2021-2022 FIRST® Tech Challenge

Forum Answered Questions - Traditional
How To Use This Document

The *FIRST* Tech Challenge Official Q&A Forum is a place where teams can ask questions and receive official answers from game expert moderators. The official *FIRST* Tech Challenge Question & Answer Forum rulings take precedence over all information in the game manuals.

Moderators will answer team questions beginning each Monday, and close on Thursday at 12:00pm eastern time. The forum answered questions are then converted to PDF (this document) to be easily read by teams and volunteers. This takes place every week for the entire season, so teams should ensure to access the new forum printout each Thursday. Any rule clarifications or changes will apply to events happening that weekend.
Table of Contents

- Traditional and Remote - General Robot Rules (8)
- Traditional and Remote - Commercial Of The Shelf Components (10)
- Traditional and Remote - Raw and Post Processed Materials (1)
- Traditional and Remote - Miscellaneous Robot Electrical Parts and Materials (13)
- Traditional and Remote - Motors and Servos (7)
- Traditional and Remote - Control System (4)
- Traditional and Remote - Sensors (11)
- Traditional and Remote - Robot Software Rules (0)
- Traditional - Gameplay - All Match Periods (26)
- Traditional - Pre-match (7)
- Traditional - Autonomous Period (3)
- Traditional - Driver-Controlled Period (13)
- Traditional - End Game (20)
- Traditional - Competition Rules (0)
- Traditional - Field Setup (1)
- Traditional - Engineering Portfolio (0)
- Traditional - Judges Interview (0)
- Traditional - Advancement (0)
- Traditional and Remote- Team Scoring Element (5)

Traditional and Remote - General Robot Rules

Q102 Can a flexible thin strip protrude out of the 18" cube?

Q:
Hello! In FRC rules allow a very thin and flexible strip of material, usually serving as visual guide for pilots, to protrude outside of the robot starting box. We wonder if this is also allowed in FTC? Ex: 1) thin 1" X 5" strip protruding horizontally out of the back to help driving more precisely toward a shipping hub, and indicate when it easily bends against the hub that we are close enough. 2) another strip protruding 45 degrees down to soften a cube falling out of the ejector. Thank you!

A:
Prior to the start of the match all parts of the robot, including a visual guide, landing strip, etc., must fit within the 18" x 18" x 18" starting volume. Once the match begins, the robot may expand in any direction outside the starting volume.

(Asked by 20272 answer published at --)

Q105 Regarding Team numbers on bot
Our team numbers meet the minimum height requirement and are easily seen. However, they are "bacon" strips formed into numbers. We are told they can't be wavy and they need to be a certain width. We cannot find anything in either manual to support those requirements. Can you help us figure out where those requirements are or is there an update that can be released to the judges?

A: There is no width requirement for the Team Numbers. The Rule RG04 states that the numbers must be at least 2.5” tall and be clearly visible by Field Personnel. Wavy numbers formed by "bacon", providing they meet these rules, are legal and really cool.

(Asked by 8743 answer published at --)

Q72 <I07> Question about the wheel/tread test.

Q: According to <I07> ...place the Robot on top of a field tile and against an immovable surface (wall) and run the wheels at full power for 15 seconds. If there is any physical damage to the floor tile, the wheels will not be allowed. We have the GoBilda Outlaw Treads. Following the directions literally, our robot rides up the wall and turtles, causing no damage to the tile. If we hold the robot down, the treads cause damage. Are these Outlaw Treads FTC Legal by I07 or illegal?

A: The tread test should be run with a stationary portion of the Robot pushing against the immovable surface (not the tread or wheel). The test must also be run with the Robot full weight it would be during a match. The intent is to simulate what would happen if a Robot loses control and the wheel/tread spin out on the field.

(Asked by 16617 answer published at --)

Q73 2nd Control Hub in place of expansion Hub

Q: <RE08> states that teams are allowed to use 1 REV Control and No more than 1 REV Expansion Hub. Since REV Expansion Hubs are currently unavailable for purchase, and assuming it would work, can teams be allowed to connect a second REV Control Hub and use it as their allowable 1 Expansion Hub for attaching additional motors?

A: No. No more than one REV Control hub may be used within a legal FTC robot

(Asked by 18597 answer published at --)

Q37 Team Scoring Element size

Q: GM 1- 7.4 <TE02> lists the size constraints of the TSE. Does the TSE always need to fit within the min/max volumes, or can it temporarily expand or contract?

A: The Team Shipping Element may be compressed or expanded when held by the Robot but it must expand or collapse to a legal size when put into play on the Barcode or when Capping. The TSE should be inspected with the TSE in the configuration as it will be used on the field.
Q32 What tires are legal?

Q: The rule states "Wheels of any type, and the manufacturer provided wheel hub used to mount the wheel to an axle EXCEPT AndyMark® AM2256. Individual components of a legal wheel assembly can be used on the robot." Is this limited to the manufacturers listed at the top? Can we make custom wheels from COTS parts?

A: Rule RG01 restricts the use of high traction wheels that may damage the playing field surface during game play. The two wheels listed are just examples of wheels that have demonstrated issues in the past and is not intended to be a comprehensive list. Teams may build their own custom wheels but they should realize that the restriction is on the tread part of the wheel that touches the tile and not on the wheel hub. Inspectors may require a test of wheels if it appears they will damage the field. The test involves placing the Robot on a tile and driving the Robot against a firm stop so that the wheels spin. If the wheels end up digging gouges in the tile, the teams will be asked to replace the wheels.

Q22 LED Lit Robot Numbers and Alliance Marker

Q: Our team is looking at using an edge lit LASER etched Acrylic sign for our Robot Team Marker. We would like to have it change between red and blue to match our alliance. I understand we still need the removable alliance markers, but will the LED signs count as lenses? And would the edge lit acrylic be approved for the robot team markers? Thank you

A: The LED signs do not count as lenses. Be aware that it is not sufficient to just change the color of the Team Marker, the rules require that the shape of the Team Marker is also changed. Per Rule RG05, a Team Marker must be a Red Square or a Blue Circle. Also, the Team Marker must be clearly visible to field personnel. Keep in mind that lighting conditions in different venues may make the LED sign easier or harder to see.

Q17 Is it legal to use gripper parts 3D printed from public files on Thingiverse?

Q: We propose to 3D print and assemble parts for a gripper from stl files at https://www.thingiverse.com/thing:3342996 Any team could use this method. The finished assembly would have one degree of freedom in a mathematical sense, i.e. its state could be represented by a single number. It does, however, move three mechanically linked fingers in different directions from that one input. If not allowed, it would be helpful to know if a modification could make it legal. Thanks--

A:
Yes, 3D printed parts are legal per Rule RM01. The degree of freedom rule, RM02, only applies to Commercial Off The Shelf (COTS) parts that are purchased as a complete assembly.

(Asked by 6025 answer published at --)

**Traditional and Remote - Commercial Of The Shelf Components**

**Q174 <RE13>c interpretation of user programmable microprocessors in LED interface modules**

**Q:**
<RE13>c says COTS LED interface modules are allowed. We think the restriction of user programmable processors is to prevent teams using them to offload robot control tasks that the android controllers should be doing. The K-1000C is advertised as "programmable", but it's really just a way to configure the LED pattern on an SD card. That doesn't make the internal processor cable of running robot control code. Is this module allowed? https://www.amazon.com/dp/B06XJ1J915

**A:**
Yes. Be aware that LEDs that flash/change colors are subject to the potential limitations listed in the orange box in RE13.

(Asked by 6832 answer published at --)

**Q160 are any uvc compatible cameras legal**

**Q:**
Are any UVC compatible cameras legal

**A:**
Yes, per RE14.b

(Asked by 14382 answer published at --)

**Q136 Logitech camera 3D printed housing**

**Q:**
Looking to see if we can pull the circuit board and camera out of the Logitech camera factory case to create our own case for mounting the camera to the robot.

**A:**
Yes. We would recommend taking pictures of the process to share with robot inspectors

(Asked by 8899 answer published at --)
Q103 When testing for legality of GoBilda tank treads, will mitigation strategies matter?

Q:
Hello. To follow up the answer to question #72. When executing the tread test, will we be able apply mitigation strategies to avoid damage to foam tiles to pass the test? For example: 1) Is the test done while running our normal game OpMode? We could detect stationary spin out and automatically cut power to the drive. 2) Cover treads with removable material to increase slip not scratch or burn foam tiles. 3) Make sure holding the robot will result in drive motors stalling, thus avoid damage.

A:
Q1: Yes, the test should be run using the normal OpMode. A programming solution to prevent field damage is acceptable. Q2: Covering the treads with a material that prevents field damage is acceptable. Q3: Designing the robot so that the motors stall out before field damage is an acceptable solution. Teams should be aware that referees have the option of sending robots back for inspection if they see an sign of field damage.

(Asked by 20272 answer published at --)

Q87 Are Gobilda motors legal?

Q:
Are Gobilda 5203 motors (SKU 5203-2402-0019, link: https://www.gobilda.com/5203-series-yellow-jacket-planetary-gear-motor-19-2-1-ratio-24mm-length-8mm-rx-shaft-312-rpm-3-3-5v-encoder/) legal? It seems like they would not be per <RE10> but Gobilda sells an FTC kit.

A:
Yes, these planetary gear motors utilize the Modern Robotics motors which are legal per rule RE10.c.

(Asked by 18133 answer published at --)

Q81 Are Gobilda parts legal?

Q:
Hi, are parts from Gobilda (link to FTC kit: https://www.gobilda.com/master-ftc-kit-8mm-rx-shaft-2021-2022-season/) legal? Confused because they are not specified in RE01, RE03, RE09, and RE10.

A:
Mechanical and structural parts from robot construction kits such as Gobuilda, Tetrix, Vex, etc. are allowed per rule RM01 and RM02. Teams should be aware that there are some parts that may violate other rules such as the single degree of freedom rule in RM02. The electrical rules are more restrictive so if there is a specific part (motor, servo, motor controller) that you wish to use, please ask about this in a separate question.

(Asked by 18133 answer published at --)

Q71 Extent of Legal Modifications to Freight

Q:
My team is considering performing vision tracking of Freight (using TensorFlow or OpenCV), but I am concerned that the Game Manual does not provide any standards to how Freight can be legally modified by tournaments

https://ftc-qa.firstinspires.org/admin/report
beyond their COTS conditions. I completely understand that the pre-load Boxes will be modified with a black mark placed upon them (an X or similar as specified in the Game Manual), but is it legal for an event to put other markings, symbols, or modify freight in any other way?

A:
It is illegal to modify the game elements in a manner that affects gameplay except as specified in the Game Manuals or in the Field Setup Manuals. However, we understand that some field elements are marked to indicate ownership when shared between teams or for events and this is allowed. We recommend that any such markings be done as inconspicuously as possible (i.e. underneath or in a corner of a field or game element).

(Asked by 18151 answer published at --)

Q60 <DS03> Gamepad - Does it have to be "Microsoft" Original Equipment?

Q:
<DS03> Gamepad - Does it have to be "Microsoft" Original Equipment? or can we use a non-modified, non-OEM Xbox 360 Wired Controller that is 100% compatible to the Xbox 360 controller in Fit, Form and Function (same buttons, Joystick, D-Pad, etc) just not $80 vs. $20 (ex. Wired Controller for X-box 360, YAEYE Game Controller for X-box 360 with Dual-Vibration Turbo for Microsoft X-box 360/360 Slim and PC Windows 7,8,10 - Amazon $17.99)

A:
The only allowed Gamepads are those listed in DS03

(Asked by 8487 answer published at --)

Q56 Injora Dual Stage SHock absorbers

Q:
Are Injora Dual Stage shock absorbers legal to use? Based on rule RM05 Lubricant - Any COTS lubricant is allowed, if it does not contaminate the Playing Field, scoring elements or other Robots. However, rule RG01 f&g dictate that the robot may not contain any liquid or gel materials. These shocks are different from the GoBuilda Big Bore shocks because they do not contain oil, and they do not use compressed air, so the rules that applied to the GoBuilda shocks do not apply to the Injora shocks.

A:
According to the Injora website, the Dual Stage Shock Absorbers are designed to be used with oil. Therefore these are not legal COTS. Even without the oil, the action of the piston results in compressing air which also makes them illegal.

(Asked by 15755 answer published at --)

Q11 Are GoBilda Shocks legal parts?

Q:
We wonder if the GoBilda Big Bore Shock is a legal part of FTC? Here is the link to the item: https://www.gobilda.com/big-bore-shock-190mm-length-black-2-pack/

A:
No, shocks are not legal per Rules RG01.g and RG01.k.

(Asked by 18438 answer published at --)

Traditional and Remote - Raw and Post Processed Materials

Q64 Magnet in the TSE

Q:
Are small magnets allowed to be incorporated into the TSE?

A:
Yes, providing no other rules are violated.

(Asked by 6645 answer published at --)

Traditional and Remote - Miscellaneous Robot Electrical Parts and Materials

Q163 Is Voltmeter legal

Q:
Is Voltmeter legal (to show battery level) in FTC? Example voltmeter is like this: https://www.amazon.com/gp/product/B00B689UGA. We have used it in the previous events. Want to get an official ruling if it is legal or not.

A:
Yes. Be aware that this would need to be connected to one of the allowed light source connection points (i.e. an XT30 port from the Control/Expansion Hubs to get battery voltage)

(Asked by 12611 answer published at --)

Q164 Is the Rev Robotics Digital LED Indicator legal to use in FTC?

Q:
Rev sells a simple one-light LED indicator (SKU REV-31-2010). It is "designed to directly interface with the DIO ports of the Expansion Hub or Control Hub." GM1 RE13.b says "Light-source control by compatible ports on the REV Expansion Hub or REV Control Hub is allowed" which suggests that this Rev LED is legal. This LED doesn't seem to need a separate power source (gets its power from DIO port) - RE13.d lists approved power sources, but does not mention the DIO port. Is this Rev LED legal?

A:
Yes.
Q143 Slip Rings

Q:
Are slip rings considered mechanical devices with 1 degree of freedom and legal, or are they considered electronic devices and illegal as per RE15 and RE17? Basically, are slip rings legal?

A:
Yes. Care should be taken to make sure that the slip ring contacts are not exposed. Additionally, you should make sure that the current capacity specifications meet or exceed the ratings for the type of connections you are trying to manage.

Q128 Devices Allowed on a Digital I/O Port in Output Mode and A119

Q:
We would like to connect Digital Out ports to the [RST] Reset pin and the [DI] I2C Address Select pin on the Adafruit BNO085 Breakout (https://www.adafruit.com/product/4754). These pins (ports) are 3.3V logic thus compatible with the REV Digital Out ports.

A:
Yes.

Q125 Is a servo travel tuner legal to adjust the range of a servo, like the one goBuilda sells?

Q:
Is a servo travel tuner legal to adjust the range of a servo, like the one goBuilda sells?
https://www.gobilda.com/servo-travel-tuner/

A:
No. Used within a robot, this device would be considered "additional electronics" and would not be allowed per RE17

Q119 Devices Allowed on a Digital I/O Port in Output Mode

Q:
<RE12> says any compatible sensor can be connected to a Digital I/O port. Other than an LED, which is not a sensor, what type of devices can be connected to a Digital I/O port when in Output mode ("Digital Out")? For
example, suppose an allowed device is connected to some compatible port other than a Digital I/O port. Can a Digital Out port be connected to a compatible port on the allowed device to say enable/disable the device, reset the device, etc.?

A:
The question as worded is too vague and hypothetical to be able to provide an answer. Please ask again using a more specific usage.  

(Asked by 9999 answer published at --)

Q111 Rule RE15.K substitute part

Q:
Rule RE15.K states "Electrically grounding the Control System electronics to the frame of the Robot is recommended and only permitted using a FIRST-approved, commercially manufactured Resistive Grounding Strap. The only Resistive Grounding Strap approved for use is the REV Robotics Resistive Grounding Strap (REV31-1269)." This part number has been out of stock for a couple of months. This is a simple 470 ohm resistor in series on a wire. Can we make our own since we can't otherwise get one?

A:
No. The only allowed chassis grounding option is via the part listed in the game manual.

(Asked by 7760 answer published at --)

Q113 About RE16 - Modifying Electronics rule

Q:
Would like to know if welding a wire to connect the wiper terminal of the servo's potentiometer and using this wire to retrieve the servo position via AD port is legal or not?

A:
No. This type of modification changes the functionality of the servo and falls into the range of disallowed modifications.

(Asked by 18225 answer published at --)

Q99 Pixy Cam power

Q:
Pixy Cams were allowed in the past. The camera needs 5 volts to operate and we ran it from the extra 5 volt ports on the Rev hub. This is no longer allowed (according to a forum answer). Would it be allowed to be plugged into the USB port on the Rev control hub for its power and the analog input at the same time? If not, as a replacement, we are considering this sensor: https://www.sparkfun.com/products/18642 Is it legal? It's a time of flight i2c sensor. Thank you!

A:
A Pixy Cam should be powered via a REV Logic Level Converter.

The time of flight sensor you listed would not be allowed as it utilizes a laser for its measurements.

(Asked by 6378 answer published at --)
Q78 Multiple USB Cameras on the Control Hub

Q:
The rule (<RE15> c. ii. i.) allows for an externally powered USB hub on a REV Expansion Hub powered from a commercial USB Battery Pack (or powered by the 5V aux power on an Expansion Hub or Control Hub). Would the use of an externally powered USB hub on a Control Hub - especially for powering multiple cameras - be allowed? I figured that <RE15> c. ii. probably wasn’t meant to only apply to the REV Expansion Hub, but I’d like clarification on this.

A:
The USB hub connection limits expressed in RE15.c.ii should be understood as applying to both REV Expansion Hubs and REV Control Hubs.

(Asked by 18151 answer published at --)

Q76 Can a passive coil electromagnet be used?

Q:
Can a COTS passive electromagnet be used? Specifically an electromagnet is simply a coil of wire, and as such would seem to fall under the classification of a passive component <RE12c>. It would be powered either with a spare motor port or a SPARKmini. If a COTS electromagnet is not allowed, would a hand wound one be permitted? Current limits would be verified to be within the hub/spark allowed range. Note: We know this was initially answered under Q20 but wish clarification with <RE12c>.

A:
No. RE12.c does not allow passive electronics to be used other than in conjunction with sensors and then only as recommended by the sensor manufacturer.

(Asked by 10138 answer published at --)

Q58 Is Intel T265 allowed?

Q:

A:
Yes. Be aware the Intel has apparently retired the T265 in favor of newer models

(Asked by 12611 answer published at --)

Q48 Are strain/force/bend gauges allowable?

Q:
Are any of the following sensor scenarios allowable if solely powered from and read by an analog port on a control or expansion hub: 1) COTS strain/force/bend sensor (made from resistors) 2) COTS strain/force/bend sensor coupled with additional resistors 3) COTS strain gauge with a COTS amplifier to boost output from mV to V. (Team
expects the amp is prohibited as an active component in <RE12>, but as amplification is recommended and often sold with a strain gauges sensor were unsure.)

A:
A COTS sensor and associated passive electronics (#2 as listed above) (as recommended by the manufacturer) would be allowed. You are correct that the additional amplifier would not be allowed. Additionally, a DIY strain/force sensor made from a collection of passive devices (#1 as listed above) would not be allowed.

(Asked by 8907 answer published at --)

Traditional and Remote - Motors and Servos

Q123 Are the linear servos from goBuilda legal?

Q:
Are the linear servos from goBuilda legal? They can operate at 6VDC. https://www.gobilda.com/linear-servos/

A:
Linear servos are legal for use as long as they are connector and voltage compatible with the available servo connection options (i.e. REV Expansion Hub, REV Control Hub, Servo Power Module)

(Asked by 10006 answer published at --)

Q75 Can FTC approved DC motors be used to drive fans on the robot?

Q:
Are fans for the purpose of transportation allowed during the competition? The fans are enclosed within a plastic duct and will have fan shields to protect the field(RG01.a), eliminate risk of entanglement(RG01.b). The fans do not generate any vacuum(RG01.l) and are not closed(RG01.j) as the intake side is open to the air and the output side will be directly facing the ground and air continuously leaves the robot.

A:
Yes, motors can be used to drive fans providing it is done in a safe manner and no other rules are violated. Any team using fans on their Robot should be aware that any Freight propelled by the air will be subject to the Control, Possession and Launching rules.

(Asked by 3470 answer published at --)

Q61 Is it legal to plug a motor into the 6v servo ports?

Q:
Is it legal to use any COTS motor powered by the 6v servo ports on the rev hub? It would basically be identical to a Vex 393 motor or a servo in continuous mode, just without the gear reduction.

A:
No. Additionally, it would not work the way you are intending. The signaling that is sent to servos is not the same sort of signaling that is sent to motors.

The Vex 393 is only useable when connected to a Vex Motor Controller 29 (it converts the servo PWM signaling into motor control signals)

It is possible to control a DC motor through a servo port, but you need to utilize a REV SPARK Mini Motor Controller to accomplish the signal translation

(Asked by 8565 answer published at --)

Q52 Is Rev UltraPlanetary Gearbox Kit & HD Hex Motor SKU: REV-41-1600 FTC Legal?

Q:
We know from list of allowed FTC legal parts that REV HD HEX motors are legal...but are UltraPlanetary Gearbox Kit also legal? SKU: REV-41-1600 The REV UltraPlanetary Gearbox Kit is the entry point into using the REV UltraPlanetary System. The kit comes with UltraPlanetary Cartridges to support six different final gear reductions ranging from nominally 3:1 to 60:1 allowing for the right amount of torque for the application at hand. https://www.revrobotics.com/rev-41-1600/

A:
Yes, per Rule RM02 single speed gearboxes are allowed.

(Asked by 11254 answer published at --)

Q54 Is the Actuonix linear servo legal?

Q:

A:
Yes, per Rule < RE12> linear actuators are allowed provided they are three wire and run on a maximum of 6 volts. This actuator meets those requirements.

(Asked by 7290 answer published at --)

Q49 Can you use a DcMotor during initialization for inspection.

Q:
Rule <RG02> states the expectations for using servos during the initialization of the robot for inspection. Nothing is mentioned concerning DcMotors. Can you use a DcMotor in a RUN_TO_POSITION mode to accomplish the same thing as the servo? Thanks!

A:
Yes. Make sure that the robot is appropriately labeled with the "Robot Moves on Initialization" warning sticker

(Asked by 14840 answer published at --)
Q: We are using 6 DC motors, but the REV Expansion Hub is out of stock, May I connect 2 DC motors in the same port in the REV Control Hub? Thanks!

A: There is nothing in the robot electrical parts and materials rules that prohibits ganging motors together into a port. Make sure that the connection is appropriate in terms of wire gauge and insulation.

Be aware that the ganging process effectively halves the available stall current from the motor port.

Other options aside from an additional Expansion Hub would be to take advantage of the REV Spark Mini Motor Controller.

(Asked by 19487 answer published at --)

Traditional and Remote - Control System

Q: In A86 you state that teams are required to develop and compete with only 10 motion devices against teams that develop and compete with 20 motion devices. You further state that teams that develop with 20 motion devices will be required to compete with only 10 motion devices when one of their REV hubs fail. A86 appears to violate FIRST's and Raytheon's policies on Equity, Equality, Inclusion, and arguably Diversity. Please rephrase your answer and please take this seriously.

A: As mentioned in the answer to Q86 (qa/86), the only approved control options are listed in part 1 of the game manual. FIRST Tech Challenge does not make mid-season changes or additions to electronics for a few reasons. One, we must first evaluate the proposed electronics to ensure that it can work with all of the other components and control systems that we currently approve. There could be unintended consequences without proper vetting and testing of any new electronic that could put teams at a disadvantage. Likewise, it could pose the potential for some teams to have a competitive advantage which is something we have to think about when we are assessing new electronics.

Two, especially given the global supply chain issues the world is facing, we need to evaluate any proposed new vendors ability to deliver the electronics in volumes where all of our teams and community can access it. This process includes determining the costs to teams, as well as timelines of when the new component can be manufactured and made available for all teams.

I’d like to note that these decisions are solely made by FIRST Tech Challenge Headquarters staff, and not by our vendors or sponsors.

(Asked by 9999 answer published at --)
Teams that are able to obtain two REV hubs can have 8 motors and 12 servos for a total of 20 motion devices on their bot. Teams that are unable to obtain more than one REV hub can have only 10 motion devices on their bot. COTS I2C PWM/Servo expansion boards can add 16 Servo ports to a REV hub. We request that teams be allowed to connect a PWM/Servo expansion board, such as a PCA9685 based board, to an I2C port of a REV hub so that all teams can have 20 motion devices on their bot.

A:
While we understand the frustration with supply delays, the only approved motor/servo control options are those that are listed in Part 1 of the Game Manual. There is no current plan to add any additional electronics to the list of approved devices.

(Asked by 9999 answer published at --)

Q59 RE01 - Power Button Cover

Q:
RE01 does not specify that the power button can or cannot be covered by a cover to prevent power on/off during competition play. Aside from the label required to the easily seen, may the power button have an open/close cover?

A:
No. RE01 requires that the power switch be "readily accessible and visible to field personnel". Covering the switch would hinder both access and visibility

(Asked by 18127 answer published at --)

Q43 Are all colors of Sony Dualshock controller allowed

Q:
This may seem a bit silly, but in Manual 1 the Sony DualShock 4 Wireless Controller for PS4 are listed as allowed, but then goes further to specify ASIN # B01LWVX2RG. This is specifically the black controller. Is this an intentional specification or are other colors allowed as well (eg. Red which is ASIN # B01MD19O12 or Camo which is ASIN # B01MTKXP31)? Asking because availability and prices fluctuate and black is currently out of stock.

A:
Yes. Other colors of the same model gamepad are allowed

(Asked by 10138 answer published at --)

Traditional and Remote - Sensors

Q173 Tilt switch

Q:
Are ball bearing tilt switches used to maintain the level of a robot arm, legal for the FTC competition.

A:
Q172 Distance sensor

Q: Since RevRobotics are out of stock on distance sensor, I have been able to find an I2C compatible distance sensor. So is the model HC-SR04 legal for use in FTC?

A: Yes.

(Asked by 20326 answer published at --)

Q148 Is the LED light on the REV color sensor v3 allowed?

Q: please clarify, is the light sensor light source allowed? the answer 'yes' is ambiguous based on the question text.

A: In the original question, [Q144](https://ftc-qa.firstinspires.org/admin/report#144), the only question asked was in the title to the post, "Is the LED light on the REV color sensor v3 allowed?". The rest of the posting was explanatory text. We are not sure what is ambiguous about the answer "Yes" to this question.

(Asked by 7571 answer published at --)

Q161 Proximity distance sensor

Q: we want to use a sharp GP2YA21-10 80cm infrared proximity distance sensor. is this legal

A: Yes.

(Asked by 14382 answer published at --)

Q165 Distance sensors

Q: What distance sensors are allowed?

A: We are not able to provide a listing of legal distance sensors. When choosing a distance sensor, be aware that sensors that use lasers as a measurement method violate RE13.a and are not allowed, with the exception of the REV 2m Distance Sensor.

(Asked by 12390 answer published at --)
Q145 Are passive force sensor and resistor allow?

Q: In the answer to Question Q48, questioner asked "2) COTS strain/force/bend sensor coupled with additional resistors." you answered "A COTS sensor and associated passive electronics (#2 as listed above) (as recommended by the manufacturer) would be allowed." We are trying out a passive pressure/force sensor (which is COTS). We will add one resistor for scaling. We will add a JST 4pin connector to connect to analog port. No other power source. No amplifier. Is this allow?

A: Yes

(Asked by 13356 answer published at --)

Q144 Is the LED light on the REV color sensor v3 allowed?

Q: Without using the LED, the color sensor v3 is not very useful as a color sensor. In the past, the team was told that the LED on the color sensor v3 was considered a focused light source and was not allowed.

A: Yes

(Asked by 7571 answer published at --)

Q80 Is it legal to use a custom 3d printed base for the Rev through-bore encoder

Q: We removed the stock base from the through bore encoders and 3d printed new ones to accommodate our design. Would this be allowed for FTC or is it considered modified electronics? An inspector at our first league meet wanted us to get this answered. We did not change anything electrical in the sensors and we didn't change the internal features of the housing design.

A: Yes. If possible, it would help to have pictures of the disassembly and re-assembly steps to help the inspectors be confident that the housing is the only modification

(Asked by 8813 answer published at --)

Q69 Use of 12V to power sensor

Q: Can we use the 12V off of the connector on the Rev Hub in order to power a sensor that then connects to a sensor port for output?

A: 
No. RE12.a limits sensor connections. 12v power is not one of the allowed connection points.

(Asked by 7244 answer published at --)

**Q67 Power sensors with 5V Aux output**

**Q:**
Can we power 5V sensors using the 5V Aux Output on the Rev hub?

**A:**
No. RE12.a limits where sensors may be connected. The 5v AUX output is not listed as an allowed connection point

(Asked by 7244 answer published at --)

**Q29 Are Intel D455 and D435i cameras legal**

**Q:**
In the past, Intel T265 is considered legal for FTC. Now Intel is deprecating T265, replacing it with D455 and D435i. https://www.intelrealsense.com/depth-camera-d455/ and https://www.intelrealsense.com/depth-camera-d435i/. Want to confirm, are Intel D455 and D435i cameras legal?

**A:**
Due to the embedded IMU as an additional sensor (accessible via USB) the two cameras mentioned are not allowed

(Asked by 12611 answer published at --)

**Traditional - Gameplay - All Match Periods**

**Q177 Inadvertent & Inconsequential contact-follow up to Q104: please clarify further**

**Q:**
Can you please quantify at what point movement of the alliance shipping hub is considered to affect gameplay? There are disparities in the way that this penalty is being assessed currently. Even accounting for the allowable 1-inch tolerance in autonomous might cause the hub to shift as much as two inches. Some contact is to be expected and in many cases is difficult to avoid. Driver practice alone won't be of help if there is no objective rule about what constitutes a penalty in this case.

**A:**
The Game Design Committee deliberately does not quantify "at what point movement of the Alliance Shipping Hub is considered to affect gameplay." The effect of Alliance Shipping Hub movement on gameplay depends on the direction it is moved. For example, movement towards a Warehouse provides a strategic advantage while movement away from the Warehouse could be viewed by a referee as having an Inconsequential impact on gameplay. A referee could view "X" distance movement towards the Warehouse as affecting gameplay and the same "X" movement away from the Warehouse as being okay.
Note: The Game Design Committee does not understand how to interpret the statement in the Team's question: "Even accounting for the allowable 1-inch tolerance in autonomous might cause the hub to shift as much as two inches." There is no 1-inch tolerance for the relocation of the Alliance Shipping Hub during the Autonomous Period. Rule G8 states that "Competition Playing Field and Game Elements will start each Match with tolerances that may vary as much as +/- 1.0 inch." Perhaps this is what the question references? As stated in the orange box for this rule, "The intent of the generous +/- 1.0 inch tolerance is to accommodate unintentional size and location variations that may occur. The tolerance is not an excuse for intentional or imprecise accuracy in construction or setup." Further, the +/- 1-inch tolerance is not a guide for determining when movement of the Alliance Shipping Hub affects gameplay.

Pro Tip: The Drivers Meeting is a good opportunity to discuss how rule GS3 will be applied at the tournament.

Pro Tip: Varying the direction a Robot approaches and interacts with the Alliance Shipping Hub will likely reduce how far an Alliance Shipping Hub moves from its Pre-Match starting location. A Robot that repeatedly interacts with the Alliance Shipping Hub from the same direction is likely to cause sufficient Shipping Hub movement to affect gameplay.

(Question 171 answer published at --)

**Q171 Legal defense about capping TSE**

**Q:**
We've noticed some teams are starting to use flat TSE elements which they could do the capping using magnetic arms, or even a tape measure. We'd like to clarify if the following scenarios are legal defense or not: Question 1: Since the TSE may be flat, the opposing robot may drive over the TSE and sit on top of it to prevent them from getting the TSE. Question 2: For teams using a tape measure, the opposing robot may just sit between the robot and the TSE to prevent them from getting the TSE.

**A:**
Per [Q37](/qa/37), a Team Shipping Element that is not Possessed by a Robot must satisfy the size requirements specified in the Game Manual Part 1 rule TE02. Therefore, a "flat" Team Shipping Element used as described in this question is not allowed.

Answer 1: A Robot Parking over a Team Shipping Element is Control of a Scoring Element as described in the definition of Control part "d" in the Game Manual Part 2 section 4.4. The defensive Robot in this scenario will receive a Major Penalty for violating rule GS4c.

Answer 2: In general, the defensive Robot is not breaking a rule for Parking between an opposing Alliance Robot and their Team Shipping Element. Keep in mind that the defending Robot is not allowed to Block all paths of travel to access the Team Shipping Element. See rule G28 for details.

(Asked by 5890 answer published at --)

(Question 178 answer published at --)

**Q178 Are teleop penalties regarding GS3a in relation to hub position at the beginning of teleop**

**Q:**
Example: Robot pushes the alliance shipping hub during the autonomous phase, then bumps hub during teleop and causes inconsequential and inadvertent movement. Would the position of the hub at the end of autonomous be considered the "starting position" with regard to the teleop phase, with additional penalties assessed with
regard to movement from that position, or will teleop penalties be assessed based on movement from original starting position of the hub, even though it first moved in auton?

A:
The rule GS3a penalty is assessed as soon as the movement of the Alliance Shipping Hub affects gameplay. This penalty, like most other penalties, can be assessed during the Autonomous and the Driver-Controlled Periods. The reference "starting point" for determining Alliance Shipping Hub motion that affects game play is the pre-Match location of the Alliance Shipping Hub. Review the Game Manual Part 2 Figure 4.3.2 and the Field Reset Guide to learn about the starting locations of the Alliance Shipping Hubs.

Pro Tip: The Drivers Meeting is a good opportunity to discuss how rule GS3 will be applied at the tournament.

(Asked by 5890 answer published at --)

Q155 Robot movement against wall

Q:
Is it legal to drive a robot (with rollers on the side intended to prevent wall scratches) against the wall to ensure that it clears the 13.68 inch (+/- 1in) gap between the barrier and the wall? Is touching the wall legal?

A:
Yes, this Robot design strategy is allowed if gameplay does not change due to the movement of the Playing Field Wall.

Note: Slight temporary angular leaning of the Playing Field wall is probably okay. Lasting (i.e., persistent) translational movement of the Playing Field that creates a consequential gap between the Playing Field Wall and the Tile is not allowed.

Pro Tip: Throughout the season, Teams participating in Traditional Events may encounter Playing Field Walls from different manufacturers. The Playing Field Walls from AndyMark and IFI may react differently in the scenario described in the question. For example, the AndyMark Playing Field Walls are somewhat bound together with an under-Tile strap extending between opposite sides of the Playing Field. The IFI Playing Field system does not use straps. The AndyMark Playing Field Walls have a smooth polycarbonate surface where the IFI Playing Fields have a metal "bump" at the juncture of two wall segments.

(Asked by 18523 answer published at --)

Q151 Follow-Up to Q133 about Legal Defense

Q:
Suppose a robot has a linear slide to deliver the freight to the alliance shipping hub, while the opposing team robot also a lifting mechanism (e.g. vertical slides, v4b, etc.) to raise the arm high, is it legal for the opposing team to use the lifting mechanism to block the attempt of freight delivery?

A:
In general, yes. The defensive Robot needs to be careful not to violate rules G26, G28, or GS3e. Keep in mind that we cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head referee.

(Asked by 14179 answer published at --)
Q162 Is intentional contact with a duck delivered from the carousel legal?

Q:
Q147 “Inadvertent Duck contact with the Robot during Delivery is allowed” to me then says that intentional contact during Delivery would be penalized. Control of a duck before it hits the field is not allowed, but if the robot was parked such that ducks would intentionally deflect off a plate mounted on the robot, would that constitute control?

A:
A panel on a Robot that is intended to prevent a Duck from becoming unintentionally stuck inside the Robot is allowed.

A gameplay strategy that uses a panel mounted on the Robot to deflect a Duck into a favorable location (e.g., a ramp that consistently deflects the Ducks into the Storage Unit) is considered Control and is not allowed.

Summary: A panel with the intended purpose of protecting the Robot from unintentionally Possessing Ducks is allowed. If the Robot's panel appears to play a part in the Drive Team's gameplay strategy, the referee will likely rule that the Duck is Controlled.

(Asked by 18111 answer published at --)

Q117 Scoring from Shared Shipping Hub Area

Q:
Can Freight be scored from across the barrier (assuming it has been removed properly via Warehouse Operations) from the section of the field containing the Shared Shipping Hub?

A:
A Robot located Completely Outside the Warehouse is allowed to Score Freight in the Alliance Shipping Hub, Shared Shipping Hub, and the Storage Units. The Playing Field Area containing the Shared Shipping Hub is not in a Warehouse and therefore, a Robot in this Area is eligible to Score Freight.

In general, any piece of Freight outside the Warehouse that is not in a Scored state is eligible to be Scored. A piece of Freight is not required to follow Warehouse Operations when exiting the Warehouse for it to be eligible for future Scoring. The Penalty assessed against an Alliance for not following Warehouse Operations offsets the future Scoring potential of the Freight for the Penalized Alliance.

(Asked by 5667 answer published at --)

Q110 Clarification on Warehouse Operations

Q:
Suppose our robot has a linear slide intake, are we allowed to extend the intake and start collecting freight before the robot is fully in the warehouse? Our robot will eventually fully drive into the warehouse and then fully exits to deliver the freight. We want to clarify if we're allowed to start the intake before we're fully in the warehouse (the purpose is to save some extra time in both autonomous and teleop). Thanks.

A:
The Game Manual Part 2 section 4.4 describes the Warehouse Operations sequence. A Robot must perform the following sequence to remove a piece of Freight from the Warehouse:
a) Start Completely Out of the Warehouse, then
b) Drive Completely In the Warehouse, then
c) Collect one (1) piece of Freight, then
d) Drive Completely Out of the Warehouse with the collected Freight.

The Robot's actions described in the question do not follow Warehouse Operations because it "start[s] collecting Freight before the Robot is fully In the Warehouse." Collecting Freight before the Robot is Completely in the Warehouse does not follow the step b) to step c) sequence. In this scenario, if the Robot removes the collected piece of Freight from the Warehouse, it will receive a Minor Penalty for violating rule GS5a.

(Asked by 14179 answer published at --)

Q101 Accidental Launching of Freight

Q:
If a team accidentally launches freight a significant distance (more than a foot) but it does not affect gameplay or give a certain team an advantage (say it gets launched back into the warehouse), will a penalty still be given?

A:
No Penalty should be assessed for the scenario described in the question.

Note: A rule GS5a Penalty will be applied to the Alliance for the following sequence: a) a Robot In the Warehouse accidentally or intentionally releases Freight that exits the Warehouse; then b) the Robot remains In the Warehouse or the Robot exits the Warehouse while Possessing or Controlling a different piece of Freight. In this scenario, the Warehouse Operations sequence was not followed for the Freight that illegally exited the Warehouse and a Minor Penalty will be assessed per rule GS5a. The piece of Freight that exited the Warehouse without following Warehouse Operations is eligible to be Scored by any Robot.

(Asked by 8565 answer published at --)

Q107 Contact with multiple game elements

Q:
If a robot's collecting mechanism contacts multiple pieces of Freight at the same time, but only collects one piece, does the contact with other Freight count as inadvertent contact, and therefore be legal? This question assumes that only one piece is collected, the other touched Freight stay outside the robot, and touched Freight are not moved to a more strategic location.

A:
The Robot in this scenario has not violated any rules.

(Asked by 3491 answer published at --)

Q104 GS3a - Inadvertent and Inconsequential Contact - At what point does it Affect Gameplay?

Q:
We’d like a clarification on the Inadvertent and Inconsequential contact that is allowed within rule GS3a. A robot scores on its Alliance Shipping Hub and bumps it, causing a slight movement of the base, should the small movement of the Alliance Shipping Hub be penalized? How should rule GS3a apply in this scenario?

A:
Rule GS3a states that Robots may not intentionally relocate their Alliance Shipping Hub. Inadvertent and Inconsequential contact is allowed but intentional movement that affects gameplay is assessed a Major Penalty.

Ideally, when maneuvering near the Alliance Shipping Hub, Teams are expected to maintain sufficient control over their Robot so that there is no translational movement of the Hub. In general, an individual large movement or cumulative small movements of the Alliance Shipping Hub that affect gameplay should be Penalized per rule GS3a.

Example scenarios:

1) No Penalty should be assessed against an Alliance for a single isolated bump of its Alliance Shipping Hub that causes a small movement of the Shipping Hub.

2) No Penalty should be assessed against an Alliance that occasionally bumps its Alliance Shipping Hub if the resulting cumulative movements do not affect gameplay.

3) An Alliance that consistently bumps the Alliance Shipping Hub during Scoring Attempts is likely to cause the Shipping Hub to move a consequential distance. This is considered to be a pattern of small movements of the Alliance Shipping Hub, done with purpose. At the time the cumulative movement of the Alliance Shipping Hub first affects gameplay, a Major Penalty will be assessed for violating rule GS3a. The preceding individual small movements are not Penalized for rule GS3a violations. Warning: future large individual or cumulative small movements of the Alliance Shipping Hub that further increase the level of impact on gameplay could receive an additional Penalty for violating rule GS3a.

Pro Tip: The Team meeting schedule should include ample time for Driver Practice and Autonomous operation testing. Poor driving skills or autonomous robot maneuvering mistakes do not excuse the Robot from being Penalized.

Note: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head referee.

(Asked by 2844 answer published at --)

Q100 Deliverly involving contact with sweeper plate but movement independent from carousel

Q:
Does these count as delivery 1: The carousel is spun slowly until the duck hits the sweeper plate. Then the carousel is spun quickly but is then stopped but the duck flys off due to inertia. The duck leaves the carousel but is always in contact with the sweeper plate 2: The carousel is spun slowly until the duck hits the sweeper plate. Then it is spun quickly so the duck deflects off the sweeper plate. The duck does not always contact the sweeper but contact with the sweeper causes delivery.

A:
We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head referee.
The Delivery sequence described in the Game Manual Part 2 section 4.4 requires the Sweeper Plate to knock the Duck or Team Shipping Element off the Carousel onto the Playing Field Floor. There is no requirement for the Duck to travel along the entire length of the Sweeper Plate before exiting the Carousel.

Pro Tip: The Team's Delivery strategy and the Robot's actions to Deliver the Duck or Team Shipping Element should clearly demonstrate compliance with the required three part Delivery sequence.

Q84 If a scoring error is made, can the score be edited?

Q:
Does a scorekeeper have the ability to edit scores for completed matches if the refs determine that an error has been made, or has something changed?

A: Yes.

Q96 Clarification of Rule GS4b

Q:
Rule GS4b in Game Manual 2 states that: "While a Robot has a Possessed Team Shipping Element In the outside edge of the Shipping Hub, it cannot be Interfered with." Question 1: Does this apply to all periods of the match or just in endgame? Question 2: Additionally, it states that: "Each violation will result in a Cap being awarded plus a Minor Penalty to the offending Robot." Does this penalty stack so that you could theoretically be awarded more than two capping attempts?

A:
Answer 1: Rule GS4b starts with the sentence: "Robots may not Interfere with their opposing Alliance’s Capping attempts." Since Capping is an End Game activity, rule GS4b protections apply only during the End Game.

Answer 2: No.

Q90 Contact with upper levels of alliance shipping hub

Q:
When placing freight on levels 2 or 3 of the robot's Alliance Shipping Hub, does incidental contact between the robot and levels 2 or 3 that does not translate hub incur a penalty?

A: No.
Q85 Blocking Section Between Barriers and Field Wall

Q:
Is it legal to stay in the sections of the field in between the barriers and the field wall? The definition of blocking in Game Manual 2 states: "Preventing an opposing Alliance Robot from accessing an Area or Game Element for an extended period by obstructing ALL paths of travel to the object or Area." The opposing robot still has a path over the barriers, so would staying in the ~13.5" section between the barrier and field wall be legal?

A:
The Robot in this scenario is not violating any rules.

A Robot Parked in the section of the Playing Field in-between the Barrier and the Playing Field Wall does not satisfy the definition of Blocking found in section 4.4 of the Game Manual Part 2.

(Asked by 7303 answer published at --)

Q70 Controlling an object...

Q:
As defined in GM2, 4.4 the definition of controlled "An object is Controlled by a Robot if the object is following the movement of the Robot" So: Does the robot changing the movement of an object while the robot is stationary (ex: rolling ball hits the side of a stationary robot and is stopped, or a game element slides down a stationary ramp) count as controlled/controlling?

A:
Answer 1: Inconsequential rolling Cargo that hits the side of a stationary Robot is not Controlled by the stationary Robot.

Answer 2: A Robot intentionally causing a Scoring Element to slide down a stationary ramp is Controlling.

(Asked by 16072 answer published at --)

Q65 Freight falls on robot from other robot or hub: is it controlled?

Q:
If two robots collide and the freight held by the other robot falls onto your robot do the penalties from rule GS8 apply? What if freight falls from a hub onto your robot? Does it depend on if your robot bumped the hub or if another robot bumped the hub? This is similar to Q44 except the action that placed the freight on your robot might be caused by other robots.

A:
The Freight in all of these scenarios is Possessed by the receiving Robot and subject to rule GS8 constraints and consequences.

Note: Freight intentionally placed On a Robot by an opposing Alliance Robot is covered by rule G3 and is not subject to rule GS8 constraints and consequences.

(Asked by 20370 answer published at --)
Q63 Is intentionally pushing down one side of the alliance shipping hub to tilt it legal

Q:
From Q16, does intentionally pushing down or up from one side of the alliance shipping hub to tilt it permitted, or would this be considered grasping? (To boil it down completely; could a piece of the robot, go over or under level 1 of the alliance hub and and then in almost a linear motion push down or up with enough force to tilt the hub in a desirable position? And while tilted score a shipping element?)

A:
Answer 1: The Robot's actions applied to its Alliance Shipping Hub in this scenario are not grasping and are permitted.

Answer 2: Freight may be Scored On the Alliance Shipping Hub while the Hub is tilted by a Robot.

(Asked by 11703 answer published at --)

Q57 What is Playing Field Perimeter outside boundary for andymark Perimeter

Q:
Andymark Perimeter https://www.andymark.com/products/first-tech-challenge-perimeter-kit-b, the wall has 2 parts: plastic transparent wall, plus top and bottom black metal bar. The black metal bar is even further outside the transparent wall. What's the outside boundary of Playing Field Perimeter in this case? Asked because there is rule saying the robot must be inside the playing field perimeter. Want to double check, if it needs to be within the vertical line of the transparent wall?

A:
The Playing Field Perimeter is defined in section 4.4 of the Game Manual Part 2. From the Game Manual:

Playing Field Perimeter – The outside face of the Playing Field Wall.

Referees should use the vertical plane defined by the outside face of the Playing Field Wall's black metal frame to determine Inside and Outside the Playing Field Perimeter.

(Asked by 12611 answer published at --)

Q51 Freight Obstructing Warehouse Exit

Q:
What happens if freight is obstructing the exit to the warehouse and a robot carrying a piece of freight accidentally pushes the freight outside while exiting the warehouse? Does the same ruling apply if some versus all paths of exits are obstructed?

A:
Referees will apply rule GS5 consequences to gameplay strategies that attempt to circumvent the Warehouse Operations sequence. Examples of strategies that referees will likely consider circumventing Warehouse Operations include: 1) Strategically placed Freight Inside the Warehouse that are Plowed or Controlled by a Robot
exiting the Warehouse; 2) Removing Freight from the Warehouse by Plowing or Controlling easily avoidable Freight.

During normal gameplay, Freight may inadvertently become repositioned near the Warehouse border. A Robot Plowing or Controlling Freight that are inadvertently positioned near the Warehouse border should not be assessed a Penalty for violating rule GS5. This guidance applies if some or all paths of exits are obstructed by inadvertently relocated Freight.

We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head referee.

(Asked by 16750 answer published at --)

Q44 Delivered duck falls on robot: is it controlled?

Q:
If the robot delivers a duck but the duck falls onto the robot and gets stuck, is the robot now controlling the duck and is this robot now prohibited from controlling any other freight for the rest of the match? If you then deliver a second duck and it also falls onto your robot are you then accessed a penalty?

A:
A Duck falling from the Carousel that gets stuck in a Robot becomes Possessed and is subject to the constraints of rule GS8 Control/Possession Limits of Scoring Elements.

**Scenario 1:** A Duck gets stuck in a Robot that was not Possessing another piece of Freight. No Penalty is assessed for this action. No points for Delivery are earned if the Duck does not follow the Delivery steps described in section 4.4 of the Game Manual Part 2.

**Scenario 2:** Adding to Scenario 1, an additional Duck gets stuck in a Robot that is already Possessing one (1) Duck. The Robot now Possesses two Ducks and will receive the Penalty consequences described in rule GS8.

(Asked by 20370 answer published at --)

Q42 Is It possible to Right a Tipped Over Shipping Hub?

Q:
If the alliance shipping hub gets tipped over can the affected team right it to the original state prior to the tipping? For example, if it got tipped over by a failed auto or another accident, this could cause the rest of the match to be obsolete.

A:
Yes, Robots may attempt to return their tipped Alliance Shipping Hub to its normal orientation on the Playing Field Floor, provided that no rules are violated. For example, Robots are not allowed to Grab or Grasp the Alliance Shipping Hub per rule G25.

Keep in mind that in this scenario, the term "tipped" describes the state of an Alliance Shipping Hub with a domed base that is not touching the Playing Field Floor.

Note: Rule GS3a consequences will be suspended while a Robot is attempting to correct the tipped Alliance Shipping Hub's orientation. When correcting a tipped Alliance Shipping Hub, Robots should attempt to position the Alliance Shipping Hub in its approximate pre-Match starting location.
Q39 Magnetization of Game Elements

Q:
Would temporary magnetization of a field element be considered field damage? “Playing Field Damage – A physical change to a Game Element or Playing Field that affects gameplay.” (Definitions Game Manual Part 2)

A:
Yes, a persistent change to the operation of a Game Element that affects gameplay is considered to be Playing Field Damage.

Q25 Clarification on Launching

Q:
Can you clarify the extent Launching and <GS6> should be called? Can you rule on the following? 1. Powered mechanism moves Freight horizontally out a hole in the side of the Robot. Freight falls with horizontal momentum from this. 2. Robot's mechanism normally drops Freight using gravity (i.e. open claw), but Robot was moving when it released. Freight falls with horizontal momentum from this. Perhaps you can state whether intent is just that teams aren't Launching significant distance.

A:
The definition of Launching is found in Section 4.4 of the Game Manual Part 2:

"Launching - Propelling Game Elements with enough force such that they move independent of contact with the Robot. Movement solely due to gravity is not Launching."

The intent of rule GS6 is for Robots to drop Scoring Elements into a Scoring location. Imparting a small amount of horizontal momentum is allowed. For example, horizontal travel that is no more than 150% of the maximum dimension of the Freight will likely be viewed by the referee as not Launching.

Keep in mind that we cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head Referee.

Q26 Does intaking 2 freights and immediately spitting out extra one get penalty

Q:
When intaking the freights, if it accidentally getting 2, the 2nd one did not completely get into the container, but on the way between intake and container, then robot immediately spits out the 2nd freight, does this behavior get penalty? Even if we make a container which can only fit 1 freight, it is still possible intake can push or touch another freight. Under what condition, will this 2nd freight be considered as extra control?

A:
If the Possession time of the second piece of Freight is brief, the action described in this scenario should not receive a penalty for violating the Control/Possession Limits of Scoring Elements rule GS8.
Keep in mind that we cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head referee.

(Asked by 12611 answer published at --)

Traditional - Pre-match

Q166 Moving Servos Continuously During Initialization

Q:
Are teams allowed to continuously move servos while their Autonomous program is initialized up until the Autonomous period starts? We know that teams are allowed to move servos once after a program is initialized, but we are not sure if teams are allowed to move them back and forth constantly until the Autonomous period starts.

A:
The Robot's actions violate rule G18 for starting gameplay early. The Robot must be motionless at the end of the Drive Team's pre-Match setup sequence described in the Game Manual Part 2 section 4.5.1 item 2. Inconsequential, small servo jitter is allowed. Commanded servo motor motion after the referee signals that pre-Match set-up is complete is not allowed.

(Asked by 3805 answer published at --)

Q150 May a robot scan between removing the barcode duck but before placing their TSE?

Q:
Previous rulings have confirmed that you may scan the field with sensors before the match begins. Furthermore they have stated that some calibration instigated by humans is allowed. They have also said you may not move the duck or TSE to all the barcode positions for calibration. Our question is: May we remove the duck from the field, the calibrate our sensors, and then place our Team Shipping Element back on the center barcode? (Assuming none of this will delay the start of the match).

A:
Yes, provided that the Robot set up procedure does not delay the start of the Match.

Note: Drive Teams are allowed to remove the Duck from the Barcode only if it is replaced with a Team Shipping Element.

(Asked by 16321 answer published at --)

Q159 Freight distribution

Q:
Although freight may not be exactly equally distributed between the corner tile of the two warehouses, should the freight within a warehouse be spread out approximately evenly over the corner tile, or can a head referee choose to place all the freight bunched up in the corner of the tile at the beginning of a match? Can a team ask that freight
within the tile be more evenly distributed before the start of a match if it is all contained within less than half of that tile?

A:
Approximately half of the Freight are placed in the corner tile of each Warehouse as described in Section 4.5.1.1.b and Appendix B of the Game Manual Part 2. The Freight should be evenly distributed within the single tile (i.e., not tightly bunched in the corner). Per Rule G12, if you believe the Playing Field is not set up correctly, you may notify the referee or field technical advisor prior to the start of the Match.

(Asked by 16597 answer published at --)

Q127 Can you scan during Robot Setup?

Q:
When we set up our Autonomous during the Setup period, we are not able to see our camera stream so we can't see if our camera will correctly identify which level to put the robot on. If we INIT our Autonomous, we can then navigate to our Camera Stream to see if our camera correctly identifies it. The only way we can exit the camera stream is to cancel the Autonomous. Are we allowed to then cancel our Autonomous to reinitialize our Autonomous so long as we do it within the set up phase?

A:
Yes, provided that the Robot set up sequence does not delay the start of the Match and the Drive Team does not move the Duck or Team Shipping Element from the center Barcode position.

(Asked by 15005 answer published at --)

Q121 Can we briefly move robot back and forth along wall during pre-match setup?

Q:
There is nothing stated on what a minimum allowed time is for team setup in the pre-match period. Our team has a very brief camera sensor calibration that we run which involves manually moving the robot back and forth along the wall near the starting position, about the length of a tile. The whole process is short, less than 10s and allows us to calibrate for any odd venue lighting. Note we are not looking for the field elements so this is not similar to Q88 in any way. Is this set up allowed?

A:
Sensor calibration and human-powered translational and/or rotational movement of the Robot during pre-Match setup are allowed. Keep in mind that the Drive Team's entire set up checklist/process is not allowed to delay the start of a Match, interfere with other Drive Teams or Robots, or affect the location of Game Elements beyond the pre-Match setup steps described in the Game Manual Part 2 section 4.5.1.

For safety reasons, Robot drivetrain motion during sensor calibration should not be controlled by Gamepad commands or autonomous software.

Pro Tip: Maximize your pre-Match set up time by arriving on time or early at the Match queue. Drive Teams arriving late at the Playing Field may not have sufficient time to complete their entire pre-Match Robot set up checklist before field personnel declare that it is time to Randomize the Playing Field.

(Asked by 10138 answer published at --)
Q88 During pre-match setup, can we move the Barcode TSE or Duck to all 3 Barcode locations

Q:
Can our team, during pre-match setup, move the Barcode TSE or Duck to all 3 Barcode locations as part of our robot setup and initialization routine? GS1 allows us to place our TSE in place of the Barcode Duck, as an exception to G12, but is not specific as to where it can be placed

A:
No, we are not going to allow this at matches. As part of pre-match setup, a duck is placed on the center barcode prior to randomization. GS1 allows the teams access to the field prior to a match to substitute that pre-placed duck with their Team Shipping Element. That is where the TSE must be placed.

(Asked by 14615 answer published at --)

Q38 Using gamepad to set autonomous actions

Q:
In the past, we have had a single OpMode for autonomous where the drivers could use the gamepads to select which of the various OpModes should be run based off of conversation with their alliance partner BEFORE randomization. This allowed an easy way to reuse code and kept the number of OpModes to a minimum. Is this still legal? (The wording of GM2 4.5.2 d (iv) seems to make that illegal this year, but we are hoping that is not intentional)

A:
The actions described in the question are allowed.

(Asked by 16072 answer published at --)

Traditional - Autonomous Period

Q167 Storage Unit - Completely Parked in Autonomous

Q:
If our Robot Arm extends beyond the 23.0" of the Alliance Storage Unit, can we rotate our Robot Arm so that it extends over the Field Wall when stopped to comply with the "Completely" in Alliance Storage Unit, if the tape line is the "Extention" vertically of the "Completely" in zone?

A:
The Storage Unit Area is defined by gaffer tape on three sides and the Playing Field Wall on the fourth side. Extending a Robot arm over the Playing Field Wall extends a portion of the Robot Outside the Alliance Storage Unit boundary.

Intentional Robot extension Outside the Playing Field Perimeter is not permitted and is subject to rule S2 consequences.

Note: See the definition of "Area" in the Game Manual Part 2 section 4.4.
Q106 autonomous multiple freight

Q: If during autonomous, a robot places the preloaded box on a level that would earn bonus on the team shipping hub, gets another freight and places the second freight on a different level, would the alliance get bonus points for the preloaded box and points for placing the non-preloaded freight?

A: Yes.

Q66 Autonomous Bonus "detect the correct Level"

Q: In 4.5.2 4) the wording is "A Robot that uses ... to detect the correct Level..." Does this mean that a robot that places the freight on the correct level by chance without attempting to detect the duck or shipping element gets no bonus? Does this mean that a robot that places the freight on the correct level by chance after it failed to detect the duck or shipping element gets no bonus? (I expect there is no way for a referee to judge this case but I'm including it for completeness.)

A: A Robot placing the Pre-Loaded Box on the correct Alliance Shipping Hub Level by chance is eligible to earn the Autonomous Bonus.

Traditional - Driver-Controlled Period

Q169 Downward Contact on Shared Shipping Hub

Q: Question 1: Can a robot hit down on the shared shipping hub causing freight from the opposing alliance to bounce over to their side? We had that happen in a tournament, not only while freight was being delivered, but the robot arm continued to hit down on the hub several times even after freight was delivered. Question 2: Is it acceptable to drop freight from the robot from say 10-12" onto the shared hub (gravity only)?

A: Answer 1: Gameplay strategies that descore Freight from the opposing Alliance's section of the Shared Shipping Hub receive a Major Penalty per Scoring Element as described in rule GS2d. It is possible that a referee will view the Robot's actions in this scenario as violating rule GS2d. We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head referee.

Answer 2: There is no rule that specifically limits the maximum height for dropping Freight (gravity only) onto a Shipping Hub.
**Q156 Shared Shipping Container Unbalanced points clarification**

**Q:**
If an opposing alliance places a piece of freight on the shared shipping container without fully leaving the warehouse, but that one piece of freight is the only freight on the shipping container, causing it to be unbalanced towards the opposing alliance side, does the opposing alliance get rewarded 20 points for the shipping container being unbalance at the end of the match? Basically can improperly placed freight reward an alliance team with unbalanced points?

**A:**
In this scenario, the Robot receives a Minor Penalty for Scoring Freight while the Robot is In the Warehouse (GS5b) and it also receives a Minor Penalty for not following Warehouse Operations (GS5a).

Freight exiting the Warehouse without following Warehouse Operations remains eligible for Scoring.

If the Freight in question remains On the Alliance's side of the Shared Shipping Hub at the End of the Match the Alliance earns four (4) points. If the Alliance's section of the Shared Shipping Hub is contacting the Tile Floor at the End of the Match it is Unbalanced and the Alliance receives twenty (20) points.

(Asked by 11703 answer published at --)

**Q153 Moving freight with warehouse using arm during the driver-controlled period.**

**Q:**
Can we use a robot arm to push multiple freight items from the corner to the middle of the warehouse during the driver-controlled period? We are referring to moving within warehouse so that our arm can access freight from the middle of warehouse.

**A:**
No, the Robot is violating rule GS8a because it is Herding a quantity of Freight above the allowed limit to gain a strategic advantage.

Note: A Robot is allowed to nudge Freight out of the way to access a specific piece of Freight.

(Asked by 18241 answer published at --)

**Q152 Descoring freight on shared shipping hub**

**Q:**
In our last match, the opposing alliance legally placed freight in their side of the shared shipping hub. Then our alliance legally placed freight in our side of the shipping hub, causing the hub to tip to our side. When it shifted, the other alliance's freight shifted and rolled into our side of the shipping hub. Neither alliance's robot touched the shipping hub in any way. 1.) Does this count as a descored freight, thus incurring a penalty? 2.) Do we score the points for this freight?
A:

Answer 1: No.

Answer 2: Yes, if the Freight remains On your Alliance's side of the Shared Shipping Hub at the End of the Match.

(Asked by 16597 answer published at --)

**Q146 Shared Shipping Hub turned 180° during Teleop**

**Q:**
During Teleop, the Shared Alliance Hub was hit by an opposing alliance robot and it rotated 180° so that our color was on the opposite side. This meant that we had to travel all the way to the other side to put in our freight. A robot was effectively blocking the way through the warehouse and we could not get through. I know they received a major penalty, but we could not make any more points, either. Can a ref rotate the hub back or are we without recourse if it happens again?

**A:**
Tournament safety protocols prevent field personnel from entering the playing field during a Match.

(Asked by 9579 answer published at --)

**Q140 Follow-Up to Q133 about Legal Defense**

**Q:**
Question 1: Rule G3 does not list a penalty for forcing an opposing robot to get a penalty. Is this intentional, and to what extent? EX: a robot pushes an opposing robot, causing consequential movement to the shared shipping hub. Question 2: If a robot being defended descores its own freight from the shared shipping hub, under what criteria would a GS2 penalty assessed to the defending alliance?

**A:**
Answer 1: The first part of the question is too general to answer. Concerning the example, no rule GS3 Penalty is assessed. Referees will likely escalate this type of defensive activity to a violation of rule G30 for egregious behavior. There is also a potential for violating rule G26.

Answer 2: Neither Robot receives a rule GS2 Penalty. The scoring Robot is protected by rule G3. Rule GS2 does not apply to the defending Robot because it did not remove Freight from the opposing Alliance's Shipping Hub.

(Asked by 16750 answer published at --)

**Q137 GS3e, any penalty if pushing other robot to their alliance hub?**

**Q:**
Follow up for Q133, if the opposing alliance robot pushes our robot to hit our alliance shipping hub, does that violate rule GS3e, "Robots cannot Interfere or interact with the opposing Alliance Shipping Hub or the opposing Alliance section of the Shared Shipping Hub."?
A:
The action described in the question does not violate rule GS3e. Referees will likely escalate this type of repeated defensive activity to a violation of rule G30 for egregious behavior. There is also a potential for violating rule G26.

(Asked by 12611 answer published at --)

Q133 Any penalty if Interfering opposite alliance's score attempt to top level alliance hub?

Q:
In a scrimmage, we noticed that there could be heavy defense, including an opposing alliance robot hitting our robot in tele-op, while we are trying to place freight on the top level alliance hub. Question 1: Does that have any penalty? Question 2: Under what situation will that be illegal?

A:
Answer 1: No.
Answer 2: The defensive Robot needs to be careful not to violate rules G26, G28, or GS3e.

Keep in mind that we cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head referee.

(Asked by 12611 answer published at --)

Q124 Clarification on Warehouse Operations Penalties and Q51

Q:
The answer to Q51 states that a GS5 penalty should not be assessed if "some or all paths of exits are obstructed by inadvertently relocated freight." Can you clarify this or provide examples as to what would and what would not fit this declaration? Would freight in only one of the spaces between the barrier and the field wall qualify? How does the "paths of exits" guidance apply as some robots inherently have less paths of exits than other robots (e.g. can't drive over the barrier successfully)?

A:
Answer 1: Inadvertently relocated Freight example. - A piece of Cargo rolls into the path of a Robot approaching the Warehouse border. The Robot Plows the Cargo while exiting the Warehouse. The Plowed Cargo is "Inadvertently relocated Freight" and does not receive a Penalty for violating rule GS5.

Answer 2: A Robot approaches a stationary piece of Freight near the Warehouse border between the Barrier and the Playing Field Wall. The second Barrier free Warehouse exit is not obstructed by a piece of Freight. - This Freight is easily avoidable because the Robot can a) travel a different exit path (over the Barrier or through the other Barrier free exit) or 2) reposition the Freight so that it remains In the Warehouse upon Robot exit. If the Robot Possesses or Controls a piece of Freight and also removes the "stationary piece of Freight near the Warehouse border" when the Robot exits, a Minor Penalty will be assessed for violating rule GS5. The state of the second Barrier free Warehouse exit (clear of obstructed) is irrelevant.
Answer 3: Does rule GS5 apply differently to Robots that are unable to travel over the Barrier? No, the Barrier is considered an open path of travel for all Robots, even if the Robot is not capable of traveling over the Barrier.

(Asked by 7373 answer published at --)

Q91 Can placement of Team Shipping Element be considered blocking?

Q:
Can the placement of the Team Shipping Element in strategic parts of the field be considered blocking? For example, the blue team places their TSE in the gap between the wall and the barriers to force the red team robot to travel over the barriers to enter the warehouse.

A:
This strategy is not allowed because it uses the Team Shipping Element protections provided by rule GS4c to increase the difficulty of gameplay for the opposing Alliance, a violation of rule G29.

Strategies that use the location of a Team Shipping Element to amplify the difficulty of any Scoring or game activity will be Penalized as described in rule G29.

(Asked by 14393 answer published at --)

Q74 Warehouse Operations <GS5> Multiple Rogue Freight Entering Field Simultaneously

Q:
Our refs have said that if freight inadvertently enters the field (i.e.due to normal plowing) the robot must "follow it out" of the warehouse in order to meet Warehouse Operations (WO) and avoid penalty <GS5>. We have seen plowing cause multiple pieces of freight to leave the warehouse at one time. Does WO require the robot to leave and re-enter the warehouse once for each piece of freight or will one exit make all the freight that left the warehouse scorable without penalty?

A:
Referees manage Warehouse Operations and the Scoring eligibility of Freight leaving the Warehouse by assessing Penalties at the time of the infraction for each piece of Freight that does not follow Warehouse Operations when exiting the Warehouse. The Penalty assessed against an Alliance for not following Warehouse Operations offsets the future Scoring potential of the Freight for the Penalized Alliance. Assessing the Penalty when the Freight exits the Warehouse eliminates the need for referees to keep track of how each individual piece of Freight exited the Warehouse as gameplay progresses.

In general, any piece of Freight outside the Warehouse that is not in a Scored state is eligible to be Scored without further Penalty. A piece of Freight is not required to follow Warehouse Operations when exiting the Warehouse for it to be eligible for future Scoring.

The following example scenarios demonstrate how referees should apply rule GS5 constraints and consequences.

Scenario 1: A Robot that does not Possess a piece of Freight completely exits the Warehouse while pushing (Controlling) one (1) piece of Freight.
Consequence for Scenario 1: Warehouse Operations were followed. No Penalty is assessed and the Freight is eligible to be Scored.

Scenario 2: A Robot that does not Possess a piece of Freight fully exits the Warehouse while pushing (Controlling) 2 pieces of Freight.

Consequence for Scenario 2: Warehouse Operations were followed for only one Piece of Freight. A Minor Penalty is assessed for one piece of Freight that didn't follow Warehouse Operations. Both pieces of Freight are eligible to be Scored without further GS5 Penalties.

Scenario 3: Same as Scenario 2 plus the Robot returns to be Completely Inside the Warehouse without Controlling or Possessing a piece of Freight. The Robot then exits the Warehouse without Controlling or Possessing a piece of Freight. The Drive Team's intent is to avoid a Penalty for previously exiting the Warehouse while Controlling two pieces of Freight.

Consequence for Scenario 3: Warehouse Operations were followed for only one Piece of Freight. A Minor Penalty is assessed for one piece of Freight that didn't follow Warehouse Operations. Both pieces of Freight are eligible to be Scored without further GS5 Penalties. The Robot returning to the Warehouse and exiting without Controlling or Possessing Freight did not affect the rule GS5 Penalty assessed when the infraction occurred.

As previously stated in the answer for Q51 (/qa/51), removing Freight from the Warehouse by Plowing or Controlling easily avoidable Freight is subject to rule GS5 Penalties. To be safe from possible rule GS5 Penalties, Freight blocking the preferred path out of the Warehouse should be repositioned so that they are not pushed out of the Warehouse when the Robot exits, or the Robot should exit the Warehouse using a path that is clear of Freight. Easily avoidable Freight that exits the Warehouse without following Warehouse Operations will likely be assessed a rule GS5 Penalty.

Note: See Q51 (/qa/51) and Q62 (/qa/62) for related information.

(Asked by 18597 answer published at --)

Q68 Movement of the Shared Shipping Hub During Teleop

Q:
Hi, our team has a question regarding the scoring for the shared shipping hub. How much bumping to the shared shipping hub is considered too much and would result in a minor penalty?

A:
Rule GS3d states that Robots may not intentionally relocate or rotate the Shared Shipping Hub. Inadvertent and Inconsequential contact is allowed but intentional movement that affects gameplay is assessed a Major Penalty.

Ideally, when maneuvering near the Shared Shipping Hub, Teams are expected to maintain sufficient control over their Robot so that there is no translational or rotational movement of the Hub. In general, individual or cumulative Robot actions that affect the Shared Shipping Hub gameplay should be Penalized per rule GS3d.

Example scenarios [not a complete list] that will likely receive rule GS3d Penalties are:

1) A Robot during scoring attempts, consistently bumps into the Shared Shipping Hub causing small translational movements of the Hub. This is considered to be a pattern of small movements of the Shared Shipping Hub, done with purpose.
2) Robot interaction with the Shared Shipping Hub that result in translation or rotation of the Shared Shipping Hub that has an effect on gameplay. For example, movement of the Shared Shipping Hub towards the opposing Alliance's Warehouse that unreasonably increases the difficulty for the opposing Alliance Robots to access the Hub.

Pro Tip: The Team meeting schedule should include ample time for Driver Practice and Autonomous operation testing. *Poor driving skills or autonomous robot maneuvering mistakes do not excuse the Robot from being Penalized.*

Note: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head referee.

(Asked by 14779 answer published at --)

**Q62 Can you score freight that enters the field without proper Warehouse Operations?**

**Q:**
The game manual is clear on the proper procedure for removing freight from the warehouse. It's quite logical, though, that freight might enter the field without those procedures being followed properly—e.g. freight that gets bumped and rolls out of the warehouse, freight that's being carried by robots that falls out of robot control before exiting the warehouse fully. Can freight that enters the field in this way be scored? Do any penalties apply for not following proper warehouse operations?

**A:**

*Answer #1:* Freight removed from the Warehouse without following Warehouse Operations remains eligible to be Scored.

*Answer #2:* Rule GS5 Penalties for not following Warehouse Operations are assessed at the time of the infraction. No additional Warehouse Operations related Penalties are assessed when a Robot Scores Freight that exited the Warehouse without following Warehouse Operations. See [Q51](/qa/51) for related information concerning Warehouse Operations.

(Asked by 15815 answer published at --)

**Traditional - End Game**

**Q175 Follow-Up to Q170 about Legal Defense**

**Q:**
In the end game period, suppose our robot has the TSE in our delivery arm, and at the same time, the robot has another freight in the delivery arm as well (this does not violate 1 freight control limit). When the robot extends the arm and try to do the delivery, it's not clear if it's a capping attempt or a freight delivery attempt since the robot may do either one or both. In this case, is any attempt to block the arm is illegal?

**A:**
During the End Game, the Drive Team's intent to Score a Possessed piece of Freight or to use their Possessed Team Shipping Element for the Capping achievement is irrelevant. Rule GS4b protections apply as soon as the Possessed Team Shipping Element is located In the outside edge of the Shipping Hub. Therefore, attempts to
block the Scoring Robot's arm are illegal.
(Asked by 14179 answer published at --)

Q147 Delivered duck bounces off the robot and doesn't get stuck. Do we get points?

Q:
The duck falling from the carousel falls onto our robot and then bounces onto the playing field in autonomous or endgame. Question 1: Do we get a penalty for violating delivery scenario? Question 2: Do we get points for duck delivery?

A:
Answer 1: Inadvertent Duck contact with the Robot during Delivery is allowed.
Answer 2: Yes.
(Asked by 11044 answer published at --)

Q134 Interaction with Ducks following Delivery

Q:
Rule GS9(a) states that a robot may Control a Duck after it contacts the playing field floor. Could a robot lay down a net flat against the playing field floor, so that the Duck falls and touches the playing field floor through a gap in the net (i.e. small, thin strings spaced apart more than 0.5”), such that the robot could then Control the Duck? The net would not affect the motion of the Duck, such that the robot would not Control the Duck until it has touched the floor and completed Delivery.

A:
The scenario described in the question is not a valid gameplay strategy for the following reasons:

1) The net is effectively a continuous surface that catches the Duck. This Robot Control of the Duck violates rule GS9a.
2) The net may pose a risk of entanglement. A violation of game rule G26 and Robot construction rule RG01d.

(Asked by 7373 answer published at --)

Q142 Duck Delivery

Q:
In End Game, duck (or TSE) is introduced to Playing Field Floor but is not delivered (as defined in GM2 delivered def (c)). GS9(b) states ducks not "delivered" to Playing Field Floor are assessed a Major. A duck introduced to Playing Field Floor but not delivered would be assessed a Major (-30), correct? Will the duck also receive the 6 points? For a net total of -24? Q5 and Q138 do not completely answer this question, IMO.

A:
The answer depends on how the Duck or Team Shipping Element is "introduced" to the Playing Field.

Examples of introducing a Duck into the Playing Field without following the Delivery sequence that should receive a Major Penalty for violating rule GS9b include:
a) A Robot picks up a Duck from the Carousel.

b) A Drive Team drops a Duck onto the Playing Field Floor.

In both of the examples above, the Duck does not earn the Delivery points.

See Q138 (qa/138) for an example of introducing a Duck into the Playing Field that does not receive a penalty for violating rule GS9b. In this example, the Robot is given the benefit of the doubt that it intends to introduce the Duck into the Playing Field. Since centrifugal force and not the Sweeper Plate introduces the Duck into the Playing Field, the Duck does not earn the Delivery points.

(Asked by 4155 answer published at --)

Q139 Direction duck faces when placed

Q: Do ducks have to face a particular direction when placed on the carousel?

A: A Duck placed on the Carousel during the End Game may face any direction.

(Asked by 11181 answer published at --)

Q132 Delivering ducks in EndGame

Q: At the last scrimmage we faced situations when a duck that the team tried to deliver in autonomous period stayed on the carousel without touching the sweeper plate. What is legal actions that team need to do during (or before) the EndGame for the duck to be counted as Delivered: 1) usual carousel rotation and duck delivery 2) replacing the duck to sweeper plate by hand 3) rotation of carousel in the opposite direction until duck touches sweeper plate and duck delivery Or something else?

A: Option #1 is the correct legal action in this scenario.

(Asked by 12524 answer published at --)

Q122 End game parking

Q: Game manual 4.5.4 Parking – a) Robots Parked In a Warehouse earn three (3) points. b) Robots Parked Completely In a Warehouse earn six (6) points. Since 2 warehouse zones are neutral, we'd like to clarify if parking in the warehouse adjacent to the opposing alliance station will also earn 3/6 points in the end game?

A: Yes, a Robot Parked in either of the two Alliance Neutral Warehouses earns End Game Parking points as described in the Game Manual Part 2 section 4.5.4.

(Asked by 14179 answer published at --)
Q120 When is the earliest you can place a duck on the carousel?

Q: When is the earliest you can place a duck on the carousel? Can you place it on the carousel during teleop? Or do you have to wait for the start of the end game?

A: A Duck placed on the Carousel by the Drive Team before the start of the End Game will earn zero (0) points for the Alliance if it enters the Playing Field.

Section 4.5.4 of the Game Manual Part 2 states: "End Game tasks, with the exception of Parking and the Balance position of the Shipping Hubs, started prior to the start of the End Game will earn zero (0) points for those tasks."

Game Manual Part 2 section 4.4 in the definition of "Deliver/Delivered" provides the sequence required in order to have a legal Delivery. The first step of the sequence requires the Drive Team to place a Duck or Team Shipping Element onto the Carousel Platform Completely In the Drive Team side of the Sweeper Plate. Therefore, a Duck or Team Shipping Element Placed on the Carousel by the Drive Team before the start of the End Game has zero (0) Score Value if it is subsequently entered into the Playing Field.

(Asked by 6596 answer published at --)

Q114 End Game Duck Points

Q: Can you clarify how this typical situation should be scored? One duck is delivered in auto (10 points). In end game 9 more ducks are delivered from the carousel (both teams used TSE for auto) to the floor. GM2 states that Delivered Duck/TSE are scored at rest. Do these 6 points only count what entered the field during endgame or does it also include counting the duck delivered in auto? What should the MAX end game duck points be if a team delivered 1 duck in auto?

A: For the scenario described in Q114, Duck Delivery Scoring is as follows:

Autonomous: One (1) Duck is Delivered for 10 points.

End Game: Nine (9) Ducks in the Loading Dock have the potential of earning 54 total points for Delivery (six (6) points each).

Total potential Delivery Score (Autonomous + End Game) = 10 + 54 = 64 points.

(Asked by 19376 answer published at --)

Q109 Alliance Hub Capping

Q: If a robot had a gripper that completely controlled the team shipping element. Is it considered to be starting endgame early if you position your team element over the top of the Alliance Hub center pole in "scoring" position (possibly touching the end of the center pole) but maintain full control of the team shipping element by not releasing your gripper until the buzzer for endgame goes off.
A:
Game Manual Part 2 section 4.5.4 states that End Game tasks, with the exception of Parking and the Balance position of the Shipping Hubs, started prior to the start of the End Game will earn zero (0) points for those tasks.

Either of the following actions performed before the start of the End Game Period indicate the start of the Capping task:

a) Placing the Team Shipping Element in a position that encompasses and obscures the tip of the Alliance Shipping Hub center pole; or

b) The Team Shipping Element contacts the Alliance Shipping Hub center pole.

If either of the above actions occur before the start of the End Game Period, the Team Shipping Element has zero (0) Capping Score value for the Match.

Note: Rule GS4b protections apply only during the End Game Period.

(Asked by 5386 answer published at --)

Q94 Team Shipping Element - Is this a valid piece of Freight

Q:
Scenario 1: If we cannot Cap our Alliance Shipping Hub with our Team Shipping Element and it falls on Level 3 (not supported by the Center Post, therefore "Not Capped") does it count as Freight? Scenario 2: Also, does this apply to placing the Team Shipping Element on the Shared Shipping Hub?

A:
Scenario 1: Game Manual Part 2 section 4.4 states that Freight consists of Cargo, Boxes, and Ducks. The Team Shipping Element is not Freight and in this scenario has zero Score Value.

Scenario 2: A Team Shipping Element On the Shared Shipping Hub has zero Score value because it is not Freight. Intentional placement of a Team Shipping Element on the Shared Shipping Hub violates rule GS4a. A Major Penalty will be applied to the offending Alliance.

(Asked by 8487 answer published at --)

Q82 Transitive Floor Contact Through Ducks

Q:
During the End Game, it is possible that Ducks will pile up on top of one another as they are Delivered using the Carousel. Is contact with the Playing Field Floor transitive through Ducks? For example, assume you have Delivered 7 Ducks via the Carousel, and now 5 Ducks are touching the Playing Field Floor and 2 Ducks are completely resting on top of those 5. (1) Is a Robot allowed to Control/Possess one of the 2 top Ducks without violating <GS9>a? (2) Have the Top 2 Ducks been DELIVERED?

A:
Example 1: Yes

Example 2: Yes

(Asked by 18151 answer published at --)
Q55 Carousel - Duck Placement - Can the Duck touch the Black Cap and not the Exposed Sweeper Bar

Q:
Carousel - Duck Placement - Can the Duck touch the Black Cap and not the Exposed Sweeper Bar to count for Points as it is pushed off the Carousel by the back of the Sweeper Bar

A:
Yes, contact with the side (not the end cap tip) of the black end cap satisfies the requirement for the Duck or Team Shipping Element to be in contact with the Sweeper Plate.

Pro Tip: Duck or Team Shipping Element placement on the Carousel by a member of the Drive Team is the first step of the Delivery process. An incorrectly placed Duck or Team Shipping Element will receive zero Delivery points.

Caution: The first eligible Duck for the Delivery achievement is placed on the Carousel by field personnel during Pre-Match setup. Illustration B-5 in Appendix B of the Game Manual Part 2 shows how the Duck will be placed on the Carousel. The Drive Team may not change the location of this Duck during Pre-Match Setup.

(Asked by 8487 answer published at --)

Q47 Capping scenario using Team Shipping Element (TSE)

Q:
Is the following scenario considered valid for scoring? 1. During the Endgame while "capping", the TSE is placed on the center pole of the Alliance Shipping Hub. 2. The TSE has a cylindrical opening in the middle such that the TSE slides over the center pole and eventually rests on Level3 of the Alliance Shipping Hub. The height of the TSE is lesser than that of the center pole on Level3. 3. At this stage, the top of the center pole is visible (not obscured).

A:
The Team Shipping Hub in this scenario has zero Score value because it does not satisfy the Capping requirements described in section 4.5.4 item 4) in the Game Manual Part 2. The Team Shipping Element in this scenario is Supported by Level #3 of the Alliance Shipping Hub and it needs to be fully Supported by the center pole.

See question Q40 (qa/40) for related guidance concerning how referees will determine the Score state of a Team Shipping Element that may not be fully Supported by the Alliance Shipping Hub center pole above Level #3.

(Asked by 11129 answer published at --)

Q40 If TSE is touching other freights, does it counted as capping?

Q:
GM2 4.5.4-4) Capping requires the TSE is “fully supported by the center pole above Level #3”. Are the following two cases counted or not? 1) The TSE is supported by the center pole above level #3, but touching other freights. It’s hard to tell how much percentage weight is supported by the center pole. 2) The level #3 is full of freight, even
the TSE is right above the center pole, but not touching the center pole. In another word, the TSE is fully supported by the freights.

A:
A valid Team Shipping Element that encompasses and obscures the top portion of the Alliance Shipping Hub center pole but is not able to be fully supported by the center pole due to contact with Scored Freight should be counted as Scored.

Scenario 1: The Team Shipping Element should count as Scored.

Scenario 2: A Team Shipping Element that encompasses and obscures the top of the pole is assumed to be sufficiently supported by the pole to count as Scored. Team Shipping Elements supported by Scored Freight on Level 3 does not negate the Capping achievement.

(Asked by 19571 answer published at --)

Q34 Clarification of "grasping"

Q:
G25 states the robot may not grab, grasp, and/or attach to any Game Element... My team is wondering if the following scenario would be considered "grasping": The robot places the team shipping element on the Shipping Hub. While the TSE is still "grasped" by the robot, but already placed on the Hub, if the robot then shakes, tips, or otherwise shifts the scoring elements by moving the TSE, has rule G25 been broken? The robot is not touching the Hub in any way other than through the TSE.

A:
The Robot actions described in this scenario are considered to be Grasping the Alliance Shipping Hub and subject to rule G25 consequences.

A small amount of Incidental tipping and/or shifting of the Alliance Shipping Hub while the Robot places the Team Shipping Element on the Alliance Shipping Hub is unlikely to be viewed by the referee as violating rule G25.

We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the referee at your event, with the final call made by the Head referee.

(Asked by 16597 answer published at --)

Q33 Stepping outside of Alliance Station to place ducks

Q:
When loading the ducks onto the carousel, the drive team handler will not be completely in the alliance station. The hands/arms will be reaching out of the alliance station and into the loading dock area. <G16> Alliance Stations – During a Match, the Drivers and Coaches must remain In their Stations. Simply breaking the plane of the Station during normal Match play is not a Penalty. When loading the duck, does the drive team member have to keep both feet in the Alliance Station?

A:
One (1) representative of the Drive Team at a time may extend and/or step outside the Alliance Station Area to interact with the Carousel. The intent is for the Drive Team representative to remain mostly within the combination of the Alliance Station and Loading Dock Areas.
Q31 <GS9> End Game, Carousel, Contact and Movement

Q: <GS9> End Game, after a Duck is Delivered to the Floor, does the Robot have to "stop" touching the carousel when it is stopped, before another duck can be placed on the Nonmoving carousel?

A: Robots are not required to separate from the Carousel while the Drive Team places a Duck or Team Shipping Element on the Carousel.

Q27 Can an empty Alliance shipping hub still earn the 10 balance points During end game?

Q: The "Shipping hub Status" task states that a balanced Alliance Shipping Hub receives 10 points during end game. The shipping hubs by their nature start out balanced when empty. Does a Shipping Hub need to contain freight in order to be eligible for these points or would an empty but balanced shipping hub still receive 10 points?

A: The End Game Alliance Shipping Hub Balance achievement does not require Freight to be Scored on the Hub. An empty and Balanced Alliance Shipping Hub at the end of the Match is eligible to receive the 10 point Balance score.

Q19 Weight of Team Shipping Element

Q: Is there a practical weight limit of a Team Shipping Element with respect to the level platforms of the Alliance Shipping Hub? In other words, is there a weight limit we should not exceed in order to not damage the Hub if an extremely heavy (with respect to other Game Elements) Team Shipping Element were placed on any given level? My team may not have the resources to purchase an Alliance Shipping Hub in order to test this properly, and would appreciate some guidance from the designers.

A: There is no weight limit for the Team Shipping Element. For reference, the top Level of the Alliance Shipping Hub will handle the combined weight of all the Freight on the field. Keep in mind, however, that dropping a TSE from an extended height will result in considerably more force on the Hub than just the weight of the TSE. And any damage to the Hub will result in a Penalty.
Traditional - Field Setup

Q131 Barcode numbering

Q:
In reading the barcode from the viewpoint of the alliance station, is the leftmost square #1 or #3

A:
From the view from each corresponding Alliance Station, the leftmost square of each barcode is #1. Please refer to Appendix D-1 of Game Manual Part 2 (traditional and remote).

(Asked by 1001 answer published at --)

Traditional and Remote- Team Scoring Element

Q126 Team Element Tensorflow Autonomous

Q:
We are a young team and we use block coding. This is the first year we have an autonomous program. Our question deals with the rule that states our team element can not resemble a game element. Our team element does not look like or resemble any of the game pieces. It is an orange traffic cone. The tensorflow program identifies it as a cube. Our question is, Can we use this in our autonomous programming to deliver the freight to the correct level for the 20 points?

A:
Providing all the other rules (size, material, etc.) are met, an orange cone is sufficiently distinct from the block, ball, and duck that it is an allowed TSE.

(Asked by 11940 answer published at --)

Q89 TSE Design Constraints

Q:
Rule TE05 states that a Team Shipping Element may not resemble this year's current scoring elements. May we make the team shipping element similar to pervious seasons' game elements and reuse computer vision software from last year?

A:
Yes, the TSE may resemble past year scoring elements providing no other rules are violated. Team developed code from previous years may be reused.

(Asked by 5361 answer published at --)

Q36 TSE Design Constraints
Q:
Rule TE05 states that a Team Shipping Element may not resemble this year's current scoring elements. How different does a TSE need to be to satisfy this rule? We know that TE04 prohibits the use of scoring elements as a TSE component but does TE05 mean that the TSE cannot be a cuboid or duck-shaped?

A:
During the Autonomous Period teams are rewarded for creating a Team Shipping Element and then training the Tensorflow software to recognize the object. Since FIRST already supplies a canned solution to recognizing a duck, having a duck-shaped TSE would eliminate the need for a team to go through the effort of training their robot. Therefore, duck-shaped TSE's are not allowed. However, because blocks and balls are not used on the barcode, cubic and spheroid shaped TSE's are allowed providing they are sufficiently different from the Game Elements so that field personnel can easily tell them apart during game play.

(Asked by 16424 answer published at --)

Q24 How many Team Shipping Elements can a team have at an event?

Q:
Follow-up to Q7. You answered "A Team has the discretion to provide either zero (0) or one (1) Team Shipping Element for a Match." Is there any limit on how many Team Shipping Elements a team has at an event / presents for inspection, and can they each be different?

A:
No, there is no limit on how many or how many different types of TSE's a team can bring to an event. However, any TSE used in a match must pass inspection.

(Asked by 10723 answer published at --)

Q13 Give a Team Shipping Element to another team

Q:
Can one team create a Team Shipping Element and then give it to another team for a match or event, assuming that the shipping element passes inspection with the appropriate team number of the team receiving it? Or does a team have to make its own TSE?

A:
Yes, teams may share TSE's with another team. However if this requires re-inspection later in the day (like for a team number change) teams should be aware that Inspectors are typically re-assigned to other tasks and it may be some time before the re-inspection can occur.

(Asked by 10723 answer published at --)