

The development of an aerodynamic body system for the existing single seat electrical vehicle



Student: Jiarui Huang
 Academic Supervisor: Paul Ewart
 Industrial Supervisor: Paul Begley

jiahua10@student.wintec.ac.nz
Paul.Ewart@wintec.ac.nz
paul.begley@alinesheetmetals.co.nz



INTRODUCTION

To increase the efficiency of vehicle usage and reduce air pollution, the BEV group in the university Waikato designs and produces a single seat electric vehicle. To improve the vehicle, it is disassembled and developed by Wintec. I am asked to design an new vehicle system for the vehicle.



Key words: Vehicle body shell, Sheet metal, Aluminium

METHODOLOGIES

1	Materials researching	(5005 grade Aluminium)
2	Rough design	(Hand sketch)
3	Relative standard researching	(LVV and EV standards)
4	Detail design with drawing	(Usage of Solidworks)
5	Components producing	(By A-Line Sheetmetal)
6	Assembling	(By A-Line Sheetmetal)
7	Design developing	(Final CAD drawings)
8	FEA or Flow simulating	(Usage of Solidworks)

The vehicle frame is measured and recorded as a CAD mold. Base on the mold, three different designs are made by the student. Then one of them will be selected to be the final design after the discussions between student and supervisors. The final design will only be roughly referred and the vehicle shell is made by the A-line Sheetmetals, mainly considering the achievements and the manufacturing time. The student is also ordered to research the information of the lights may used, which will not be assembled to the vehicle in the period since the limited budget.

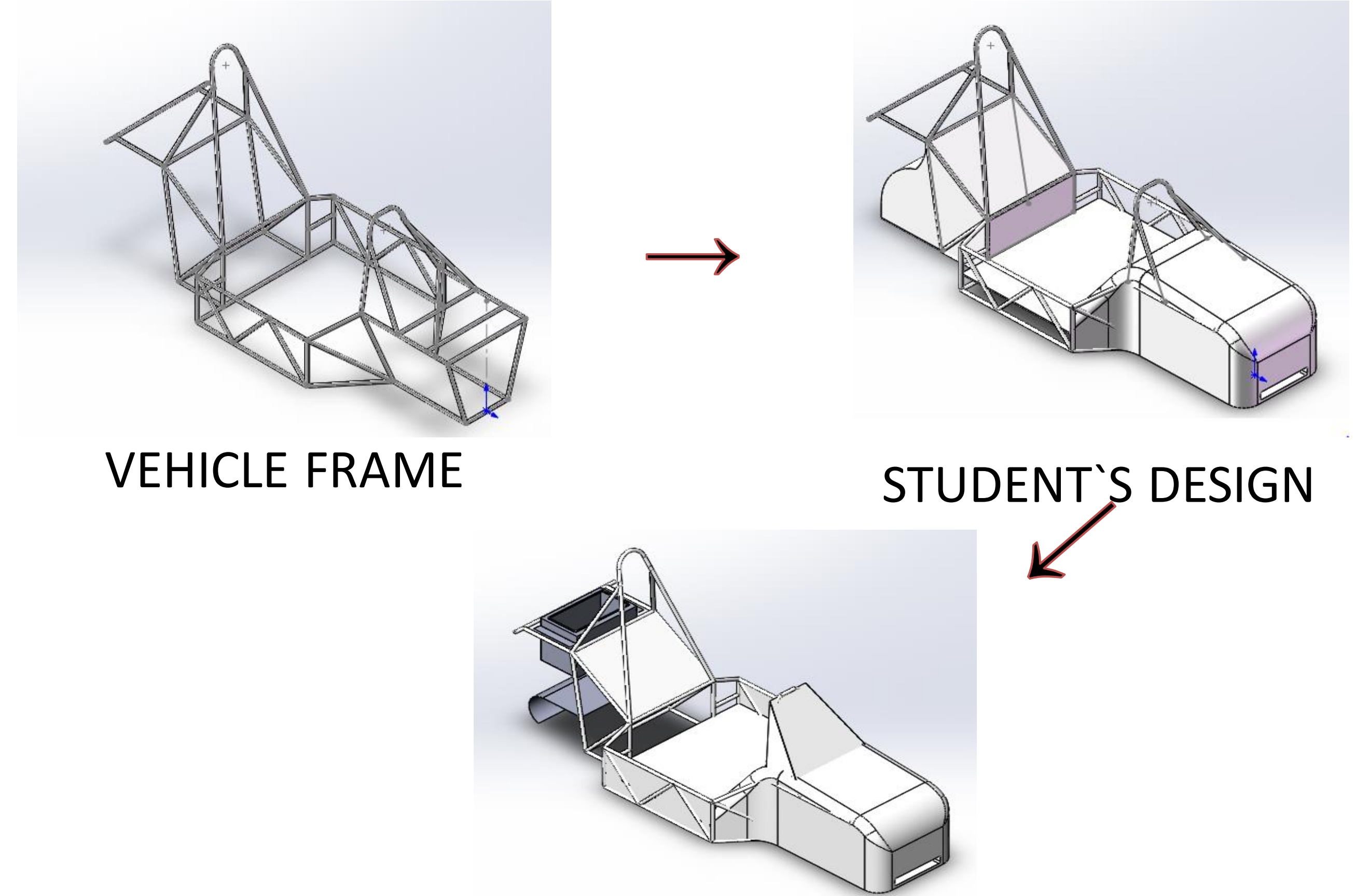
Equipment usage



The Break Press (Left) is used for folding rectangular sheets.

The plates-rolling machine (Right) is used for making the mudguards.

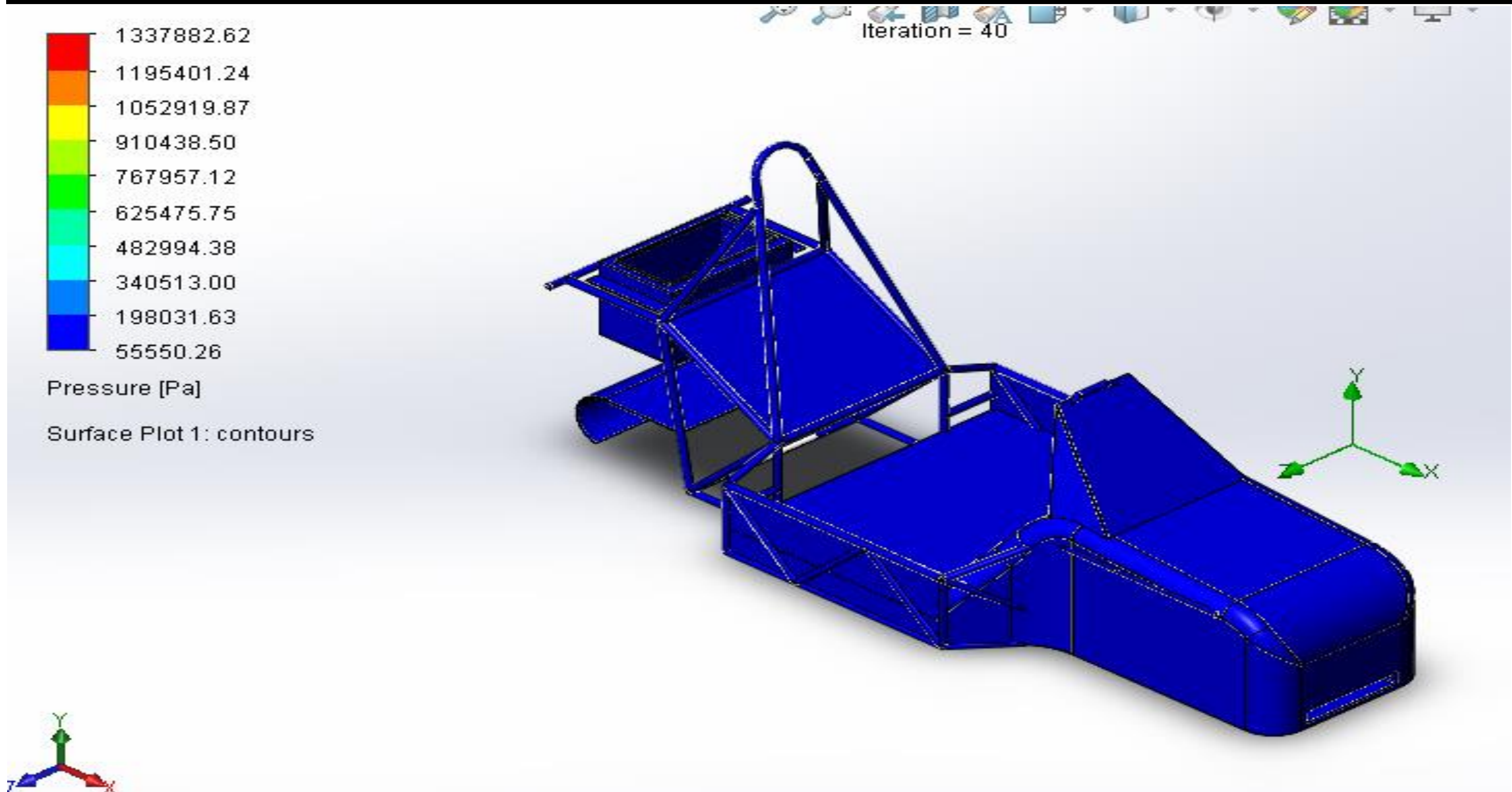
CONCEPTS DESIGN



CURRENT DESIGN

As the images shows above, the current design, which is still been developing by the A-line Sheetmetals, is a little bit different from the student's design. A trunk is added in the rear suggested by the academic supervisor.

Flow simulation



The image above shows a very basic flow simulation with a -30m/s air flow acting in the x-axis.

Limitation

- There may be errors in the measurement because it is not allowed to disassembly the frame.
- There may be errors in the flow simulation because my course about that is in next semester.
- The design is still been producing.

CONCLUSION

Since it is a pilot design, its manufacturing processes will not be too rigorous. Instead of taking too much time to test and redesign, we decide to produce the vehicle shell first, then test and develop it. The design is always changed during the manufacturing processes because of the errors found and the new design ideas. Currently, the vehicle is still been manufacturing.



References

- <https://www.youtube.com/watch?v=5kxOYOrgUYA>
- <https://www.youtube.com/watch?v=brXFHCcMnWI>