

# ACE

## Engineering Feasibility Study

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### Wire Hoist Lift

#### *Purpose*

The purpose of the hoist lift is to elevate the fuse (resistor) from the base of the slide through the funnel and to the circuit board. To do this, the lift must be able to move not only up and down, but have the ability to move in all 3 dimensions so that the funnel can correctly place the fuse. It must also keep the fuse from tipping in any direction while it is being elevated. Therefore, the hoist lift will require accuracy, horizontal forgiveness, stability for the fuse, and reliability. The results of this trade study will allow the team to choose the best lift from other options in addition to affecting the design of several components of the project.

#### *Design Variables*

- Wire - Configuration, Material
- Lift Bucket – Design, Material
- Speed of ascent to the board.

#### *Behavioral Variables*

- Wire – Tensile Strength (diameter)
- Motor – Torque, Power
- Weight of lift bucket

#### *Variable Constraints*

- Lift Design must physically fit into the system.
- Lift Design must be low cost.
- Wire Forces cannot exceed their tensile strength

#### *Analysis*

Research will be required to determine the best design of the hoist lift, material and diameter of the wire, and the proper motor to use. This determination will be based on the forces acting on the wires, the power required to elevate the lift, the proper wiring of the system for stability and simplicity, and low cost. With each lift design and wiring configuration, wire forces will be found using statics and this will allow for the necessary power to be found using the correct engineering equations.

#### *Results*

The results of this trade study will be to determine the wire material and diameter, the necessary torque and power of the motor, the design of the lift bucket and the wiring configuration of the hoist lift.

#### *Milestones*

- 9/27 – Determine possible materials and lift designs to analyze
- 10/5 – Completed calculations for the state variables
- 10/12 – Submit finished trade study