Tohoku University Formula Team

2016 Student Formula Japan
- Monozukuri Design Competition -

Nov. 24,2016
Akari SAWASE（Team leader）
Hiro ABE（Technical director）

Outline

- Tohoku University Formula Team
- TF-16
- Result
- Future Plans

What is TUFT: Tohoku University Formula Team?

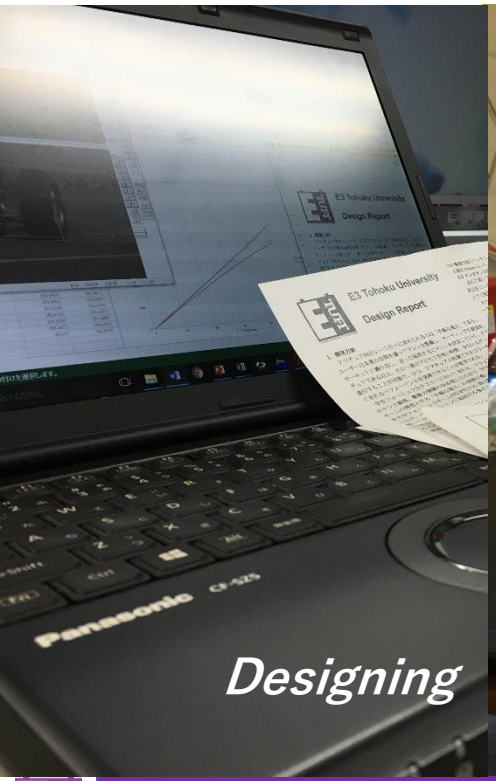
We develop Electric Racing Cars.

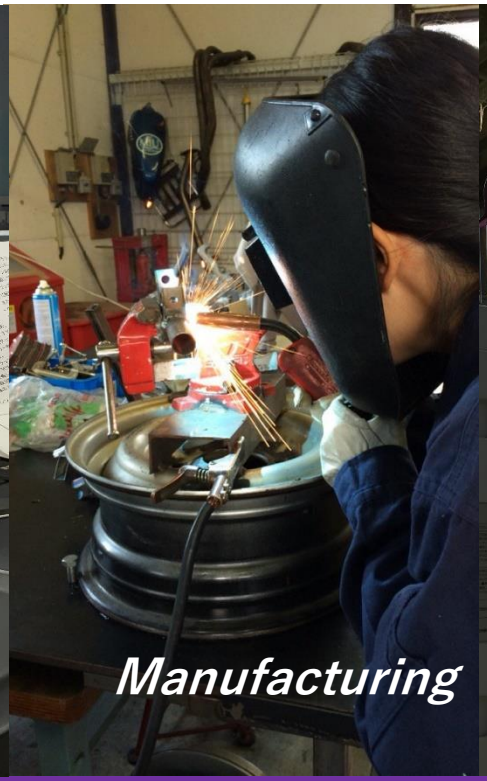
Our purpose is to win the Student Formula Japan.

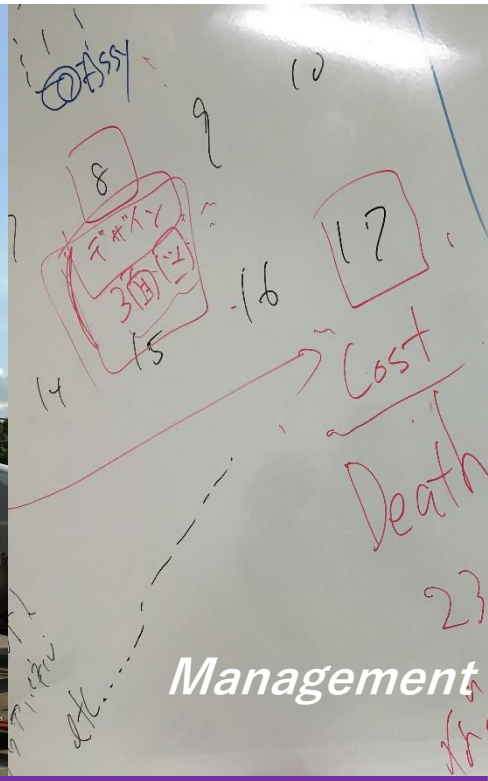
What is TUFT: Tohoku University Formula Team?

Whole processes are coordinated by students.

We don’t just design and manufacture it,
but also a public relations and a budgetary control.







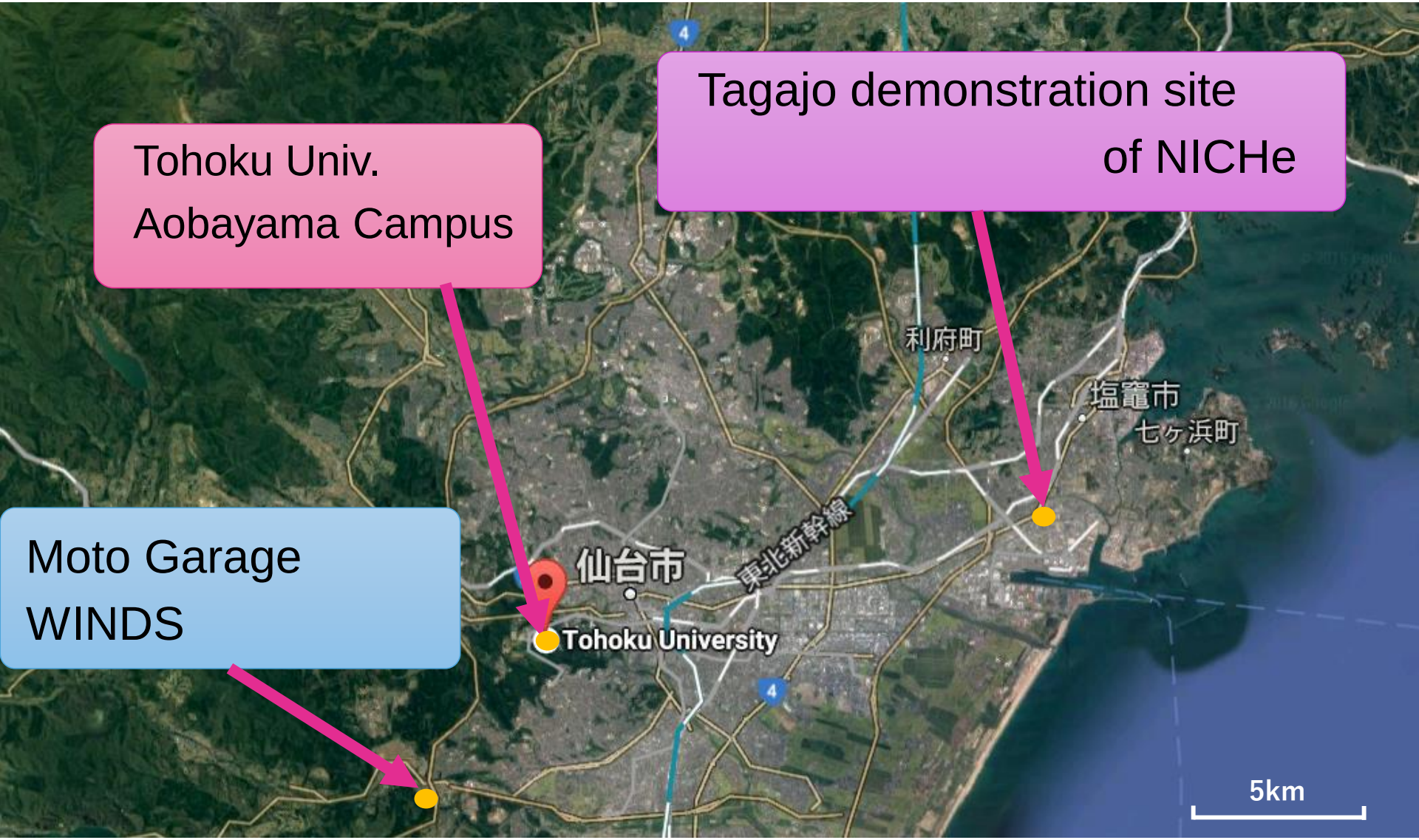
What's student formula ?

To challenge design, fabricate, develop and compete with small, formula style, vehicles.

Name of competition: 2016 Student Formula
Date: Sep. 6~10, 2016

Place: Ogasayama Sports Park ECOPA (Shizuoka prefecture)

Activity bases

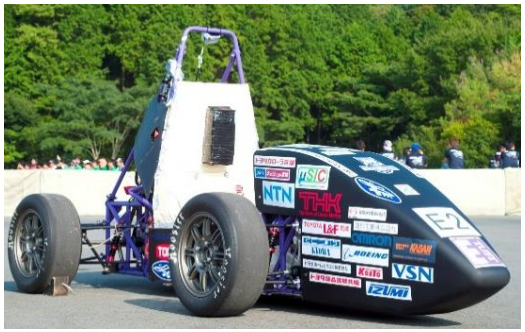


2016 Theme

High Power and Light Weight

Our problems

TF-14



Reliable chassis mechanism

TF-15

Reliable Electrical Systems

But too heavy!!

We need lighter weight, higher power !

Power Up: Completively NEW Tractive System

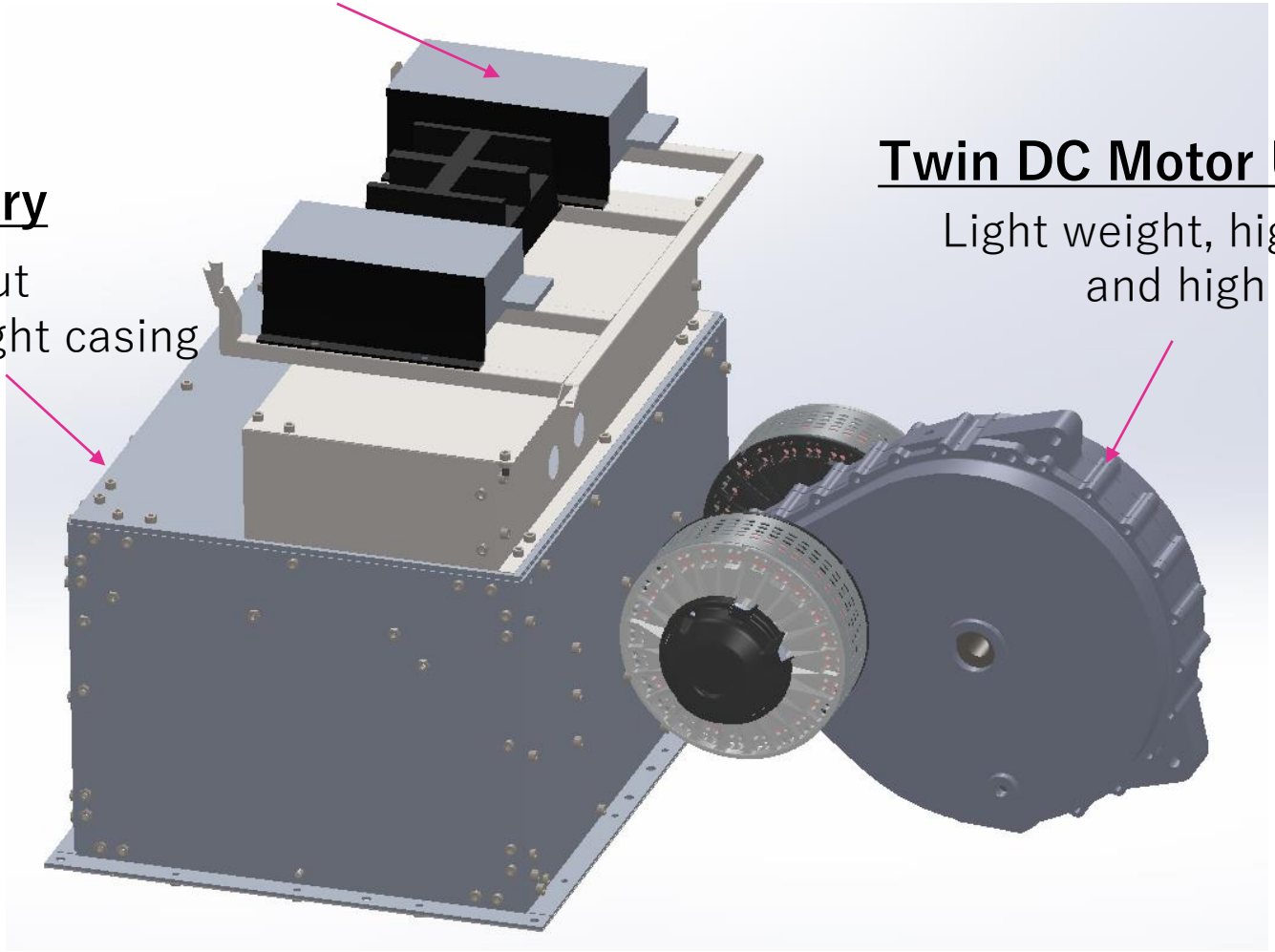
Controller

Li-ion battery

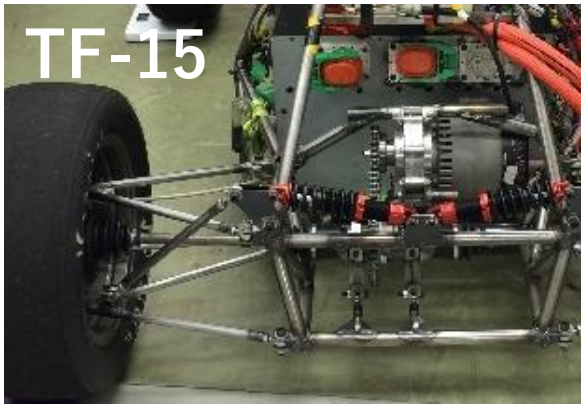
Compact layout
and light weight casing

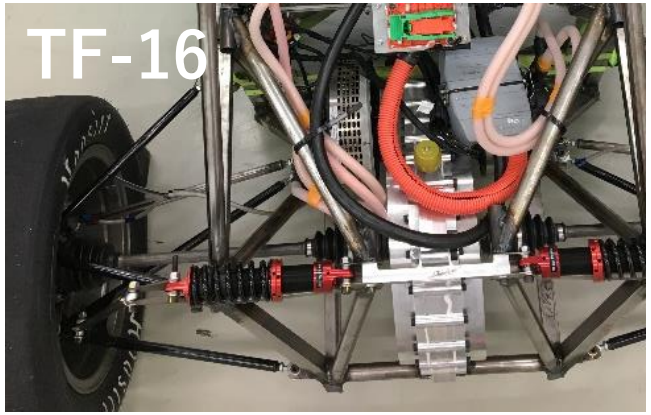
Twin DC Motor Unit

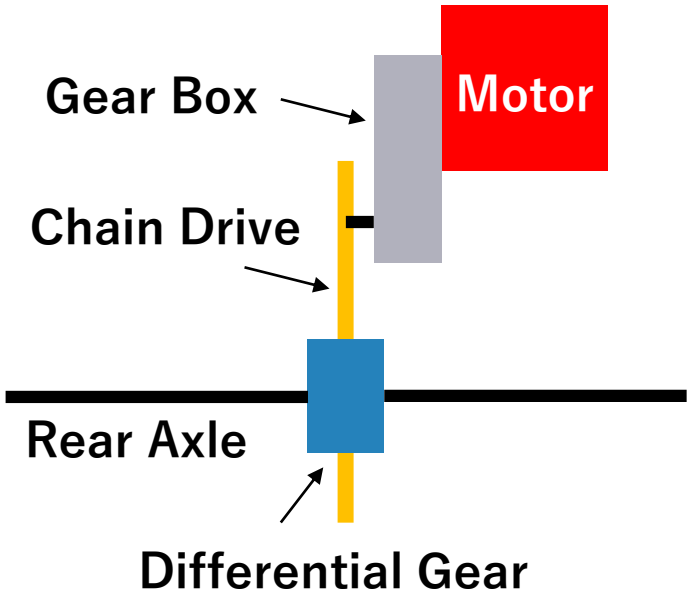
Light weight, high power
and high efficiency

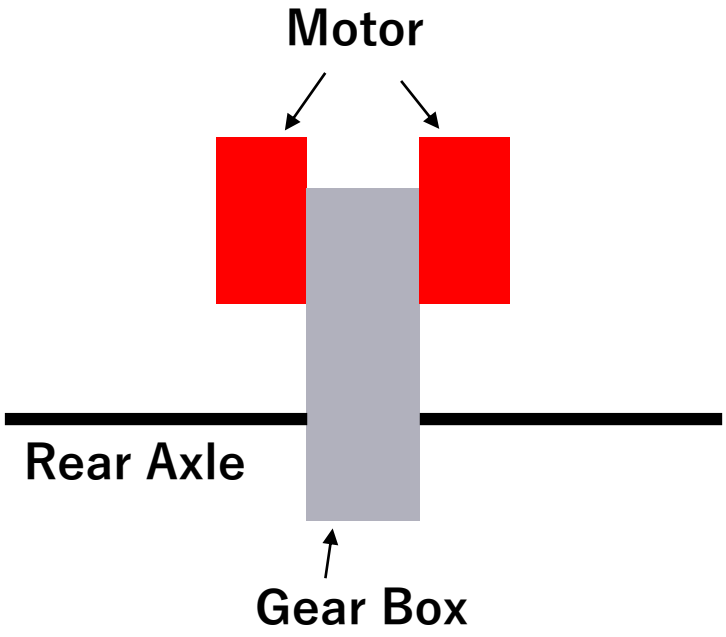


Power Up: Twin motor unit

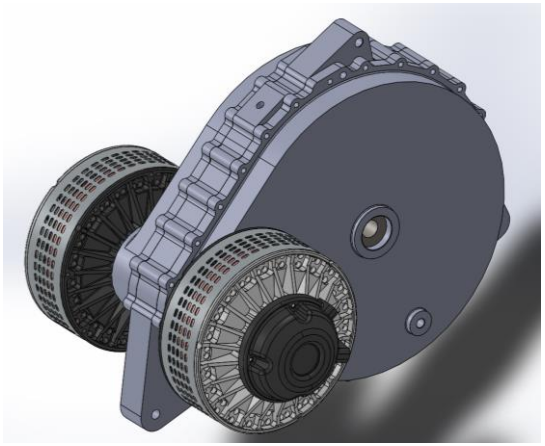


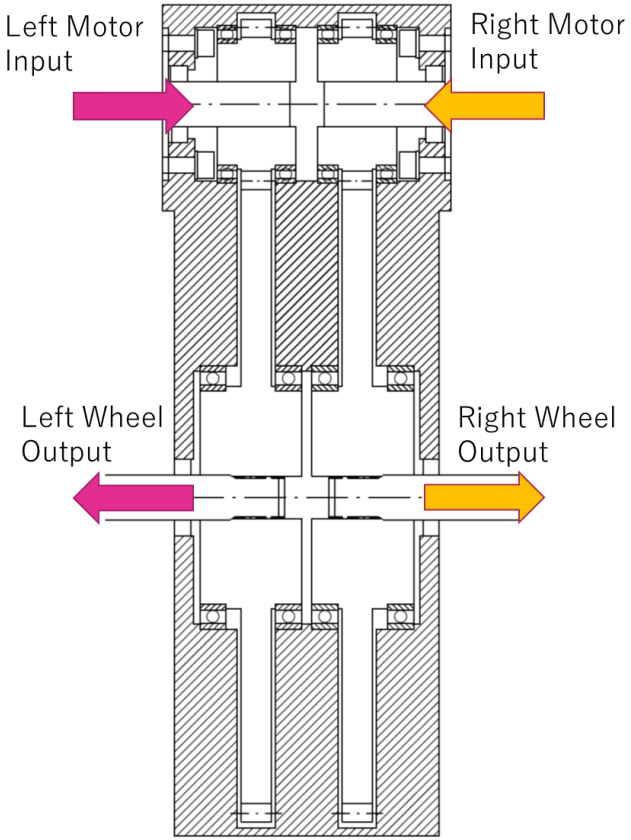


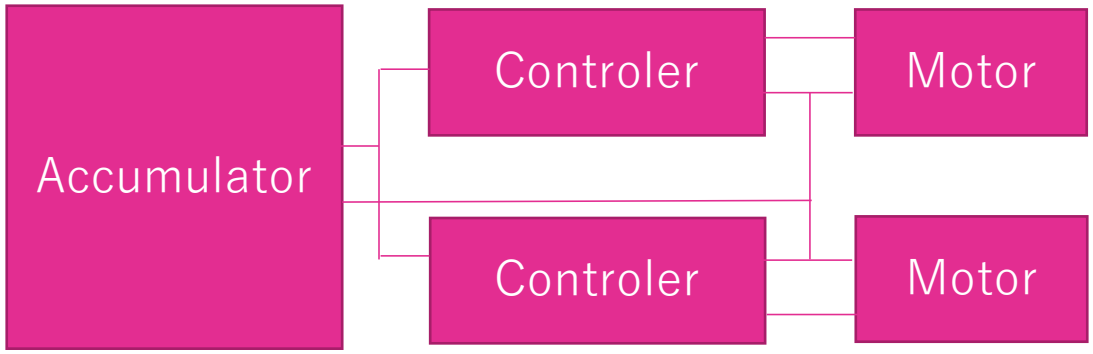




Power up: Twin-motor Unit

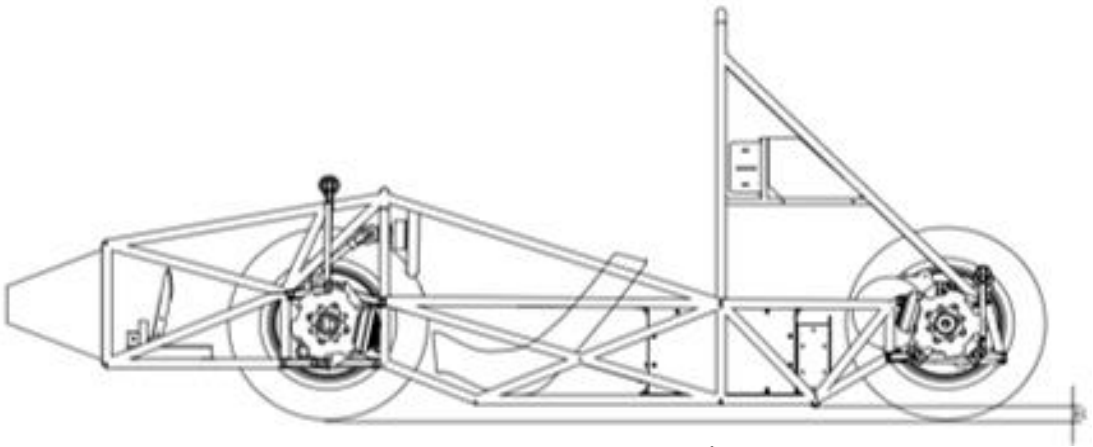


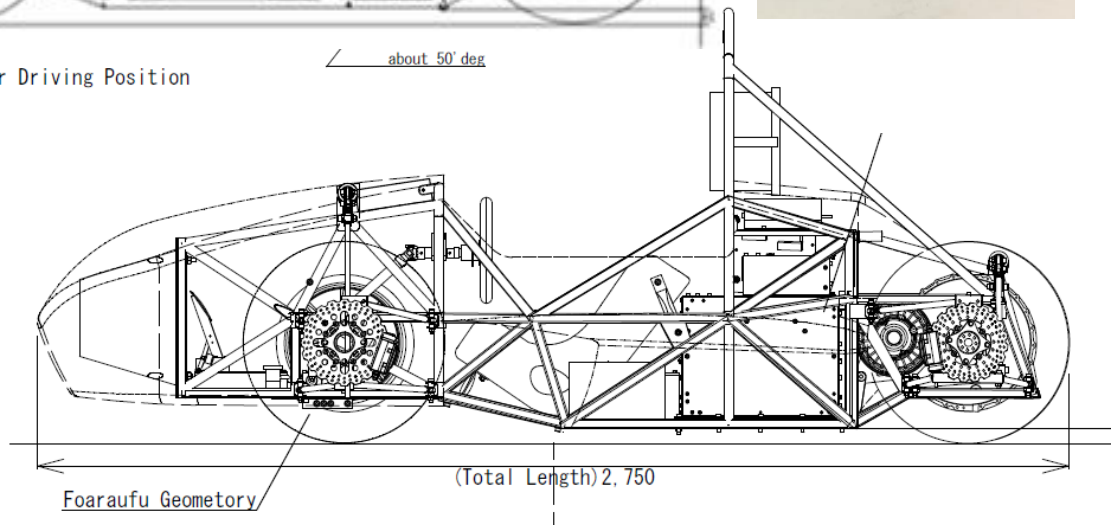




Simple and Reliable Mechanism

Weight reduction of Chassis: Down Sizing



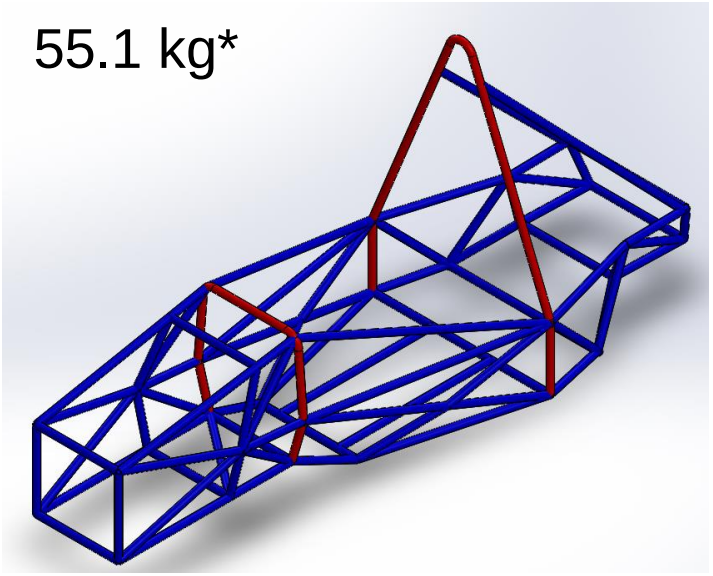


Less Clearance and Higher working Accuracy

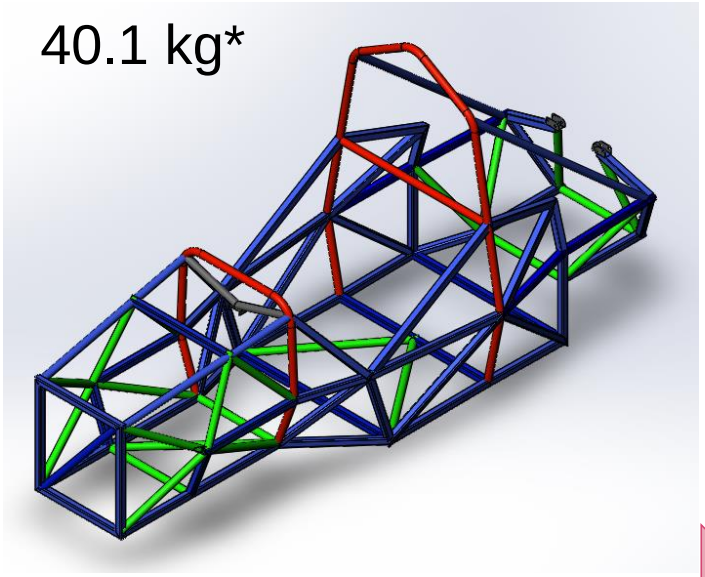
Weight Reduction of Chassis: Frame

Weight reduction of frame

55.1 kg*



40.1 kg*



TF-15 → TF-16

Thickness of Steel tubes

Blue : 1.6 mm　Red : 2.3 mm　Green : 1.2 mm

※ Including weight of stays

-15kg

Weight Reduction of Chasiss

TF-15 → TF-16

-30kg

Power Weight Ratio

TF-15 → TF-16

W/P 18.9kg/kW →6.3 kg/kW

※with a 68kg driver

Specification

TF-16	
Drive system	EV
Overall Length	2750mm
Overall Height	1150mm
Wheel Base	1650mm
Track Width Front / Rear	1250mm/ 1250mm
Weight	321.4kg
Weight distribution	45:55 (with 68kg driver)
Motor	LEM200-D135RAGS (Lynch motors)
Peak power	60kW
Peak Torque of Motor	84Nm
Battery Type	Li-ion
Max Voltage	131V
Battery capacity	6kwh/50Ah

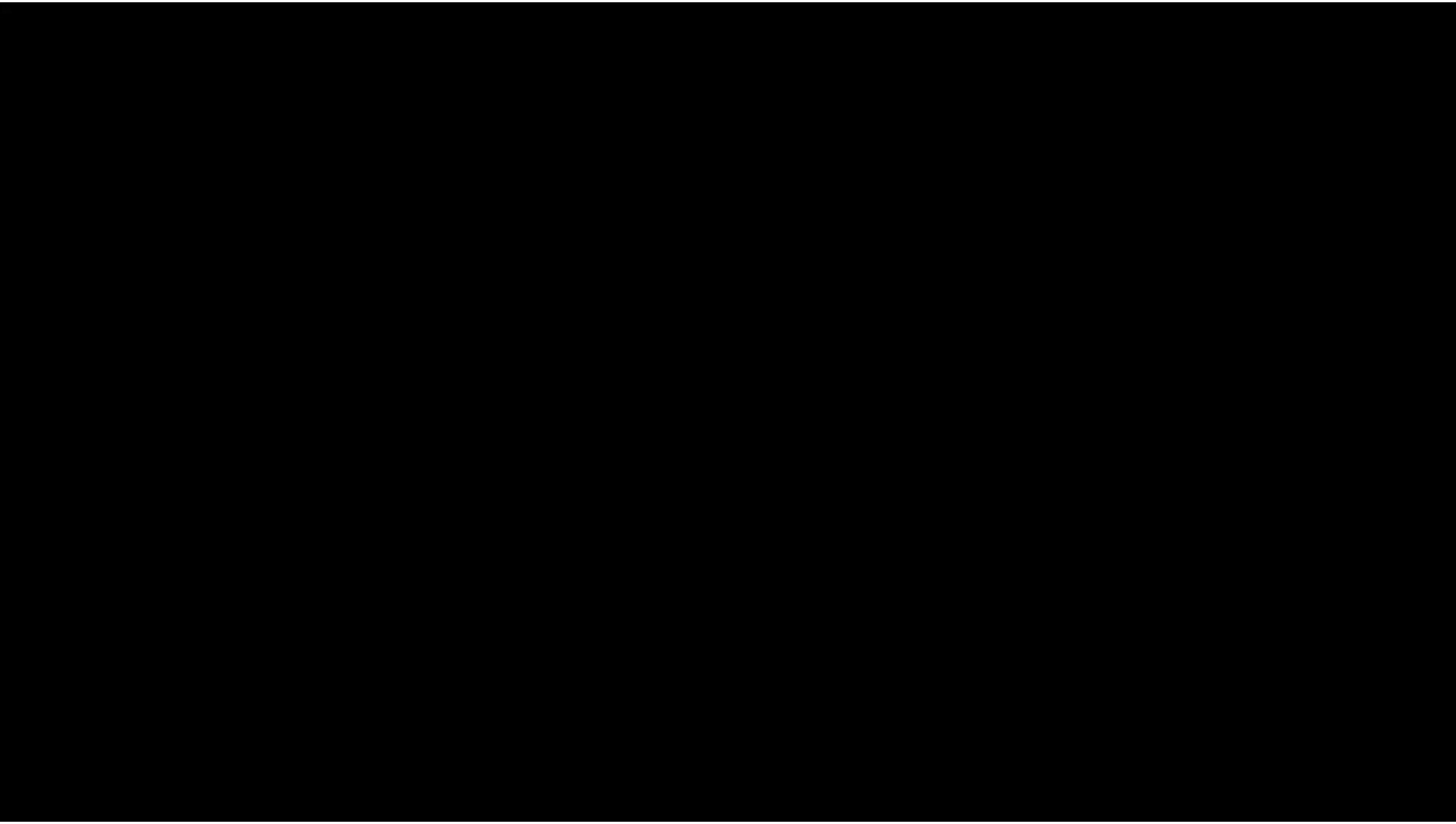
Other Challenge

【Key words】

・Renewal of high voltage system
・Independent left & right wheel driving device
・Weight reduction
・Change of driving position
・Improvement of controllability
・Gear ratio change of steering
・Improvement of suspension linearity
・Increasing suspension adjustment mechanism
（anti-roll bar, anti-pitch, canber-angle）
・proportioning valve
・Strengthening wiring
・Easy Maintenance
・Printed circuit board
・Sensor
・Independently developed of Li-ion battery

Result of SFJ2016

Movie



Result of SFJ2016

Rank 50th (of 106 teams), and 3rd (of 13 EV teams)

Items		Rank of 106 teams (ICV + EV)	Rank of 13 teams (only EV)	Point	from a year earlier
Technical Inspection		Passed	Passed (4 teams passed)	—	—
Static Events	Cost and Manufacturing	72	5	8.4pt/100pt	+108.4
	Design	37	4	68pt/150pt	+3
	Presentation	24	3	45pt/75pt	+14.21
Dynamic events	Acceleration	41 (of 46 teams)	3 (of 3 teams)	3.5pt/75pt	+3.5
	Skid Pad	Do not started (of 44 teams)	Do not started (of 2 teams)	0pt/50pt	0
	Autocross	49 (of 74 teams)	3 (of 3 teams)	53.78pt /150pt	-37.17
	Endurance	4th rap retired	—	3pt/300pt	-6
	Efficiency	—	—	0pt/100pt	0
Over all result		50	3	181.68pt /1000pt	+100.94

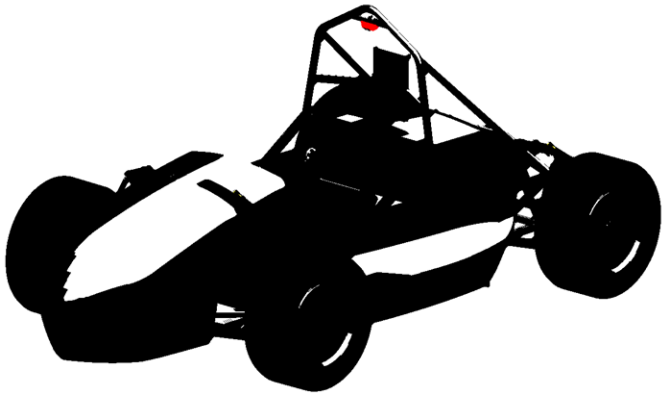
We must have got more high scores,
if we have not had a trouble in the endurance.

Plan for 2016-2017

Machine Concept

Reliable System, Reliable Performance

【Key Words】
- Drivability
- Easier Maintenance
- Reliable power train
- Light weight
- Low center of gravity



Thank you for your attension.

Styling

Styling