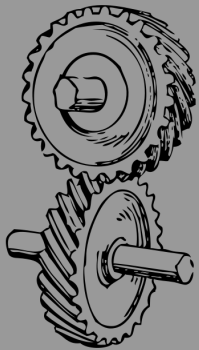


PROJECT LEAD THE WAY

PLTW



Why should you take a Project Lead the Way Engineering course?

- ★ **PLTW courses offer students the opportunity to build a strong foundation for college and career paths.**
- ★ **Courses engage students in real-world challenges.**
- ★ **Students become better collaborators and thinkers.**
- ★ **Applied learning experiences allow students to gain skills to thrive in today's technology fields.**
- ★ **Students have the opportunity to earn college credit.**

Each PLTW Engineering course engages students in interdisciplinary activities like working with a client to design a home, programming electronic devices or robotic arms, or exploring algae as a biofuel source. These activities not only build knowledge and skills in engineering, but also empower students to develop essential skills such as problem solving, critical and creative thinking, communication, collaboration, and perseverance.

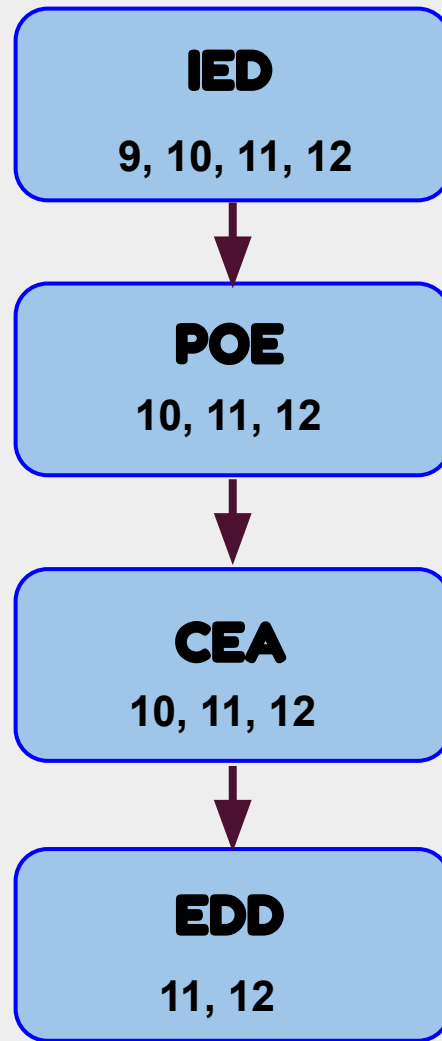


<https://www.pltw.org/our-programs/pltw-engineering>

Jefferson City High School

Project Lead the Way - Engineering

- **Introductory Courses**
 - Introduction to Engineering Design (IED)
 - Principles of Engineering (POE)
- **Specialization Courses**
 - Civil Engineering and Architecture (CEA)
- **Capstone Course**
 - Engineering Design and Development (EDD)





Engineering Branch (JCHS)

- Introduction to Engineering Design
- Principles of Engineering
- Civil Engineering and Architecture
- Engineering Design and Development

Introduction to Engineering Design (IED)

Students dig deep into the engineering design process, applying math, science, and engineering standards to hands-on projects. They work both individually and in teams to design solutions to a variety of problems using 3D modeling software, and use an engineering notebook to document their work.

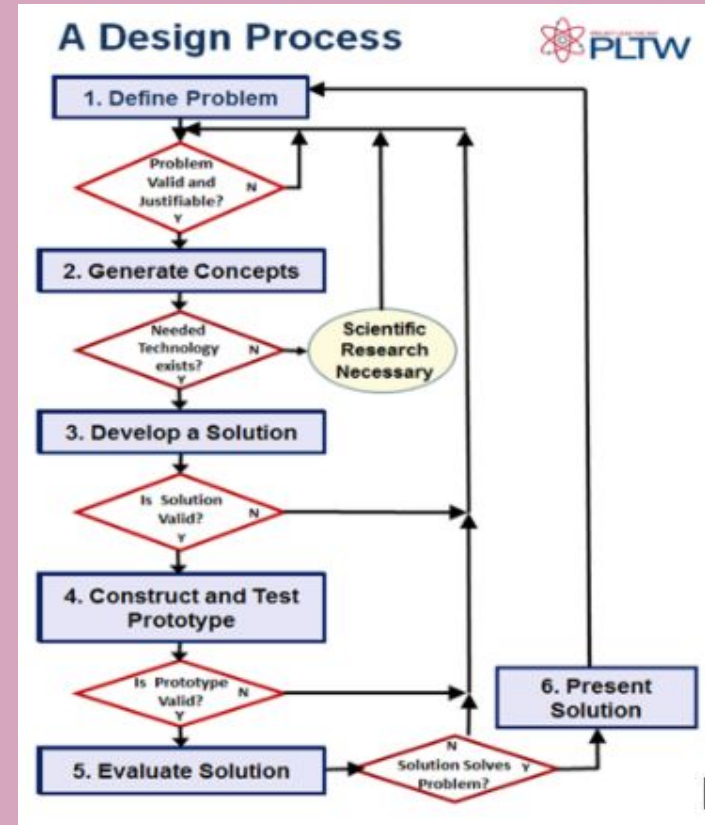
Offered to students in grades 9, 10, 11, 12

Prerequisites: Successful completion of Algebra I or teacher recommendation.

<https://www.pltw.org/our-programs/pltw-engineering>

Introduction to Engineering Design (IED)

- The Design Process
- Technical Drawing Skills
- CAD Modeling Skills (Fusion 360)
- Computational and Analytical Skills
- Professional Skills
- Presentations
- Modeling in Engineering



The Skyscraper Design Challenge



3D Printer Projects



The Automata Design Challenge

Key Chains



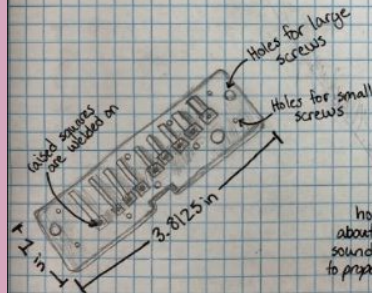
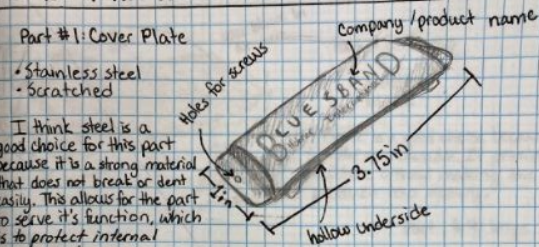
Technical Drawings in the Engineering Notebook

Title: 2.2.4 Part Sketches Page 35

Part #1: Cover Plate

- Stainless steel
- Scratched

I think steel is a good choice for this part because it is a strong material that does not break or dent easily. This allows for the part to serve its function, which is to protect internal components.



Part #2: Reed Plate

- Brass alloy
- Tarnished

I think they probably chose brass for the sound it makes when vibrated, however I do not know enough about metals and the difference in sound they make in instruments to properly justify the use of brass.

Continued on Page 36

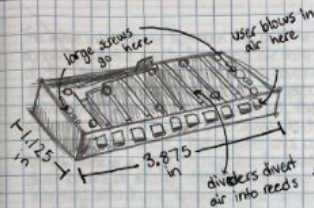
Signature: Anna Machway

Date: 3/3/21

Disclosed to and understood by: Emma Frielman

Date: 3/1/21

Title: 2.2.4 Part Sketches Page 36



Part #3: Comb

- Plastic
- Black

Plastic is a good choice because it is light and durable. It provides structure without making the product too heavy.

Part #4: large screw

- Brass alloy
- Phillips head



Part #5: small screw

- Brass alloy
- Phillips head



Part #6: nut

- Brass alloy
- Tarnished



My hypothesis was that it used a system that funnels air in order to make different sounds for each hole. Although my original hypothesis did succeed in naming that it was a system that funnels air, that system does not make the noise. Instead, the sound is made by the vibration of metal reeds, which happens after the air is funneled into the correct reed by the comb.

Continued on Page 37

Signature: Anna Machway

Date: 3/3/21

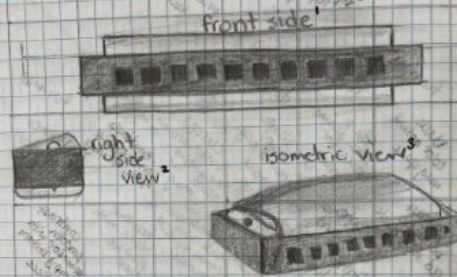
Disclosed to and understood by: Emma Frielman

Date: 3/5/21

Title: 2.2.2 Visual Analysis Page 37

Reflection Question

Sharp, clean lines and solid unnatural colors (such as red) complements the wabi-sabi style.



From the front view, it is apparent that the harmonica has negative space spaced with regular rhythm. It is also apparent that the texture is smooth and the color of the rectangular prism is black. The design is symmetrical.

From the right side view, it is apparent that the design does not have right-side symmetry. It is also apparent that the rectangular shape is black.

From the isometric view, you can see that the top piece is curved and metallic.

Signature: Anna Machway

Disclosed to and understood by: Anna Machway

Continued on Page 27

Date: 2/23/21

Principles of Engineering (POE)

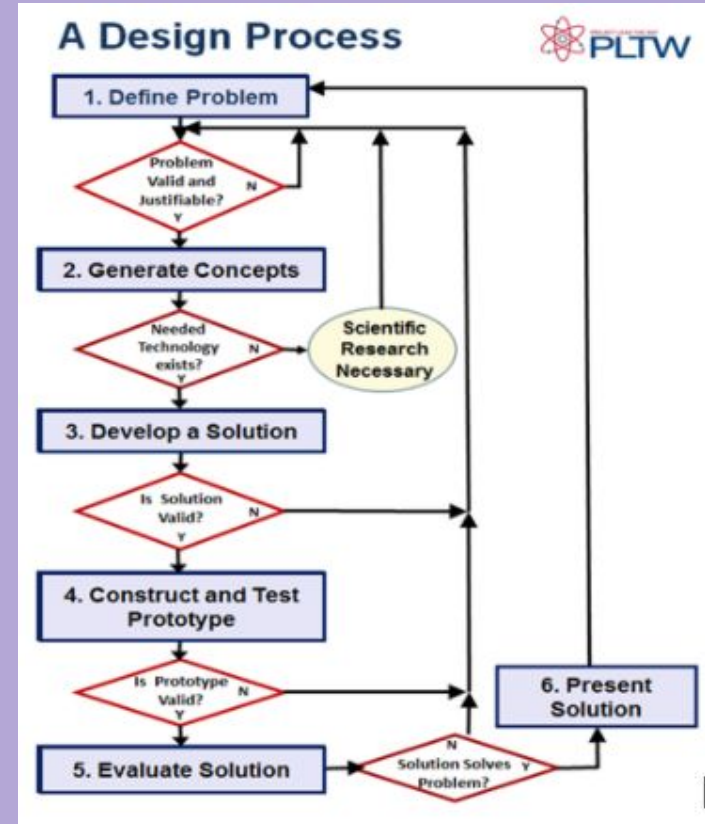
Through problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of structures and materials, and automation. Students develop skills in problem solving, research, and design while learning strategies for design process documentation, collaboration, and presentation.

Offered to students in grades 10, 11, 12

Prerequisites: Successful completion of Algebra I.

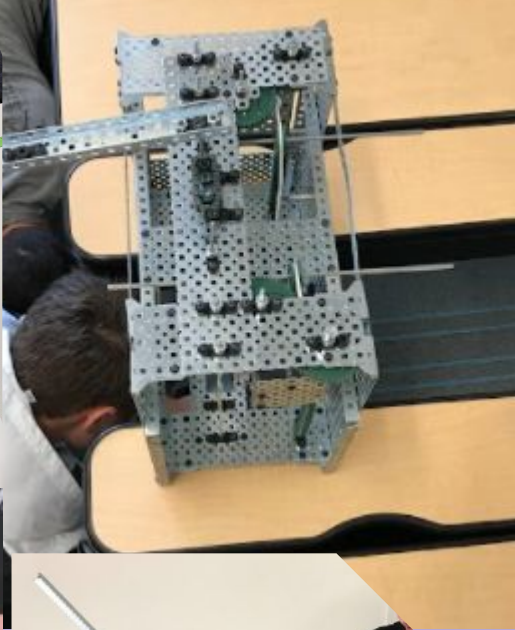
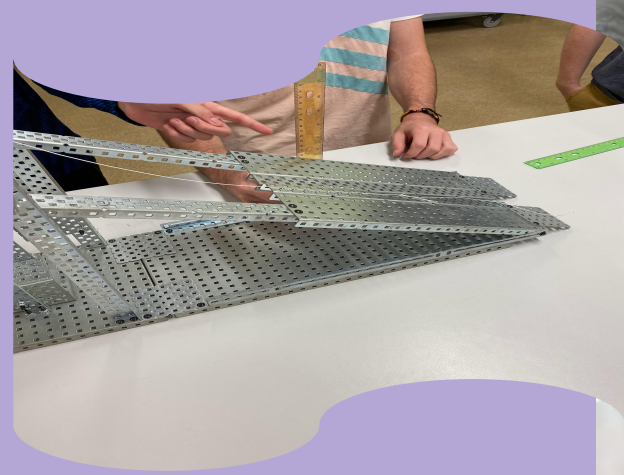
Principles of Engineering (POE)

- Mechanisms and simple machines
- Mechanical advantage
- Energy sources and applications
- Fluid Power
- Control Systems (Coding)
- Material properties
- Centroids
- Tensile testing
- Vectors, forces, and statics
- Trusses
- Presentations



Compound Machine Design

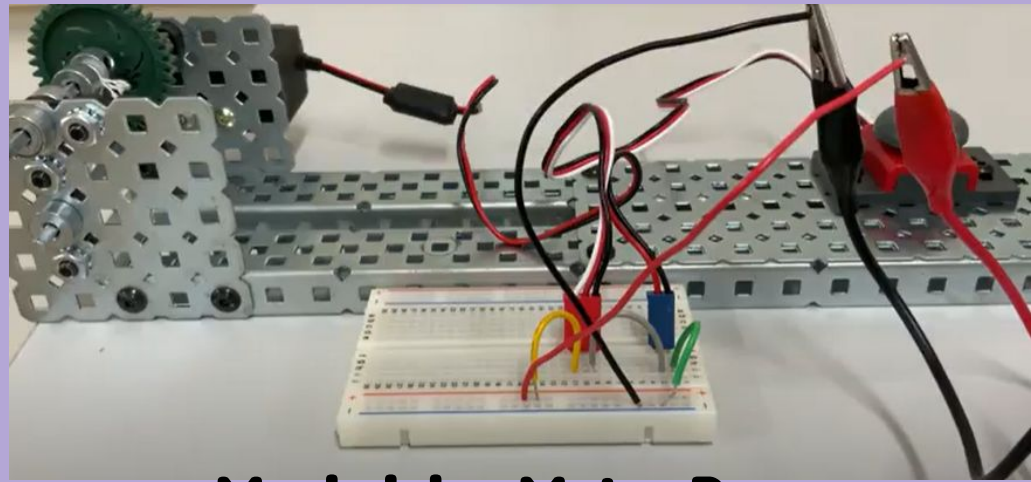
- Maximum 2 base plates
- At least 3 simple machines
- Must lift a toolbox (weight varies each year) minimum 5 inches
- Only one human input force



Energy Sources and Applications



**Solar Panel and
Hydrogen Fuel Cells**

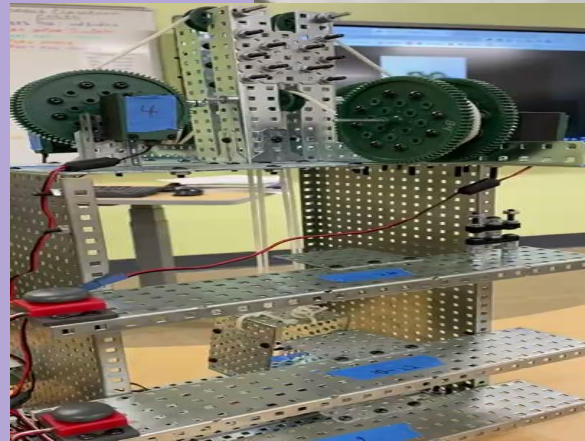
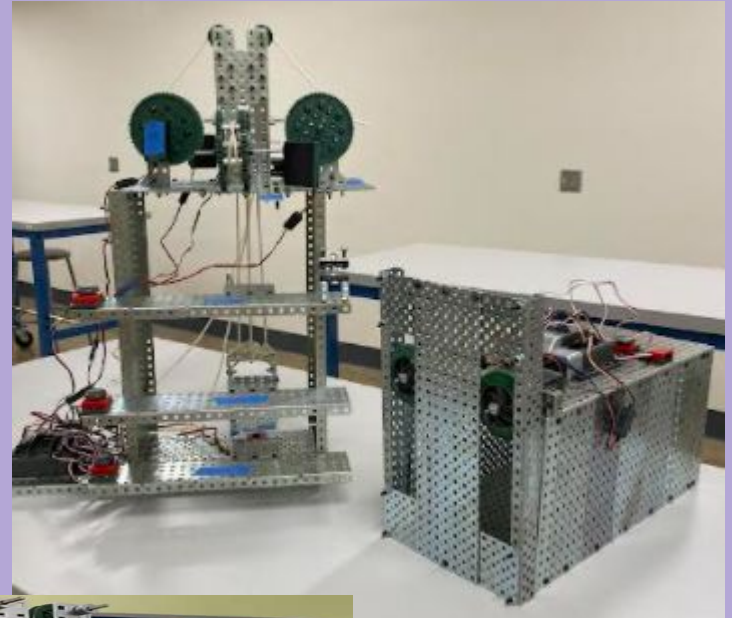
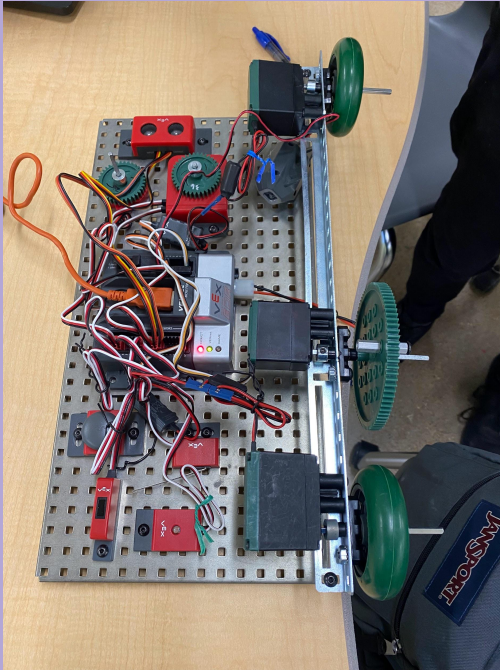


Maximizing Motor Power

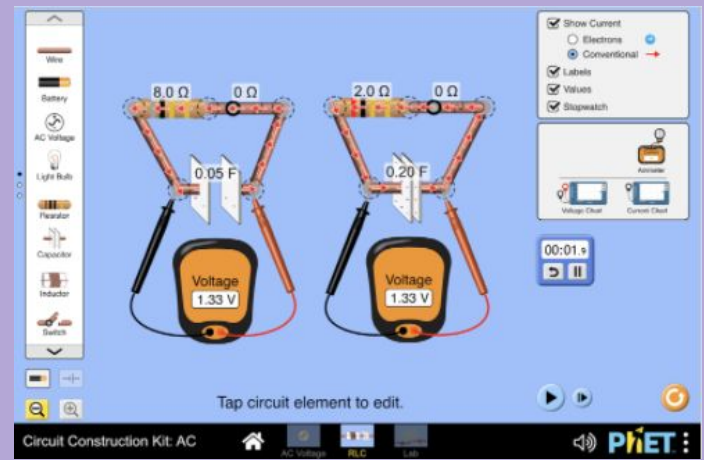
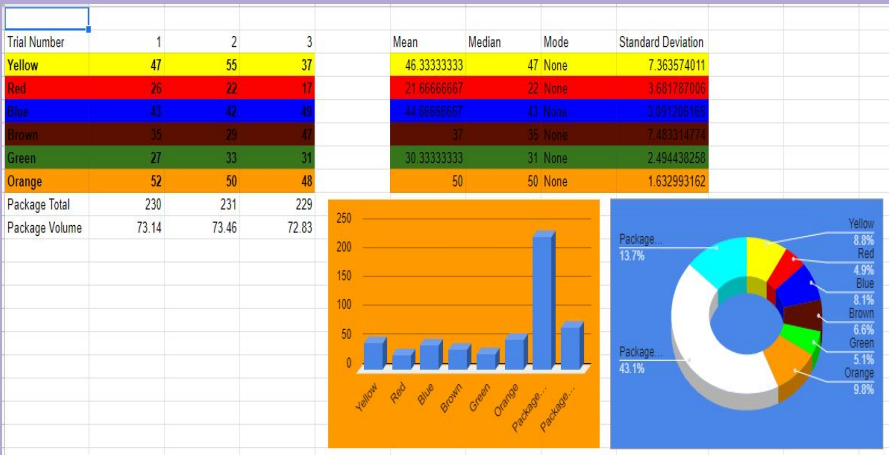
Fluid Power



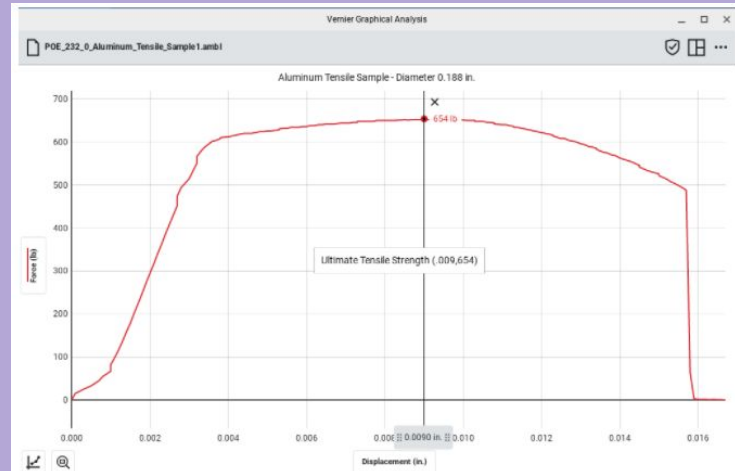
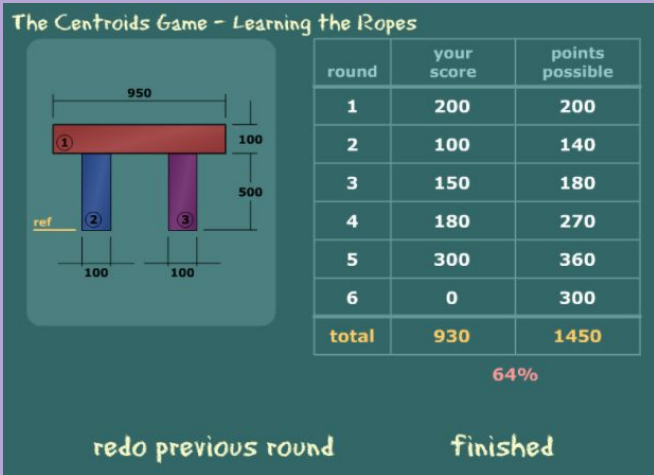
The Testbed



**Machine
Control Design**



Software and Simulation Applications



Civil Engineering and Architecture (CEA)

Students learn important aspects of building and site design and development. They apply math, science, and standard engineering practices to design both residential and commercial projects and document their work using 3D architecture design software.

Offered to students in grades 10, 11, 12

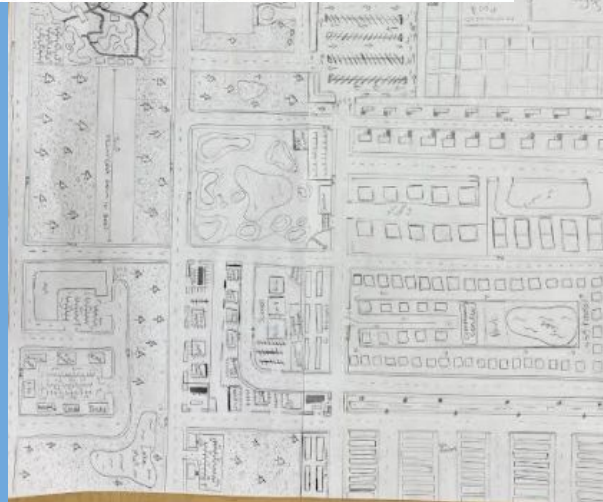
Prerequisites: Other than concurrent enrollment in college preparatory mathematics and science courses, this course assumes no previous knowledge: However, students are encouraged to take the first two engineering courses in the PLTW sequence.

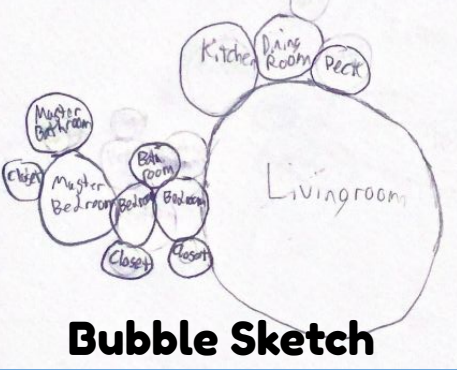
<https://www.pltw.org/our-programs/pltw-engineering>

Civil Engineering and Architecture (CEA)

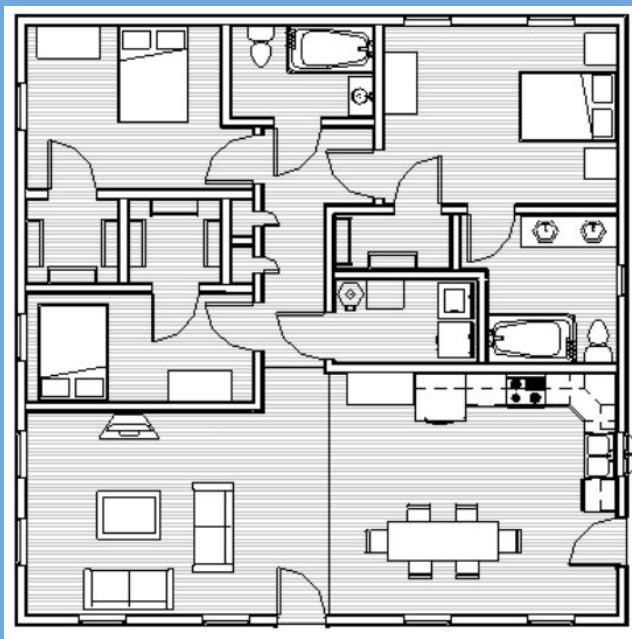
- **Residential Design:**
 - **Construction Costs**
 - **Planning and Development**
 - **REVIT software**
 - **Building Codes**
 - **Green and Sustainable Design**
 - **Site Planning**
- **Commercial Design:**
 - **Building Systems**
 - **Building Loads**
 - **Project Management**
 - **Land Surveying**

The photograph shows a collection of architectural models on a white table. The models include a triangular house with a grey roof, a multi-story yellow house with a purple roof, a small brown house, a black and white geometric house, and a large wavy house. A tall black display board with a grid of small photos is also visible. The background shows a classroom setting with a door and cabinets.

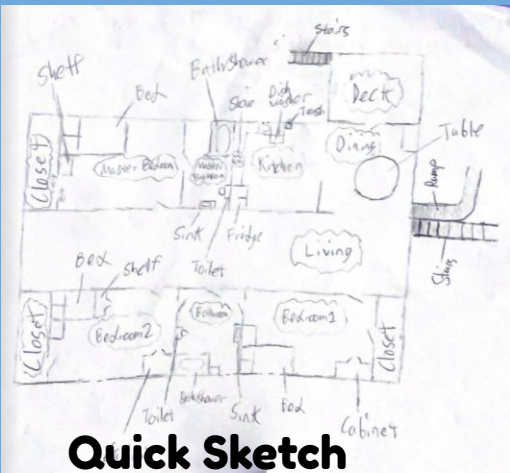
[illegible]



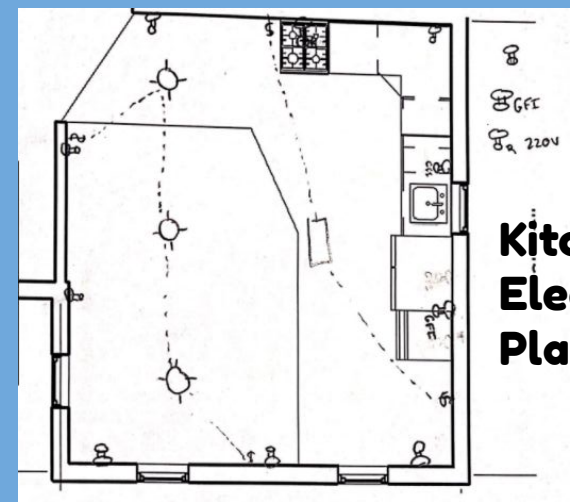
Bubble Sketch



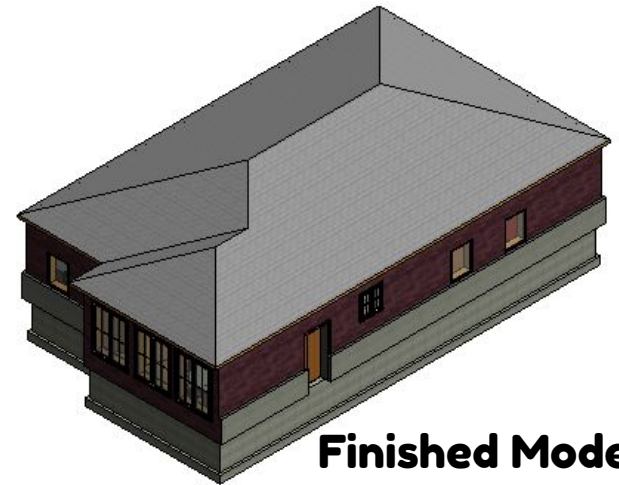
Floor Plan



Quick Sketch



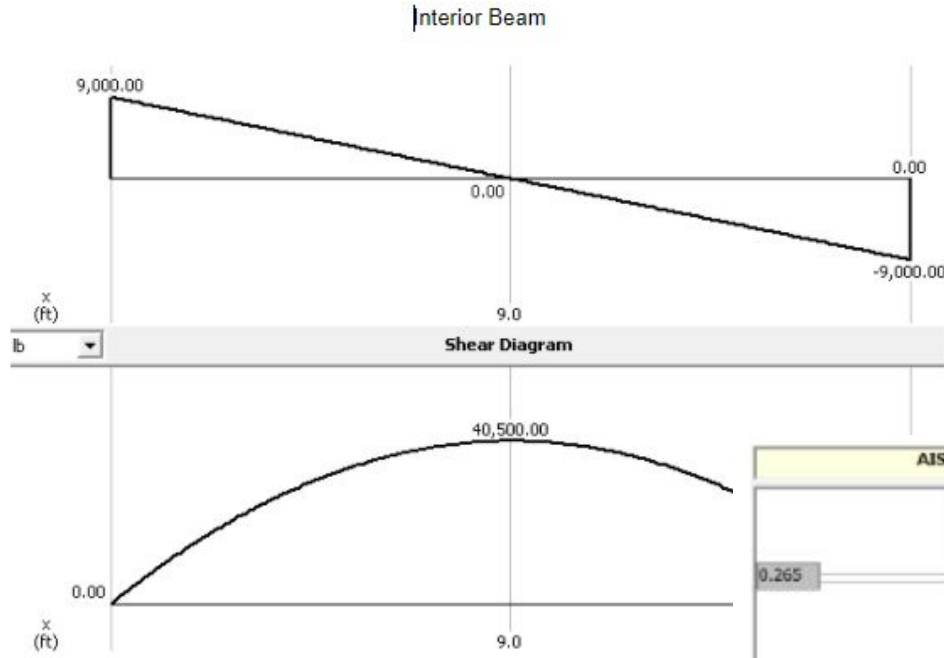
**Kitchen
Electrical
Plan**



Finished Model

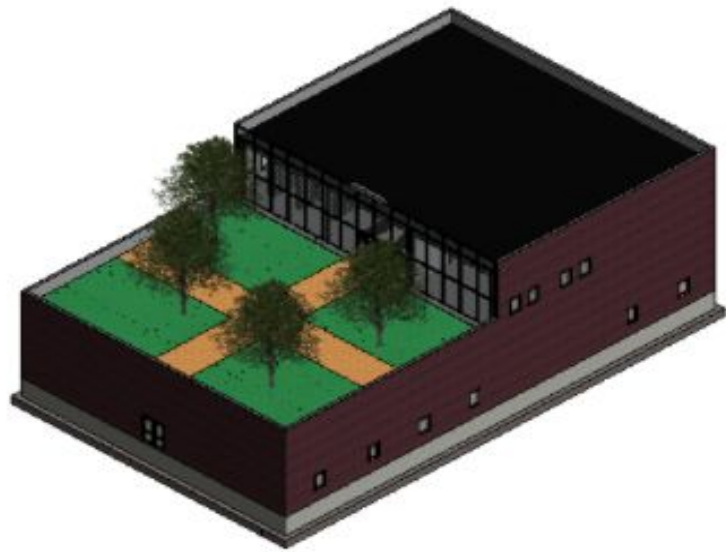
Residential Design

Software Generated Beam Design



Z Axis Properties		
Elastic Modulus	E	29.0000E+06 psi
From bottom to centroid	y (bot)	6.0000 in.
From centroid to top	y (top)	6.0000 in.
Area of shape	A	4.7100 in. ²
Moment of Inertia	I _z	103.0000 in. ⁴
Section Modulus	S _z	17.1000 in. ³
Section Modulus (bottom)	S (bot)	17.1000 in. ³
Section Modulus (top)	S (top)	17.1000 in. ³
Radius of Gyration	r _z	4.6700 in.
Plastic Modulus	Z _z	20.1000 in. ³
Shape Factor		1.1754
From bottom to plastic n.a.	y _p (bot)	6.0000 in.
From plastic n.a. to top	y _p (top)	6.0000 in.
Polar Moment of Inertia	J	0.1030 in. ⁴
Product of Inertia	I _{yz}	0.0000 in. ⁴
Maximum Moment of Inertia	I _{max}	103.0000 in. ⁴
Minimum Moment of Inertia	I _{min}	2.8200 in. ⁴
Angle from z axis to I _{max} axis	B	0.0000 degrees

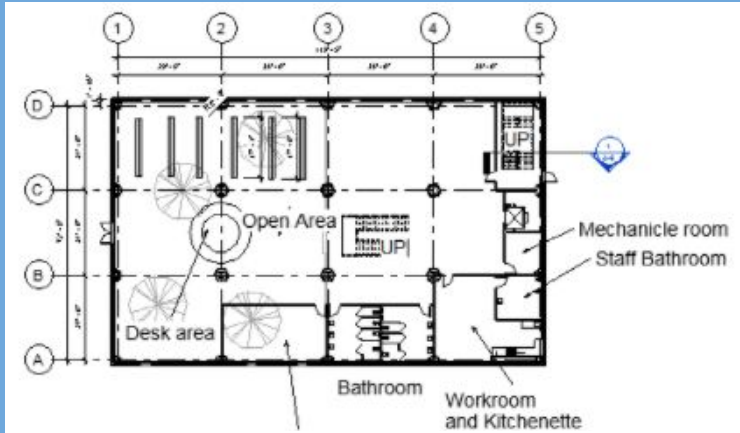
Counterclockwise



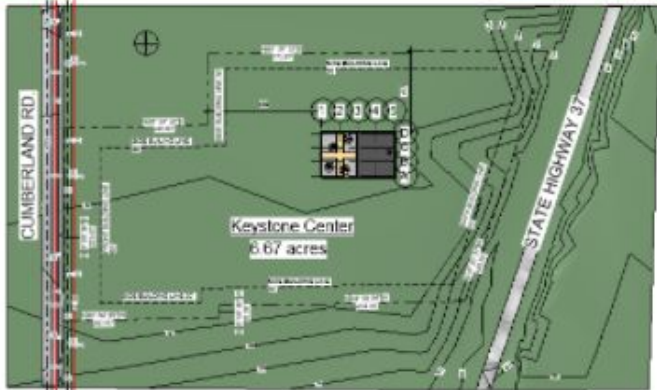
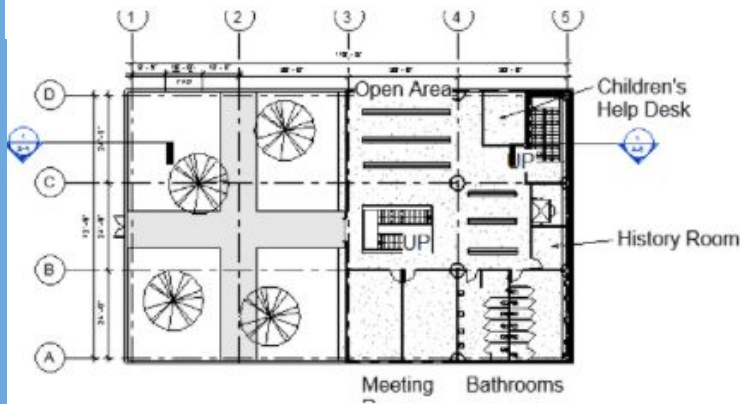
Commercial Design

Keystone Library Renovation

**1st
Floor**



**2nd
Floor**



SECTIONAL DESIGN SITE PLAN

Autodesk Revit

Project Lead The Way
Keystone Center

NO.	DESCRIPTION	DATE
1	ISSUED FOR PERMIT	10/1/11
2	ISSUED FOR CONSTRUCTION	10/1/11
3	ISSUED FOR OCCUPANCY	10/1/11

SITE PLAN

PROJECT: PROJECT
NO. 1000000000
DATE: 10/1/11
DRAWN BY: J. J. J.
CHECKED BY: J. J. J.
SCALE: 1/8" = 1'-0"

C-1

Engineering Design and Development (EDD)

The knowledge and skills students acquire throughout PLTW Engineering come together in Engineering Design and Development as they identify an issue and then research, design, and test a solution, ultimately presenting their solution to a panel of engineers. Students apply the professional skills they have developed to document a design process to standards, completing Engineering Design and Development ready to take on any post-secondary program or career.

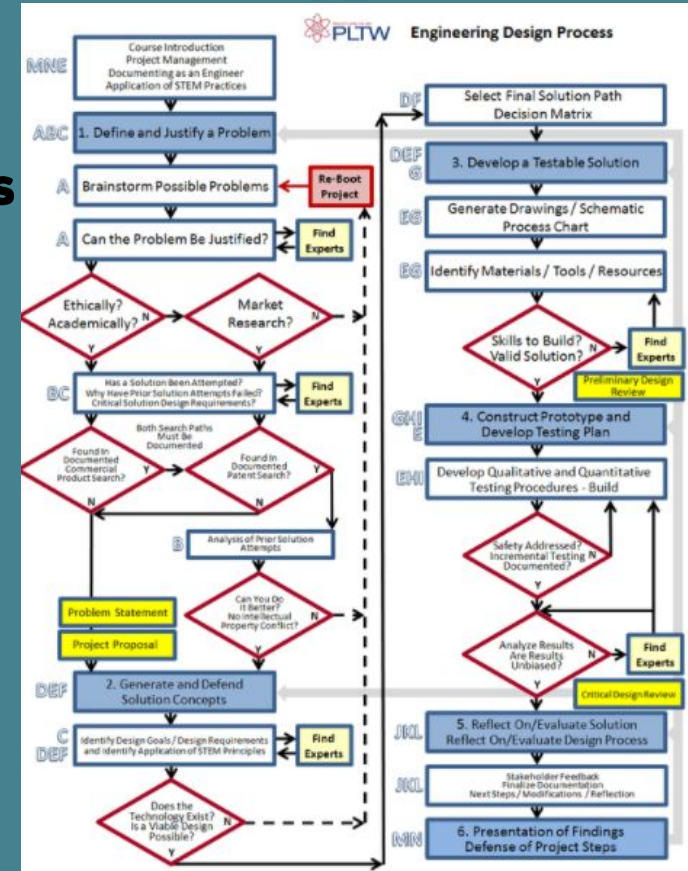
Offered to students in grades 11, 12

Prerequisites: Two of the three previous engineering PLTW courses.

<https://www.pltw.org/our-programs/pltw-engineering>

Engineering Design and Development (EDD)

- Engineering Design Processes
- Project Management
- Documenting an Engineering Design Process
- Teamwork and Professional Skills
- Problem Identification and Justification
- Research
- Intellectual Property
- Project Proposals- Design
- Preliminary Design Reviews
- Prototyping
- Testing a Prototype
- Presenting the Process and Results



Narrowing Down the Project Choices

Ethans TOP Five!

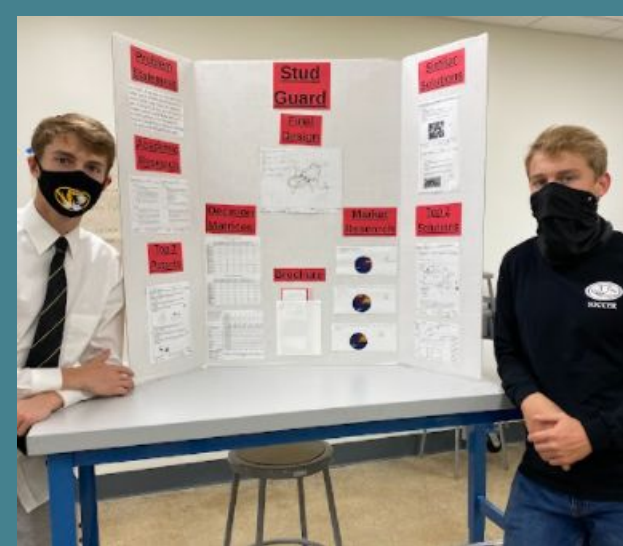
- 1) Texting and Driving
- 2) Energetic dogs and NO time to walk them.
- 3) Unsafe crosswalks for pedestrians
- 4) Packages being stolen at door step
- 5) Wearing down flat studs on concrete or other non-attended surfaces.

Trevor's Top 5

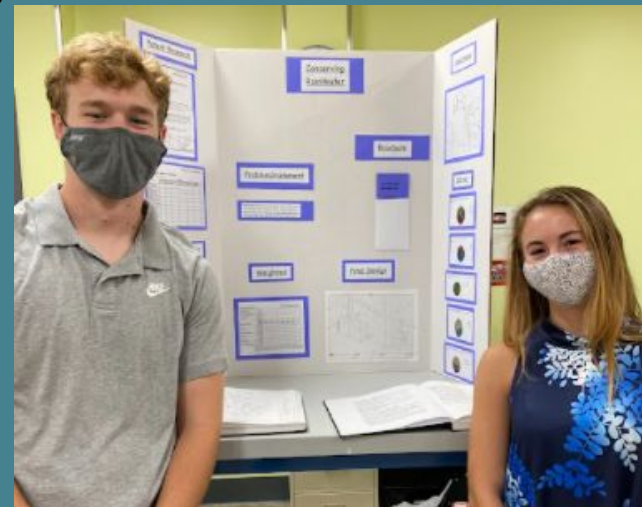
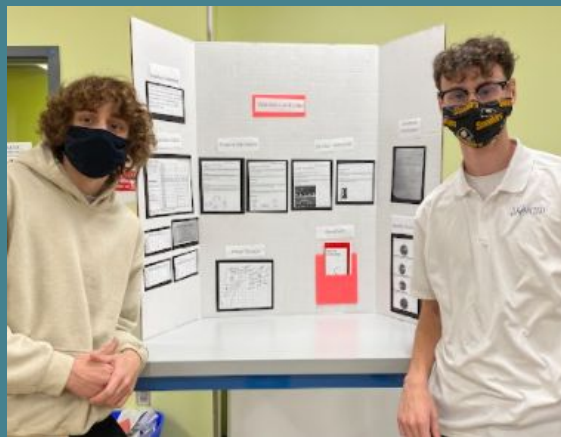
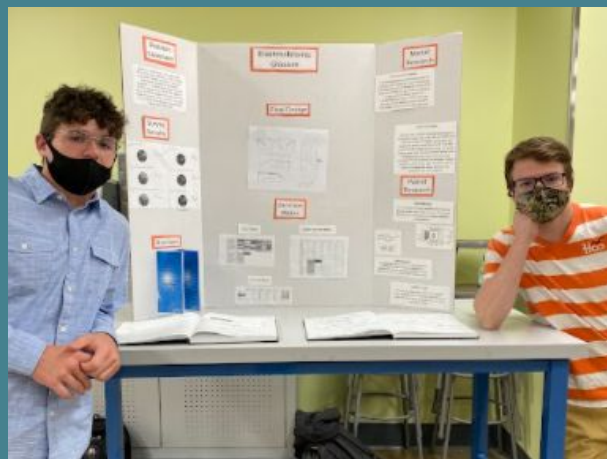
- 1) I wish I didn't have to feed the dog so often
- 2) I wish I didn't have to replace light bulbs as often
- 3) I wish I didn't have to make my bed every morning
- 4) I wish there was an easier way to put a worm on a fishing hook
- 5) I wish I didn't have to pick up a dead bug every time I use a fly swatter

Nathans Top five (not in specific order)

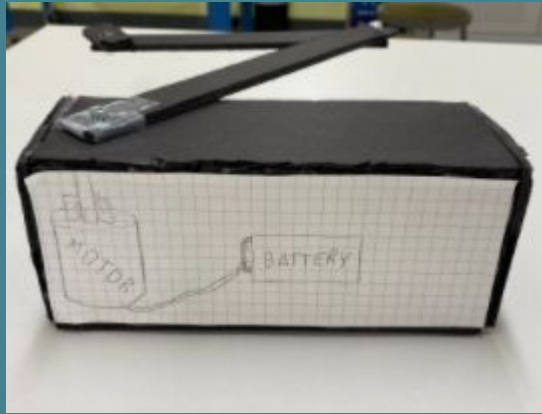
1. Automatic Animal feeder
2. Easier warning system for the elderly
3. ~~Automatic~~ Door Closer
4. Stop the car Doors from Slamming
5. Uniform Dryer

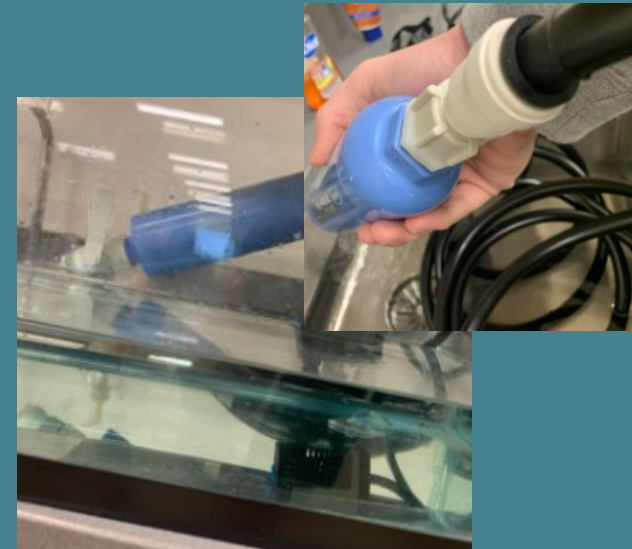
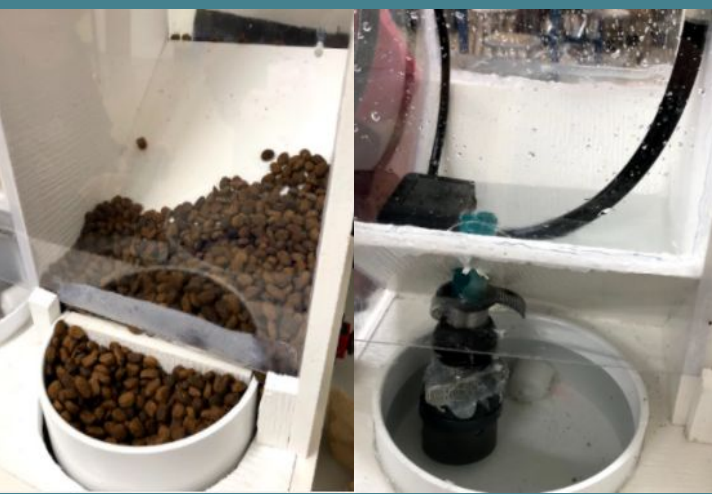


Project Proposals

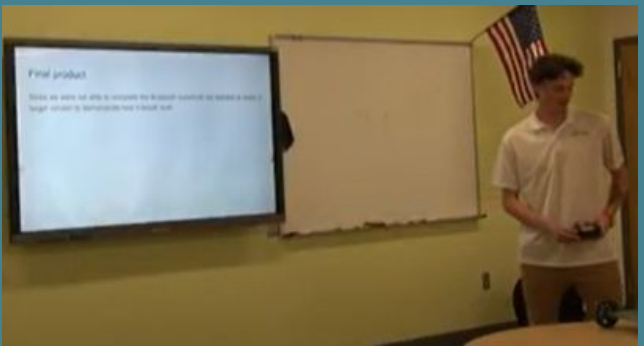


Mock-ups





Prototypes



Final Presentations

References

Course descriptions :

<https://www.pltw.org/our-programs/pltw-engineering>

Questions?

contact Becky Turner

becky.turner@jcschools.us