Field Operations Guide

Revision History	
Revision	Description
25-26.1	Initial 2025-26 Season Release
25-26.2	Additional details regarding Practice Match operations

Contents

Introduction

This guide provides training and advice for *FIRST* Technical Advisors (FTAs) and Field Supervisors on topics related to the management of competition and practice fields at a *FIRST*® Tech Challenge event. It also describes workflows that are relevant to individuals in the Lead Queuer and Head Referee roles.

Due to the wide variety of event types and sizes, it is not expected that everything in this guide will be relevant at every event. Where possible, guidance is classified as **required** when it is expected at every event, **recommended** when *FIRST* believes that alternative choices may have a negative impact on the experience of event participants, or **suggested** if the guidance comes from an evolving understanding of event best practices.

Seasonal Topics of Emphasis

Although this guide is new for the 2025–2026 season, the following are key changes in field operations for the majority of *FIRST* Tech Challenge events:

- **Reporting Structure:** The roles of FTA and Field Supervisor have been formally swapped in the recommended reporting structure. This change reflects the hierarchy found in *FIRST* Robotics Competition and represents the start of a long-term transition of the FTA role from purely technology-focused towards event leadership. Training and documentation related to these roles will be updated over the next few seasons.

- **Practice Matches:** Previously, inspection was split into *Robot Inspection* and *Field Inspection*. The main purpose of Field Inspection was to ensure that teams would be successful once they started their matches. This season, several of the checks that were previously part of Field Inspection have been absorbed into Robot Inspection, and the Field Inspection process has been replaced with Practice Matches. Although not all events will use Practice Matches — and some may choose to split Inspection into Hardware and Sizing and Control Inspection — field staff should be prepared to run Practice Matches. See Practice Matches for more information.

Roles and Responsibilities

Primary descriptions of each volunteer role can be found in their respective volunteer manuals. This section focuses on the interaction between volunteers and the division of responsibilities between them. Recommendations regarding the level of staffing for each role are available in the Field Operations section of the Tournament Guide.

FIRST Technical Advisor

This is a key volunteer role that is **required** at all *FIRST* Tech Challenge events. Some events may have a hierarchy of FTAs that includes an *Event Lead FTA* and *Division FTAs* as appropriate.

The FTA serves as the leader for all field operations at an event. The field operation responsibilities described in this guide represent a portion of the FTA's duties, so they may adopt strategies for effectively delegating or prioritizing their focus.

At events **without** a Field Supervisor staffed — which are typically smaller, single-division events with fewer fields — the FTA will divide their focus between field operations and other responsibilities. This typically means prioritizing emergencies (for example, competition field repair) and deprioritizing other concerns (for example, minor improvements to the flow of people and robots through the arena).

At events **with** a Field Supervisor staffed — which are typically larger events, events with multiple divisions, or events with a larger number of fields — the FTA may delegate some or all the field operation responsibilities to the Field Supervisor. In this situation, the FTA should periodically check in with the Field Supervisor and remain apprised of urgent or ongoing issues.

An FTA Assistant role may be used to enable volunteers to gain experience in event leadership.

> Individuals in the Field Supervisor role are most effective when the FTA empowers them to observe and experiment with ways to improve field operations throughout the day (within the guidelines set by *FIRST*).

Field Supervisor

The Field Supervisor reports to the FTA and assists with the field operation responsibilities described in this guide. They lead the Lead Queuer and all Field Reset personnel.

Similar to the relationship between the FTA and Field Supervisor, the Field Supervisor should periodically check in with queuing and field reset staff and remain apprised of urgent or ongoing issues. They can also empower those individuals to observe and experiment with ways to improve their processes throughout the day (within the guidelines set by *FIRST*).

By observing the workload and level of stress of the FTA, the Field Supervisor can strike a balance between collaborating with the FTA on non-urgent issues or managing them without the FTA's input. In either case, the Field Supervisor should record information about their experience so that the FTA can effectively track long-term issues and make reports to the Event Director, local Program Delivery Partner (PDP), and *FIRST* staff.

Lead Queuer

The Lead Queuer reports to the Field Supervisor or FTA (if the Field Supervisor role is not staffed) and supervises Queuer volunteers. They are encouraged to take charge of the match queuing process and collaborate with the Field Supervisor/FTA to improve the overall flow of matches throughout the day.

Queuing Staff

Queuer volunteers report to the Lead Queuer. Queuing is a highly accessible volunteer role that may be staffed with young or first-time volunteers. FTAs, Field Supervisors, and Lead Queuers are encouraged to perform on-site training of Queuer volunteers.

Field Reset Staff

Field Reset volunteers report to the Field Supervisor or FTA (if the Field Supervisor role is not staffed). Field Reset is a highly accessible volunteer role that may be staffed with young or first-time volunteers. FTAs and Field Supervisors are encouraged to perform on-site training of Field Reset volunteers.

Head Referee

The Head Referee is an event leader who collaborates with the FTA to ensure matches are conducted effectively, fairly, and promptly. This guide describes workflows and handoffs between the Head Referee and FTA (or Field Supervisor, as appropriate). At some events, the exact division of responsibilities between these roles may shift slightly based on individual experience and workload.

> This document often describes actions taken by the FTA. In practice, these actions might be taken by the FTA or a delegate such as the Field Supervisor (if staffed) or an FTA Assistant.

Before the Event

Prior to event day, the FTA should work with the Event Director on an Event Technical Checklist. This document should resolve basic questions about the event (such as the number of competition fields) and provide constraints when laying out the arena and practice fields.

It is **recommended** that the FTA and Event Director use the Event Technical Checklist to collaborate on overall event and arena diagrams that can be shared with load-in and event setup volunteers. These diagrams do not need to use CAD tools or be constructed to scale, but should include:

- The approximate locations of competition fields, practice fields, and team pits
- Critical measurements (for example, the setback of competition fields from the audience)
- Intended walking paths for the audience, queued teams, and teams exiting the arena

Overall event and arena diagrams can be reused and refined year-to-year when events return to the same venue. See the Tournament Guide for more information about event and arena layout.

The Event Technical Checklist, overall event layout, and arena layout are all opportunities to design the event experience for participants. There is often more than one way to ensure safety and accessibility while balancing ease of movement and audience experience.

Using the Event Technical Checklist, overall event diagram, and arena diagram, the Event Director and FTA can prepare appropriate signage to guide participants within and between event spaces and create a Pit Map in the FTC Scoring system (see the Event Management System Guide for more information).

The time spent creating these resources prior to the event will reduce overall confusion, decision-making workload, and communication burden on event day.

Event Setup

At an ideal event, event setup is guided by detailed event layout and arena diagrams along with the Event Technical Checklist. However, even with these resources, there is often a series of small but important decisions necessary to set up the arena and practice fields. These decisions are a collaboration between the Event Director and FTA.

Supervision of volunteers assisting with the construction of the arena is the ultimate responsibility of the FTA. At events that staff the Field Supervisor role, it is **recommended** that the FTA empower the Field Supervisor to supervise these tasks. Individuals in these roles should arrive prepared with an electronic or printed copy of the Event Field Setup Guide.

See the Tournament Guide for additional information about recommended event and arena layouts.

Field Consistency

Section 13.2 — General Tournament Rules of the Competition Manual **requires** events with multiple competition fields to provide consistency between those fields. The FTA should work with the Event Director to ensure that the same type of field perimeter, field tiles, and field timer display are used at each competition field. Consistency with practice fields is encouraged but not required.

Field Tolerance

FIRST publishes a Field Acceptance Checklist that describes critical field-related measurements that should be checked to ensure consistent gameplay across events. It is the responsibility of the FTA to ensure all competition fields meet the acceptance criteria and are consistent as described in Section 13 — Tournament. It is **required** that the acceptance checklist be completed for all competition fields at least once per competition day at all advancing, Championship, and Premier events. It is **recommended** that the acceptance checklist be completed for all practice fields at least once per competition day.

Static Spray

In climates where the relative humidity at room temperature is below 40%, *FIRST* **recommends** that events take action to reduce static buildup on robots.

Anti-Static Spray (Recommended)

This method involves field staff spraying commercial anti-static spray (such as *Heavy Duty Staticide*) on the field tiles. *FIRST* does not recommend use of non-commercial sprays and those meant for clothing. Following are procedures and important considerations for applying anti-static spray:

- Because this action changes the nature of the tiles, it is **required** that the FTA consult the owner of the field tiles prior to applying anti-static spray.
- Tape must be applied to the field **before** anti-static spray.
- Anti-static spray should be applied at most once per 4 days of competition.
- Fields must be allowed to dry for at least an hour before any traffic (human or robot) occurs.
- Spray the tiles until they are damp. *FIRST* **recommends** pointing the spray horizontally (not at the tiles) and using a mist setting. Avoid creating large droplets or pools. In spaces with significant air currents, it may be necessary to hold the spray closer to the tiles.
- Avoid walking or driving on field tiles until dry. Ensure the area is well-ventilated.

Water Spray

This method involves field staff spraying water on the field tiles. Water is as effective as commercial anti-static spray at mitigating the risk of static buildup, with the benefit that it does not change the nature of the tiles and traffic can resume just a few minutes after it is applied. However, water must be reapplied at least every 30 minutes. Similar to anti-static spray, here are procedures for applying water:

- Tape must be applied to the field **before** water is sprayed.
- Spray the tiles until they are damp. *FIRST* **recommends** pointing the spray horizontally (not at the tiles) and using a mist setting. Avoid creating large droplets of pools. In spaces with significant air currents, it may be necessary to hold the spray closer to the tiles.
- Avoid walking or driving on the tiles until most of the water has been absorbed by the tiles. One way to measure this is by placing a hand on the field: this action should not create an obvious wet patch/print or leave your hand noticeably wet. This should occur within a few minutes.
- Reapply approximately every 30 minutes.

When water is used, the FTA should monitor the frequency of suspected electro-static discharge (ESD) disruptions and adjust their re-application strategy accordingly throughout the day.

Schedule Mindset

A valued measure of event quality is starting and finishing on time. Attendees plan their day based on the published event schedule. Ending significantly late affects travel plans, post-event meals, duty-time limits for bus drivers, etc. Running significantly ahead of schedule can put undue stress on teams and volunteers who may have other responsibilities during scheduled breaks in activity.

Events are complex, and there are many opportunities for activities to run ahead or behind schedule. Overall, field staff should be **schedule-aware, not schedule-driven**. This means routinely observing the difference between the published schedule and reality. Armed with this awareness, volunteers remain empowered to occasionally delay proceedings for the sake of team and volunteer experience. For example, occasionally delaying a match to ensure that all four robots can compete is usually worth the impact on the schedule.

Strategies for Timing Adjustment

In general, during match play, it is our goal to remain within ±1 match of the scheduled times. There are several strategies that field and event staff can use to adjust the timing of match play.

Team Introductions

Emcees often introduce the competing teams prior to the start of the match. In an ideal flow, these introductions occur while teams are finishing their pre-match setup and continue seamlessly into starting the match. If matches are running behind schedule, the FTA (or their delegate) may ask the Emcee to introduce teams early and quickly during pre-match setup and expedite the start of the match once teams are ready.

Score Announcement

After a qualification match is complete and scores are submitted, it is natural to announce the final scores as soon as possible. However, doing this may interrupt teams that are in the process of leaving the arena (and delay field reset). If matches are running behind schedule, the FTA (or their delegate) may ask the Scorekeeper and Emcee to wait to announce scores until after teams have left the field.

At events with more than one competition field, the FTA and Head Referee may agree to delay the announcement of qualification match scores until after the match that follows. This larger process change should only be used if the event is significantly or chronically behind schedule.

Pre-Match Setup

A common cause of delayed match play is lengthy pre-match setup by teams. This can be caused by inattentiveness or technical issues beyond a team's control. Field staff should remain vigilant and gently redirect teams that lose focus during setup. It is the responsibility of the FTA to take reasonable steps to ensure all teams can compete in the match, even if this means occasionally delaying a match.

Post-Match Review

Another common cause of delayed match play is extended post-match review by referees. Field staff should utilize this time to triage match issues and perform as-needed repairs to the field. Referees should consider whether the topics in review require the presence of teams on the field, or whether they can be released to begin field reset. It is the responsibility of the referees to take reasonable steps to ensure matches are scored fairly and accurately, even if this means occasionally delaying a match.

Event Disruptions

In cases where a significant disruption (such as an evacuation of the venue) causes the event to fall more than 30 minutes behind schedule in an unrecoverable way, the Event Director and FTA may modify the times in the public match schedule to better reflect the real start times of remaining matches. Such a change should not modify any previously scheduled breaks and must be clearly communicated to teams and volunteers. See the Event Management System Guide for details.

Sensor Calibration

Teams benefit from a brief period on each of the competition fields to calibrate their robot's sensors under competition lighting conditions. *FIRST* **recommends** that events specify a time window for sensor calibration prior to matches on each day of the competition, with a minimum of 30 minutes total for this activity. This period may be concurrent with — or a part of — the inspection process. The Event Director and FTA will select the time(s) for robot sensor calibration.

Workflow

In general, teams may calibrate on each competition field they will use (for example, only their division fields in a multi-division event). Prior to playoff matches, teams may need additional time to calibrate on any competition fields they have not previously encountered during divisional play. All fields should have competition lighting during these periods. All teams should have access to approximately equal time for calibration. Not all teams will want to make use of this time, and multiple teams can calibrate at the same time. If equitable access is a concern, it Is it **recommended** that teams are limited to five minutes maximum on each field.

> Teams are restricted in what actions they can take during sensor calibration. Relevant rules can be found in Section 13 — Tournament of the Competition Manual.

At least one member of field staff per division is **required** to monitor teams during sensor calibration. This volunteer should keep track of how long each team has been at the field and actively cycle teams off and on the fields. They should also be familiar with the relevant rules for sensor calibration found in Section 13 — Tournament. In general, this opportunity should not be used for practice by the teams.

Lighting Changes

If a significant change occurs to competition lighting conditions, the Event Director and FTA should decide if teams will be given an opportunity to perform sensor calibration prior to resuming match play. This is not always possible given schedule constraints, but it is a **suggested** practice if time allows. To expedite this process, sensor re-calibration should be time-limited and only for teams that require it.

Even if re-calibration is not possible, it is **required** to inform teams of significant changes in competition lighting conditions that occur after a scheduled sensor calibration period or after qualification matches have begun.

Practice Matches

Practice matches are an optional part of an event that provides an opportunity for teams and field staff to practice the entire match process, from queuing to reset, as described in Section 13 — Tournament of the Competition Manual.

In general, field staff should follow the guidance outlined in Qualification Matches during practice matches. Regardless of whether practice matches are open or scheduled, field staff should provide additional guidance and patience for volunteers and teams during this period. The intention is for teams and volunteers to practice the match flow without the stress of worrying about the match outcome. Not all field staff roles need to be present at the field to run practice matches.

While it is encouraged to run practice matches as close to normal field operations as possible, events are empowered and encouraged to adapt and run minimal field crews or fewer fields as dictated by the greater event needs. There are no requirements to provide scores or penalties during practice matches. Practice matches **require** the FTA or an appropriately trained delegate to be present at the field for the matches to provide leadership oversight of the process. It's **encouraged** that the Head Referee should also be present or have an appropriately trained delegate.

Practice Match Schedule

At a typical single-day *FIRST* Tech Challenge Event, practice matches happen in parallel to other event activities such as inspection and judging. Practice matches should only be offered at an event if all teams will have a reasonable opportunity to participate in a minimum of one practice match. There is no one right way to accomplish this, but field staff should keep the goal of equitable access for all teams in mind when offering practice matches.

The amount of time planned for practice matches should support the goal of having all or most teams play at least one match, assuming a slower-than-normal match cycle time. Two **recommended** methods for offering practice matches are Scheduled Practice Matches and Open Practice Matches. Additional guidance regarding the scheduling of practice matches as part of overall event planning is available in the Tournament Guide.

Scheduled Practice Matches

Scheduled practice matches use the Event Management System to generate a practice match schedule similar to the Qualification Match schedule. When using this method, all teams must be scheduled for at least one practice match. The Lead Scorekeeper should configure a slower-than-normal match cycle time when generating this schedule.

Teams are guaranteed the opportunity to play in their scheduled match(es). If the scheduled match time conflicts with another scheduled activity such as judging or inspection, the team should attend those appointments instead and field staff should work with the team to find them another opportunity to join a practice match. This is done on a best-effort basis; it may not always be possible for every team to participate in a practice match. Teams may decline participation in practice matches.

In addition to queuing teams for their scheduled practice matches, there should be a designated place to form a filler-line. When teams do not report to their scheduled practice match, empty slots should be filled from teams in the filler-line. See the Filler-Line Best Practices for recommended ways to manage the filler-line process.

Open Practice Matches

Open Practice Matches use the "Test Match" function of the Event Management System to manually enter team numbers and play matches. During the designated time, teams form a filler-line and join matches on a first-come, first-served basis. See the `Filler-Line Best Practices` for recommended ways to manage the filler-line process.

The time period for open practice matches should be scheduled so that all the teams who are ready and interested in participating have an equitable opportunity to play in a practice match. Ideally, this portion of the event schedule is big enough for every team to play in at least one practice match. However, at the discretion of the Event Director and FTA, the scheduled time can be shorter. This should only be done if, in the judgement of the Event Director and FTA:

- A significant number of teams will not want to participate in a practice match, or
- For the overall success of the event, it's better to have some practice matches than none.

If the scheduled time is less than the time necessary for all teams to participate in at least one practice match, the FTA and Event Director should agree on a fair way to prioritize access to practice matches. Recommendations regarding how to prioritize access are included in `Filler-Line Best Practices`.

Filler-Line Best Practices

The filler-line is generally a first-come, first-served queue of teams. It is **suggested** that teams demonstrate their readiness to participate by bringing their robots and operator consoles with them in the filler-line. If a team is not ready to participate (for example, their robot is not present) when queued from the filler-line, field staff may ask them to wait until the following practice match.

Ideally, all practice matches are played with four teams participating. However, practice matches may be played with fewer than four teams if there is an insufficient number of teams available in the filler-line. Field staff may delay the start of a practice match if they have identified a clear candidate for filling an open position at the field and the team is making a good-faith effort to participate.

> Whether practice matches are open or scheduled, the overall goal of the filler-line is to provide interested teams with an opportunity to practice while supporting a consistent pace of matches with all four teams filled.

If not all teams have a reasonable opportunity to participate in a practice match, the Event Director and FTA should agree on a fair process to prioritize access to the filler-line. **Recommended** ways of prioritizing access include:

- Random invitation of available teams
- Prioritizing access for teams who do not have access to a field outside of events
- Prioritizing access for teams who are competing for the first time this season

The following methods are **not recommended** for prioritizing access:

- Inviting teams in order of team number (ascending or descending)
- Prioritizing rookie teams

Teams may also be invited at the request of CSA volunteers who wish to validate the team's ability to participate in future matches.

Typically, if the event provides teams with an assigned inspection time, teams can join the filler-line without being inspected. However, if the event uses a first-come, first-served inspection process, it is **suggested** that the Event Director and FTA require teams to complete inspection prior to joining the filler-line (similar to E116 requirements for Practice Field access).

Events with multiple competition fields may use multiple filler-lines. In this case, it is **suggested** that the teams are only allowed to join one line at a time to promote equitable access for all teams.

Practice Match Safety

It is expected that teams may not be fully competition-ready as described in Section 3 — Competition Eligibility and Inspection during practice matches (for example, they may not have passed inspection). During pre-match setup for a practice match, field staff should observe the robots and note any obvious safety hazards that may be present. Robots in practice matches **do not** need to adhere to all robot construction rules, but they **must not** pose a safety risk to teams, field staff, or other robots.

If time allows, field staff should also note any mechanisms or configurations that may cause damage to the field. Teams may still be allowed to participate in the practice match; however, they should be gently warned to avoid any actions that might cause damage.

Event Management System & A/V Testing

Practice matches provide an opportunity to test the Event Management System and any A/V systems. As matches continue, field staff should observe the following:

- Are field timers and audience displays active and showing the correct division and field?
- Can drive team members hear game sounds for their matches (and effectively distinguish them from the game sounds of other fields and divisions)?
- Can drive team members and the audience hear the Emcee and Game Announcer?
- Can the Scorekeeper hear match countdowns and effectively signal score availability?

The FTA should work with the Technical Director (if staffed) or Scorekeeper to adjust the setup. Making iterative adjustments during practice matches will lead to stress-free qualification matches.

Qualification Matches

Qualification matches represent most of the time spent during a *FIRST* Tech Challenge event. Whether the event is a small, single-field meet or a multi-day, multi-division Championship, each event is unique and there are many opportunities for field staff to observe and experiment with ways to improve the flow of matches.

The following describes a workflow for qualification matches, organized in order from a team's perspective (from queue to field reset). Many of the topics discussed in this section are also relevant to playoff matches. Within the rules and guidelines found in the Competition Manual and this document, volunteers are encouraged to iterate on this workflow and provide feedback about their experiences.

Remember that it is our goal to remain within ±1 match of the scheduled times. The `Schedule Mindset` section describes some strategies for adjusting timing.

Queuing

A full description of the role of Queuer is available in the Lead Queuer Manual. Following are some considerations related to queuing that involve multiple volunteer roles:

Traffic Patterns

Prior to the event, the Event Director and FTA may have outlined an intended traffic flow for teams entering and exiting the arena. However, observation of this flow may expose opportunities for improvement. FTAs and Field Supervisors should empower and collaborate with the Lead Queuer to improve traffic patterns. This may involve moving queuing tables, changing the timing of teams moving to and from the fields, placing tape arrows, or other optimizations.

When changes occur, it is important to communicate clearly and patiently with teams and volunteers.

Queuing Depth

The number of teams queued (next match, next two matches, etc.) depends on the number of teams at an event and the number of competition fields. It is important for teams to have a break between matches and not spend all their time in the queue. In general, the queue depth should be as shallow as possible while still ensuring that teams are present in time for their scheduled matches.

FTAs and Field Supervisors should collaborate with the Lead Queuer to choose an appropriate queue depth based on the number of teams, the number of competition fields, venue layout (for example, the distance between pits and queuing), and observed team behavior.

Match Participation

Although Queuers are responsible for ensuring teams are aware of upcoming matches, the teams are responsible for showing up in a timely manner that does not impede the flow of matches.

If it looks like a team may not appear in time for their match, Queuers should alert the Lead Queuer (who, in turn, should alert the Field Supervisor or FTA). Their prioritized goals are:

- Locate the team and ensure they are aware of the upcoming match.
- Learn whether the team intends to participate and inform the FTA and Head Referee. This will determine whether it is necessary to wait (with a match delay timer) or if play can proceed.
- Remind the team that they should send a drive team representative if they are unable to participate in a match; otherwise, they are unable to earn credit for the match.
- Refer the team to relevant rules in Section 11.3 — Pre-MATCH of the Competition Manual related to causing a significant delay to the start of a match.

If a team communicates that they do not intend to participate in an upcoming match, Queuers should:

- Inform the team that they will not receive any additional reminders about the match.
- Remind the team that they should send a drive team representative if they are unable to participate in a match; otherwise, they are unable to earn credit for the match.
- Inform the Lead Queuer (who should, in turn, inform the FTA and Head Referee).

If the team later changes their mind, they may participate provided they do not cause further delay.

> In all cases, the goal of field staff is to provide an empathetic balance between giving teams an opportunity to participate and ensuring the efficient flow of matches.

FTA & Head Referee Workflow

FIRST Tech Challenge uses the concept of *field ownership* to describe the relationship between the FTA (and their delegates) and the Head Referee during match play. When a key volunteer *owns* the field, they are responsible for all its processes and volunteers. This workflow improves match efficiency and provides clarity for in an area where important decisions can occur in a high-stress environment.

> Safety concerns always override field ownership. If either the FTA or Head Referee see an unsafe condition, they should work to resolve it.

Before the start of practice or qualification matches, the FTA and Head Referee should meet and confirm that they are aware of this workflow and would like to follow it.

At events which staff the Field Supervisor or FTA Assistant role, one of these volunteers may be delegated the responsibility of field ownership for one or more competition fields. This responsibility may also be passed between volunteers throughout the day to facilitate breaks. Whenever this happens, a brief conversation should occur between the (new and previous) representatives and the Head Referee to ensure clarity during field ownership handoffs.

Pre-Match Set Up

The FTA (or their delegate) owns the field prior to the start of matches and as soon as robots are released from a previous match. During this time, they are responsible for the teams removing their robots, field reset activities, and pre-match setup by teams participating in the next match.

Ready Handoff

When the FTA (or their delegate) determines that teams are ready for the upcoming match, they should give a clear, unambiguous signal (such as a thumbs-up) to the Head Referee as a formal handoff of field ownership. (When field staff take breaks or otherwise change representation, it should be made clear who will give this signal to the Head Referee.)

Match Play

After the formal handoff, the Head Referee owns the field. The FTA (or their delegate) may ask the Head Referee to return ownership in certain situations, such as when the field requires repair or when a team has encountered a technical issue prior to the start of the match. The Head Referee should oblige this request in most cases but may not, at their discretion. The Head Referee maintains ownership through randomization, the start of the match, all match periods, and post-match scoring.

Field Reset

When the Head Referee signals to teams that they may remove their robots from the field, ownership implicitly returns to the FTA (or their delegate).

Pre-Match Set Up

Prior to the start of the match, the FTA (or a Field Supervisor or FTA Assistant acting as their delegate) is responsible for:

- Ensuring the field is properly reset and does not require any maintenance,
- Verifying that the drive teams and their robots are ready for the start of the match, and
- Once ready, performing the handoff described in the `FTA & Head Referee Workflow`.

Following is a step-by-step guide of the FTA's (or their delegate's) pre-match activities:

Field Maintenance

Fields may require repairs or adjustments throughout the day. To accomplish this, field staff may enter the field immediately following the end of a match as long they do not disrupt the scoring activities of the Referees. If any repairs or adjustments might affect scoring, field staff should consult with the Head Referee before starting.

If field maintenance continues while teams arrive at the field for an upcoming match, field staff may ask drive team members to wait until work is complete before entering the field.

Welcoming Teams

As drive teams arrive with their robots, field staff welcome them and expedite the setup process by providing focus and assistance. The **recommended** step-by-step process is:

1. Welcome drive teams from a position on the field or near the alliance area.
2. If multiple members of field staff are present, each can focus on helping one alliance and provide as-needed support to the other alliance.
3. Drive teams may perform an optional `Robot Wiggle Test` on their own.
4. Observe robot setup and gently redirect drive teams that may be distracted.
5. As time allows, look for obvious safety and entanglement issues or disconnected wires.
6. Confirm that the REV Control and Expansion Hubs have status LEDs that indicate they are ready for the start of the match.
7. When applicable, confirm that drive teams have preloaded the allowed scoring element(s).
8. Confirm `Driver Station Readiness`.
9. Once both alliances are ready to start the match, handoff the field to the Head Referee.

Robot Wiggle Test

Teams may — at their discretion, and if they are not delaying the start of a match — perform a robot wiggle test during pre-match setup to verify that the drive team is able to control their robot. Doing this allows field staff to discover and triage issues before the start of the match. These optional tests are not performed in a coordinated way; they occur independently as part of a team's setup procedure.

A robot wiggle test is performed by running a TeleOp OpMode and using a gamepad to slightly move a servo (recommended) or DC motor. This movement should not involve driving the robot or interacting with any scoring elements, except those that may have already been preloaded by the team. Movement confirms that communication between the driver station and robot controller devices is operational.

Driver Station Readiness

For teams using the *FTC Driver Station* app version 11.0 or higher, the initialization and start button will have a **green background with a white play button** if the following is true:

1. The driver station is connected to a robot controller with a matching team number,
2. At least one gamepad is connected and registered,
3. An OpMode is selected and initialized, and
4. The thirty-second stop timer is engaged (for Autonomous OpModes only).

Although this match readiness signal is not a perfect indicator of success (for example, the team may intend to use two gamepads or have an incorrect OpMode selected), field staff may rely on it when close examination of each team's driver station is not possible. "Getting to green" is **not required** of teams, but field staff are encouraged to educate teams about the benefit of the indicator and the risks they face if field staff are not able to use it. In the absence of the match readiness signal, field staff are encouraged to manually observe the gamepad indicators, play button, and stop timer.

> Teams might not run an Autonomous OpMode in any given match. They are, however, bound by rules related to initialization during pre-match setup in Section 11 — Game Rules (G) of the Competition Manual.

Pre-Match Triage

Prior to the formal handoff of field ownership to the Head Referee, the FTA (or their delegate) has broad latitude in the actions they can take to ensure that all teams are able to participate in a match. This is balanced by a responsibility to ensure the efficient flow of matches and fairness for the teams that are waiting to begin their scheduled match.

If the FTA or a team identifies an issue that may prevent them from participating in a match, the FTA may:

- Talk with members of the affected drive team,
- Recommend corrective action to the drive team,
- With permission, touch the team's robot, driver station device, gamepads, etc., and/or
- Visually inspect the robot and operator console.

If formal handoff of the field to the Head Referee has already occurred, but the FTA has identified a potential issue that may prevent one or more teams from participating in a match, the FTA may request return of field ownership from the Head Referee to address the issue. Otherwise, the FTA may continue performing triage within the guidelines described in `Triage During a Match`.

Schedule Considerations

Pre-match robot triage can have a significant impact on the overall event schedule. FTAs are empowered to take reasonable steps to ensure that all four teams scheduled for a match can participate in it. These include, but aren't limited to:

- Investigating the robot and operator console for common causes of issues,
- Cycling robot main power and rebooting the driver station device, and
- Inviting the team to use a nearby spare battery or driver station device.

Most common issues related to robot power and control systems can be resolved in two minutes or less. If triage takes longer than this, the FTA may need to consider making the difficult decision to start the match with a non-functional robot.

Match Delay Considerations

The FTA should be familiar with rules related to pre-match setup from [Section 11.3 — Pre-MATCH] of the Competition Manual. This includes the requirement of teams not to cause significant delays to the start of a match. If a team is not ready by the expected match start time, the FTA should work with the Head Referee to determine if a violation has taken place.

Teams are **not** at risk of a match delay violation if the FTA has identified a technical issue related to the team and is working with them to resolve it. This may include periods of time when it is not obvious that a team is making a "good faith" effort to become ready for the match, such as waiting for a driver station device to reboot.

If a team experiences a technical issue that delays the start of a match, other teams in the match may take certain actions, such as de-initializing their robot, that will otherwise fall outside the realm of "good faith efforts" to become ready for the match. The FTA should remain vigilant for actions by any team that fall outside of "good faith efforts" such as using tools to make significant changes to their robot.

Non-Functional Robots

If the FTA or Head Referee decides to start a match with a robot that is non-functional, they should invite the team to remove the robot from the field and begin work to resolve the issue back in their pits. They should also remind the team to leave one representative at the field so that they may get credit for the match. Finding a CSA or other support for the team is helpful, if available.

During a Match

During a match, the FTA (or their delegate) is limited in the actions they can take to triage robot issues. Unless a robot poses a clear safety risk, the FTA may not enter the field or touch any robots. They may:

- Talk with members of the affected drive team,
- Recommend correct action to the drive team,
- With permission, touch the team's driver station device, gamepads, etc., and/or
- Visually inspect the robot and operator console from outside of the field.

Gathering data during the match can help determine the cause of a robot issue, even if final determination cannot be made until after the match is over. FTAs can always encourage the team to issue robot restart commands on their driver station device, re-register their gamepads, and take other actions that don't involve physically interacting with the robot.

> Only a Referee can declare a robot officially "disabled" during a match, as this can affect match outcomes. The FTA should advise the Head Referee as soon as possible if a robot is non-functional during a match.
> **An important exception is safety**: an FTA may instruct a team to stop their robot if they determine that it poses a safety risk.

Scoring Elements Outside of the Field

Occasionally, scoring elements may exit the field during a match. Rules regarding if and how these elements should be returned to the field vary from season to season. Check with the Head Referee regarding the correct procedure for returning elements to the field during a match.

Triage After a Match

After the end of the match, the FTA (or their delegate) may continue to triage robot issues. In general, this means the FTA may enter the playing field **if all robots are stopped** and if it can be done without disturbing the playing field or disrupting referee activities. It is **strongly recommended** to share the intent to enter the field with the Head Referee if this can be done without disrupting scoring activity.

It is not always possible to determine the cause of a robot issue at the field. The FTA's goal is to ensure that teams exit the arena with a good understanding of the symptoms and likely causes, preferably with an actionable next step to address the issue.

Question Box

Although the question box is primarily used for questions to the Head Referee, a team member may also ask questions of the FTA. When a team member enters the question box, field staff are encouraged to ask whether the question relates to match scoring, gameplay rules, or another matter.

Here are some common questions that may be asked of the FTA:

Q1: Why aren't you going to replay that match?
A1: *There are only certain situations that warrant replaying a match. Unless we can prove that an arena fault affected the outcome of a match, we are unable to replay the match.*

Q2: Why don't you fix the wireless? It's obviously causing problems.
A2: *We have been monitoring the wireless environment throughout the day.* [State relevant facts about the wireless environment and actions taken.]

Remember that any questions related to scoring or gameplay should be directed to the Head Referee.

Field Reset

Once the Head Referee returns the field to the FTA (or their delegate), field reset begins. A season-specific description of the procedure is available in the Field Reset Guide.

Timing

While resetting the field quickly is important to ensuring the efficient flow of matches, it is also important that the previous match's scores are fully submitted. Field reset should not begin until the Head Referee has given a clear signal to teams that they can remove their robots. Teams should also be given some time to safely remove their robots from the field before Field Reset volunteers enter.

Accidental Removal of Scoring Elements

If scoring elements were removed from the field during a match, field staff should ensure they are found and returned according to that season's rules for scoring elements that exit the field. It is also recommended that field staff observe robots as they exit the arena to ensure that they don't accidentally carry scoring elements away from the field. Field staff should not remove scoring elements from robots or help teams lift or move their robots.

Playoff Matches

Playoff matches have a few key differences to qualification matches from a field operations perspective. Field staff will need to exercise greater patience with teams during this high-stress period, and with one another as the arena changes between match play and awards presentation.

Playoff and Awards Schedule

A key piece of information that all field staff should understand is the order of events for the playoff period. *FIRST* Tech Challenge **recommends** interspersing awards presentations and playoff rounds (when appropriate). However, the Event Director may choose to present awards during opening ceremonies or at the end of the playoff rounds. The recommended order and timing of awards presentations depend on the size of the playoff bracket. At events where awards are interspersed with playoffs, regular reference of Section 13 — Tournament from the Competition Manual will be helpful.

Regardless of the schedule of awards presentation, events with larger playoff brackets will see teams regularly change fields and alliance color. Queuers should be prepared to remind teams of their next match number, field, and alliance.

Regularly showing the playoff bracket to the audience using the video switch feature of the Event Management System, FTC-Live, will be critical to their understanding of the event. See the FTC-Live Setup Guide for more.

Minimum Timeouts

When a playoff match features an alliance that recently finished a match, a minimum timeout will be enforced by the Event Management System. Notably, this situation will not arise in early playoff rounds at events with large playoff brackets. Teams may be under the mistaken impression that they cannot incur a match delay violation in these circumstances.

Finals Round

Double-elimination tournaments have a variable number of matches depending on whether the lower bracket alliance defeats the upper bracket alliance. In this guide, we refer to both matches — the potential final match, in which the lower bracket alliance faces the upper bracket alliance, and the absolute final match that occurs if the lower bracket alliance wins — the "Finals Round."

In the Event Management System, matches in the Finals Round occur on "Field 0". Practically, this means that field staff can select any field to host the final matches, without rebinding field displays. This decision is ultimately made by the Event Director with input from the FTA. Selection of the field for final matches should consider the audience view, field element quality, and other production aspects. If the playoffs continue to a second final match, a different field can be used.

Exceptional Situations

While the majority of *FIRST* Tech Challenge matches and events occur without too much difficulty beyond the usual labor of adhering to the match schedule, there are occasionally some exceptional circumstances. Below are some examples that demonstrate how field staff might respond.

Arena Faults

After a match is complete, the FTA and Head Referee may determine that a fault in the arena affected the outcome of the match. This could stem from wireless interference, a field lighting change, or some other issue. Occasionally, the FTA and Head Referee may determine that the fault did affect or may have affected the outcome of more than one match. This can lead to a difficult decision to replay multiple matches.

When a match replay decision might significantly affect the overall event schedule, the Event Director must be consulted. The FTA and Head Referee can inform the Event Director of the circumstances, and the Event Director can weigh this against other factors such as venue timing restrictions. The FTA should encourage the Event Director to contact *FIRST* HQ for assistance with this decision.

If the decision is made to replay multiple matches, the FTA should inform teams as soon as possible and provide a best-effort estimate of their new match start times. Similarly, the Event Director should inform all teams of any changes to the overall event schedule. Matches are generally replayed during the next scheduled break, however it may be necessary to split the replays across multiple breaks (for example, to ensure that teams are able to eat lunch).

The schedule impact can sometimes be reduced by speaking with the affected teams. For any given match, the FTA may ask participating teams if they would like to replay the match (note: the FTA should avoid implying that they would prefer for a team to decline). Even if a replay might improve a team's overall event performance, they may be disinterested for a variety of reasons. If all four participating teams decline, then the original match results can be kept.

Key Points

- Replay decisions that affect the overall event schedule require the Event Director's agreement.
- Match replays may need to be split across multiple breaks.
- In some cases, time can be saved by talking with the affected teams.

Significant Field Damage

Occasionally, significant field damage may occur. The time necessary to repair the affected elements may exceed the expected start time of the next match on the affected field. At an event with multiple competition fields, the FTA can direct matches to continue on another competition field while repairs are underway. If there is only one competition field available, the FTA may use significant portions of, or an entire, practice field to continue the event. Depending on the timing of the incident, it may be helpful to break for lunch early.

Borrowing parts from a practice field is a common way of quickly fixing a competition field. While it is unfortunate that teams may not be able to fully utilize the practice field, they will ultimately benefit more from the efficient continuation of matches.

Note that if matches are played somewhere other than their scheduled field, it may be necessary to reconfigure field timer displays and other scoring-related equipment to support the match.

Key Points

- Field staff should prioritize competition field repair over other concerns, such as triage.
- A reasonable degradation of team experience (a partially deconstructed practice field) is an appropriate tradeoff for ensuring match flow.
- Familiarity with the FTC-Live scoring system and related technology can allow event volunteers to use the available equipment in an exceptional way.

Scheduling Conflicts

Occasionally, portions of an event can conflict with one another. For example, structured interviews for judging may be scheduled concurrently with match play (or take longer than anticipated, causing an overlap with the match schedule). This can cause teams to miss the scheduled start of a match through no fault of their own. In such a situation, the team is not subject to a match delay violation.

The FTA should remain vigilant for situations like this and regularly check in with the Event Director regarding the other activities scheduled on event day. If queuing staff are unable to locate a team, the FTA should consider if this type of situation is a possible cause.

In isolated cases, the FTA is empowered and encouraged to skip a qualification match to support a team in this situation. Additional coordination with the Event Director is necessary if the problem affects multiple matches, as this may affect the overall event schedule. Whenever a match is skipped, the four teams involved should be informed of the FTA’s best estimate for the new scheduled match time (the beginning of the next scheduled break in matches). Quickly proceeding with the next qualification match is the best way to reduce the impact on the match schedule.

Key Points

- Teams are not punished for structural issues with the event schedule.
- Qualification matches can be skipped and played at the beginning of the next scheduled break.
- Affected teams should be informed of the best estimate of their new match time.

Conclusion

The workflows described in this document are based on our evolving understanding of best practices for ensuring an efficient flow of matches at our events. Your observation, experimentation, and feedback are critical to the continued growth of the program. Please share your experience with your local event leadership, Program Delivery Partner, Global Key Technology Volunteers, and *FIRST* HQ.

Thank you for volunteering at *FIRST* Tech Challenge events.