



# Brush Buster – Spyker KAT 2X Tank

By Trina Thompson, Owen Walley, Natasha Wray

Dr. Lucas Craig, Cullen Haskins, Mechanical Engineering Technology, Capstone

## What is a Spyker KAT 2x Tank?

- Created by Ryan Butler of St. Paul, MN who is known for his innovative designs who was inspired by the Tesla Cybertruck.
- 3-D printed RC tank, add-ons were created to be used for various tasks that included snow blowing.
- Overall tank itself took 7 rolls of filament printing at 100% infill.



## Building the Spyker KAT 2X:



- Kit included a total of 50+ pieces
- No official written 'manual'
- Watched 'build series' on YouTube.
- All pieces needed to be predrilled – took 2.25 hrs.



- Side panels: consisted of 14 parts on one side.
- Setbacks occurred, took 3-5 hrs. to complete.



- Base: consisted of 7 pieces
- Assembly took 30 mins

## Building Cont'd.:



- Overall Base took a total of 7-10hrs.
- Upon the final build noticed parts of the missing.
  - This caused delay in the build.

## Files needed:

- Acquired the files from Spyker Workshop website for \$8.
- Files included the '2X Basher Body':
  - Primary Color (Green) files included a total of 9 parts.
  - Secondary Color (Black) files included a total of 16 parts.
- Included the Hardware list needed to assemble the top.



## Additional Files needed:

- Missing parts on the main part of the tank.
  - 8 wheel pieces and Wheel Sprocket.
- Purchased additional files for \$40.

## Cost to Construct Top:

Item	Hardware Type	Link	Cost	Quantity	Package	Subtotal
Black Filament (2pk)	PLA	Amazon	\$ 27.98	3	2	\$ 55.96
#4 x 1/2" Flat head (24 pk)	Sheet metal screws	Lowes	\$ 1.48	110	5	\$ 7.40
6-32 x 3/4" Flat Head (12 pk)	Machine Screws	Lowes	\$ 1.48	20	2	\$ 2.96
6-32 Lock Nut (4 pc)	Locknut	Home Depot	\$ 1.38	20	5	\$ 6.90
#6 Washer (30 pc)	Washers	Home Depot	\$ 1.38	20	1	\$ 1.38
Cut-off switch	Switch	Amazon	\$ 17.99	1	1	\$ 17.99
Voltage Meter	Voltage Meter	Amazon	\$ 19.54	1	1	\$ 19.54
<b>Total</b>				175	17	\$ 18.64
<b>Total (Actual)</b>						\$130.77

## Printing Time Required for Top:

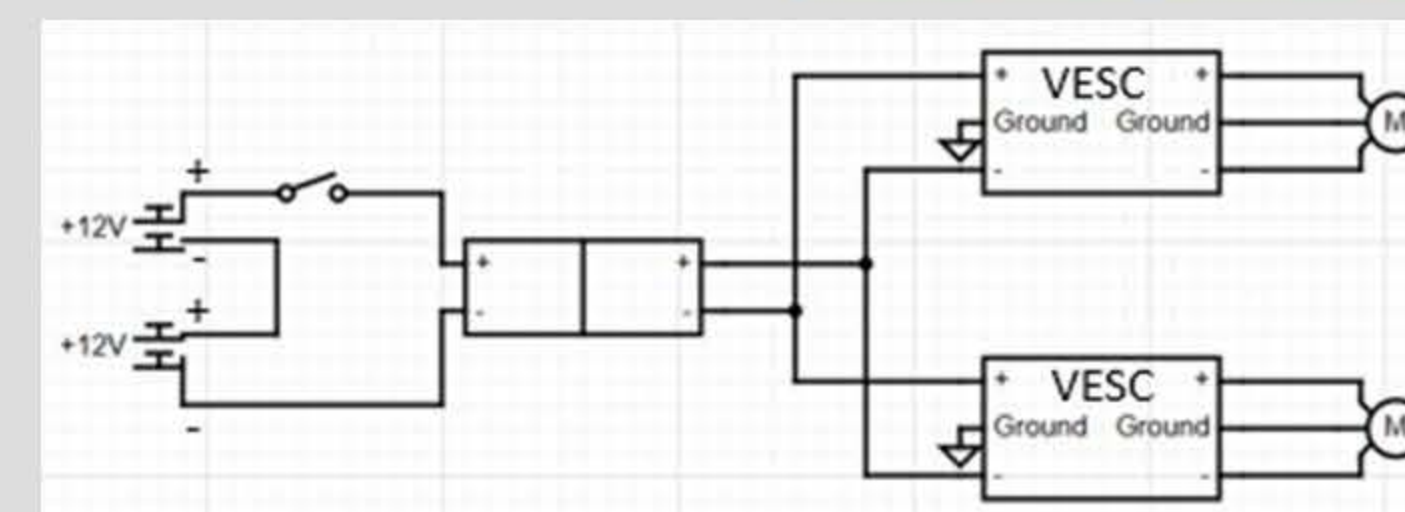
- The top of the Tank included 3 removal pieces; 25 parts in total that were required.
- Printers used included: 2 Bambu P1S printers with a 0.4 and 0.8 Nozzle and a Creality Printer with a 0.4 Nozzle.
- All the pieces needed to be printed with 100% infill due to the weight, material and components that it will need to hold.
- Printing initiated on 3/17 and finished on 3/21.
- Printing was continuous for 5 days between the hours of 10 am to 1:15-2pm daily, with one overnight continuous print.

Files	Item	Quantity	Time (Hours)	Time (Mins.)	Nozzle size	Filament	% Infill
Primary Color	Front Backer Plate	2	1	7	0.4	PLA	100%
	Front Basher Top Cover	1	4	10	0.4	PLA	100%
	Front Basher Top Cover	1	3	12	0.8	PLA	100%
	Mid Basher Body Top	1	31	0	0.4	PLA	100%
	Panel Cut out	1	0	56.5	0.4	PLA	100%
	Front Backer Plate & Front Plate	1	3	59	0.4	PLA	100%
Secondary Color	Body Clip (L,R)	1	2	48	0.4	PLA	100%
	Power Panel (2 pieces)	1	10	18	0.4	PLA	100%
	Power Panel	3	0	34	0.8	PLA	100%
	Front Basher Body L	1	3	38	0.4	PLA	100%
	Front Basher Body L	1	2	20	0.8	PLA	100%
	Front Basher Body R	2	2	20	0.8	PLA	100%
Other Parts	Mid Basher Body	1	2	4	0.8	PLA	100%
	Mid Basher body & L-Clip	1	4	27	0.4	PLA	100%
	Wheels (4 pieces)	2	4	23	0.8	PLA	100%
	Wheel rod	2	0	22.5	0.8	PLA	100%
	Spacers	2	0	11.25	0.4	ABS	100%
	Wheel Sprocket	1	3	58	0.4	PLA	100%
Overall Total		25	81	620			
Total time			91	20			

## Wiring



- Soldering needed to be done to connect the motors and the VESC



- The middle of the base will hold:
  - 2- 12 Volt batteries will run the drive train of the Spyker Tank.
  - 1-12 Volt battery will control the servos.

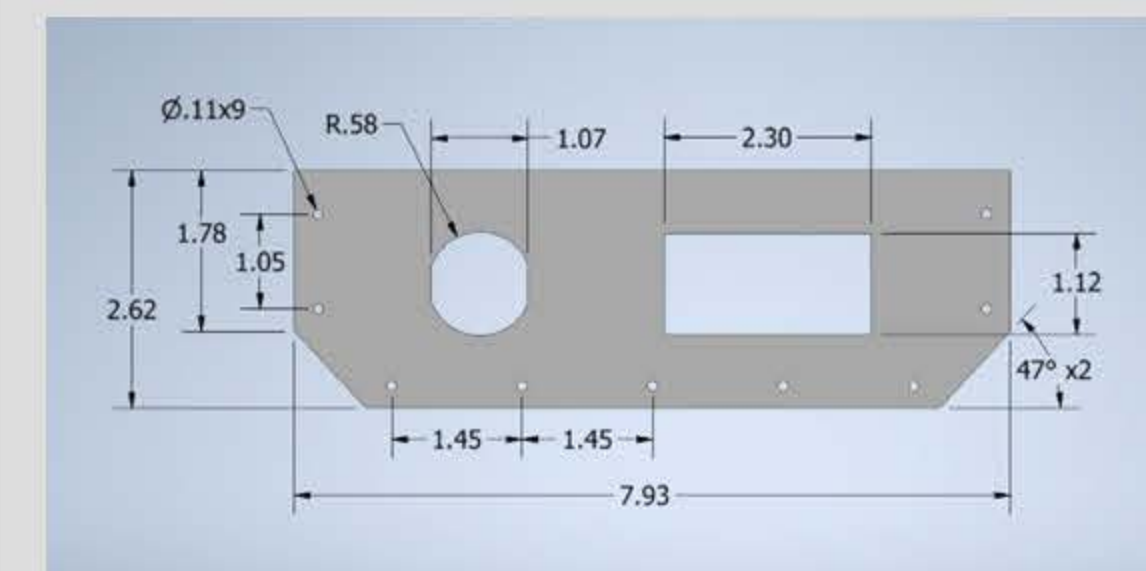


## Complications:

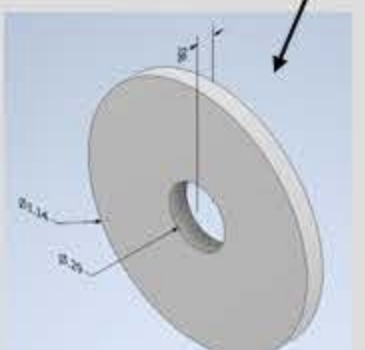
- The screws kept getting stripped and jammed into parts
- Needed to redrill the holes and ordering more durable screws
- 3-D printed parts broke and needed to be fixed/reprinted
- Chain drive – chain links broke during assembly
- Hex bar was a tight fit for majority of the parts
- Reforming a base part was needed as we did NOT have the files or know how to acquire them at the time.



## Redesigns:

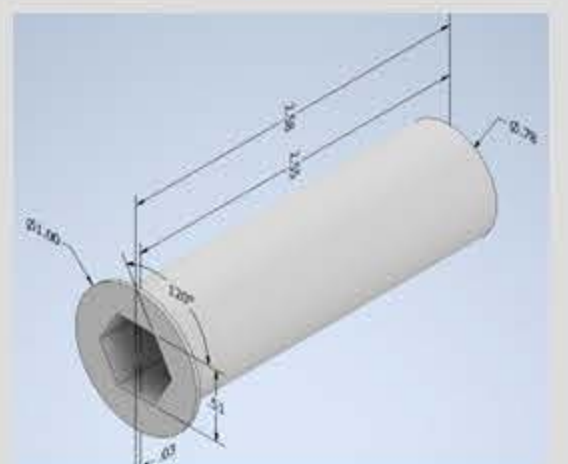


- Washers needed to be created due to the original design not fitting.



- Power Panel needed a bigger hole for the power knob
  - Redesigned overall specs.

- Original wheel rod(s) needed to be adjusted as the STL files purchased did not include the proper length.



## Final Notes/Summary:

- Make sure to ALWAYS wear personal protective equipment:
  - Glasses to protect from flying parts
  - Gloves for drilling
- Make sure to predrill and itemize parts, to ensure correct parts are used.
- You can purchase the complete kit on Spykerworkshop.com