

## Problem Scenario: 2007

Your team of design engineers has been commissioned to construct a device for moving an object. The device will move the object, a ball, from one location to another.

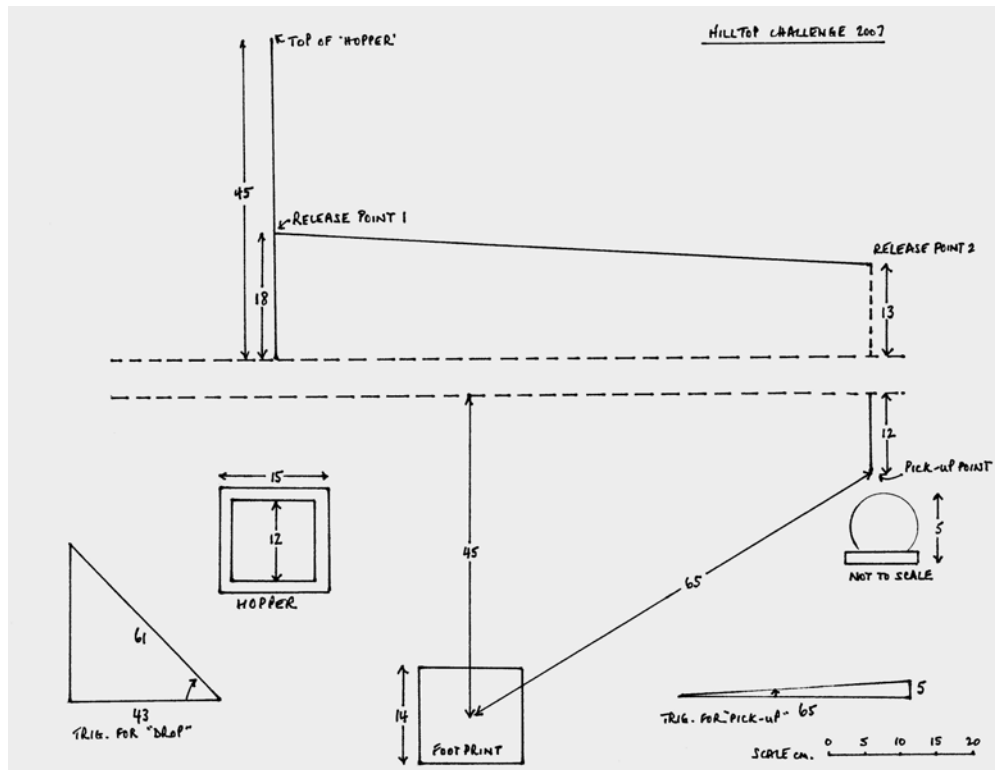


The device will be controlled by fluid power. It will be capable of lifting the ball from the “Pick-Up point” and then moving it across and up, and releasing it into the “Hopper”. (See picture above).

Structural strength and fluidic control will be important as the object will be dropped into the hopper and then returned to the pick-up point to repeat the process as many times as possible in the designated two minutes. If the ball is dropped in transit, it will not count and will be replaced on the pick-up point manually.

Your device will have a “footprint” of limited size. It will fit into the area shown as red in the picture above. The dimensions of this footprint are 14cms square.

When a the ball is placed into the hopper it will drop into a trap that will release it down a ramp so that it can find its way back to the pick-up point. Your device should not touch the structure at all. This includes the “lip” of the hopper or the pick-up point.



## Specifications:

The lip of the hopper is 45cms above the footprint and the centre of the ball, when resting at the pick-up point, is 2.5cms above the footprint. The distance from the centre of the footprint to the nearest part of the lip of the hopper is 61cms, and it is 65 cms from the nearest part of the pick-up point. The centre of the footprint is also 45cms from the structure that contains the hopper, the release mechanisms, and the ramp. (See diagram above, and larger copy attached)

## Before the competition:

Your team will design the device for moving the ball from the pick-up point to the hopper. Your team will use the tools and the materials provided at the workshop for this purpose.

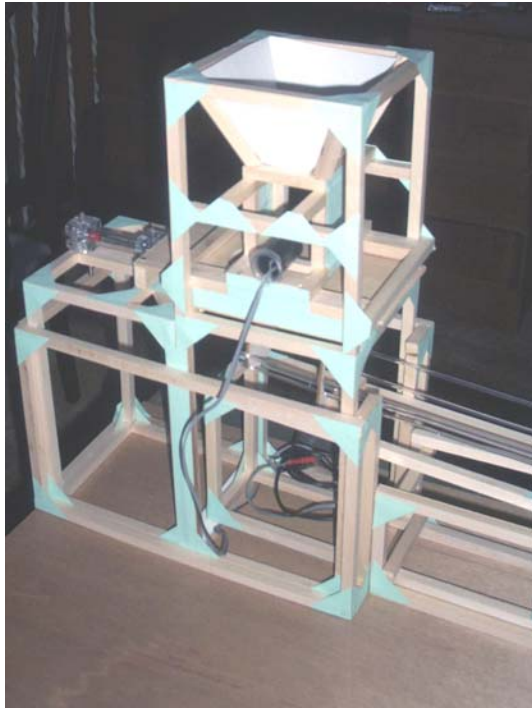
Your team's work will be recorded in a portfolio.

## At the competition:

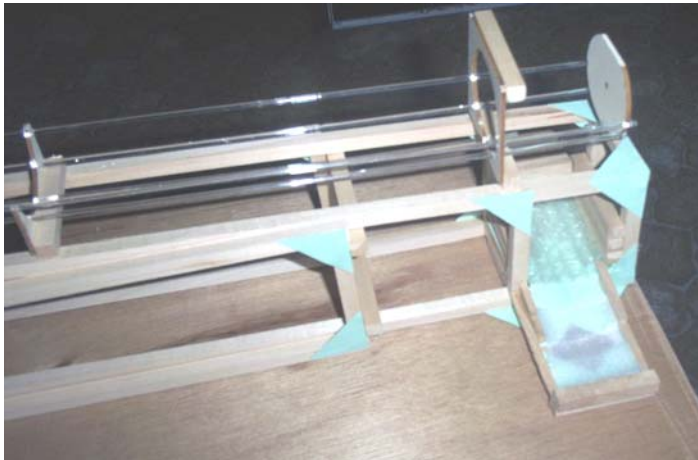
Working as a co-operative unit your team will build the device and use it to move the ball as many times as possible from the pick-up point to the hopper in the designated two minutes.

Your team can only bring its portfolio and the tools to the competition.

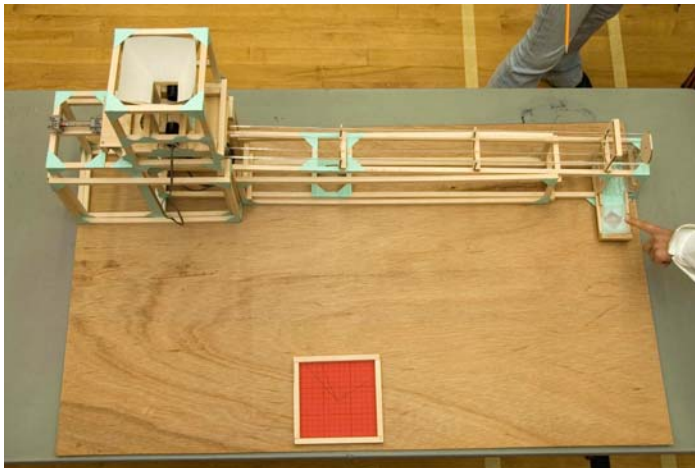
You must "purchase" materials at the competition to make your device from scratch. The cost of your "purchased" materials will be divided by the number of times you successfully drop the ball into the hopper to calculate a measure of cost efficiency. You will be marked on your cost efficiency. (See score sheet)



Detail of Hopper



Pick-Up Point



Plan View

HILLTOP CHALLENGE 2007

