The goal of this project was to design a wheelbarrow that is easier to handle on an incline. The solution we came up with is to give the wheelbarrow a brake that the user can apply to help steady the wheelbarrow.

For this project, we performed four steps in our design process. After defining the problem that we wanted to solve, we obtained and tested a benchmark and used this to determine what goals we wanted for our product. Then we made a CAD model for the wheelbarrow with the braking system. An Abaqus model of the disk brake was then made to make sure the disk could withstand the forces that a user could apply. Finally, a prototype was fabricated and assembled.

In order to have a better understanding of the product that we wanted to make, both FEM and CAD models were made of the wheelbarrow and its parts. Analysis was performed to determine the forces that would be involved from reducing the stopping distance by half for the fully loaded wheelbarrow. The results of this showed that the braking system can easily handle the loads that can be applied by the user.

We wanted our benchmark to be a standard wheelbarrow that you can buy at any hardware store. Towards this end, we obtained a True Temper 5 Cu. Ft. Wheelbarrow. For benchmarking purposes, we tested this wheelbarrow with 235 pounds of weight added and measured the distance needed to come to a complete stop on an inclined surface.

The wheelbarrow is a common tool that has had very little change over the years. We feel that the addition of this braking system will make the wheelbarrow easier and safer to use on any kind of terrain. We also feel that this project could be expanded upon to include more features, such as a ‘parking brake’ and a braking system that is more resistant to harsh working environments.

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References
[1] HomeDepot.com (Benchmark Picture)