

Team Update 01

GENERAL

- **CAD Models:** [The official CAD models](#) have been updated per the changes described in this document and also to correct errors users may have experienced in accessing files for parts that get a vinyl overlay.
- **Control System:** As you dive into programming your robot, we want to point out two pages of the Screensteps documentation you may want to pay particularly close attention to. The [New for 2019!](#) page outlines major software changes for the 2019 season, including information about 2019 Game Specifics such as how the Sandstorm is handled in robot code. The [Known Issues](#) page documents major issues we are currently aware of along with workarounds or solutions where available.

KICKOFF KIT CHECKLIST: BLACK TOTE

V1 of the [Black Tote Checklist](#) has been updated to include the following edit:

Seat Motor
w/ connector, cable

Bosch

6004 RA3 194-
06 1

n/a
www.andymark.com



2019 VIRTUAL KIT CATALOG

Consider marking up your *2019 Virtual Kit Catalog* packed in your Black Tote with the following edits:

- **Inventables:** Use the voucher code as a gift certificate code in the "Enter Promotion" field on the shopping cart page.
- **Next Gen Robots:** Voucher Detail: CIM Cooler 180 or 775 Cooler 360
- **Wolfram:** Access Codes: Visit Team Registration Account (Lead Mentor 1 or 2) sent via email after completing webform

VIRTUAL REALITY (VR) ASSETS

VR assets have been updated as follows:

- [AutomationDirect HTC Vive/Oculus Rift Asset](#): The color of cargo ships has been corrected.
- [PTC](#): The [VuMark pdf](#) (for use with the [Scaled VR model](#)) has been updated to remove unnecessary "with ThingMark" language.

MANUAL

SECTION 4.1

A run of steel, black powder coated cable protectors (VEX part number 217-6294) extends from the center of the guardrail on the scoring table side of the FIELD to the center of the FIELD, between the CARGO SHIPS. A cable protector run is made up of three (3) long segments (P/N) and an exit segment (P/N note, the exit segments are not available for purchase).



SECTION 4.4

- Figure 4-16 has been added (please note, this addition rennumbers all subsequent images in Section 4).

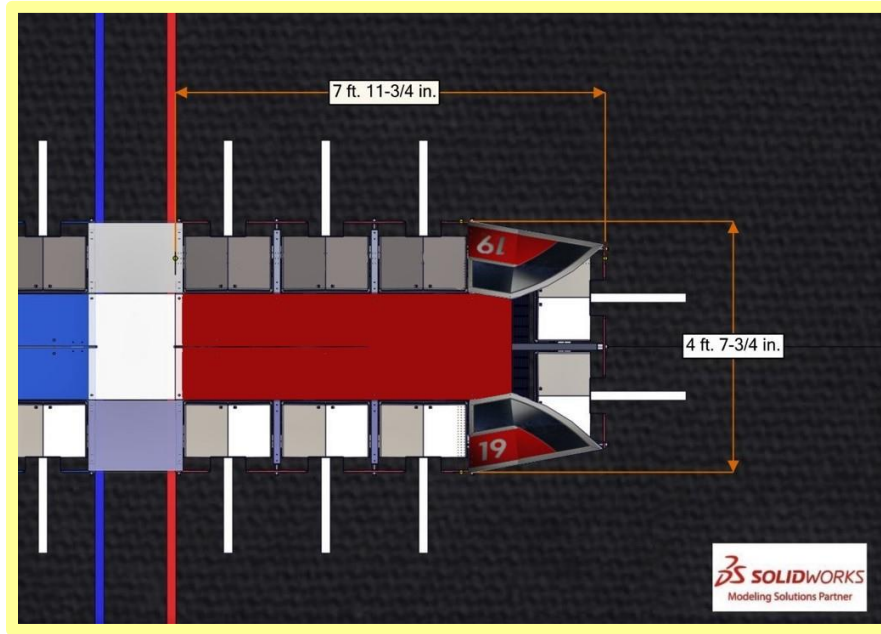


Figure 4-16 Overall CARGO SHIP length and width.



- Figure 4-17 (formerly Figure 4-16) has been updated to correct the length and width of the CARGO SHIP base.

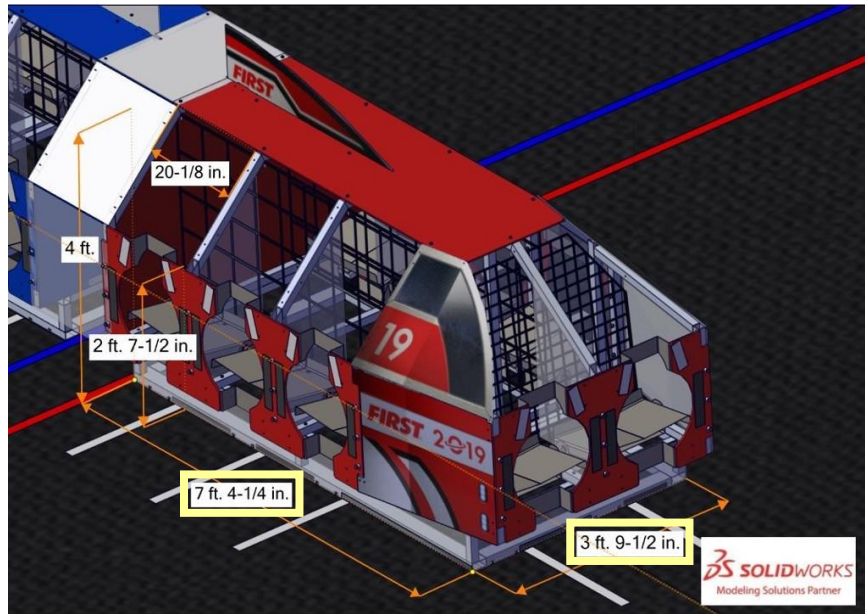


Figure 4-17 Major CARGO SHIP dimensions.

- Figure 4-18 (formerly Figure 4-17) has been updated as follows:

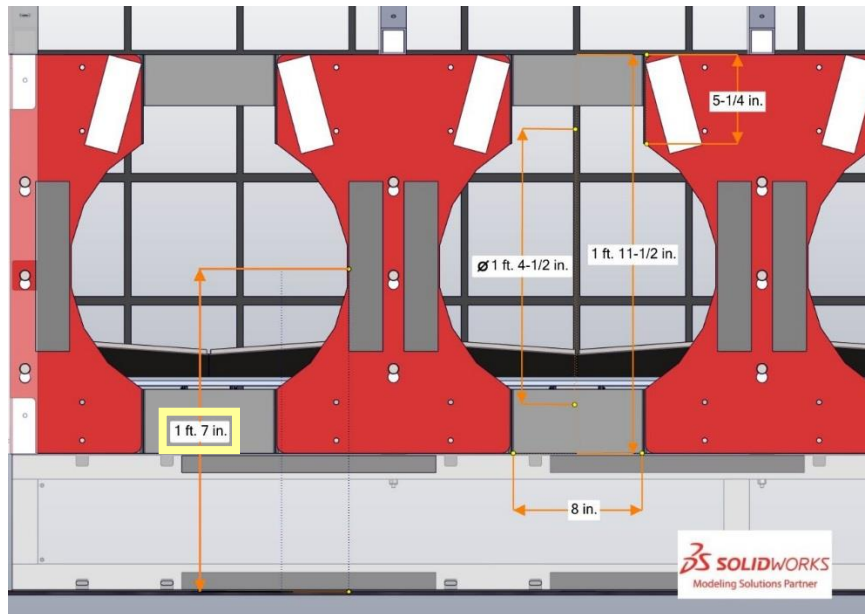


Figure 4-18 CARGO SHIP HATCH geometry and dimensions.



SECTION 4.5

Figure 4-21 (formerly Figure 4-20) has been updated to correct the width and depth of the lowest deck and ramps.

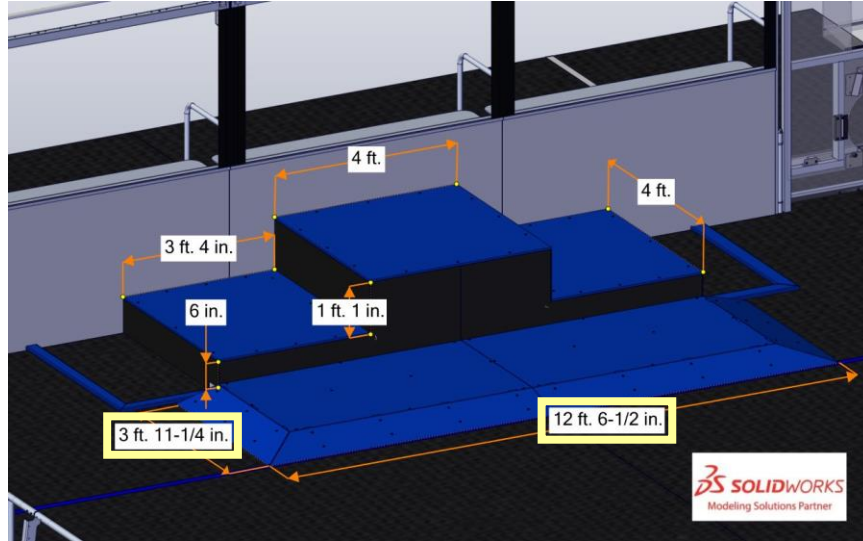


Figure 4-21 Blue HAB PLATFORM with major dimensions.

SECTION 4.6

Figure 4-23 (formerly Figure 4-22) has been updated to correct the width and depth of the DEPOT.

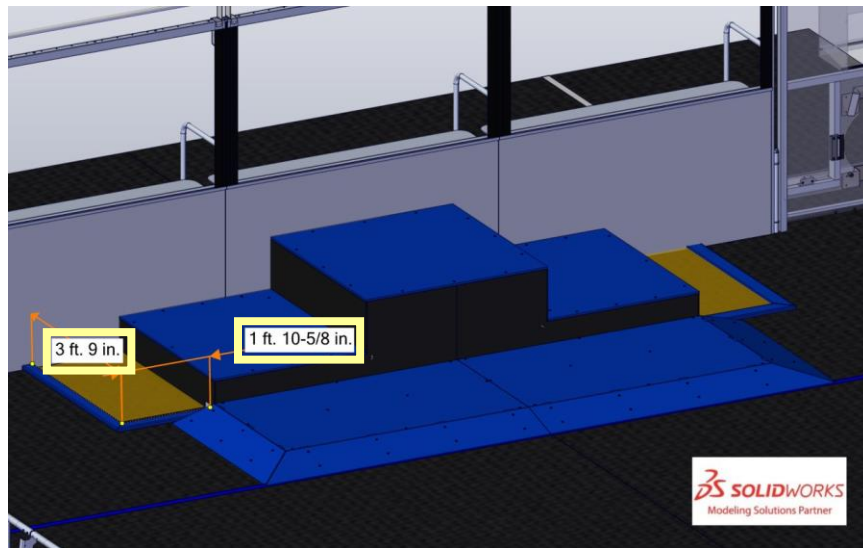


Figure 4-23 Blue DEPOTS

SECTION 4.8.1.1

Three (3) in. (~7.6 cm) of black tape is applied to the left and right edges of the PLAYER STATION polycarbonate window, on the FIELD side.

Figure 4-26 (formerly Figure 4-25) has been updated to show the wider taped area (as have other affected images in the manual, [CAD models](#), and the [Layout and Marking Diagram](#)):





Figure 4-27 Tape on PLAYER STATION window

SECTION 4.8.1.2

Figure 4-28 (formerly Figure 4-27) has been updated to correct the width of the LOADING STATION.

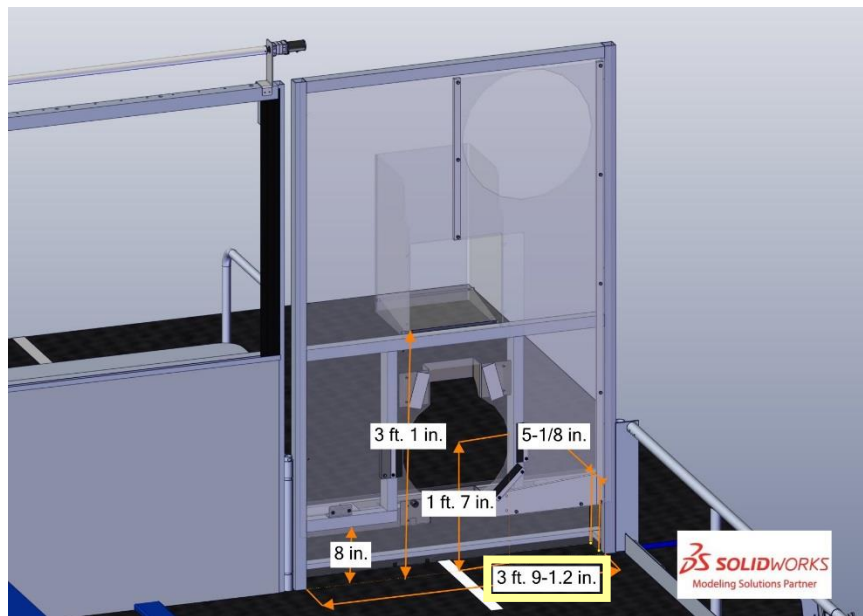


Figure 4-28 LOADING STATION

SECTION 4.9.1

Each CARGO is an orange 13-in. (~33 cm) $\pm\frac{1}{2}$ in. (~1.2 cm) diameter rubber playground ball with a FIRST logo as shown in Figure 4-29 Figure 4-30.

SECTION 5.5

While the TECHNICIAN may be the primary technical member of the DRIVE TEAM, all members of the DRIVE TEAM are encouraged to have knowledge of the basic functionality of the ROBOT, such as the location and operation of the main circuit breaker, connecting and resetting joysticks or gamepads from the OPERATOR CONSOLE, and releasing removing the ROBOT from the SCALEHAB PLATFORM.



SECTION 6

- S2. Wait for the green lights.** Team members may only enter the **FIELD** if the ROCKET'S nosecone LEDs are green, unless explicitly instructed by a REFEREE or an FTA.

SECTION 8.2.2

- G5. Don't mess with opponents' scored GAME PIECES.** A ROBOT may not remove a GAME PIECE from an opponents' ROCKET/CARGO SHIP. GAME PIECES which become dislodged because of incidental contact with the ROCKET/CARGO SHIP are not considered a violation of this rule.

*Violation: FOUL per GAME PIECE de-scored and opponents are awarded one (1) **Complete ROCKET** Ranking Point if neither of their ROCKETS are completed at T-minus 0s.*

SECTION 8.2.4

- G16. Don't touch opponents' ROCKETS at the end of the MATCH.** During Qualification MATCHES, ROBOTS may not contact opponents' ROCKETS starting at T-minus 20s. Incidental contact, i.e. unintentional contact where opponents' actions are not impeded (e.g. minor contact while driving by the ROCKET), is an exception to this rule.

*Violation: FOUL and opponents are awarded one (1) **Complete ROCKET** Ranking Point if neither of their ROCKETS are completed at T-minus 0s.*

SECTION 10.4

A note about the change to R12: We regret the oversight of not informing teams of the changes to the cost limit and KIT OF PARTS definition before the Drive Base Opt Out window and *FIRST* Choice Round 1.

We're sorry.

As a result, we're modifying R12 to compensate, if only partially, for the fact that teams may have made different decisions in the fall given the change to the rules.

- R12.** The total cost of all items on the ROBOT shall not exceed ~~\$5000~~ **\$5500** USD. All costs are to be determined as explained in the [Budget Constraints & Fabrication Schedule](#) section. Exceptions are as follows:
- A.** individual items that are less than \$5 USD each, as purchasable from a VENDOR, and
 - B.** items from the current year's KOP, up to the KOP quantity (including the rookie KOP items). Identical replacements may be used to meet this criterion.

SECTION 10.9

- R86.** Throughout an event, compressed air on the ROBOT must be provided by its one **onboard** compressor **only**. Compressor specifications must not exceed nominal 1.10 cfm (~319 cm³/s) flow rate @ 12VDC.

SECTION 12.7

Table 12-3 was updated as follows:

Table 12-3 Playoff MATCH Tiebreaker Criteria

| Order Sort | Criteria |
|-----------------|---|
| 1 st | Cumulative FOUL and TECH FOUL points due to opponent rule violations |
| 2 nd | Cumulative CARGO points |
| 3 rd | Cumulative HATCH PANEL points |
| 4 th | Cumulative HAB CLIMB points |
| 5 th | Cumulative SANDSTORM BONUS points |
| 6 th | MATCH is replayed |

SECTION 12.8.3

Some District Championships have a sufficient number of teams to justify using more than one division. Teams are assigned divisions by ~~event organizers~~ **FIRST** using a process developed by *FIRST* in Michigan.

The process employs a "brute force iterative randomizer" and is executed as follows:



1. The district team list is sorted in order of cumulative district points earned as described in the District Events section.
2. The list is divided into quartiles based on rank (e.g. the 1st quartile has the top 25% ranked teams)
3. Division assignments are randomly generated using equal contribution from each quartile
4. Three (3) criteria are calculated for each division:
 - a. Average strength: The arithmetic mean of the district point values of teams in a division
 - b. Distribution of strength: The Signal to Noise Ratio (SNR) of the district point values of teams in a division. SNR is calculated as follows:

$$SNR = 10(\log \frac{\bar{x}^2}{\sigma^2})$$

\bar{x} = arithmetic mean of the district points in a division

σ = standard deviation of the district points in a division

- c. Distribution of strength for “top” teams: The SNR of the district point values of teams in the 1st quartile of a division.
5. The three (3) criteria for each division are compared to the other division(s). If the difference between the division’s value and any other division’s value exceeds the limits in Table 0-1, the criteria is not met.

Table 0-1 District Championship Division Evaluation Limits

| | Two (2) Divisions | Four (4) Divisions |
|---|-------------------|--------------------|
| Average strength | 1 | 2 |
| Distribution of strength | 1 | 2.5 |
| Distribution of strength for “top” teams | 1.5 | 2 |

6. If all three (3) criteria met, event organizers publish the assignments. If any of the three (3) criteria are not met, assignments are rejected, and the process returns to Step 3.

In these cases:

- Division winning ALLIANCES play each other in District Championship Playoffs, employing the bracket below that corresponds to their District, until a winning ALLIANCE for the event is determined.

