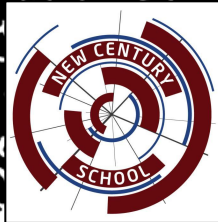


ENGINEERING
MACHINE DESIGN CONTEST
MANKATO 2022

TEAM BE



ENGINEERING
MACHINE DESIGN CONTEST



OUR TEAM

Ridwan Abdullahi 8th Grade
Jihan Ibrahim 8th Grade
Abdinajib Mohamed 8th Grade

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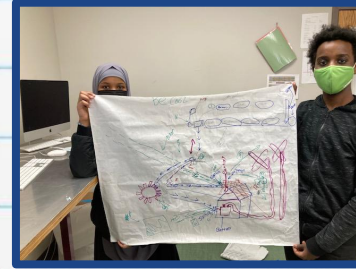
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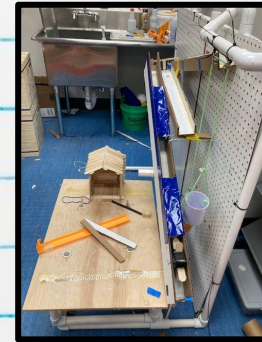
Beneficial Electrification

OUR PLAN

The BE Farm has been using non renewable energy. We began by replacing oil and coal with renewable sources (hydro wheel, solar panel, and wind turbine).



Our non renewables roll down a incline plane and are poured into the dump then the animals are being brought down a incline plane pushed down by a pulley and are brought to a farm. One ball activates a water wheel and another ball is dropped on an incline plane and turns on a switch in a garage and another in the house. Once that happens it turns on the battery in the garage and another one in the house which turns on the motors that cause the wind turbines to move. Finally one of the wind turbines are connected to a string that pulls a wedge that releases the ball into the hay basket.



Final Machine Design 03/23/2022



OUR PLAN

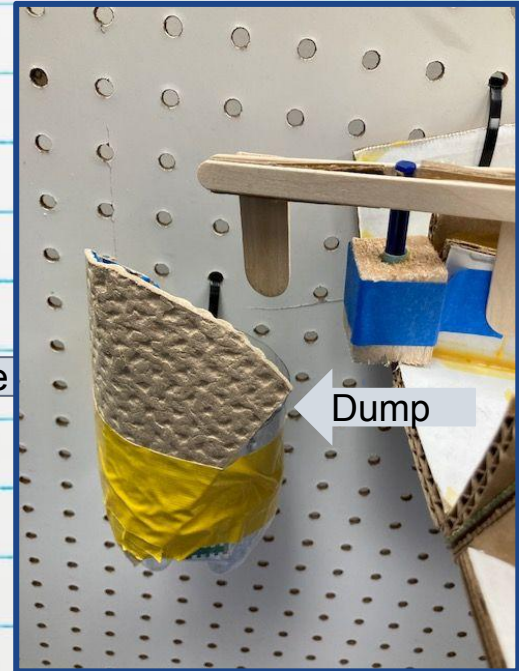
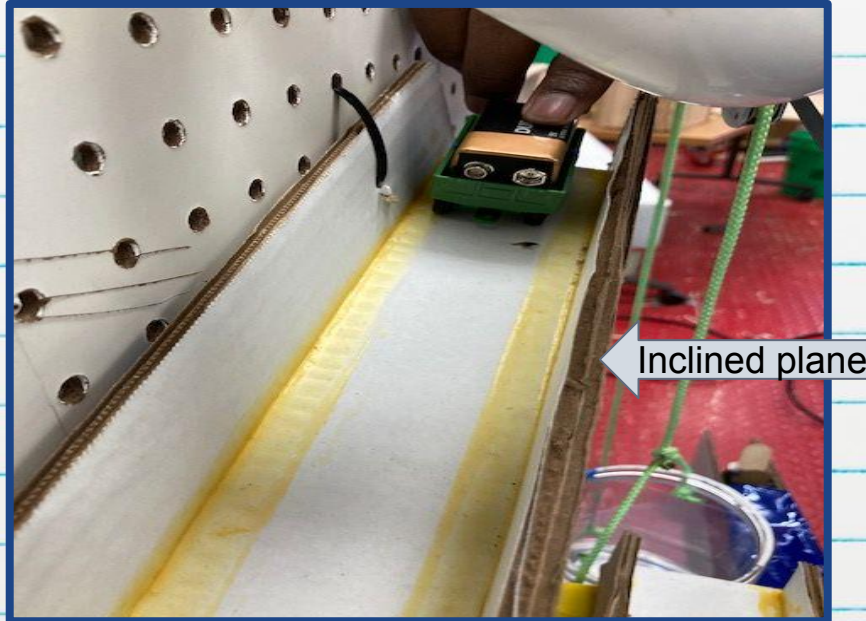
We planned the steps of the machine and drew a prototype



Step 1

Good Riddance Non- Renewable

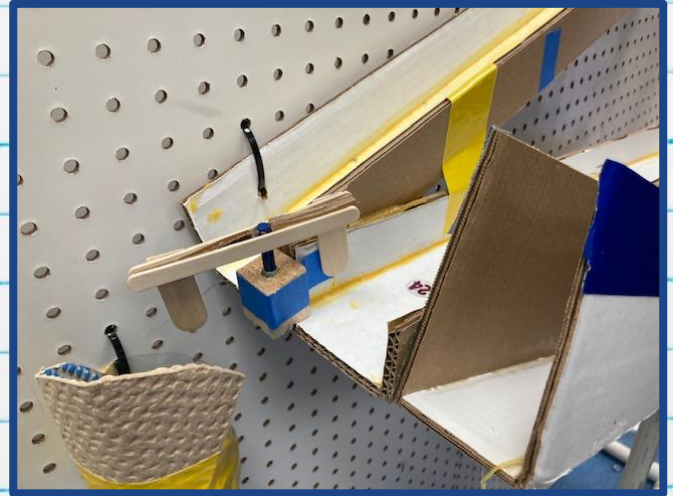
*Oil and coal are released on an
incline plane into a dump.*



Step 2

Animals on the Loose

A lever switch hits the animals they're pushed down an inclined plane and released into a train car.



We improved this switch by making it longer so that it could release both balls down an inclined plane at the same time.

Step 3

It's Raining Animals!

Animals are lowered by a pulley which takes them down to the farm.



Pulley



Step 4

Hydro Magic

4. *One ball hits the hydro wheel and drops into a pipe.*



We asked how can we change the switch to release the ball to the next step



Change of Plans

Initial Plan

Step 1: Non-renewable but animals come in
Step 2: The pulley takes down the animals to the farm
Step 3: The ball is pushed by the bear
Step 4: The hydro wheel pushes the ball into an incline plane
Step 5: The second ball rolls down and turns on the wind turbines
Step 6: The first ball hits the switch and goes to another incline plane
~~Step 7: The lego's are pushed into the lake~~
Step 8: The second ball goes to the other incline plane pushes the fish to the river
Step 9: The wind turbines are connected to a string.
Step 10: the wedge is pulled up and the ball rolls on the hay basket.

Change from step 4

4. One ball hits the hydro wheel and drops into a pipe.
5. The ball rolls down an inclined plane to a geothermal house.
6. When the ball is hit it rolls down the ramp and it goes into the geothermal system.
7. There is a ball that transfers cool air into our geothermal system.
8. Another ball goes down and transfers hot air into our geothermal system
9. Now we have a block that falls on to our electrical switch
10. Wind turbine turns on

Step 5

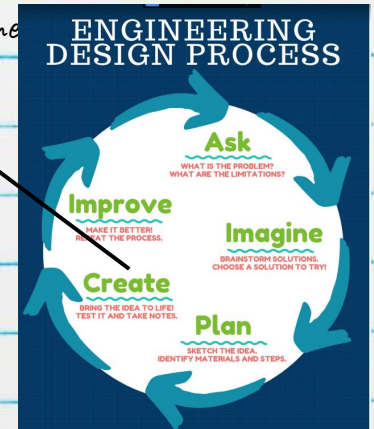
Ball Comes Tumbling Down

The ball rolls down an inclined plane to a geothermal house.

Completed 3/24/22



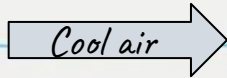
*We created a platform to
separate the top of the machine
from the geothermal system*



Step 6	Underground!
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There is a ball that transfers cool air into our geothermal system.

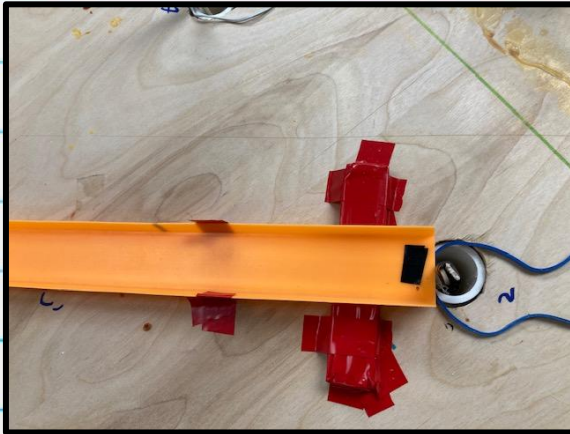
Complete 3/24/22



Step 7	Geothermal System
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*Another ball goes and transfers hot air
into the geothermal system*

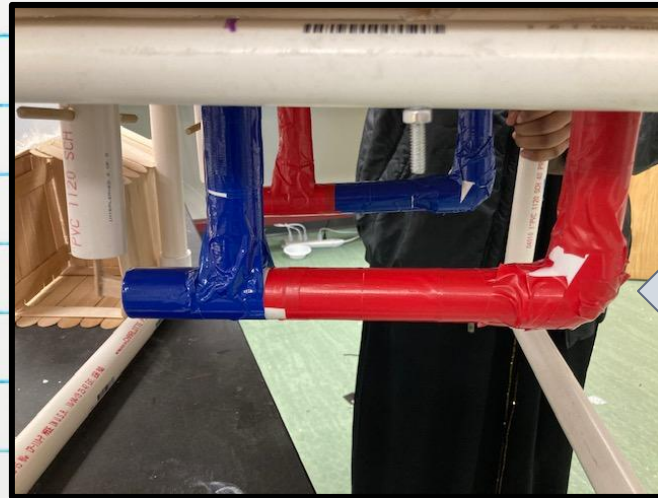
Complete 3/24/22



Step 8

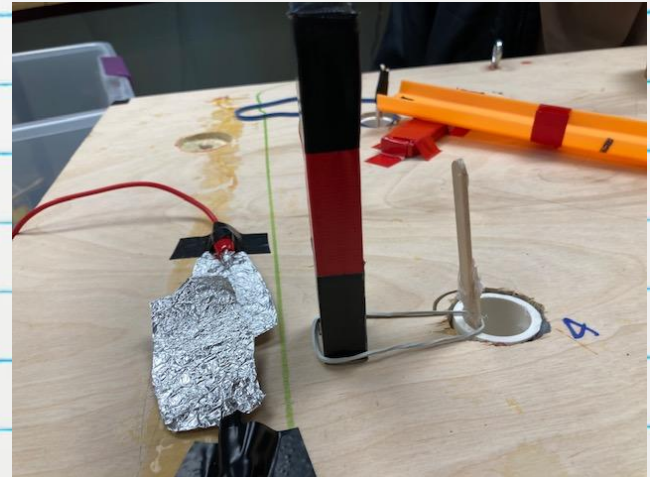
Underground view

Hot air going in comes out cool through our geothermal system



Step 9	Power on!
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Now that our cool air is out, we have a block powering our wind turbine by a electrical switch

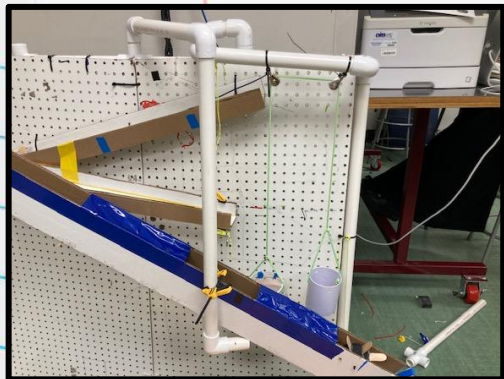


Step 10	Geothermal activated
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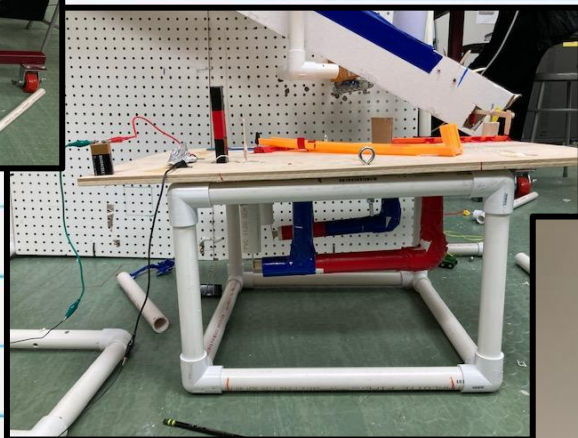
*The block activates the electrical switch
turning on our wind turbine.*



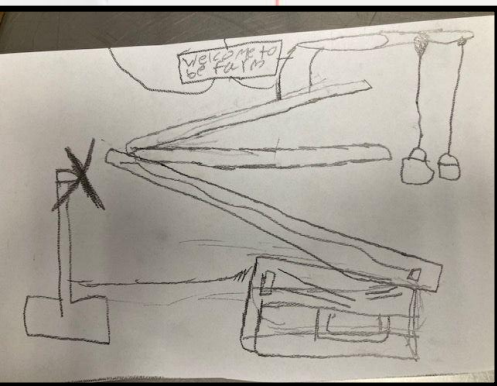
Electrical switch



Top of machine



Bottom of machine



Final machine
4/19/22



CHALLENGES AND SUCCESSES

Ridwan: One of my group accomplishments was finishing out geothermal house. It didn't take much time to build but, my group had some difficulties building it and sometimes we would be off task. We started a really late so we're behind but we worked a harder and got most of it done.

Abdinajib: Our greatest accomplishment was the geothermal house. And our biggest challenge we faced. The reason why it's our biggest accomplishment because we had the most steps about 6 to 8 steps. Why it was so hard to build it because we had to make a switch inside a PVC pipe. It also took us a very long time to build about 3 days. Another challenge we had was the pulley. It was very hard to balance it. But my good friend bilal found a solution. And it worked.

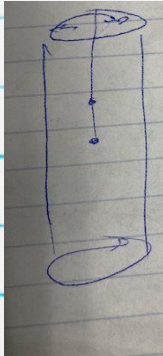
Jihan: one of my groups challenging work was the house geothermal because it took a lot time to get it to work the hard thing about it was the pbv bc it had to be a exact angel and the switch had to be a at a correct posistotion.

CHALLENGES AND SUCCESSSES(continued)

Abadinsa Omer: Our greatest accomplishment was making the geothermal house. Why ask well because we were having trouble with our first prototype and was having a hard time centering the balsa wood in the hole so the ball could hit the switch out with a bit of help from our beloved Dr.blue we got it done and made our second one and accomplished it and started working on something else.

Our next accomplishment was that on the second one we made we had a hard time balancing it because we had the axle very low on the PVC pole and it wouldn't stay at its resting point so what we did is we used a rubber band to give it a little bit of tension to keep it at its proper resting position so when the ball hit the balsa wood it would move and once we tried 3x times we were very happy that we accomplished the geothermal house that took us days to finish and we finally move on to another step.

Bilal Ali: Our biggest challenge was making our pulley. The problem was one of the sides would be heavier than the other. We try to move the strings apart from each other. That seemed to work but an another problem came along the way . The pulley was to short to hit the switch. So we had to restart making the string longer , but it was to long and kepted on hitting to switch to hard. So we restated and shorten the string and retested fixing the problem.



Component	Description	Cost	Quantity	Type	Reusable
PVC Elbow	90 degree PVC Elbow	\$0.64	7	EMC Component	<input checked="" type="checkbox"/>
PVC Elbow	side outlet PVC Elbow	\$3.74	12	EMC Component	<input checked="" type="checkbox"/>
PVC 'T'	side outlet PVC Elbow	\$0.82	6	EMC Component	<input checked="" type="checkbox"/>
PVC Pipe	10 feet piece	\$3.97	30	EMC Component	<input checked="" type="checkbox"/>
Peg Board	12x48 sheet	\$15.21	2	EMC Component	<input checked="" type="checkbox"/>
Screw #10 x 3/4 in.	25-Pack	\$3.86	0		<input type="checkbox"/>
Cardboard				Recycled	<input checked="" type="checkbox"/>
Balsa wood				EMC Component	<input type="checkbox"/>
Ply wood				EMC Component	<input checked="" type="checkbox"/>
Marbles				EMC Component	<input checked="" type="checkbox"/>
Popsicle sticks				EMC Component	<input type="checkbox"/>
Ducktape				New	<input type="checkbox"/>
Farm equipment				New	<input checked="" type="checkbox"/>
Farm animals			4	Salvage	<input checked="" type="checkbox"/>
Pulleys			2	New	<input checked="" type="checkbox"/>
Zipties				New	<input checked="" type="checkbox"/>
Plastic bucket				Recycled	<input checked="" type="checkbox"/>
HotWheel track				Borrowed	<input checked="" type="checkbox"/>

TEAM REFLECTION

3/23/22

By: Abadinsa Omer

4 weeks ago today our team was struggling when our beloved coach Dr. Blue told us to make teams of our own and I had a dilemma because everyone wanted me to be in their team and I didn't want to choose favorites so I let the others choose. When we got settled and made teams we were still struggling. Why ask well because our team wasn't focused and were playing around and didn't worry that we only had a month to build a machine and after constantly speaking to them and telling them to "be focused" they finally came to a decision and actually started working. When we got our first step done (It took us a day or two). We started feeling confident. Finally we were gaining momentum and felt that we could build a great machine within two weeks. Well believe it or not We went back to not being focused. So I gathered my friends together and told them if we don't listen to one another and start focusing I would tell our coach to kick people off the team (That's not exactly what I said it's just a brief summary - and we all know that Dr. Blue does not pick our teams and does not kick anyone off). Within the next day we were locked in and focused!

We finished the second and third steps within a few hours and by the end of day we were advanced. With all of us focused we are now on eleventh step and we are almost finished with our machine. I thank my teammates/colleagues who listened to one another to get our machine ready for MANKATO!!!!

TEAM REFLECTION

4/19/2022

When Dr. blue told us that you guys lost 2 members from your team i felt upset and confused. I was thinking to myself if we are going to be able to do as good as last time (and get better), Are team is gonna have to work extra hard. And it looks like we are doing good. Our was feeling kinda sad but i think we are feeling better. We did have problems stabilizing the hydro wheel ramp. But we were able to stabilize it by using clamps. Our smaller team is working better than last time. And, our machine is successful! By: Abdinajib Mohamed

When dr blue told us the news of our team members i wasn't shocked because they have been playing around alot. There was a lot of difficulties on our house and ramp. Our ramp was crooked was wasn't very stable. There had been a lot of changes while i was gone my team members managed to get much done. By Jihan Ibrahim

TEAM REFLECTION CONTINUED 4/19/22

Today we lost 2 members one being our team captain because they weren't meeting expectations in other classes (not engineering). Our team captain was doing a lot of stuff for our team and really held our team together. As for our other team member he knew a lot about our project like the geothermal system and the math. It's really disappointing for our team but we can handle it. Our coach Dr. Blue asked us if we still wanted to continue now that we were down to 3 people. We decided to continue i'm the new team captain and with new team responsibilities. In the last days before the finals we worked on our challenges. We had to adjust a lot of things one being our ramp with the hydro wheel, it wasn't stable and kept leaning a lot and was blocking our pulley so we fixed that with a clamp. Another challenge was our pulley it wouldn't go in the right places sometimes and our tractor would fall out but we managed to fix that as well by marking the placement of the pulley. The clamps really helped more than i expected honestly.

By: ridwan

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Critique and Feedback-The Story of Austin's Butterfly by Ron Berger

<https://www.youtube.com/watch?v=hqh1MRWZjms>

Great River Energy

Meet Our Partners

Tesla - Rogers, MN

