Industry projects 2020

**Hitachi Rail Limited**

**Week 1 (Project introduction)**

**What information does the design brief give?**

**What other information might you need to meet the design brief?**

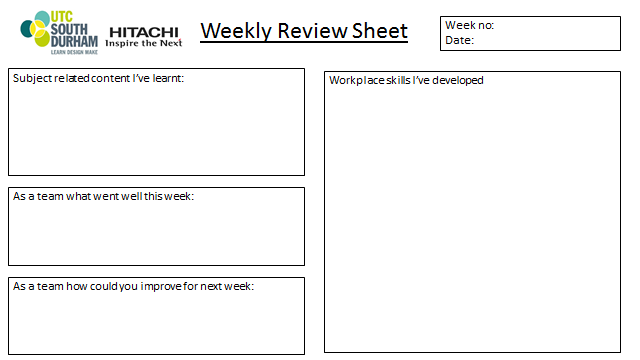
**Create a list/mind map of initial ideas you have that will help you meet the aim.**

**Complete the following table after your interview**

* **Which of the following work place skills have you used/shown in the interview?**
* **How did you demonstrate them?**
* **For those you did not demonstrate, how could you demonstrate them in a future interview?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Workplace Skill** | **Skill shown in interview?** | **How did you demonstrate the skill?** | **How could you demonstrate the skill next time?** |
| Attitude |  |  |  |
| Organisation |  |  |  |
| Knowledge |  |  |  |
| Confidence |  |  |  |
| Communication |  |  |  |
| Teamwork |  |  |  |
| Compliance |  |  |  |
| Initiative |  |  |  |

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**Week 2 (Design - Material)**

**Complete the materials matrix – Research each material and their properties. What uses do they have? Are they suitable to use when building a train?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Material** | **Properties** | **Common Uses** | **Suitability** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Complete the table whilst testing your materials.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials** |  |  |  |
| **Steel** |  |  |  |
| **Aluminium** |  |  |  |
|  |  |  |  |

Week 2: Materials testing

You are going to be testing 3 different metals for hardness and malleability (how easy it is to bend).

Test 1: Hardness

* Centre Punch
* Punch hole (Whitney punch)
* Tin snips
* Scriber (can you scratch the testing material?)

Using the above materials test the hardness of aluminium, mild steel and stainless steel

Test 2: Malleability

* Mole grips

Using the mole grips test aluminium, mild steel and stainless steel to see how easy they are to bend

Results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Material | Centre punch (hardness) | Whitney punch (Hardness) | Tin snips (hardness) | Scriber (Hardness) | Mole grips (malleability) |
| Aluminium |  |  |  |  |  |
| Mild steel |  |  |  |  |  |
| Stainless steel |  |  |  |  |  |

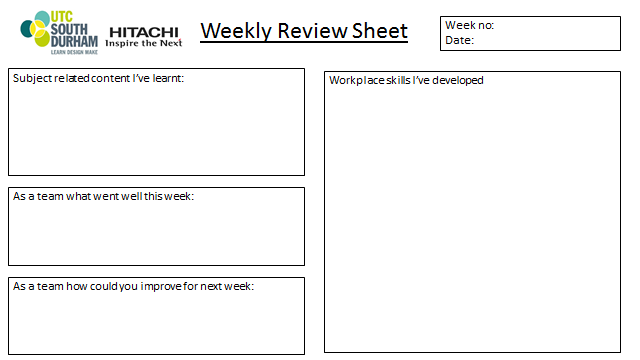
**Write a recommendation on which material would be best to use when building your train. Justify your answer. Use the structure below if needed.**

**Introduction**

What materials have you tested?

How have you tested them?

Why have you tested them?

****Week 3 – Hitachi Rail facility visit

**Conclusion**

Which material would you recommend?

Explain why

**Material 3**

Describe how the material performed during the tests

**Material 2**

Describe how the material performed during the tests

**Material 1**

Describe how the material performed during the tests

Make notes and diagrams about the layout of the factory and any information about the vehicle shapes during the visit to Hitachi Rail facility.

Think about:

Where the equipment is located

How the carriages move along the production line

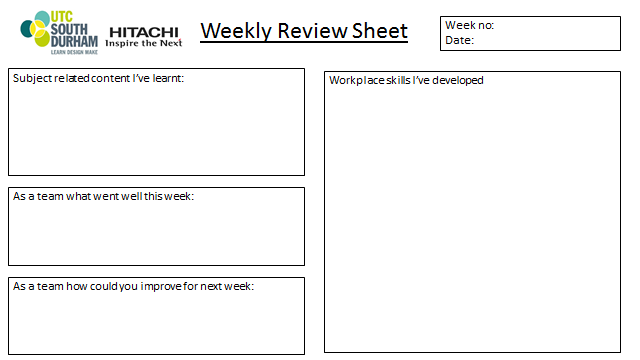
**Week 3 (Manufacturing Layout)**

**Write a short description of your factory’s floorplan.**

* **Identify where the equipment is located.**
* **Explain how your carriages move along the production line.**

**What are the benefits of your floorplan?**

**Are there any negatives? What would you do to solve those issues?**

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**Week 4 (Design – Body Design)**

**Create a mood board of current train designs. Think about:**

* **The similarities of the designs**
* **The differences of the designs**
* **The positives of the designs**
* **The negatives of the designs**

**Create a design concept for your train. You should use ACCESSFM to help you when designing a product. Add a definition for each word in ACCESSFM**

Aesthetics -

Cost -

Customer -

Environment -

Safety -

Size -

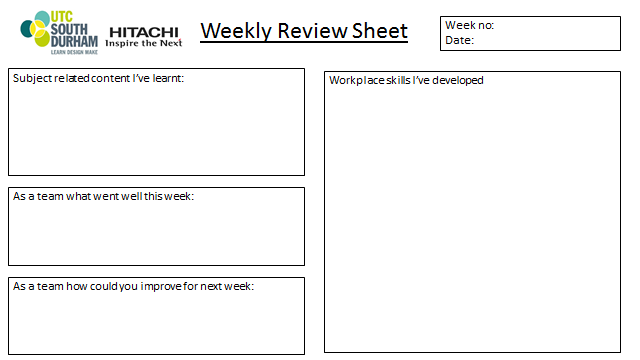
Function -

Materials -

Keep ACCESSFM in mind whilst designing your train.

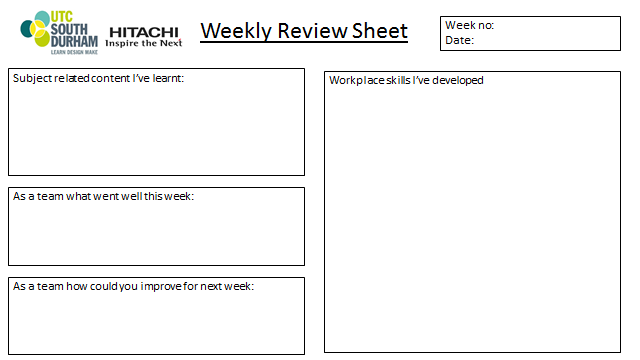
**Choose one design from your group to use as your prototype.**

**Why have you chosen this design?**

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**Week 5 (Design and build)**

**Build your prototype train – Use this page for any key information that you would like to record.**

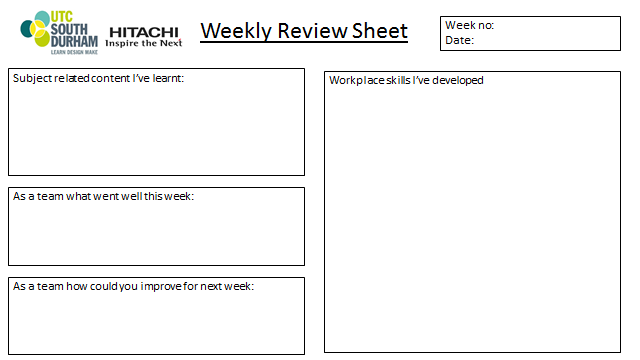
**Week 6 (Power)**

**Complete a risk assessment on the use of overhead line electrification (OLE)**

**Make notes on the effects of each power source and decide on which you would use for your train.**

|  |  |
| --- | --- |
| **Power Source** | **Effects** |

**Complete a risk assessment on your choice of power for your train**

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**Week 7 (Assembly vs Sub-Assembly)**

**Use the table below to make notes on assembly and sub assembly. You will have to compare the two in a report, so make sure you record all key information.**

|  |  |
| --- | --- |
| **Assembly** | **Sub-assembly** |
|  |  |

**Write a comparison of assembly and sub-assembly methods. Which is the most efficient?**

**Assembly**

How did this process work?

What were the positives?

What were the negatives?

**Sub-assembly**

How did this process work?

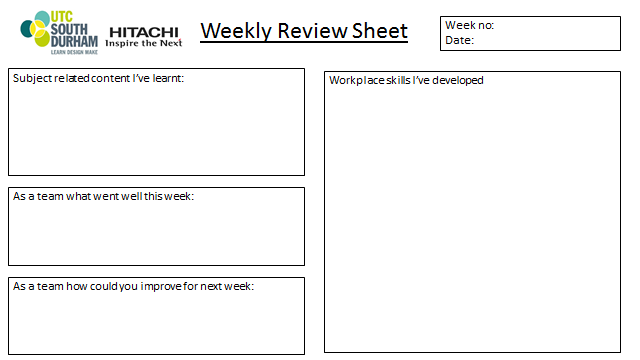
What were the positives?

What were the negatives?

**Conclusion**

Which process was the most efficient?

Why was this process the most efficient?

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**Week 8 (Drive Systems)**

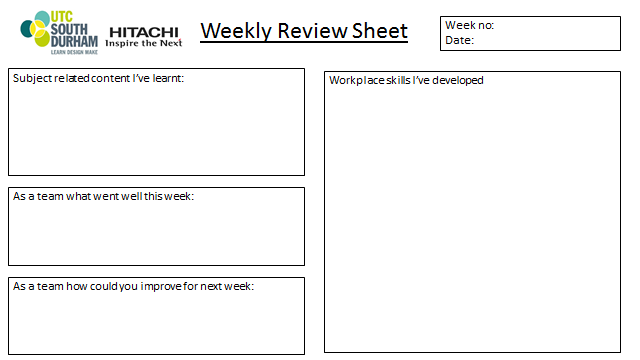
**Use this page to take notes whilst visiting the National Railway Museum at Shildon. Record all key information.**

**Answer the following questions after testing your train.**

**What were the positives of your train?**

**What were the negatives of your train?**

**How could you improve your train?**

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**Week 9 (Drive Systems)**

Below you will find information from three different bogie suppliers. They can all supply bogies for your train but vary in cost, quality and performance.

**Compare the variances and decide which supply you would buy your bogies from.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Supplier** | **Positives** | **Negatives** | **Conclusion** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Write a report comparing each factor and detailing your reasons for choosing a specific supplier.**

**Introduction**

What is the purpose of the report?

What are the options available?

**Supplier 1**

What are the positives and negatives of this supplier?

**Conclusion**

Which supplier will you use?

Explain why

**Supplier 3**

What are the positives and negatives of this supplier?

**Supplier 2**

What are the positives and negatives of this supplier?

**Week 9 (Vehicle Braking)**

**Make notes on the stopping distances of a train.**

**Write a report on the effects of vehicle breaking. You should include:**

* **Results from your practice experiments**
* **Effects the materials had on the trains breaking**
* **Safety considerations when using each material (e.g. speed limits/mass/track)**

**Introduction**

What is the purpose of the report?

What did you expect to find?

**Experiment**

How did you conduct the experiment?

**Conclusion**

Which materials are the best to use?

Explain why

**Safety**

What safety implications does each material give?

**Results**

What were your results?

What did you learn from them?

How does the number of passengers on the train affect the stopping distance of the train?

It is vital that a train can come to a stop at stations and level crossings. We will investigate how the number of passengers on the train affects the distance its stopping distance.



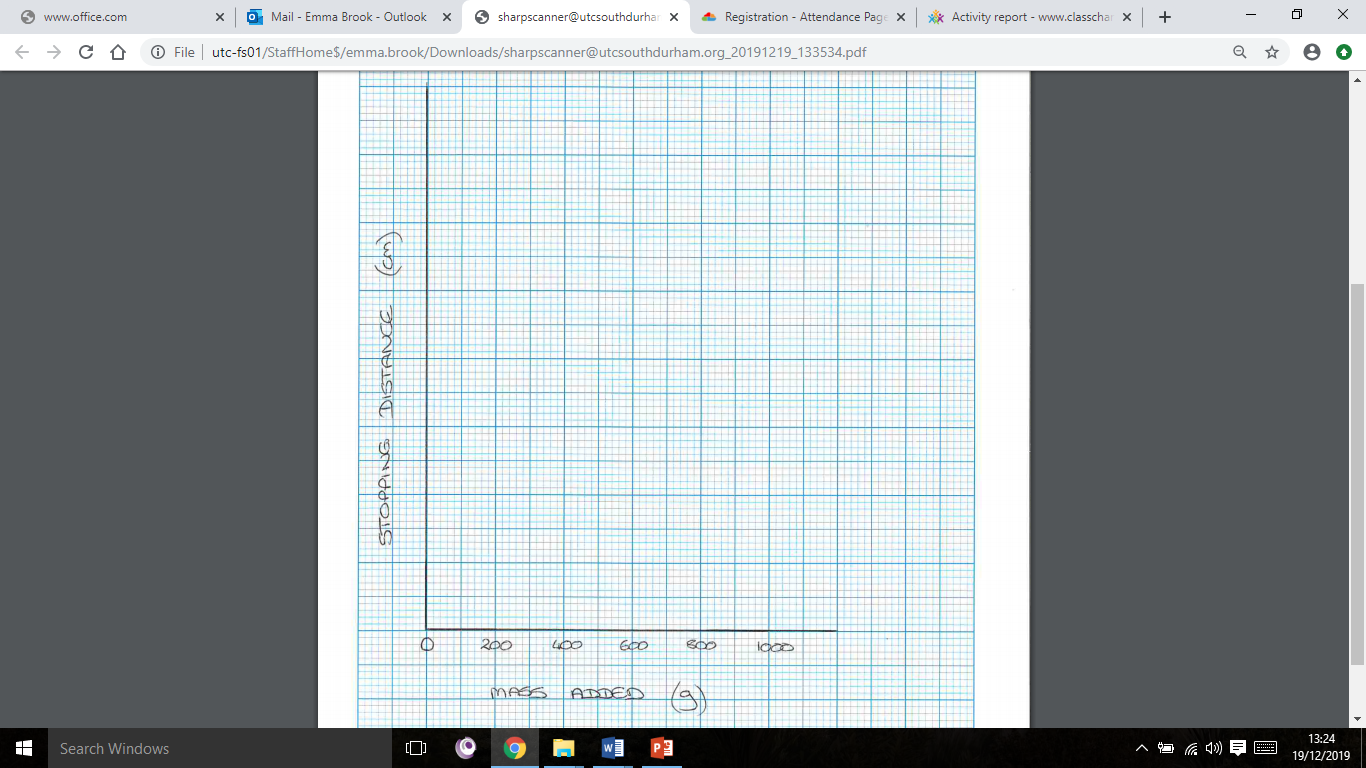
Method

1. Balance the ramp on the box to make a slope, ensure you do not change the angle of the slope once it is set.
2. Hold a trolley at the top of the ramp and allow it to roll down the ramp.
3. Measure the distance from the bottom of the ramp to where the trolley came to rest (measure to the very front of the train)
4. Repeat 2 more times.
5. Add 200g mass and repeat steps 1-4
6. Repeat for 400g, 600g, 800g and 1000g

Results

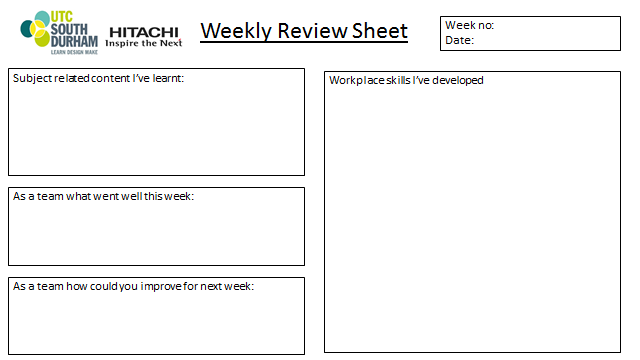
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mass added to trolley (g) | Distance 1 (cm) | Distance 2 (cm) | Distance 3 (cm) | Mean distance (cm) |
| 0 |  |  |  |  |
| 200 |  |  |  |  |
| 400 |  |  |  |  |
| 600 |  |  |  |  |
| 800 |  |  |  |  |
| 1000 |  |  |  |  |

Graph

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Analysis

How does increasing the mass of the train (more passengers) affect the stopping distance of the train?

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**Week 10-11 (Presentation prep)**

**You have 4 lessons to complete all of the following task in preparation for the Project Presentation event. You may wish to have roles within your team in order to finish each task before the deadline.**

* **Complete all tasks from previous weeks (see booklet) – All students must have a completed booklet.**
* **Create a poster to be used when presenting your prototype at the Project Presentation event.**
* **Create an advertising campaign. This could be an advert for TV/radio or a billboard.**
* **Prepare your board for the Project Presentation event. You should include information from each of the steps you have completed whilst completing this project.**