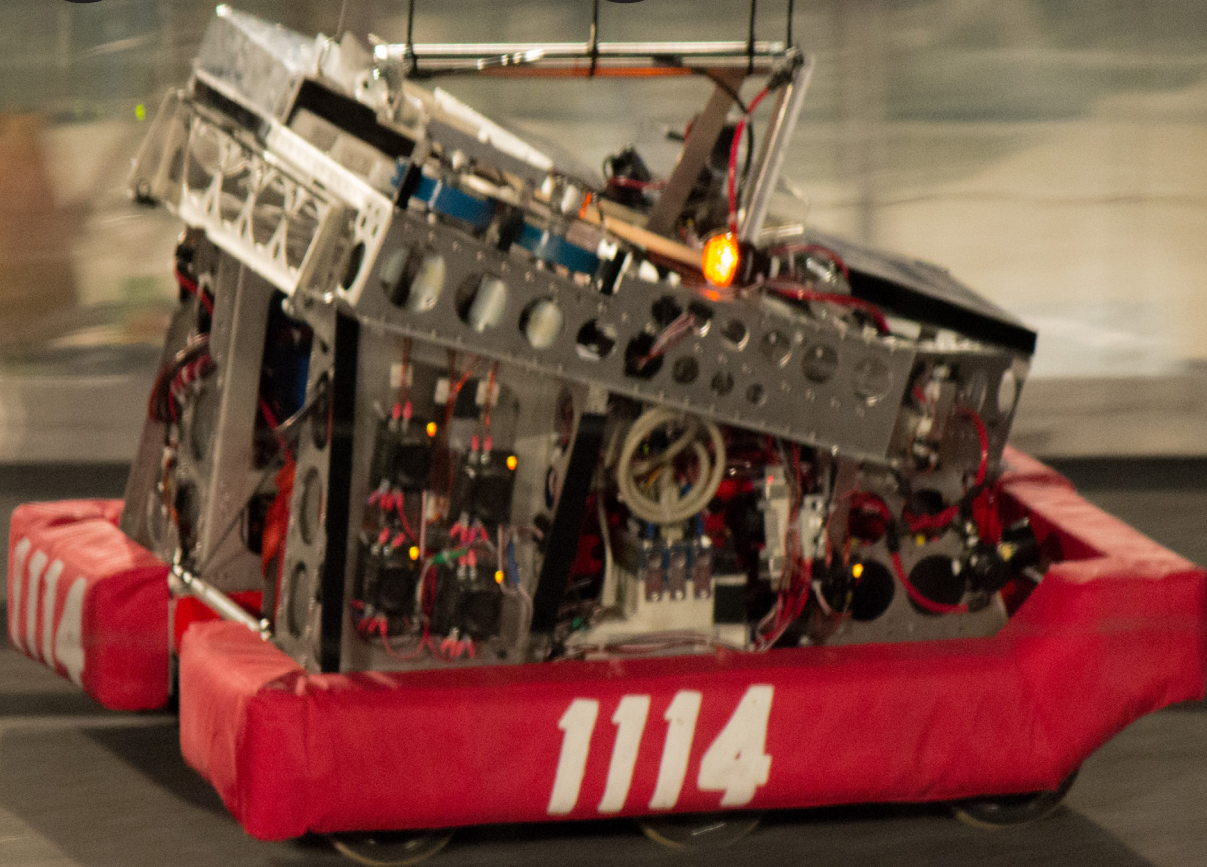


2012 HALL OF FAME TEAM 1114
SIMBOTICS

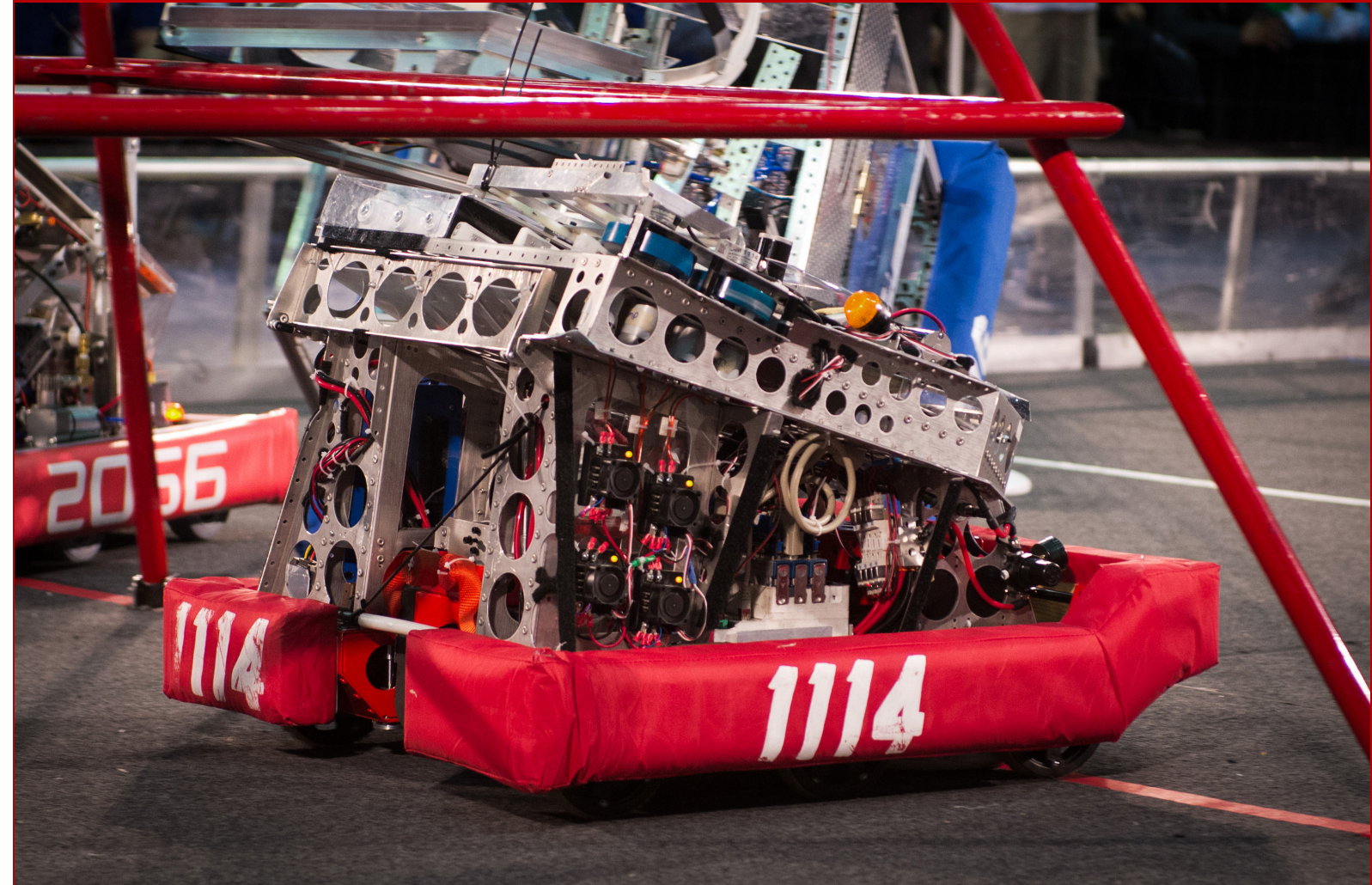
Engineering Notebook



2013 Robot
B.A. Baracus



SHOOTER



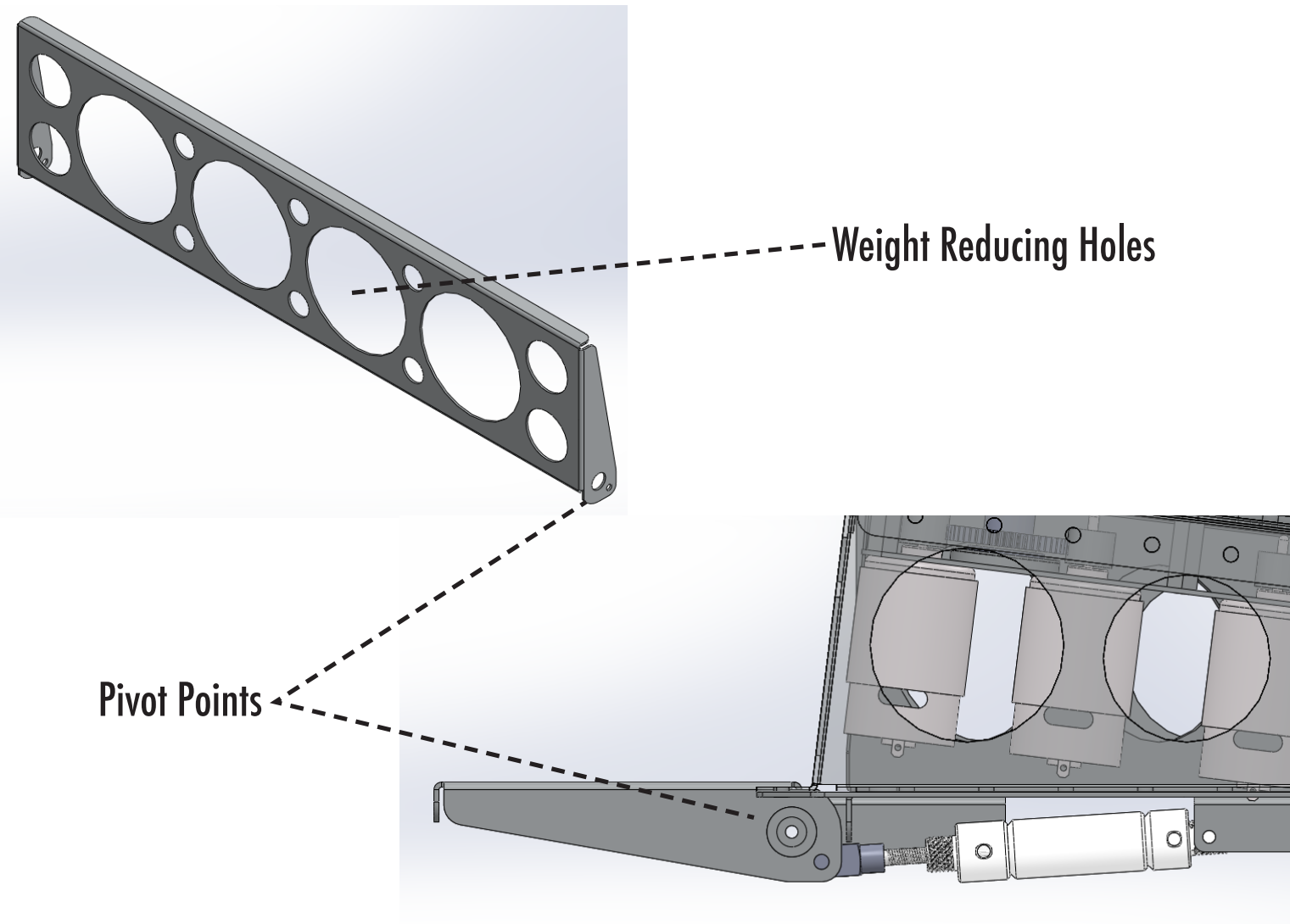
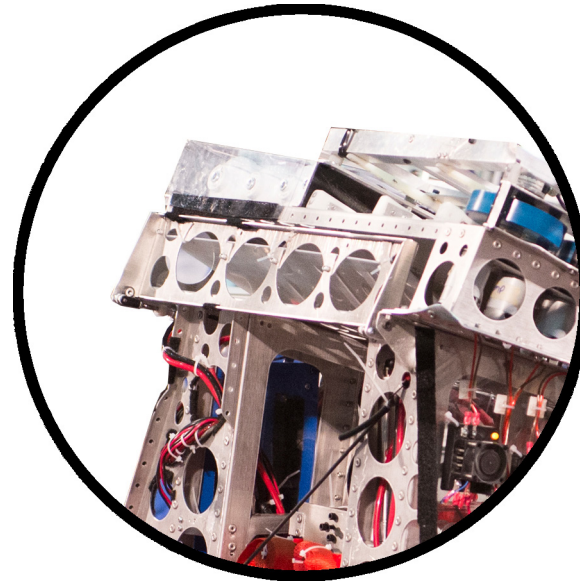
Subsystem Includes:

- Hopper Door
- Horseshoe Hopper
- Shooter
- Feeder Wheel
- Deflector

HOPPER DOOR

Info

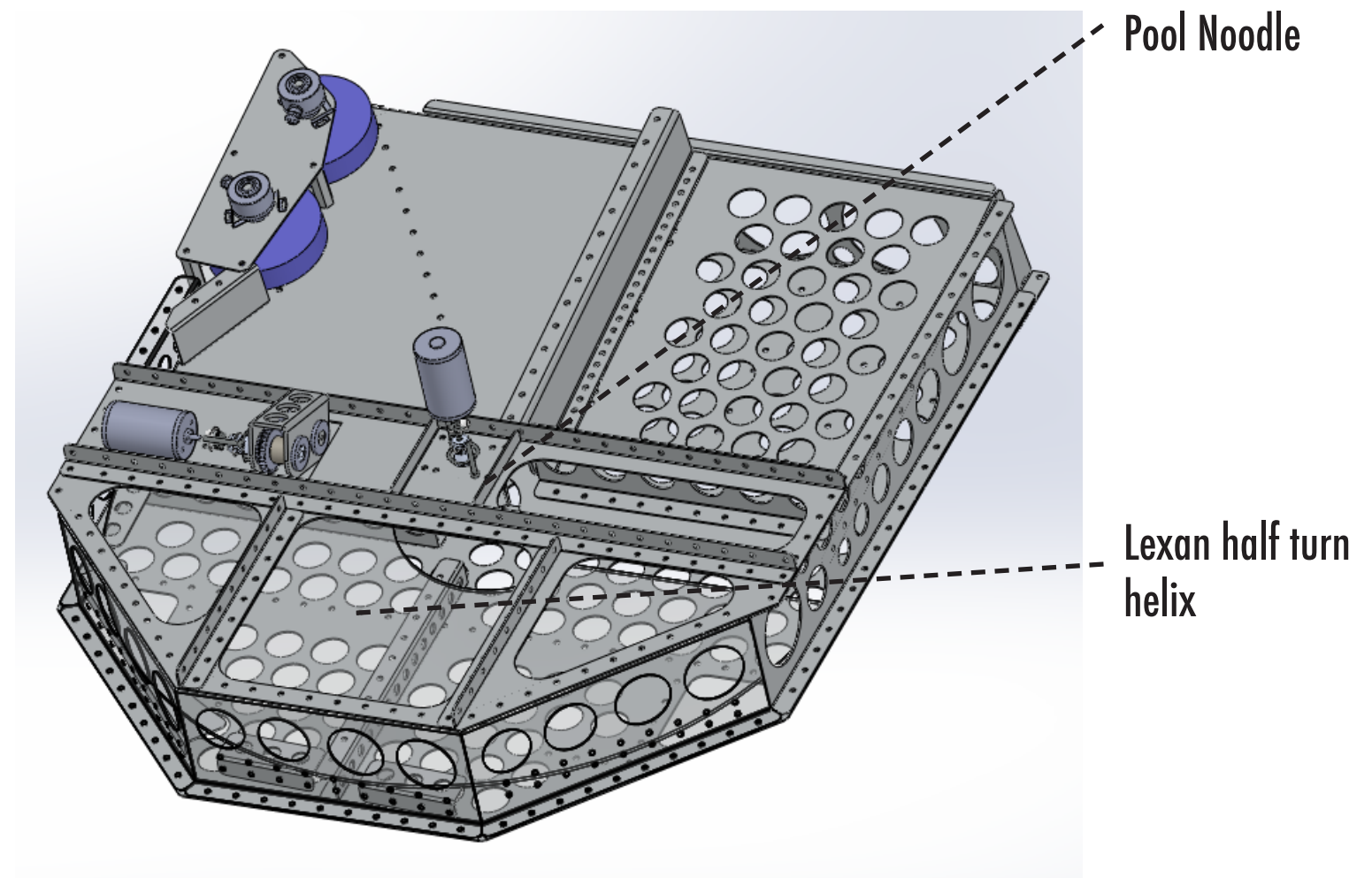
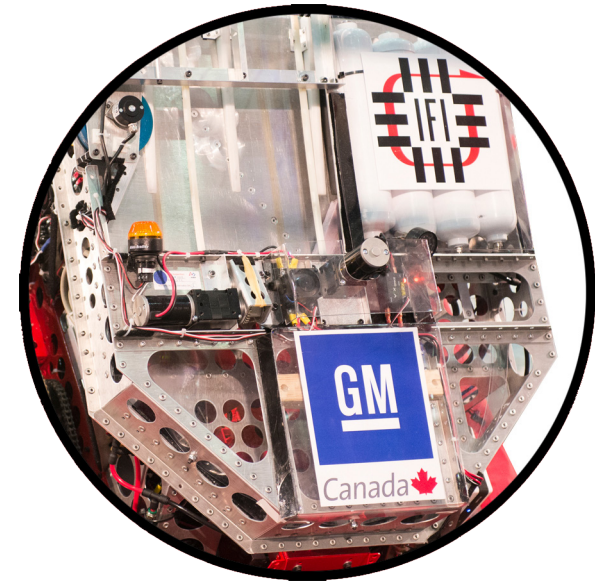
- In open position, extends hopper to human load slot for smooth transition
- In closed position, retains frisbees while driving and increases inclination to aid gravity fed loading
- Low friction plastic placed on surface to allow frisbees to slide
- Actuates with 2 double acting, 7/16" bore, 1" stroke pneumatic cylinders



HORSESHOE HOPPER

Info

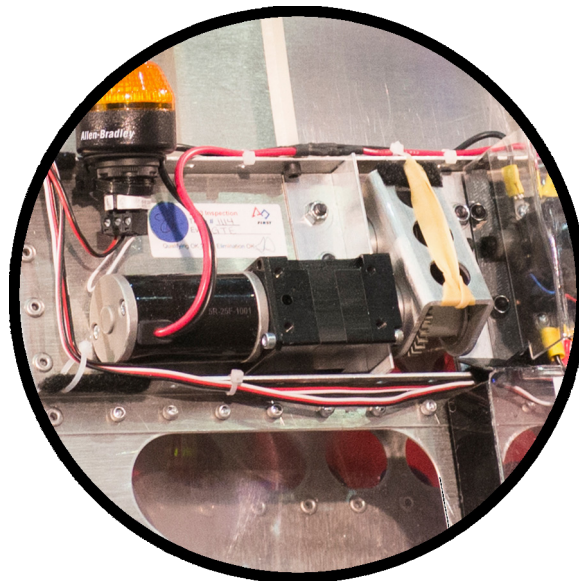
- U-shaped sheet metal hopper to minimize human loading and shooting time
- Holds 4 frisbees and feeds them to the shooter using a lexan half turn helix
- Pool noodle "brush" located at the center of the helix powered by a BAG motor through a 10:1 VEXpro VersaPlanetary Gearbox
- Frisbees slide on low friction teflon strips into the lexan half turn helix



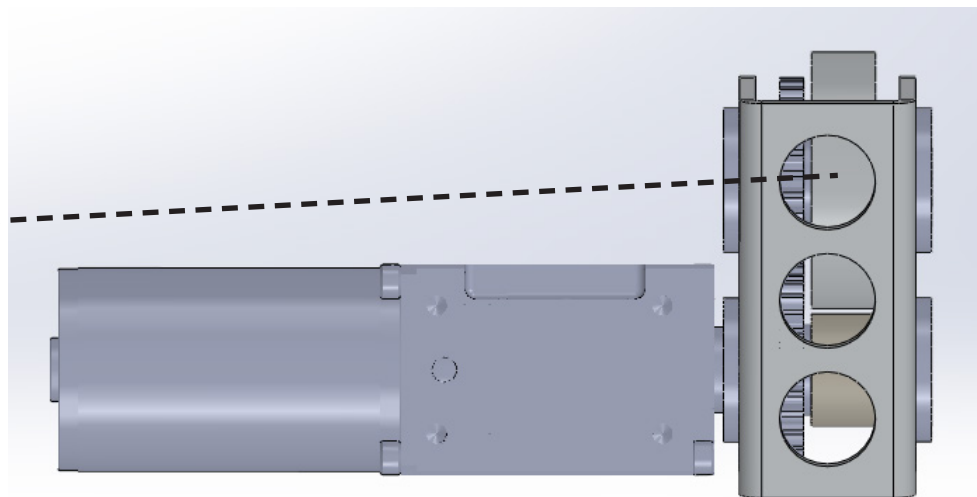
FEEDER WHEEL

Info

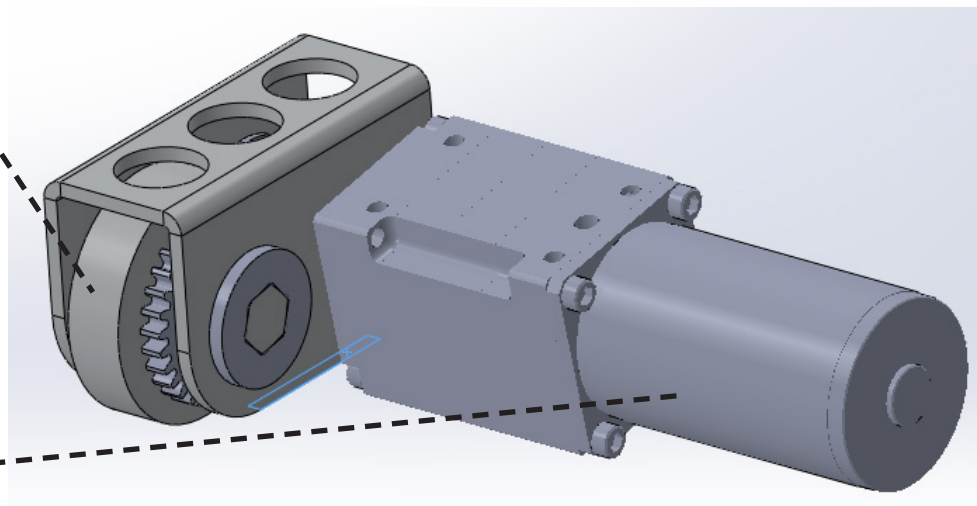
- 2" urethane wheel used to feed frisbees from the helix to the shooter
- Powered by a BAG motor through a 20:1 VEXpro VersaPlanetary Gearbox



Feeder Wheel



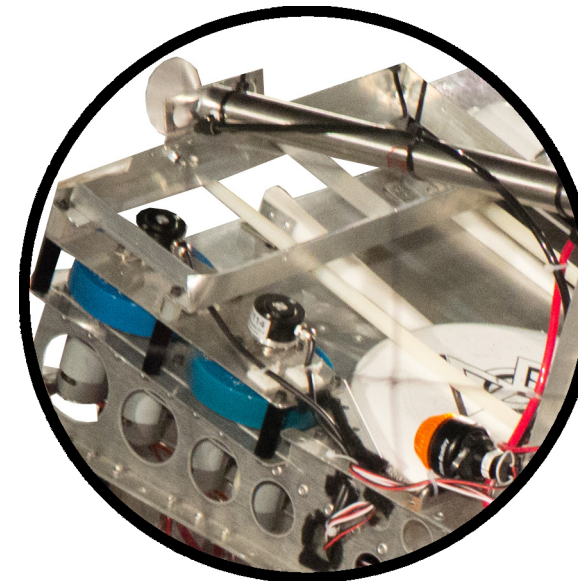
Versa planetary Gearbox with BAG motor attachment



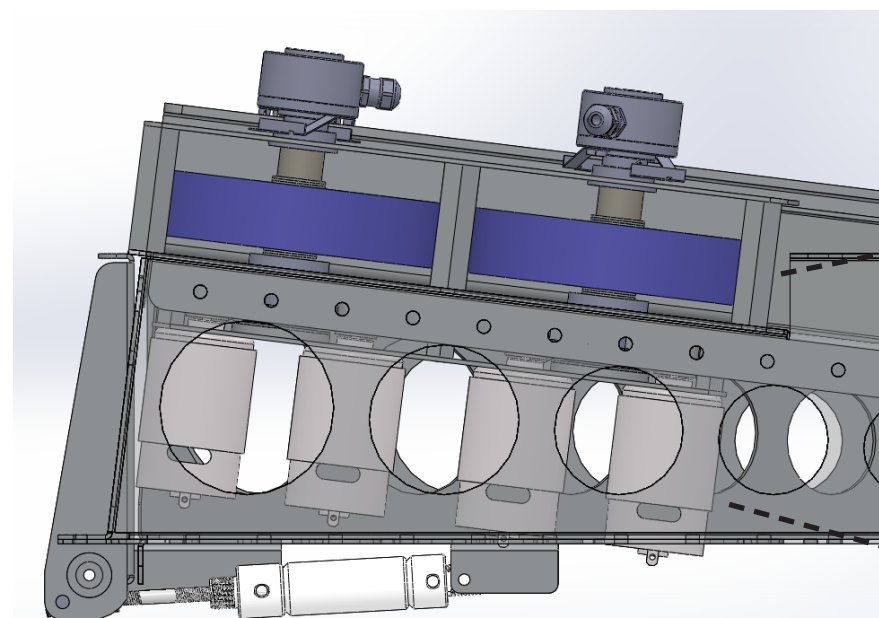
SHOOTER

Info

- Dual 4" urethane wheel shooter, each powered by two RS-550 motors through a custom gearbox (approx 2.5 : 1) using Fischer-Price/SDP-SI gears
- Adhesive backed urethane used on the opposite wall to provide friction and generate spin

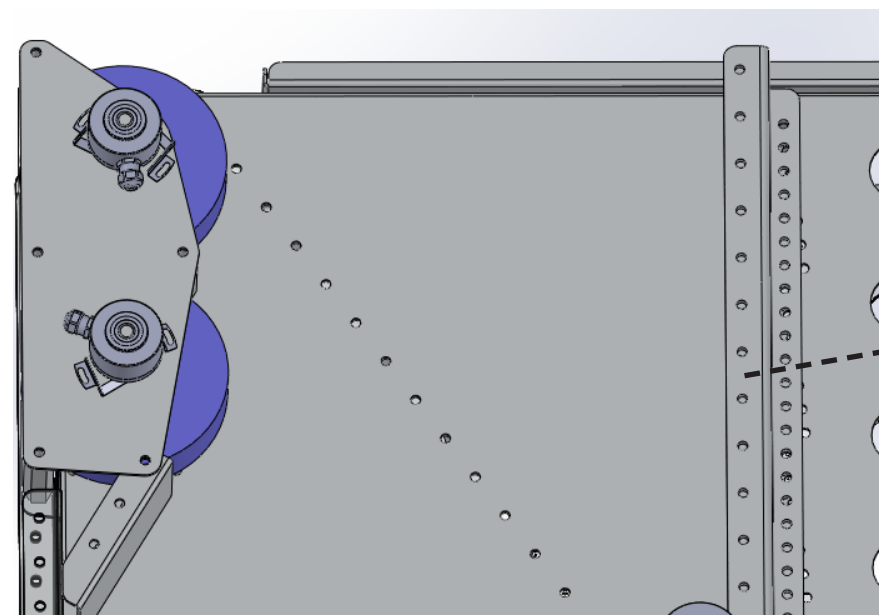


Shooter wheels



RS-550 Motors

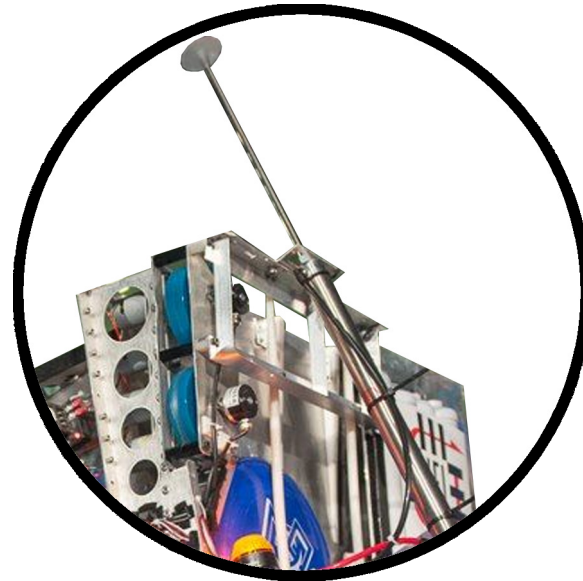
Urethane Wall



DEFLECTOR

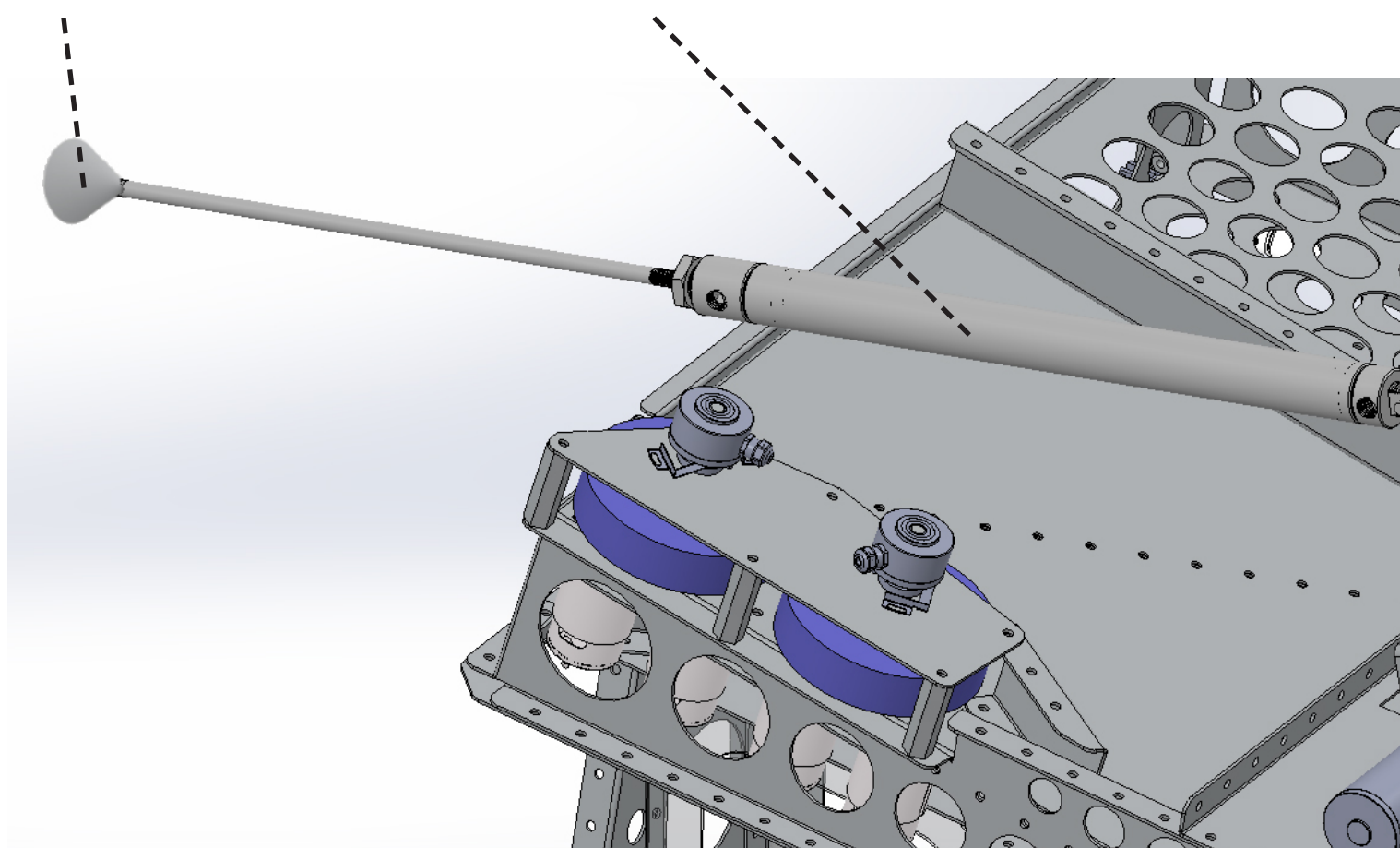
Info

- Deflects frisbees from shooter into the pyramid goal using a pneumatic piston
- Double acting piston with a 12" stroke
- Cone on the end of the piston used to angle frisbees

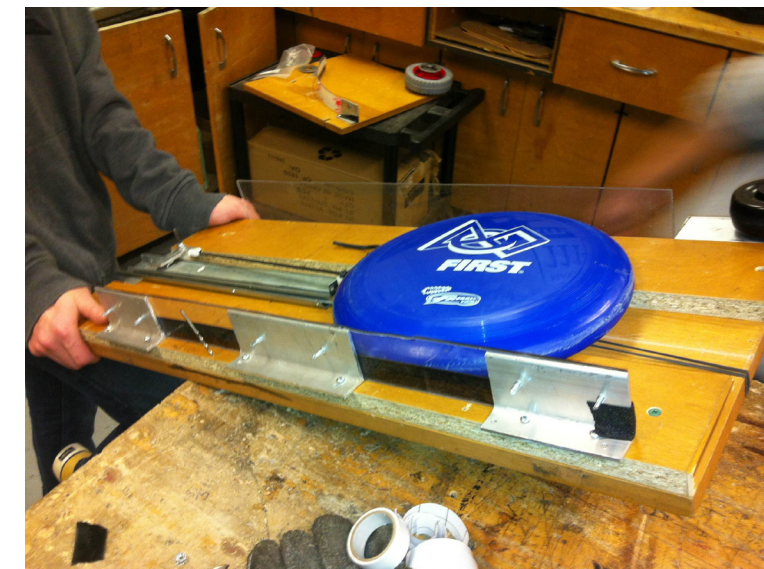


Cone

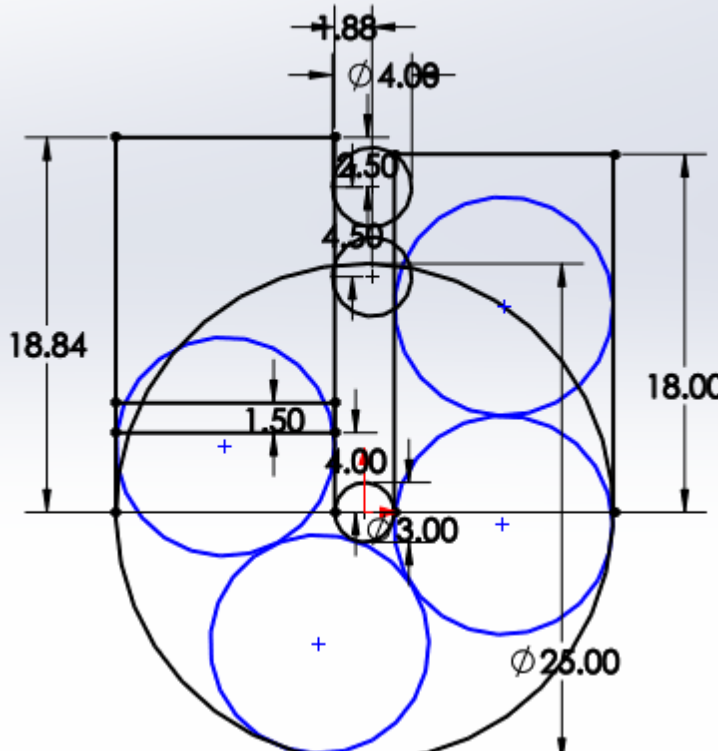
Deflector Piston



SHOOTER PROTOTYPES

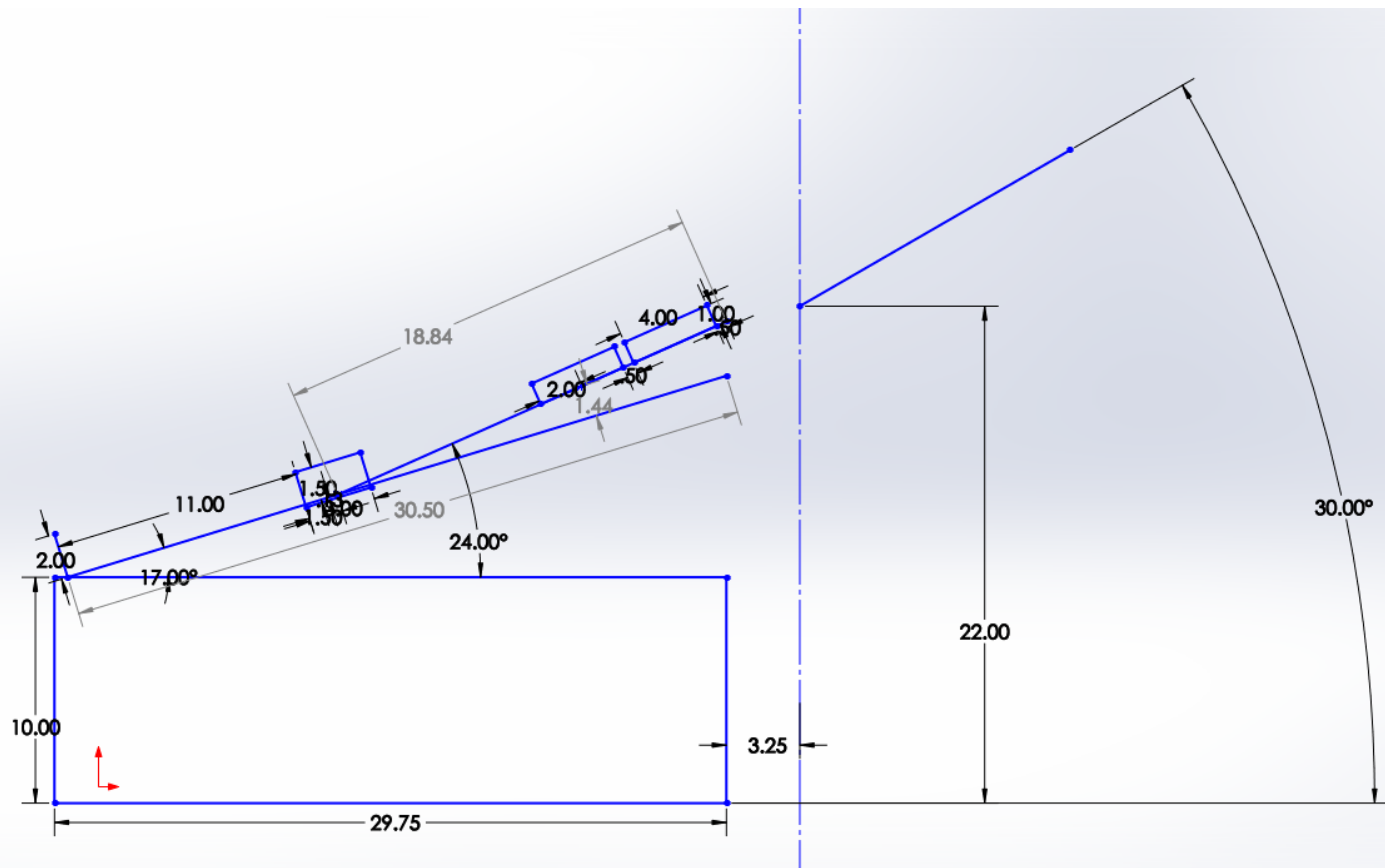


SHOOTER DESIGN NOTES

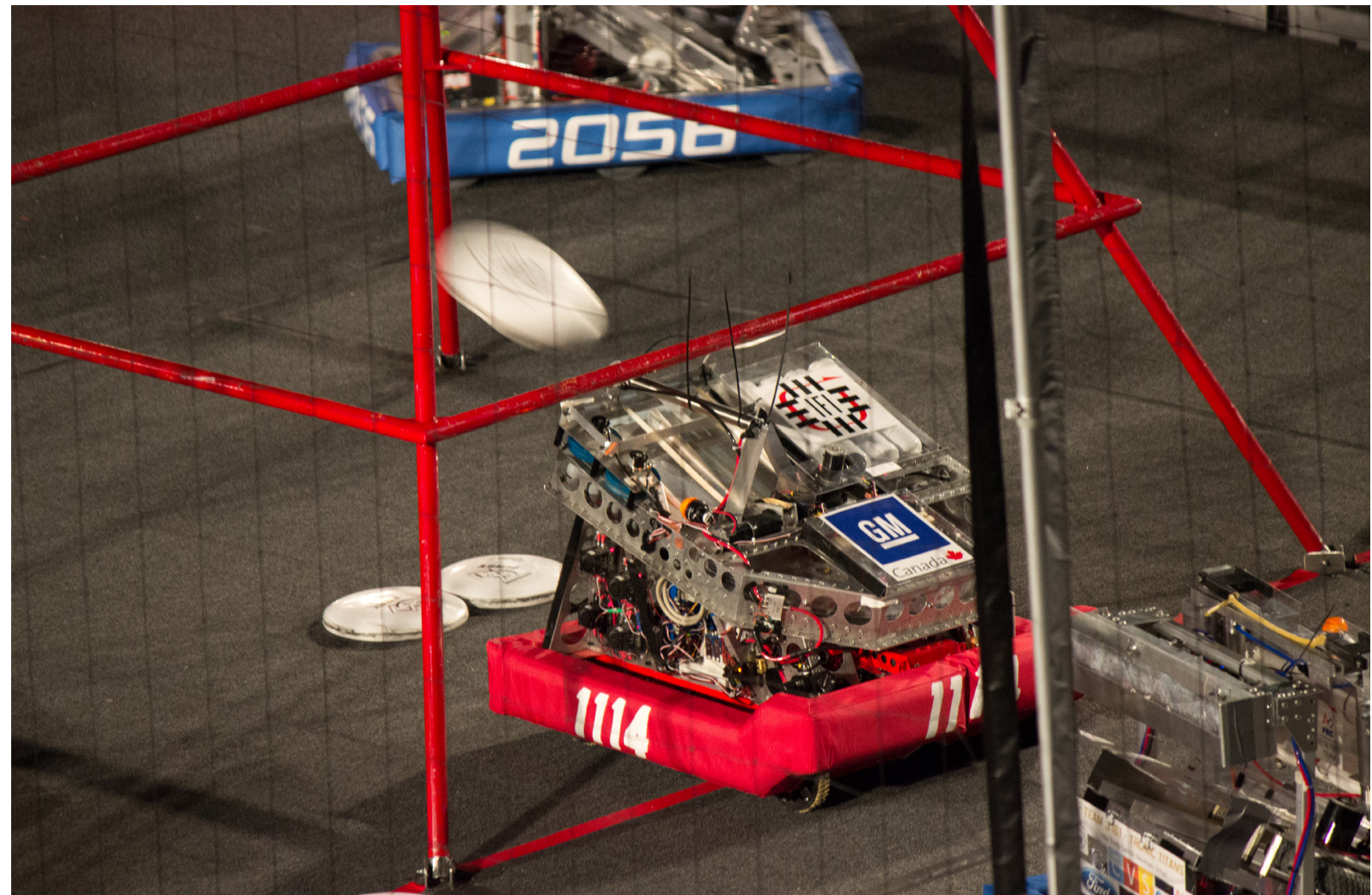
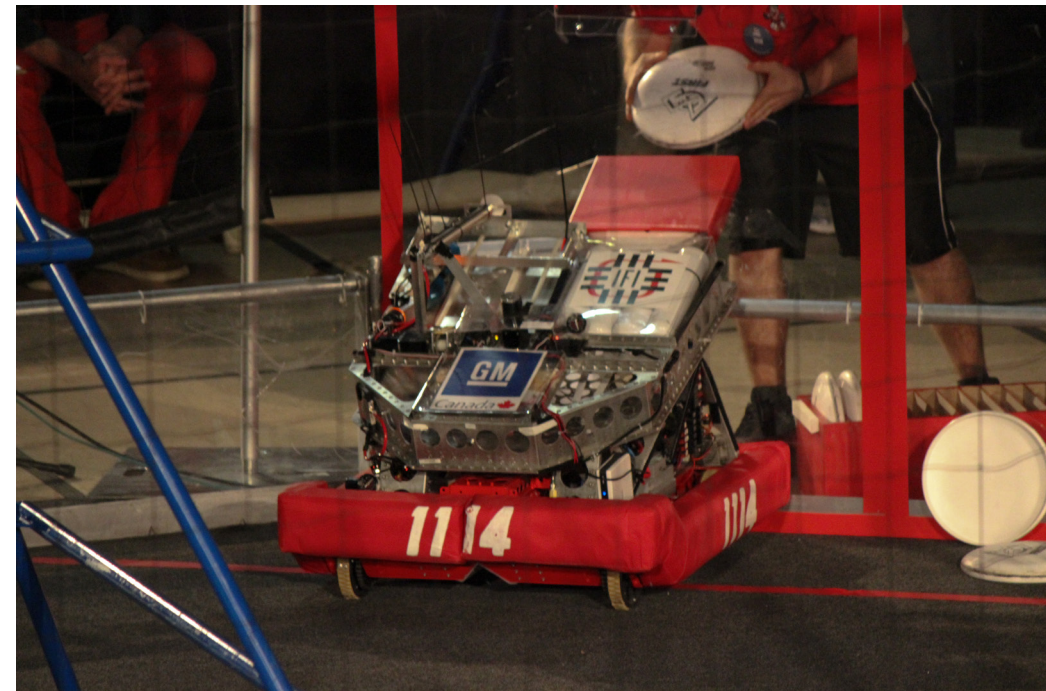


Early sketch of the horseshoe hopper with four frisbees

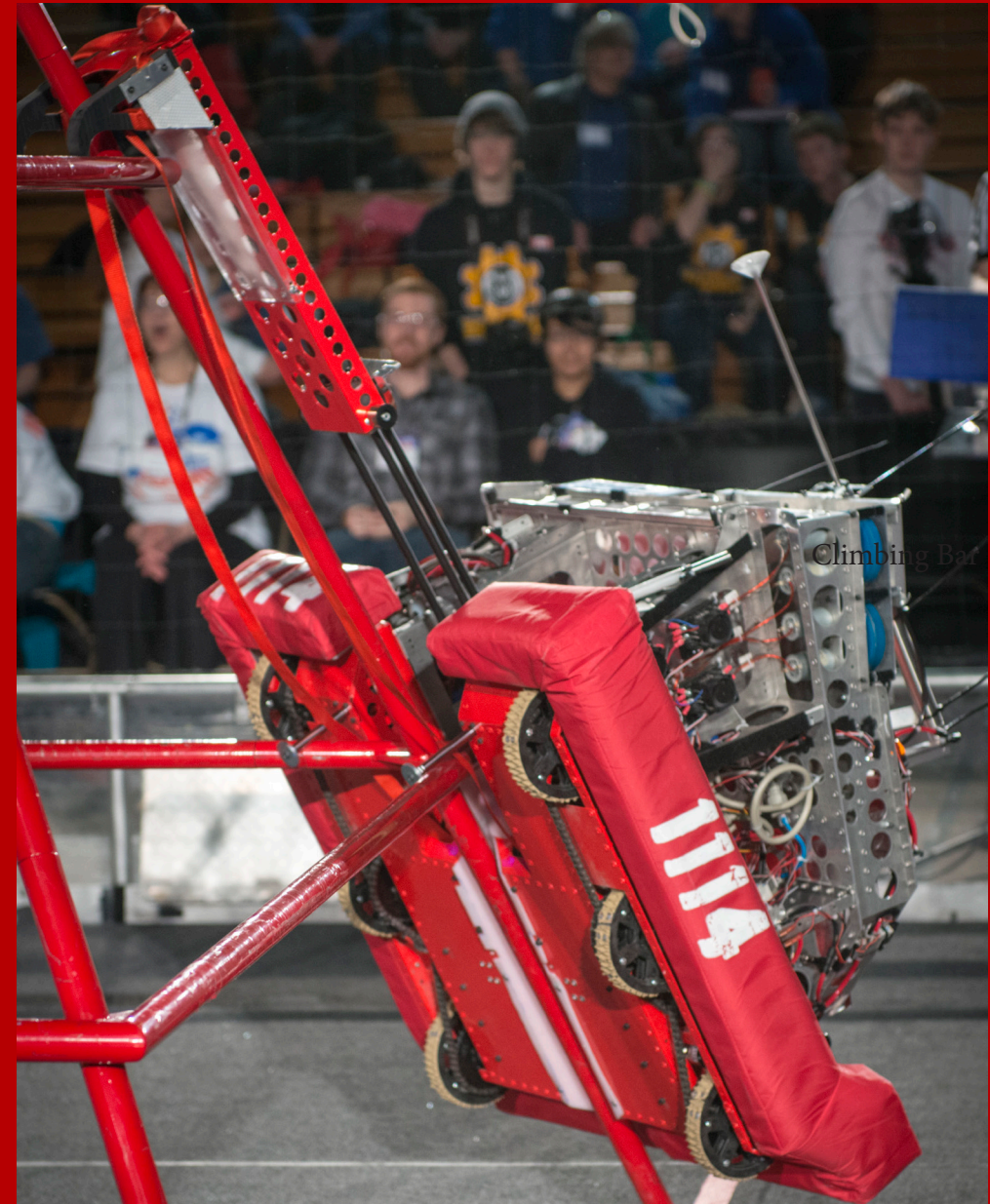
Sketch of the shooter and horseshoe hopper with the 22" human loader



SHOOTER PICTURES



CLIMB



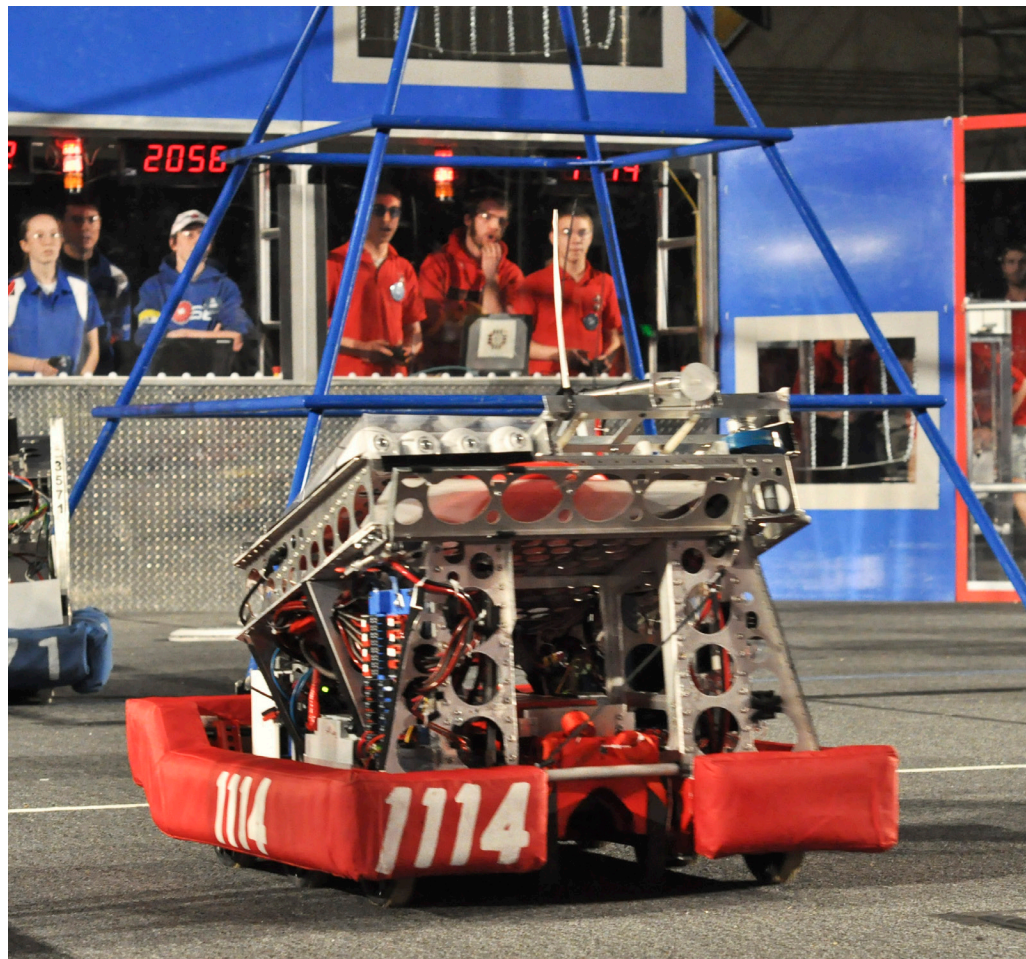
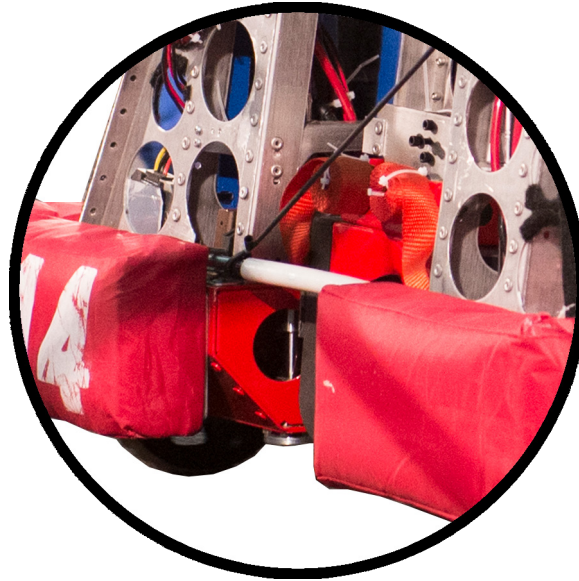
Subsystem Includes:

- Climb Bar
- Hanging Arm
- Fixed Hooks

CLIMB BAR

Info

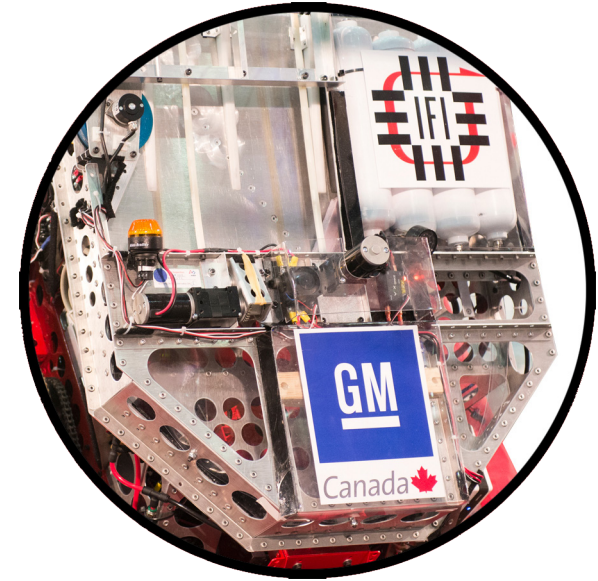
- Steel bar in the opening at the front of the robot used to drive up the corner pyramid pole to start the hang sequence
- Held in place using landing gear style mechanism which is driven by a servo



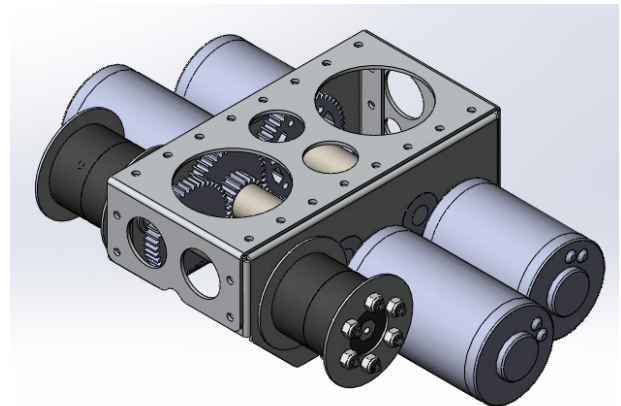
HANGING ARM

Info

- Two stage linear bearing telescoping arm capable of level 3 climbing
- Constructed from sheet metal, nylon, and delrin rods
- Extends via constant force spring and surgical tubing, retracts using ratchet strap winch
- Winch is powered by two CIM motors in a custom gearbox using VEXpro gears, bearings, and shafts
- Arm raises and lowers to get over the knuckle using pneumatics

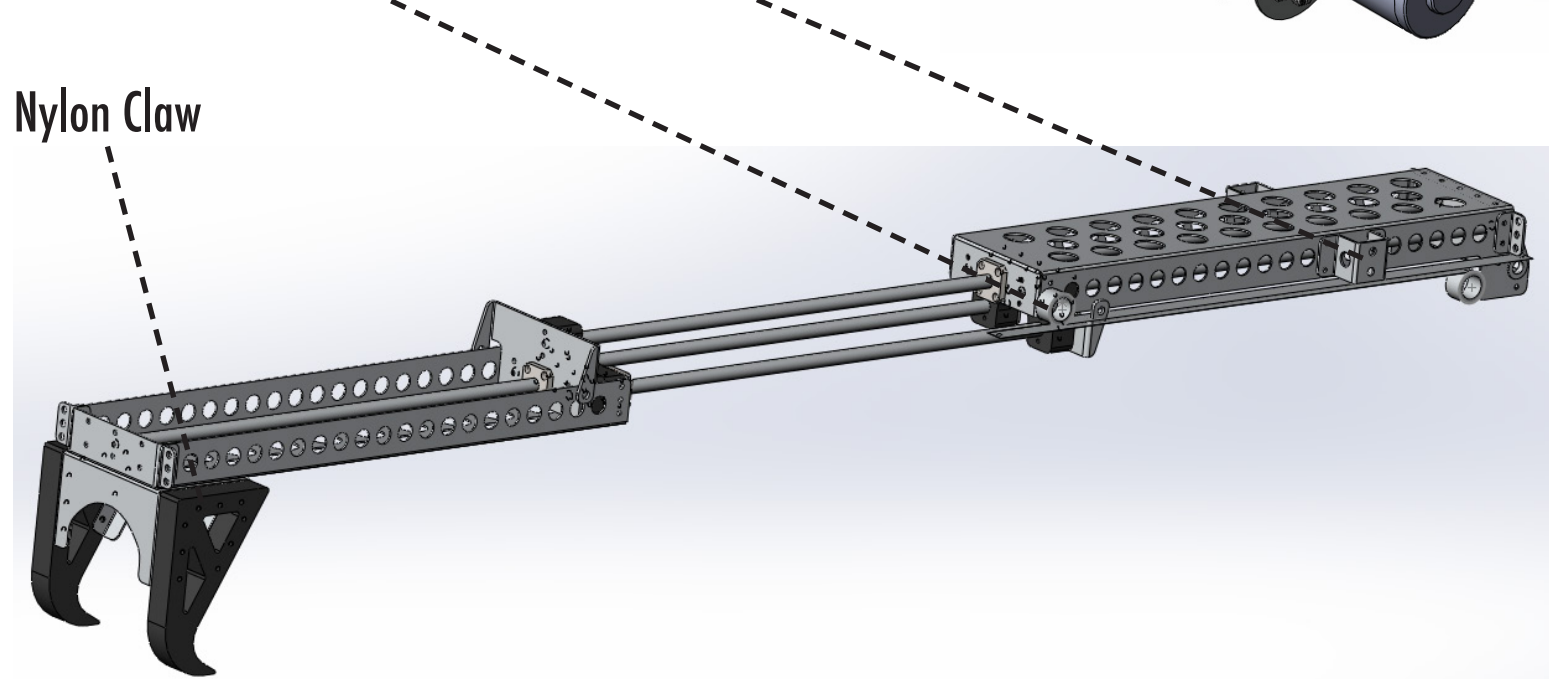


Arm Gearbox



Constant Force Springs Piston Mounts

Nylon Claw



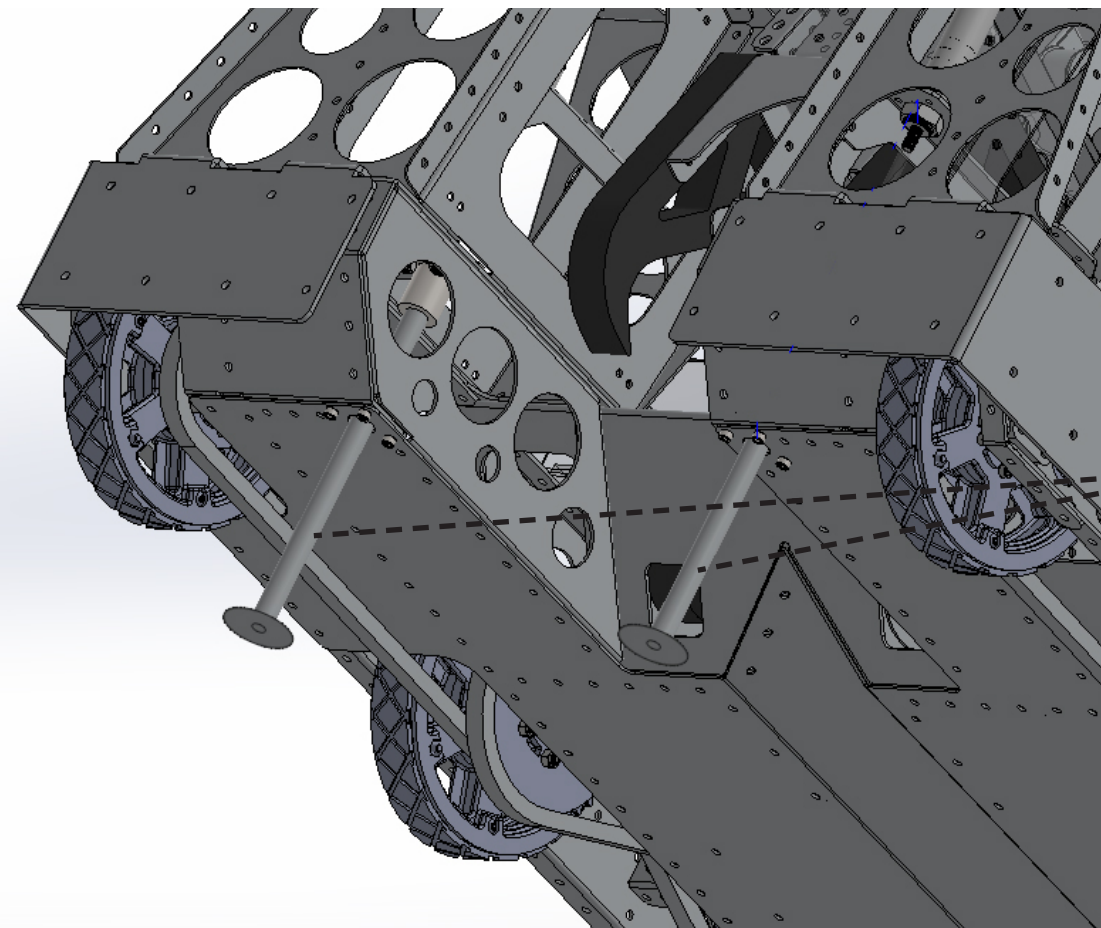
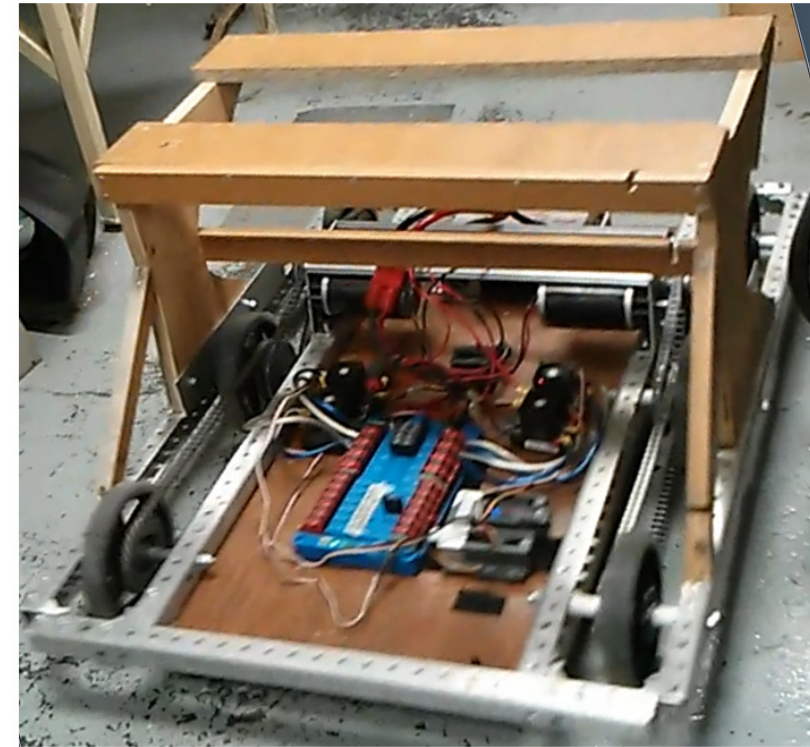
FIXED HOOKS

Info

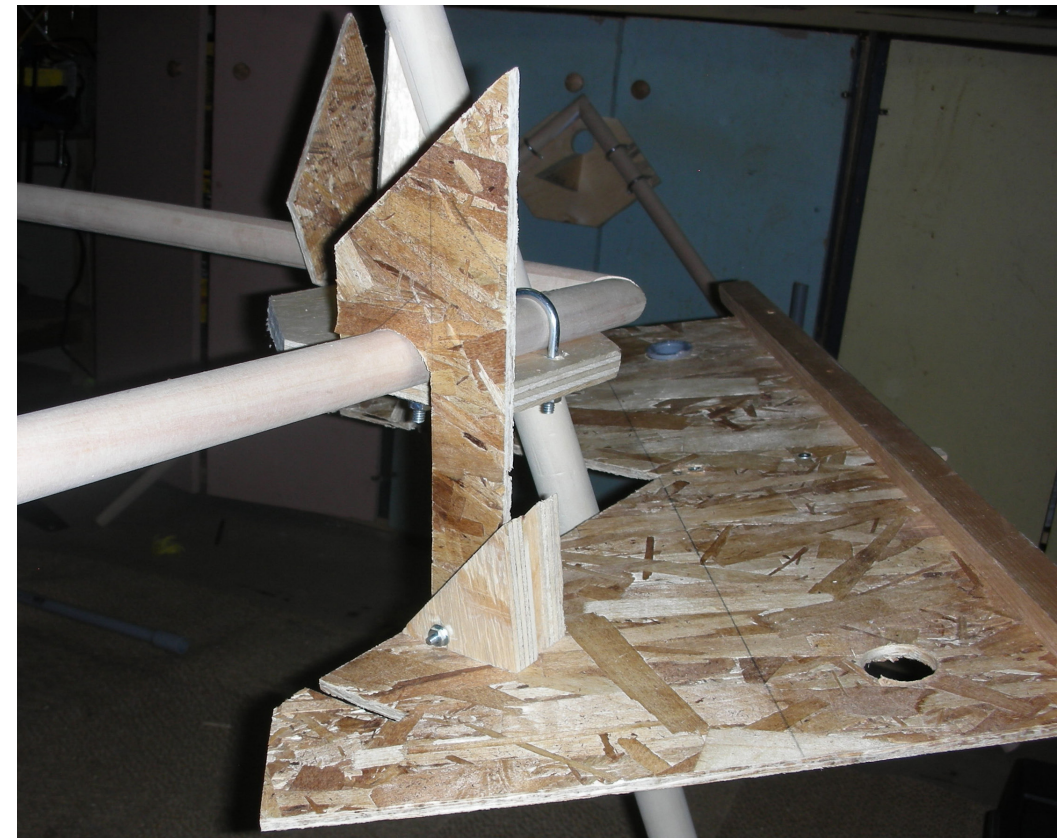
- Two steel shafts extend out of the base of the robot to act as fixed hooks while the arm extends to the next level
- Driven by pneumatics, supported through linear bearings



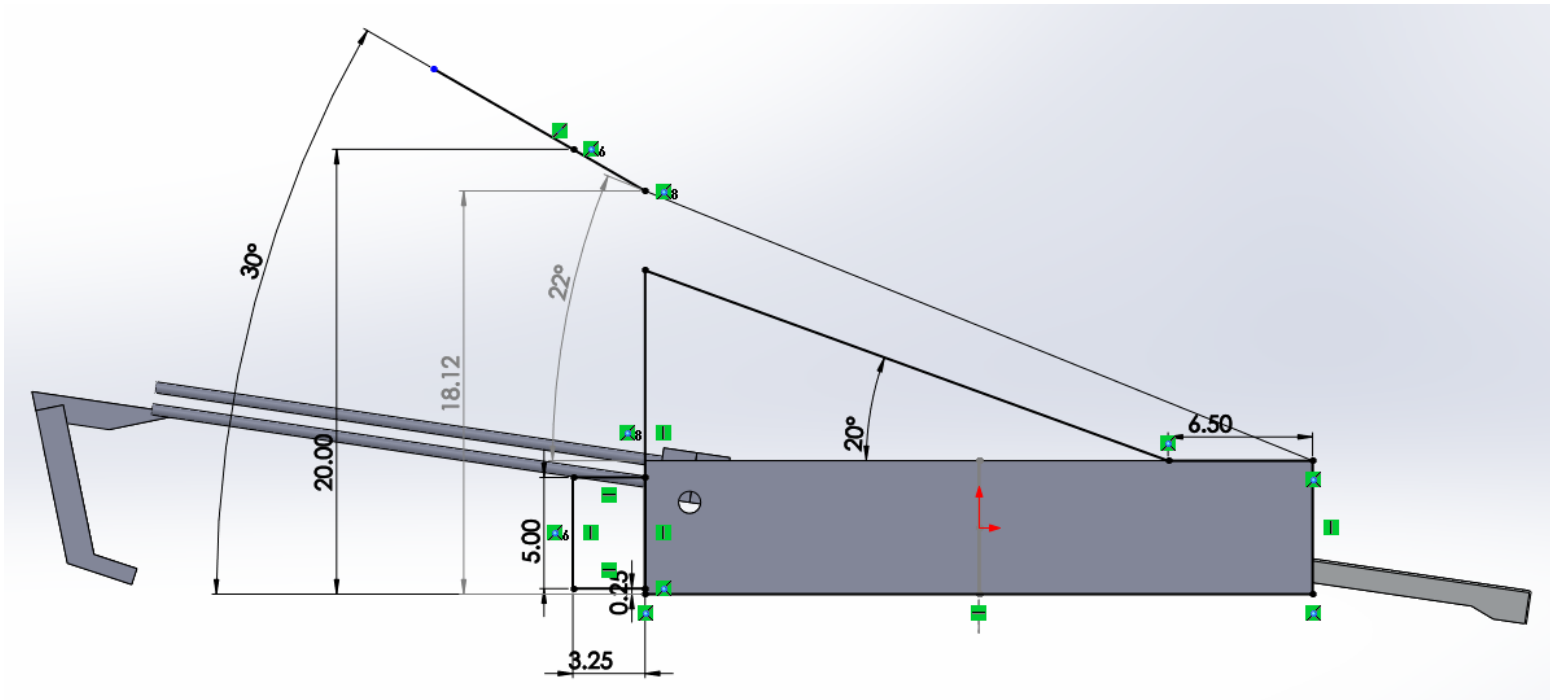
CLIMBER PROTOTYPES



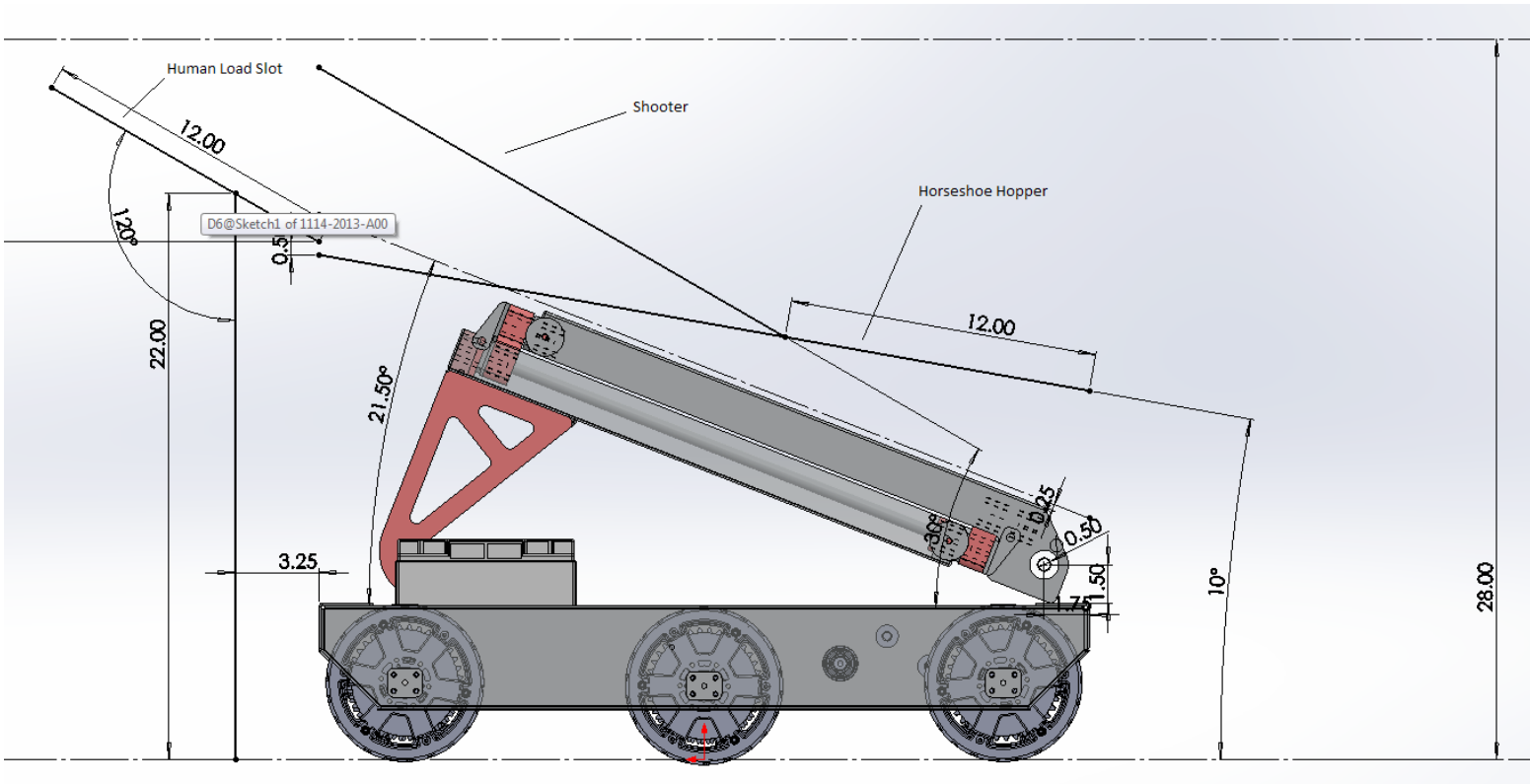
Fixed hooks



CLIMBER DESIGN NOTES

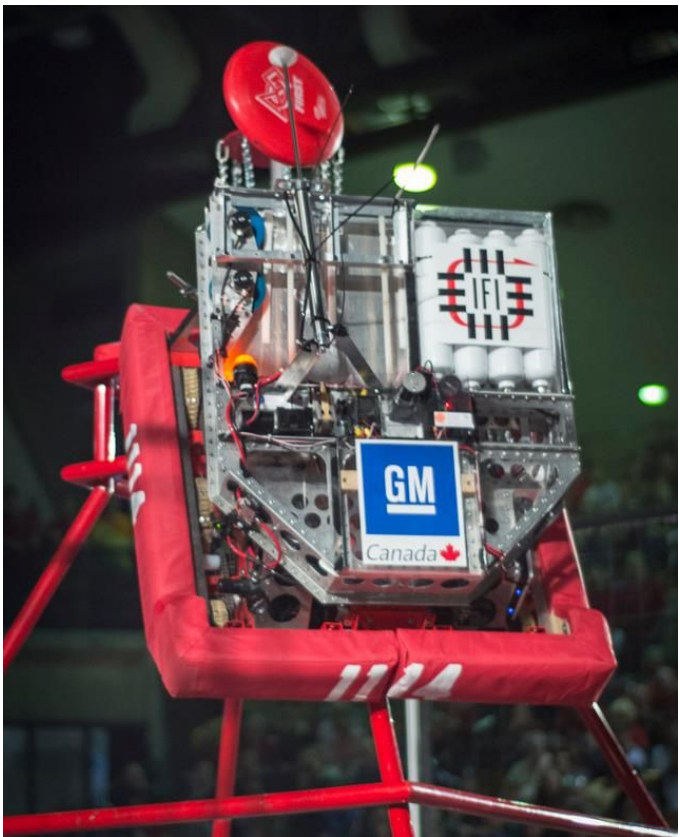
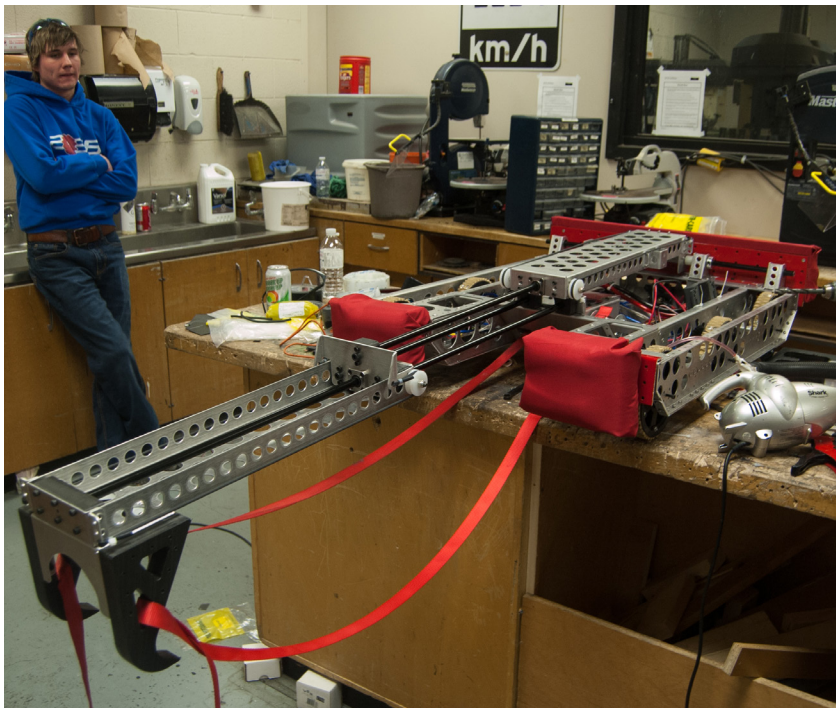
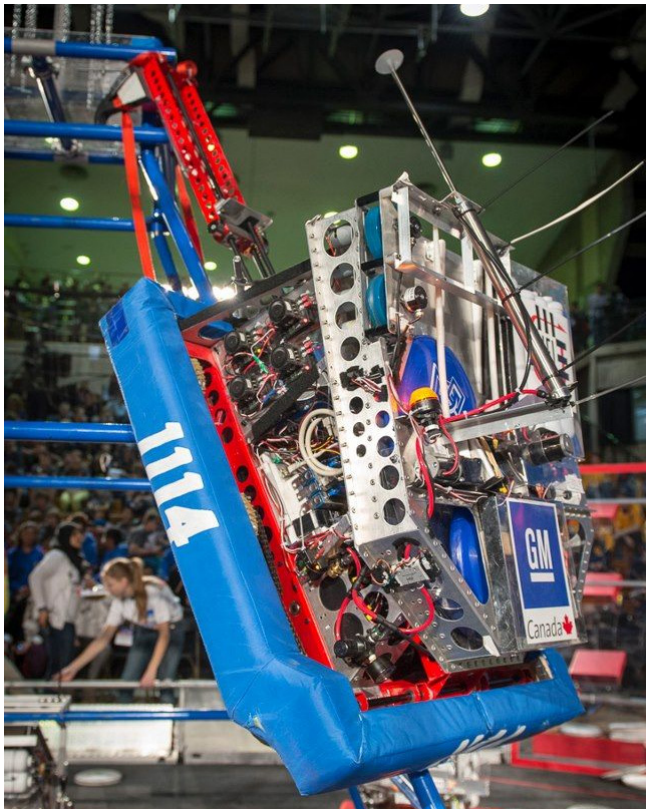


Early sketch of the climber to determine the geometry and dimensions.



Final climber geometry

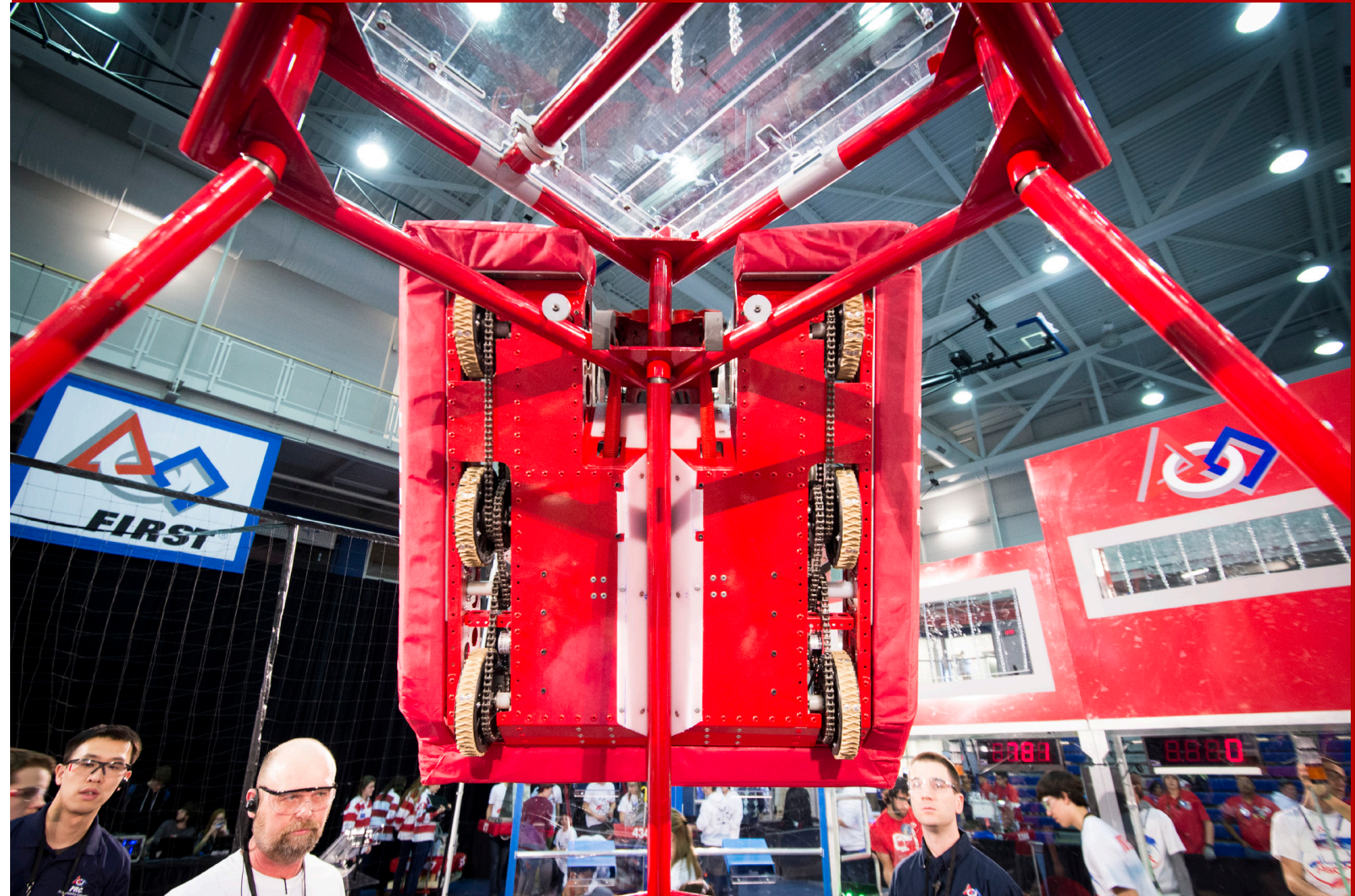
CLIMBER PICTURES



CLIMBING SEQUENCE

1. Intake four coloured frisbees from the low feeding slot.
2. Maneuver the front of the robot to a corner of the pyramid.
3. Drive into the corner of the pyramid with the climbing bar which raises the front of the robot off the ground.
4. Servo attached to a landing gear style mechanism releases the spring loaded climbing bar to make way for the arm to extend.
5. Two pancake cylinders angle the arm so that it can extend over the pyramid corner.
6. The arm winch unwinds and constant-force springs extend the arm just past the lowest pyramid corner.
7. The two pancake cylinders angle the arm down and the claw hooks over the pyramid corner.
8. The winch spools a ratchet strap that is attached to the arm which pulls the robot up the pyramid and off of the ground.
9. Two fixed hooks extend out from the bottom of the drivebase over the first corner of the pyramid with two pistons, which hold the robot onto the pyramid.
10. The two pancake cylinders angle the arm up while the winch unwinds extending the claw to the next pyramid corner.
11. Steps 7 to 10 repeat twice until the robot is hanging from the third pyramid corner with the fixed hooks.
12. The shooter wheels spin at a low rpm and the four coloured frisbees shoot out into the extended deflecting piston to be scored into the pyramid goal.

DRIVETRAIN

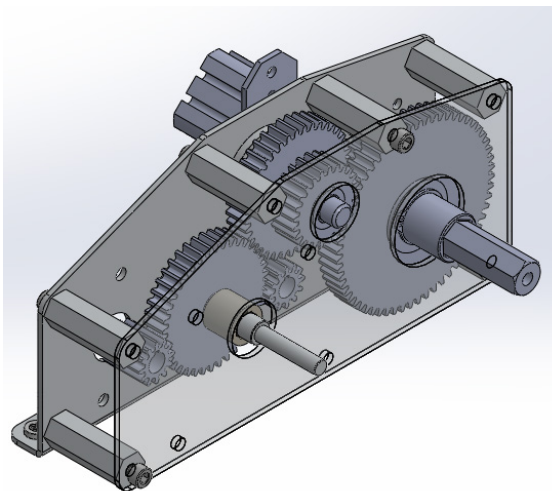
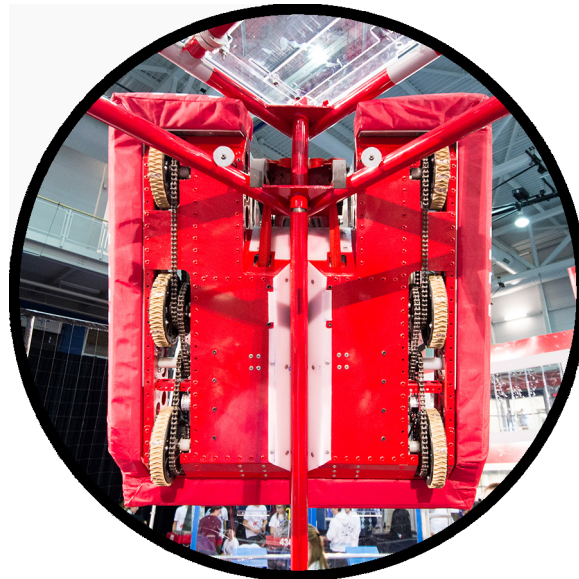


Subsystem Includes:

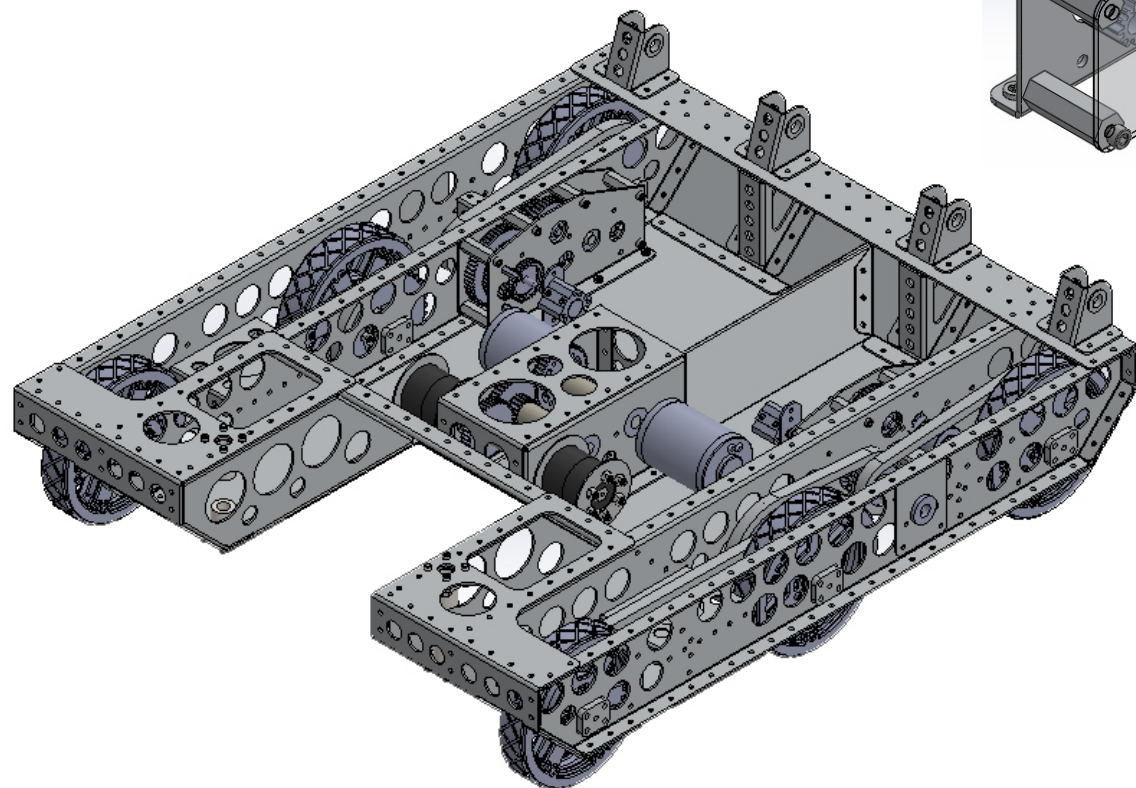
- Drivetrain
- Transmission

Info

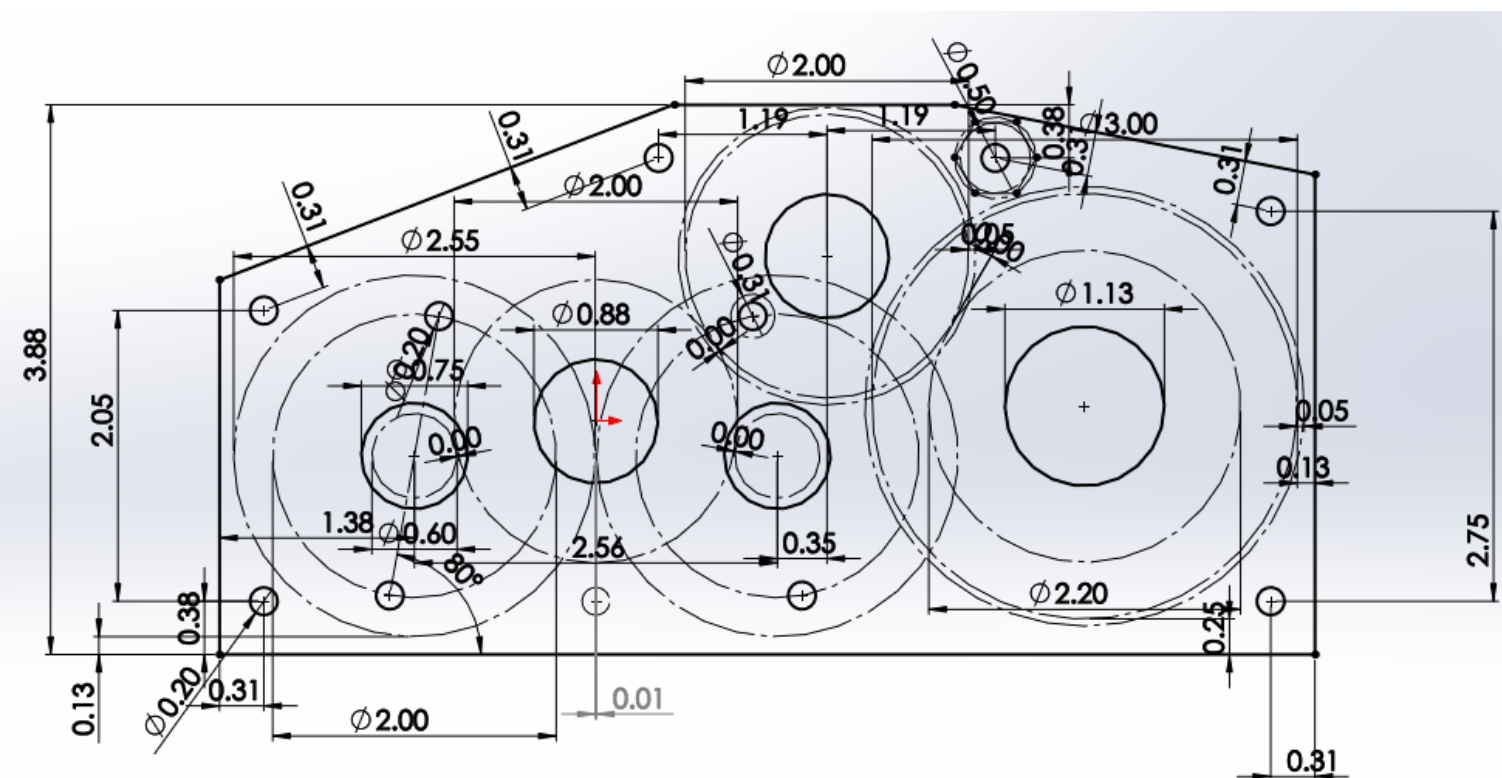
- Riveted aluminum sheet metal chassis
- Base contoured to aid stability while climbing
- Six wheeled drive utilizing 6" x 1" VEXpro traction wheels
- Powered by four CIM motors; power transmission via custom two speed transmission, utilizing VEXpro ball shifter components and roller chain drive
- Approximate top speeds of 6.7 fps and 15 fps



Drivetrain Gearbox with Vexpro Ballshifter

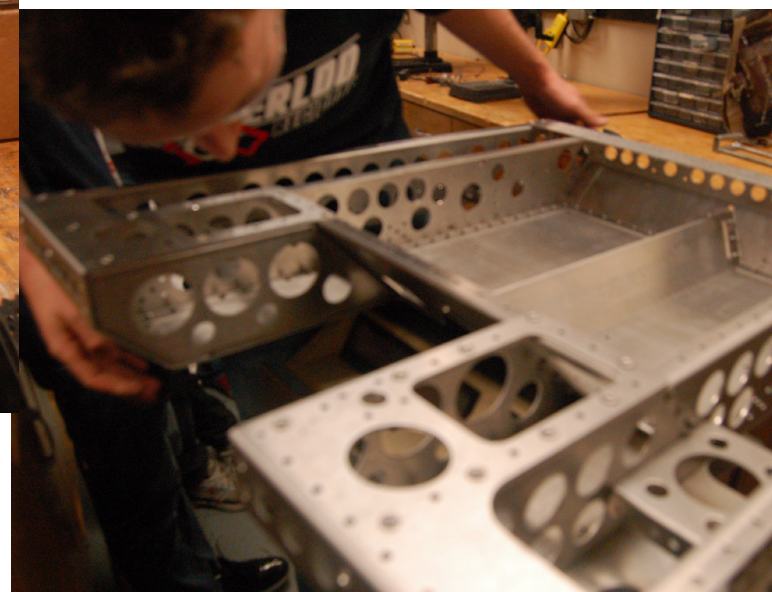
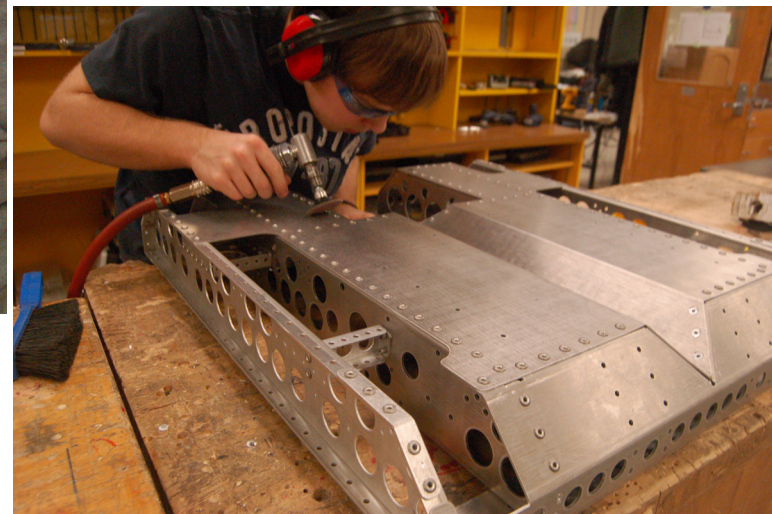
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Dimensions of the drive side rail

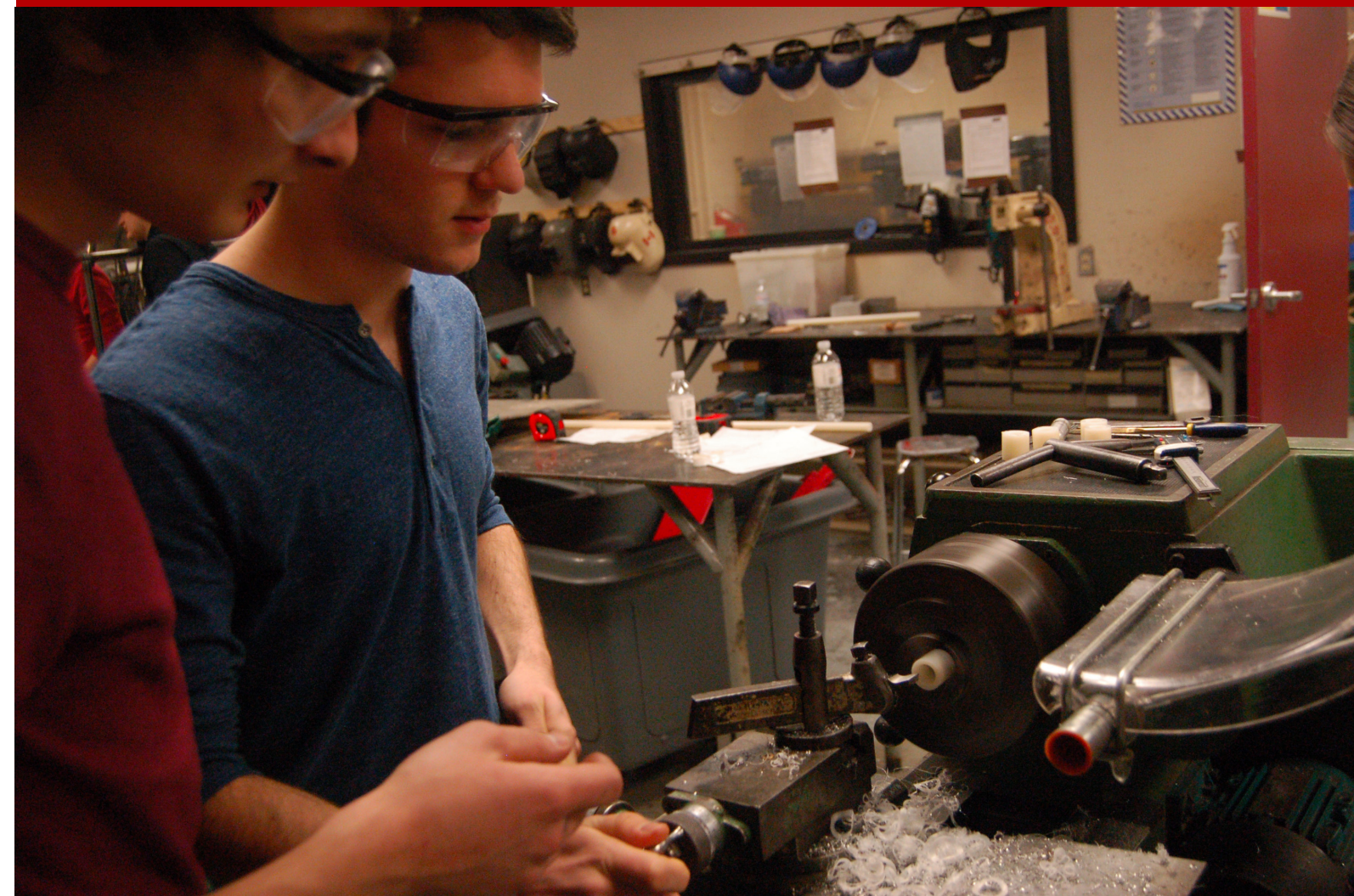


Dimensions of the drive gearbox plate

DRIVETRAIN PICTURES



MANUFACTURING



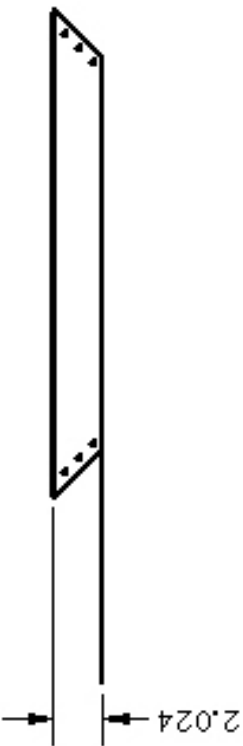
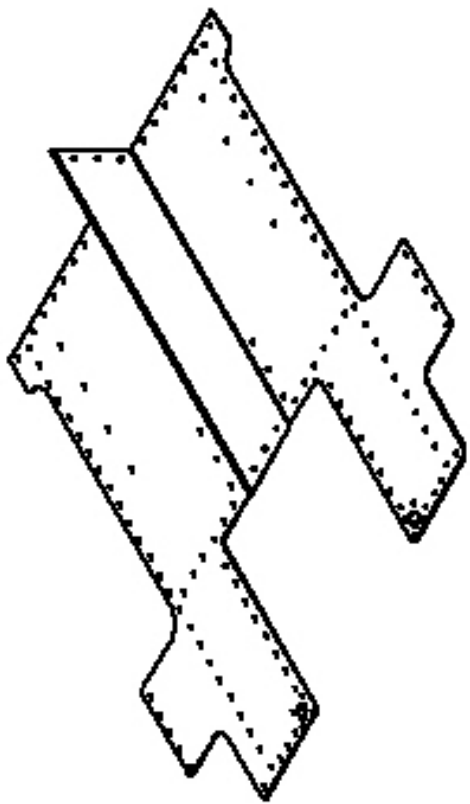
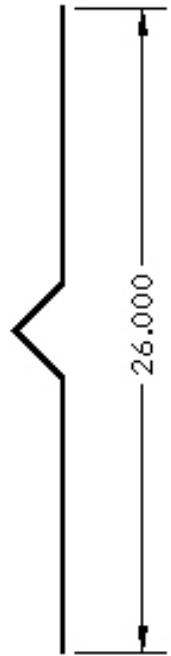
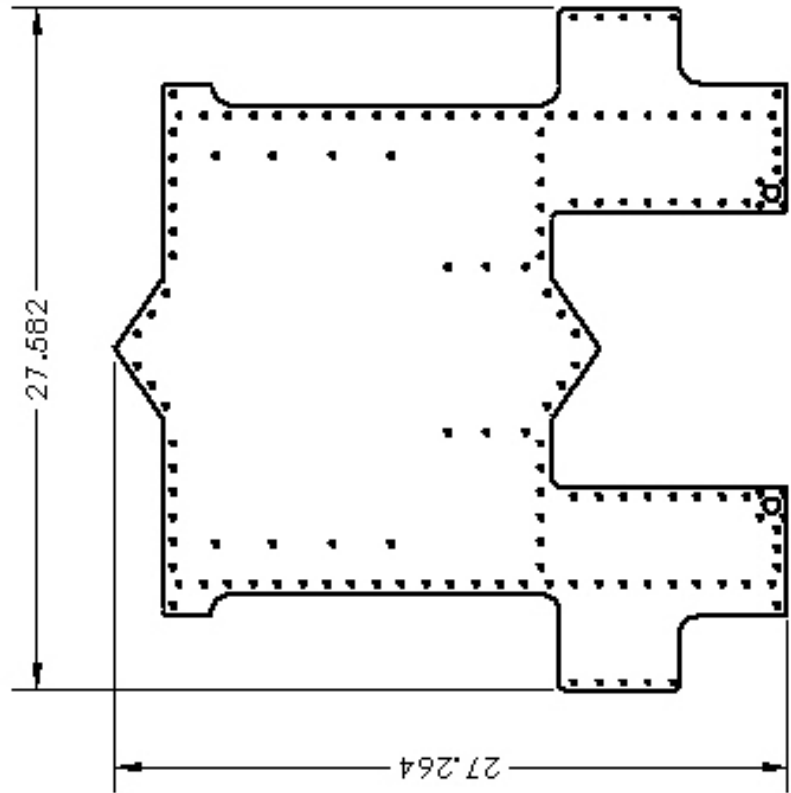
Section Includes:

- Sheet Metaled Parts
- Custom Parts

SHEET METALED PARTS

Examples of sheet metaled parts

- Drivetrain chassis
- Horse shoe helix
- Super structure (supports the shooter and the horseshoe helix)
- Gearboxes
- Bumper mounts



Dimensions per 1114-2013-DT-S007.sldprt or step		Printed on 4/24/2013	Sheet 1 of 1
Material		Innovation First, Inc.	
Aluminum 5052-H32, 0.063" Thick		DRIVETRAIN BASEPLATE	
Finish		No Coating, Machine Deburr	
TOLERANCES (unless otherwise specified): +/- .005 on flat pattern +/- .010 on bends +/- 1/2 deg angles + .003/- .001 on holes +/- .010 on CSink dia & thru hole		NO BURRS or SHARP EDGES	
PROPRIETARY AND CONFIDENTIAL		1114-2013-DT-S007	

1114-2013-SS-\$105

SS FRONT WIDE PLATE

Innovation First, Inc.

Printed on 4/24/2013 Sheet 1 of 1

Dimensions per 1114-2013-SS-\$105.sldprt or .step

TOLERANCES (unless otherwise specified):

- +/- .005 on flat pattern
- +/- .010 on bends
- +/- 1/2 deg angles
- + .003/- .001 on holes
- +/- .010 on sink dia & thru hole

PROPRIETARY AND CONFIDENTIAL

NO COATING, MACHINE DEBURR

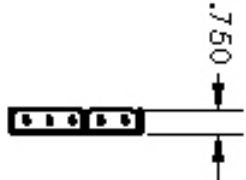
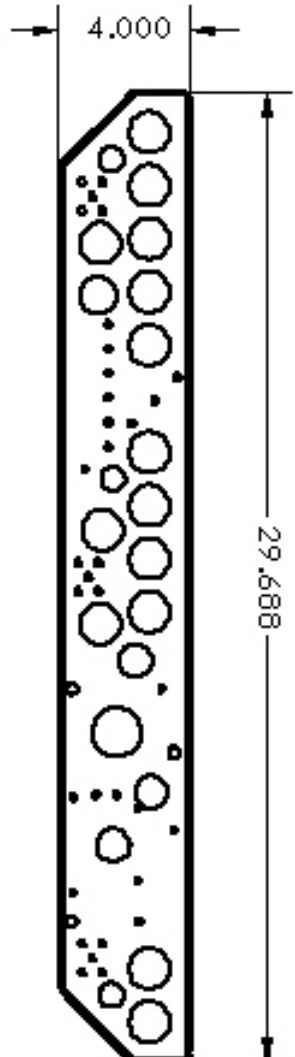
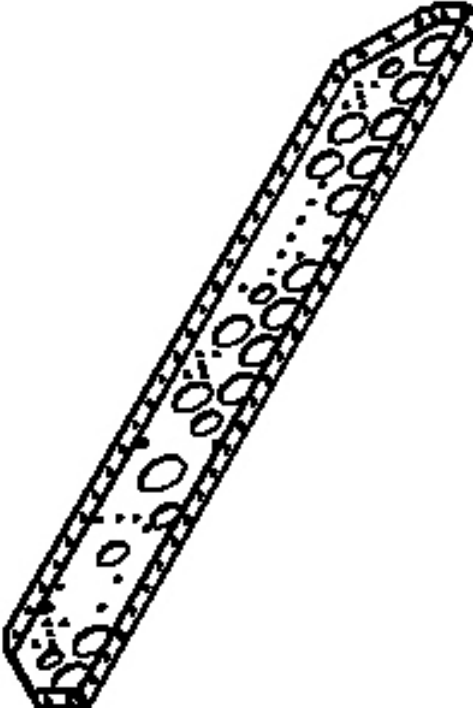
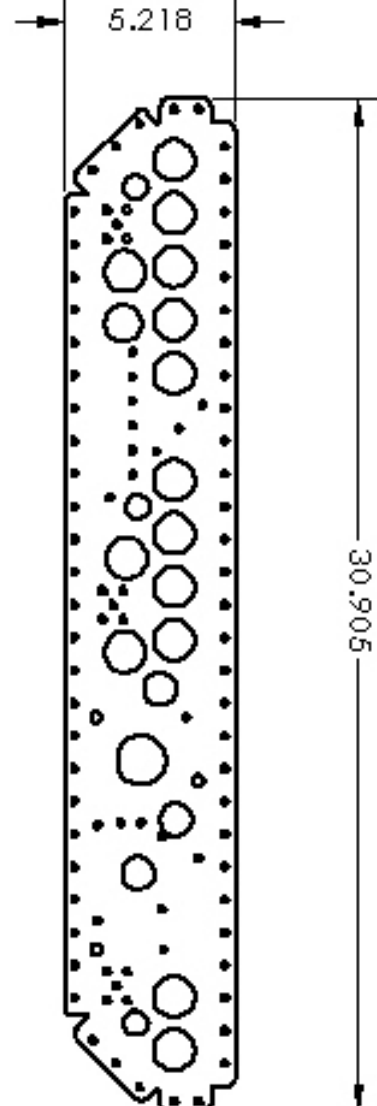
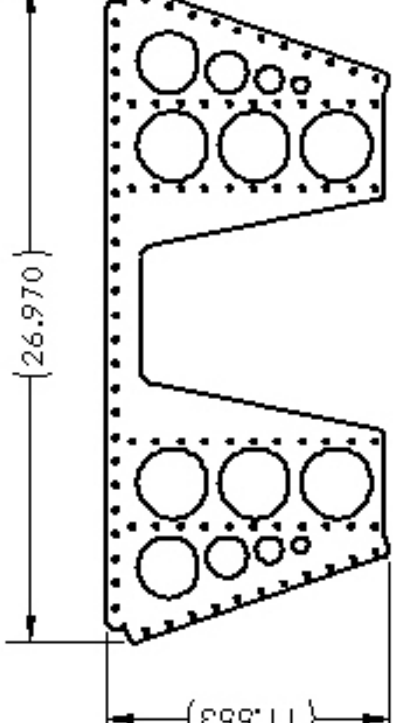
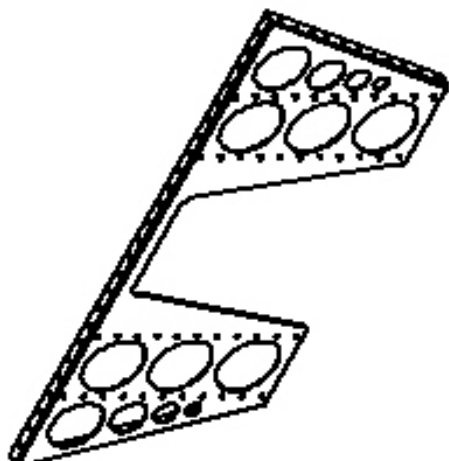
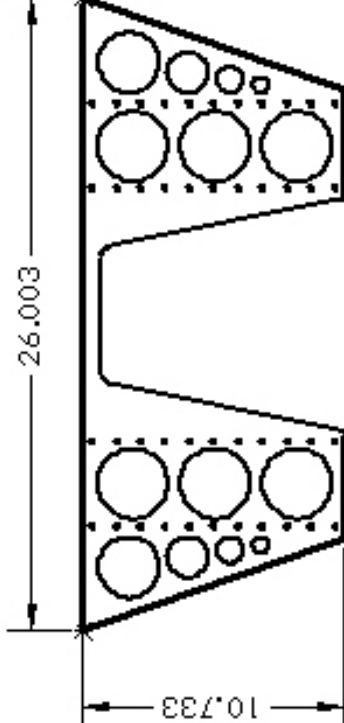
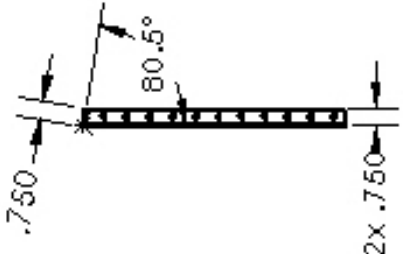
NO BURRS OR SHARP EDGES

ALL DIMENSIONS ARE IN INCHES.

Material: Aluminum 5052-H32, 0.063" Thick

Finish: No Coating, Machine Deburr

Notes:



TOLERANCES (unless otherwise specified):
+/- .005 on flat pattern
+/- .010 on bends
+/- 1/2 deg angles
+ .003/- .001 on holes
+/- .010 on sink dia & thru hole

PROPRIETARY AND CONFIDENTIAL

Dimensions per 1114-2013-DI-S001.sldprt or .step

Innovation First, Inc.
DRIVETRAIN INNER RAIL
1114-2013-DI-S001

Printed on 4/24/2013

Sheet 1 of 1

Innovation First, Inc.

SHOOTER BASE PLATE

1114-2013-HH-S011

Material
Aluminum 5052-H32, 0.063" Thick

Finish
No Coating, Machine Deburr

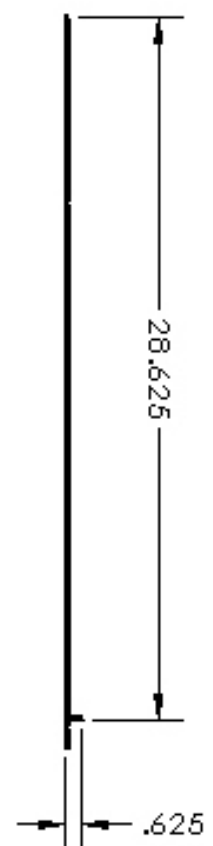
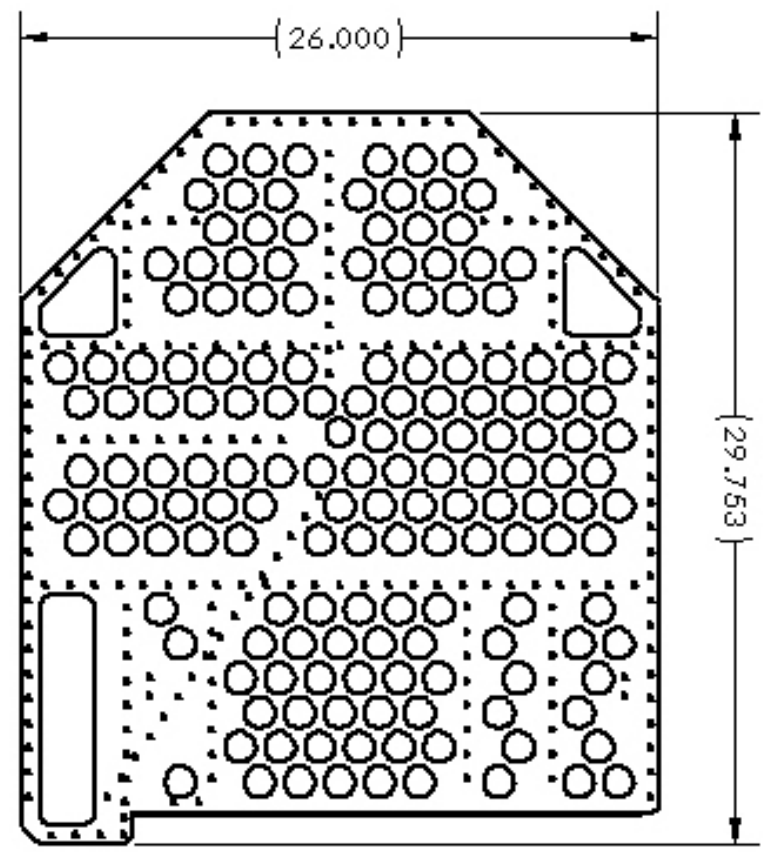
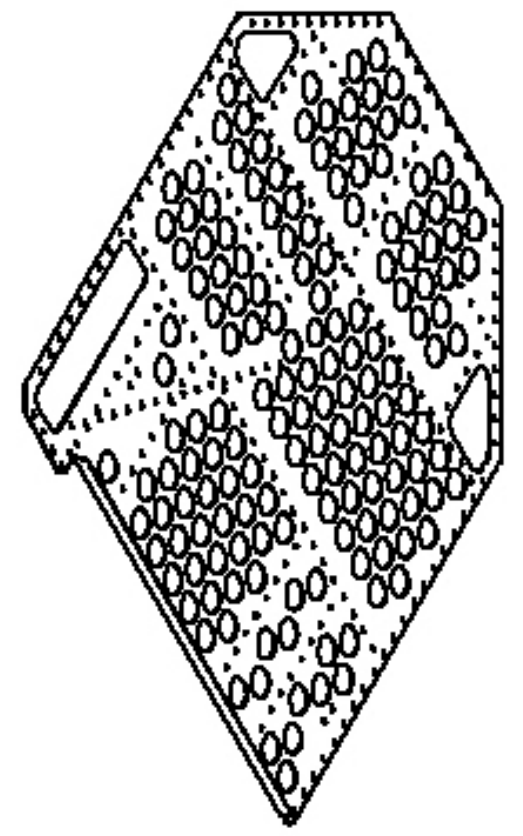
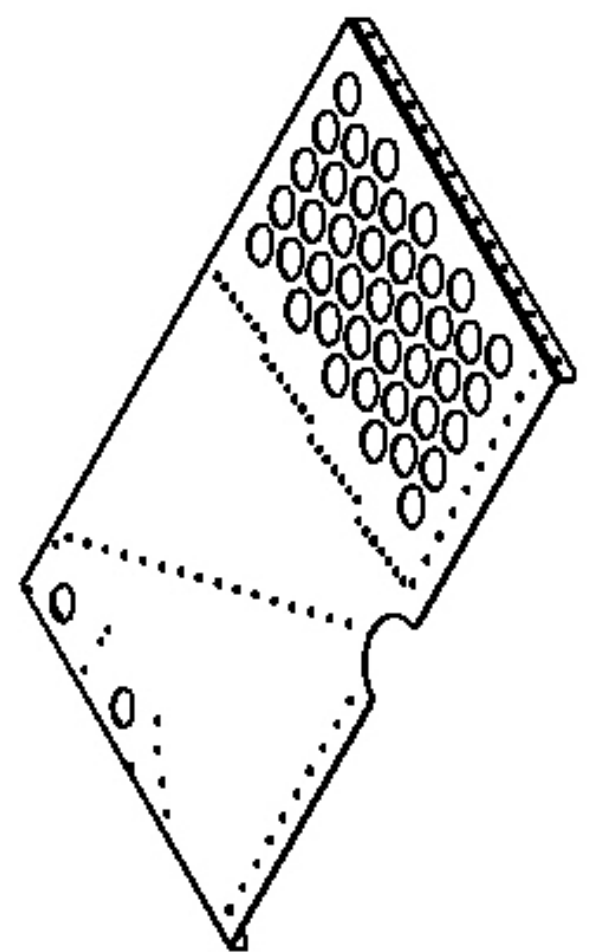
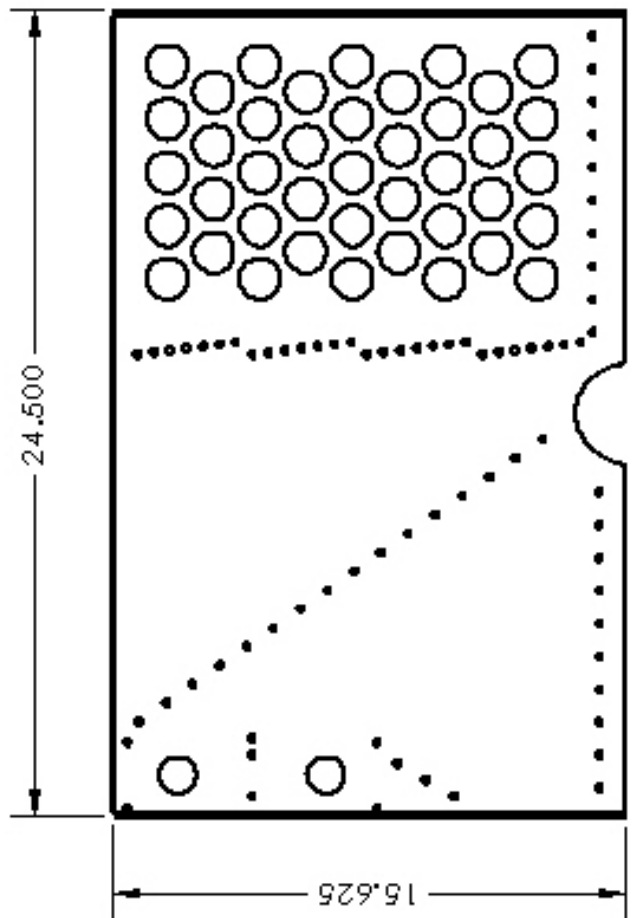
NO BURRS or SHARP EDGES

TOLERANCES (unless otherwise specified):
+/- .005 on flat pattern
+/- .010 on bends
+/- 1/2 deg angles
+.003/- .001 on holes
+/- .010 on csink dia & thru hole

PROPRIETARY AND CONFIDENTIAL



3x .750



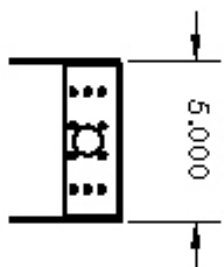
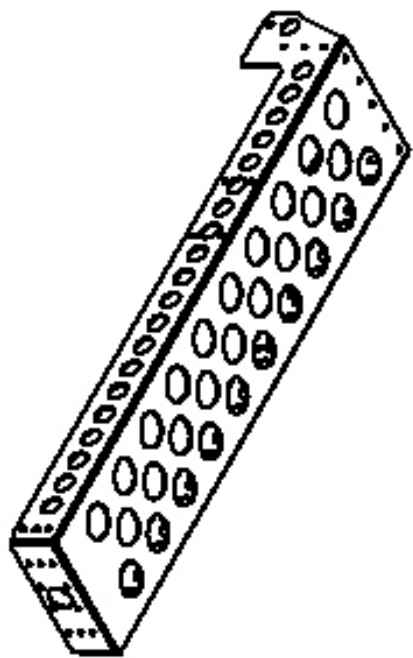
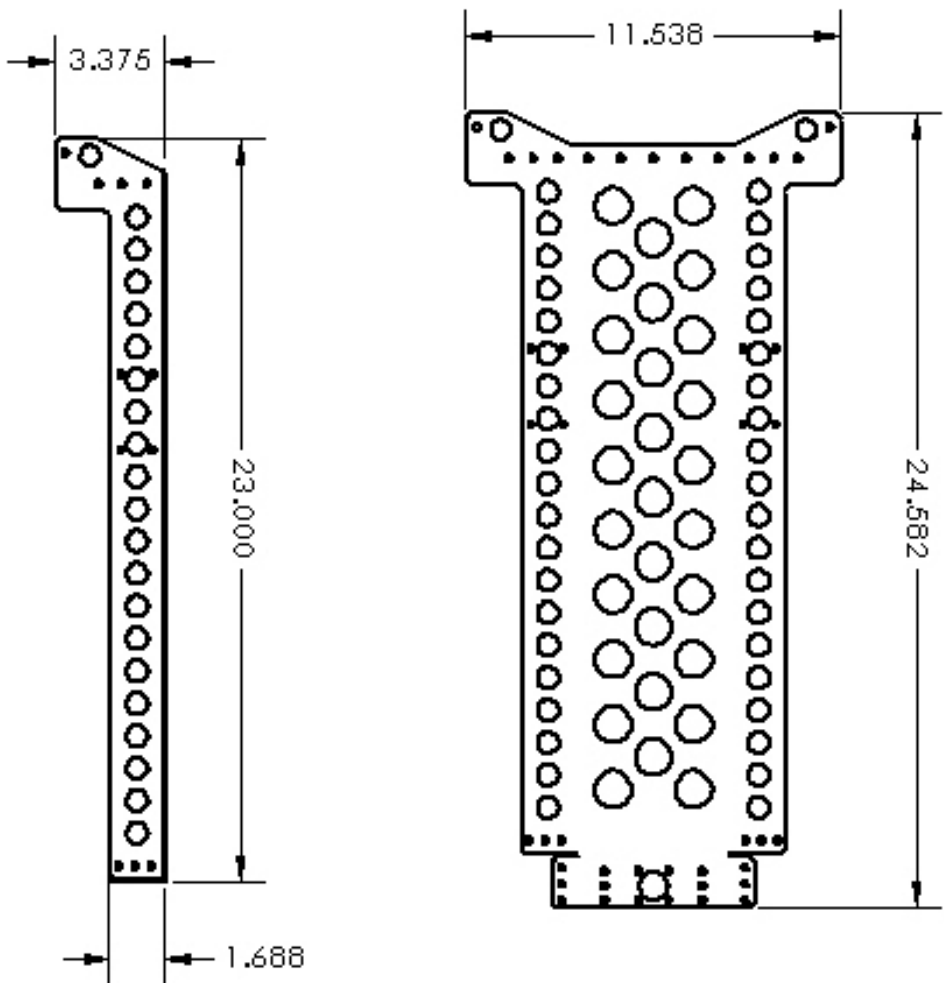
TOLERANCES (unless otherwise specified):
+/- .005 on flat pattern
+/- .010 on bends
+/- 1/2 deg angles
+.003/- .001 on holes
+/- .010 on csink dia & thru hole

PROPRIETARY AND CONFIDENTIAL

CUSTOM PARTS

Examples of Custom parts

- Custom Shafts
- Custom Bushings
- Custom Spacers
- Nylon Claw
- Drive Blocks



TOLERANCES (unless otherwise specified):
 +/- .005 on flat pattern
 +/- .010 on bends
 +/- 1/2 deg angles
 +.003/- .001 on holes
 +/- .010 on sink dia & thru hole

PROPRIETARY AND CONFIDENTIAL

Dimensions per 1114-2013-HA-S001 sidpt or step
 Material
 Aluminum 5052-H32, 0.063" Thick
 Finish
 No coating, machine deburr
 NO BURRS OR SHARP EDGES
 ALL DIMENSIONS ARE IN INCHES

Innovation First, Inc.
 ARM FIXED STAGE BODY
 1114-2013-HA-S001
 Printed on 4/24/2013
 Sheet 1 of 1

BUMPER MOUNT

Innovation First, Inc.

Printed on 4/24/2013

Sheet 1 of 1

Dimensions per Custom Bumper mountslprt or step

TOLERANCES (unless otherwise specified)

- +/- .005 on flat pattern
- +/- .010 on bends
- +/- 1/2 deg angles
- + .003/- .001 on holes
- +/- .010 on csink dia & thru hole

PROPRIETARY AND CONFIDENTIAL

No Coating, Machine Deburr

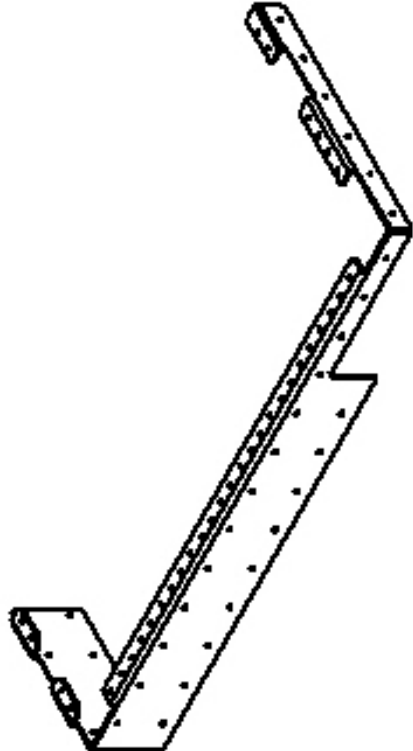
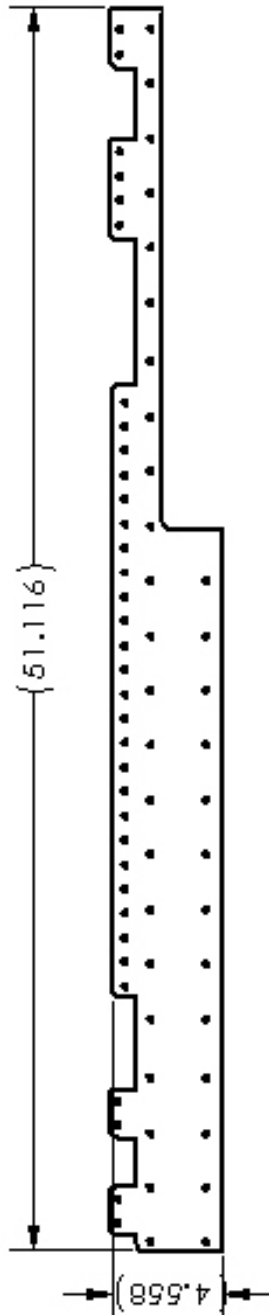
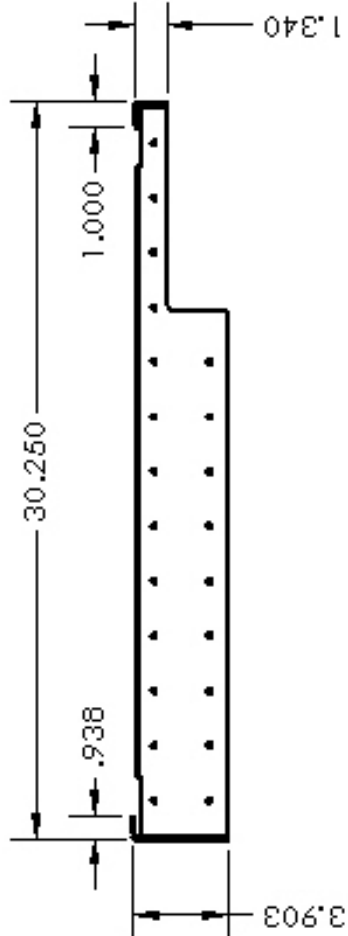
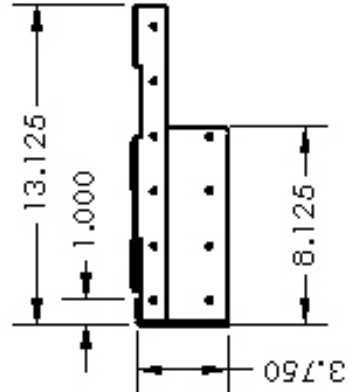
NO BURRS or SHARP EDGES

ALL DIMENSIONS ARE IN INCHES.

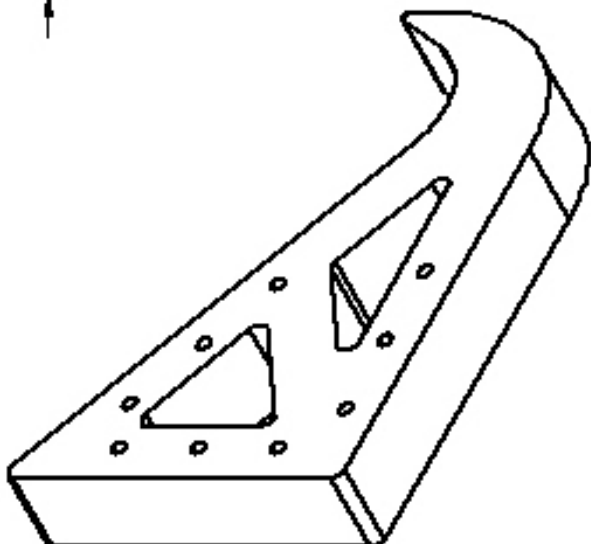
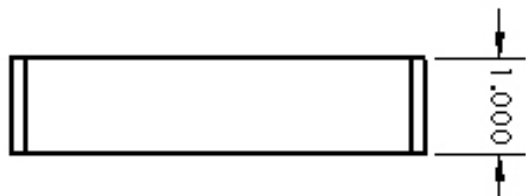
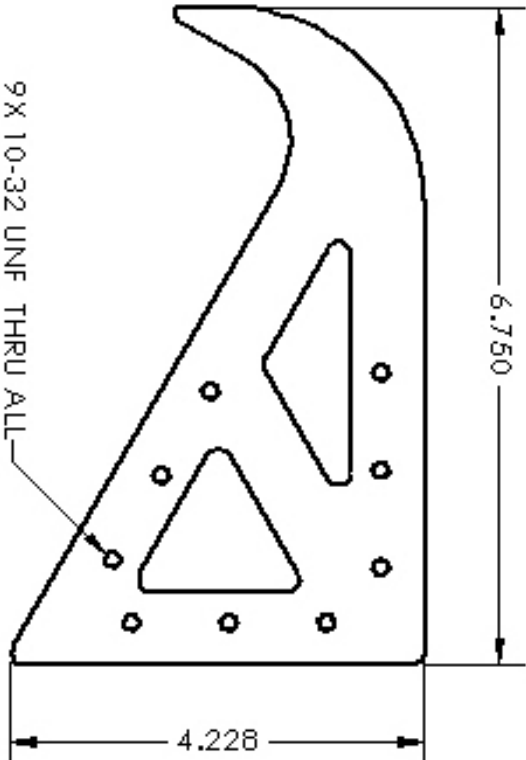
Aluminum 5052-H32, 0.125" Thick

Finish

Workface



QTY: 2



Dimensions per 1114-2013-HA-P008 slprt or step

Printed on 4/24/2013

Sheet 1 of 1

Material

1" NYLON SHEET

ARM HOOK

6.00 1/2 x 1.50

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1114-2013-HA-P008

TOLERANCES (unless otherwise specified)

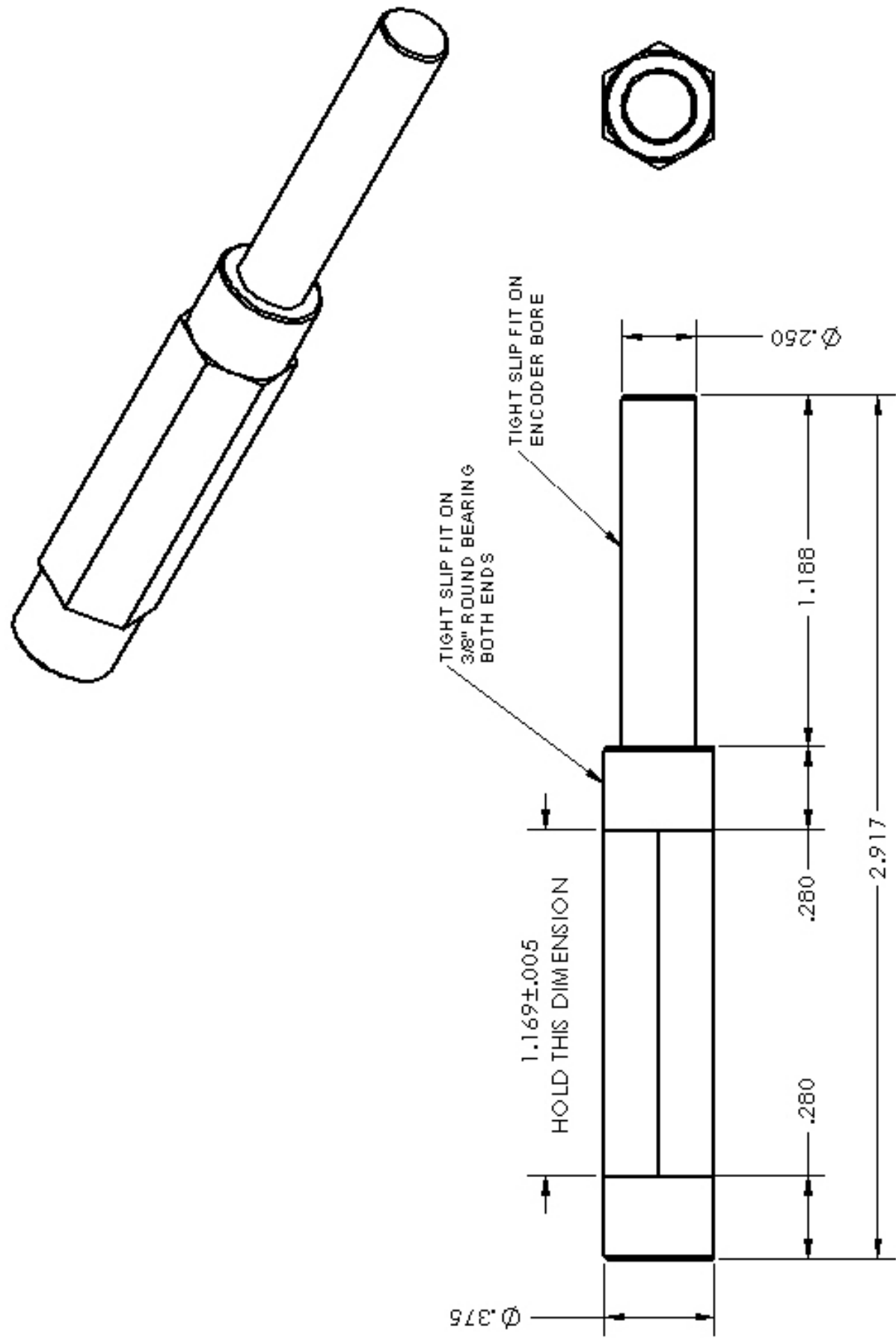
- +/- .005 on flat pattern
- +/- .010 on bends
- +/- 1/2 deg angles
- + .003/- .001 on holes
- +/- .010 on csink dia & thru hole

PROPRIETARY AND CONFIDENTIAL

No Coating, Machine Deburr

NO BURRS or SHARP EDGES

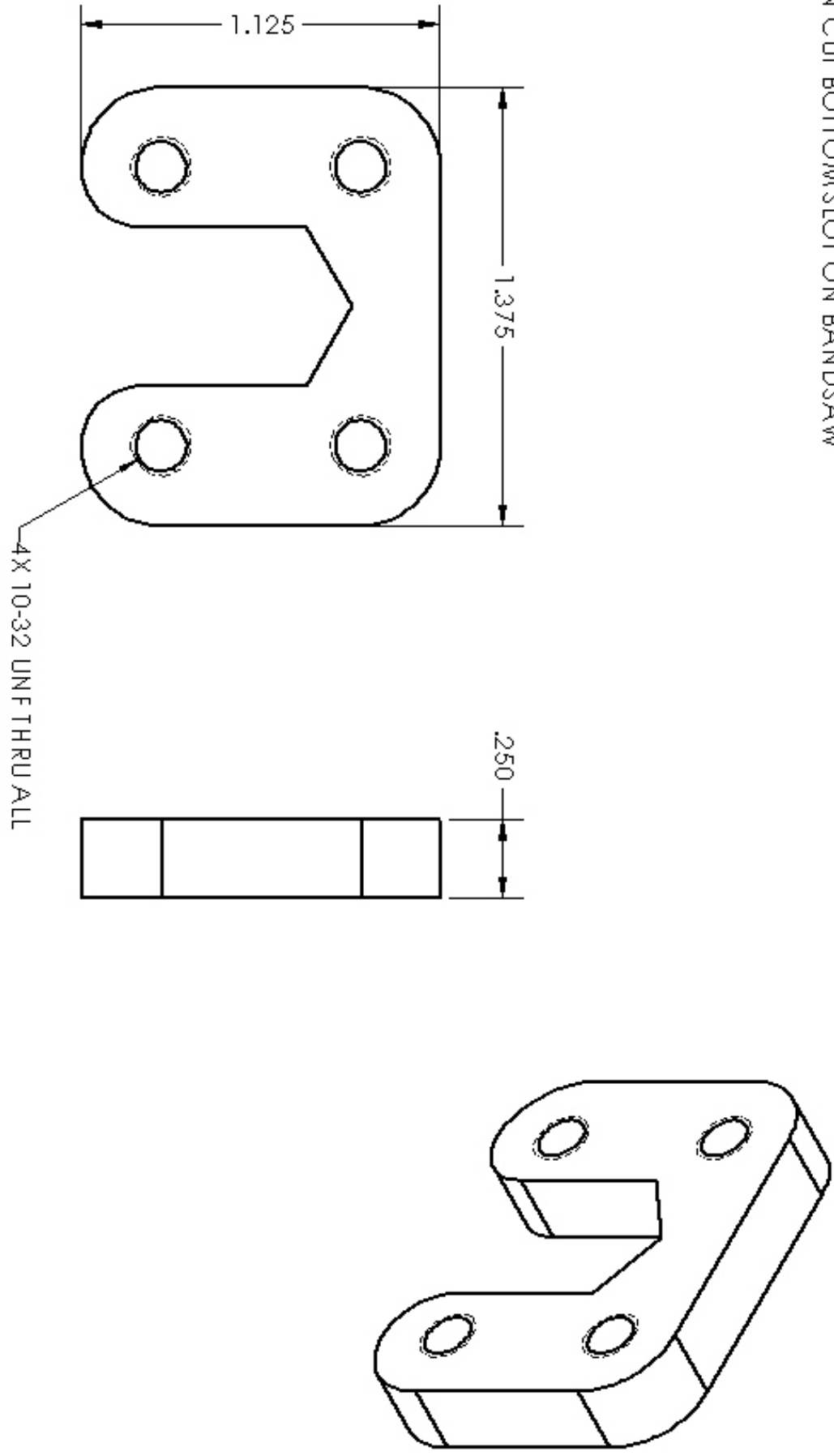
ALL DIMENSIONS ARE IN INCHES.



QTY: 9

QTY: 15

USE STEP FILE FOR 1114-2013-DT-P002 TO CUT PERIMETER AND DRILL CENTRE HOLES ON CNC
THEN DRILL CENTRE HOLE TO 0.500" AND BROACH TO 1/2" HEX
THEN CUT BOTTOM SLOT ON BANDSAW



TOLERANCES (unless otherwise specified):
+/- .005 on flat pattern
+/- .010 on bends
+/- 1/2 deg angles
+ .003/- .001 on holes
+/- .010 on Csink dia & thru hole

1/4" ALUM

No Coating, Machine Debur
NO BURRS or SHARP EDGES

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INNER AXEL BLOCK

1114-2013-DT-P001

