Mechanical Engineering Portfolio

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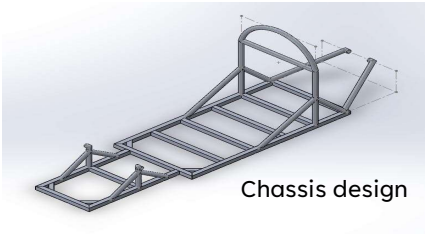
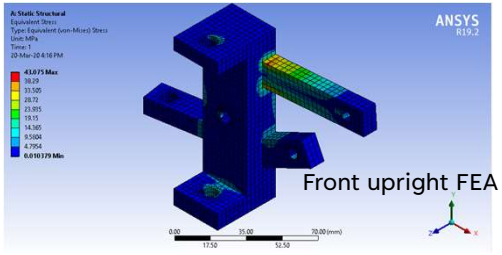
Nakshatra – Ultra Efficient EV prototype car

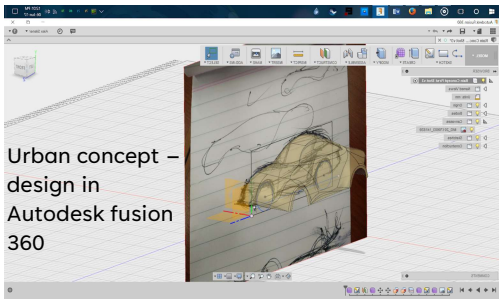
Carbon fiber shell



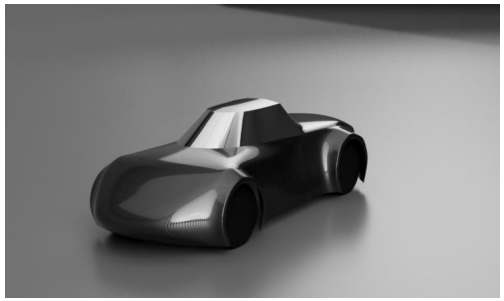
Chassis design



Front upright FEA



Urban concept – design in Autodesk fusion 360



Test run

Check our youtube channel-

[Nakshatra | Team Kaizen India – YouTube]

• Increased car efficiency by 70% to 123km/kwh.

• Managed the project with a fund of 20Lakhs (~$27000) collected through sponsorships.

• Ranked 12th in Asia out of 300 teams.

Head Vehicle Dynamics and Analysis –

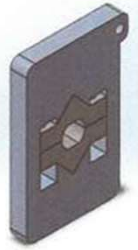
• Reduced the overall car weight by 50% by incorporating carbon fiber reinforced chassis. The final weight of the vehicle was 37kgs.

• Reduced the car's drag coefficient to 0.048 using ANSYS fluent.

• Patented a design patent on rectangular torque arm for a 500W motor and lightweight aluminum chassis for prototype battery electric car.

Team manager –

- Budget planning and timeline creation, and day-to decisions.
- Logistics planning to ship the car to Malaysia from India, get permission.
- Pitch the project to sponsors and convince them to invest.
- Maintain safety and health log.

DESIGN NUMBER	333623-001	
CLASS	12-16	
PANDIT DEENDAYAL PETROLEUM UNIVERSITY, KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR - 382007, GUJARAT (STATE), INDIA		
DATE OF REGISTRATION	25/09/2020	
TITLE	TORQUE ARMS FOR VEHICLE	
PRIORITY NA		

DESIGN NUMBER	333625-001	
CLASS	12-16	
PANDIT DEENDAYAL PETROLEUM UNIVERSITY, KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR - 382007, GUJARAT (STATE), INDIA		
DATE OF REGISTRATION	25/09/2020	
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A STUDY OF TEMPERATURE RISE FOR LI-ION POUCH CELLS AND 18650 CYLINDRICAL CELLS BY CHANGING DIFFERENT PARAMETERS

Sr no.	Battery Model	Discharge rate
Case-1	Single Cell (Pouch Cell and 18650)	1C
Case-2		2C
Case-3		3C
Case-4		5C
Case-5	6s4p (Pouch Cell)	1C
Case-6		2C
Case-7		3C
Case-8		5C
Case-9		10C
Case-10	3p8s (18650 cell)	1C
Case-11		2C
Case-12		3C
Case-13		5C
Case-14		10 C

Cases to examine

Single pouch cell and 18650 cell heat generation simulation.

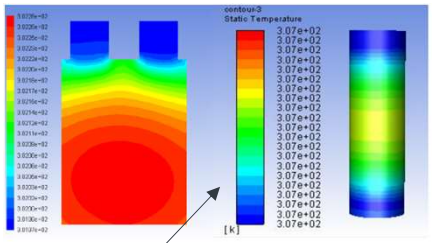
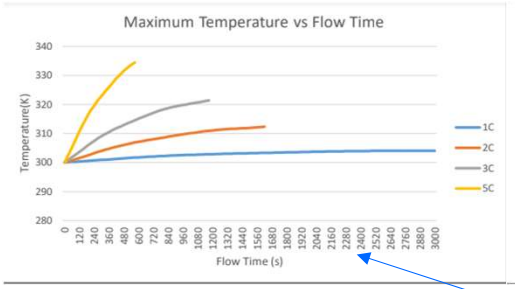
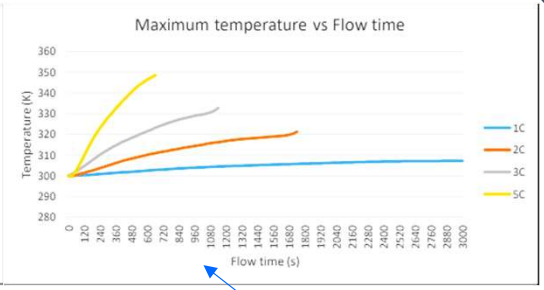


Table 4: Comparison of temperature rise in 6s4p pouch cell pack and 18650 3p8s cell battery packs at different C-rates





Single pouch cell and 18650 cell

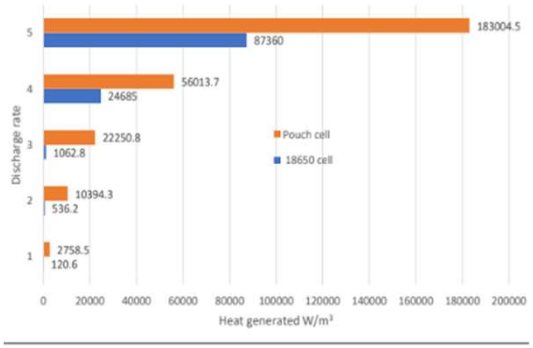
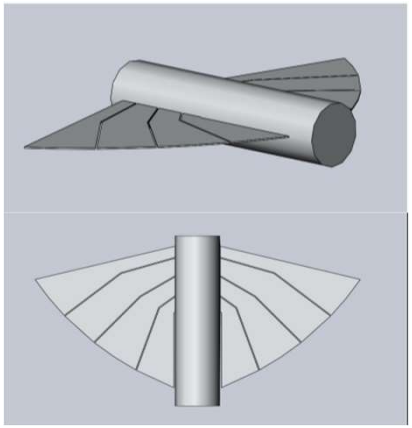


Figure 28: Heat generation v/s discharge rate for 6s4p pouch cell and 18650 cell

shows the comparison of heat generated by 6s4p pouch cell is more than 3p8s 18650 cell pack which is one of the major reason for the use of cylindrical cells for higher power consumption with limited cooling, although pouch cells show high power to volume occupied by the battery pack showing that if with proper cooling system pouch cell pack can be used for high power solutions which we see now are being used in other electric cars by GM, Hyundai, Mahindra etc. other than Tesla.

Miniaturization of unfolding mechanism for rocket lifting surfaces



$$Endurnace = \frac{m_{batt} E_{density} \eta}{W_{total}^{3/2}} \left(\frac{CL^{3/2}}{C_D}\right) \sqrt{\frac{\rho S}{2}}$$

$$Range = E_{density} \eta \left(\frac{C_L}{C_D}\right) \left(\frac{m_{batt}}{W_{total}}\right)$$