There are many components to consider when designing the manufacturing procedure behind a product. On the flipside, when a product is being designed, it is essential for the designer to consider the manufacturing process/costs as part of the procedure (1). In the case of this project, a basic assembly design has already been provided as a starting point; with intentions that this design will be reviewed and improved upon. This section of the report looks at redesigning the provided diaphragm component with heavy focus on the manufacturing process.

The team has gone through a customised version of the standard engineering procedure in order to optimise and justify the component outcome. The traditional procedure (2) goes as such:

1. Defining the Problem
2. Gathering Information
3. Generating Solutions
4. Analyse and Select Solution
5. Test and Implement Solution
6. Improve

The team has generated the following procedure that reflects on the traditional one:

1. Defining Requirements
2. Research
3. Ideation
4. Selection
5. Refinement

Where stages 3, 4, 5 should be treated as an iterative approach and repeated, as necessary. As the team does not have the access or means to test and implement by the ideal means, a thorough cross examination between the project requirements and solution has been conducted.

1. <https://blog.mrt-castings.co.uk/blog/7-things-to-consider-when-designing-your-product>
2. <https://dphu.org/uploads/attachements/books/books_2547_0.pdf>

The primary constraints and requirements of that provided by RME40003 are:

* The component redesign section of the report is worth 8% of the final project mark (1) [1]
* Justification must be provided for each design decision (1) [2]
* Multiple design approaches should be generated and considered (1) [3]
* Reasonable component alterations promote efficiency (in terms of cost, complexity and time) (2) [4]
* Design changes should prioritise the manufacturing process (2) [5]
* The number of components cannot be reduced for the diaphragm assembly (2) [6]
* The redesign should be approved by the tutor before further implementation (2) [7]
* The outer diameter, shape, and material of the disk must remain unchanged (2) [8]

Figure (?) has been provided as a base design for the diaphragm component. Here, 4x primary elements have been identified: 2x fasteners, 1x circular diaphragm, 1x C-mount. The design scope is otherwise up to the discretion of the team; with this in mind the team has generated some potential additional constraints and requirements.

* The design considers manufacturing cost [9]
* The slots in the C-mount remain unobstructed [10]
* The circular diaphragm is unable to rotate [11]
* The design can be disassembled [12]
* The design considers Aesthetics [13]
* The design considers Efficiency [14]
* The diaphragm is to be air-tight [15]

In order to prioritise the provided and generated requirements, the team has used the MoSCoW technique (3). The results have been documented with concise reasoning for future design evaluation in table (?).

|  |  |  |
| --- | --- | --- |
| [1] | MUST | RME40003 Requirement |
| [2] | MUST | RME40003 Requirement |
| [3] | MUST | RME40003 Requirement |
| [4] | MUST | RME40003 Requirement |
| [5] | MUST | RME40003 Requirement |
| [6] | MUST | RME40003 Requirement |
| [7] | MUST | RME40003 Requirement |
| [8] | MUST | RME40003 Requirement |
| [9] | SHOULD | Cheaper manufacturing will allow but greater stock output |
| [10] | SHOULD | Allows for unit to be mounted onto a single rod |
| [11] | SHOULD | Makes for higher quality diaphragm |
| [12] | COULD | Useful for future part maintenance |
| [13] | WON’T | Unnecessary for an assumed industrial part |
| [14] | COULD | Efficiency will allow for greater stock output |
| [15] | WON’T | It is assumed this is not required based on the provided design |

1. Assignment Rubric.pdf
2. Robot assembly cell project.pdf
3. <http://www.mvnet.fi/publications/software_development_seminar.pdf>