

Project Summaries – MEEG 304-04F

1. Collapsible Crate

Design a collapsible crate system based upon mesh-covered sides with one side having horizontal support arms and the balance of the sides having crossed arm supports. Sponsor would like to create a crate system with performance properties equal to that of the “*Better Buy Dog Crates*” produced by Midwest Homes for Pets based on a mesh-covered cross support arm system. (See [http://www.midwesthomes4pets.com/Catalog/BetterBuy\(1\).htm](http://www.midwesthomes4pets.com/Catalog/BetterBuy(1).htm) for details on the competitive product.) Sponsor is interested in having a minimum number of assembly parts, light weight, and low cost.

2. Collapsible Crib

Design a collapsible, full size or near full size baby crib based with construction based upon a coated fabric floor liner, mesh covered sides with one side having horizontal support arms as designed by the 2003 Junior Design class and the balance of the sides having crossed arm supports. Sponsor would like to have a design for a collapsible baby crib, mounted on a standard twin bed, that meets or exceeds all safety criteria. Sponsor is interested in having a minimum number of assembly parts, light in weight, low cost of goods and collapsible into a format that can be easily transported.

3. Collapsible Pen

Design a collapsible exercise pen system based upon mesh-covered sides with one side having horizontal support arms and the balance of the sides having crossed arm supports. Sponsor would like to create a pen system with performance properties equal to that of the “*Galvanized & Pro Series Exercise Pens*” produced by Midwest Homes for Pets based on a mesh covered cross support arm system. (See [http://www.midwesthomes4pets.com/Catalog/PensIntro\(1\).htm](http://www.midwesthomes4pets.com/Catalog/PensIntro(1).htm) for details on the competitive product.) Sponsor is interested in having a minimum number of assembly parts, light weight, and low cost.

4. Fabric Friction Tester

A device is needed that will allow us to vary a known transverse force on a fixture that can be placed inside the Instron to experimentally determine yarn-yarn friction in a fabric. We hope to be able to avoid any geometric processing issues (weave, knit, braid) and determine just the basic friction coefficient - assuming at first a simple Coulomb model.

5. Golf Club Stiffness Tester

Design a machine to quickly and automatically measure the bending stiffness profile (EI) of a composite golf club shaft. Golf club shafts can have a complex geometry, but will always be circular in cross section. Benchmark current applicable technology, and making maximum use of applicable technology create a design that is portable, repeatable, reliable, simple to use, low cost, and effective in a high-volume manufacturing environment.

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6. Lightweight Roll Cutter

A Senior Design team from Fall 2003 designed and built a feasibility prototype of a working device to cut extra plastic off of industrial rolls for recycling. Now the company wishes to see some design development of that idea to reduce the weight/size/bulk of primarily the framing components.

7. Multifunctional Home Gym

Design a simple machine for multi-motion “weight lifting” based on a second class level concept. Many systems have been devised for multifunctional gyms – often called “Smith Machines”, but there is still opportunity to compete in the marketplace based on “free weight feel”; safe single person use; minimal personal effort to move between set-ups; reliability (life); and extreme simplicity (low cost).

8. Position-Sensing Glove Tester

The goal of this project is to design and develop a prototype low-cost functional glove tester platform that will evaluate key finger, thumb, and wrist position sensors. A Senior Design team from Fall 2003 designed and built several prototype methods for quantifying sensor performance. Integration of their results, along with additional improvements, is needed to design a formal testing platform.

9. Running Exercise System

Design a home exercise system that simulates a running motion. In MEEG 301 several teams created four bar linkage designs to simulate low impact running in the context of a low cost, but attractive system that would be competitive in the marketplace. With this work as input, and given current competitive benchmarks, create a more optimum design focusing on “relaxed running feel” performance, with simplicity/low cost, and appropriate reliability/life.

10. Water Ski Tester

Design a machine to quickly and automatically measure the bending stiffness (EI) and torsional stiffness (GJ) of a high performance, composite sandwich, competition water ski. The machine will be used for both checking the quality of skis after manufacturing as well as evaluating new ski designs. Benchmark current applicable technology, and making maximum use of applicable technology create a design that is portable, accurate, repeatable, reliable, simple to use, and low cost.

11. Tachometer Tester

The customer uses multiple high-resolution tachometers to measure relative surface speeds during various manufacturing processes. These tachometers consist of an indicating wheel connected to an incremental encoder. A Senior Design team from Fall 2003 designed and built a feasibility prototype of a constant velocity source to calibrate these surface tachometers. Design of a low vibration calibration stand to arrange and hold multiple tachometers is still needed.