

RoboMaster 2019 Aesthetic and Safety Standards for Chassis Design

1. Background

In order to increase the viewing value of the competition, make certain standardizations to the external appearance of robots and ensure that competing teams properly protect the components mounted on their robots, the organizing committee has decided to implement and enforce strict requirements for the exterior design of robot chassis this year.

We recommend that teams implement protective outer shells for their robot chassis. Teams can choose to hire industrial design engineers to design these exterior shells or manufacture and install their own using PC, foam, sheet metal, carbon fiber and other appropriate materials in order to provide their robots with a durable and aesthetically pleasing chassis.

2. Inspection Standards for Chassis Shells

In order to prevent poorly designed chassis shells from obstructing match procedures and impacting viewing experience, the following standards regarding their design must be adhered to

1. Gloss

Shells may be made using any material of choice. However, certain standards regarding their gloss must be followed in order to prevent reflections from

disrupting computer vision algorithms that teams may use.

During the pre-match inspection, inspection staff will use the glossmeter below to measure the gloss of robot chassis.



Working principle of the glossmeter: During operation, the device emits a beam of light that reflects off the material in question, determining its gloss based on the light reflected. The range of values for gloss units is 0-101 Gs, with a mirror's gloss being 101 Gs and a fully diffuse reflector having a gloss of 0 Gs.

Requirement: Chassis shell gloss must not exceed 15 Gs

Penalty: Robots that fail to comply with this requirement will not pass inspection.

Note: The inspection area will provide non-reflective stickers and paint to allow teams to correct chassis shells that do not pass this requirement.

2. Coloring and Aesthetics Requirement for Chassis

In order to ensure the consistency of the blue-vs-red color scheme of the competition and prevent teams from disrupting the computer vision algorithms of other teams, the following coloring standards must be followed for the chassis:

Chassis must be painted with a majority dark color background (can contain textures) + additional embellishments of a different color (can contain textures)

At the same time, their appearances must fulfil the following requirements (these requirements do not apply to the aerial and engineer):

(1) The robots' appearance must not give the possibility of misidentifying its team based on its color scheme. (Avoid using blue and red hues)

(2) All robots on a team must have the same color scheme (colors used, coloring patterns etc)

(3) Teams may not use more than 2 colors for their chassis, not including the intrinsic black or metallic (referring to the natural color of carbon fibre, aluminum, steel, etc) color of the material used.

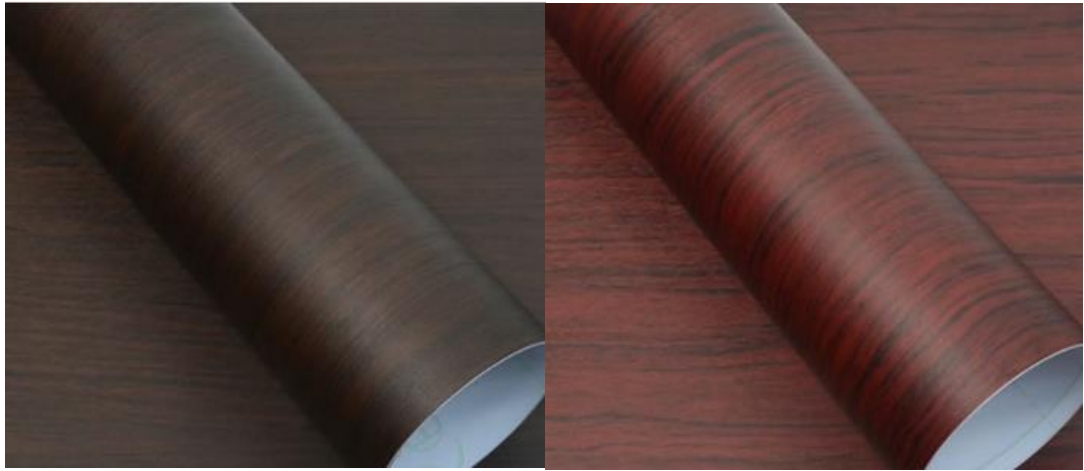
i) Textures such as camoufflage patterns, fiber textures, wood grain textures, brushed metal textures etc are counted as 1 color of the 2 allowed.



Camouflage patterns



Fiber textures



Wood grain textures



Marble texture and brushed metal texture

ii) The colors of dots and color patches are counted as individual colors



Dots and color patches

iii) Sponsor logos must be in black and white (convert logos to grayscale), and the white color of sponsor logos do not count towards the color limit. If the logo contains any color other than black and white, that color will count towards the team' s two-color limit. If there are special circumstances (such as if the sponsor has a request to display their logo in full color) the team must contact the organizing committee to handle the issue.

iv) Sheets (such as fiberglass sheets), 3D printed materials and other special materials must also adhere to the color limit (we recommend using black for all such materials – use black PLA filament rolls etc). Transparency is also counted as a single color (such as that of transparent acrylic sheets and PC sheets).

v) The color of finished modules and small components do not count towards the color limit. For example, the color of the friction wheel rubber, pneumatic devices, motors, ESCs, batteries, cable ties, sensors and pre-made mechanical components do not count towards the color limit. If there are any

doubts or queries regarding this, please contact the organizing committee.

(4) The chassis must display two logos of the team' s institution (each visible from a different angle). They must be placed at highly visible locations (such as on the turret or at the front of the chassis) for media publicity purposes. Teams that are unable to display their school logos must inform the organizing committee of their reasons.

Penalty: Robots that do not meet the above aesthetic standards will not pass inspection

3. Chassis Safety Requirements

Robot chassis must fulfil the usual inspection requirements, such as having no obstructions within 145 degrees of any armor module. For the full list of requirements, refer to the RoboMaster 2019 Rules Handbook.

Penalty: Robot that do not meet the safety requirements will not pass inspection

Note: We recommend that teams use durable and strong materials to build their chassis and conduct live firing tests on them in order to avoid chassis shattering and breakages during the actual matches.

4. Basic Requirements

Teams that choose not to have any substantial aesthetic design or choose not to design a chassis shell do not have to meet requirements 1-3 stated above, but must at least meet the basic requirements below:

(1) Robots must have clean, organized and unexposed circuitry all contained

within the chassis. If it is impossible to keep all the circuitry within the interior of the chassis, externally exposed wires must be protected with drag chains and other cable management equipment.

(2) The chassis must not display any components that spoils its aesthetic appearance. These include, but are not limited to, plastic basins, plastic bottles, corrugated paper, bedsheets, stockings, Styrofoam boards and bubble wrap.

(3) Fishnet meshes may only be used for functional purposes.

Penalty: Robots that do not meet the above basic requirements will not pass inspection

3. Aesthetic Design Review

1. Final Robot Assessment Video Aesthetic Design Review

Before submitting the Final Robot Assessment Video, teams must review their design and aesthetic choices and ensure that the submitted video captures these features. The organizing committee will then review the external appearance of the chassis presented in the video and score them accordingly.

Teams that do not meet the standards stated above will not pass the Final Robot Assessment Video review and will not be allowed to participate in the competition.

If teams are unable to present a finished version of their chassis shell designs with the final layer of paint coating, they must submit a sample picture of their final coating designs along with their submission of the Final Robot

Assessment Video. (Requirements for the sample picture: teams must paint their designs on a piece of 20cm x 20cm paper and include a photo of it in the video). If there are any queries regarding the coloring and aesthetic appearance of the robot chassis, please approach the organizing committee.

2. Live Aesthetic Design Review

During the actual competition, the organizing committee will conduct a live appraisal of the robots' aesthetic appearances and determine the 10 best-looking robots. The selected teams will be awarded a prize for aesthetic design. For detailed information, please refer to the RoboMaster 2019 Rules Handbook.