|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Material Selection for Combustion Chamber Decision Matrix** | | | | | | | | | | |
|  | Commercial Availability | | Cost | | Machinability | | Corrosion | |  | |
| Weight: 20% | | Weight: 30% | | Weight: 20% | | Weight: 30% | |
| Rank | Weighted Rank | Rank | Weighted Rank | Rank | Weighted Rank | Rank | Weighted Rank | Total | Weighted Total |
| Aluminum 6061 | 3 | .6 | 3 | .9 | 3 | .6 | 1 | .3 | 10 | 2.4 |
| Inconel | 2 | .4 | 1 | .3 | 1 | .2 | 3 | .9 | 8 | 1.8 |
| Steel | 3 | .6 | 2 | .6 | 2 | .4 | 2 | .4 | 9 | 2.0 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Material Selection for Nozzle Decision Matrix** | | | | | | | | | | |
|  | Commercial Availability | | Cost | | Machinability | | Corrosion | |  | |
| Weight: 20% | | Weight: 30% | | Weight: 20% | | Weight: 30% | |
| Rank | Weighted Rank | Rank | Weighted Rank | Rank | Weighted Rank | Rank | Weighted Rank | Total | Weighted Total |
| Inconel | 2 | .4 | 2 | .6 | 1 | .2 | 3 | .9 | 9 | 2.1 |
| Graphite | 3 | .6 | 3 | .9 | 3 | .6 | 1 | .3 | 10 | 2.4 |
| Molybdenum | 1 | .2 | 2 | .6 | 2 | .4 | 3 | .9 | 8 | 2.1 |

Three different materials were chosen for the combustion chamber and the nozzle, from a list of about 10 different materials. When choosing these materials, we compared them by different properties such as young’s modulus, thermal Conductivity, coefficient of thermal expansion, Melting point and Density. A Strong, durable, but lightweight and cost-efficient material is desired for our hybrid engine. Once the three possible materials were selected, the cost, corrosion, machinability, and commercial availability were included in these decisions as well. Due to a limited budget cost and corrosion were the most important aspect in choosing a material. Wasting materials due to corrosion will result in purchasing more material, therefor having a durable material is very important. All of the materials are fairly easy to get and to machine so these aspects are not as important as the others. Based on these conclusions we decided to choose Aluminum 6061 for the combustion chamber and graphite for the nozzle. These materials will be used for initial testing, but if the materials that were chosen are proven to not be the best and most reliable, we are open to changing the material to a more reliable one.