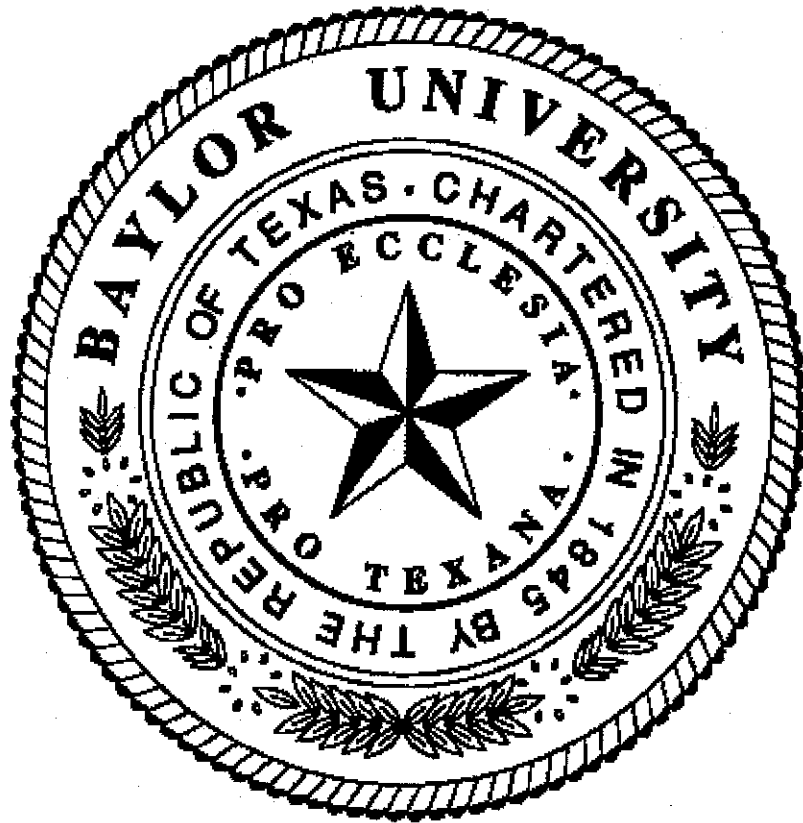


**REQUEST
FOR
PROPOSAL**



**The Department of Engineering
Baylor University**

DOCUMENT TITLE: PING-PONG BALL PICK AND PLACE SYSTEM		ME APPROVAL:	EE APPROVAL:
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I. STATEMENT OF WORK

Qualified engineering design teams are invited to submit a technical proposal for the design of a Ping-Pong Ball Pick and Place System, hereafter referred to as the *system*, to the Department of Engineering at Baylor University, hereafter referred to as the *owner*. Upon owner approval of the proposed design, each successful engineering team, hereafter referred to as the *design team*, shall build, test, and evaluate a prototype device.

The design, construction, testing, and reporting of the system is a requirement for completion of Engineering 3380 - Engineering Design I at Baylor University for the Spring semester 2004. *The owners reserve the right to ensure that designs meet the pedagogical requirements of the course.*

II. SPECIFICATION

1. Scope

The design team shall design, construct, test, and evaluate a system which shall receive from the owner a quantity of standard ping-pong balls, and direct the balls into one of six chambers within a specified ball receptacle. The ball direction will be controlled by a user that will visually identify each ball based on markings, and provide the system with an input corresponding to its marking. The system will then direct the ball into the appropriate chamber within the receptacle.

2. Design Criteria and Operational Requirements

The design team shall design the device to meet or exceed all of the criteria listed below.

2.1. Ball Marking

The ping-pong balls shall be of regulation size and mass and will be marked with one of six identification markings corresponding to the six chambers in the receptacle. See Figure 1 for ball marking details. Each quantity of balls delivered to the hopper will contain, at most, three balls of identical marking.

2.2. The Hopper

The system will contain a ball hopper capable of receiving up to eighteen (18) balls at a time. The hopper will contain a ball entry zone easily accessible by the owner. The entire quantity of balls to be processed (up to 18) will be poured into the hopper within approximately two (2) seconds.

2.3. The Inspection Station

The system will contain an inspection station whereby an operator may inspect the balls, one at a time, and direct the subsequent ball placement. The inspection station will provide adequate ball visibility so that a user may easily determine the ball marking without physical contact. The

inspection station will also contain a numeric keypad which will receive a code entered by the user.

2.3.a. Keypad Entry

The keypad entry will be operated by the user to provide the system with information regarding ball marking. While a ten digit keypad is acceptable, it is not required. The use of the term "keypad" should not dissuade the design team from other logical forms of data entry. These might include, but are not limited to, dials, toggle switches, and/or sliding levers. However, the data entry received by the keypad must be transmitted to the rest of the system by means of an electrical signal; the user may not impart any mechanical energy to the system.

2.3.b. Readout Mechanism

A readout mechanism will provide visual feedback to the user reflecting the entered data. The readout mechanism might include, but is not limited to, a seven segment display, LEDs, a liquid crystal display, and/or mechanical dials. The readout mechanism will remain visible and indicative of the last ball placement until a subsequent ball is processed.

2.4. Ball Placement

The system shall direct the inspected balls into the receptacle container in such a manner that the balls or the container are not damaged. Damage to balls includes cracking, crushing, or otherwise permanently deforming.

Furthermore, the placement and orientation of the system will be such that the user and/or owners can verify the system has correctly placed each ball. This verification will be a visual inspection only; no contact with the system, or the ball receptacle is permitted.

2.5. The Receptacle

The receptacle will be provided by the owner and shall be in accordance with Figure 2.

2.6. Level of Automation

After being assembled/configured for operation, the system shall be manually switched into an "on and ready" condition. Balls may be loaded in the hopper before or after this switching action. After this, the device shall operate autonomously, with the exception of the required keypad entry. Upon receiving balls into the hopper, the system will direct a ball into the inspection station. The system will then sit indefinitely in a dormant condition until the user enters the appropriate direction with the keypad. Upon receiving this signal from the keypad, the system shall direct the first ball into the receptacle and automatically reload another ball from the hopper into the inspection station (until the hopper is empty).

3. Documentation Requirements

The design team shall document the project by use of manuscripts, calculations and drafted drawings. All formal documents shall be one-sided and laser-printed on 8.5x11" or 11x17" white paper. Required documentation is discussed below.

3.1 Conceptual Design Proposal

A written Conceptual Design Proposal will be required from each design team. Additional details will be provided in subsequent revisions of this document.

3.2 Final Report

A final report will be required of each design team. This report will serve as an Owners Manual for the system and will include, but is not limited to, the following items:

1. Directions for the operation of the system
2. Safety considerations and warnings
3. A complete drawing package sufficient to reproduce the device

The final report will be bound and will become the property of the owners upon submittal. Additional details will be provided in subsequent revisions of this document.

4. Safety Requirements

The design team shall conduct all system construction and testing with safety as the primary consideration. Failure to observe departmental workplace rules will lead to severe penalties up to expulsion from the university.

The device shall not be dangerous to personnel, destructive to Baylor property, or otherwise inappropriate for operation in a classroom at Baylor University as judged by the owners. Special design attention is required to ensure that the device will not function in a manner that could damage the desktop, carpet, or other building furnishings.

5. Test Requirements

There will be three system tests whereby the design team will demonstrate the operation of the system or a subset of the system. These are listed below:

1. Subsystem Test
2. Systems Integration Test
3. Compliance Test

Additional details regarding the nature of these tests will be provided in subsequent revisions of this document.

6. Presentation Requirements

Four oral presentations will be given by the design team:

1. Conceptual Design Presentation
2. Progress Reports (2)
3. Final Presentation

Additional details regarding the nature of these tests will be provided in subsequent revisions of this document.

III. CONTRACT SCHEDULE

The following is the schedule of required reports, presentations, and system tests:

Due Date	Reports	System Tests	Presentations
2/19/2004	Conceptual Design Proposal		Conceptual Design Presentation
3/4/2004		Subsystem Test	
3/5/2004			Progress Report
3/20/2004			Progress Report
3/25/2004		Systems Integration Test	
4/8/2004		Compliance Test	
4/16/2004			Final Presentation
4/19/2004	Final Report (Owners Manual and Dwgs.)		

All project submittals are due on the scheduled date at the start of scheduled class time and shall be delivered to the owner in room 106 of the Rogers Engineering and Computer Science Building at that time. Incomplete or unsatisfactory submittals shall be resubmitted and will be assessed an owner-specified penalty.

FIGURE 1

BALL MARKING

For Reference: typical ball diameter, 1.5 inches, typical mass, 2.7 g.

BALL MARKING DETAILS TBD

FIGURE 2

BALL RECEPTACLE (OR BIN)

