Sample Mass & Power Budget

The following is a mass budget template which can be used for your design documents (Proposal, PDR and CDR). The following mass and power budgets are samples, the components and their respective values will vary for each project. Your experiment is expected to have more components than the sample budget below. Please use the following nomenclature:

E = Estimated Mass

M0 = Calculated using a 3D solid model (SolidEdge, Pro-Engineer, etc.)

M1 = Taken from a manufacturer spec sheet

M2 = Measured using a scale

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Component | Status | Qty. | CBE Unit  [kg] | CBE Total [kg] | Mass  Fraction | Remarks |
| **Structure and Mechanisms** | | | **Subtotal** | **9.00** | **52%** |  |
| Aluminum Structure | M2 | 1 | 6.00 | 6.00 |  |  |
| Three-Axis Manipulator | M0 | 1 | 2.00 | 2.00 |  |  |
| Support Brackets | M2 | 5 | 0.20 | 1.00 |  |  |
| **Experiment Components** | | | **Subtotal** | **5.00** | **29%** |  |
| Sealed Liquid Water Tank | M2 | 2 | 2.00 | 4.00 |  |  |
| High-Speed Camera | M1 | 1 | 0.50 | 1.00 |  |  |
| **Power Systems** | | | **Subtotal** | **0.85** | **5%** |  |
| Batteries | M2 | 4 | 0.10 | 0.40 |  |  |
| 9V Power Adapters | M2 | 3 | 0.05 | 0.15 |  |  |
| Power Bar | M2 | 1 | 0.30 | 0.30 |  |  |
| **Data Handling** | | | **Subtotal** | **1.10** | **6%** |  |
| Data Logger | M2 | 1 | 0.50 | 0.50 |  |  |
| Tablet | M2 | 1 | 0.60 | 0.60 |  |  |
| **Electronics** | | | **Subtotal** | **0.50** | **3%** |  |
| Arduino UNO | M0 | 1 | 0.10 | 0.10 |  |  |
| Inertial Measurement Unit | M0 | 1 | 0.40 | 0.40 |  |  |
| **Miscellaneous** | | | **Subtotal** | **0.80** | **5%** |  |
| Cabling | E | 1 | 0.50 | 0.50 |  |  |
| Fasteners | M0 | 1 | 0.30 | 0.30 |  |  |
| **TOTAL** | | | | **17.25** | **100%** | - |
| **Target Mass** | | | | **20.00** | **-** | **-** |
| **Margin** | | | | **2.75** | **14%** | **-** |

You may use the table below as a template for your power budget.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Component | Power Consumption [W] | Qty. | Experiment Operational Mode | | | |
| Idle | | Science | |
| Average [W] | Duty Cycle | Average  [W] | Duty Cycle |
| RF Module | 0.17 | 4 | 0.00 | 0% | 0.68 | 100% |
| Tablet | 10.00 | 1 | 10.00 | 100% | 10.00 | 100% |
| Robotic Manipulator | 20.00 | 1 | 0.00 | 0% | 20.00 | 100% |
| Microcontroller | 5.00 | 2 | 5.00 | 50% | 10.00 | 100% |
| **Power Used [W]** | | | **15.00** | **-** | **40.68** | **-** |
| **Power Available [W]** | | | **50** | **-** | **50** | **-** |
| **Margin [%]** | | | **70%** | **-** | **19%** | **-** |