

TEAM 10173C AND TESLA

FROM SMALL, UNIQUE ROBOTS TO SUSTAINABLE,
ELECTRIC AUTOMOBILES, THE FUNDAMENTALS FOR
SUCCESS ARE VERY SIMILAR.

Word count: 992

Members: Shriya, Ria, Oishani, Robyn,
Aalia, Abbirami
Team: #10173C HBS Legacy
Location: London UNited Kingdom

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01 INTRODUCTION




credit: hadrian/shutterstock

We decided to focus on the STEM career in the eco-friendly automobile industry.

We chose this industry because everyone in our team is aware of vehicle pollution, and it's something we're all passionate about and sustainability is something would like to contribute to in our careers.

We researched into the design process of Tesla to understand the process of designing and constructing electric vehicles, and how this correlates to our own experiences whilst taking part in VEX.



“When something is important enough, you do it even if the odds are not in your favor.”

- Elon Musk

02

ENGINEERING DESIGN PROCESS

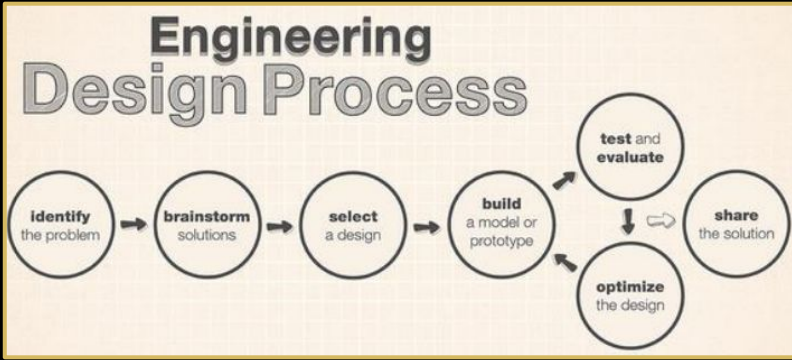
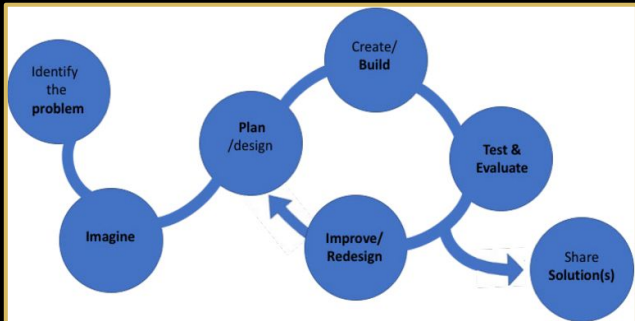


Image credit: Viraj Desai

Figures 1 & 2: General Engineering Design Process



Adapted from cunningham & hester, 2018

Tesla employs the engineering design process in a comprehensive way to develop its products. It's at the forefront of the electric automobile industry.

As part of VEX, we use the engineering design process to make our robot. We first identify the challenge of the game, then brainstorm solutions and mechanisms. After that, we select a design, build it, and test it continuously.

02

ENGINEERING DESIGN PROCESS

(how this is used in the eco-friendly automobile industry)

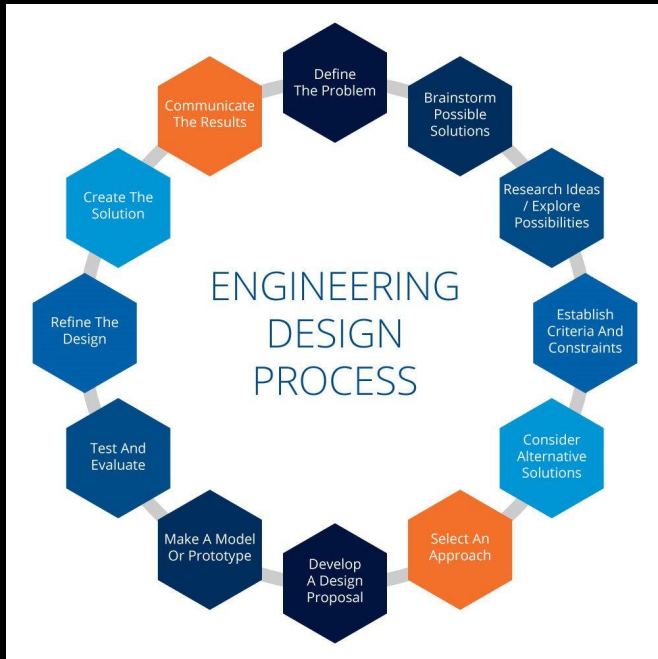


Figure 3: the automobile industry's design process

Tesla first defines the specifications the automobile will have. Research is then conducted, followed by brainstorming ideas that will lead to the design of the automobile on paper; prototypes are then created and feedback sought. Issues raised are taken on and the designs are refined until a proper solution is agreed upon. Then detailed blueprints are produced and delivered to the manufacturing team.

designō (v., latin) to describe,
designate, define

This word, which is the root word of the term *design*, corresponds directly to what we do in our VEX team. We design and build robots that aim to win challenges, the same way designers in Tesla design and build cars for us to use. At its root, designing in STEM is the passion that unites us.

03

SIMILARITIES BETWEEN PROCESSES

Image credit: the motley fool



1. Define/identify problem
2. Brainstorm/analyse/collect info
3. Prototyping/testing/develop solution
4. Feedback/test/evaluate
5. Optimise/improve

*Five points similar between our design
process & Tesla's*



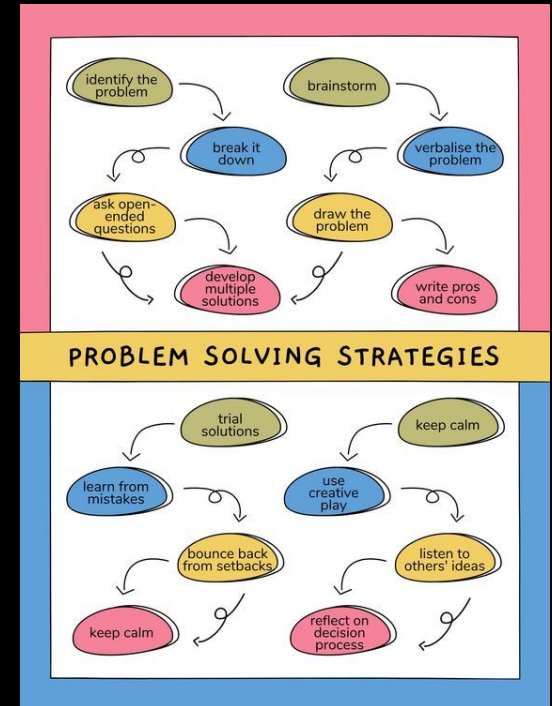
Image credit: Autocar

03

Define/Identify Problem

Before any designing can begin, the problem must be identified and defined clearly. This is to ensure the automobile or robot made will meet all the requirements within the constraints detailed.

Tesla identifies the market/consumer needs and opportunities. For example, the demand for sustainable transportation and energy efficient solutions. Their vision includes reducing our dependence on fossil fuels and advancing our use of renewable energy.



03

Analyse/Brainstorm/Research and Development



The next stages will be to collect as much information as possible to ensure the best solution is created. After analysing the information obtained during the research process, brainstorming in the form of sketches or mindmaps can happen.

Tesla conducts extensive research into battery technology, electric drivetrains and renewable energy sources. The company continuously aims to explore new concepts and technologies that can improve performance, range and efficiency.

03

Analyse/Brainstorm/Research and Development

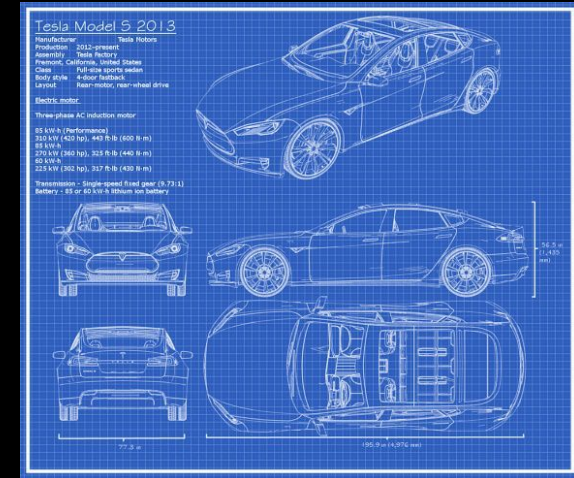
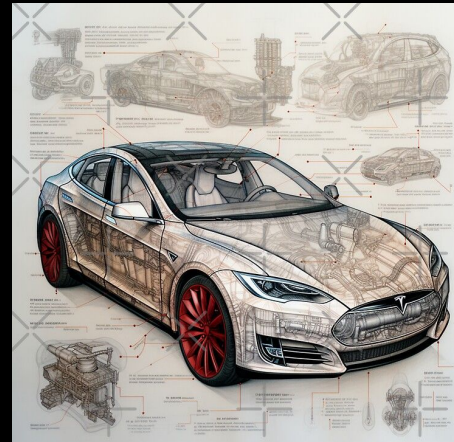
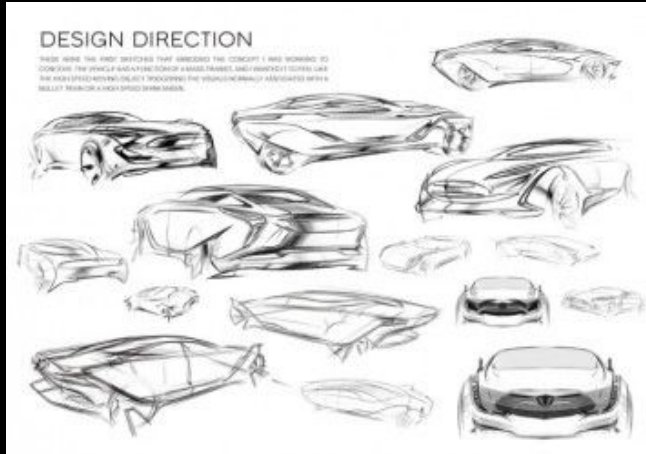


Figure 4 & 5: brainstorming for Tesla model X on a design board

Figure 6: blueprint of Tesla model S

03

Analyse/Brainstorm/Research and Development

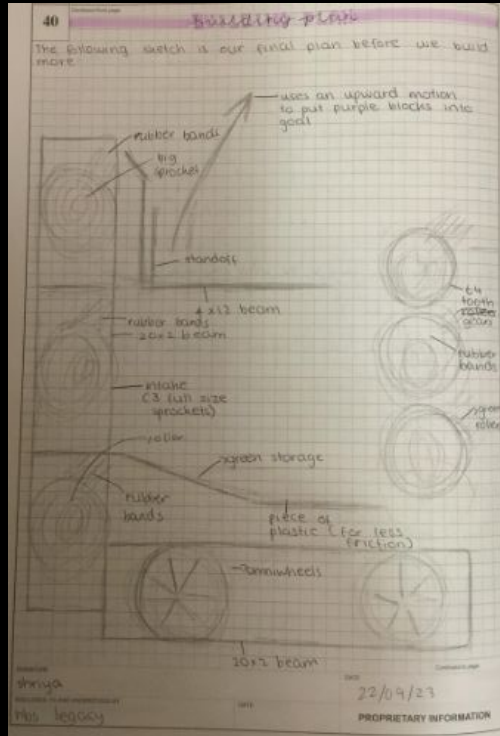


Figure 7: brainstorming for how to build our robot

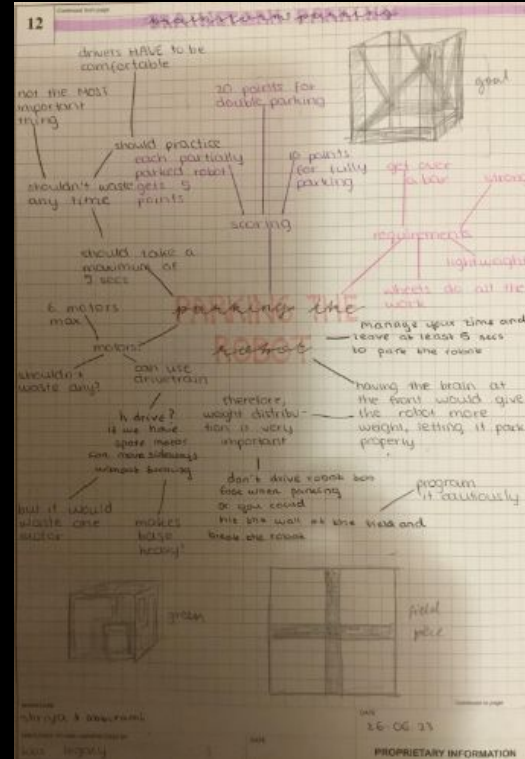


Figure 8: a brainstorm in our sketchbook about how to park

03

Develop solution/Prototype

The next stage is to develop initial ideas further until a viable solution can be found, from which small-scale prototypes and models can be built. Notebooks with the evolution of ideas are vital to engineers and ourselves. These can then be translated into scaled, accurate models in CAD software to see how all the pieces can fit and work together.

Tesla creates prototypes for its vehicles and components, subjecting them to rigorous testing. This includes testing batteries, software, and vehicle safety features. The iterative process involves refining designs based on testing outcomes.

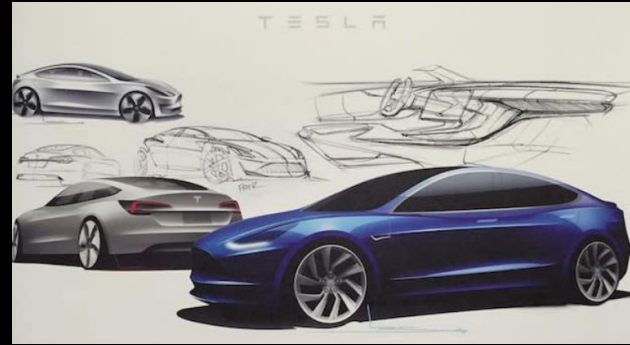


Image credit: yahoo news

03

Develop solution/Prototype

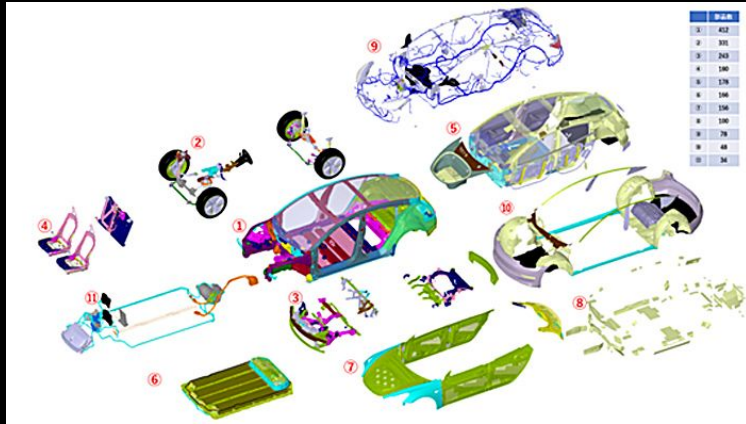


Figure 9: reverse engineered CAD of Tesla model 3

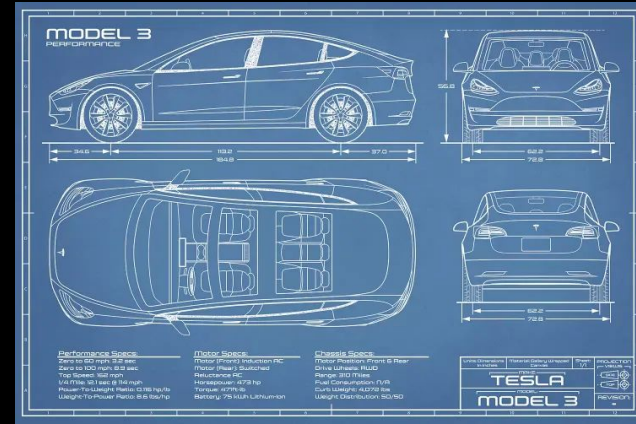


Figure 10: a final blueprint of Tesla model 3

03

Tests, Evaluations & Feedback

Once prototypes and scaled models have been created, they are tested against the original requirements to ensure all objectives are met and the automobiles/robots work well under the constraints.

Tesla seeks feedback from their users. They use this data to identify issues and areas for improvement. Similarly, our breakdowns of matches play a crucial role in improvements to our robot.



03

Tests, Evaluations & Feedback

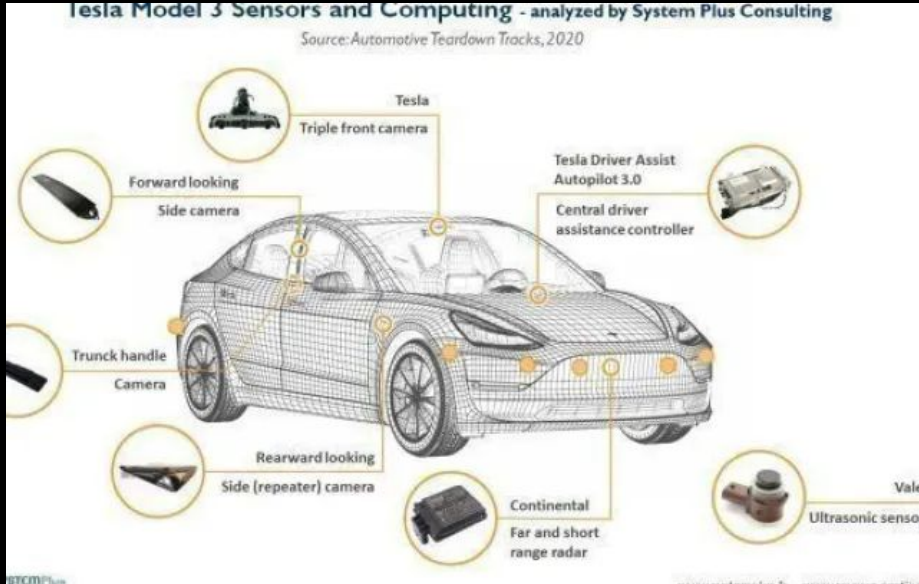


Figure 11: Tesla roadster prototype picture (Tesla/Petersen Automotive Museum)

From auton code to a high-end electrical vehicle, designers around the world test and refine their products, releasing a prototype, testing it, and tweaking it slightly to create a perfect end result.



Figure 12: testing our robot on the field.



From feedback and test results, changes are made to improve the solution and this process becomes iterative until the final product, be it an automobile or a robot, fulfils all the requirements needed. Once this is perfected, the design process is complete for both the automobile designers and ourselves and we move to construction/manufacturing with our detailed plans and blueprints.

03

THE DESIGN PROCESS: SUMMARISED

We can grow from understanding how a multi-billion-dollar STEM company, Tesla, designs innovative and cutting-edge products, and comparing it to our design process in VEX. By analysing Tesla's design process, we gain insights into efficient problem-solving, and the importance of testing/evaluation. This knowledge allows us to enhance our own VEX design process, pushing the boundaries of what is possible in the realm of STEM innovation.

VEX robotics helps us prepare for future careers by teaching us the basics of design, teamwork and opening paths in STEM.

Technical skills

- We design, build and program robots, gaining practical engineering skills.
- beneficial for those pursuing careers in mechanical or electrical engineering, and fields in programming.

Problem solving

- VEX competitions give us real-world challenges that require creative problem-solving.
- fosters critical thinking skills, applicable in many professional settings.
- dealing with unexpected challenges and learning from failures are important skills.

Teamwork

- Working in teams, we learn to collaborate, communicate and delegate responsibilities.
- essential in all career paths, since many careers require you to collaborate with colleagues.

05

CREDITS TO OUR TEAM



Ria

Oishani

Aalia

Shriya

Robyn

Nitya

Abbirami

CREDITS TO OUR TEAM

Shriya Rayaraddi (captain)

Shriya is a builder and driver.

Ria Sivvaraja

Ria is a builder and driver.

Nitya Kuntala

Nitya is an auton programmer and OC person.

04

CREDITS TO OUR TEAM (CONT.)

Robyn Sastry

Robyn is a sketchbooker and strategist for competitors.

Oishani Chakraborty

Oishani is a coder and CAD-person.

Abbirami Thirumal

Abbirami is a CAD-person as well as a sketchbooker.

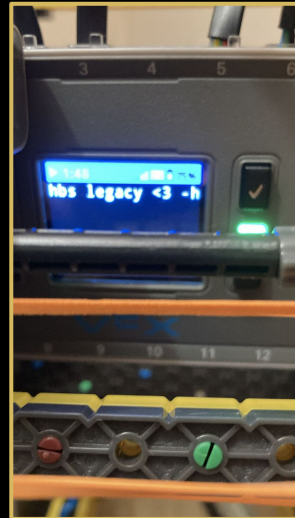
Aalia Khan

Aalia is a sketchbooker and coder.

05

CREDITS (CONT.)

*Pictures - Robyn
Text - Shriya, Aalia
Concept - Abbirami, Oishani
Layout - Nitya*



05

CITATIONS AND REFERENCES

[Quotes by Elon Musk](#)

[Design Process for Tesla](#)

[VEX design process](#)

[Keeping a notebook](#)

[Wikipedia - Designer](#)

[Tesla design interview](#)

[Tesla designing analysis](#)

[Tesla's refinement](#)

[STEM careers](#)

[Jobs in STEM](#)

[The value of STEM](#)