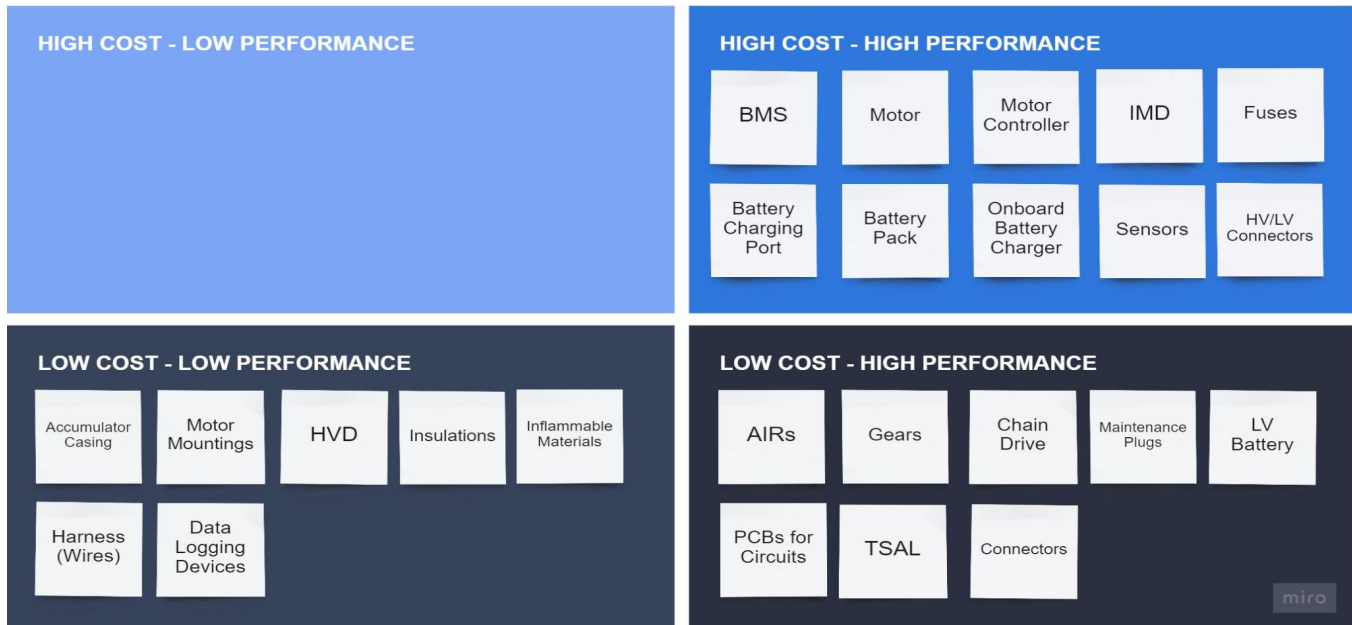
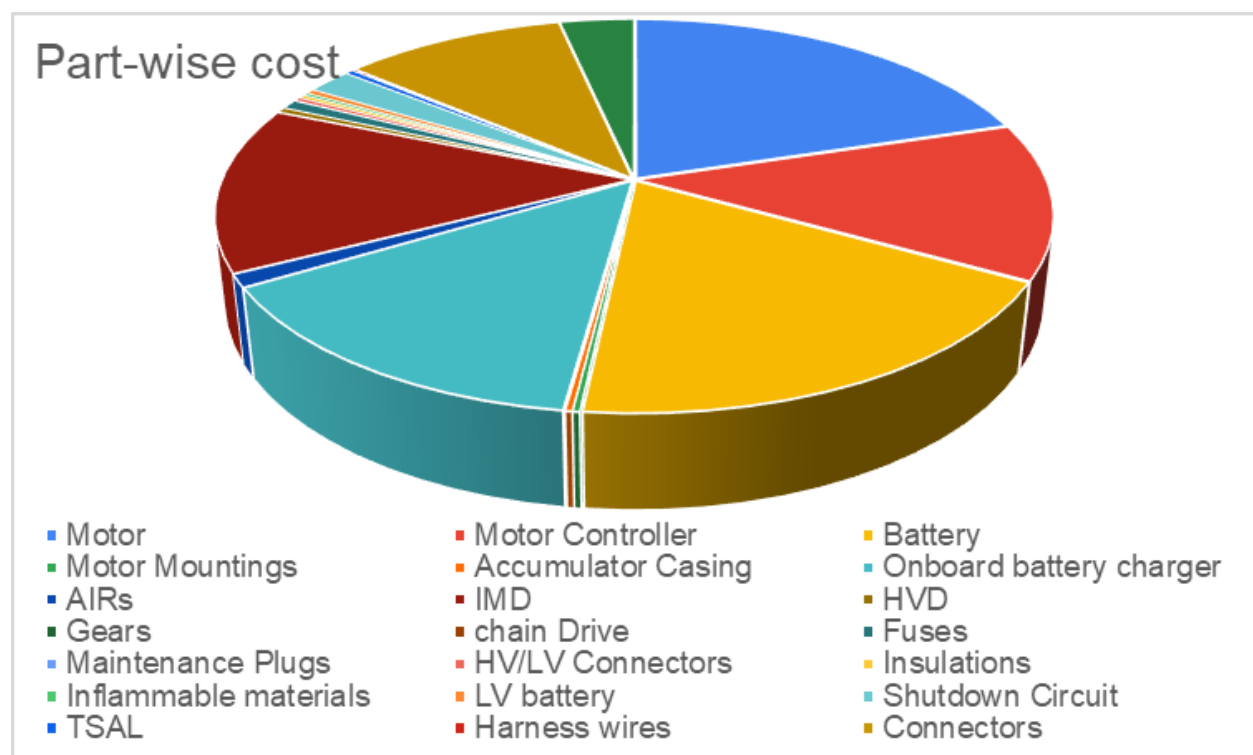


COMPONENETS	COST	SELLER 1 NAME	SELLER 1	TRANSPORTATION COST	SELLER 2 NAME	SELLER 2	TRANSPORTATION COST
Motor	2,94,000/-	Emrax	Slovenia	1,56,000/-	GB Motors	Delhi	1450
Motor Controller	187500/-	Unitek Industries	Germany	1,00,000/-	Electra EV	Coimbatore	1815
Battery	270000/-	Autorev Pvt Ltd.	Bhopal	1890/-	Electra EV	Coimbatore	1815
Battery Management System							
Motor Mountings (We purchased material for manufacturing it ourselves.)	1 Kg of Aluminum alloy 6061 T6 Sheets - 275/- 1 Kg of Mild Steel - 68/-	Maharastra Metal Gupta Iron and Steel Co.	Mumbai New Delhi	1150/- 1690/-	Local Market(Procured in Kolkata)	Kolkata	550
Accumulator Casing (We purchased material for manufacturing it ourselves.)	1 Kg of Aluminum alloy 6061 T6 Sheets - 275/- 1 Kg of Mild Steel - 68/-	Maharastra Metal Gupta Iron and Steel Co.	Mumbai New Delhi	1150/- 1690/-	Fabrication is done in Local Market in Ranchi	Ranchi	300
Onboard Battery Charger	207000/-	Electra EV	Coimbatore	1815/-	Exiom	Gurugram	1490
Battery Charging Port							
AIRs	15000/-	Joyful wears private limited	Noida	1720/-	TEMSRAX	Hyderabad	1900
IMD	2,00,000/-	Allied Power Solution	Delhi	1690/-	c- electric automotive	Cochin	1500
HVD	6000/-	CELL PROPULSION	Bangalore	1850	CELL PROPULSION	Bangalore	1850
GEARS (Final gear ratio is 3.14 No of teeth are 14 & 44)	270/-	Local Market(Procured in Dhanbad)	Dhanbad	0	Local Market(Procured in Kolkata)	Kolkata	550
Chain Drive	0/-	We already have stock that we brought for IC vehicle	-	-	-	-	-
Fuses	3 Fuses of 350A - 9500/- 1 Fuse of 150A - 1605/- 1 Fuse of 5A - 5/-	Amazon	-	-	Flipkart	-	-
Maintenance Plugs	550/-	Electra Ev	Coimbatore	1815/-	Electra Ev	Coimbatore	1815
HV/LV Connectors	4599/-	Shalimar Precision Enterprises LLP	New Delhi	1690/-	Local Market(Procured in Kolkata)	Kolkata	550
Insulations	2800/- 10kg mica sheets 1240/- silcon 5 Kg	Savitha Mica International	New Delhi	1690/-	Local Market(Procured in Kolkata)	Kolkata	550
Inflammable Materials	1 Kg of Aluminum alloy 6061 T6 Sheets - 275/- 1 Kg of Mild Steel - 68/-	Maharastra Metal Gupta Iron and Steel Co.	Mumbai New Delhi	1150/- 1690/-	Local Market(Procured in Ranchi)	Ranchi	300
LV Battery	5679/-	Azad Auto Sales	Kolkata	550/-	Local Market(Procured in Kolkata)	Kolkata	550
Shutdown Circuit	30000/-	Local Market(Procured in Kolkata)	Kolkata	550/-	zam enterprises	Ahemdabad	
TSAL	5499/-	Joyful wears private limited	Noida	1750/-	NAPINO	Gurugram	
Harness (Wires)	1950/- for 3 pieces	Shree Krishna Auto Electricals	Delhi	1690/-	Temsrax	Hyderabad	
Connectors	150000/-	Ingar Electronics Private Limited	Delhi	1690/-	Temsrax	Hyderabad	
Sensors	Voltage sensor - 7800/-	Vivek Agro Plast	Coimbatore	1815/-	-	-	-
	Temperature sensor - 210/-	Zentraid	Thrissur	50/-	-	-	-
	Current sensor- 3000/-	Osian Mercantiles	Kolkata	120/-	-	-	-
	Odometer - 17000/-	Purnima Auro Motor	Surat	1825/-	-	-	-
	Speedometer - 5400/-	New Asian Motor	Delhi	1690/-	-	-	-
	Voltage sensor - 7800/-	Vivek Agro Plast	Coimbatore	1815/-	-	-	-

Budget allocation	Allocation Target	Percentage to be used in powertrain	Amount for Powertrain
From College	300000	100	300000
Nvcti	1500000	75	1125000
Crowd Funding from alumni	350000	50	175000
Dassault Systems	200000	50	100000
MRF Tyres	150000	75	112500
State Book of India	150000	75	112500
		Total	1925000
Motor	2,94,000/-		
Motor Controller	187500/-		
Battery			
Battery Management System	270000/-		
Motor Mountings (We purchased material for manufacturing it ourselves.)	1 Kg of Aluminum alloy 6061 T6 Sheets - 1819/- 1 Kg of Mild Steel - 1612/-		
Accumulator Casing (We purchased material for manufacturing it ourselves.)	1 Kg of Aluminum alloy 6061 T6 Sheets - 1819/- 1 Kg of Mild Steel - 1612/-		
Onboard Battery Charger			
Battery Charging Port	207000/-		
AIRs	15000/-		
IMD	2,00,000/-		
HVD	6000/-		
GEARS (Final gear ratio is 3.14 No of teeth are 14 & 44)	270/-		
Chain Drive	0/-		
Fuses	3 Fuses of 350A - 9500/- 1 Fuse of 150A - 1605/- 1 Fuse of 5A - 5/-		
Maintenance Plugs	550/-		
HV/LV Connectors	4599/-		
Insulations	2800/- 10kg mica sheets 1240/- silcon 5 Kg		
Inflammable Materials	1 Kg of Aluminum alloy 6061 T6 Sheets - 1819/- 1 Kg of Mild Steel - 1612/-		
LV Battery	5679/-		
Shutdown Circuit	30000/-		
TSAL	5499/-		
Harness (Wires)	1950/- for 3 pieces		
Connectors	150000/-		
Sensors	Voltage sensor - 7800/-		
	Temperature sensor - 210/-		
	Current sensor- 3000/-		
	Odometer - 17000/-		
	Speedometer - 5400/-		
	Gyroscope - 42000/-		
Total	1453287		
Risk Cost	471713		



The team has focused on parts that provide high performance at a high cost, high performance at a low cost and low performance at a low cost. Parts that provide low performance at a high cost are totally emitted from the procurement process. The team decided it will be willing to pay a high cost to procure parts that provide high performance such as the motors, motor controllers and the battery.





APPENDIX



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Overview

To conceptualize, design, and manufacture the most optimal electric powertrain package of a Formula Student Electric Vehicle while complying with the rules provided by the Formula Bharat technical guidelines, the team will have to plan and strategize to make the procurement, and manage sponsorships and funding to prepare a budget, which is enough to fabricate the whole electric vehicle powertrain.

Objectives

1. To **conceptualize and design** the electric vehicle powertrain package.
2. To **prepare a budget** required for the fabrication.
3. To **select vendors** for components and procurement of these components.
4. To **manufacture and build** the Electric Vehicle Powertrain following the rules stated in the Rulebook.
5. To **test and tune** the Electric Vehicle Powertrain

Deliverables


1. Budget Report
2. Engineering Design Report
3. Software and Algorithms Report
4. Fully-Functional Electric Vehicle Powertrain following FSAE guidelines

Milestones

I. Conceptualization

The team members go through texts and resources and contact other FSAE teams to understand how to proceed, learn about the required skills and knowledge, and set performance targets for our vehicle. Previous competition judge design reviews are studied and included while conceptualizing the design of our car. The team also estimates the costs necessary to procure, manufacture and build the complete electric vehicle powertrain.

II. Design



Members begin working on the engineering design of the electric powertrain, performing calculations for selecting various components according to our car's performance targets. This is followed by designing a suitable packaging architecture by choosing an appropriate configuration.

III. Vendor Selection and Procurement

Members do market research for availability, cost, vendor details and reliability of different parts. The respective vendor for each part is then contacted, and the procurement payment procedure is followed. Parts are then procured from the dealers while taking constant updates from the vendors throughout the delivery timeline. Quality checking of parts is done before they are delivered. Parts are checked for damages and tested after their delivery on campus.

IV. Manufacturing of Components and Assembly

Manufacturing of the remaining parts takes place in the workshop, strictly following good standard manufacturing processes and methodology to produce high-quality components. The whole electric vehicle powertrain is then assembled while sticking to the rules given in the rulebook. Utmost care is taken to not to damage any component during the assembly.


V. Testing and Tuning of the Electric Vehicle Powertrain

The powertrain package is then tested for performance, and the data is collected. This performance data is then analyzed to understand what parameters need to be tuned in order to achieve the performance targets set for the vehicle at the beginning. Iterations of this testing and tuning process to obtain the optimum version of our electric vehicle powertrain.

Risks

Risks in Timeline:

1. Delay in completion of a certain task.
2. Delay in procurement delivery leading to a delay in the timeline.
3. Outbreak of disease/natural calamity causing a stoppage in progress.
4. Scope Creep - Initial project objectives are not met and work goes on as extra objectives.
5. The vendor is unable to make a deal for a part causing a stoppage in work.

- 
6. Getting the sequence of the milestones in the project wrong would get the timeline off.
 7. Misplacing/Damaging resources potentially compromising the project timelines.
 8. Replacement of part(s), if required, may cause a delay in the timeline

Risks in Procurement:

1. The product is damaged.
2. The product is not timely delivered.
3. The product gets damaged after procurement.
4. Unorganized supplier relationship management
5. Poor supplier performance
6. The vendor is unable to make a deal for a part. (Plan A fails)
7. Supplier company gets shut down
8. The supplier might not uphold the correct ethical standards
9. The supplier could be non-compliant
10. Delayed approvals
11. Error-ridden documentation
12. Wasted time remedying mistakes and chasing paperwork

Risks in Budget:

1. Price fluctuation of the parts to be procured.
2. Cuts in the estimated budget.
3. Plan A fails, leading to the option to follow the costlier Plan B.
4. Budget allocation does not take place by the required time.
5. Difficulty in Money Transfer/Payment
6. Unanticipated transportation requirements and difficulties
7. Banking fees and charges being amended

RISK DESCRIPTION	IMPACT DESCRIPTION	IMPACT LEVEL	PROBABILITY LEVEL	RISK LEVEL (IMPACT X PROBABILITY) Address the highest first.	MITIGATION NOTES
Give a brief summary of the risk.	What will happen if the risk is not mitigated or eliminated?	Rate 1 (LOW) to 5 (HIGH)	Rate 1 (LOW) to 5 (HIGH)		What can be done to lower or eliminate the impact or probability?
Delay in completion of a certain task	1. Delay in Timeline 2. Missing deadlines	2	5	10	1. Setting realistic deadlines 2. Knowledge Management 3. Tracking progress regularly
Delay in procurement delivery	1. Delay in timeline	3	3	9	1. Visualization of supply chains 2. Maintaining effective communication with vendors and taking constant updates on procurement delivery
Outbreak of disease/ Natural calamity	1. Delay in timeline 2. Delay in Procurement 3. Financial Losses	5	1	5	1. Prime concern is to keep the team members safe. 2. Maintain proper rules and regulations while interacting with people.
Scope Creep	1. Delay in Timeline 2. Resource Constraints	2	3	6	1. Clear Communication and Feedback 2. Assessment and Estimation 3. Managing New Ideas Effectively
Vendor is unable to deal the part	1. Delay in Timeline 2. Delay in Procurement	4	2	8	1. Reliable vendors are contacted 2. Other vendors are also contacted for backup in case of any mishap
Getting the sequence of the targets in the project timeline wrong	1. Delay in Timeline 2. Delay in Procurement 3. Financial Losses	5	2	10	1. Proper ground research is done before preparing timeline 2. Other teams are contacted in order to learn from their experiences and mistakes
Misplacing/Damaging parts	1. Delay in Timeline 2. Financial Losses	4	2	8	1. Extra care when packaging or unpacking goods 2. Workplace is kept clean and not cluttered
Replacement of part if required	1. Delay in timeline	3	3	9	1. Maintaining effective communication with vendors and asking them for visual proof of the parts to make sure they are as required and not damaged 2. Vendors are asked to send pictures of the part before delivery
Product is not able to be delivered	1. Delay in timeline 2. Delay in procurement	4	1	4	1. Maintaining effective communication with vendors 2. Reliable vendors are contacted
Unorganized supplier relationship management	1. Faulty Procurement 2. Financial Losses	4	1	4	1. Use of supplier management software/tools to keep track of information about the suppliers in one place 2. Maintaining effective communication with vendors
Poor supplier performance	1. Delay in Timeline 2. Compromise in Quality 3. Financial Losses	4	2	8	1. Developing best practice policies among suppliers 2. Maintaining effective communication with vendors 3. Reliable vendors are contacted
Supplier company gets shut down	1. Delay in timeline 2. Delay in procurement 3. Financial losses	5	1	5	1. Maintaining effective communication with vendors 2. Reliable vendors are contacted 3. Conducting a supply chain vulnerability audit 4. Other vendors are also contacted for backup in case of any mishap
Supplier might not uphold the correct ethical standards	1. Financial Losses 2. Increases budget 3. Delay in timeline	4	1	4	1. Contacting other teams would let us know which suppliers hold correct ethical standards 2. Diversifying supply base
Delayed approvals	1. Delay in timeline 2. Delay in procurement	4	2	8	Allocating buffer time for procurement in timeline
Error-ridden documentation	1. Delay in timeline 2. Delay in Procurement	3	3	9	1. Carefully planning of all the timeline and objectives and discussing it with all the team members would reduce the chances of error 2. Rechecking of every documentation before finalisation

Cuts in the estimated budget	1. Lowers the level of performance indirectly 2. Delay in Timeline 3. Delay in Procurement	5	3	15	1. Contacting teams and estimating costs 2. Including some extra budget
Budget allocation doesn't happen by the required time	1. Delay in timeline 2. Delay in procurement	5	3	15	1. Reaching out to multiple parties for sponsorships 2. Using the crowdfunding in this case
Issues in Money Transfer/Payment	1. Delay in timeline 2. Delay in procurement	4	3	12	1. Using alternate payment methods 2. Asking the vendors in advance about the available payment methods
Unanticipated transportation requirements	1. Delays Procurement 2. Increases budget	3	2	6	1. Contacting suppliers would really help us to properly estimate transportation costs and method 2. Team would use most reliable means of transportation
Banking fees and charges being amended	Increases budget	3	2	6	1. These costs are constantly monitored and predicted 2. Extra costs are included in budget taking these factors into account