Design Brief- Designing and Building a Solar-Powered Vehicle
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Introduction
Your firm has been contracted to build a solar-powered vehicle that takes into consideration use of renewable resources and their ecological impact. You and three colleagues will design, and build a vehicle that uses solar energy as its power source. You will also be given the opportunity to test your vehicle, reassess any issues that occur and then rebuild or redesign vehicle. You will then have to present the design, building, results and implications to competing companies, as well as contact your local town hall to find a suitable location to display the vehicles.

Challenge
Your firm will design an awe-inspiring display unveiling your solar-powered vehicle and will formally present a functional scale prototype to the client.

Design Brief Goals
• You will design and build a solar vehicle that exemplifies your planning, design, and building abilities as well as your assessment and presentation skills.
• This project will require you to use previously learned skills associated with welding, fastening, soldering, electrical systems, and functional aesthetics.

Material/Equipment List
You may use any materials, equipment, software, hardware, or material processing tools in the lab, subject to the usual class regulations.

Limitations
• You must meet all of the client’s specs
  o Solar Powered
  o Energy Indicator
  o Speed Indicator
  o Must be able to be tested on provided track
• You must observe all of our industry policies.
• Some supplies are in limited supply. Be prepared to negotiate.

General Procedures & Requirements
• Your firm is expected to research the best approach to building your vehicle using online and print media.
• You will design vehicle using Inventor program, and present design for approval to client. A design proposal is due on Day 5. Each team member should submit an ICM (Individual Critique Memo).
• After client approval on design, your firm will begin fabrication of a prototype that exemplifies your skills and knowledge of solar power, problem solving abilities, functional aesthetics, and proficiencies with tools and materials in the lab. A prototype is due on Day 10.
• Firms will then have to display and demonstrate their prototypes, see how they compare to other firms efforts and then will be given the opportunity to revise any part of their vehicle to produce a finalized prototype.
• After reevaluation and reengineering process firms will be asked to assemble an oral PowerPoint presentation that discusses their vehicle, reasons for design and the ecological implications of their vehicle.
• On the final day of the project, all firms will be invited to the Solar-Powered Vehicle Conference, in which they must race their vehicle with their competition. Companies will be graded on their design thoughtfulness, execution and functional aesthetics.

References

Evaluation/Assessment/Feedback
• Informal Assessment
  o Implication Exit Cards
    ▪ Students will fill out exit cards before they leave the classroom at the end of each lesson that detail what our in class discussions mean to them or society
  o Town Hall or Library Display
    ▪ Students will be responsible for contacting local officials and finding a site where they can display their vehicles and findings
• Formal Assessment
  o Design of Solar Vehicle Kit Car
    ▪ Develop conceptual designs for transportation, communications, production—produce a final vehicle design which is able to drive a specified distance
  o Building of Solar Vehicle Kit Car
    ▪ Fabricate a Solar powered vehicle using provided solar panel, motor and gears that maximizes efficiency
  o Presentation of Findings on Solar Vehicle
    ▪ Using oral and written communication, present ideas to the class and teacher that illustrate how their findings can be applied to the future of green technology
Overall Grade for Unit: /12

<table>
<thead>
<tr>
<th>Core Element</th>
<th>4 “Strong Evidence”</th>
<th>3 “Moderate Evidence”</th>
<th>2 “Limited Evidence”</th>
<th>1 “No Evidence”</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD Drawing</td>
<td>The student becomes familiar with the components of vehicle design as they are implemented in the CAD software. The student consistently applies knowledge of solar technology, impact of gear ratios, and efficient vehicle movement.</td>
<td>The student becomes familiar with the components of vehicle design as they are implemented in the CAD software. The student indicates some knowledge of the solar technology, impact of gear ratios, and efficient vehicle movement.</td>
<td>The student indicates a minimal understanding of the solar technology, impact of gear ratios, and efficient vehicle movement. In a rudimentary but intentional manner, the student applies this knowledge in the final vehicle design.</td>
<td>The vehicle design submitted by the student, as well as observations of the student during the design phase, give no indication that the student applied any knowledge of the effect that solar technology, impact of gear ratios, and efficient vehicle movement have on the finished product.</td>
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<tr>
<td>Vehicle</td>
<td>The student submits a finished prototype by the deadline. The final product meets or exceeds all teacher specifications and uniformly reflects a high level of attention to detail. During the testing phase, the student consistently implements design changes based on feedback from multiple test runs.</td>
<td>The student submits a finished prototype by the deadline that generally meets teacher specifications. The final product reflects moderate student attention to detail. The student uses at least one full test-redesign-retest phase.</td>
<td>The student submits a finished prototype that generally addresses the problem presented by the teacher. The student uses the trough to test the vehicle as instructed, but does not use feedback from testing to improve the design.</td>
<td>The student fails to submit a final product that meets a majority of teacher specification. The student either does not test the vehicle, or does not incorporate any changes to the vehicle as a result of testing. The student does not demonstrate any consistent attention to detail in this activity.</td>
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<td>Presentation</td>
<td>Student consistently presents information to others in a manner easy to understand. The student responds to and makes corrections to oral and written reports based on teacher feedback. Written materials and oral presentations meet or exceed all teacher specifications and contain only minor grammatical and style errors.</td>
<td>Student presents information to others in a generally understandable manner. The student makes some corrections to oral and written reports based on teacher feedback. Written materials and oral presentations meet most teacher specifications.</td>
<td>The student submits a written report to the teacher or gives an oral presentation before the class. The student needs to re-write the report or presentation before it meets most teacher specifications.</td>
<td>Even if given time to re-write based on teacher feedback of a rough or final draft, the student does not submit a written report to the teacher or give an oral presentation before the class that meets most teacher specifications.</td>
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