

Electric Car Challenge

[Information] [Materials] [Systems]

Significant Concept:

The automotive industry is reacting to the pressures of environmental responsibility.

Unit questions:

How can automotive design improve performance? (HI) (E)

Context:

Car manufactures spend million of dollars each year trying to improve the performance of their cars. With the effects of global warming become evident, the focus of automotive designers is increasingly on car performance and energy efficiency. Electrical and hybrid cars have been hailed as possible breakthroughs.

Task:

Your task is to design and make working prototype of a car that runs on an electrical motor. In teams, you will race against each other to find the fastest car over a set distance (best performance). All cars will be given the same motor and power source.

Information:

- Communication of information using appropriate I.T. to produce a Design Folio.
- Communication of ideas through design sketches

Systems:

- Basic electrical systems
- Mechanical systems

Materials:

- Properties of materials (timber, metal, plastics)
- Use of appropriate tools and equipment

Areas of Interaction:

Student learning Expectations (SLE's)

ATL

Collaboration: How can I best collaborate
Thinking: What tools can I use to solve complex problems?

HI

The impact of environmental concerns on automotive design.

E

The impact of automotive design on our environment.

OBJECTIVES

1. Use the Design Cycle.
2. Undertake meaningful and relevant research.
3. Understand what design factors influence performance
4. Understand the impact of environmental concerns on the automotive industry
5. Apply research.
6. Gain experience working with materials, systems and equipment.
7. Manage time & resources.
8. Critically evaluate own work.

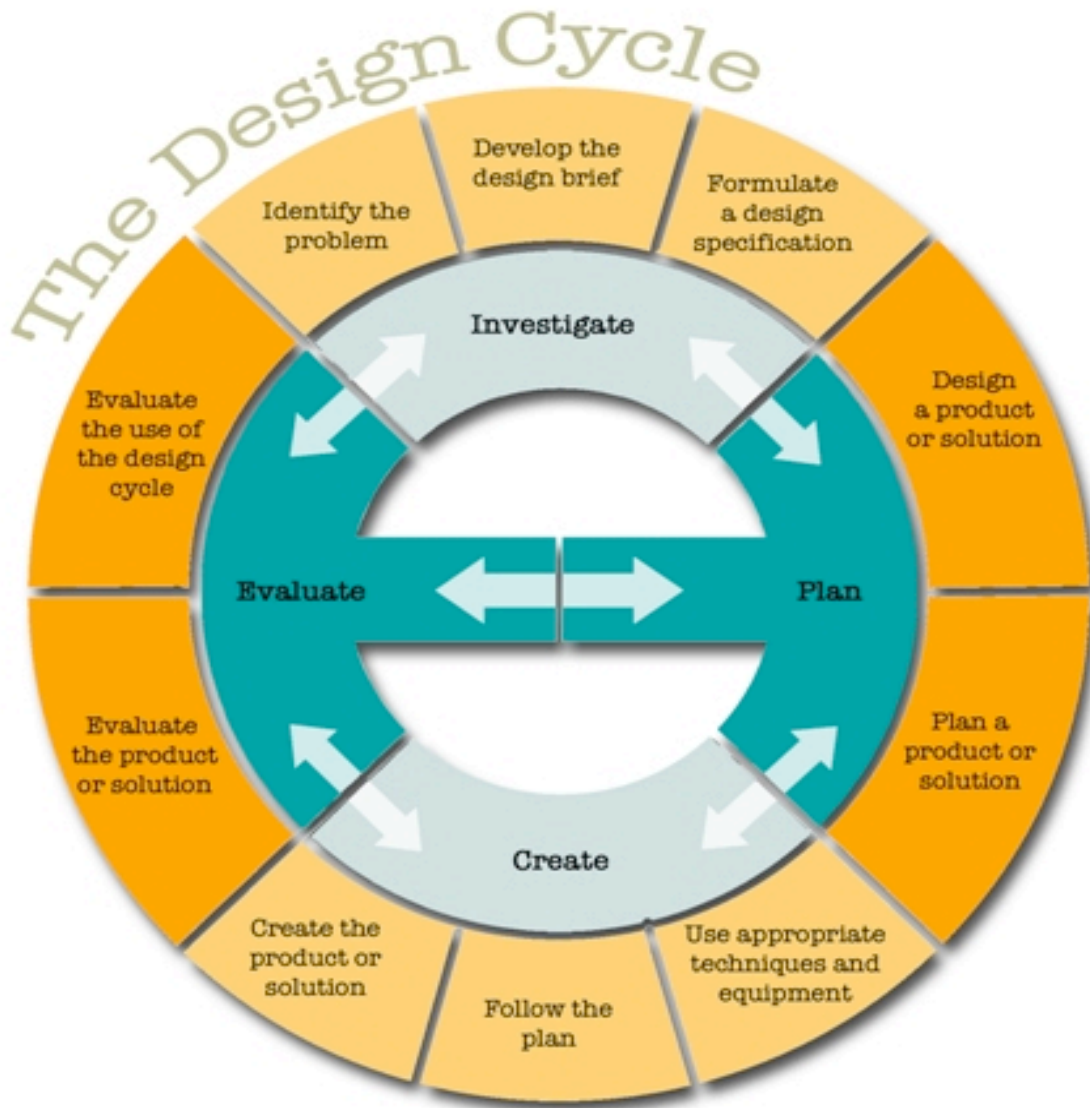
ASSESSMENT

1. Create a Design Folio following the Design Cycle.
2. Demonstrate the a grasp of electrical systems
3. Explain the how hybrid cars work
4. Highlight the impact of environmental concerns on industry.
5. Provide several possible solutions and justify final choice.
6. Create solution (prototype car) to appropriate standard.
7. Plan in detail the construction of a prototype.
8. Test & evaluate solution. Evaluate design in terms of AOI.

You will follow the Design Cycle to complete this task. I have created a checklist for you to follow for each stage of the Design Cycle complete with due dates. I will assess each section independently and then the whole Design Folio will be submitted for final assessment.

Please refer to my wiki for help. www.myp-tech.wikispaces.com

Your first task is to make your own notes against the Check List and Assessment Criteria.



Check List. Car Challenge

Investigate: [Due: 19th Sept]

Identify the Problem. (Research)

- ☐ Rewrite the task in your own words.
- ☐ Write an explanation of how of environmental concerns impact automotive design.
- ☐ Critically discuss hybrid & electrical cars in terms of their impact on the environment and on the automotive industry.
- ☐ Research relevant automotive systems. e.g. gear-ratio, chassis, bearings, drive-train, power to weight ratio, friction etc
- ☐ Explain how an electrical motor works.
- ☐ Conduct a detailed Product Analysis
- ☐ **Detailed** research into materials and components that are available.

Develop A Design Brief

- ☐ Write a Design Brief explaining **what** you will design, **what** are the constraints of the completion and **how** this project impact upon the car industry.

Formulate a Design Specification

- ☐ Write a **detailed** Design Specification

Investigate- Tips for Success

www.myp-tech.wikispaces.com

Design: [Due 30th Sept]

Design a product or Solution

- ☐ Create a detailed **Mind Map** to identify the possibilities for your car design
- ☐ Sketch **4** designs for you car and annotate thoroughly.
- ☐ Evaluate **each** design against the Design Specification.
- ☐ Justify you chosen design.

Design- Tips for Success

Plan: [Due 9th Oct]

Plan a Product or Solution

- ☐ Write a time management plan for the entire project.
- ☐ Write a **detailed** Materials & Component List

Plan- Tips for Success

Assessment Rubric: Car Challenge

	LEVEL 5 - 6	LEVEL 3 - 4	LEVEL 1 - 2
INVESTIGATE	<p>I have clearly re-written the Design Brief in my own words detailing the needs of automotive industry</p> <p>I have a complete Product Analysis with relevant annotation and then evaluated research against the specification.</p> <p>I have written a detailed Design Specification with clear and relevant points that demonstrate an excellent understanding of the task.</p> <p>I have written an excellent and thoughtful explanation of the impact of hybrid & electrical cars on the car industry & the environment.</p> <p>I have conducted a relevant and thorough research into automotive systems and materials and have clearly demonstrated my understanding.</p>	<p>I have clearly re-written the Design Brief with mention of the intended market (company) and have written relevant guiding questions.</p> <p>I have a complete and detailed Product Analysis with relevant annotation.</p> <p>I have written a Design Specification with clear and relevant points that demonstrate a good understanding of the task.</p> <p>I have written a detailed explanation of the impact of hybrid & electrical cars on the car industry & the environment.</p> <p>I have conducted thorough research into relevant automotive systems and materials</p>	<p>I have written a Design brief and have written a guiding question.</p> <p>I have attempted some product analysis.</p> <p>I have written a Design Specification</p> <p>I have made an attempt at explaining the impact of hybrid & electrical cars</p> <p>I have conducted some research</p>
DESIGN	<p>I completed 4 detailed designs of excellent quality with annotation, each evaluated against the specification.</p> <p>I have clearly indicated what materials, automotive systems and construction techniques I will use.</p> <p>I justified the chosen design and critically evaluated against the design specification.</p> <p>I created a detailed mind map of excellent quality.</p>	<p>I completed 4 designs of good quality with annotation and have indicated materials, automotive systems & construction techniques.</p> <p>I evaluated my all designs against the design specification and justified my chosen design.</p> <p>I created a mind map of good quality.</p>	<p>I completed less than 4 designs and with some attempt to justify against the specification.</p> <p>Some of my design are of poor quality</p> <p>I created a mind map.</p>
PLAN	<p>I produced a highly logical and detailed time management tool.</p> <p>I produced production plan containing a number of detailed, logical steps with that described workshop skills, time allocation, materials and testing that could be followed by others.</p> <p>I critically evaluated and justified any modifications to my plan & design.</p>	<p>I produced a reasonably logical and detailed time management tool.</p> <p>I produced a production plan containing a number of logical steps that include resources and time.</p> <p>I made some attempt to evaluate the plan.</p>	<p>I produced a time management tool.</p> <p>My production plan lacks detailed and could not be followed by others.</p>

CREATE	<p>I followed my plan, justified and changes and created a prototype car of excellent quality.</p> <p>I confidently used tools & equipment with a high level of skill.</p> <p>I kept a very detailed Process Journal using a variety of media to explain my progress. (including testing)</p>	<p>I followed my plan and created a prototype car of good quality.</p> <p>I used tools & equipment with satisfactory skill.</p> <p>I took photographs/video to highlight steps & testing in my detailed Process Journal.</p>	<p>I considered my plan and created a prototype car.</p> <p>I followed the teacher's instructions.</p> <p>I wrote an infrequent Process Journal.</p>
EVALUATE	<p>I gauged the success of my prototype and evaluated objectively based on the results of relevant testing. (race)</p> <p>I made clearly explained the relevance of this task to the car industry (big picture).</p> <p>I produced a detailed evaluation at each stage of design cycle, suggesting improvements.</p> <p>I insightfully evaluated the AOI and clearly demonstrated an understanding of its relevance.</p>	<p>I evaluated my prototype car and own performance, suggesting what could be improved.</p> <p>I made clearly explained the relevance of this task to the car industry (big picture).</p> <p>I evaluated my efforts at each stage of the Design Cycle.</p> <p>I evaluated the AOI.</p>	<p>I evaluated my prototype car or my own performance.</p> <p>I made some attempt to explain the relevance of this task to the car industry</p>
ATTITUDE	<p>My conduct in a workshop environment is exemplary.</p> <p>I have worked with a consistently positive attitude</p> <p>I can highlight many Learner profile attributes I have exhibited</p> <p>My overall effort and work ethic has been excellent.</p>	<p>I always conduct myself in a responsible manner in the workshop</p> <p>I have worked with a generally positive attitude</p> <p>I can highlight several Learner Profile attributes I have exhibited</p> <p>My overall effort and work ethic has been good.</p>	<p>I mostly conduct myself in a responsible manner in the workshop</p> <p>I have worked with a reasonably positive attitude</p> <p>I can highlight some Learner profile attributes I have exhibited</p> <p>I could improve my overall effort and work ethic.</p>