PURDUE UNIVERSITY

CAPSTONE EXPERIENCE 2011

Agricultural & Biological ENGINEERING

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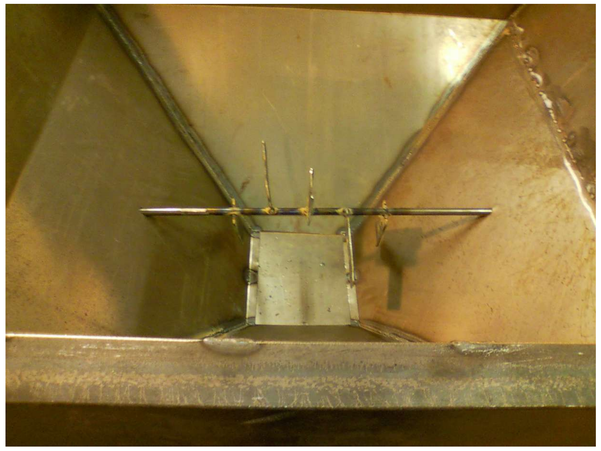
Pull Type Compost Spreader

Problem:

Homeowners who are spreading or wish to spread compost on their lawn pay a high price for the spreader. Our solution to this problem is to create a compost spreader that will be marketed lower than the existing models listed for retail. Target cost of building the prototype compost spreader is $1000.00. The compost spreader is aimed to be marketed between $200-300.00. The date of completion is April 21, 2011.

Background:

•Increasing regulations of fertilizer applications
•Solution to this problem is to create an option for those who are restricted by fertilizer type and application location.
•Homeowners and landowners who use commercial fertilizers on their lawns fail to realize how to properly apply them. Synthetic fertilizers are able to be substituted by compost.
•Compost is that it offers a form of soil improvement as well as providing essential nutrients.
•The problem we are faced with is being able to spread the larger particles associated with compost.
•Research- We found most miniature compost spreaders on the market cost around $800.00. Our goal is to find a solution that is more economical for the homeowner that wishes to use it 2-3 times a year, and minimize the storage space when not in use.
•Our sponsor has requested a pull-behind compost spreader with a capacity of ¼ to ½ cubic yard.

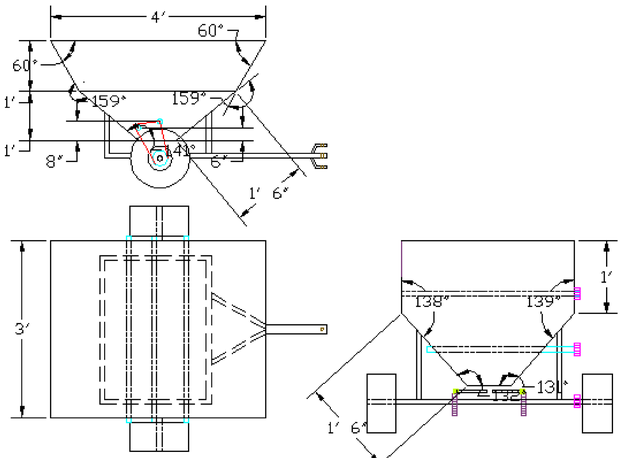


Economics: We ordered our materials through Surplus Center and Central Machine Shop. All fasteners were bought at the local Tractor Supply Co. store. Our broadcast wheel drive mechanisms were ordered through West Side Tractor Sales. The amount spent to build the prototype spreader was well under the projected amount. If these were to be mass produced, materials and their costs would be much lower per unit produced**.** The hopper would be injection molded from plastic, and the frame would be build much lighter. We chose parts that are readily accessible to the consumer in the case that something breaks.

Bill of Materials	
Item	Cost($)
Metal	135
Bearings	75
Sprockets/Chains/Flights	170
Travel Expenses	30
Wheels/Tires	80
Fasteners/Extra	45
Total	$535

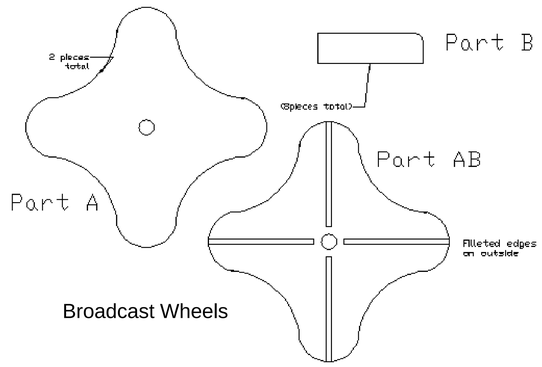
Alternative Solutions:

•Ferrous steel and aluminum, Stainless steel, and galvanized materials were options that could have been used for building implemented. Galvanized materials carry a higher weight.
•Pulleys with belts, chains and sprockets, and gears were all possible mechanical means to transfer power. Agitators were used to churn the compost so that there are no areas for the compost to hold in the hopper.
•Adjustable gate was added to the bottom of the hopper to allow for more control of the application rate. Broadcast wheels and drop-type spreaders where discussed. An alternative solution to these is to use a spinning brush to distribute the compost with a belt.
•Solid tires were ruled out because of the tendency to bounce.
•We chose to use two broadcast wheels to achieve a more uniform spread pattern. A single broadcast wheel does not deliver an even pattern when compared to using two.



Isometric Drawing

We used AutoCAD to develop our drawings before we started any fabrication of parts. We were able to see design flaws and make corrections. ASABE standards will be used to calibrate the spreader.



Broadcast Wheels

Management:

All team members made a tremendous effort throughout the project. Individual team members were responsible for specific tasks. Team members worked well as a group when planning and designing, and also when fabrication dates needed to be met.

Final Solution:

We have built a prototype compost spreader that could be marketed in the $200-300 range if mass produced. The vision of the spreader evolved over the semester with minor adjustments. The pull type compost spreader is user friendly. The slide gate handle can be operated from the operator's platform increasing efficiency. Maintenance is not difficult since all hardware is easily accessible. The orientation of bearings are easy to reach when grease is needed. Careful planning and decision making enabled this project to be successful.

Sponsor: ABE Department
Technical Advisor: Dr. Patrick Murphy

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