

2019 Evolocity High Schools Competition Design Guide and Technical Regulations

MULTI (3+)WHEELED VEHICLES

All vehicles are subject to scrutineering and compete at the scrutineer's discretion. For any technical queries please post questions in 'General Discussion' on <http://evolocityschools.freeforums.net/> and wait for 'Admin' to answer.

Comments:

Chassis and general construction:



1.1 Chassis of robust build with suitable materials and joining techniques.



1.2 Safety critical components, especially steering, should have appropriate failure reducing fastening techniques such as lock nuts (with minimum of one thread protruding), castellated nuts or similar.



1.3 A mechanism to prevent feet escaping/ protect the lower body such as a solid bulkhead forward and beneath the drivers feet.



1.4 Provide surfaces for mounting two race numbers (approx. 200mm x 150mm ea.) and sponsor decals to be seen clearly **at all times** from front and profile view.

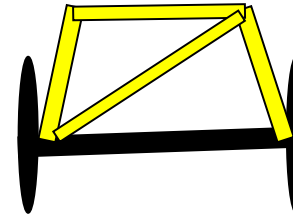
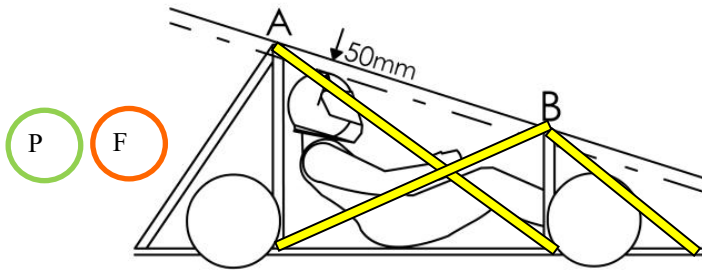
Centre of Gravity:



2.1 Vehicles should demonstrate sufficient stability. Stability will be affected by Centre of Gravity, wheel track, wheel base ,steering and other design aspects. In the event of a vehicle being deemed unstable by the scrutineers, or overturning at any time, it may be restricted from competing in any or all events at the discretion of the scrutineers. *See tips below.*

Safety Cell

- 3.1 Develop a safety cell in such a way as to provide effective protection for the driver that is able to withstand reasonable impact forces from **all directions**. The diagram below shows an **example** of where directional forces have been considered.



Lateral triangulation

Assessment

- Helmeted head of all drivers must be at least 50mm below the line A-B as shown
- Adequate fixing
- Driver must be securely contained within the safety cell

Drive train:

- 4.1 The drive train must be adequately guarded to prevent fingers, hair and clothing becoming trapped by either the occupant of a vehicle, or any person working on a vehicle, during the course of any event.

Tyres and steering:

- 5.1 Tyres not excessively worn (no canvas showing)

- 5.2 Steering systems must be adequate for the task, including having minimal play in joints.

Braking:

- 6.1 The vehicle must have an effective braking system that will prevent it from being pushed from a standstill with the brakes applied.

- 6.2 The brakes must be operable without compromising vehicle control.

Driver and seating:

- ☒ P ☐ F 7.1 The vehicle will have a seat/ body support firmly fixed to the chassis racing (refer to safety cell assessment)
- ☒ P ☐ F 7.2 There should be some form of head restraint behind the driver's helmet.
- ☒ P ☐ F 7.3 Driver to wear zipped cotton overalls, motorcycle helmet, sturdy shoes or boots, and stout gloves. There is to be no bare skin exposed. Long hair tied up.

Electrics and batteries:

- ☒ P ☐ F 8.1 Batteries must be adequately secured to the chassis, separated from the driver in a way that will prevent any person or object from being able to damage, or be damaged by, the batteries. Batteries that require it will also need adequate ventilation.
- ☒ P ☐ F 8.2 Appropriate circuit breaker or fuse in the circuit from the power supply, rated for the current draw of the system.
- ☒ P ☐ F 8.3 System must have an accessible and labelled way to isolate the power, fitted in the circuit from the battery. 'Kill Switch' stickers are provided at scrutineering.
- ☒ P ☐ F 8.4 The motor controller must be adequate for the task, constructed and mounted safely.
- ☒ P ☐ F 8.5 Vehicles competing in the Standard class are required to use the batteries, motor and gearbox without modification, available from EVelocity.
- ☒ P ☐ F 8.6 Vehicles competing in the **Open Class** can use any motor with batteries not to exceed a **nominal voltage of 48V**. Team will be provided with a thermal overload switch appropriate to their battery choice (0 to 24V is 100A overload, 24V to 36V is a 50A overload, 36V to 48V is a 40A overload). **Teams inform EVelocity of their battery specification to receive their thermal overload switch.**
- ☒ P ☐ F 8.7 All components that require it must be provided with adequate heat dissipation.
- ☒ P ☐ F 8.8 The throttle must reliably return to zero when it is released.
- ☒ P ☐ F 8.9 All wires and terminals on the vehicle must be neatly run, secured and unable to chafe, away from moving parts, and be rated correctly.

Other:

9.1 All wheel bearings smooth and free running



9.2 All cockpit edges and sharp edges/protrusions in the cockpit must be padded/protected. Potentially dangerous open tubes to be plugged.



9.3 Scrutineer will take into account any other aspects of the vehicle that could affect safety of occupant or nearby personnel and reserve the right to restrict the vehicle's entry. Queries relating to these regulations need to be presented on the online forum.

Evolocity will supply a Health and Safety Plan. A RAMS document is the responsibility of the school, a copy may be requested by Evolocity.

Build Tips:

When designing your vehicle think about how you will store and transport it. Larger vehicles will be potentially more difficult to manage.

Keep the Centre of Gravity low to improve stability. For example on multi wheeled vehicles keep the driver as low as possible with respect to the chassis. One way of achieving this is to make the seat height below wheel hub centres. Batteries typically have high mass, so keeping them as low as possible will also assist.

OPEN CLASS

If teams build a vehicle that utilises a non-standard motor, battery voltage above 24V or make other modifications they can compete (at the scrutineer's discretion) in the Open class events (Indicated on the Competition Category Document) providing:



(i) Multi- wheeled vehicles Maximum voltage 48V with appropriate thermal overload switch.