RIGID3D ANKA

1/10 RC SHORT COURSE TRUCK

English

Version 1.0

CONTENTS

INTRODUCTION

Anka is a mostly 3d printed 1/10 RC Short Course Truck which is inspired and remixed from the excellent Tarmo4 project. (You may reach the Tarmo4 project's details from here.)

If you are a terrible driver like me, this hobby might become a bit expensive. Especially bashers may encounter lots of crashes and breakage which discourages the hobbyist. I wanted to design a basher which is mostly 3d printed so that I can drive it without worrying about crashes and breaks. I enjoy bashing more since I don't have to pay for the spares and wait for them to arrive.

The project is named Anka which is the Turkish equivalent of Phoenix from Greek or Simurgh from Persian mythology. After each crash broken parts are reprinted and the truck is reborn as does the immortal Anka which is reborn from its ashes.

In this model you can even print the shock absorbers and tires with TPU filament. But do not expect the performance of oil filled shocks or rubber tires from them.

Most of the parts may be printed with PLA and should work well with 2600KV motor and 2S LIPO battery. The material tested and recommended are shown in the file notes.

It can be printed on small printers. Each part can be fit in a 15x15x15cm (6"x6"x6") build volume.

The truck is designed in the Short Course Truck (SCT) class. It meets the width and wheelbase dimension specifications of ROAR 1/10 Short Course Truck class.

The steering system is designed according to Ackermann geometry.

3d printed open differentials are used on both front and rear differentials.

You may reach the parametric design files from github repository.

LICENSE

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LINKS

TARMO4 Project	https://www.reddit.com/r/EngineeringNS/
STL Files	https://www.printables.com/model/214280
GITHUB Repository (STL + Parametric Files)	https://github.com/mehmetsutas/Rigid3D-Anka-RC-Short-Course-Truck
Rigid3D Website (Turkish)	https://www.rigid3d.com
Anka Webpage (under development)	https://www.rigid3d.com/rigid3d-anka-rc-truck/

You may use EngineeringNS subreddit to discuss issues about ANKA along with TARMO4.

Class	1/10 Expert Short Course Truck 4x4
Length	NA (will be available after bumper designs)
Front Track	296mm (with 3d printed tires)
Rear Track	296mm (with 3d printed tires)
Center Ground Clearence	67mm (with 3d printed tires and shocks)
Weight	2.3kgs (without battery / with 3d printed tires and shocks)
Height	NA (depends on body)
Wheelbase	321mm
Tire Diameter / Width	107mm / 46mm
Wheel Diameter	Outer 56mm, Inner 76mm
Drive Ratio	Gearbox 2.625, Differential 2.5, Total 6,5625
Differential	Front & rear 3d printed open type
Drive	Shaft driven
Theoretical Steering Angle	Max. 30° (depends on the servo angle. 180° servo may steer upto around 27°)
Caster	15° Positive
Camber	Neutral
Toe	Front Zero, Rear 2.5° Toe-in
Battery Compartment Dim.	122x40x43mm
ESC Compartment Dim.	(122 – Motor Body Length)x40x43mm
Motor Mount	Suitable for Φ36mm brushless or 540/550 brushed motor (Max motor body length 78mm)
Recommended Motor	Brushless 2600KV or lower KV / Brushed 35T or higher turns
Servo Mount Dimensions	40x20mm servo, distance between mount holes 49x10mm

NEEDED TOOLS

- PH1 Screw Driver
- 5.5 and 7mm Wrench
- 2.5mm Allen Wrench (A short and a long one with ball head is recommended)
- 7mm Socket Wrench (for tightening wheel nuts)
- Drill & 2.5, 3, 4mm drill Bits
- M3 Tap (Optional. There are only a few screws that are directly screwed on plastic.)
- 200 grit sand paper (For cleaning the bearing fit surfaces)
- Hacksaw (for cutting 3mm rod to length)

CONSUMABLES

- PLA filament (more than 1 kg)
- PA12 filament (optional)
- TPU filament
- CA glue
- NLGI00 grade lithium grease[*]

(*) NLGI grade determines the viscosity of the grease. 00 grade is low viscous. While NLGI3 grease is like a soap, NLGI00 is like thin jam. It is mainly used in machines with automatic oil pumps for lubricating the linear rails, gears and bearings. It would be hard (at least in Turkey) to find it in small volumes. It is sold in barrels or buckets. But you can produce your own low viscosity grease by mixing a small amount NLGI 2-3 lithium grease with general purpose machine oil or engine oil. The thickness should be like jam. You can use the same mixture to lubricate the linear rails and linear bearings of the 3d printer.

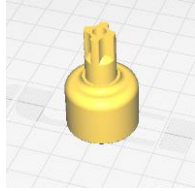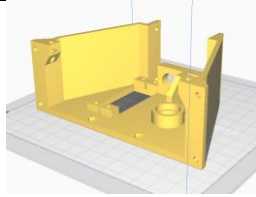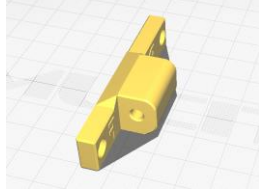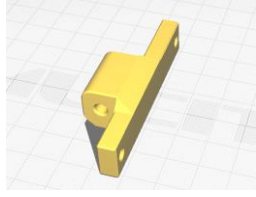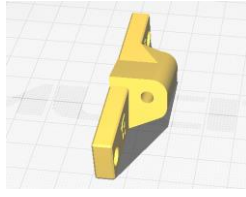| ITEM NO.	PART	SPECIFICATION	QTY
82	motor		1
102	servo		1
126	esc		1
4/15/37/62/83/117	6700 - 15x10x4 bearing		18
13	6802 - 15x24x5 bearing		4
	Φ3mm steele rod		1 meter
30	wheel-shaft-strength-bar	Φ3mm x 60mm	4
91	drive-shaft-strength-bar	Φ3mm x 160mm	1
2	planet-gear-pin	Φ3mm x 28mm	12
24	shock-pin	Φ3mm x 40mm	4
105	rod-ball / 8mm metal bead with 3mm hole		4
7/115	countersunk flat head cross recess screw_iso	M3 X 30	9
103	countersunk flat head cross recess screw_iso	M3 X 10	1
114	countersunk flat head cross recess screw_iso	M3 X 12	3
113	countersunk flat head cross recess screw_iso	M3 X 16	2
19/112	countersunk flat head cross recess screw_iso	M3 X 25	6
86/122	countersunk flat head cross recess screw_iso	M3 X 8	10
8/18/52/88/109/129	hex nut style 1 gradeab_iso	M3	69
57	hex nut style 1 gradeab_iso	M4	8
55/72	hex screw gradeab_iso	M4 X 30	4
48	pan head cross recess screw_iso	M4 X 16	8
43/79	pan head cross recess screw_iso	M4 X 35	4
58/78	pan head cross recess screw_iso_2	M4 X 45	8
10/42/75/96/107	plain washer normal grade a_iso	3	62
41/71	plain washer normal grade a_iso	4	29
20/94/108/127	socket head cap screw_iso	M3 X 10	23
54/74/89/97/123/130	socket head cap screw_iso	M3 X 12	22
28/51/76/99	socket head cap screw_iso	M3 X 16	17
45/77	socket head cap screw_iso	M3 X 25	6
44	socket head cap screw_iso	M3 X 30	2
87	socket set screw cup point_iso	M4 X 5	1
9/29/46/121	torque nut 08_iso	M3	31
47/73	torque nut 08_iso	M4	16

Use any 540/550 sized 35T or higher turn brushed motor or any 2600KV or lower KV Φ36mm inrunner brushless motor. (https://www.aliexpress.com/item/32964687978.html)
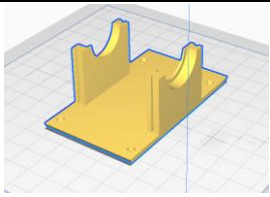
For rod balls, stainless steel beads for jewelry making may be used or the balls can be printed. STL for the rod balls can be found at extras folder. (https://www.aliexpress.com/item/33012805327.html)
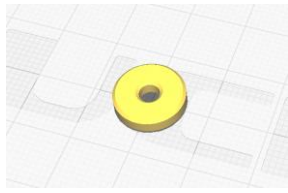
Links are given for information. Do not consider them as best option.
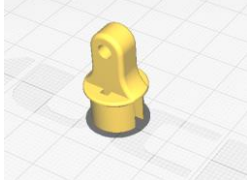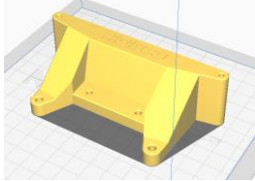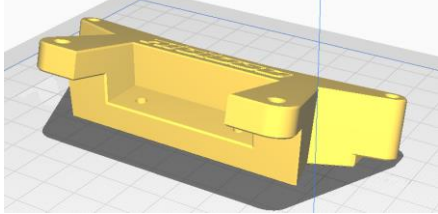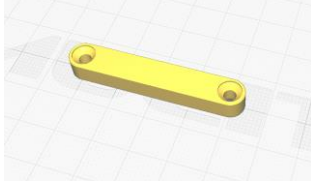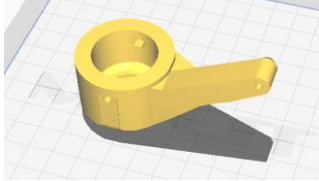
ITEM NO.	PART	QTY	LAYER HEIGHT	S	INFILL	WALL THICKNESS	MAT.	ORIENTATION
36/63	axle	4	0,2mm	N	10	3,2mm	PLA	
110	chassis-front	1	0,3mm	N	10	1,6mm	PLA	
93	chassis-middle	1	0,3mm	N	10	1,6mm	PLA	
60	control-arm-lower-BACK	2	0,2mm	N	10	3,2mm	PLA	
70	control-arm-lower-bracket-back-left	1	0,2mm	N	10	3,2mm	PLA (PA12)	
69	control-arm-lower-bracket-back-right	1	0,2mm	N	10	3,2mm	PLA (PA12)	
49	control-arm-lower-bracket-front-left	1	0,2mm	N	10	3,2mm	PLA (PA12)	
50	control-arm-lower-bracket-front-right	1	0,2mm	N	10	3,2mm	PLA (PA12)	

ITEM NO.	PART	QTY	LAYER HEIGHT	S	INFILL	WALL THICKNESS	MAT.	ORIENTATION
34	control-arm-lower-FRONT	2	0,2mm	N	10	3,2mm	PLA	
65	control-arm-upper-BACK	2	0,2mm	N	10	3,2mm	PLA (PA12)	
39	control-arm-upper-FRONT	2	0,2mm	N	10	3,2mm	PLA (PA12)	
128	cover-front	1	0,3mm	N	10	1,6mm	PLA	
131	cover-middle	1	0,3mm	Y	10	1,6mm	PLA	
1	differential-housing-a	2	0,2mm	N	10	3,2mm	PLA	
6	differential-housing-b	2	0,2mm	N	10	3,2mm	PLA	
11	differential-box	2	0,3mm	N	10	1,6mm	PLA	

ITEM NO.	PART	QTY	LAYER HEIGHT	S	INFILL	WALL THICKNESS	MAT.	ORIENTATION
14	differential-box-lid	2	0,3mm	N	10	1,6mm	PLA	
16	drive-pinion-gear	2	0,2mm	N	10	3,2mm	PLA	
90	drive-shaft	1	0,2mm	N	10	3,2mm	TPU	
80	gear-box	1	0,3mm	N	10	1,6mm	PLA	
81	gear-box-lid	1	0,3mm	N	10	1,6mm	PLA	
61	knuckle-rear	2	0,2mm	N	10	3,2mm	PLA	
100	lock-bar	1	0,2mm	N	10	1,6mm	PLA	
3	planet-gear	12	0,2mm	N	10	3,2mm	PLA	

ITEM NO.	PART	QTY	LAYER HEIGHT	S	INFILL	WALL THICKNESS	MAT.	ORIENTATION
25	rim	4	0,25mm	Y	10	1,6mm	PLA	
116	rod-ball-spacer	2	0,2mm	N	10	1,6mm	PLA	
111	servo-cover	1	0,3mm	N	10	1,6mm	PLA	
104	servo-saver	1	0,2mm	N	10	3,2mm	PLA	
119	servo-saver-SLAVE	1	0,2mm	N	10	3,2mm	PLA	
118	servo-saver-washer	1	0,2mm	N	10	1,6mm	PLA	
84	sg-16-1	1	0,2mm	N	10	3,2mm	PLA	
85	sg-42-1	1	0,2mm	N	10	3,2mm	PLA	

ITEM NO.	PART	QTY	LAYER HEIGHT	S	INFILL	WALL THICKNESS	MAT.	ORIENTATION
5	shaft-gear	4	0,2mm	N	10	3,2mm	PLA	
23	shock-eye-A	4	0,2mm	N	10	3,2mm	PLA	
22	shock-eye-B	4	0,2mm	N	10	3,2mm	PLA	
66	shock-tower-back	1	0,3mm	N	10	1,6mm	PLA	
53	shock-tower-front	1	0,3mm	Y	10	1,6mm	PLA	
120	steering-center-link	1	0,2mm	N	10	3,2mm	PLA	
33	steering-knuckle-bracket	4	0,2mm	N	10	3,2mm	PLA	
32	steering-knuckle-left	1	0,2mm	N	10	3,2mm	PLA	

| ITEM NO.	PART	QTY	LAYER HEIGHT	S	INFILL	WALL THICKNESS	MAT.	ORIENTATION
56	steering-knuckle-right	1	0,2mm	N	10	3,2mm	PLA	
106	steering-linkage(*)	2	0,2mm	N	10	3,2mm	PLA	
26	tire	4	0,25mm	N	10	1,6mm	TPU	
21	tpu-spring	4	0,2mm	N	10	1,6mm	TPU	
27	wheel-shaft	4	0,2mm	N	10	3,2mm	PLA	
17	wheel-shaft-housing	4	0,2mm	N	10	3,2mm	PLA	

S: Support Needed? Y=Yes / N=No

MAT.: Material

Although PLA is sufficient for most of the parts on normal operation of the car. It is seen that some parts tend to break more frequently on crashes. It is recommended to print these parts with a nylon blend such as PA12. PA12 is shown in parenthesis as material for these parts.

(*) Print steering linkage in 2 pieces by lowering the model 2.5mm in Z direction into the print bed. Combine 2 halves by screws and nuts after placing the rod balls on the recesses.
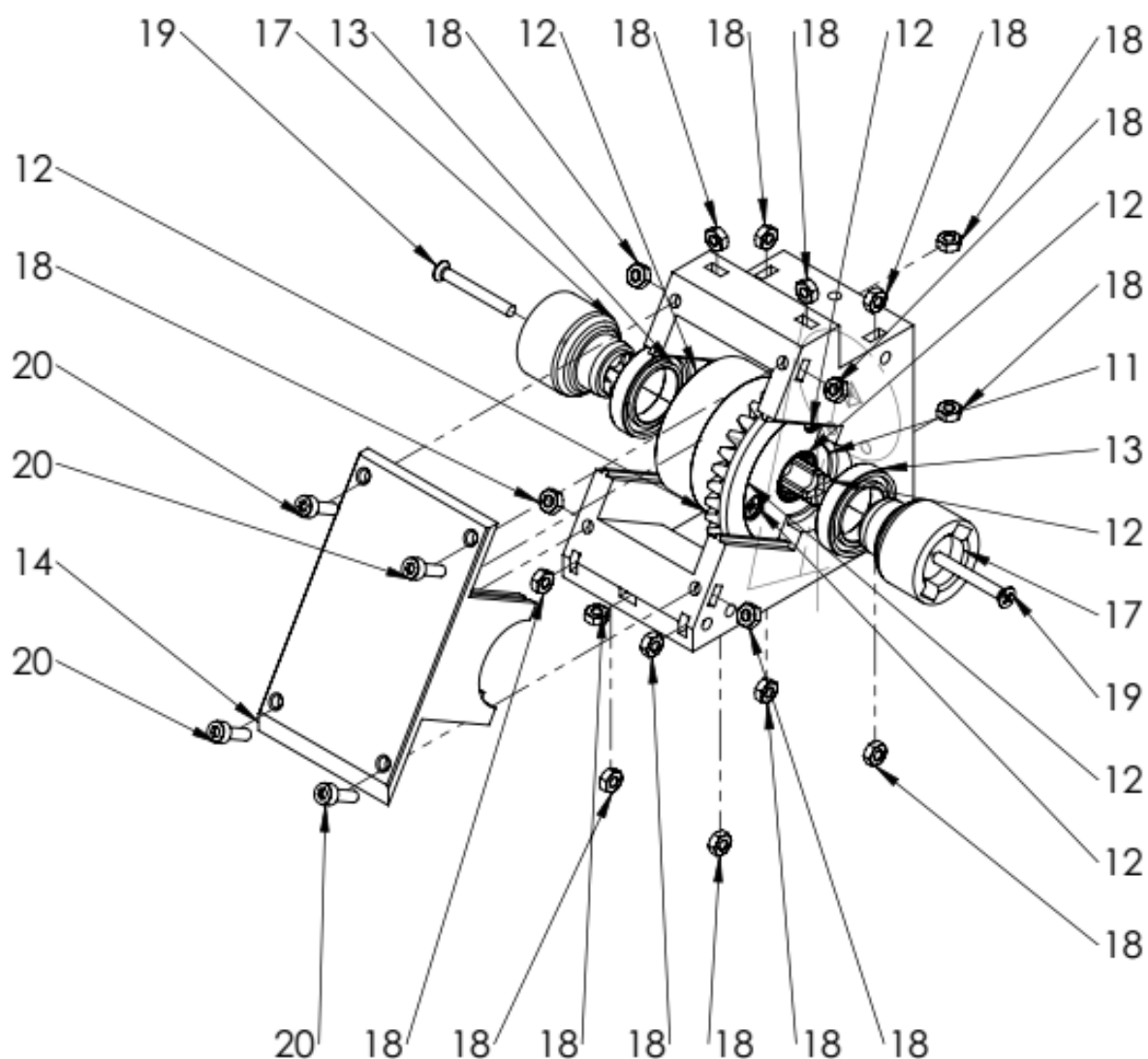
DIFFERENTIAL INNER ASSY
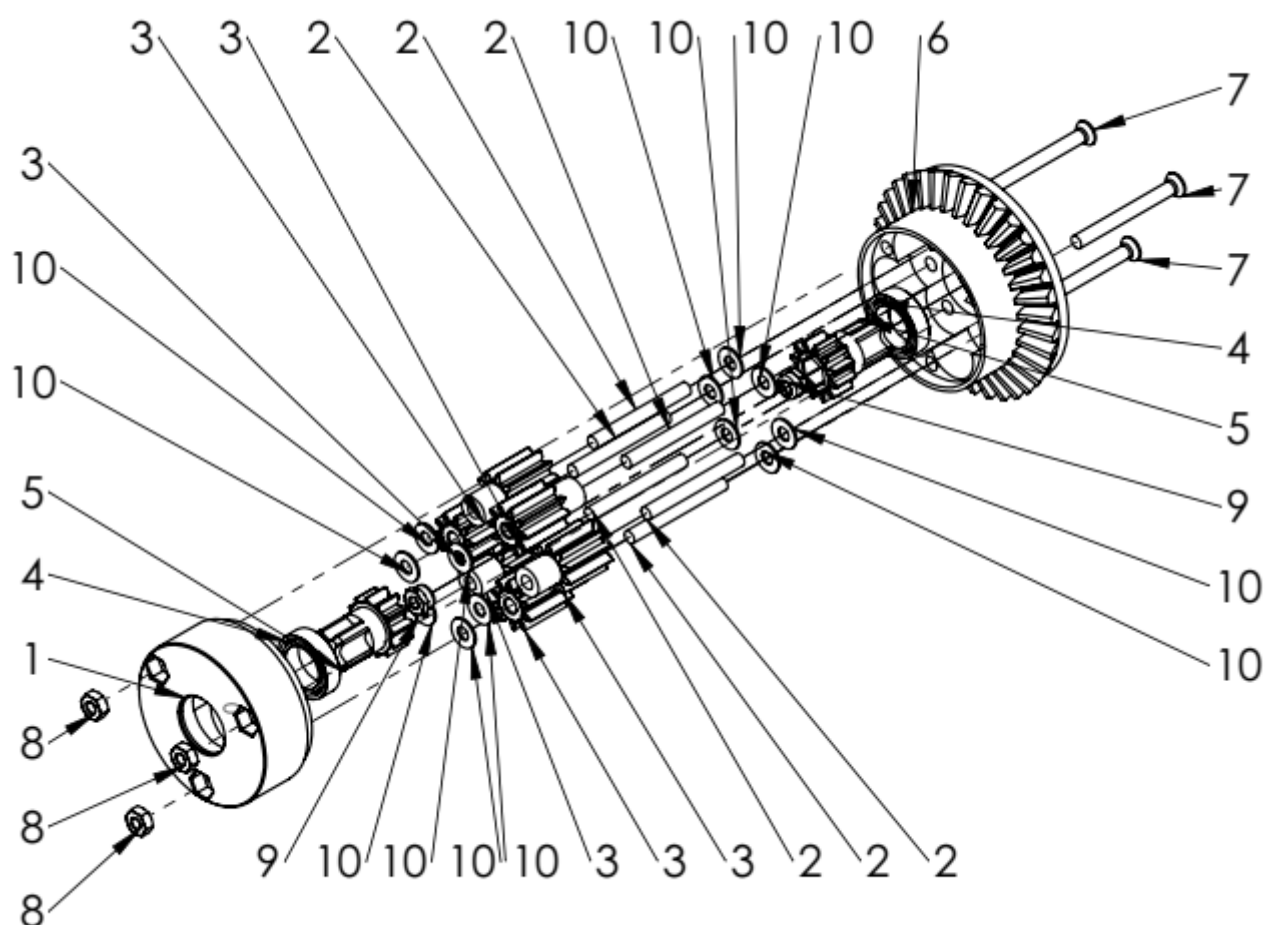
ITEM NO.	PART	SPECIFICATION	QTY.
1	dıfferentıal-housıng-a		1
2	planet-gear-pın	Φ3mm x 28mm	6
3	planet-gear		6
4	6700 - 15x10x4 bearıng		2
5	shaft-gear		2
6	dıfferentıal-housıng-b		1
7	countersunk flat head cross recess screw_ıso	M3 X 30	3
8	hex nut style 1 gradeab_ıso	M3	3
9	torque nut 08_ıso	M3	2
10	plain washer normal grade a_ıso	3	12

Note:

Fill the housing with NLGI00 grade grease.

ITEM NO.	PART	SPECIFICATION	QTY.
11	differential-box		1
12	differential-inner-assy		1
13	radial ball bearing_68_iso	15X24X5MM 6802	2
14	differential-box-lid		1
15	6700 - 15x10x4 Bearing		1
16	drive-pinion-gear		1
17	wheel-shaft-housing		2
18	hex nut style 1 gradeab_iso	M3	19
19	countersunk flat head cross recess screw_iso	M3 X 25	2
20	socket head cap screw_iso	M3 X 10	4

Note:

Apply NLGI00 grade grease on the bevel gears.
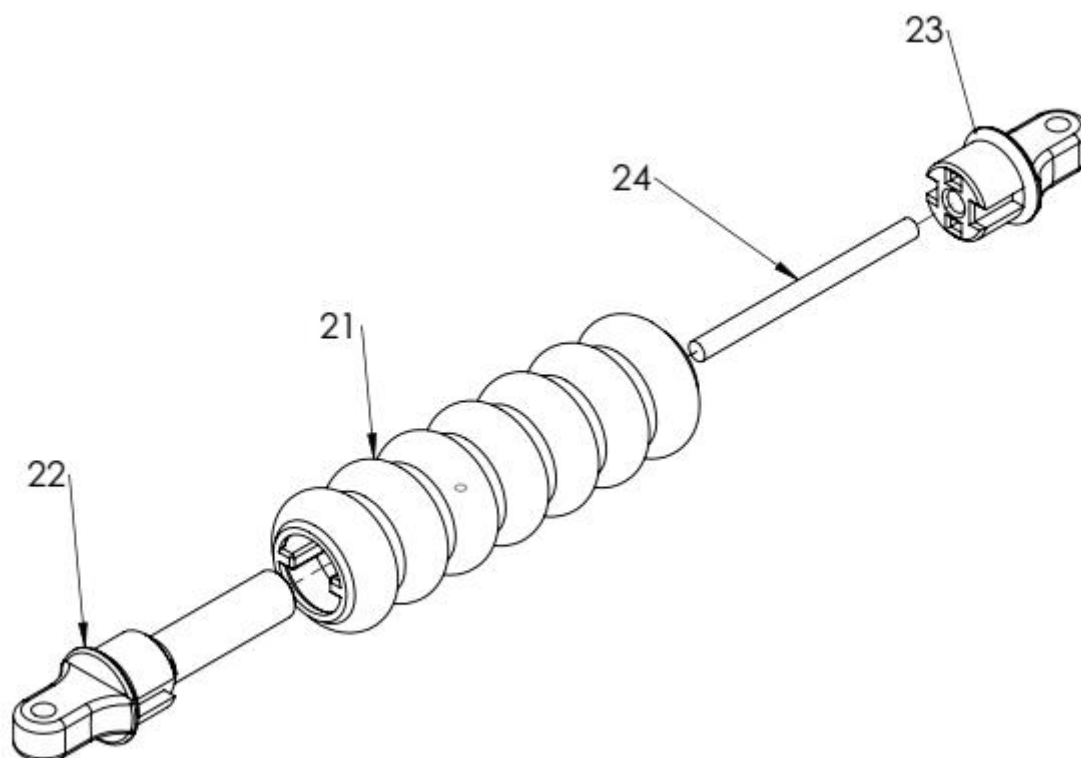
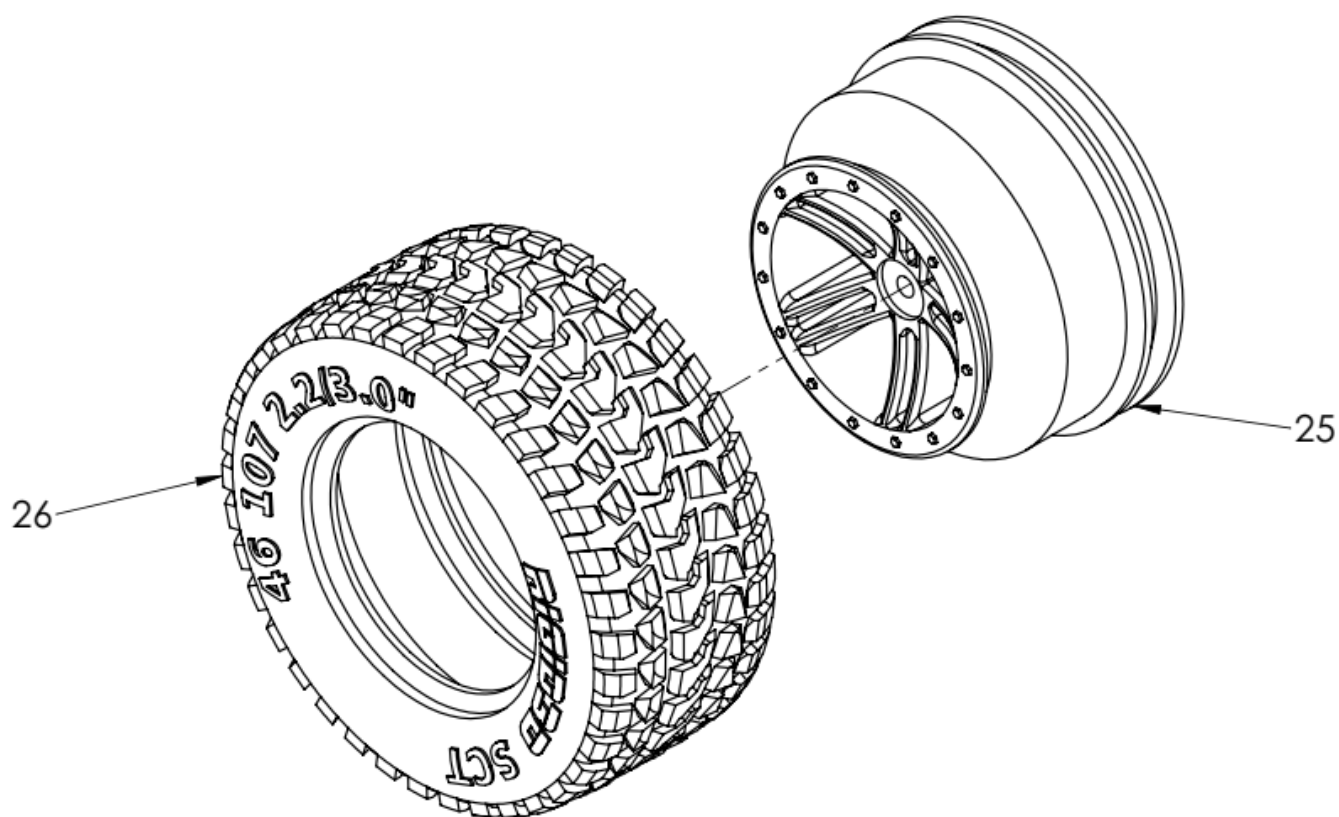| ITEM NO.	PART	SPECIFICATION	QTY.
21	tpu-spring		1
22	shock-eye	B	1
23	shock-eye	A	1
24	shock-pin	Φ3mm x 40mm	1

Note:

Glue the parts. Pin to shock-eye-A. Shock eyes to tpu-spring.

ITEM NO.	PART	SPECIFICATION	QTY.
25	rim		1
26	tire		1

Notes:

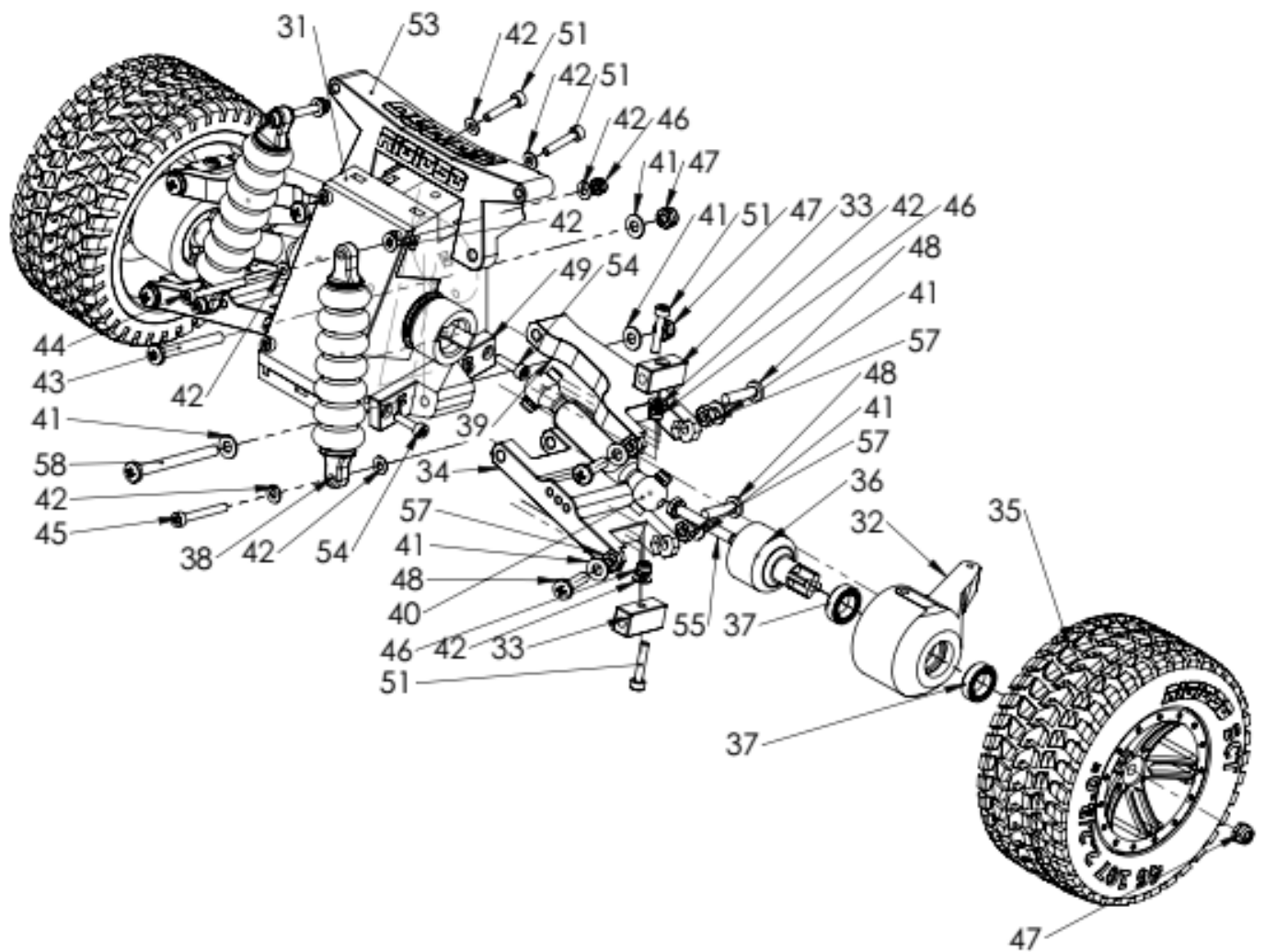Rim and tire fit very tightly and it requires a lot of force to assemble them together. You may try stepping on the sides of the tire to slide them onto the rim.

WHEEL SHAFT ASSY
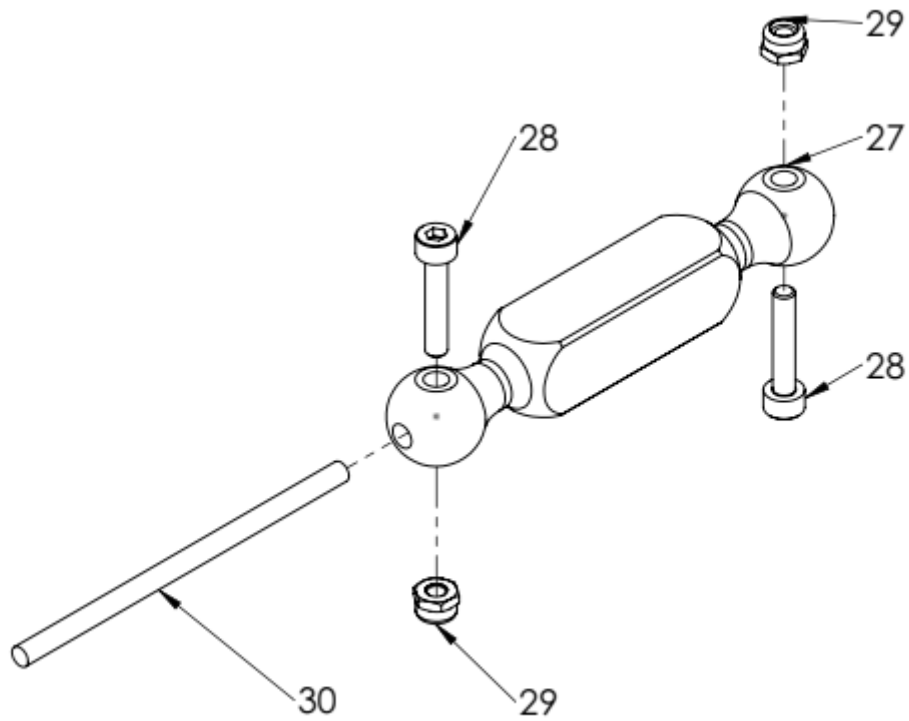
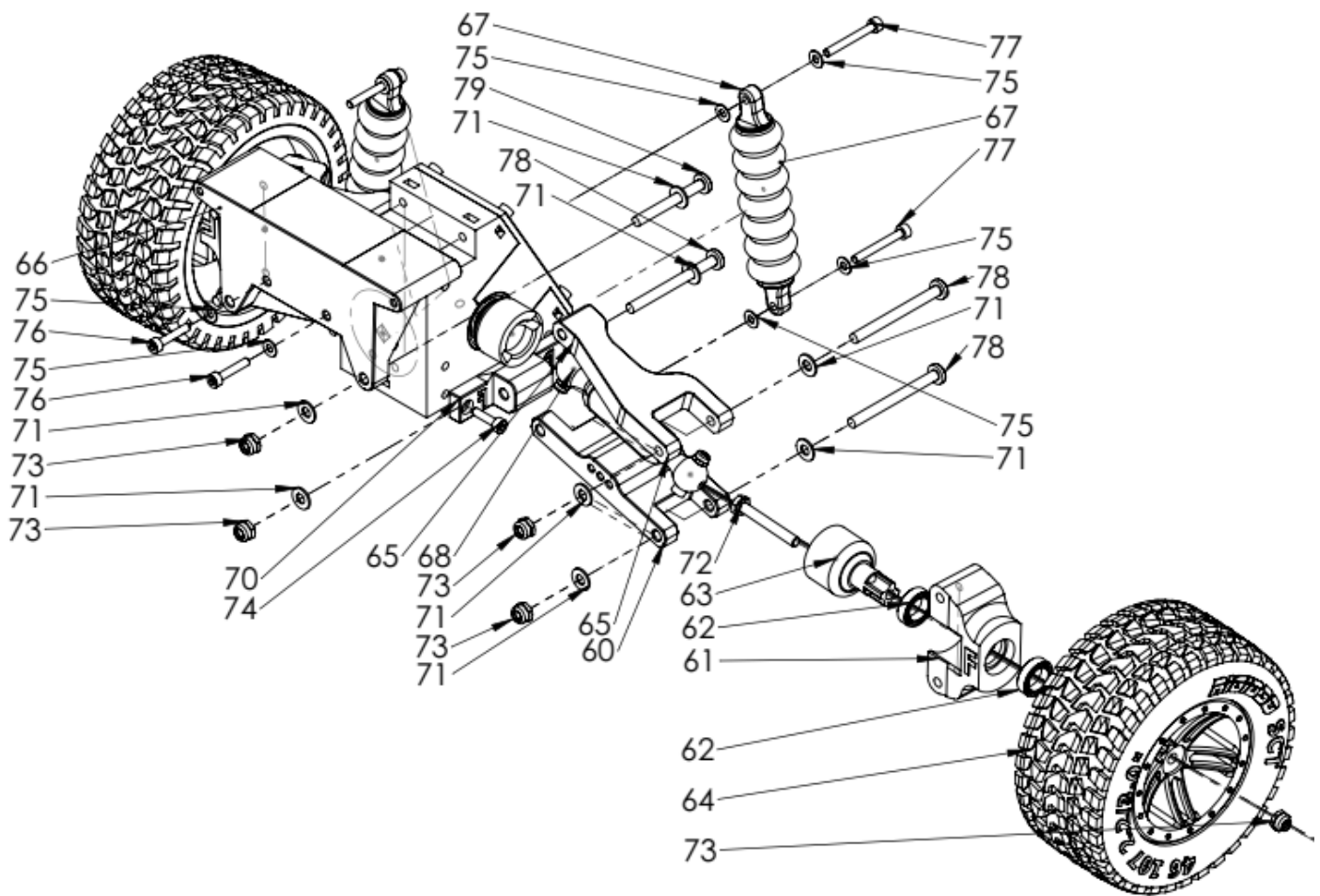| ITEM NO.	PART	SPECIFICATION	QTY.
27	wheel-shaft		1
28	socket head cap screw_iso	M3 X 16	2
29	torque nut 08_iso	M3	2
30	wheel-shaft-strength-bar	Φ3mm x 60mm	1

Notes:

- Only one side is exploded for constraining the sketch size.
- For ease of work, assemble the tires in the last step. Do not install them at this stage of the assembly.

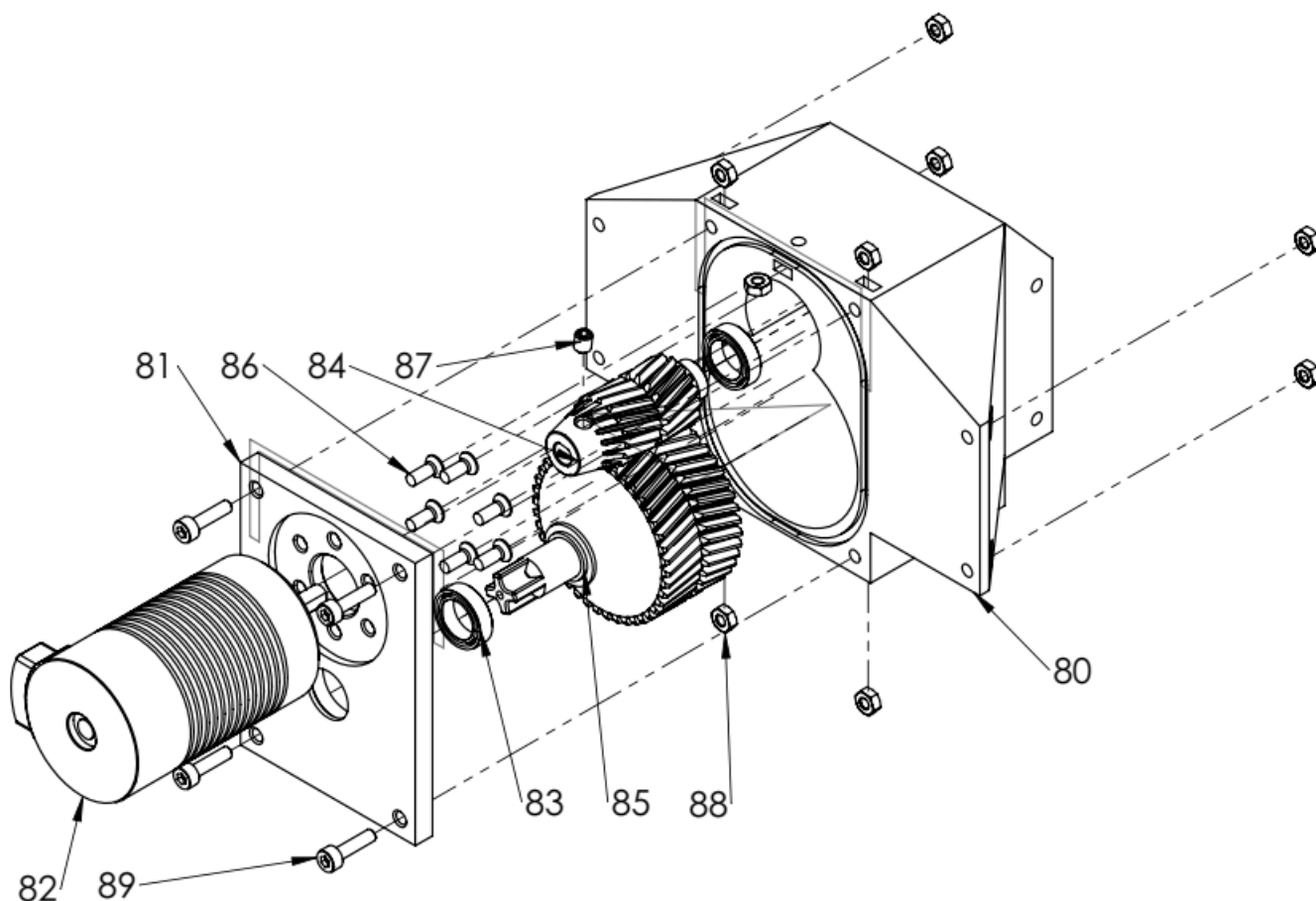| ITEM NO.	PART	SPECIFICATION	QTY.
31	differential-assy		1
32	steering-knuckle-left		1
33	steering-knuckle-bracket		4
34	control-arm-lower-FRONT	FRONT	2
35	wheel-assy		2
36	axle		2
37	6700 - 15x10x4 Bearing		4
38	shock-assy-V2		2
39	control-arm-upper-FRONT	FRONT	2
40	wheel-shaft-assy		2
41	plain washer normal grade a_iso	4	13
42	plain washer normal grade a_iso	3	17
43	pan head cross recess screw_iso	M4 X 35	2
44	socket head cap screw_iso	M3 X 30	2
45	socket head cap screw_iso	M3 X 25	2
46	torque nut 08_iso	M3	6
47	torque nut 08_iso	M4	6
48	pan head cross recess screw_iso	M4 X 16	8
49	control-arm-lower-bracket-front-left		1
50	control-arm-lower-bracket-front-right		1
51	socket head cap screw_iso	M3 X 16	6
52	hex nut style 1 gradeab_iso	M3	2
53	shock-tower-front		1
54	socket head cap screw_iso	M3 X 12	4
55	hex screw gradeab_iso	M4 X 30	2
56	steering-knuckle-right		1
57	hex nut style 1 gradeab_iso	M4	8
58	pan head cross recess screw_iso_2	M4 X 45	2

Notes:

- Only one side is exploded for constraining the sketch size.
- For ease of work, assemble the tires in the last step. Do not install them at this stage of the assembly.

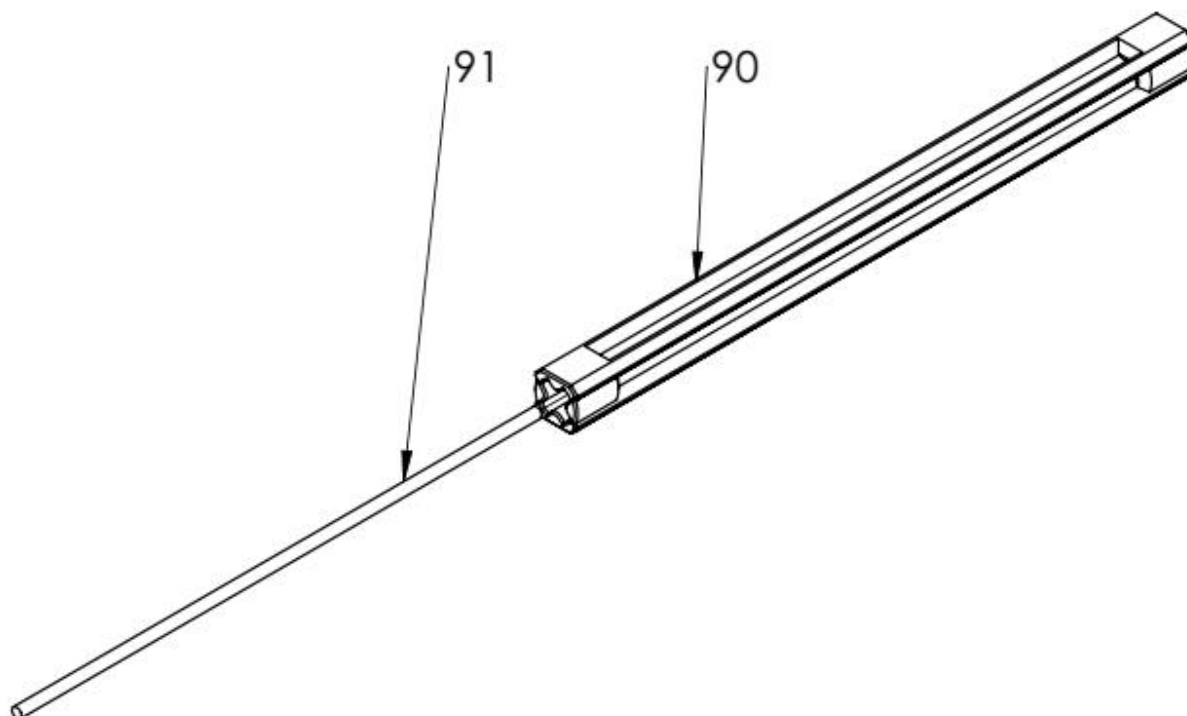| ITEM NO.	PART	SPECIFICATION	QTY.
59	differential-assy		1
60	control-arm-lower-BACK	BACK	2
61	knuckle-rear		2
62	6700 - 15x10x4 Bearing		4
63	axle		2
64	wheel-assy		2
65	control-arm-upper-BACK	BACK	2
66	shock-tower-back		1
67	shock-assy-V2		2
68	wheel-shaft-assy		2
69	control-arm-lower-bracket-back-right		1
70	control-arm-lower-bracket-back-left		1
71	plain washer normal grade a_iso	4	16
72	hex screw gradeab_iso	M4 X 30	2
73	torque nut 08_iso	M4	10
74	socket head cap screw_iso	M3 X 12	4
75	plain washer normal grade a_iso	3	10
76	socket head cap screw_iso	M3 X 16	2
77	socket head cap screw_iso	M3 X 25	4
78	pan head cross recess screw_iso_2	M4 X 45	6
79	pan head cross recess screw_iso_2	M4 X 35	2

GEAR BOX ASSY

ITEM NO.	PART	SPECIFICATION	QTY.
80	gear-box		1
81	gear-box-lid		1
82	motor		1
83	6700 - 15x10x4 Bearing		2
84	sg-16-1	16T-M1	1
85	sg-42-1	42T-M1	1
86	countersunk flat head cross recess screw_iso	M3 X 8	6
87	socket set screw cup point_iso	M4 X 5	1
88	hex nut style 1 gradeab_iso	M3	9
89	socket head cap screw_iso	M3 X 12	4

Note:

Apply NLGI00 grade grease on the gears.

ITEM NO.	PART	SPECIFICATION	QTY.
90	drive-shaft		1
91	drive-shaft-strength-bar	Φ3mm x 160mm	1
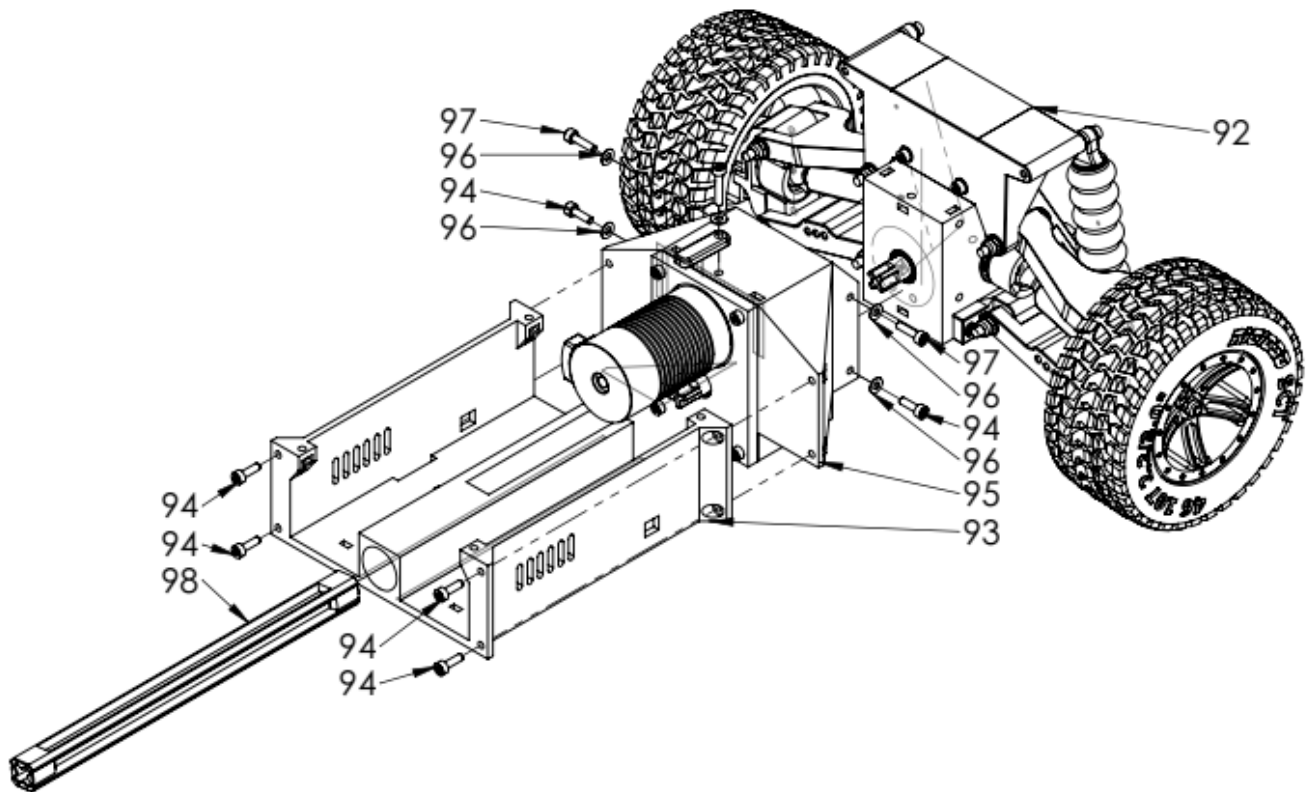
ITEM NO.	PART	SPECIFICATION	QTY.
92	back-assy		1
93	chassis-middle		1
94	socket head cap screw_iso	M3 X 10	6
95	gear-box-assy		1
96	plain washer normal grade a_iso	3	5
97	socket head cap screw_iso	M3 X 12	2
98	drive-shaft-assy		1
99	socket head cap screw_iso	M3 X 16	1
100	lock-bar		1
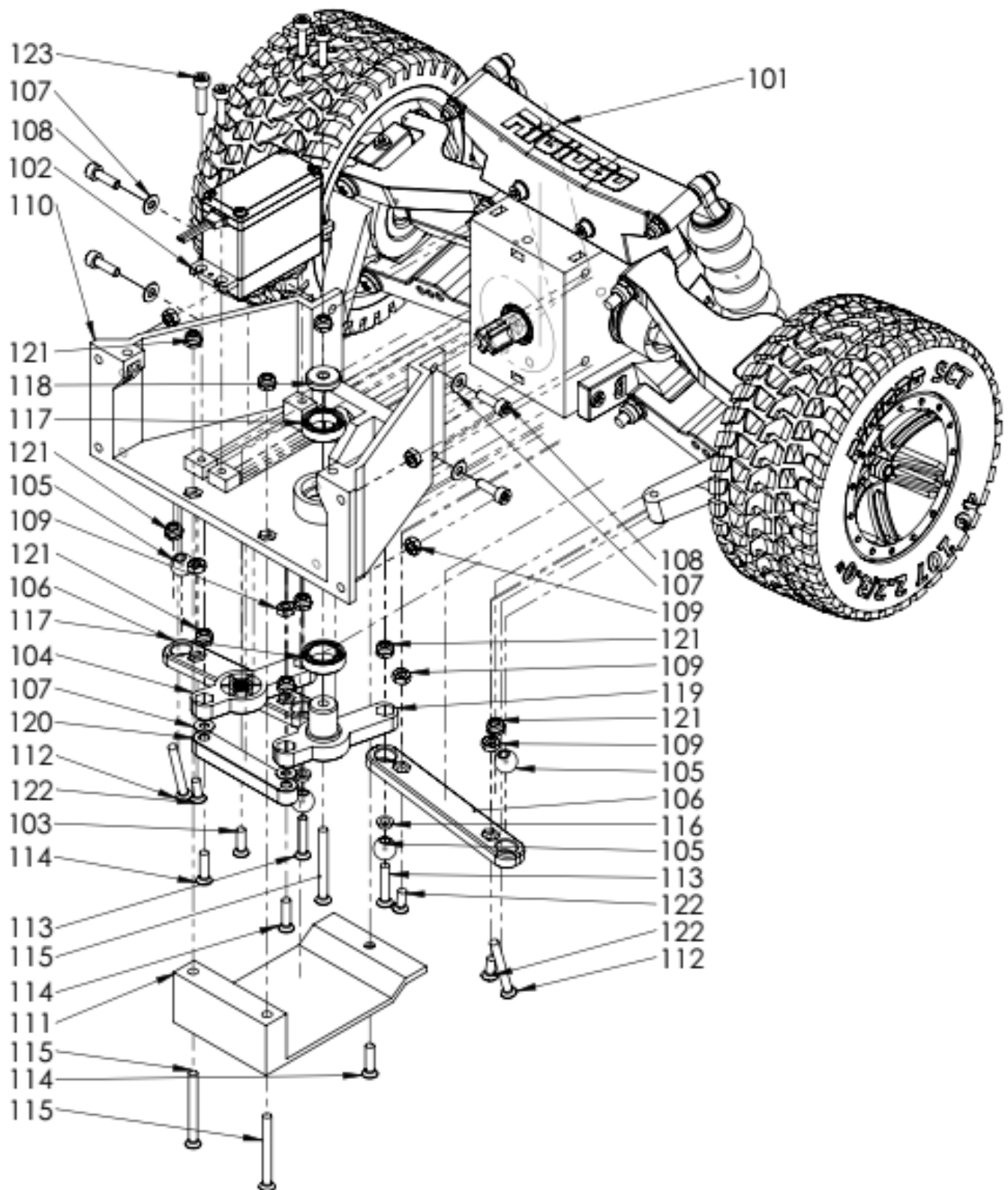
ITEM NO.	PART	SPECIFICATION	QTY.
101	front-assy		1
102	servo		1
103	countersunk flat head cross recess screw_iso	M3 X 10	1
104	servo-saver		1
105	rod-ball		4
106	steering-linkage		2
107	plain washer normal grade a_iso	3	6
108	socket head cap screw_iso	M3 X 10	4
109	hex nut style 1 gradeab_iso	M3	8
110	chassis-front		1
111	servo-cover		1
112	countersunk flat head cross recess screw_iso	M3 X 25	2
113	countersunk flat head cross recess screw_iso	M3 X 16	2
114	countersunk flat head cross recess screw_iso	M3 X 12	3
115	countersunk flat head cross recess screw_iso	M3 X 30	3
116	rod-ball-spacer		2
117	6700 - 15x10x4 Bearing		2
118	servo-saver-washer		1
119	servo-saver-SLAVE	SLAVE	1
120	steering-center-link		1
121	torque nut 08_iso	M3	13
122	countersunk flat head cross recess screw_iso	M3 X 8	4
123	socket head cap screw_iso	M3 X 12	4
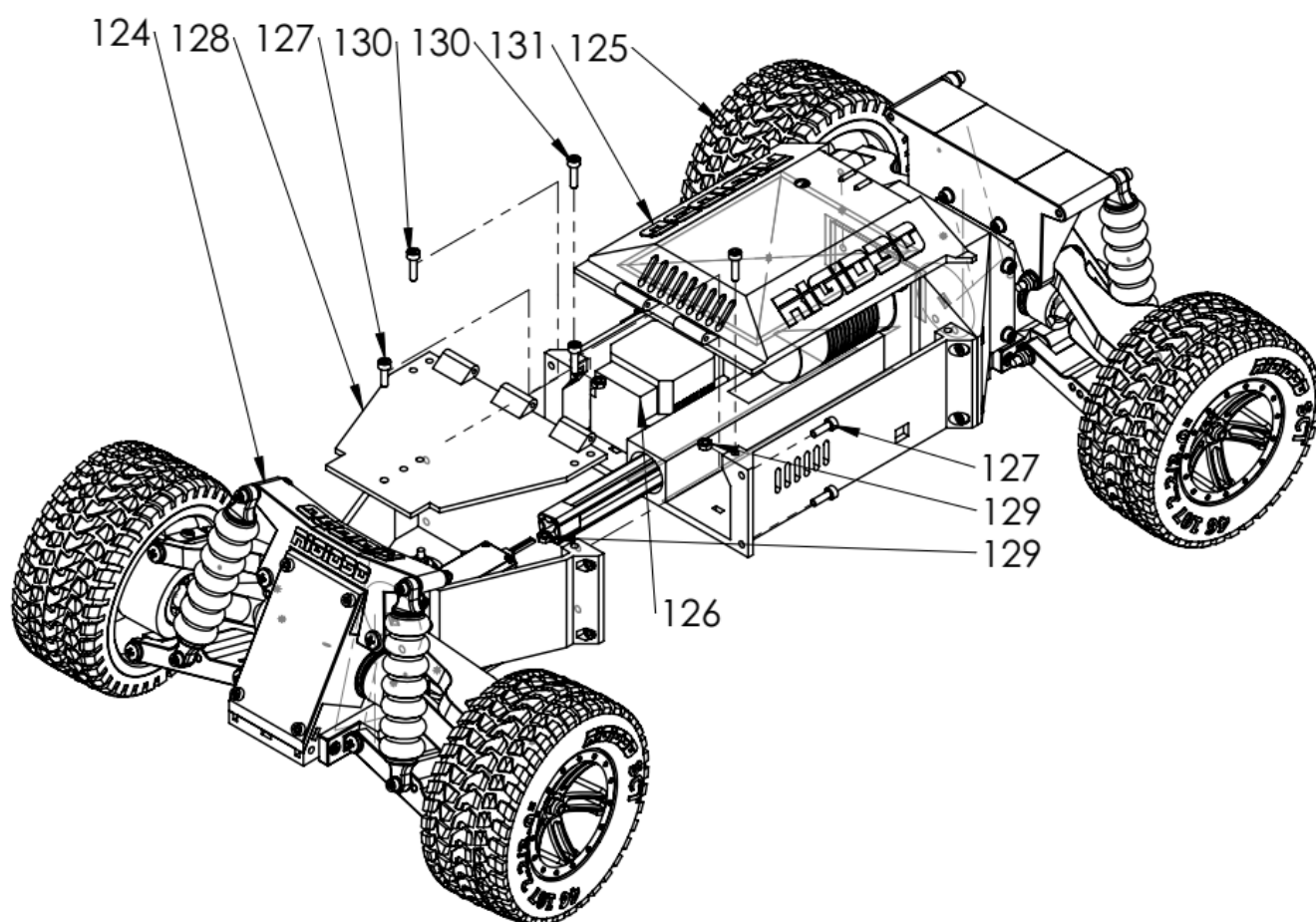
ITEM NO.	PART	SPECIFICATION	QTY.
124	rigid3d-sct-front-assy		1
125	rigid3d-sct-back-assy		1
126	esc		1
127	socket head cap screw_iso	M3 X 10	5
128	cover-front		1
129	hex nut style 1 gradeab_iso	M3	6
130	socket head cap screw_iso	M3 X 12	4
131	cover-middle		1

Note:

Middle cover is hinged. Use a piece of 1.75mm filament as hinge pin.