**Weighing Values explanation**

The weighing factor was obtained by a team wide survey where a multiplication factor between 1 and 3 was to be chosen based on what we believed to be the most and least important requirements from our list of requirements. The average of these values was then taken and used. As such the collective comprehension of the assignment can be used to explain and justify the weighing factor values.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Factor | Threaded rod | Gears | Double L |
| Dimensions | 3 | 1 | 1 | 1 |

We believed that all the proposed concepts would realistically fit into the designated dimensions and as such this factor was decided as a tie with 1 being the set value for a tie to prevent inflation of scores.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Weight | 1.3 | 2 | 1 | 3 |

Due to the large number of parts that we judged to be of higher weight (gears made of layered sheet metal, axles, bearings) the gears were judged to be heaviest. Second heaviest were threaded rods due to the requirement of four metal threaded rods and the bearings attached to them, leaving the Double L concept lightest.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Production | 2.3 | 2 | 1 | 3 |

Due to the large number of parts that would need to be machined as well as attached, gears were judged to be the most difficult, with the gear ratios also requiring lots of calculation and non-standard gears. Second were threaded rods as the threaded rods themselves would be complex to manufacture and would also need to be very precise, again leaving Double L as the easiest.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mass production | 1.6 | 2 | 3 | 1 |

Since the whole gear axle could be made out of a mold and in one piece and also with gears being standard in the industry that concept was judged to be the easiest for mass production. Double L was judged to be the most difficult due to the welding required and also because the concept is relatively unproven, whereas threaded rods are actually used in machines of this purpose.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Placement | 2.4 | 2 | 1 | 3 |

Because the double L idea had an enclosed placement system as well as a timing mechanism it was judged to be the best, although it relied on gravity for separation. The threaded rods were then ranked second as there was uncertainty with the possible slipping and rotation of trays during their descent, leading to misplacements. Gears end up being last as they rely on gravity for separation and also would not have a feasible timing mechanism nor be enclosed.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Reliability | 2.6 | 1 | 2 | 3 |

Due to the high likelihood of the belt slipping the threaded rods idea was judged weakest. Although the drivetrain of the gears would be very secure and certain, the actual placement would rely on gravity without much of a timing making its reliability questionable, leaving the double L design as most reliable.

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| --- | --- | --- | --- | --- |
| Operation ability | 1.4 | 1 | 1 | 1 |

Again we believed that all designs could reasonably be operated by people of all ages, making it a tie.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Factor | Threaded rod | Gears | Double L |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Total |  | 22.2 | 20.4 | 31.8 |

Once all scores were multiplied by their connected weighing factor they were added up to show that we considered the double L mechanism as the best concept.