**Problem Statement:**
This project will address an issue on how to safely and accurately measure the amount of material that must be returned to the threshing system on a John Deere class 7 test combine. The objective is to devise a way to allow the cab operator to use pneumatic and electronic controls to allow for the collection of materials that are in the return elevator of John Deere test combines. The plan will also attempt to devise a way to collect and extract multiple samples during a single test run.

**Introduction:**
This project was given to us from the advanced functions divisions for combines at John Deere. They would like to remotely sample the amount of grain in the return elevator during a test run. John Deere provided us with a test stand for us to be able to mount and test our design. We hope that this test stand will be able to help John Deere optimize their part selection for their combines so that they become more efficient and thus more valuable.

**Solution:**
In order to determine the best solution for this problem we came up with 3 different ideas on how to solve this problem. Each solution was then put into a decision matrix in order for us to decide which design solution would work best. The design matrix is shown below in figure 1. Our wedge shape design was shown to be our best option.

**Initial Design:**
Our original design called for wedge shaped bins mounted to the underneath of the combine with a ramp system off of the return elevator in order to direct the flow of grain to the desired location. Original concept drawings of our design are shown in figure 2.

**Final Design:**
Like with every design problem arose that made us reconsider aspects of our original design. For example, it was decided that the bins should rotate because it was thought that the ramp design would restrict the flow of grain too much. Also, we would limit our sample size to two bins. This is because of restrictions of space in the area where we are to mount our sampler.

**Budget:**
Our original budget was $2,400. We ended up exceeding this because of some issues that arose throughout the project. We had to spend more money on steel because in our original estimate we did not account for the steel that would be needed to modify the test stand. Also a major source of our overage was the electric motors to run the test stand.