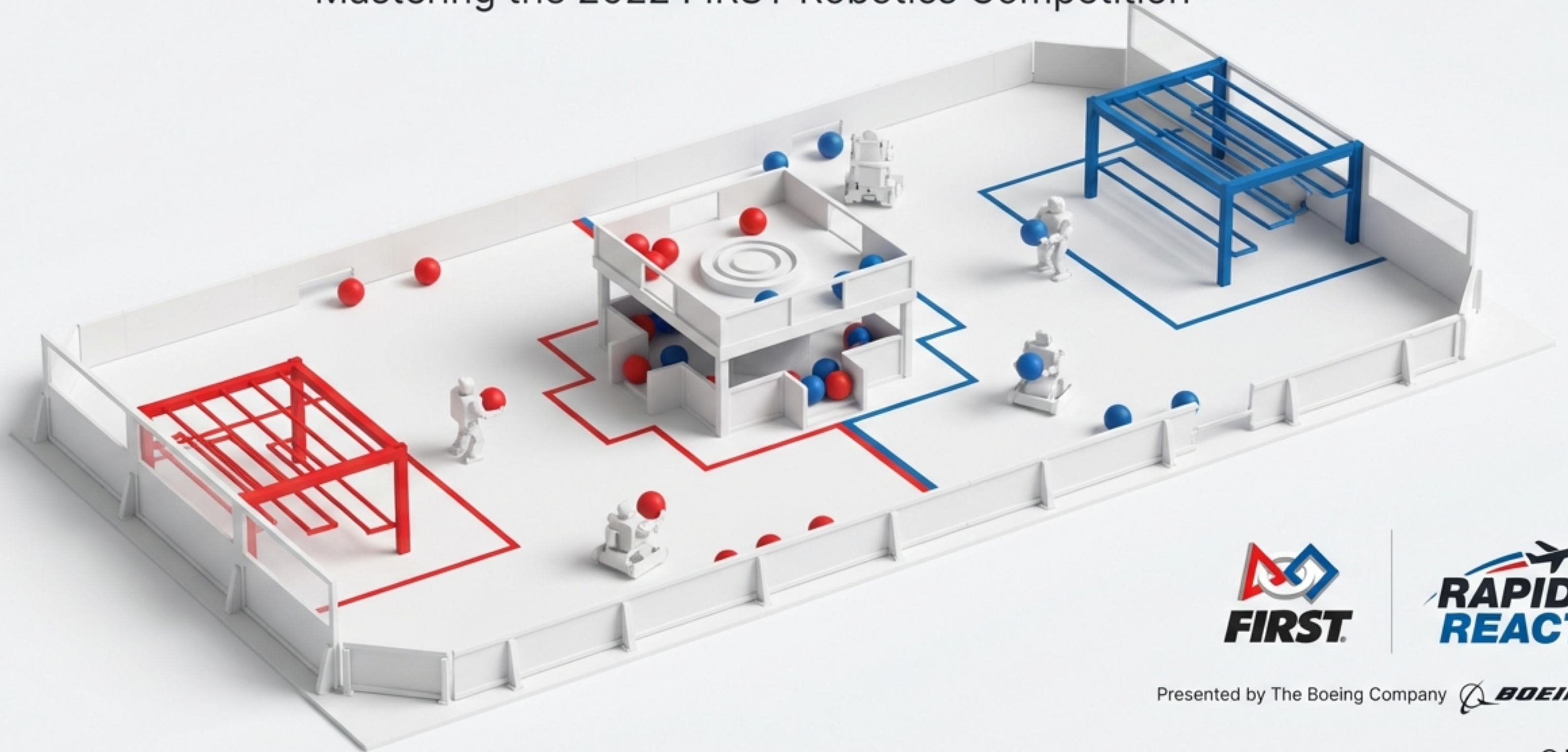



RAPID REACT: The Strategic Briefing

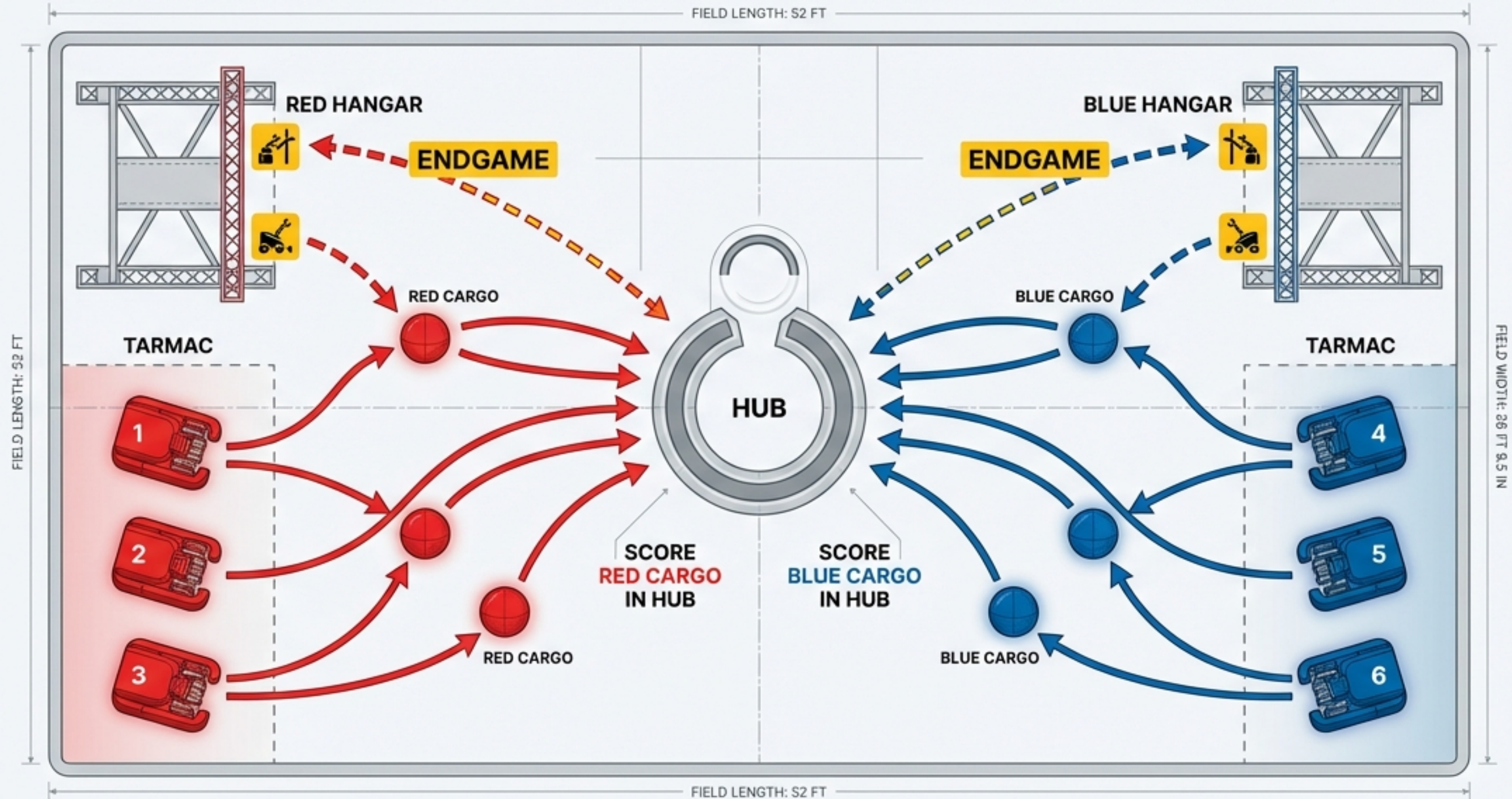
Mastering the 2022 FIRST Robotics Competition



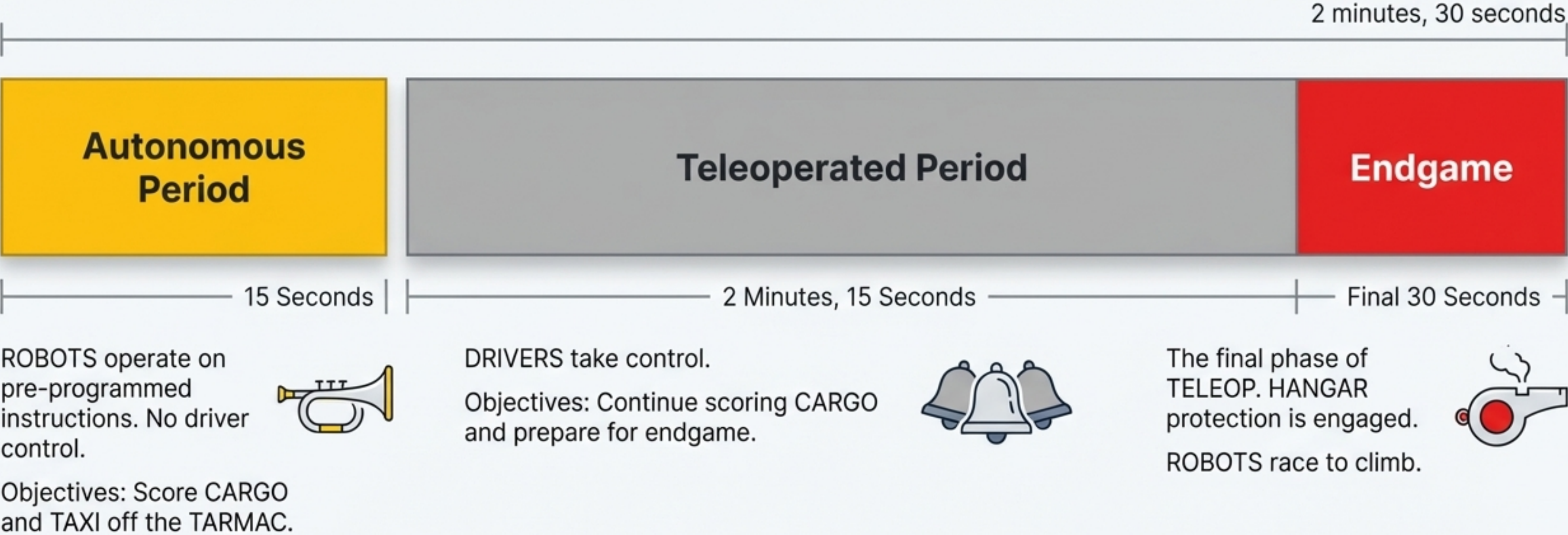
Presented by The Boeing Company  **BOEING**

Your Mission: Process and Transport CARGO

In RAPID REACT, two competing alliances are invited to process CARGO for transportation. Each alliance is assigned a CARGO color (red or blue) to process by retrieving their assigned CARGO and scoring it into the HUB. In the final moments of each match, alliance ROBOTS race to engage with their HANGAR to prepare for transport!



The Anatomy of a RAPID REACT Match



The ARENA: Key Field Elements

The HANGAR

The alliance-specific endgame structure. ROBOTS climb its four RUNGS for points.

The TERMINAL

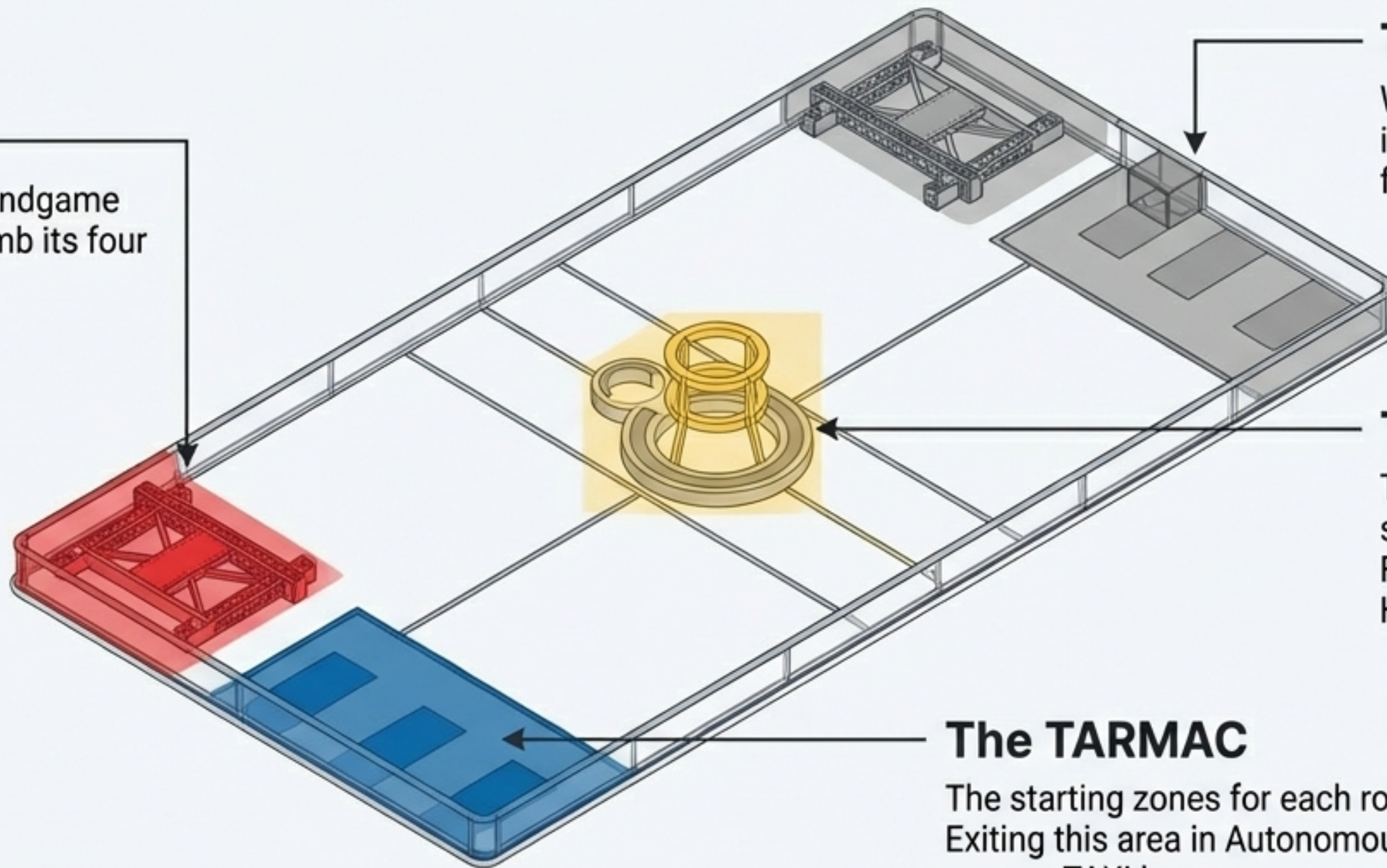
Where HUMAN PLAYERS introduce CARGO onto the field during the match.

The HUB

The central scoring goal, shared by both alliances. Features an UPPER and LOWER HUB for scoring CARGO.

The TARMAC

The starting zones for each robot. Exiting this area in Autonomous earns a TAXI bonus.



Field Dimensions: 27 ft. (~823 cm) by 54 ft. (~1646 cm)

The Core Objective: Scoring CARGO

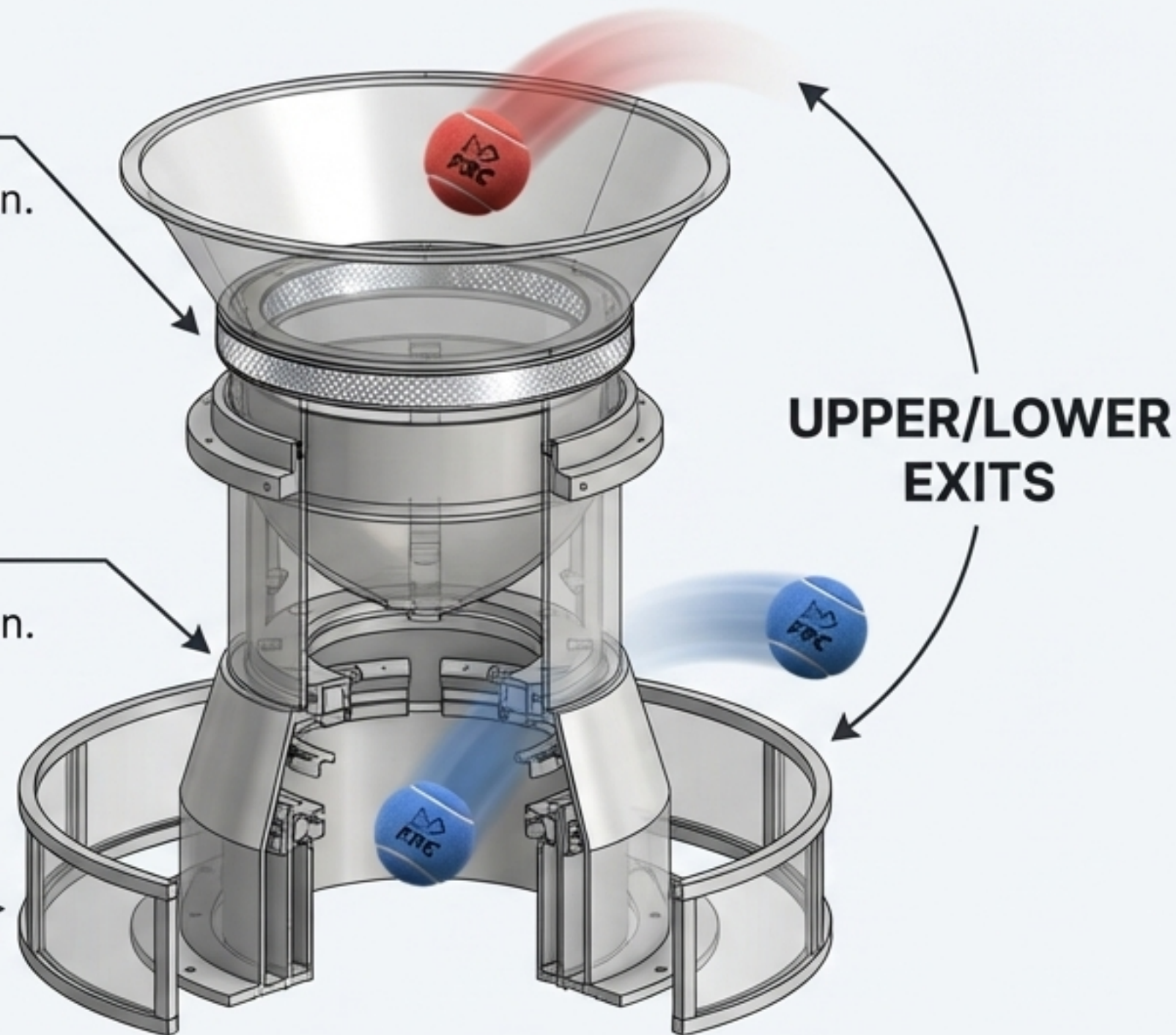
UPPER HUB

Opening at 8 ft. 8 in.
(~264 cm). Vision
Target ring is
located here.

LOWER HUB

Opening at 3 ft. 5 in.
(~104 cm).

Fenders



The CARGO



Type: Oversized tennis ball
Diameter: 9½ in. (~24 cm)
Weight: 9½ oz. (~270 g)
Inflation: 3½ psi. ±½ psi

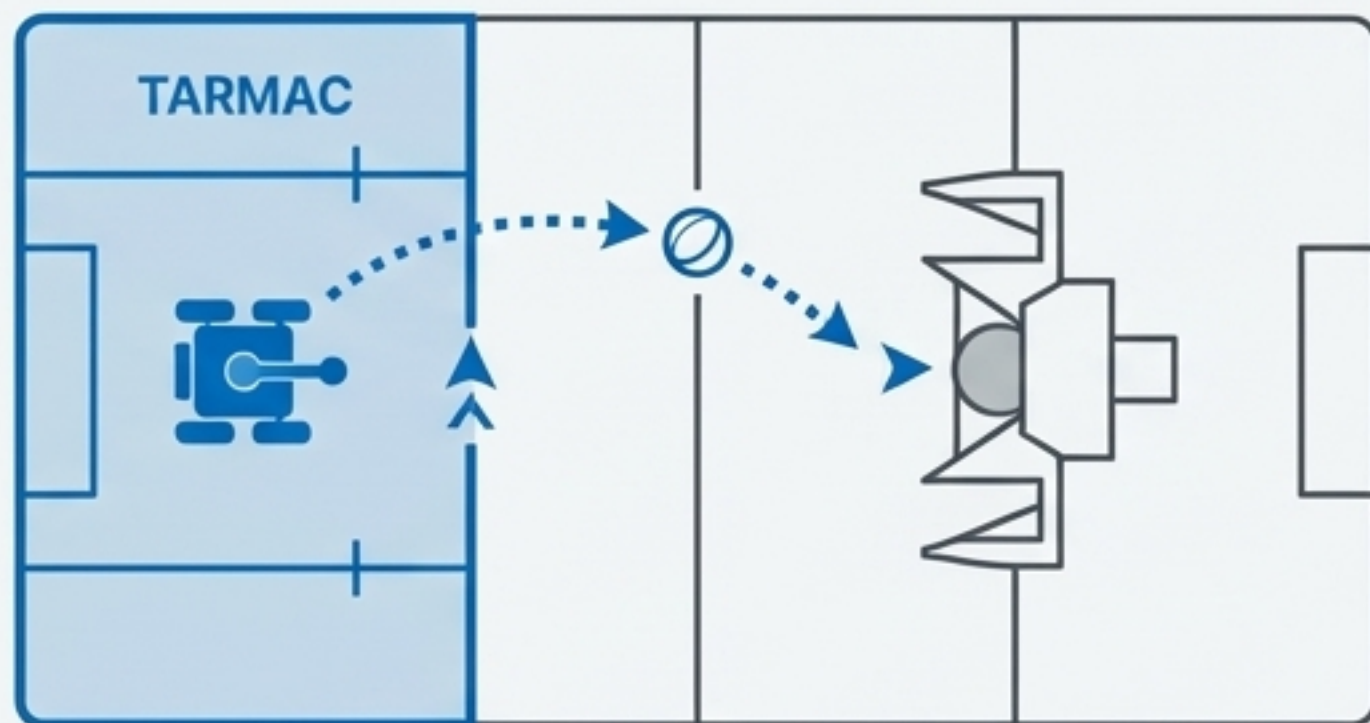
Tele-Op Point Values

- Scored in **UPPER HUB: 2 points**
- Scored in **LOWER HUB: 1 point**

Act I: The 15-Second Autonomous Sprint

Primary Objectives:

1. **TAXI:** A ROBOT'S BUMPERS must completely leave its TARMAC.
2. **Score CARGO:** Retrieve and score pre-loaded or field CARGO.



Key Insight: The Auto Multiplier

Action	AUTO Value	TELE-OP Value	Strategic Value
TAXI	2 points	0 points	Guaranteed points
LOWER HUB CARGO	2 points	1 point	2x Multiplier
UPPER HUB CARGO	4 points	2 points	2x Multiplier

During AUTO, a ROBOT may not contact opponent ROBOTS or CARGO on the opposing side of the field. (**G210**)

The Path to Playoffs: Earning Ranking Points

In Qualification matches, your rank is determined by your Ranking Score (RS), an average of Ranking Points (RPs) earned. Each match offers up to 4 RPs.

Win/Tie



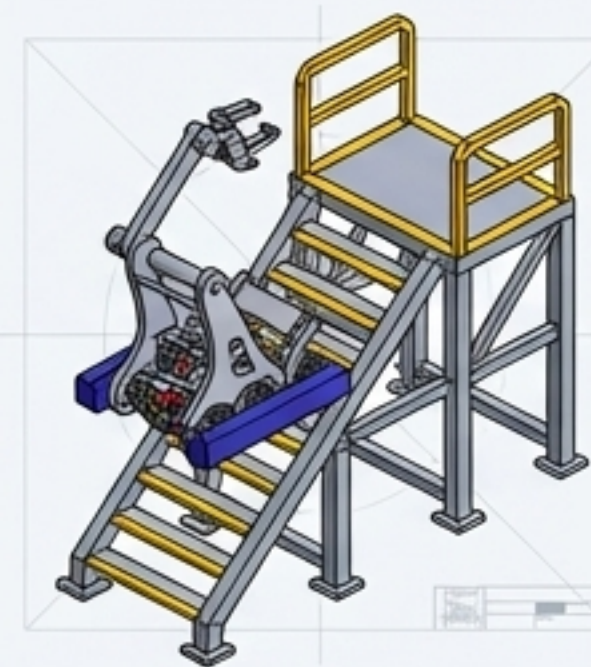
Win the match for **2 RPs**.
Tie the match for **1 RP**.

CARGO BONUS



Score a threshold number
of ALLIANCE CARGO.
(Details on next slide).
Earn **1 RP**.

HANGAR BONUS



Achieve a threshold
number of HANGAR
points. (Details later).
Earn **1 RP**.

CARGO BONUS

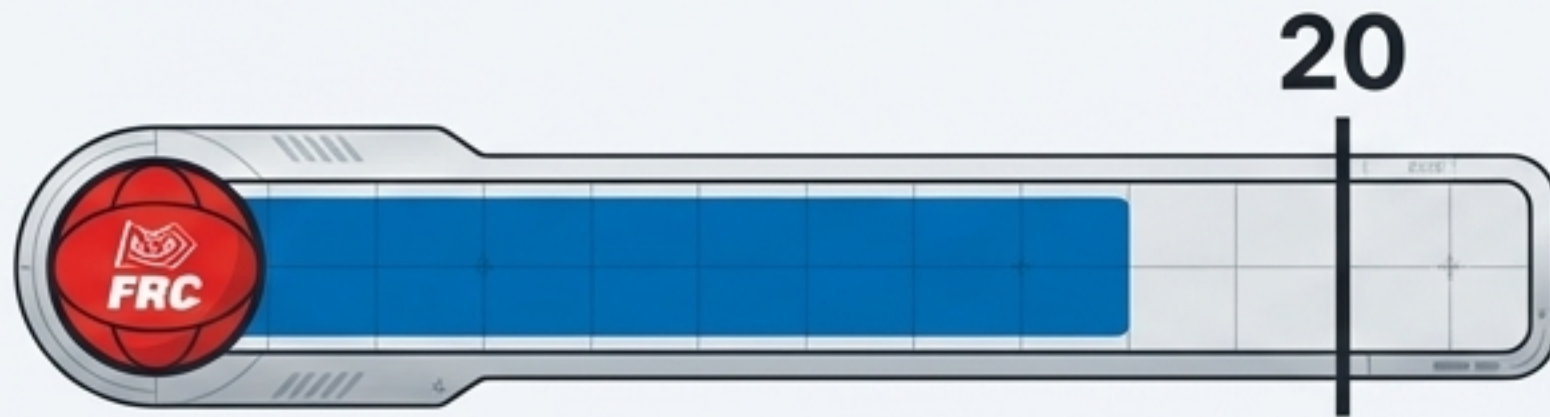


Score a threshold number
of ALLIANCE CARGO.
(Details on next slide).
Earn **1 RP**.

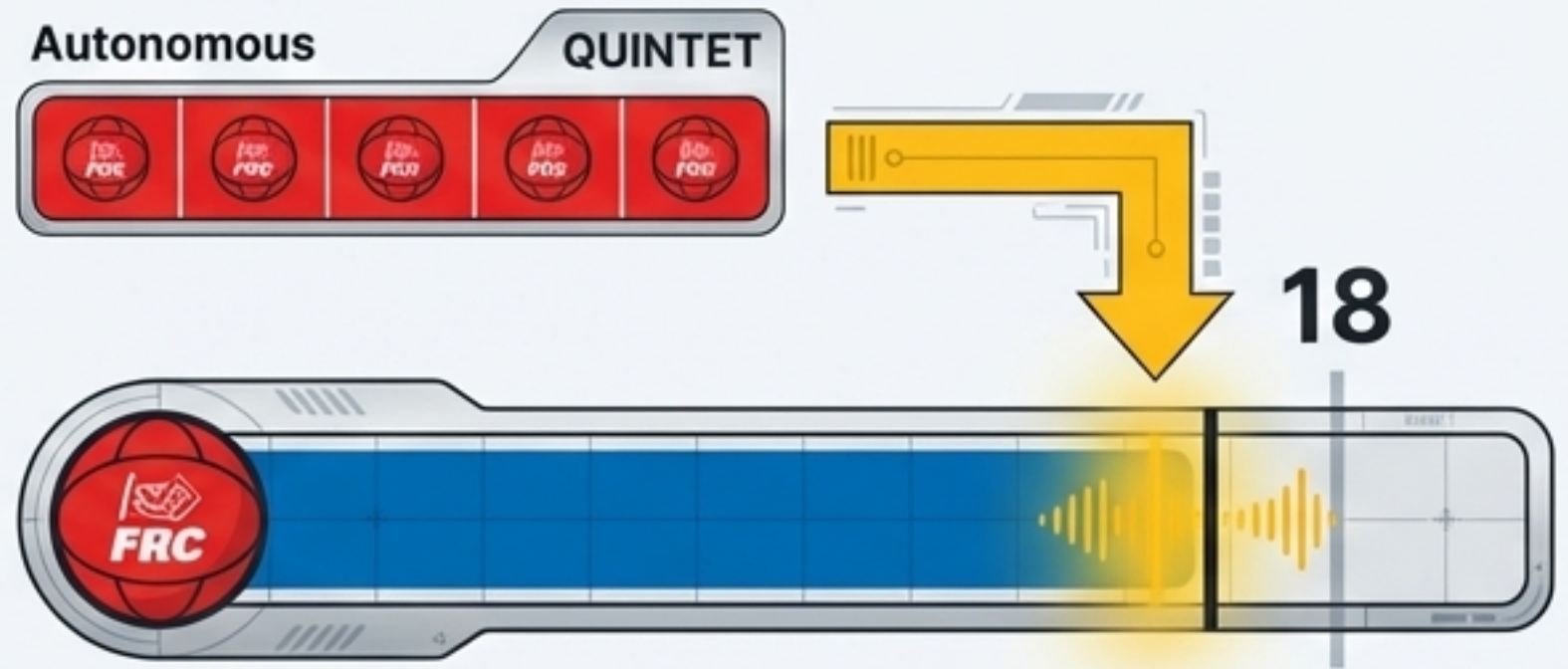
Unlocking the CARGO BONUS

Section 1: Standard Path

Score **20 or more** ALLIANCE CARGO during the match to earn **1 Ranking Point**.



Section 2: The Strategic Shortcut: The QUINTET



If your alliance scores at least **5 CARGO** in **Autonomous** (a QUINTET), the threshold for the CARGO BONUS is lowered to **18** for the entire match.



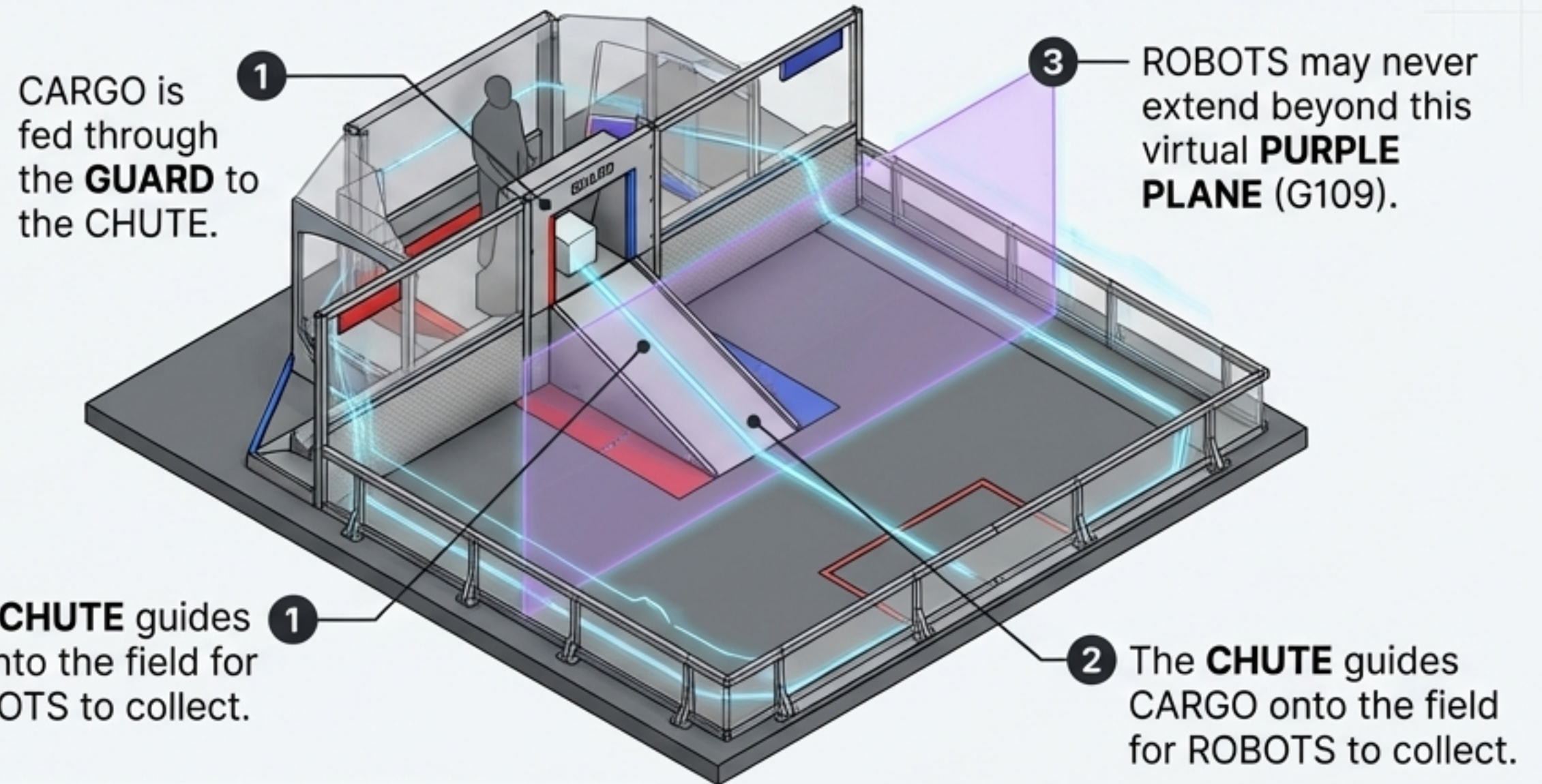
Field Insight: "Your alliance's progress towards the CARGO BONUS is displayed on the DRIVER STATION LED strings."

Act II: The 2:15 Teleoperated Period

Drivers now control ROBOTS to continue the mission of scoring CARGO.

Introducing the Human Element: The TERMINAL

HUMAN PLAYERS are staged in the TERMINAL AREAS. During TELEOP, they are the only source for re-introducing CARGO to the field.



Rule Highlight (H504): During TELEOP, CARGO may only be introduced to the FIELD by a HUMAN PLAYER and through the GUARD.

Act III: The Endgame HANGAR Climb

TRAVERSAL RUNG: **15 Points**

| Top at 7 ft. 7 in. (~231 cm)

HIGH RUNG: **10 Points**

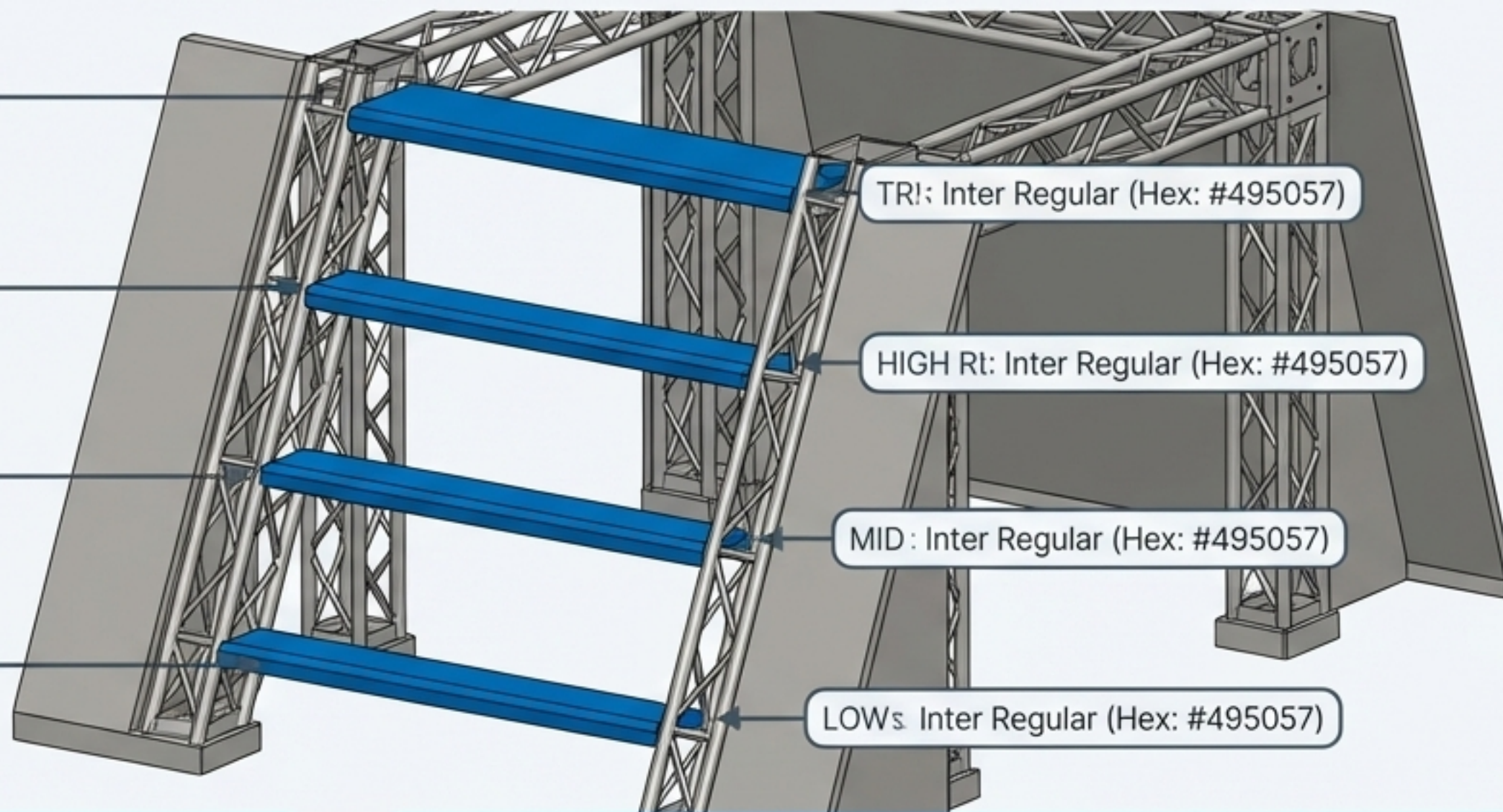
| Top at 6 ft. 3 $\frac{5}{8}$ in. (~192 cm)

MID RUNG: **6 Points**

| Top at 5 ft. $\frac{1}{4}$ in. (~153 cm)

LOW RUNG: **4 Points**

| Top at 4 ft. $\frac{3}{4}$ in. (~124 cm)



✓ **Scoring Criteria:**

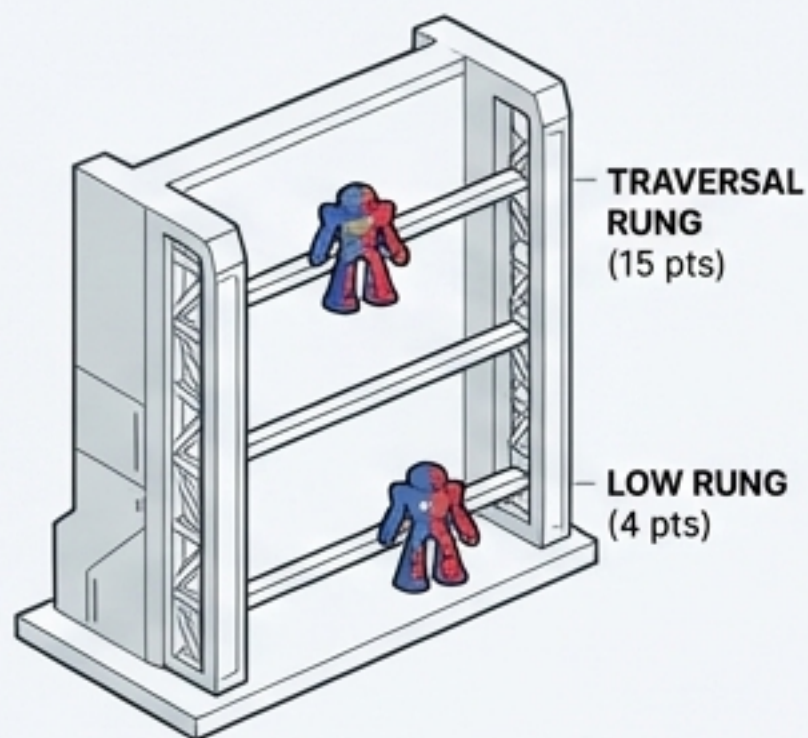
To earn points, a ROBOT may only be contacting the target RUNG or any RUNG(S) higher than it. A ROBOT may only earn points for a single RUNG.

⌚ **Key Timing:**

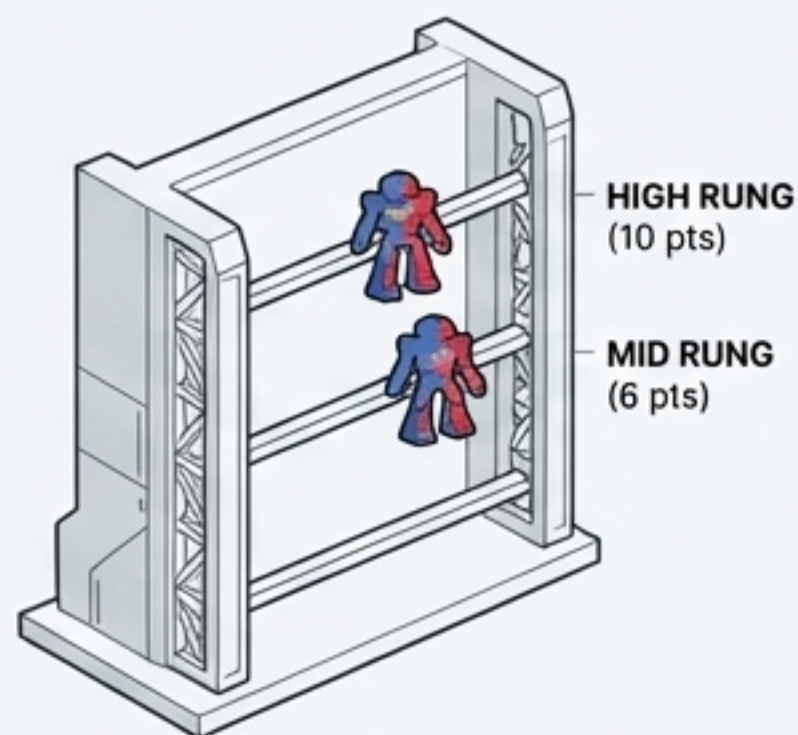
The HANGAR climb is the primary objective of the final portion of the match. Assessment is made 5 seconds after the match ends.

Securing the HANGAR BONUS

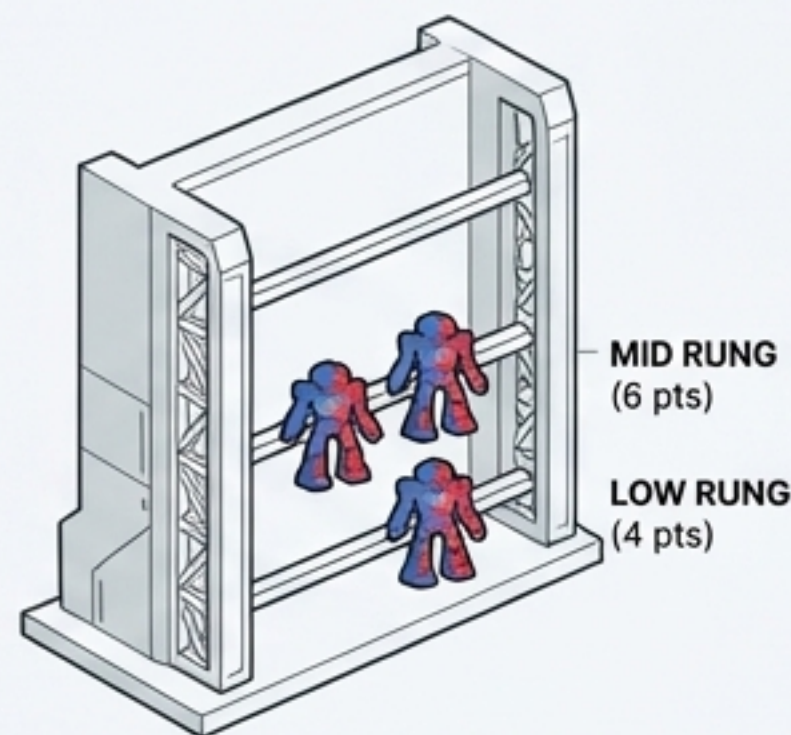
If your alliance earns a total of **16 or more HANGAR points** at the end of the match, you earn **1 Ranking Point**.



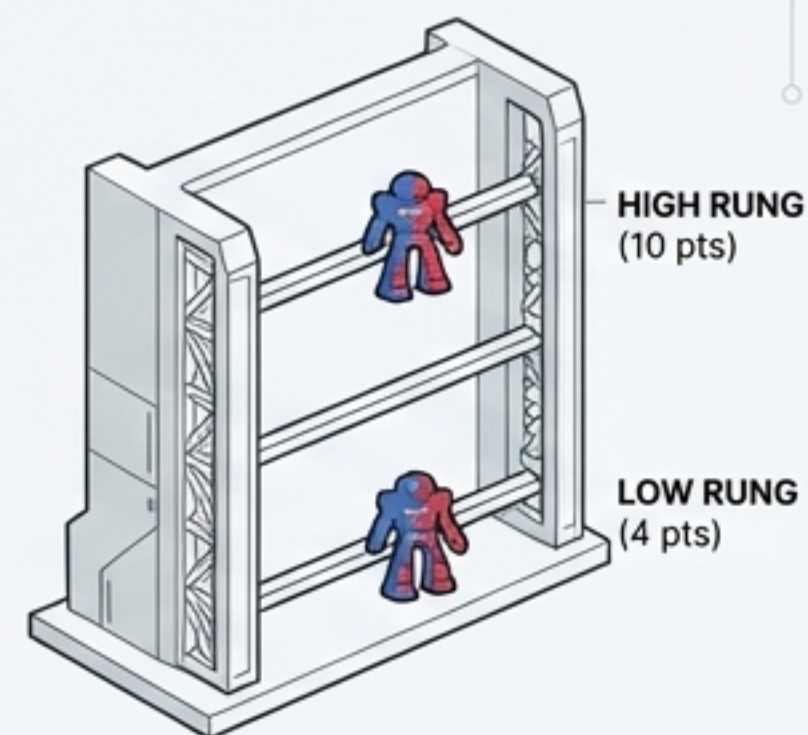
✓ Traversal (15) + Low (4) = **19 points.**
BONUS ACHIEVED



✓ High (10) + Mid (6) = **16 points.**
BONUS ACHIEVED



✓ Mid (6) + Mid (6) + Low (4) = **16 points.**
BONUS ACHIEVED



✗ High (10) + Low (4) = **14 points.**
NO BONUS

Strategic Note: Achieving this bonus requires significant coordination between alliance partners during the endgame.

Mission Critical Rules of Engagement



CARGO Control (G403)

ROBOTS may not have greater-than-MOMENTARY CONTROL of more than **2 CARGO** at a time.

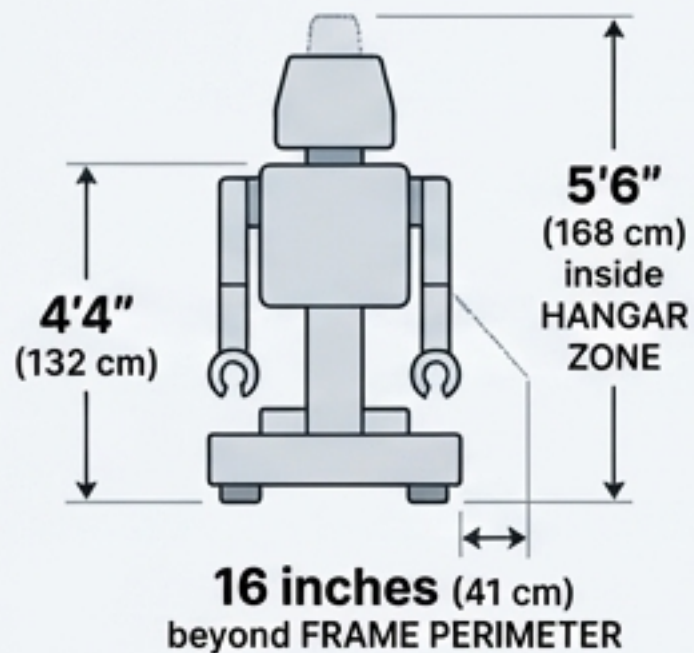
Penalty: FOUL per additional CARGO.



HANGAR Protection (G208)

In the final 30 seconds, contacting an opponent ROBOT in their HANGAR ZONE is prohibited.

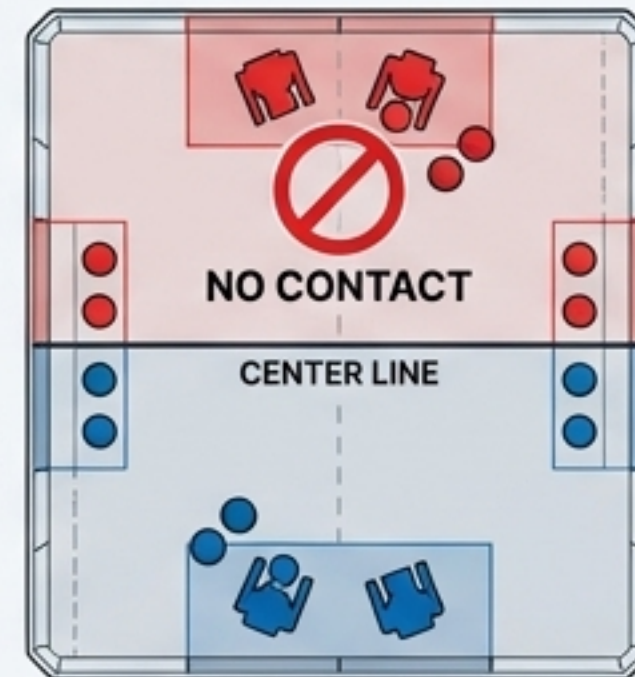
Penalty: The contacted opponent is awarded **TRAVERSAL RUNG (15) points**.



Height & Extension (G106 & G107)

Height is limited to **4'4"**—but can extend to **5'6"** inside your **HANGAR ZONE**.

Horizontal extension is limited to **16 inches** beyond the **FRAME PERIMETER**.



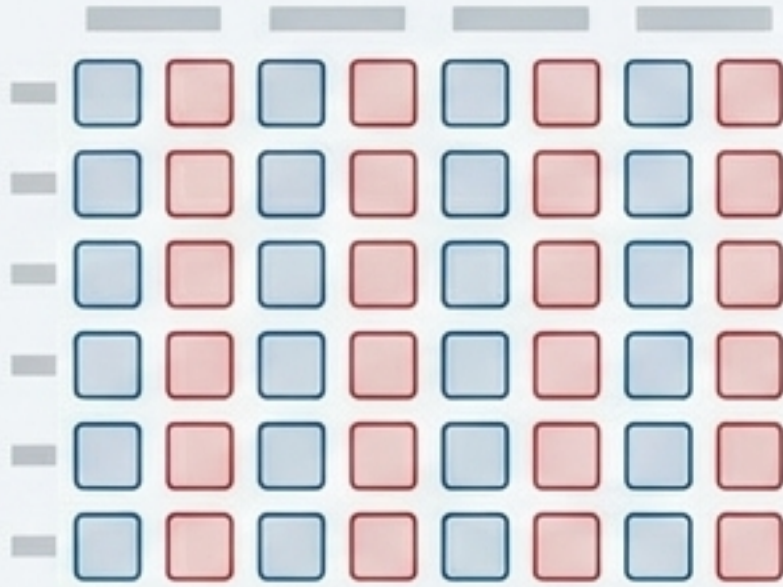
AUTO Neutrality (G210)

During AUTO, ROBOTS may not cross the **CENTER LINE** and contact opposing ROBOTS or their staged CARGO.

Penalty: **TECH FOUL**.

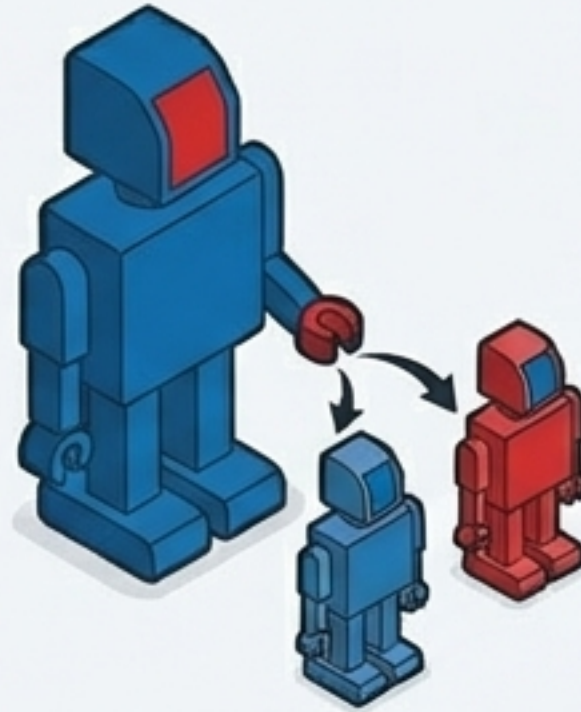
From Qualification to Champion

Qualification Matches



All teams play a set number of matches. Alliances are randomized. Teams earn Ranking Points (RPs) to determine their seed.

Alliance Selection



The top 8 seeded teams become **ALLIANCE CAPTAINS**. They pick two partners each in a serpentine draft (1-8, 8-1) to form 8 alliances for the playoffs.

Playoff Tournament



A double-elimination bracket. The first alliance to win 2 matches in a series advances. The final winning alliance becomes the event Champion.

At the **FIRST** Championship, alliances will consist of 4 robots.

Key Strategic Imperatives



Dominate the First 15 Seconds

The Autonomous period's 2x point multiplier and its impact on CARGO BONUS (the QUINTET) make it the single most influential phase of the match. A strong AUTO is a powerful advantage.



Alliance Synergy is Non-Negotiable

Both bonus Ranking Points—CARGO and HANGAR—are alliance-wide efforts. Success in qualifications hinges on effective communication and complementary robot capabilities.



The Endgame Can Overturn Everything

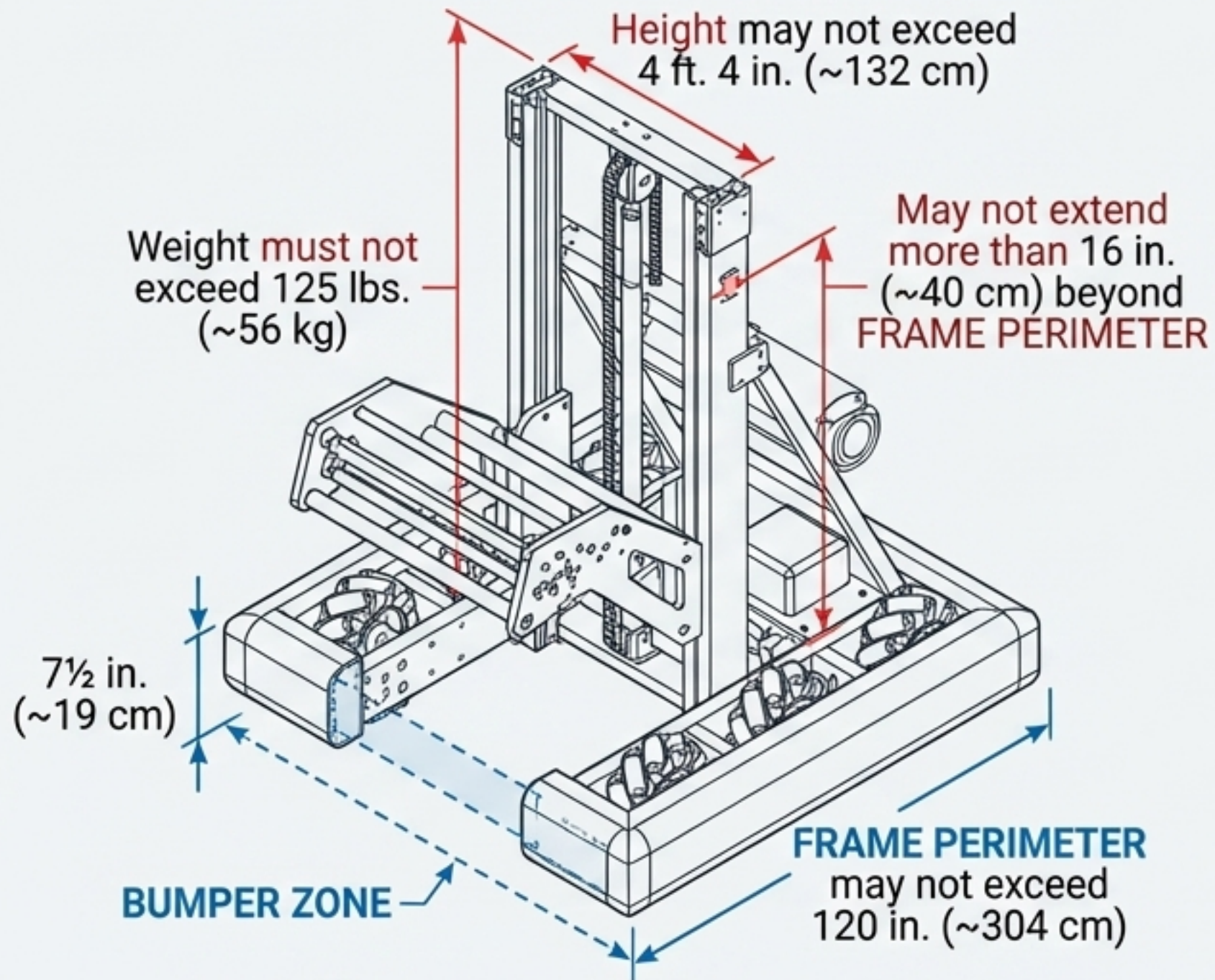
The potential for a 30+ point swing from HANGAR scores means the match is never over until the final second. A robust climbing mechanism is a game-changer.



Play Smart, Avoid Crippling Penalties

The penalty for contacting an opponent in their HANGAR is severe enough to decide a match. Understanding and respecting protected zones is as critical as scoring.

The Engineer's Checklist: Core Robot Constraints



- **Weight Limit (R103):**
 - Must not exceed **125 lbs. (~56 kg)**.
 - *Excludes BUMPERS and BATTERY.*
- **Starting Configuration (R104):**
 - FRAME PERIMETER may not exceed **120 in. (~304 cm)**.
 - Height may not exceed **4 ft. 4 in. (~132 cm)**.
- **Extension Limit (R105):**
 - May not extend more than **16 in. (~40 cm)** beyond FRAME PERIMETER.
- **BUMPER Rules (R402 & R401):**
 - BUMPERS must be located entirely within the **BUMPER ZONE** (bottom 7½ in. (~19 cm) of the robot).
 - Must protect all outside corners of the FRAME PERIMETER.

This is a summary. Please refer to the 2022 Game Manual for full details and inspection requirements.