

Team Update 03

GENERAL

- **Control System:** An optional update has been released for WPILib for C++\Java, fixing a number of minor bugs discovered by teams in the first week of the season. Upgrade instructions and release notes detailing the changes can be found on the [release page](#).
- **VR Assets:** A new version of the [AutomationDirect HTC Vive/Oculus Rift application](#) has been posted. The new version allows users to control the CARGO SHIP to hold or eject CARGO, drive a ROBOT around the FIELD, and run a simulated MATCH. The SANDSTORM PERIOD has an active ROBOT camera view in the Driver Station computer.
- **Q&A:** [Q25](#) and [Q50](#) have been revised to reflect the clarification on SANDSTORM and HAB Climb Bonus assessments. Please accept our apologies for any confusion.

MANUAL

SECTION 5.1.1

Twenty-four (24) of each GAME PIECE are staged on each side of the FIELD ARENA for each MATCH as follows:

SECTION 5.3

For the purposes of assessing SANDSTORM and HAB Climb Bonuses described in Table 5-1, a ROBOT is considered to have started from, or climbed to, a HAB Level if:

1. the ROBOT'S BUMPERS are fully above the Level's platform,
2. the ROBOT is only supported by:
 - surfaces of the HAB PLATFORM at or above that Level,
 - ALLIANCE WALL, and/or
 - another ROBOT which has climbed to that HAB Level or higher

SANDSTORM and HAB Climb Bonuses are evaluated and scored by human REFEREES. Teams are encouraged to make sure that it's obvious and unambiguous that a ROBOT is not being supported by anything below that Level.

SECTION 8.2.2

- G4. One GAME PIECE at a time.** ROBOTS may not have extended or repeated control, i.e. exercise extended or repeated influence, of more than one (1) GAME PIECE at a time, either directly or transitively through other objects.

Violation: FOUL per additional GAME PIECE. If greater than two (2) at a time or second GAME PIECE leaves ROBOT, YELLOW CARD. If ROBOT releases all GAME PIECES, YELLOW CARD.

If a GAME PIECE becomes lodged in or on a ROBOT, it is considered controlled by the ROBOT. It is important to design your ROBOT so that it is impossible to inadvertently or unintentionally control more than the allowed maximum.

For example, if a ROBOT controls three (3) GAME PIECES and then releases them all, the team is issued two (2) FOULS (per part 1 of the violation), a YELLOW CARD for controlling more than two (2) GAME PIECES (per part 2 of the violation), and a second YELLOW CARD for releasing them all during the MATCH (per part 3 of the violation), thus earning a RED CARD.

- G6. No throwing HATCH PANELS.** ROBOTS may not shoot HATCH PANELS into the air in a way that's prohibited in R6, kick them across the floor using an active MECHANISM, or eject them across the floor in a forceful way (i.e. HATCH PANEL is propelled caused to move a significant distance).



SECTION 8.2.6

G24. Don't overextend yourself. ROBOTS may not extend more than 30 in (~76 cm). beyond their FRAME PERIMETER (see Figure 8-2).

Violation: FOUL. If strategic (e.g. expansion results in scoring a GAME PIECE), RED CARD.

Examples of compliance and non-compliance of G24 are shown in Figure 8-2.

Yellow bars represent the limits of the FRAME PERIMETER and are drawn in the same orientation of the ROBOT'S FRAME PERIMETER. Green bars represent a measured extension from the FRAME PERIMETER that has not been exceeded. Red bars represent a measured extension from the FRAME PERIMETER that has exceeded the limit in G24). ROBOTS A and C violate G24, whereas ROBOT B does not.

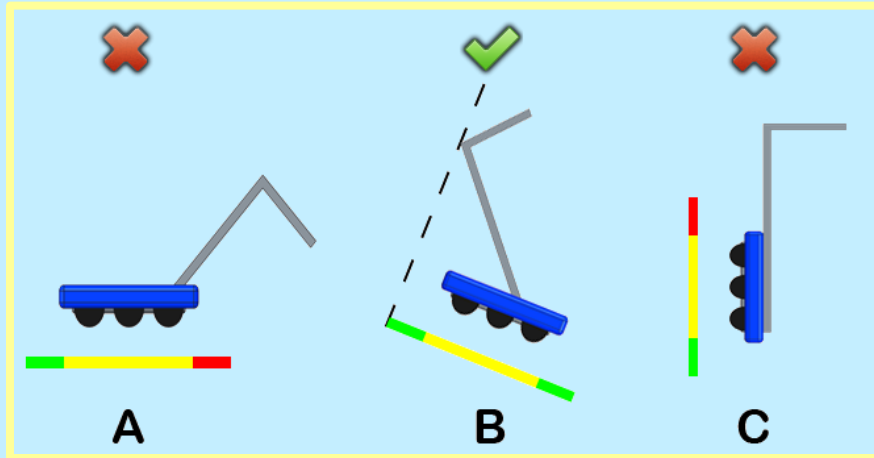


Figure 8-2 Examples of G24 compliance and non-compliance

SECTION 10.2

R3. (Blue Box)

~~Expect to have to demonstrate a ROBOT'S ability to constrain itself per above during Inspection. Constraints may be implemented with either hardware or software.~~

Be sure to consider the size of the ROBOT on its cart to make sure it will fit through doors. Also consider the size of the ROBOT to ensure that it will fit into a shipping crate, bag, vehicle, etc.

Note that the BUMPER Rules contained in the [BUMPER Rules section](#) may impose additional restrictions on ROBOT design

R4. (Blue Box)

~~Expect to have to demonstrate a ROBOT'S ability to constrain itself per above during Inspection. Constraints may be implemented with either hardware or software.~~

See the [Game Rules: ROBOTS](#) section for height and extension restrictions for various areas of the FIELD.

SECTION 10.3

R6. A ROBOT may not be designed to shoot a HATCH PANEL such that it travels more than 3 horizontal ft. (~91 cm) beyond its FRAME PERIMETER (reference G6).

The distance is measured with a stationary ROBOT relative to the ground and from the ROBOT'S FRAME PERIMETER to where the HATCH PANEL first contacts the ground. **At Inspection,**



Inspectors will expect teams to demonstrate compliance with R6 using the configuration and operation of the ROBOT that results in the farthest shot of a HATCH PANEL, i.e. the greatest distance of which the ROBOT is capable.

SECTION 10.4

- R13.** No individual, non-KOP item shall have a value Fair Market Value that exceeds \$500 USD. The total cost of COMPONENTS purchased in bulk may exceed \$500 USD as long as the cost of an individual COMPONENT does not exceed \$500 USD.
- R14.** The BOM cost of each non-KOP item must be calculated based on the unit Fair Market Value for the material and/or labor, except for labor provided by team members (including sponsor employees who are members of the team), members of other teams, event provided Machine Shops and shipping.

The Fair Market Value of a COTS part is its price defined by a VENDOR.

Example 1: A team orders a custom bracket made by a company to the team's specification. The company's material cost and normally charged labor rate apply.

Example 2: A team receives a donated sensor. The company would normally sell this item for \$52 USD, which is therefore its Fair Market Value.

Example 3: Special price discounts from National Instruments and other *FIRST* Suppliers are being offered to teams. The discounted purchase price of items from these sources may be used in the additional parts accounting calculations.

Example 4: A team purchases steel bar stock for \$10 USD and has it machined by a local machine shop. The machine shop is not considered a team Sponsor but donates two (2) hours of expended labor anyway. The team must include the estimated normal cost of the labor as if it were paid to the machine shop and add it to the \$10 USD.

Example 5: A team purchases steel bar stock for \$10 USD and has it machined by a local machine shop that is a recognized Sponsor of the team. If the machinists are considered members of the team, their labor costs do not apply. The total applicable cost for the part would be \$10 USD.

It is in the best interests of the teams and *FIRST* to form relationships with as many organizations as possible. Teams are encouraged to be expansive in recruiting and including organizations in their team, as that exposes more people and organizations to *FIRST*. Recognizing supporting companies as Sponsors of, and members in, the team is encouraged, even if the involvement of the Sponsor is solely through the donation of fabrication labor.

Example 6: A team purchases steel bar stock for \$10 USD and has it machined by another team. The total applicable cost for the part would be \$10 USD.

Example 7: A team purchases a 4 ft. by 4 ft. (~122 cm by 122 cm) sheet of aluminum, but only uses a piece 10 in. by 10 in. (~25 cm by 25 cm) on their ROBOT. The team identifies a source that sells aluminum sheet in 1 by 1 ft. (~30 cm by 30 cm) pieces. The team may cost their part based on a 1 by 1 ft. (~30 cm by 30 cm) piece, even though they cut the piece from a larger bulk purchase. They do not have to account for the entire 4 by 4 ft. (~122 cm by 122 cm) bulk purchase item.

Example 8: A team purchases a widget at a garage sale or online auction for \$3, but it's available for sale from a VENDOR for \$13. The Fair Market Value that gets reported on the BOM is \$13.

SECTION 10.5

R25.

Example 2: A ROBOT outside its HAB ZONE deploys a MECHANISM which lifts the BUMPERS outside the BUMPER ZONE (when virtually transposed onto a flat floor). This violates R25.

R31.



- B. hard BUMPER parts allowed per R31-A, -E, -F, and -G must not extend more than 1 in. (~25 mm) beyond the FRAME PERIMETER (measured as shown in Figure 10-4).

R31. (Blue Box 2)

All pool noodles used on a ROBOT must be the same in order to maintain the desired interaction between ROBOTS in the cases of BUMPER-to-BUMPER contact. BUMPERS containing pool noodles of vastly different construction may cause a “ramp” effect when interacting with other BUMPERS.

Noodle compression as a result of smoothing BUMPER fabric or rounding a FRAME PERIMETER corner is not considered deformed. Any compression beyond that, e.g. for the purposes of flattening the noodle, is deformation and a violation of R31-C.

- R31. (Figure 10-6, change is “optional aluminum metal angle attached with wood screws to clamp fabric” in callout)

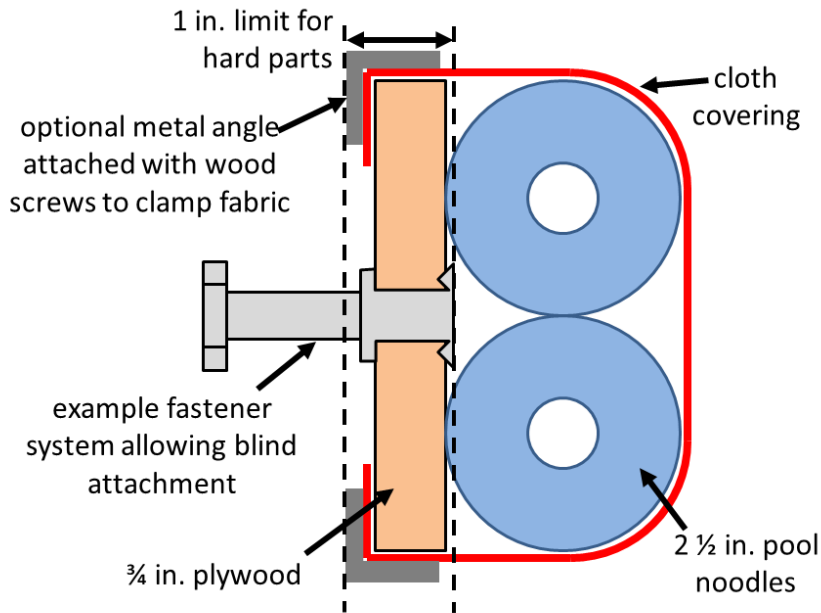


Figure 10-6 BUMPER Vertical Cross Section

- R32. (Figure 10-7, modified to better represent that the bottom right example is a noodle wrapped around the corner.)



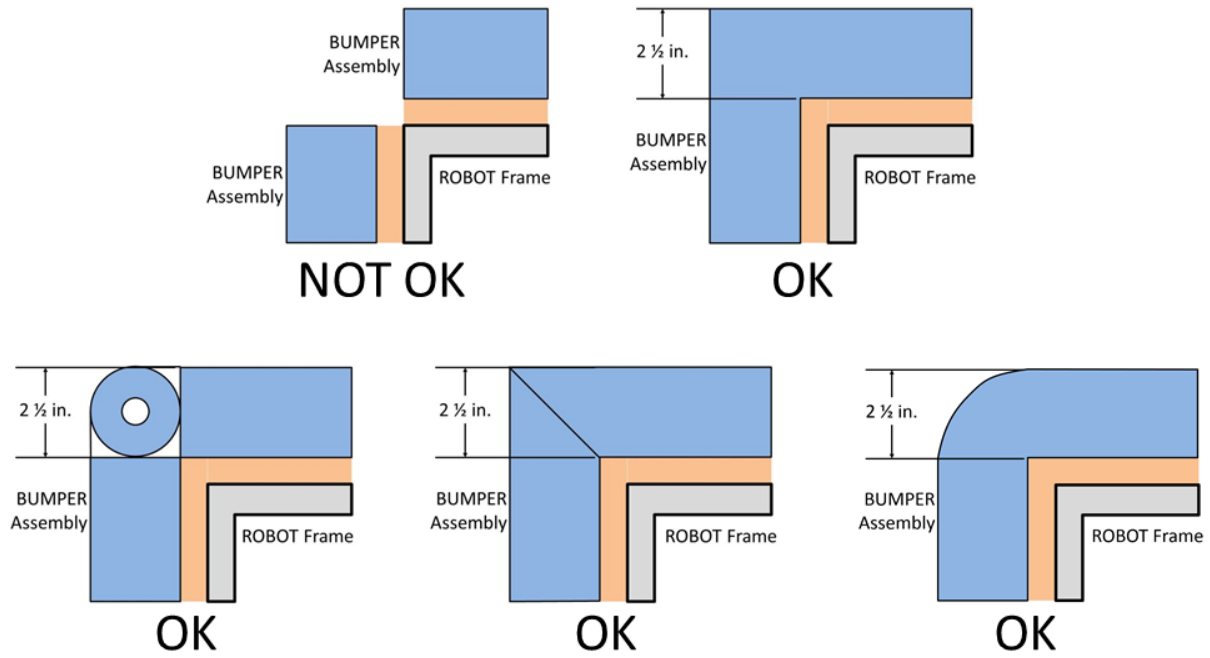


Figure 10-7 Soft Parts of BUMPER Corners

SECTION 10.9

R92.

- C. The two wires from the pressure switch must be connected directly to the pressure switch input of the PCM controlling the compressor or, if controlled using the roboRIO and a Spike relay, to the roboRIO.

