (thermocole) is not permitted. Materials cannot be glued, welded or screwed together. Materials used must be solid. Hollow materials, such as honeycomb structures, are not permitted. The entire model has to be fabricated out of one solid piece of raw material. Total material cost is not to exceed INR 500.

Facility constraints for building the prototype

The prototype must be built by the student her/himself. Each individual student will build a prototype based on the design finalized by the group. Three laboratory sessions will be made available to each student during which time s/he may use the facilities available in the prototype laboratory. In addition, students may use the prototype laboratory facilities during working Friday afternoons when no classes are scheduled. On Friday, facilities will be made available to students in the prototype laboratory on a first come first served basis. If a large number of students show up, the laboratory assistant will use her/his judgment to allot a limited amount of time to each student.

Constraints on tools to be used

A vice for holding the model, files, and hack saws will be made available in the prototype laboratory. Students may purchase scissors and knives if they so need. The total cost of scissors and knives used should not exceed INR 100. Any other suitable tool or device may be used to fabricate the model but the total cost of all such aids should not exceed INR 1000.

Constraint on shape, size, weight, workmanship, etc.

The prototype should be a 2-dimensional (2-D) model having a uniform thickness in the third dimension. It should have a uniform thickness of 8 mm +/- 2 mm (i.e. uniform thickness between 6 and 10 mm). The maximum weight of the model permitted is half a kilogram. All the three letters (MÉC) used should be either uppercase or lowercase, but not mixed. The 2-D face must be reasonably square with the side walls that make up the thickness of the model. Ornamentation, such as painting, is not encouraged.

Evaluation parameters

1. Aesthetic appeal (the subjective judgment of the examining committee is final): 20%
2. Constraint satisfaction: Violation of any constraint will disqualify the design.
3. Teamwork: 20% (will be judged based on paperwork to be submitted regarding minutes of meeting and timeline planning. The instructor will provide more details in class on the subject matter of documenting teamwork.)
4. Group presentation: 20% (No more than 10 slides on Power Point.)
5. Individual report: 20% (The format of the report will be communicated by the instructor in class.)
6. Workmanship: 20%

Completion deadline

Completed model and individual report to be submitted by Friday, November 14, 2014, to the designated laboratory assistant.

Group presentation dates will be announced but are tentatively scheduled for the week of November 17-21, 2014.