

Armada Robotics
FRC 2508
Build Handbook





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Stillwater Area High School
FRC Team 2508 - Armada Robotics
Build Handbook



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Glossary

Term	Definition
775/Redline	A small brushed motor
80/20	80/20 is a type of slotted aluminum framing that is versatile and strong although is not torsion-resistant and is heavy compared to box section
Anderson Powerpole	A type of connector that comes in sizes rate for 15, 30 and 45 Amps, often used to connect speed controls to motors
Anderson SB50	The type of connector used on batteries
AndyMark	AndyMark is a Vendor that supplies a variety of mostly mechanical components
Autodesk Fusion 360	A CAD program that is simpler than Autodesk Inventor, Fusion also has a built-in CAM package
Autodesk Inventor	A CAD program made by Autodesk
Autonomous	The first period of the match where robots run pre-programmed code that allows them to navigate the field
BOM	A list of all materials and components necessary for constructing a design or mechanism, includes prices, quantity, source, etc.
Bag Motor	A motor that is visually similar to a CIM but is much smaller
BaneBots	BaneBots is a vendor that provides specialty items
Blue Banner	A banner awarded to teams for certain awards or for winning an event
Build-Season	The time after kickoff and before competitions



Bumpers	Bumpers are placed on the robot's frame perimeter and soften any collisions made with other items on the field, they are constructed with pool noodles and plywood
Button Board	A board used by the operator to control mechanisms on the robot
CAD	An umbrella term for design software
CAM	The process of readying a part for manufacturing
CIM	A brushed motor often used in drive bases
COTS	COTS components are components easily purchasable from a vendor
CSA	CSAs help with diagnosing control system issues at events and wear bright orange hats
CTR(E)	CTRE is a Vendor that provides electronic components
Chairman's Award	An award that is given to one team at each regional event where teams submit a video, essay, and give a presentation about their team and how they have represented the ideas of <i>FIRST</i>
Champs / Championships	The World Championships, all winners of regional events and district events advance to Champs
Chief Delphi	An unofficial <i>FIRST</i> Forum
Churro	A shaft profile that fits into hex bores, has less torsion resistance than hex shaft
Defense	Preventing another team from completing objectives
DigiKey	DigiKey is a Vendor that stocks mostly raw electronic components
Drive Coach	The Drive Coach is responsible for coaching the drive team during the match, this can be a mentor or a student
Drive Team	A group of individuals designated to operate the robot during competition
Driver	A member of the drive team designated to drive the robot



Drivetrain	The part of the robot that allows it to move around
EPR	A measurement of raw encoder units detected
End Effector	The part of the robot that is directly used to complete objectives and directly interface with objects
Endgame	The final 30 seconds of the match
FIRST	A global robotics community preparing young people for the future and the world's leading youth-serving nonprofit advancing STEM education
FLLC	A robotics competition organized by <i>FIRST</i> for ages 9-14 in the US/Canada and 9-16 elsewhere
FLLE	A robotics competition organized by <i>FIRST</i> for ages 6-10
FMS	The system that manages the field during competition
FRC	A high school robotics competition organized by <i>FIRST</i>
FTA	The FTA is responsible for managing the FMS and related systems
FTAA	FTAAs assist the FTA
FTC	A robotics competition organized by <i>FIRST</i> for grades 7-12
Falcon 500	A brushless motor that features an embedded motor controller, made by CTRE and VexPro
Field	Where the game is played
Field Reset	Volunteers that reset the field after a match
Foul	If a foul is called points are awarded to the opposing alliance
Gracious Professionalism	The “Ethos” of <i>FIRST</i>
Hall of Fame	The <i>FIRST</i> Hall of Fame is a list of role model teams determined by who wins the chairman’s award at championships and are allowed to attend championships every year



Human Player	The Human player is a member of the drive team and their exact role is dependent on the game
Inspection	All robots must be inspected by a certified robot inspector to compete in qualification matches
Judges	Volunteers with blue polo shirts that hand out awards
Kickoff	An event held early in January to announce the game and distribute kits to each of the teams
Kit of Parts	A kit received on kickoff provided by <i>FIRST</i> that contains parts that can be used throughout the season
Lexan	A brand of polycarbonate used for building, not acrylic
Limelight	An all-in-one vision system
Loctite	Loctite is a threadlocker used to keep bolts from becoming unfastened due to vibration
MC/EMCEE	The official host of the event
MXP	The expansion port on the RoboRIO
Match Schedule	The order in which matches will be played, generated live at the competition
McMaster Carr	McMaster Carr is a Vendor who provides a variety of specialty components and materials
Mecanum Wheels	Mecanum wheels are wheels that have rollers angled at 45 degrees such that when placed in the right configuration in a drivetrain, a robot can move in any direction
Mini CIM	A smaller/shorter version of a CIM
NEO	The first certified brushless motor in FRC, does not have an attached motor controller, made by Rev Robotics
OPR	An estimation of how much a team contributes to their alliance
Off-Season	The time before kickoff and after competitions
Offense	Completing objectives for your alliance



Omni-Wheels	Wheels that have rollers with an axis of rotation tangent to the edge of the wheel such that sideways movement is not restricted
Operator	A member of the drive team designated to operate the end effector or superstructure of the robot
PID	A type of control loop that uses proportional, integral, and derivative gains to make a system track a setpoint
PWM	A control method where a 1-2ms pulse is sent every 20ms(50Hz) determining the power or position of an actuator
Pits	Where robots are worked on at the competition
Playoffs	Matches after alliance selection where a best of 3 single elimination bracket is played
Practice Matches	Matches played before qualification matches to work out bugs before qualification matches start
Qualification Matches	Matches which determine a team's rank based on their average ranking point score
Queue	Where robots wait before a match starts
Red Card	A red card is waved by a referee and signals the disqualification of a team
Referee	A volunteer who is certified by <i>FIRST</i> to enforce the rules of the game(White and Black Striped Shirts)
Rev Robotics	Rev Robotics is a Vendor
RoboRIO	The main controller used in the robot
Robot Inspector	Robots must be inspected before they can play in qualification matches, this individual is a volunteer certified to inspect robots and wears a bright yellow hat
Rookie Member	A first-year member
Rookie Team	A first-year team



Solenoid	A device that controls the flow of air by using an electromagnetic coil, connected to PCM
Solidworks	A CAD program made by Dassault Systèmes
Sponsor	An entity (often a company or corporation) who has supported a team monetarily, with parts, or otherwise
Swerve Drive	A type of drive that has independently controllable swiveling wheels
Tech Foul	Similar to a foul, may have a different point value awarded
Technician	A member of the drive team who is designated to resolve problems related to the robot
Teleop	The TeleOperated or driver-controlled portion of the match where humans control their respective robots
The Blue Alliance	A website that displays information about FRC Teams, <i>FIRST</i> Events, Matches, etc.
Toughbox Mini	A type of gearbox from AndyMark
VEXPro	VEXPro is Vendor that makes a variety of products including the Falcon 500 with CTRE
VSCode	The application used to write and deploy robot code
Vendor	A supplier that meets <i>FIRST</i> Criteria
Veteran Member	A member who has competed for 2+ years
Veteran Team	A team who has competed for 2+ years
Vision	Short for computer vision, meaning any image recognition system running on the robot, typically uses retroreflectors to identify key locations on the field
Volunteer	Someone who volunteers their time at a <i>FIRST</i> event to keep the event running (e.g. Robot Inspector, Referee, FTA, etc.)
WAGO Lever-Nuts	Small connects that connect two wires together, often used for CAN wiring
WAGO Terminal	The ports on the PDP



WAGO Tool	A hardened tool used to connect wires to the WAGO Terminals on the PDP
WCD	A type of drive usually having 6+ wheels and gearboxes are attached rigidly to one of the wheels closer to the center of the robot, often very robust
Weidmuller Connector	Weidmuller connectors are the connectors used on the VRM/PCM
Woodie Flowers Award	An award given to mentors each year to recognize their outstanding effort to promote the ideals of <i>FIRST</i>
Yellow Card	A yellow card is waved by a referee, this card is a warning and does not have any initial consequences but is the equivalent of a red card if repeated



Acronyms

Acronym	Expanded Form
BOM	Bill of Materials
CAD	Computer-Aided Design
CAM	Computer-Aided Machining
CAN	Controller Area Network
CD	Chief Delphi
CIM	CCL Industrial Motor
COTS	Commercial off the Shelf
CRIO	Compact RIO
CSA	Control Systems Advisor
CTR(E)	Cross the Road Electronics
DQ	Disqualified
EI	Engineering Inspiration
EPR	Edges Per Rotation
<i>FIRST</i>	For Inspiration and Recognition of Science and Technology
FLLC	<i>FIRST</i> Lego League Challenge
FLLE	<i>FIRST</i> Lego League Explore



FMS	Field Management System
FRC	<i>FIRST</i> Robotics Competition
FTA	<i>FIRST</i> Technical Advisor
FTAA	<i>FIRST</i> Technical Advisor Assistant
FTC	<i>FIRST</i> Tech Challenge
GP	Gracious Professionalism
HOF	Hall of Fame
KOP	Kit of Parts
LED	Light Emitting Diode
LRI	Lead Robot Inspector
MC/EMCEE	Master of Ceremonies
NI	National Instruments
OI	Operator Interface
OPR	Offensive Power Rating
PCM	Pneumatics Control Module
PDP	Power Distribution Panel
PID	Proportional Integral Derivative
PWM	Pulse Width Modulation
RSL	Robot Status Light



RoboRIO	Robot Reconfigurable Input/Output
SPI	Serial Peripheral Interface
TBA	The Blue Alliance
VRM	Voltage Regulator Module
VSCoDe	Visual Studio Code
WCD	West Coast Drive
WFA	Woodie Flowers Award