Tohoku University Formula Team

2017 Student Formula Japan
- Monozukuri Design Competition -

Dec. 4, 2017
Yutaro ISHIKAWA (Team leader)
Naoki TASHIRO (Drivetrain-part leader)
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What is TUFT: Tohoku University Formula Team?

We develop Electric Racing Cars.

Whole processes are coordinated by students.

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

About team

Consisted of 10 students majoring in engineering.

We are sponsored by 50 companies. Not only financial support or parts supply but holding safety lectures and so on.

Pit

Tohoku Univ.
New Industry Creation Hatchery Center (Tagojo city)

We held meetings, PR events, machine assembly & maintenance, test run.
What’s student formula?

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

Dynamic events and Static events are held. The result is depended on whole development process.
Our machine

TF-17

Concept: Reliable System, Reliable Performance
## TF-17 specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Length</td>
<td>2800 mm</td>
</tr>
<tr>
<td>Overall Height</td>
<td>1230 mm</td>
</tr>
<tr>
<td>Overall Width</td>
<td>1520 mm</td>
</tr>
<tr>
<td>Wheel Base</td>
<td>1700 mm</td>
</tr>
<tr>
<td>Track Width (F/R)</td>
<td>1300 mm 1300 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>334 kg</td>
</tr>
<tr>
<td>Weight distribution</td>
<td>F:R 42 : 58</td>
</tr>
<tr>
<td>Height of gravity center</td>
<td>330 mm</td>
</tr>
<tr>
<td>Peak power</td>
<td>27 kW x 2</td>
</tr>
<tr>
<td>Battery type</td>
<td>Li – ion</td>
</tr>
<tr>
<td>Battery Capacity</td>
<td>7.4 kWh</td>
</tr>
<tr>
<td>Max Voltage</td>
<td>284 V</td>
</tr>
<tr>
<td>Frame</td>
<td>Steel Spaceframe</td>
</tr>
<tr>
<td>Suspension</td>
<td>Double Wishbone x Push Rod</td>
</tr>
<tr>
<td>Tire</td>
<td>Hoosier 20.5 x 7.0-13</td>
</tr>
</tbody>
</table>

**Feature:** Battery, Inverter, Motor unit
Supplied by Honda R&D Co., LTD.
Result of 15th Student Formula Japan
In September 2017, Shizuoka

Rank 36th (of 94 teams), 3rd (of 16 EV teams)

- Presentation 7th of 94 teams
- Acceleration 9th of 67 teams
Dynamic Events (Technical Inspection)

Mechanical & Electrical inspection

Tilt test

Rain test

Brake test

Quickly passed all inspection due to elaborate preparation
Dynamic Events

① **Acceleration**  7th of 67 teams

0-75m acceleration test on a straight course.

② **Skid Pad**  44th of 67 teams

Cornering performance evaluation on a figure-of-eight course.

③ **Auto Cross**  38th of 76 teams

Running a 950m course that includes straights, bends, a slalom and a crank.

④ **Endurance & Efficiency**  41st of 65 teams

Running Autocross course 22 laps (ca. 20km). Whole performance and reliability are evaluated.

We completed all the dynamic events except Endurance.
Static Events (Without running)

① **Cost**  59th of 94 teams
Evaluate Accuracy of pre-submitted report including manufacturing cost and method.

② **Design**  56th of 94 teams
Evaluate the process and rationality of design by pre-submitted report and discussion.

③ **Presentation**  7th of 94 teams
On the assumption that teams sell the machine, make a presentation about business plan. (Judges are regarded as a business partner)

We should have prepared more documents and knowledges.
Autocross
For 2017-2018 season

- Improvement of schedule management & routine works
  - Earliest machine completion in team history
  - Passed inspection quickly & could make a solid strategy (ex. Consider about weather) in competition

- Not enough knowledge on “design & development” & need more consciousness to make a ”fast” car
  - Fuzzy process of designing and developing
  - Hurried to much of early completion
    → Lack of new idea, increase of weight
  - Couldn’t make test run more effectively
    → got lower score than we’ve expected

Next season:
Focus on developing “fast” machine with better management
For 2017-2018 season

Machine Concept: **Beyond** -Beyond TF-17, beyond rivals-

【Key Words】
- Drivability
- Traction control
- Light weight
- Torque vectoring
- Low center of gravity

Acceleration  
Cornering  

We bought a charger, corresponding to 200V power supply.

Battery is Fully charged by 4 hours (half of conventional)

→ Enable us to do more test run or machine improvement

(Longer charging time is weak point of EV)
Thank you for your attention.