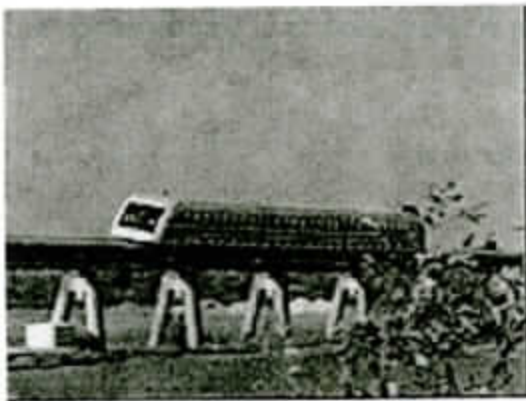


Driving without wheels Flying without wings

Introduction

Ever ridden on a train before? What about an airplane? What if someone could combine the two, making a flying train? Well someone has, and even better, this new "flying train" doesn't need engines, is environmentally friendly, and would require less maintenance than your car. Oh yeah, and its way quieter than a normal train. This new invention is called a Maglev train, which stands for Magnetically Levitated train. A Maglev uses magnetism to hover above the ground, which allows it to travel way faster than a regular train.



Maglev Project

Research

Brain storming Sketches

Final Drawing

Construction

Presentation

Testing

Evaluation

Engineering Design Summative Project

Research on Car Design:

Links

www.hk-phy.org/articles/maglev/maglev_e.html
www.gluckman.com/Maglev.html
www.o-keating.com/hsr/maglev.htm
www.howstuffworks.com
www.transrapid.de
<http://cede.psu.edu/~dbieryla/maglev/>
<http://www.calmaglev.org/default.php?getpage=technology>

Brain storming Sketches

Research the internet besides other sources. Check out the different designs of Maglev vehicles build by students.

How are they designed?

What is the method used to levitate and how do they move forward?

What materials are used? Does it have to be light or heavy?

Where is the motor placed and how does it get power?

What tools and equipment are required to build?

Consider all the above factors and more while designing your model. Create at least **two** sketches of your own.

CONSIDERATIONS

1. You may use up to six ceramic magnets supplied by the teacher.
2. Your vehicle can only be propelled by a sail.
3. The rails of the track are 5.7 cm apart so the base of your racer should be slightly smaller.
4. The vehicle should be no longer than 15cm in length.

HINTS:

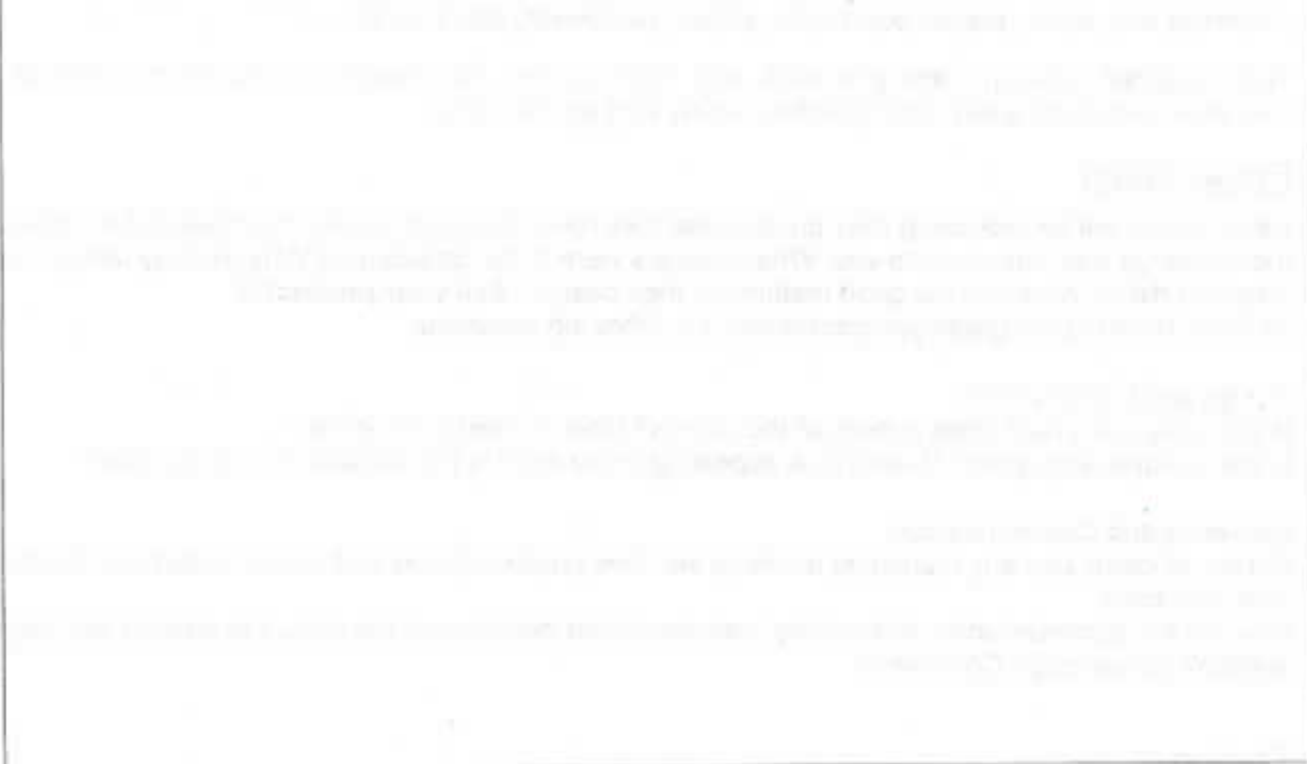
1. Usually, the higher the vehicle levitates off the track, the better it performs.
2. The load (weight) should be distributed evenly. Vehicles that ride level do very well.
3. Decorations can and should be added to your vehicle. Most spray paints will dissolve Styrofoam but you can use permanent marker, acrylic paint, or stickers.

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Sketch # 1



Sketch # 2



Engineering Design Summative Project

Final Drawing

Compare your sketches. Brainstorm and analyze best features. You could select one design or mix and match from your different designs. Finalize and start creating your orthographic drawing using actual measurements. All measurements are in mm.

#	Item	L	W	H		#	Item	L	Dia
1.	Base					5.			
2.	Magnet					6.			
3.	Body					7.			
4.						8.			

Note: You must use either Sketch-up or SolidWorks to create your drawing. Dimension and label parts. Also use Borders and Title Block

Construction

Get ready to do some hands on stuff. Remember **Safety** is always first. Use the tools as directed by the teacher. Cleanup after yourself and return all tools and materials at the end of each class.

Each person will be given a container to store incomplete projects. Please take care of the parts and return the container at the end of each class. You will receive: Styrofoam base, and six magnets. You should arrange to bring in parts for the body as per your design. Suggested materials are; foam, plastic pop bottle, paper, cardboard, balsa wood.....

Tools required: Glue gun and glue stick, and foam cutters. The maglev car construction will be evaluated based on good workmanship, safety and performance.

Presentation

Each person will be promoting their product that they have designed & built. You have to talk about the challenge that was given to you. What criteria's were to be considered? Why did they design the way they did it? What are the good features of their design? **Sell your product!!!**

All other students will grade you considering the following questions.

Design and Construction:

Is the design original? Does it meet all the criteria? Does it satisfy the needs?

Is the workmanship good? Does it look appealing to the eye? Is the fabrication method good?

Marketing and Communication:

Did the students use any marketing media to sell their products? How well was it made? Did it catch your attention?

How are the communication skills of the marketers? Did they convey the message clearly? Are they audible? Convincing? Confident?

Testing

Engineering Design Summative Project

Conduct of the Race

The race will be run under the following conditions.

- 1. Inspections** Vehicles will be inspected by the teacher prior to the race and may be inspected between heats at the teacher's discretion.
- 2. Starting** At race time, your team will place the vehicle on the track behind the starting line with all parts of the vehicle inside the track. On the GO signal from the official your team start person will turn the power on to 6V on the power supply unit.
- 3. Pushing** An early push start may result in either disqualification, forfeiture or a re-run of the heat and will be determined by the starting judge.
- 4. Winner** The winner will be determined by the fastest vehicle. This means that the vehicle with the least time to cross the track is the most efficient design.
- 5. Collecting Vehicles** Vehicles stalled on the track may be retrieved only after the end of the race has been declared by the finish line judge.
- 6. Fixing Vehicles** Teams may work on their vehicles between races to fix problems. Remember that if you are called to the next race and your car is not ready you will forfeit the race - at the start line judge's determination.
- 7. Horse play** Horse play during the construction or race will not be tolerated and may result in disqualification.
- 8. Format** All vehicles will race to determine time trails. A record will be kept and a competition chart will be prepared and a winner determined based on the best win-loss record. A runoff will be used in case of a tie.

Evaluate

Evaluation Report: Compose a detail summary or evaluation of what you observed and learned during the project. (Maximum one page, typed.)

1. Describe briefly the challenge given to you.
2. Explain the problems you faced and the solutions you came up with.
3. Highlight strengths and weaknesses of your design.
4. Conclude by writing a passage noting the changes you would do to your design if you were to make it again.

Title page: Design an attractive Title page using illustrations and text. You may use a computer or draw it by hand. The title page must have the following:

1. Name of your project in bold, creative font. E.g. "Drag-raycer" "Typhoon Car".
2. You must include a picture of your project or a coloured hand drawn sketch.
3. You may use other illustrations to make you title page attractive.
4. The title page must also include the student names of your group, Course code and teacher's name.
5. The title page must have a border all around.

Submit your report in an attractive folder/file.

Assessment Rubric: Maglev Project

Name:

Engineering Design Summative Project

Categories	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)
T and I	<=2.5	3	3.5 – 4	4.5 – 5
Draw sketches.	Draws one sketch of possible design solutions and writes notes and features of that idea.	Draws two sketches of possible design solutions and writes some notes and features of those ideas.	Draws <u>three</u> sketches of possible design solutions and writes detail notes and features of those ideas.	Draws <u>three</u> sketches and a final sketch of possible design solutions and writes detail notes and features of those ideas.
T and I	<=5	6	7 – 8	9 – 10
Draws orthographic views in AutoCAD.	Draws Front and Top orthographic views of the final sketch with <u>limited</u> accuracy and effectiveness.	Draws Front and Top orthographic views of the final sketch with <u>some</u> accuracy and effectiveness.	Draws Front, Top and Side orthographic views of the final sketch with <u>considerable</u> accuracy and effectiveness.	Draws Front, Top and Side orthographic views of the final sketch with a <u>high degree</u> of accuracy and effectiveness.
K and U	<=5	6	7 – 8	9 – 10
Fabricates the structure using tools safely.	Fabricates the structure that is not as per drawing with <u>major</u> changes. Uses tools unsafely .	Fabricates the structure that is somewhat as per drawing with <u>minor</u> changes. Demonstrates <u>fairly good</u> workmanship. Uses tools safely .	Fabricates the structure that is almost as per drawing with <u>minor</u> changes. Demonstrates <u>good</u> workmanship. Uses tools safely .	Fabricates the structure that is as per drawing with <u>no</u> changes. Demonstrates <u>excellent</u> workmanship. Uses tools very safely .
Application	<=10 - 11-12	12.5 –13 – 14	14.5 -15 - 16	16.5 –17 – 18 -19 - 20
Does it work?	Works rarely. Not efficient and low speed.	Works some times. Somewhat efficient and average speed.	Works as expected. Efficient and fast	Works perfectly. Highly efficient and fast
Application	<=5	6	7 – 8	9 – 10
Title Page	The title page has very few of the required components with a simple layout.	The title page has most of the required components with fairly good layout.	The title page has all the required components with good layout out and attracts attention.	The title page has all the required components with excellent layout out and grabs the attention of the reader.
K and U	<=2.5	3	3.5 – 4	4.5 – 5
Presentation	Message conveyed. Low confidence shown and inaudible speech. Few criteria met.	Message conveyed. Some confidence shown but audible speech. Some criteria met.	Message conveyed clearly. Confident and audible speech. Most criteria met.	Message conveyed clearly. Very confident. Audible speech. All criteria met. Very Convincing.
Communication	<=2.5	3	3.5 – 4	4.5 – 5
Evaluation	Poor evaluation. Incomplete description of strengths and weaknesses.	Fair evaluation. Simple description of strengths and weaknesses.	Good evaluation. Complete description of strengths and weaknesses.	Excellent evaluation. Description of strengths and weaknesses is complete and insightful.
Communication	<=2.5	3	3.5 – 4	4.5 – 5