SAIMechE TECHNOLOGY Olympiad
Encouraging Careers in Engineering

2011 Challenge

Bottle Cap Placement Device:

Design and build a device which automatically places used soft drink bottle caps on "targets".

The targets are marked at 300mm intervals along a 3m straight line.
Each target is a 100mm circle of paper pasted on the floor.

Requirements:

- A portfolio must be submitted at the Regional Competition as per the attached guidelines.
- Cost of all materials is limited to a maximum of R150.00.
- A breakdown of the costs must be clearly shown in the portfolio.

Specifications

- Only the Allowable Materials as specified below may be used.
- In its ready to be released state, the device must fit into an A3 Box (420mmx300mm) having an allowed maximum height of 500mm.
- Each testing station will consist of two preset tracks of 3m.
- Each Track will include an ‘alignment target’ for alignment and calibration purposes.
- There is no limit to the number of bottle caps the device may carry.
- The device may be pulled along the track by a team member standing in the ‘Energy’ square.
- No energy created by the pulling motion may be utilized to release the caps.

Timing and release of the caps must be automatically driven by a separate energy source built into the device.

The only human intervention allowed will be for :

- Retrieving the used caps once the Judge has completed counting.
- Loading the caps into the device before a new cycle is started.
- Energizing the device before a new cycle is started
- Pulling the device across the floor.
- Repairs to the device before a new cycle is started.

Rules:

- A team must consist of 2 or 3 members.
- Teams will be allowed 5 minutes to prepare and 5 minutes to demonstrate the device.
- No additional time will be allowed in the case of a breakdown or jam.
- Teams must provide their own bottle caps
- The cap liner and the anti-tamper ring may be removed from caps.
  No other modifications allowed.
- As many attempts as possible may be made during the 5 minutes

- The device must start over the alignment target.
- The release and placement of the caps **MUST** be entirely automatic with **NO HUMAN** intervention.
- Once the device deposits the 10th cap it may be picked up, reloaded and returned to the start position for the start of a new cycle on the other track. (to allow for the judging of the placed caps)
- Other than being pulled along the device may not be handled until it has completed the trip or failed.
- If the device fails it may be retrieved and repaired. A new cycle must then be started.

Scoring:

All caps placed correctly before failure will be counted as follows:

- A cap placed within the boundary of the target will count as 1 point.
- A cap touching or over the line will count as ½ a point.

A Bonus of **2 points per cycle** will be given if **ALL** 10 caps are correctly placed inside the targets.

The Judges decision is final!

MATERIALS LIST

ONLY the following materials may be used:

- Commercially available wire- (no thicker than 4 mm diameter)
- Welding or brazing rods up to 4mm diameter
- Round tin, aluminium and plastic containers
- 2-litre or smaller, plastic soft-drink bottles (no mineral water bottles)
- Valves & T-pieces for Hydraulics / Pneumatics only
- Manually operated pump to pressurise bottles.
- Pop rivets, nails, screws, nuts, bolts and washers
- Only hand held tools may be used.
- Plastic tubing
- Syringes
- String and rope
- Wood
- Elastic bands
- Glue and Solder
- Lubrication
- Water in a sealed system

Decoration is optional

NONE of the following materials may be used:

- **NO** machined parts
- **NO** pre-manufactured or bought gears, pulleys, wheels, discs, etc. from old toys, machines or other devices will be allowed.

The use of invalid materials will result in automatic penalties.

Layout of the Testing Area is attached