**Session 1:  DM Monday 7th January**

Introduction to the project and project mentors from Husqvarna.

* Roles explained and when they are to be used in the course of the [project](https://www.youtube.com/watch?v=X-WmAatNyrA).
* Define the skills that are needed for these roles.
* Carry out a skills audit of your group to identify strengths and preferences.

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| Questions the students should be considering. |
| * Actual real-world budget that the factory might have for this part. |
| * Confirm that the parts FESTO think are involved are in fact the correct components. |
| * Need details of the screw centres for mounting the new grip plate to robot & any other dimensional constraints (such as width of gap into injection moulding machine. |
| * What companies might Husqvarna have used to make the thing for real so we can research those companies? |
| * What air supply is available on the robot? Suction or compressed or both? |
| * Can we borrow the “spare?” head we have photos of to strip for components? These will be returned along with new working solution. |

Re-cap the issue.

The following poster will help understand the machine which the robot takes parts out of:

<http://www.technologystudent.com/pdf14/poster_injection1.pdf>

**Session 1.1: MR Tuesday 8th January**

Introduce types of motion, (use Engineering TVQ unit 2). Students to research one type each. Then in groups combine these and make a ppt per group of not more than 10 slides.  To present next session.

\*Rotary

\*Oscillating

\*Linear

\*Reciprocating

Then motion transmission

\*Rotary to Rotary

\*Rotary to linear

\*Linear to rotary

\*Rotary to reciprocating

\*Reciprocating to rotary

\*Rotary to oscillating

\*Oscillating to rotary

<http://www.technologystudent.com/cams/camdex.htm>

**Session 2.0 : DM Monday 13th January**

Some time to collate presentations, students to present to class.

Grading.

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|  | Content | Communicative achievement | Organisation | Language |
| 5 | All content is relevant to the task. Target reader is fully informed. | Uses the conventions of the communicative task effectively to hold the target reader’s attention and communicate straightforward and complex ideas, as appropriate. | Text is well organised and coherent, using a variety of cohesive devices and organisational patterns to generally good effect | Uses a range of vocabulary, including less common lexis, appropriately. Uses a range of simple and complex grammatical forms with control and flexibility. Occasional errors may be present but do not impede communication |
| 4 | Performance shares features of Bands 3 and 5. | | | |
| 3 | Minor irrelevances and/or omissions may be present. Target reader is on the whole informed. | Uses the conventions of the communicative task to hold the target reader’s attention and communicate straightforward ideas. | Text is generally well organised and coherent, using a variety of linking words and cohesive devices. | Uses a range of everyday vocabulary appropriately, with occasional inappropriate use of less common lexis. Uses a range of simple and some complex grammatical forms with a good degree of control. Errors do not impede communication. |
| 2 | Performance shares features of Bands 1 and 3. | | | |
| 1 | Irrelevances and misinterpretation of task may be present. Target reader is minimally informed. | Uses the conventions of the communicative task in generally appropriate ways to communicate straightforward ideas. | Text is connected and coherent, using basic linking words and a limited number of cohesive devices. | Uses everyday vocabulary generally appropriately, while occasionally overusing certain lexis. Uses simple grammatical forms with a good degree of control. While errors are noticeable, meaning can still be determined. |
| 0 | Content is totally irrelevant. Target reader is not informed. | Performance below Band 1. | | |

**Session 2.1:  MR Tuesday 14th January**

Introduce GANTT charts, introduce mood boards, and Split the group into two, each half completes either Gantt or Mood.

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| Design team | Research/Costing/maths team |
| Mood boards begin design, individually. | Gantt chart.  Turn this document into a timeline to work out their own deadline dates. |

**Session 3.0 DM Monday 20th January**

Complete mood boards and Gantt charts.

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| Design team | Research/Costing/maths team | Report writing. |
| Mood boards | Gantt chart. | Report number 1 is due in a week. Follow guidance to complete the aspects that this should include. |

Roles of each of the three groups to be made clear at this phase.   
Needs to be clear that groups will be working with each other and determined phases of work will be given to the groups.

**Session 3.1 MR Tuesday 21st January**

Introduce Arduino and possible components such as Servo and Stepper motors. Basic coding. Demonstrate dual rod piston if it’s arrived from Taiwan. Whilst the piston itself is reserved for the year 12 project, a copy could be made on the 3d printer as a semi-functional model.

**Session 4.0: DM Monday 27th January**

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| **Design team** | **Research team** | **Costing team** | **Report writing team** |
| Begin some SERIOUS design attempt on paper based on lessons learned from mood boards. Start to take the best aspects of each concept and bring them together.  <https://www.geogebra.org/m/We7gwyc6> | [Health & safety](https://www.hse.gov.uk/research/rrhtm/rr906.htm), [materials](http://www.robotoid.com/howto/materials-for-robot-building-an-introduction.html), code of practice, professional standards.  Identification of parts from design team. | [Costing](http://communitysouthwark.org/sites/default/files/images/An%20Introduction%20to%20Budgets.pdf), [efficiencies](http://www.wrap.org.uk/sites/files/wrap/Designing%20out%20Waste%20-%20a%20design%20team%20guide%20for%20civil%20engineering%20-%20Part%201%20(interactive)1.pdf), [marketing](https://www.youtube.com/watch?v=i1xz5Kv-7VY) & [procurement](https://www.youtube.com/watch?v=ntHnQrQBG2Y). Costing for parts  **Calculating prices for various options given by design/ research.** | Today is due report number 1 to your teacher.  This should include a section from each subsection of your team, but can all be written up by one or two people. |

**Useful web links for materials.**

**Wood:**<http://www.nytimber.co.uk/>   [www.diy.com](http://www.diy.com/)

**Plastic:** <https://www.technologysupplies.co.uk/>

**Metal:** See Stuart in Engineering first we have some in stock. Or:  <https://www.metals4u.co.uk/>

**Electronics:**See Mike Reid in 105 first, we have some bits in stock, or: <https://www.rapidonline.com/Education>

**Session 4.1 MR Tuesday 28th January**

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| **Design team** | **Research team** | **Costing team** |
| Begin some SERIOUS design attempt on paper based on lessons learned from mood boards. Start to take the best aspects of each concept and bring them together.  <https://www.geogebra.org/m/We7gwyc6>  Must negotiate with research team regarding feasible designs for the frame/ forms of movement for the arms.  Design team much consider % of wasted materials cut from any rectangular frame. | Health & safety, materials, code of practice, professional standards.  Identification of parts from design team.  Types of metals to use for the frame, durability, longevity etc.  [**Different forms of frames.**](https://www.active8robots.com/robot-grippers/?gclid=Cj0KCQiA89zvBRDoARIsAOIePbCuSSU-o22Wry6jPDbKXJCfyRYRzQjAkWx-xCoiZLU_qv98Ikc7ypEaApKGEALw_wcB)  **Different forms of movement.**  Negotiate with costing & design team.  Various forms of movement, to negotiate with design team. | Costing, efficiencies, marketing & procurement. Costing for parts  **Calculating prices for various options given by design/ research.**  *Need to be given budget/ negotiate with design/ research. Must identify costs to create various designs.* |

**Session 5.0 DM Monday 3rd February**

As session 4.0

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| **Design team** | **Research team** | **Costing team** |
| Begin some SERIOUS design attempt on paper based on lessons learned from mood boards. Start to take the best aspects of each concept and bring them together.  <https://www.geogebra.org/m/We7gwyc6> | Health & safety, materials, code of practice, professional standards.  Identification of parts from design team.    **Liaise with design team for components and materials.** | Costing, efficiencies, marketing & procurement. Costing for parts  **Calculating prices for various options given by design/ research.**  **Consider marketing efficiencies as in bulk purchases of components.**  **Create a budget sheet.** |

**Session 5.1 MR Tuesday 4th February**

Introduce Solid works and 2d Design.

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| Design team | Research team | Costings team | marketing team |
| Begin to take paper drawings to CAD for 3D assembly.  Use 2D design to draw flat components that can be laser cut from Card for prototypes and later from MDF/PLY if suitable. | Continue to research components and materials.  Look into how to code an Arduino using off the shelf components. | What is likely to be the final cost of materials and build?  Confirm budget and ordering sheets are complete. | Start to collate information for your final presentation and report.  Build a file of photos, drawings and written reviews of achievements. |

**Session 6.0 DM *Industry leaders present for mid project review.* Monday 10th February**

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| --- | --- | --- | --- |
| Design team | Research team | Costings team | marketing team |
| Find paperwork for MPR | Find paperwork for MPR | Find paperwork for MPR | Find paperwork for MPR |

**Session 6.1 MR Tuesday 11th February**

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| **CAD team** | **Manufacturing team** | **Marketing team** |  |
| Continue 3d drawings of components and putting them together into an assembly. Produce relevant technical drawings with dimensions. | Arduino coding.  Measurements of servos/steppers as required. | Research what Husqvarna actually do.  Research the brand of robot arm in use.  Research the robot arm in the UTC.  Research companies that would have made this product in the real world to solve this problem. | **Possible site visit soon?** |

**Session 7.0 DM Monday 24th February**

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| **CAD team** | **Manufacturing team** | **Marketing team** | **Reporting team** |
| Continue finalising 3d drawings of components and putting them together into an assembly. Produce relevant technical drawings with dimensions. | Consider taking some 2d CAD files to the laser. (MR is by the laser in mechlab during pad 7).    Arduino coding | Considering future projects, how can design   Write a marketing slogan for the product. And suitable for different audiences.  Create an advertisement poster / leaflet for the product.  Begin considering how the final product will be presented in the exhibition. How materials & costs decided were, how will other prototype frames be presented? How was the final design chosen? | Report number 2 is due in a week. Follow guidance to complete the aspects that this should include. |

**Session 7.1 MR Tuesday 25th February**

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| **CAD team** | **Manufacturing team** | **Marketing team** |  |
| Continue finalising 3d drawings of components and putting them together into an assembly. Produce relevant technical drawings with dimensions. | Consider taking some 2d CAD files to the laser. (MR is by the laser in mechlab during pd 7).    Arduino coding. | Write a marketing slogan for the product. And suitable for different audiences.  Create an advertisement poster / leaflet for the product.  Begin considering how the final product will be [presented](https://www.youtube.com/watch?v=MnIPpUiTcRc) in the exhibition. How materials & costs decided were, how will other prototype frames be presented? How was the final design chosen? |  |

**Session 8.0 DM Prototyping & redesigning Monday 2nd March**

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| --- | --- | --- | --- | --- |
| **CAD team** | **Manufacturing team** | **Marketing team** | **Coding team** | **Reporting team** |
| Complete construction of current prototype and assess for new design | Complete construction of current prototype and assess construction complexities, update for new design.  Laser cutting component parts (card first, then wood if suitable). | Liaise with CAD team and Manufacturing team. Write up report on successes/ problems so far & plans moving forward.  How do new designs & construction complexities affect cost? **This phase is crucial for the exhibition & final write up.** | Coding Arduino and testing.  De-bug errors. | Today is due report number 2 to your teacher.  This should include a section from each subsection of your team, but can all be written up by one or two people. |

**Session 8.1 MR Tuesday 3rd March**

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| --- | --- | --- | --- |
| **CAD team** | **Manufacturing team** | **Marketing team** | **Report writing team** |
| Complete construction of current prototype and assess for new design | Complete construction of current prototype and assess construction complexities, update for new design. | Liaise with CAD team and Manufacturing team. Write up report on successes/ problems so far & plans moving forward.  How do new designs & construction complexities affect cost? **This phase is crucial for the exhibition & final write up.** | Continue to gather reports on all activities. What went well? What went badly?  What would be done differently?  How did the product prototyped work in comparison to the given problem?  Consider what skills you have all used to get to this point. |

**Session 9.0 DM Monday 9th March**

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| **CAD team** | **Manufacturing team** | **Marketing team** | **Report writing team** |
| Write up timeline piece of all designs covered, how the final design was chosen & constructed. How did the prototyping phase affect new designs? | Complete construction of current prototype and assess construction complexities, update for new design. | Liaise with CAD team and Manufacturing team. Plan for the final presentations, Inc. Posters & presentation pieces. | Write up timeline piece of all designs covered, how the final design was chosen & constructed. How did the prototyping phase affect new designs? |

**Session 9.1 MR Tuesday 10th March**

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| --- | --- | --- | --- |
| **CAD team** | **Manufacturing team** | **Marketing team** | **Report writing team** |
| Write up timeline piece of all designs covered, how the final design was chosen & constructed. How did the prototyping phase affect new designs? | Complete any final prototype work, such as laser cutting platform from wood.  3d printing any models of pistons. | Liaise with CAD team and Manufacturing team. Plan for the final presentations, Inc. Posters & presentation pieces. | Write up timeline piece of all designs covered, how the final design was chosen & constructed. How did the prototyping phase affect new designs? |

**Session 10.0 DM Monday 16th March**

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| **CAD team** | **Manufacturing team** | **Marketing team** | **Report writing team** |
| Write up timeline piece of all designs covered, how the final design was chosen & constructed. How did the prototyping phase affect new designs? | Complete any final prototype work, such as laser cutting platform from wood.  3d printing any models of pistons. | Finalising presentations & rehearsal. | Write up timeline piece of all designs covered, how the final design was chosen & constructed. How did the prototyping phase affect new designs? |

**Session 10.1 MR Tuesday 17th March**

Plan presentation format, speech, who did what, answers to possible questions, produce CVs and business cards to hand to prospective employers.

Pre-rehearsal for partners

**Session 11.0 DM *Industry leaders present* Monday 23rd March**

Rehearsal presentation to partners. Conclusions, reflections & evaluations to be finalised.

**Session 11.1 MR Tuesday 24th March**

Requests to Catherine to print any large format posters for display board.

**Session 12.0 DM Monday 30th March**

Set up display for marketplace presentation.

**Session 12.1 MR Monday 31st March**

Final rehearsals and write up for any missing forms.

Final Set up display for marketplace presentation.

**Final session, industry presentation in engineering hall.  Friday 3rd April.**

**Example report template number 1**

* Mood board
* Gantt chart
* Types of motion
* Use of Arduino and other components.
* Assignment of roles and skills audit.

**Example report template number 2**

* Designs examples of
* CAD work
* Materials
* Costings
* Programming completed
* Any prototypes planned or completed.