

The PitCrew Master Playbook

A Comprehensive Guide to AI-Assisted Build Seasons for FRC & FTC Teams *Build. Plan. Win.* Version 11 — Updated July 2026 Domain: the-pitcrew.co

Introduction

Running a FIRST Robotics Competition (FRC) or FIRST Tech Challenge (FTC) team with a small roster is one of the hardest jobs in youth STEM. Between the 8-week (FRC) or 18-week (FTC) build season, the engineering notebook, the competition schedule, and the daily challenge of keeping students engaged, most mentors are stretched thin before Kickoff Day even ends.

PitCrew is a mentor-assist build-season command center built specifically for small and rebuilding FRC and FTC teams. It combines a structured project management workflow with a 17-agent AI team — covering every discipline from game strategy and mechanical design to grant writing and the engineering notebook — so that a team of 5 to 6 students can operate with the strategic depth and organizational efficiency of a 50-student powerhouse.

This playbook is the complete reference for everything PitCrew offers: the human-AI collaboration model, the full agent roster, every major workflow, and the platform features available at the-pitcrew.co.

Part 1: The Human-AI Collaboration Model

The AI agents in PitCrew are powerful intellectual engines, but they exist entirely in the digital realm. **AI agents cannot turn a wrench, crimp a wire, or drive a robot.** That is the irreplaceable role of the human students.

FIRST Rules on Who Builds the Robot

FIRST is a mentor-based program designed to inspire youth in science, technology, engineering, and mathematics. The official rules define clear boundaries:

1. **Student eligibility.** FRC is for high school students (grades 9–12, ages 14–18) [1]. FTC is for middle and high school students. Once a student graduates, they transition to a mentor role [1].
2. **The role of mentors.** FIRST explicitly encourages mentors to teach, guide, and build alongside students [1]. The PitCrew AI agents function as a team of highly specialized digital

mentors — always available, never tired, and never opinionated about which student should drive.

3. **The human in the loop.** While agents can design a mechanism or write a block of code, students must understand it, approve it, and be the ones to present it to judges or operate it on the field.

The Five Human Roles

PitCrew uses five distinct human roles. Each role surfaces the most relevant agents in the sidebar and determines which administrative actions the member can perform.

Role	Color	Who Does It	What the AI Provides	Admin Permissions
Executive	Blue	Team captain, business lead, strategic decision-maker	MoSCoW lists, strategies, designs	Rename projects, reassign member roles
Fabricator	Orange	Build team, mechanical students, shop workers	CAD blueprints, wiring manifests	—
Integrator	Green	Programmers, electrical students, systems integrators	WPILib Java / FTC SDK code, CAN ID maps	—
Operator	Purple	Drive team, pit crew, competition day students	Talking points, match strategy briefs	—
Outreach	Pink	Business team, media, community engagement	Sponsorship letters, outreach plans	—

Role colors appear as a dot next to each member’s name in the Members tab, as a tinted avatar, and as a segmented breakdown bar at the bottom of each team card on the Teams page.

Program Type: FRC vs. FTC

PitCrew supports both FRC and FTC programs at the **project level**. A single team can run an FRC project and an FTC project simultaneously — each with its own Kickoff Wizard session, MoSCoW Board, Build Calendar, and agent context.

When creating a project, select **FRC** or **FTC** from the program type selector. This choice drives:

- The Build Calendar week structure (8 weeks for FRC; 18 weeks default for FTC, customizable from 6 to 20)
 - The season event labels (Regional / District / Championship for FRC; Scrimmage / League Meet / League Tournament / State Championship for FTC)
 - The Robot Freeze badge (shown for FRC; hidden for FTC, which has no equivalent rule)
 - The AI agent context — Commander and all specialist agents automatically receive the correct game manual, scoring terminology, and hardware platform for the selected program
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Part 2: The 17-Agent Roster

PitCrew ships with 17 highly specialized AI agents, structured hierarchically under the Commander.

#	Agent	Department	Role
0	Commander	Orchestrator	Head Coach & MoSCoW Strategist
1	Rulebook	Engineering	Game Manual & Requirements
2	CAD-Bot	Engineering	Mechanical Design
3	Ada	Engineering	Software & Programming
4	Optic	Engineering	Vision & AprilTag / Camera Targeting
5	Volt	Engineering	Electrical, CAN Bus & Pneumatics
6	Scout	Engineering	Strategy & Scouting
7	OSHA	Operations	Safety Inspection
8	Ledger	Operations	Budget & Parts
9	Stress-Test	Operations	QA, Test Cases & Pre-Match Checklists
10	Grants	Outreach	Grant Writing — location-aware
11	Megaphone	Outreach	Outreach Coordinator — location-aware
12	Legacy	Awards	FIRST Impact / Inspire Award
13	Spark	Awards	Engineering Inspiration
14	Aesthetics	Awards	Industrial Design & Judges' Award
15	Scribe	Documentation	Engineering Notebook & Portfolio
16	Guide	Human Resources	Student Interviews, Role Matching & Culture

Location-Aware Agents: Grants and Megaphone

When a team sets its city, state, and country in Team Settings, the Grants and Megaphone agents automatically incorporate that location into every response. Grants researches funding at four tiers:

Tier	Examples
Local	Community foundations, local businesses, city STEM initiatives
State	State STEM grant programs, regional manufacturing associations
National	STEM-focused corporate sponsors (Boeing, Rockwell, Google)
Federal	NSF education grants, DOE STEM programs

To set your team’s location: navigate to **Teams** → **[Your Team]** → **Settings tab** → enter City, State/Province, and Country → Save.

Kickoff Context Injection

Commander and all 17 specialist agents automatically receive a **Kickoff Context** block in their system prompt whenever the active project has a completed Kickoff Wizard session. This block includes the game name, selected strategy, Minimum Competitive Robot (MCR) definition, team constraints, and key scoring tasks — so agents already know your game and robot definition without any copy-pasting required.

Part 3: The Agent Roster — Live Activity View

The **Agent Roster** page (`/agents`) provides a real-time view of all 17 agents during an active Commander session.

State	Visual	Meaning
Idle	Dimmed card	Agent not involved in the current session
Active	Pulsing ring + spinner	Agent is currently processing
Done	Green checkmark + output preview	Agent has completed its task
Skipped	Faded card	Agent was not needed for this query

A session progress bar at the top shows the session title, an X/N agent counter, and a **View** button that jumps directly to that Commander session. The roster polls every 1.2 seconds during an active session and every 5 seconds when idle.

Part 4: The Kickoff Wizard

The Kickoff Wizard is the starting point for every new build season. It guides the team through a structured 9-step process on Kickoff Day, transforming a raw game manual into a complete strategic plan.

The 9-Step Wizard Flow

Step	Name	What Happens
0	Game Library	Select the current game from the library or upload a new game manual PDF
1	Game Notes	Auto-fill game notes from the uploaded manual; review and edit
2	Strategy Framing	Choose rookie vs. veteran approach; set team constraints
3	Decision Matrix	AI-scored matrix of strategic options; select your primary strategy
4	MCR Definition	Define the Minimum Competitive Robot — the simplest robot that can score
5	Prototype Plan	Generate a prototype checklist from the MCR definition
6	Review	Full summary of all decisions before locking
7	Export	Export the session as Markdown for the Engineering Notebook
8	Meeting Mode	Full-screen facilitation view for projecting during Kickoff Day

Game Library

The Game Library (/game-library) stores pre-loaded cheatsheets for past FRC and FTC seasons. Each cheatsheet includes scoring objects, autonomous tasks, endgame tasks, and key constraints extracted from the official game manual. Administrators can upload new game manuals as PDFs; the AI extracts and structures the data automatically.

Commander Context Banner

After completing the Kickoff Wizard, a context banner appears at the top of the Commander page showing the active game, strategy, MCR, and constraint count. This confirms that

Commander has the full kickoff context loaded and is ready to answer build-season questions with game-specific accuracy.

Part 5: MoSCoW Board

The MoSCoW Board ([/moscow](#)) is the team's prioritization engine. It organizes every robot feature into four columns:

- **Must Have** — Non-negotiable for a competitive robot (e.g., drivetrain, floor intake, basic climb)
- **Should Have** — Important but not critical (e.g., high goal scorer, 1-piece auto)
- **Could Have** — Nice to have if time and resources allow (e.g., 2-piece auto, max climb)
- **Won't Have** — Explicitly cut to protect scope (e.g., turret, shooting on the move)

Generating the Board

1. Navigate to **MoSCoW Board** in the sidebar.
2. Click **Generate with Commander**.
3. In the **Game Description** field, describe the game and your team's constraints. The **Team Constraints** field is optional but recommended — include team size, budget, available tools, and location.
4. Click **Generate**. Commander activates Rulebook, Scout, and Ledger and returns a populated four-column board.
5. Review each card as a team. Click the checkmark to approve items you agree on.
6. Click **Export .md** to download the board for your Engineering Notebook.

Prototype Targets

Each MoSCoW card can be flagged as **Needs Prototype**. Flagged items appear in the Prototype Tracker and, once a Proto Due Date is set, as purple chips on the Build Calendar week grid.

Part 6: Prototype Tracker

The Prototype Tracker ([/prototype](#)) manages the physical prototyping process. Each prototype item is linked to a MoSCoW card and tracks:

- **Subsystem** — the robot system being prototyped
- **Proto Status** — Not Started, In Progress, Done, or Cancelled
- **Proto Due Date** — the target date for completing the prototype, which places the item as a chip on the Build Calendar

Items with a Proto Due Date appear as **purple chips** in the correct week column on the Build Calendar. Items without a due date appear in the undated **Prototype Work** row below the week grid.

Part 7: CAD Board and Cut List

The **CAD Board** (/cad) manages mechanical design requests from concept through review. Each CAD request tracks the subsystem, assignee, status (Requested → In Progress → In Review → Approved → Archived), and due date. Approved items with due dates appear as **blue chips** on the Build Calendar.

The **Cut List** (/cut-list) is a companion tool for tracking raw stock cuts. It integrates with the Scope and Fabrication workflows to ensure every cut is documented and assigned before shop time begins.

Part 8: Fabrication Tracker

The Fabrication Tracker (/fabrication) manages the physical build process. Each fabrication task tracks the part name, subsystem, assignee, status, and due date. Completed fabrication tasks with due dates appear as **green chips** on the Build Calendar.

Part 9: Assignments

The Assignments page (/assignments) provides a unified view of all tasks across CAD, Fabrication, and Prototype — filtered by assignee, subsystem, or due date. It is the go-to page for a mentor who wants to see what every student is working on at a glance.

Part 10: Build Calendar

The Build Calendar (/build-calendar) is the team's week-by-week timeline for the entire build season. It is program-aware: FRC projects use an 8-week structure with a Robot Freeze badge; FTC projects default to 18 weeks (September Kickoff through January/February

Championship) with no Robot Freeze. FTC teams build in stages — the robot does not need to be complete for the October Scrimmage, and the goal is to have a competitive robot by the first League Meet in November.

Calendar Features

Week Grid. Each week column shows three types of auto-derived chips alongside manually created tasks:

Chip Color	Source	What It Represents
Blue	CAD Board	CAD requests with due dates in that week
Green	Fabrication Tracker	Fabrication tasks with due dates in that week
Purple	Prototype Tracker	Prototype items with Proto Due Dates in that week

Manually created tasks can be dragged between weeks. Clicking any chip opens a quick-edit modal with a direct link to the source tool.

Prototype Work Row. Below the week grid, a horizontal scrolling row shows all prototype items that do not yet have a Proto Due Date. This ensures no prototype work is invisible on the calendar, even before due dates are assigned.

Season Dates Tab. The Season Dates tab stores competition events, league meets, and milestones. Labels adapt to the project’s program type:

Event Type	FRC Label	FTC Label
tournament	Regional / District Competition	League Tournament
championship	Championship (April)	State Championship
scrimmage	Scrimmage	Scrimmage
milestone	Milestone	Milestone

Kickoff Settings. The kickoff date and total week count are saved to the database and shared across all team members. Changing the kickoff date on one device updates it for everyone on the team.

Part 11: Project Lifecycle Checklist

The Lifecycle Checklist (/lifecycle) is a real-time guide from project creation to competition day. It shows six collapsible phases, each with checklist items that auto-check based on actual project data.

Phase	Key Auto-Checked Items
1 — Kickoff & Strategy	Kickoff Wizard session exists, game notes filled, strategy selected, MCR defined, constraints set
2 — Planning & Prioritization	MoSCoW Board generated, prototype targets flagged, CAD requests created, assignments made
3 — Build Season	Fabrication tasks created, cut list items added, build calendar tasks exist
4 — Integration & Testing	CAD items in review or approved, fabrication tasks completed, notebook entries created
5 — Competition Prep	Tournament or league meet dates added to Season Dates, championship event added
6 — Post-Competition Review	Notebook entries with “review”, “debrief”, or “lessons” in the title

Each item includes a **Go** → link that navigates directly to the relevant tool. An overall progress bar at the top shows the percentage of phases complete across the entire project lifecycle.

Part 12: Engineering Notebook (Scribe)

The Notebook (/notebook) is powered by the Scribe agent. Every Commander session automatically generates a dated notebook entry combining agent outputs with student reflections. Entries are organized chronologically and can be exported as Markdown for submission to judges.

Scribe follows the FTC Think Award rubric [5] [6] when structuring entries: engineering design process, trade-off analyses, and lessons learned are explicitly highlighted. For FRC teams, the same structure satisfies the Engineering Inspiration Award criteria.

Part 13: Commander — The AI Chat Interface

Commander (`/chat`) is the primary interface for interacting with the 17-agent team. It is a persistent chat interface that routes every question to the appropriate specialist agent and synthesizes the responses into a single, coherent reply.

How Commander Works

1. The user types a question or task in the chat input.
2. Commander reads the active project's **Kickoff Context** (game name, strategy, MCR, constraints) from the Kickoff Wizard session.
3. Commander routes the query to the relevant specialist agents (e.g., a wiring question goes to Volt; a scouting question goes to Scout).
4. Each agent processes the query in parallel.
5. Commander synthesizes the agent outputs into a single reply, citing which agents contributed.

Kickoff Context in Commander

When a Kickoff Wizard session exists for the active project, Commander automatically knows:

- The game name and year
- The selected strategy and its description
- The MCR definition
- Team constraints (budget, experience, tools)
- Key scoring objects, auto tasks, and endgame tasks

This means you can open Commander on Day 2 of build season and ask “*What should we prioritize this week?*” and receive a game-specific, strategy-aware answer — without pasting any context manually.

Part 14: Key Workflows

Kickoff Day Workflow

1. Open the **Kickoff Wizard** (`/kickoff`) and select the current game from the Game Library.
2. Review and edit the auto-filled game notes.

3. Set team constraints (budget, experience level, available tools).
4. Work through the Decision Matrix and select your primary strategy.
5. Define the MCR — the simplest robot that can score.
6. Generate the Prototype Plan.
7. Export the session as Markdown for the Engineering Notebook.
8. Use **Meeting Mode** to project the full session on a screen for the team.

Student Onboarding Workflow

1. The team owner goes to **Teams** → **[Your Team]** → **Invite tab** and clicks **Generate Invite Link**.
2. Share the link with the new student via group chat, email, or Discord.
3. The student opens the link, signs in, and clicks **Join Team**.
4. The student navigates to **Profile** and selects their team role.
5. The owner can verify and reassign the role at any time from **Team Detail** → **Members tab** by clicking the role badge dropdown.

Build Delegation Workflow

1. **Human:** *"We are building a 4-module swerve drive using REV NEO motors."*
2. **Commander delegates:**
 - **CAD-Bot** selects modules and mounting hardware.
 - **Volt** generates the wiring manifest and CAN ID map.
 - **Ada** writes the WPILib swerve kinematics code.
 - **OSHA** reviews wire gauges and breaker sizes for compliance.

QA Validation Workflow (Post-Build)

1. Human students declare a subsystem complete (e.g., floor intake is assembled).
2. Commander delegates to Stress-Test: *"Generate a validation protocol for the floor intake."*
3. Stress-Test outputs structured test cases covering mechanical durability, software edge cases, and drive team drills — each with a clear Pass/Fail criterion.
4. Human students execute the tests and report results back to Commander.
5. If a test fails, Commander routes the failure back to the appropriate agent (e.g., CAD-Bot for a bent intake, Ada for a software crash).

Engineering Notebook Workflow (Daily)

1. Build session ends. Scribe has logged all agent outputs (CAD-Bot’s gear ratios, Ada’s code logic, Volt’s wiring manifest).
2. Scribe prompts students: *“Today I recorded a floor intake revision. Can a student provide 2 sentences on why the prototype failed?”*
3. Student replies with a brief reflection in their own words.
4. Scribe generates a dated notebook entry combining the agent math, the student quote, and placeholder tags for photos — ready for the judge’s portfolio.

Part 15: FRC vs. FTC — Season Structure and Platform Comparison

FRC and FTC are fundamentally different in pace, scale, and competitive format. Understanding these differences is essential to using PitCrew effectively for each program.

Season Timeline Comparison

Season Phase	FTC	FRC
Season Duration	8–9 months (September – April)	4–5 months (January – April)
Game Kickoff	Early September	First Saturday of January
Robot Build Period	4–5 months (September – January)	8–10 weeks (January – March)
Competition Format	Multiple single-day league meets spread across the season	Intense multi-day Regional / District events (3-day tournaments)
Championships	State Championship (March) + World Championship (April)	Regional / District Championship (March) + FIRST Championship (April)
Robot Freeze	None — teams iterate continuously	Yes — robot is frozen / shipped at end of build season

Structural Differences

The FRC Build Season Crunch. Unlike FTC, where teams have all autumn to iterate on their design, FRC gives teams roughly 8–10 weeks from Kickoff (early January) to build a massive, 125-pound robot. This is one of the most intense engineering experiences in high school STEM — every week matters, and the Robot Freeze is a hard deadline with no exceptions.

The Florida Tournament Format. Central Florida FTC teams play in local evening and weekend league meets — lower-pressure, single-day events that allow iteration between rounds. Florida FRC teams compete in massive Regional Tournaments (such as the Orlando Regional), which are grueling, high-energy, three-day events held in major sports arenas and convention centers. The atmosphere and stakes are significantly higher.

Cost and Scale. FRC robots are significantly larger, heavier (up to 125 lbs), and more expensive than FTC robots. FRC fabrication typically requires industrial tools — CNC routers, laser cutters, lathes, and welding equipment. FTC robots are bench-top scale, built primarily with aluminum extrusion (GoBilda, REV), and can be fabricated with basic hand tools and a drill press.

PitCrew Platform Comparison

Feature	FRC	FTC
Build Calendar weeks	8 weeks (default)	18 weeks (default; customizable 6–20)
Build phase labels	Design → Build → Integration & Testing → Robot Freeze / Ship	Prototype → Core Robot → Iteration → Polish & Prep
Robot Freeze badge	Shown (final week)	Hidden — no Robot Freeze in FTC
Season event labels	Regional / District / Championship	Scrimmage / League Meet / League Tournament / State Championship
Kickoff Wizard game library	FRC games (Charged Up, Crescendo, REEFSCAPE...)	FTC games (CENTERSTAGE, INTO THE DEEP, DECODE...)
Ada agent	WPILib Java for roboRIO	FTC SDK Java for Control Hub
Volt agent	PDH, SPARK MAX, CAN bus	REV Control Hub, simpler wiring
Optic agent	Limelight / PhotonVision	FTC Vision Portal / EasyOpenCV
OSHA agent	FRC Inspection Checklist	FTC Inspection Checklist
Scribe agent	Engineering Inspiration Award rubric	FTC Think Award rubric
Per-project program type	FRC or FTC per project	FRC or FTC per project

A single team account can have both FRC and FTC projects active simultaneously. Each project maintains its own Kickoff Wizard session, MoSCoW Board, Build Calendar, and agent context independently.

FTC Season Note (Florida Example): FTC runs from September Kickoff through State Championship in February–March — approximately 18–20 calendar weeks. Teams build in stages: the robot does not need to be complete for the October Scrimmage; the goal is a competitive robot by League Meet 1 in November. Florida schedule: League Kickoff Sep 6 · Scrimmage Oct 11 · League Meet 1 Nov 15 · League Meet 2 Dec 13 · League Meet 3 Jan 17

· Orlando League Tournament Jan 31 · Florida State Championship Mar 6–7. Other states vary — adjust the Season Dates tab to match your local league schedule.

FRC Season Note (Florida Example): FRC Kickoff is the first Saturday of January. Teams have 8–10 weeks to build a 125 lb robot before Robot Freeze / Ship Day. Florida teams typically compete at the Orlando Regional (a 3-day event in March) before advancing to the FIRST Championship in April.

Part 16: Minimum Viable Shop Equipment

To build the robot, students need physical tools. A starter shop (under \$1,000) includes [2]:

- **Cutting:** Chop saw (~150), *jigsaw*(30), hacksaw (~\$13)
- **Drilling:** Benchtop drill press (~100), *cordeddrill*(30), step drill bits (~\$10)
- **Electrical:** Ratcheting crimping tool (~30), *wirestrippers*(12), multimeter (~\$10)
- **Assembly:** Hex key sets, combination wrenches, rivet gun, bench vise
- **Safety:** Safety glasses (mandatory at all times in the shop) [2]

Conclusion

By deploying PitCrew’s 17-agent team alongside a structured project workflow, a small roster of 5 to 6 high school students can operate with the strategic depth, engineering rigor, and organizational efficiency of a 50-student powerhouse. The AI handles the heavy mental lifting — reading the rulebook, designing mechanisms, writing code, tracking the budget, building the engineering portfolio, and researching local grants — leaving students free to focus on what matters most: learning, fabricating, and competing.

PitCrew is available at the-pitcrew.co.

References

- [1] FIRST Inspires Community Blog. “The Role of Mentors in FIRST Robotics Competition.” <https://community.firstinspires.org/the-role-of-mentors-in-first-robotics-competition>
- [2] Team 3847 / FIRST. “Tool Recommendations for FIRST Robotics Competition Teams.” https://robotics.choate.edu/wp-content/uploads/2022/02/frc_tool_recommendations.pdf
- [3] ProductPlan. “MoSCoW Prioritization.” <https://www.productplan.com/glossary/moscow-prioritization>

- [4] Chief Delphi Forum. "Kickoff Strategy Discussions." <https://www.chiefdelphi.com/t/kickoff-strategy-discussions/356465>
- [5] RECF / FIRST. "Guide to Judging: Judging Engineering Notebooks." <https://kb.roboticseducation.org/hc/en-us/articles/4969763478167-Guide-to-Judging-Judging-Engineering-Notebooks>
- [6] FIRST Tech Challenge. "Think Award Judge Summary Sheet." <https://info.firstinspires.org/hubfs/web/program/ftc/ftc-judging-summary-sheet.pdf>
- [7] Chief Delphi Forum. "How does the electrical inspection work at competitions?" <https://www.chiefdelphi.com/t/how-does-the-electrical-inspection-work-at-competitions/425201>
- [8] FIRST Inspires. "2025 FRC Game Manual." <https://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>
- [9] FIRST Inspires. "Gracious Professionalism." <https://www.firstinspires.org/about/vision-and-mission/gracious-professionalism>