Chassis Work Shop
Presented by
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Welcome!!
A few flavors of chassis...Which one is right for you?

Just a few of the Hartland School District Robotics FTC robots
What to do first?

READ THE RULES..........................More than once.

Decide on what kind of robot you are wanting to build.
• Offensive
• Defensive
• Scoring in Autonomous
• Scoring is Teleop
• Fast and Agile
• Slow and Strong

It makes all the difference in how you build your chassis and how you play the game.
Top 6 things to keep in mind when designing a chassis.

• Be aware of geometry and wheel locations
  – Dimensions and spacing geometry is important. Continuously consider your chassis abilities to turn. It needs to be balanced with consistency when wanting to travel in a straight line. Try to keep weight centered between axles.

• Keep center of gravity as low as possible
  – Spec Ops. features typically raise center of gravity so plan to be low early in design for chassis.

• Choose Wheels types and location carefully
  – Traction will always come in to play at some point. Keep it in mind when choosing Omni wheels.

• Think about motor location for ease of access if they need to be replaced
  – It is inevitable that a Tetrix Motor will fail at some point in time. Make sure you can replace it in under 3 minutes. It may happen between matches.

• Use encoders for autonomous as well as power control
  – Not all Tetrix Motors are created equal. Variation in motors occurs encoders will assist in keeping your robot heading in the right direction

• Gear ratios are flexible use them
  – There are 3 sizes of gears available to build various power curves. Be cautious when setting up robots with larger gears on motors and small gears on axles. It can stall motors easily.
Design Basics

- Axles should be supported on two side with bronze bearings on each side.
Design Basics

• Keep Drive wheels symmetric when first building your robots. Asymmetric designs are possible but are more difficult to perfect.

(Note: The demo bot is an asymmetric design. The Omni wheels help to overcome its shortfalls)
Design Basics

• Build Big! Unless there are specific elements in the game that are benefited by a small robot, maximize your chassis size. It is more difficult for smaller robots to play a defensive role if other elements of your robot fail.
The Simple Chassis

What follows is not intended to be a perfect chassis. It is simply a stepping stone for you to get a feel for identifying and assembling parts. We should be able to create this chassis in about 40 minutes.

At the end of the build session we will have time for discussion, questions and Ideas for improvements.

Lets get on with it!
Simple Chassis
Bottom View
Top View
Bill of Materials (main rails)

- 8 bronze bushings
- 2 motor mounts
- 2 channels 32mm
- 2 channels 415
- 2 SHSC (socket head cap screws) 6-32 x 1.25
- 2 SHSC (socket head cap screws) 6-32 x 1.50
- 8 SHSC (socket head cap screws) 6-32 x .50
- 12 lock nuts
Create 2 Main rails Symmetrically opposite
Sub Assy. of Main rails
Motor encoder assembly

- Encoder cover
- Data Disk
- Encoder assembly and mount
- Spacing gauge (this part does NOT remain with encoder)
- 2 Install screws
Install encoder assembly and mount

Encoder assembly

And mount

2 Install screws
Install encoder disc using gauge to set location.

The disc has a short and long flange on it. The short flange faces UP.

Spacing gauge (this part does NOT remain with encoder)
Install encoder cover assembly

- Encoder cover
- Spacing gauge (this part does NOT remain with encoder)
Bill of Materials (Motors)

- 2 Motors with encoder installed
- 2 Motor Hubs (Note they have larger hole in center) w/set screw
- 2 Gears 80
- 4 SHCS 6-32 x .5
Motor and gear assembly
(Note: PTC does not have an encoder modeled so it is not shown)
Create 2 motor assemblies
Install motors on to Main rails
Bill of Materials (Drive wheel assemblies)

- 2 wheels 76mm (3”)
- 2 D-Axle Hubs (Note they have smaller hole in center) w/set screw
- 2 Gears 80
Bill of Materials (Drive wheel assemblies) continued

• 2 Hub spacers

• 2 Large Nylon Spacers

• 2 Axle D-shafts

• 8 SHCS 6-32 x 1.25
Create 2 Drive Wheel assemblies
Finished Drive Wheel assemblies

Front View

Rear View
Install Drive Wheel Assemblies to frame rails

Install d-shaft collar to inside
To hold shafts in place
Bill of Materials (Omni wheel assemblies)

• 2 Omni wheels (3”)

• 2 D-Axle Hubs (Note they have smaller hole in center) w/set screw
Bill of Materials (Omni wheel assemblies) continued

- 4 small Nylon Spacers
- 2 Axle D-shaft
- 8 SHCS 6-32 x .5
Create 2 Omni Wheel assemblies
Omni Wheel assemblies

Front View

Rear View
Install Omni Wheel Assemblies to frame rails

- Install d-shaft collar to inside to hold shafts in place.
Bill of Materials (Front cross member rail)

- 1 Channel 288
- 1 L-Bracket
- 1 Channel 160
- Bracket Servo Single
- 6 SHCS 6-32 X .5
- 6 lock nuts
Create 1 Front Cross member assembly
Install Front Cross member assembly to frame right and left

Assemble using 4 SHCS 6-32 x .5 and 4 lock nuts
Install Rear Cross member (channel 288) assembly to frame.

Assemble using 4 SHCS 6-32 x .5 and 4 lock nuts
Install front half of servo Mount
Install servo to servo Mount. Using Button screws
Install Encoder Wires and Adjust motor lash
Questions?

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You are done....for now!

Enjoy your robot and pay close attention to how it moves and handles various challenges on the field. Think about how you could improve it every Time it runs today. Let me know what you see!

Thank You for attending our seminar!