

Design Exercise #2. Design of Bail

Assigned: 10/17/12, Not to Exceed Due Date: 10/31/12

Grading:

- 15 points (style, grammar, organization),
- 10 points (quality of drawings),
- 10 points (Design Content: Calculations),
- 5 points (Design Content: Functional Requirement-Design Feature Mapping),
- 5 points (Design Content: Cost Estimates)
- 55 points (Design Content: Design Quality, Completeness, Buildability)

NOTE: all members of the same design group must design a bail for the same type of catapult.

NOTE: all members of the same design group must use the same third level functional requirements for this design feature.

The second level functional requirements for your design will be

- A) a machine frame to contain all components and allow adjustment of the range
- B) an element to store energy for release on firing and transfer that energy to the potato
- C) a automatic mechanism, actuated by the two provided servo motors, which will hold the element in B in the fully loaded position and which will decouple the gearbox (D) from the energy storage element (B)
- D) a gearbox, actuated by the supplied DC motor, which will wind the energy storage element (B) through the coupling (C).

This design exercise is to develop a design to fulfill functional requirement B.

Constraint One: The catapult in one configuration must fit into a box 24"x24"x12" in some orientation.

Identify the third level functional requirements for FR B (call them B1, B2, ...).

Design Output: Produce a report that includes the mapping of Functional Requirements to Design Features.

Discuss special features or design decisions so as to facilitate the selection of your device for the group's build.

Provide engineering calculations which support your decision-making process. In particular, how much energy will your device ideally store? What forces and torques will be involved? Where are the maximum loads in your system? What will be the deflection of the bail under these loads?

Provide detailed engineering drawings for all parts and assembly drawings to illustrate your design concept. Drawings should be sufficient for your group to actually build the device. This is not a rough draft.

Provide an inventory of parts that need to be purchased, along with part numbers and suppliers and cost (put it in a table please).

Provide an inventory of materials that need to be purchased, along with part numbers and suppliers and cost (put it in a table please).