**Judges’ Rubric**

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|  | | **Part A: PORTFOLIO** | | | | | | | | | | |
| ***Success criteria*** | | ***5*** | | ***4*** | | ***3*** | | | ***2*** | | ***0-1*** | |
| Quality of portfolio’s presentation including title and index pages | | Title page contains all elements: school, team #, student’s names. Index links to marked pages and the overall presentation is of a high quality | | Title page contains all elements: school, team #, student’s names. The overall presentation is of a high quality. The Index is missing | | Title page contains all elements: school, team #, student’s names. The overall presentation is of an average quality. The Index is missing | | | The overall presentation is of an average quality. The Index and the Title page are missing | | The overall presentation is of a poor quality. The Index and the Title page are missing (1) | |
| A detailed outline of each team member’s participation in the production of the portfolio and planned production of the device | | All team members participated in a material way and were familiar with portfolio contents and a production schedule was provided for the device | | All team members participated in a material way and were familiar with portfolio contents, however no production schedule was provided | | Most team members participated but one or two were not very familiar with portfolio contents. No production schedule was provided | | | Portfolio was done mostly by one or two students without a planned production of either portfolio or device | | One student did portfolio; other team members are not at all familiar with portfolio contents  No Portfolio (0) | |
| At least three illustrations of the initial design concepts of possible device | | Three illustrations that show connecting parts in some detail | | Three illustrations, two of which show some connecting parts | | Three illustrations, one of which shows some connecting parts | | | Two illustrations | | One illustration (1)  No illustrations (0) | |
| Materials used to build prototype from the Workshop Kit | | A comprehensive list of materials, correctly labeled and including dimensions | | A list of all materials used, correctly labeled and including some dimensions | | A list of all materials used, correctly labeled without dimensions | | | A list of some but not all materials with some labels and dimensions | | A list of some materials without dimensions (1)  No list (0) | |
| Description of the use of the principles of structural strength and stability | | Uses 5 terms from the following sets: force or load or compression or tension; symmetry or triangulation; center of gravity or balance and counterbalance; support beams or struts; gusset or joining methods; aesthetics | | Uses 4 terms from the following sets: force or load or compression or tension; symmetry or triangulation; center of gravity or balance and counterbalance; support beams or struts; gusset or joining methods; aesthetics | | Uses 3 terms from the following sets: force or load or compression or tension; symmetry or triangulation; center of gravity or balance and counterbalance; support beams or struts; gusset or joining methods; aesthetics | | | Uses 2 terms from the following sets: force or load or compression or tension; symmetry or triangulation; center of gravity or balance and counterbalance; support beams or struts; gusset or joining methods; aesthetics | | Uses 1 term from the following sets: force or load or compression or tension; symmetry or triangulation; center of gravity or balance and counterbalance; support beams or struts; gusset or joining methods; aesthetics No description (0) | |
| Rationale used to decide on the type of fluid power used and where to place the piston-syringes | | Explains the position of the piston-syringes in terms of actions (1). In doing so, uses 4 terms from the following sets: pneumatic and hydraulic; system or input and output; density or particle theory; pressure or Pascal’s principle; lever or pivot; friction; work done or mechanical advantage | | Explains the position of the piston-syringes in terms of actions (1). In doing so, uses 3 terms from the following sets: pneumatic and hydraulic; system or input and output; density or particle theory; pressure or Pascal’s principle; lever or pivot; friction; work done or mechanical advantage | | Explains the position of the piston-syringes in terms of actions (1). In doing so, uses 2 terms from the following sets: pneumatic and hydraulic; system or input and output; density or particle theory; pressure or Pascal’s principle; lever or pivot; friction; work done or mechanical advantage | | | Explains the position of the piston-syringes in terms of actions (1). In doing so, uses 1 term from the following sets: pneumatic and hydraulic; system or input and output; density or particle theory; pressure or Pascal’s principle; lever or pivot; friction; work done or mechanical advantage | | Explains the position of the piston-syringes in terms of actions (1).  No explanation (0) | |
| An isometric drawing of the portion of the prototype used to grab the object | | The isometric drawing is properly dimensioned and of high quality | | The isometric drawing is of good quality with some correct dimensions | | The isometric drawing of fair quality with some correct dimensions | | | The isometric drawing is of fair quality without dimensions | | The isometric drawing is poor without dimensions (1)  No isometric drawing (0) | |
| ***Success criteria*** | | ***5*** | | ***4*** | | ***3*** | | | ***2*** | | ***0-1*** | |
| An orthographic drawing showing dimensions and construction notes | | The orthographic drawing shows front, side and plan views and is drawn so the scaled dimensions relate to the views and includes notes | | Three orthographic drawings are presented showing front, side and plan views using a consistent scale | | Three orthographic drawings are presented showing front, side and plan views using an inconsistent scale | | | Only two of three orthographic drawings are available | | Only one of three orthographic drawings are available (1)  No drawings (0) | |
| A list of alternative materials that would have been useful with reasons why they would have been so | | At least three new materials are listed, and the current materials are commented on. Reasons are given as to why the new materials would be useful | | At least two new materials are listed, and the current materials are commented on. Reasons are given as to why the new materials would be useful | | At least two new materials are listed, and reasons are given as to why the new materials would be useful | | | Two new materials are listed. No reasons are given as to why the new materials would be useful | | One new material is listed. No reasons are given as to why the new materials would be useful (1)  No new materials listed (0) | |
| Evaluation of a prototype including conclusions from making it | | A good description of two prototypes and thorough documentation of lessons learned including reasons for choosing one of the prototypes | | A good description of a prototype and documentation of lessons learned with conclusions | | A fair description of a prototype and poor documentation of lessons learned | | | A poor description of prototype and poor documentation of conclusions | | No description of prototype and no documentation of conclusions (1)  No mention of prototype or conclusions (0) | |
|  | | **Part B: WORK HABITS** | | | | | | | | |
| ***Success criteria*** | | ***5*** | | ***4*** | | ***3*** | ***2*** | | ***0-1*** | |
| Members of the group work independently and co-operatively in an organized way | | All team members work co-operatively sharing the workload in a planned way by working in pairs and individually | | All team members work co-operatively sharing the workload by working in pairs and individually without an organized plan | | 3 team members work co-operatively sharing the workload by working in pairs and individually. One team member participates minimally | 2 team members work co-operatively sharing most of the workload. The remaining members participate minimally | | 1 team member does most of the work on their own with the remaining members participating minimally (1)  The team participates minimally (0) | |
| Members of the group demonstrate safe working practices | | Team members wear safety glasses while cutting and drilling using the appropriate tools safely with materials held in a secure way | | Team members wear safety glasses while cutting and drilling using the appropriate tools safely with material held in an insecure way | | Team members wear safety glasses while cutting or drilling using the inappropriate tools with material held in an insecure way | Some team members do not wear safety glasses while cutting or drilling using inappropriate tools with material held in an insecure way | | Only one team member wears safety glasses while cutting or drilling (1)  No team member wears safety glasses while cutting or drilling (0) | |
|  | | **Part C: DEVICE DESIGN AND OPERATION** | | | | | | | | |
| ***Success criteria*** | | ***5*** | | ***4*** | | ***3*** | ***2*** | | ***0-1*** | |
| The device uses materials effectively and is well constructed with parts securely attached | | The device has all parts securely attached. The materials are used efficiently | | The device has all parts securely attached. There are materials that perform a moderately useful function | | The device has most, but not all, parts attached. There are materials that perform a moderately useful function | The device has some parts attached and there are redundant materials that perform no useful function | | The device has few parts attached and there are redundant materials | |
| The device itself operates efficiently and is operated in an organized way | | The device operates smoothly without any glitches and the team works together efficiently | | The device operates with minor glitches and the team successfully fixes it | | Initially the device operates efficiently however one piston becomes inoperative despite team efforts to fix it | Breakage immediately occurs when force is applied to the device and the team members are unable to fix it | | The device does not work (0) | |
| **TOTAL TEAM SCORE:** | | **SUMMATION OF SCORES** | | | | | | | | |
| Portfolio (50) | | Work Habits (10) | | Device Design and Operation (10) | Interview Questions (20) | | Points accumulated in designated time period | |
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| Interview question 1:  What alternative designs did you look at before selecting the design you are building? |
| Interview question 2:  Why did you select this design to use for the Challenge? |
| Interview question 3:  What did you find most difficult with the project overall? |
| Interview question 4:  How did you decide who on your team would be responsible for which parts of the project? |

