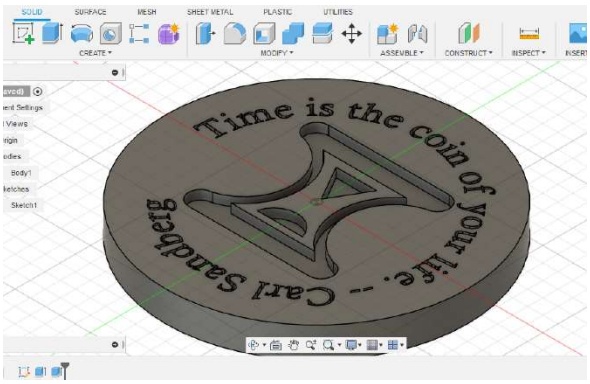
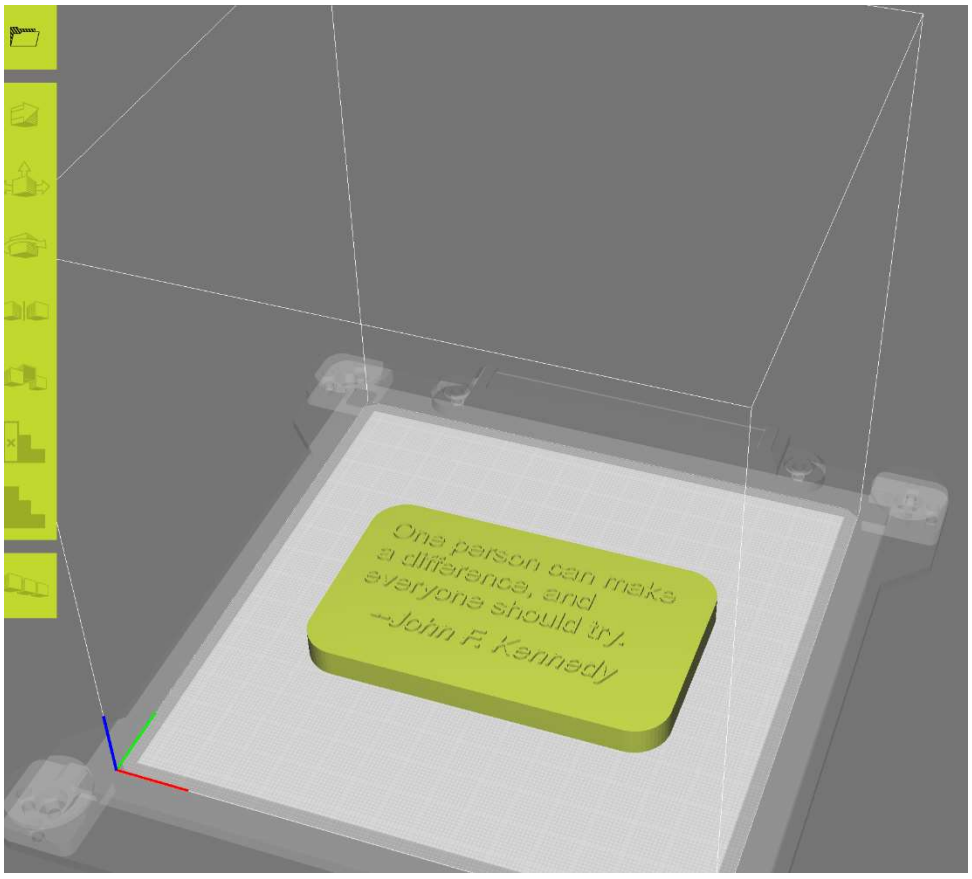
“Projects with a Purpose” – Examples

Examples of Philanthropy Quotations (Optional Pre-Project Activity)

Ask students to select an inspiring philanthropy-related quote and use computer-aided design software to 3D-print or laser-cut that quote. This simple activity can help students get into a “philanthropy mindset” while also practicing the use of the available design and fabrication tools. It is also a great way to use up scrap material!





Examples of "Projects with a Purpose" Brainstorming

What can you create in your engineering lab that serves a purpose? Our students came up with hundreds and hundreds of ideas through thinking, class discussions, and interviews with family or community members. Here are just a few…

Ideas to Help the Environment

- Reusable portable straws
- Missing chess pieces or game pieces (instead of buying a new chess set you could just print the missing part)
- Plastic cups that are biodegradable so that the ocean stays clean
- Trash collecting sieve for ocean or lake
- Trash collecting grabber to safely pick up trash

Ideas to Help People with Disabilities or Medical Situations

- A cupholder for scooters for people with leg injuries
- Braille nametags
- A special phone case that has a pocket in it for Epipens so that kids with allergies can keep their Epipens nearby at all times
- A keychain pills container for people that need to take important medication on time
- Custom fidget toys for students with ADHD or autism
- Prosthetic hands
- A customized organizer for my grandmother

Ideas to Help Teachers in our School

- A customized paperclip for our biology teacher who teaches 3 separate classes and is always looking for her papers (I could make this paperclip thicker to hold lots of papers, while also putting a design on the end of anatomy, biology, or AP biology.)
- Many of the teachers struggle with keeping the screen for the projector pulled all of the way down, so designing a hook that can grasp the string and tie it down may be beneficial!
- Customized coaster for a teacher (Renaissance designs for the history teacher, "Chest day best day" for the PE teacher, Colosseum design for the Latin teacher, etc.)
- A customized hall pass holder for teachers
- Covers for the tympani mallets in the music room to protect them from getting ruined when students touch them
- 3D-shapes to be used as models for the drawing class

Ideas to Keep Us All Better Organized

- Ring holder or jewelry organizer
- A cord organizer that has Velcro or a magnet on the back so that it can stick to a surface or the back of a desk so that the cords are organized and hidden.
- USB and SD card organizer
- Bathroom organizer--for toothbrush and bathroom necessities
- A paint brush holder with a spot for water
- Organizer for miscellaneous art room supplies

- Locker organizer
- An organizer for drill bits that I could give to my dad who could use it at his jobs
- Flash card organizer
- Phone charging organizer
- A school binder carrying caddy and organizer
- A backpack organizer for small items
- Screwdriver organizer for the garage
- Glasses sleeve that can stay on the headboard of a bed

Ideas for a Family Member to Make Things Easier Around the House

- A small tool to help pick weeds that I could 3D print for my mom who likes gardening.
- Collapsible spoons, forks, and knives for camping or other uses.
- An object that would prevent a dog from messing with the electrical outlets
- A self-watering flowerpot for people who can't remember to water their plants
- Temporary glasses frame for broken eyeglasses
- Tea bag holder to hold the tea bag when it is sitting in the liquid soaking
- Holder for the scrubbers used to wash dishes that can let the water drain
- A unique cookie cutter
- Night light dome for my younger brother's room

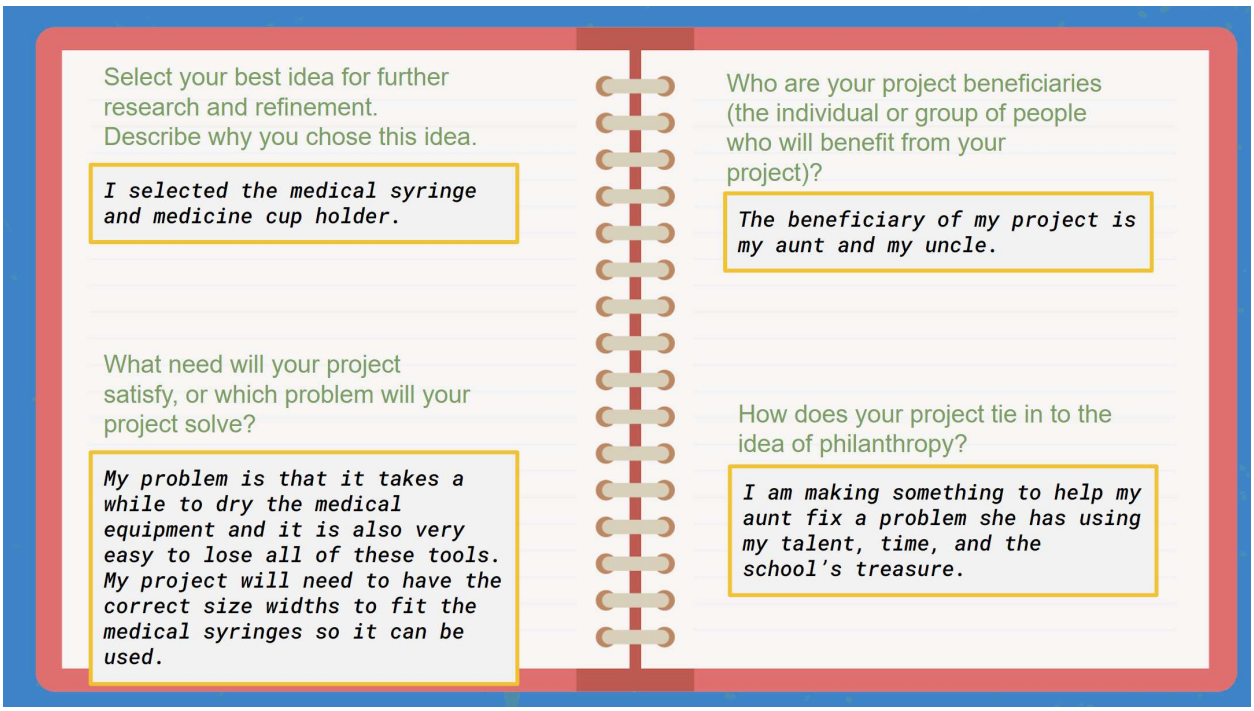
Ideas for the Future

(Note: These ideas are probably not "doable" for the classroom today with our current knowledge and resources, but they are definitely ideas for the future that students should be thinking about. We consider "crazy" and "wild" ideas when we brainstorm because sometimes they lead to practical ideas and they may also inspire a future engineer. Today's engineers are creating some of these things already.)

- My idea is that 3d printing can be used for a cheaper alternative to replacement parts for power plants or factories as well as machines for factories so as to reduce child labor and harsh working conditions.
- Canes/ Walkers for elders that can be more adaptable and easily transported.
- Prosthetics for those who have lost limbs of some sort. This could include a foot, a finger and entire hand etc. It could also be used to help people who have lost feeling in certain parts of their bodies or they are experiencing paralysis
- 3d printing houses to reduce homelessness.
- 3d printing crowns for teeth
- 3d printing replacement car parts

“Project with a Purpose” Design Example – A Syringe Holder

Here are some excerpts from one student’s engineering notebook.



This student created the following presentation slides at the end of her project:

Client...

My cousin has a very rare genetic disorder which causes her to have seizures that have taken away any mobility of her body. My cousin has to take a lot of medicine to help control these seizures so my aunt has lots of medical syringes and equipment. They get lost and can take a while to dry just in a drawer. My aunt and uncle are my clients for this project.

Idea...

My idea was to create something that would hold all the medical syringes in place and dry them at the same time. In order to keep them off of a dirty surface and to speed up the drying process I would create a two level piece that hangs the syringes in the air.

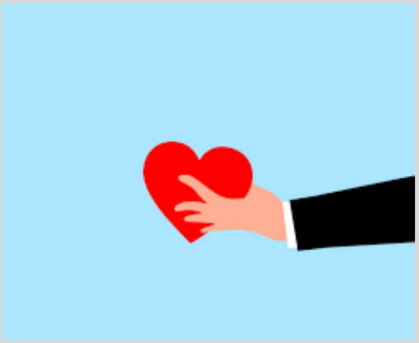
Benefits...

- organization/storage
- Air flow into the tubes
- Now they can easily find the medical syringes

How did Philanthropy inspire my solution?

Philanthropy: the desire to promote the welfare of others, expressed especially by the generous donation of money to good causes.

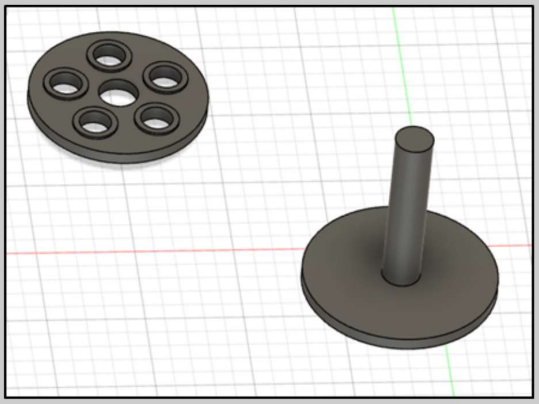
Using the money and tools that my teacher gave to us I decided to create my idea in order to help solve a problem in my family's life. I wanted to make this not only to complete this project, but also to make their lives easier.



Fusion 360 Design

I separated it into two parts so that I did not need to use supports to hold it up. I also added rims around the holes that fit the syringes so that the syringes will stay in place. I also sized the center hole on the top part so that the cylinder could fit and stay to hold up the top wheel like part.

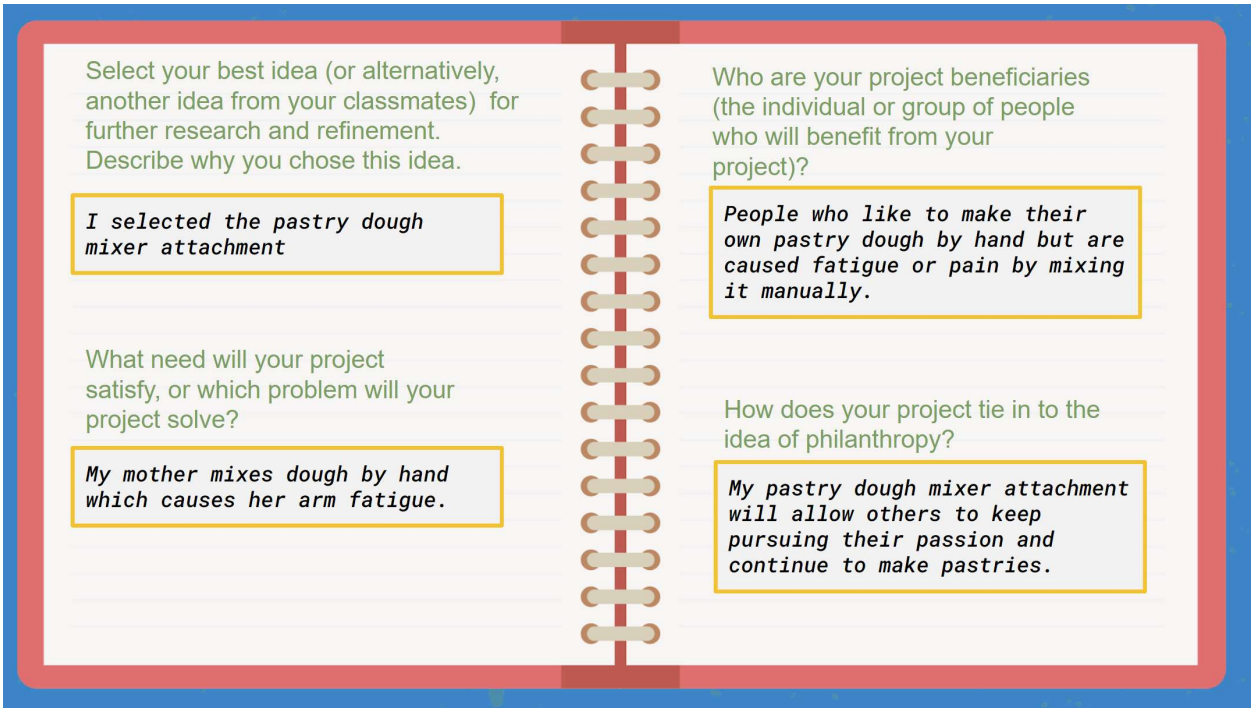
I had to convert mm to inches and cm in order to get the actual sizing so that I did not make it too big.

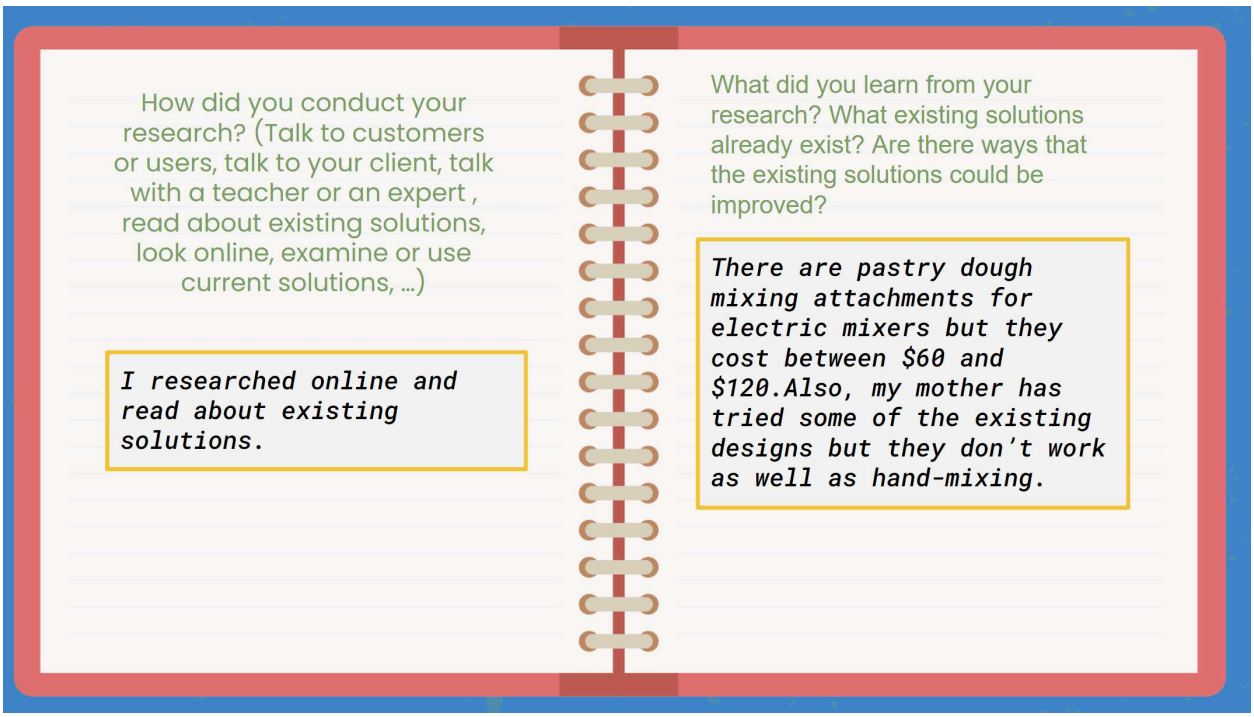


Final Result:

Project with a Purpose Example 2 – A Mixer Blade

This student designed a custom mixer attachment for pastry dough.





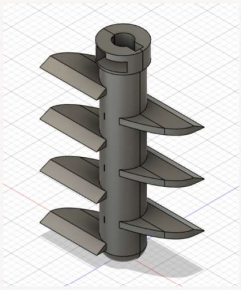
Step 5: CREATE

Design the Solution

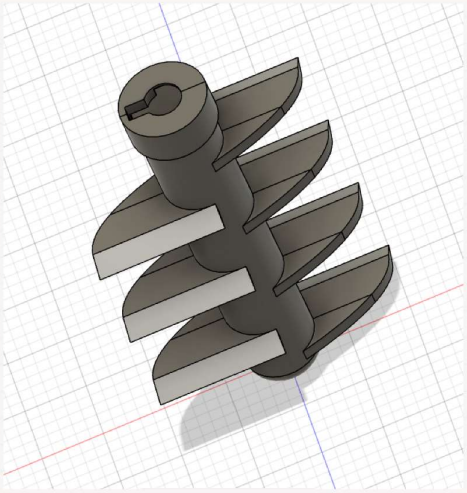
After the solution has been chosen, it must be developed.

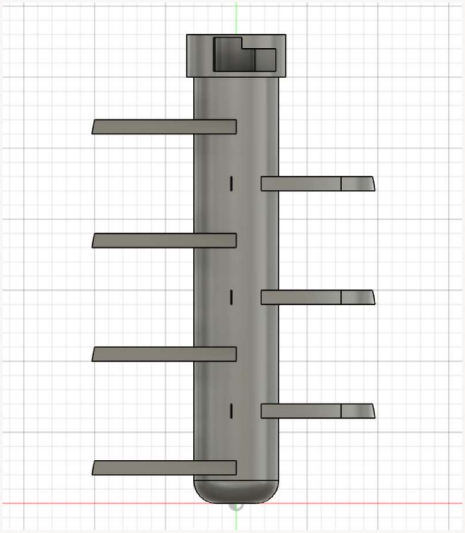
For your project, this will involve modeling the solution in CAD software. You may also want to create quick physical prototypes to visualize aspects of your design.

Add pictures of your initial CAD design here:



More CAD pictures (additional views)





Step 6: MAKE

Build a Prototype

A prototype is an operating version of a solution or a key feature. Your first prototype may be created by hand or it may be 3D printed or laser cut.

Prototypes are used for testing the features of your design.

Add a picture of your first prototype here:

What did you test? How well did your first prototype meet the requirements?

The prototype mixer blade fit on the kitchen aid mixer. When the mixer was run at low speeds, the mixing blade worked pretty well. At higher speeds, the mixing blade fell apart.

What feedback did your client give you about your design? How can you improve the design?

My mom was happy with how the mixing blade worked and blended the ingredients for the pastry dough but said that it needed to be able to work at higher speeds without coming apart.

Oops! The designed solution was partially successful, but the blade made with the available material (3D-printed PLA) was not strong enough to withstand higher mixer speeds. The student had some ideas on how to improve the design, but time ran out before the improvements could be implemented. This is a great example of an ambitious project that was not considered a failure by the teacher even though the requirements were not fully met. The student learned that there are some limits to strengths of materials. Sometimes a design can be 3D-printed in a different orientation to increase strength, but ultimately it might be better to use a different material to solve the problem. We learned something!