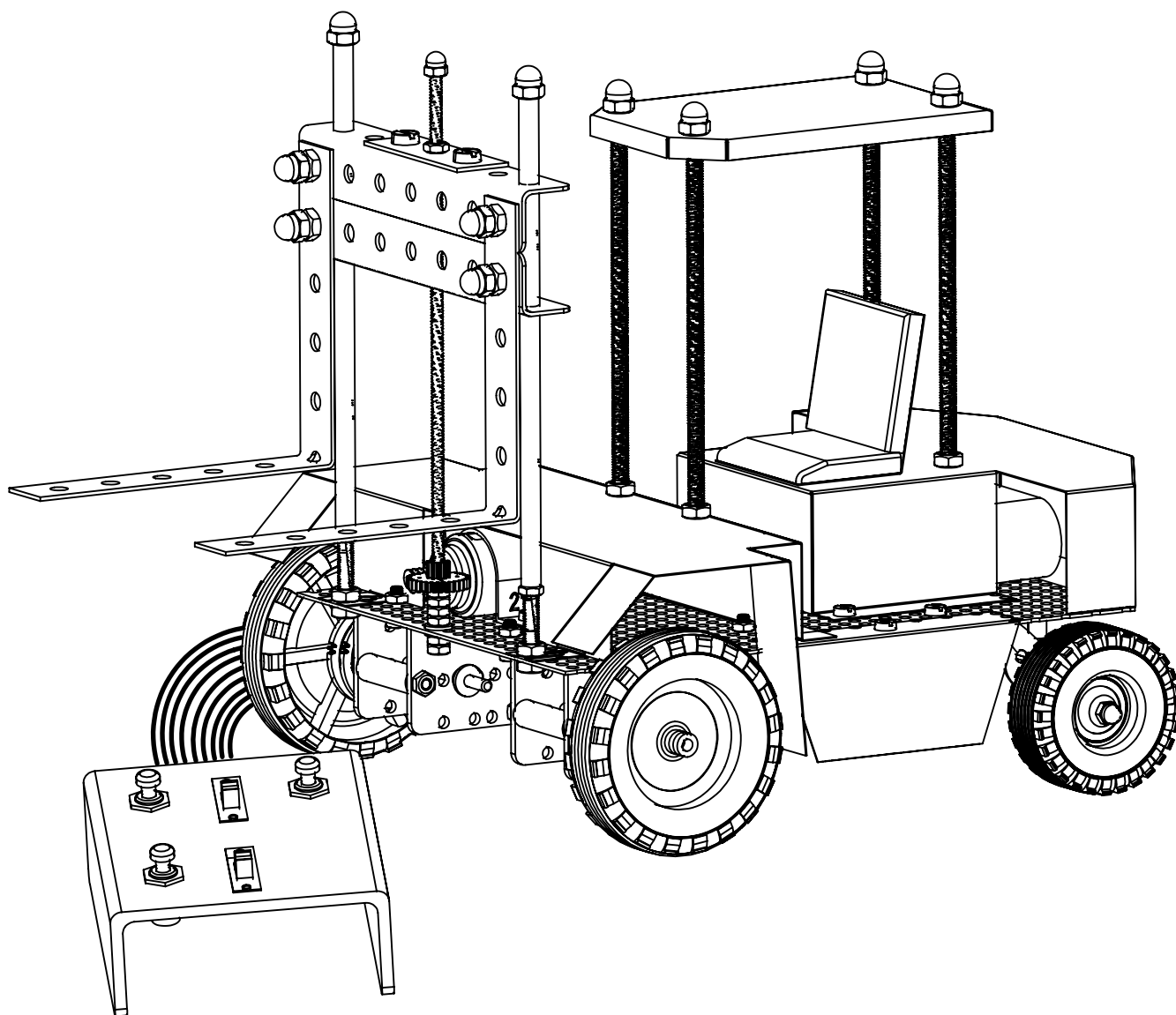


OPITEC

Fork lift truck “MANITOU”

101.200



Please Note

The OPITEC range of projects is not intended as play toys for young children. They are teaching aids for young people learning the skills of Craft, Design and Technology. These projects should only be undertaken and tested with the guidance of a fully qualified adult.

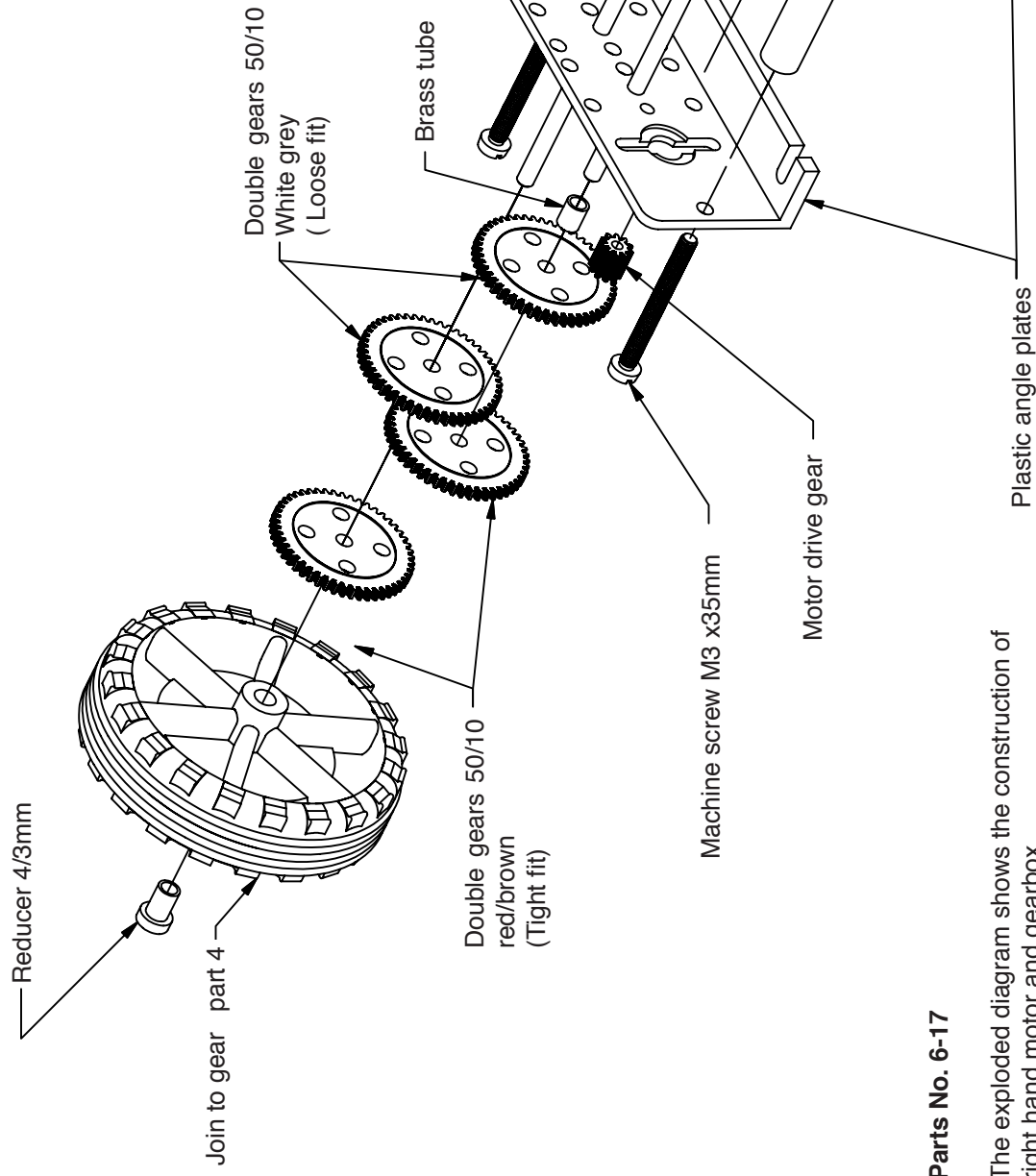
The finished projects are not suitable to give to children under 3 years old. Some parts can be swallowed. Danger of suffocation!

Parts list

It is recommended that you sort through and identify the various parts before starting this project.
Please remove any 'burr' from the metal parts with a file or emery cloth before assembly!

	Quantity	Description	PartNo	Material	Size
Chassis	1	Chassis/base	1	Holed metal	130 x 166mm
	2	Rear axle bearing	2	Holed metal strip	15 x 60 (4 holes)
	2	Steering rods	3	Welding rod	1mm x 100mm
	2	Wheels (large)	4	Plastic	55mm dia
	3	Wheels (small)	5	Plastic	43mm dia
Drive system	2	Motor R 20	6	Metal	21mm dia
	2	Motor drive gear	7	Plastic	
	2	Angle plates	8	Plastic	
	4	Distance rollers	9	Plastic	25mm dia
	4	Machine screws	10	Steel	M3 x 35mm
	4	Nuts	11	Steel	M3
	4	Metal axles	12	Steel	3mm x 70mm
	4	Double gears 50/10	13	Plastic Red/brown (tight)	
	4	Double gears	14	Plastic White grey (loose)	
	4	Tube spacers	15	Brass	
	2	Distance washers	16	Plastic red or white	
	2	Reducers 4/3mm	17	Plastic	
	2	Fork guides	18	Threaded steel rod	M4 x 150mm
	1	Hub rod	19	Threaded steel rod	M4 x 150mm
	2	Fork holder	20	Steel holed strip	5x15 x 105mm (7 holes)
Lift mechanism	1	Fork coupling	21	Steel holed strip	1x45 (3holes)
	2	Forks	22	Steel holed strip	1x15x250mm
	1	Fork drive	23	Plastic double gear 30/10 Red/brown	
	1	Motor R20	24	Metal	
	1	Motor fixing	25	Steel	
	1	Drive worm gear	26	Plastic	
	2	Brass tubes	27	Tube 5mm dia x 250	
	14	Machine screws	28	Steel	M3x 8mm
	2	Machine screws	29	Steel	M3 x 25mm
Construction material	6	Washers	30	Steel	M3
	27	Nuts	31	Steel	M3
	3	Domed nuts	32	Steel	M3
	6	Machine screw	33	Steel	M4 x 8mm
	24	Nuts	34	Steel	M4
	10	Domed nut	35	Steel	M4
	1	Steering joiner	36	Connecting block, cut off	
	2	Battery and seat fixing	37	Sticky pads	
	1	Seat squab	38	Hard foam or similar	
	1	Motor cover	39	Cut from sheet metal	200x155mm
	2	Side panels	40	0,29 x 200 x200	70 x 45mm
Panels	1	Wheel cover	41	Cut from sheet metal	170x132mm
	1	Roof	42	0,29x300x150mm	100x70mm
	1	Seat	43		70x40mm
	4	Roof support	44	Steel/Threaded rod	M4 x 100mm
Electrical parts	2	Flat connectors	45	Metal	6,3mm
	4	Self tappers	46	Steel	2,9x9,mm
	1	Hand control housing	47	Polystyrol	3 x80x130mm
	1	Press switch	48	Connector	
	2	Slide switches	49	2 xUM	
	2	Cable joiner	50	Connecting block (to be cut)	
	1	Flat cable	51a		
	1	Round cable	51b		

Drive system



Parts No. 6-17

The exploded diagram shows the construction of right hand motor and gearbox.

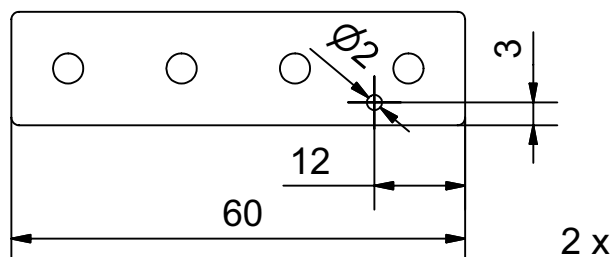
The left hand motor and gearbox is assembled the same way in the mirror image.

Chassis

Part Nr: 2

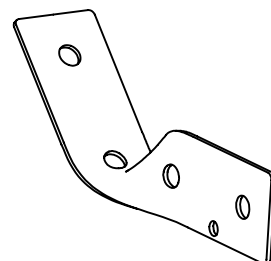
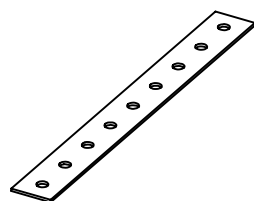
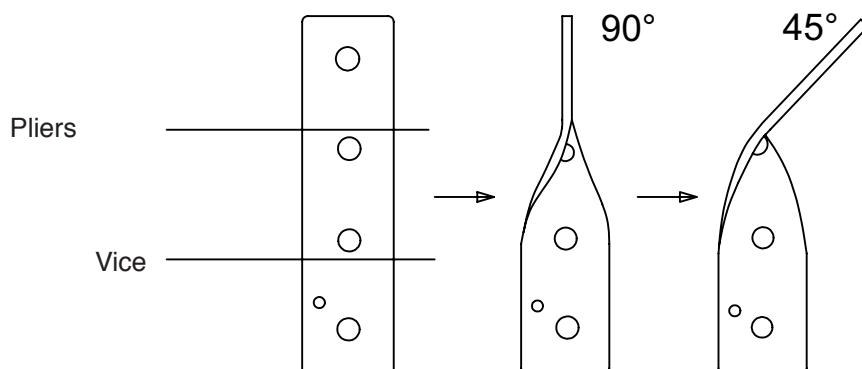
Cut two holed metal strips to 60mm long, and round the sharp corners with a file.

Mark out and drill the 2 diameter in the holed metal strip



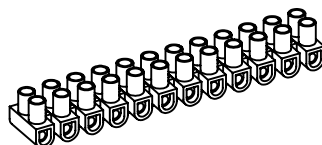
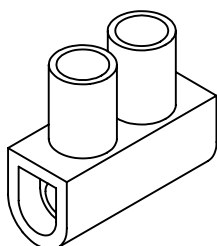
Hold the holed metal strip up to the bottom line in a vice (See diagram)

And twist the top half (Upper line) with a pair of pliers, firstly turn it through 90 degrees and finally bend it across at 45 degrees



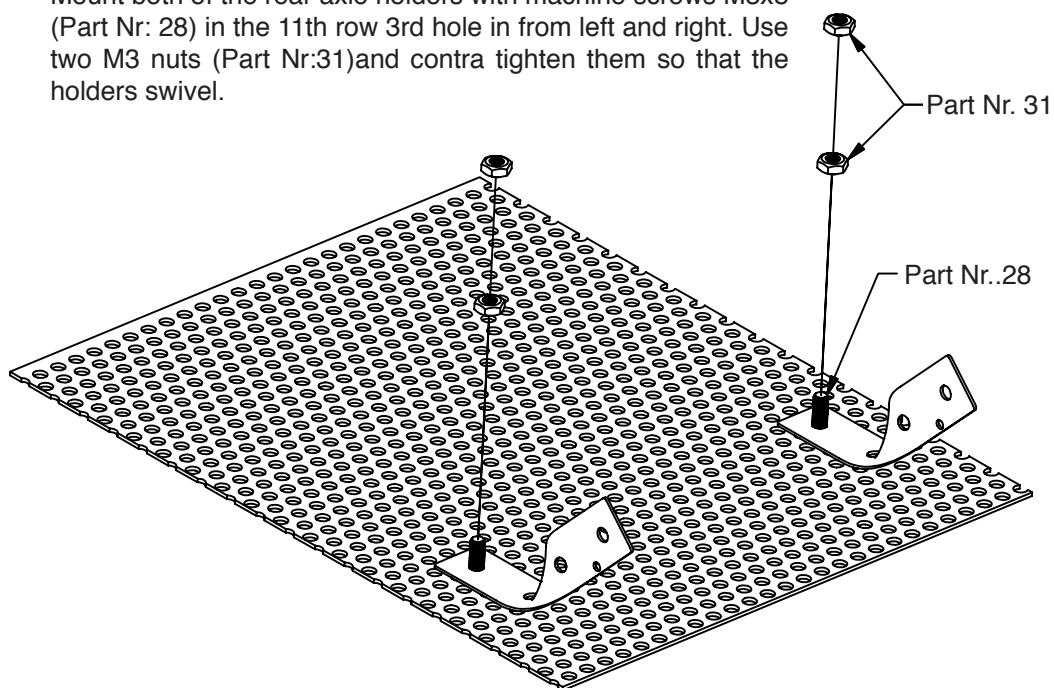
Part No: 36

Cut off one section from the row of connectors



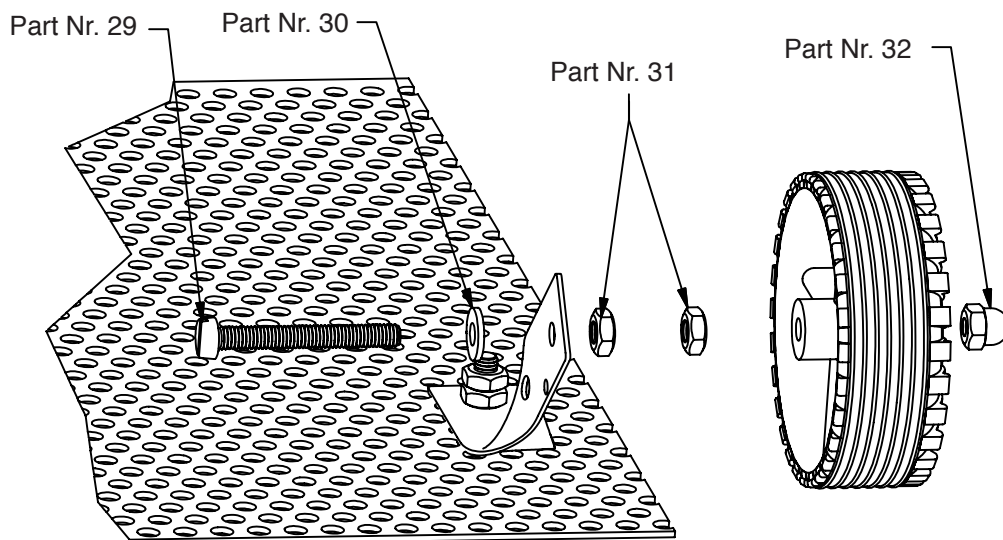
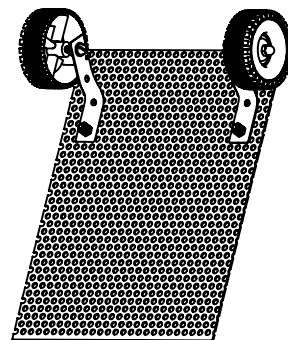
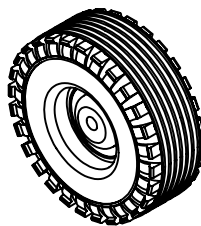
Part Nr.2

Mount both of the rear axle holders with machine screws M3x8 (Part Nr: 28) in the 11th row 3rd hole in from left and right. Use two M3 nuts (Part Nr:31) and contra tighten them so that the holders swivel.



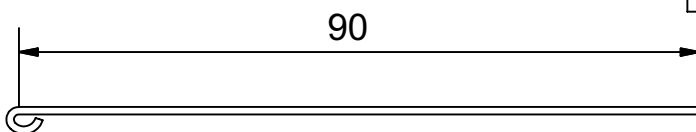
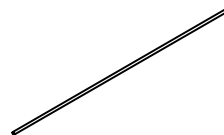
Part Nr: 5

To fit the two small wheels as shown
Insert the machine screw M3 x25 (Part Nr: 29) and washer (Part Nr: 30) from the inside through the axle holder. Contra tighten with two nuts (Part Nr:31) and finally fix the wheel with a domed nut (Part Nr:32)



Part Nr:3

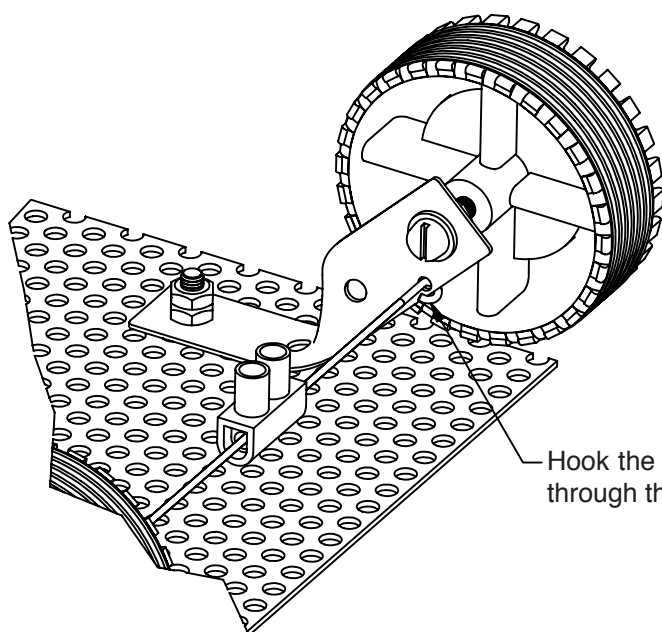
Form an eye in one end on the ends of the welding rod as shown.



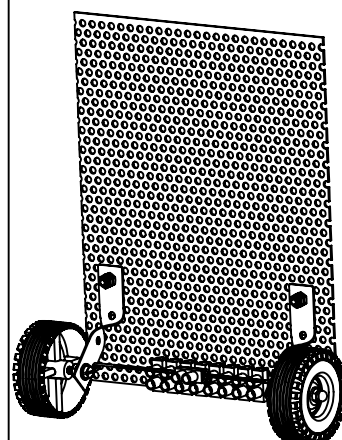
Join both welding rods together in a connector block (lightly tighten)

Hook the eye at the end of rod through the 2mm dia hole in the axle holder. Tighten the loop afterwards with a pair of pliers so that it cannot spring out.

The tracking can be adjusted later when both sets of wheels are in position.

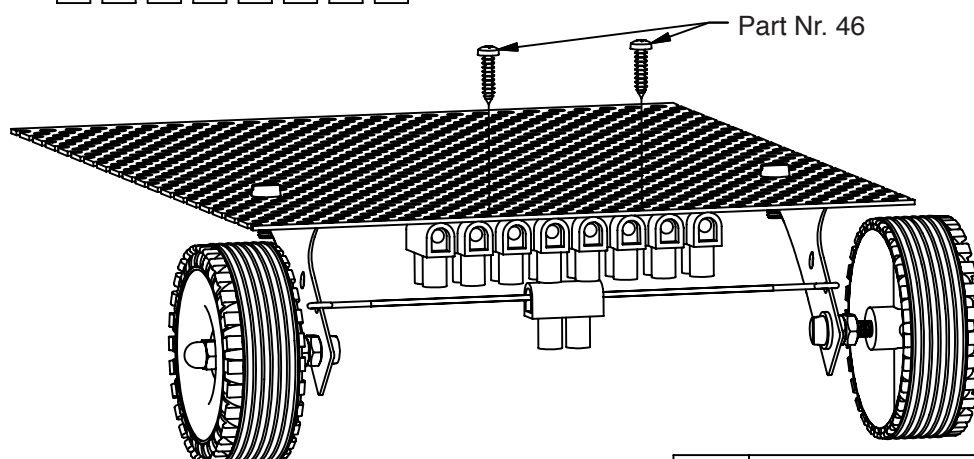
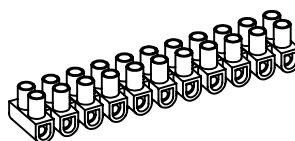


Hook the eye in the welding rod through the hole and tighten



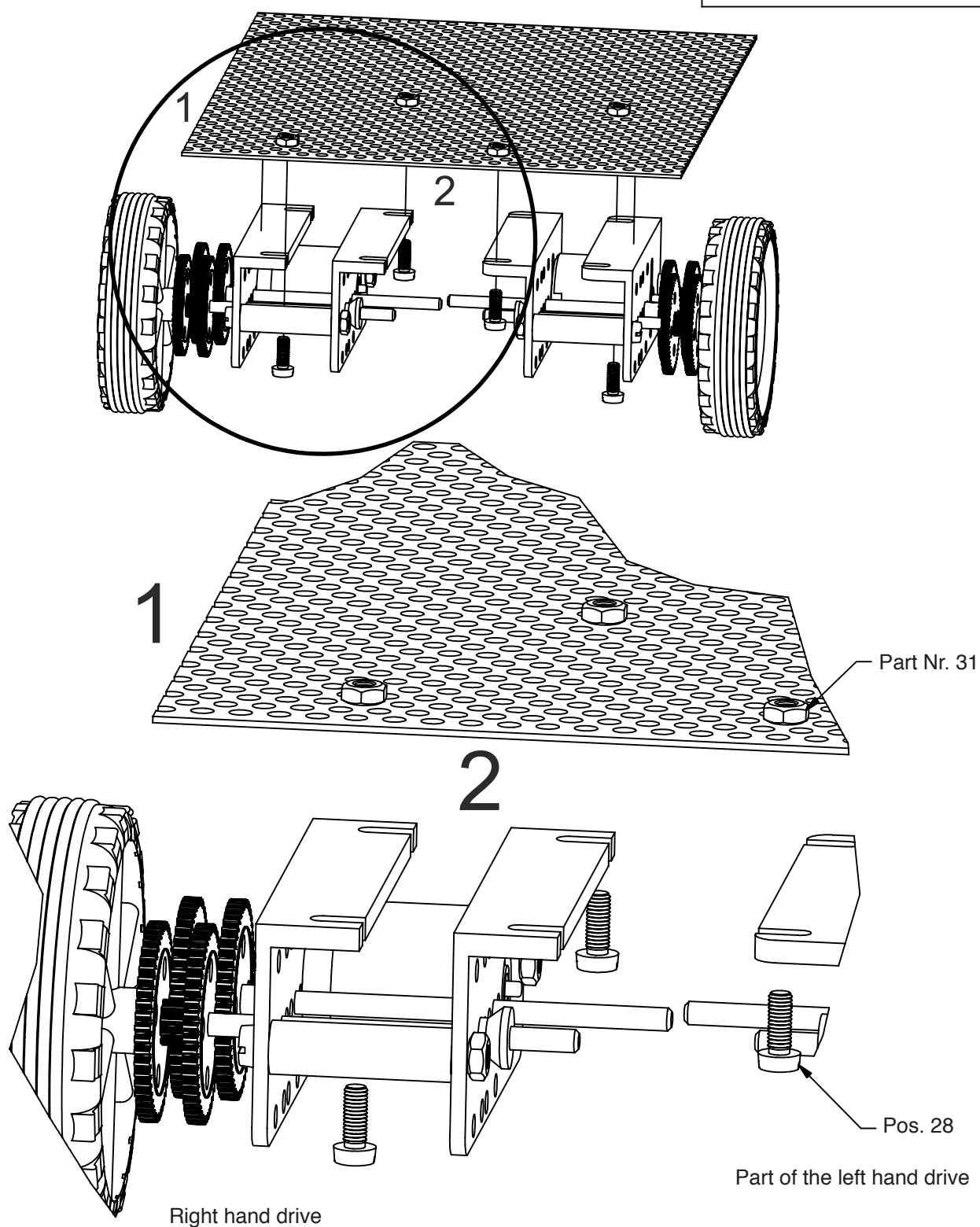
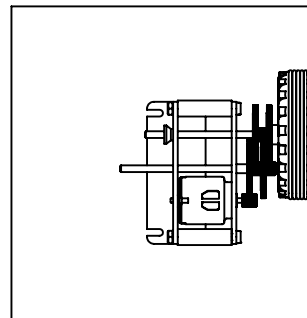
Part Nr:50

Cut off 8 blocks from the connector block and fix with 2 self tapping screws (46) centrally between the two rear axle holders.

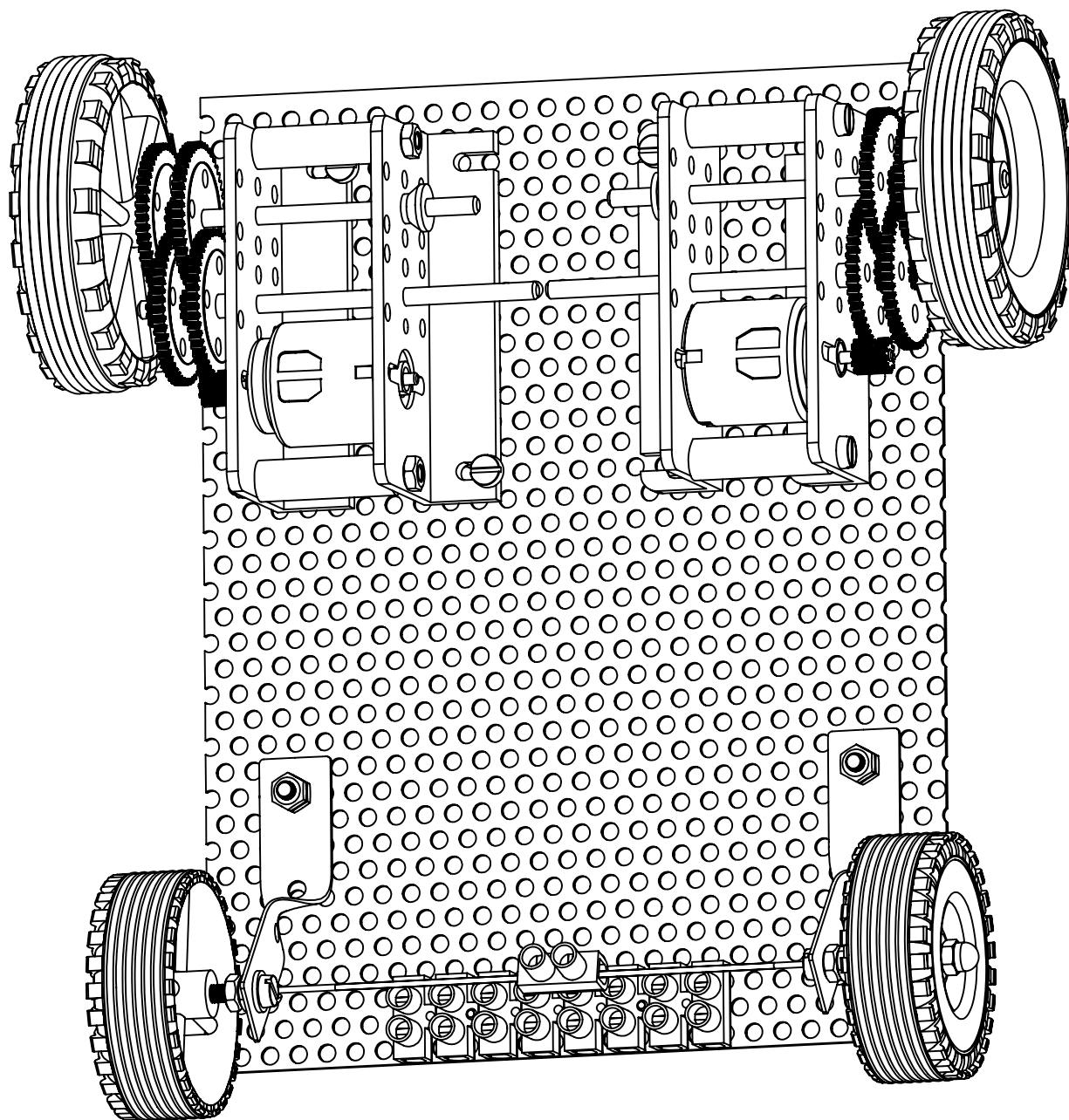


Part Nr 6

Mount the one motor and gearbox and wheel assembly with 2 machine screws (Part No: 28) and nuts (Part No:31).in the 10th row of holes and 3 holes from the edge 2. Carry out the same Procedure with the second motor and gearbox



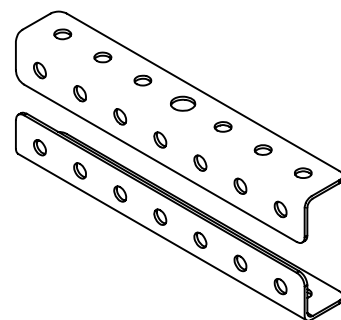
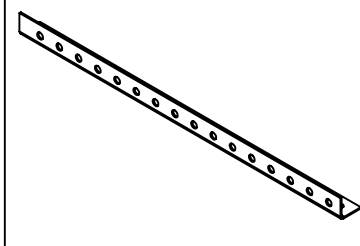
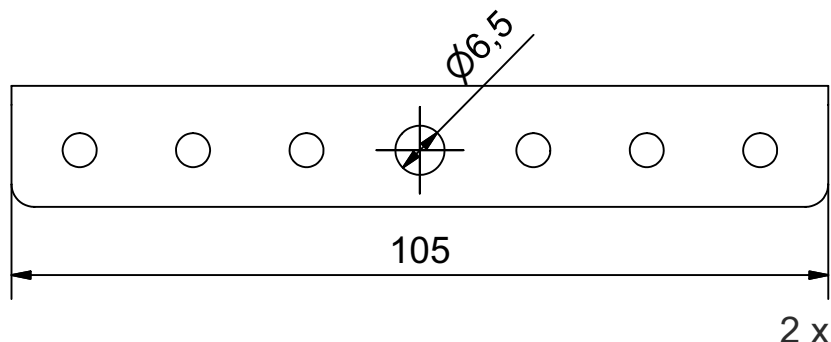
Finished chassis with wheels and gearboxes



Fork lift assembly

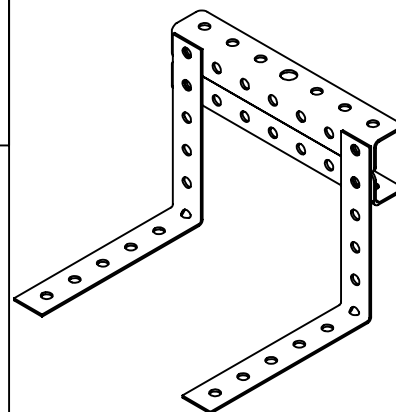
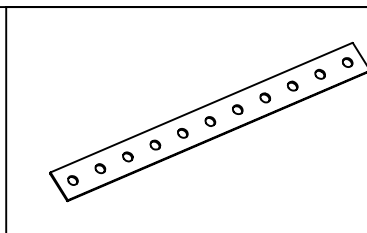
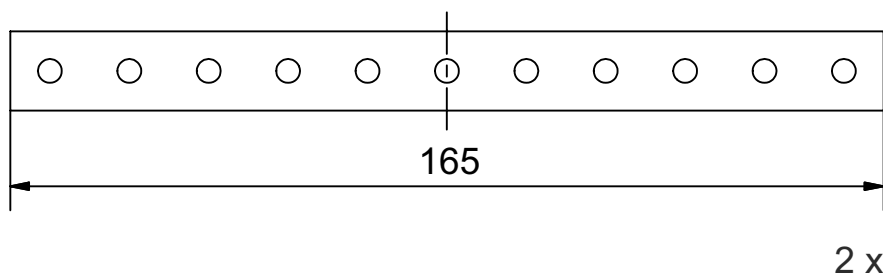
Part Nr:20

Cut the fork carrier to length and drill the middle hole out to 6.5 mm diameter
Round the ends with a file



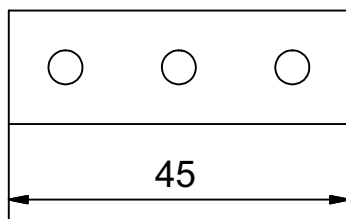
Part Nr:22

Cut the fork assembly to length. Use the machine screws M4x 8 (Part Nr:23)
M4 nuts and domed nuts (Part Nr: 34 and 35) join them to part 20
(See sheet 9)

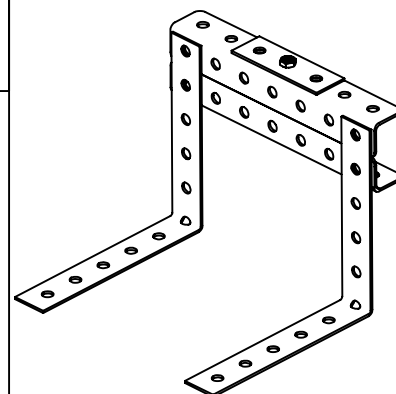
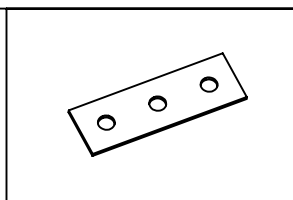
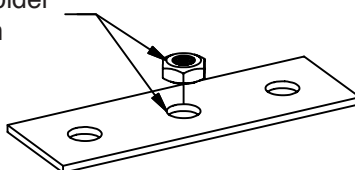


Part Nr:21

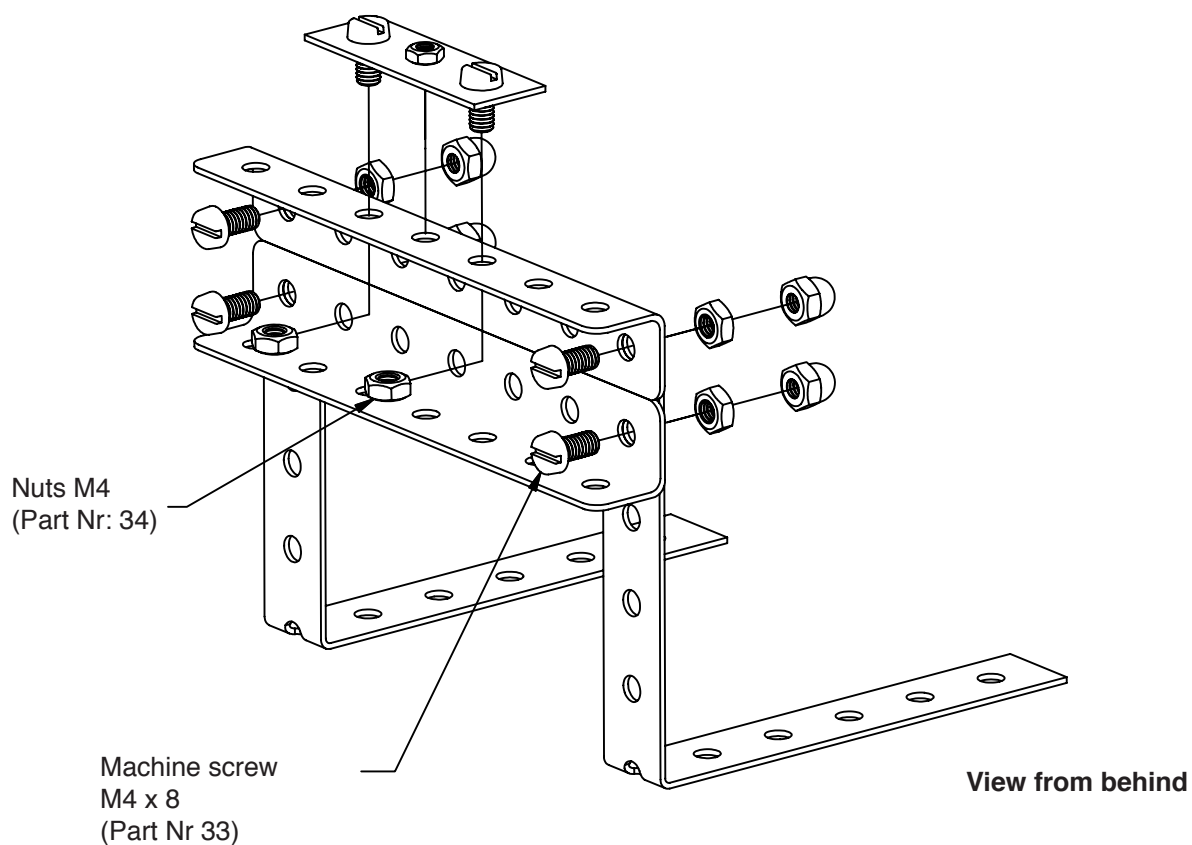
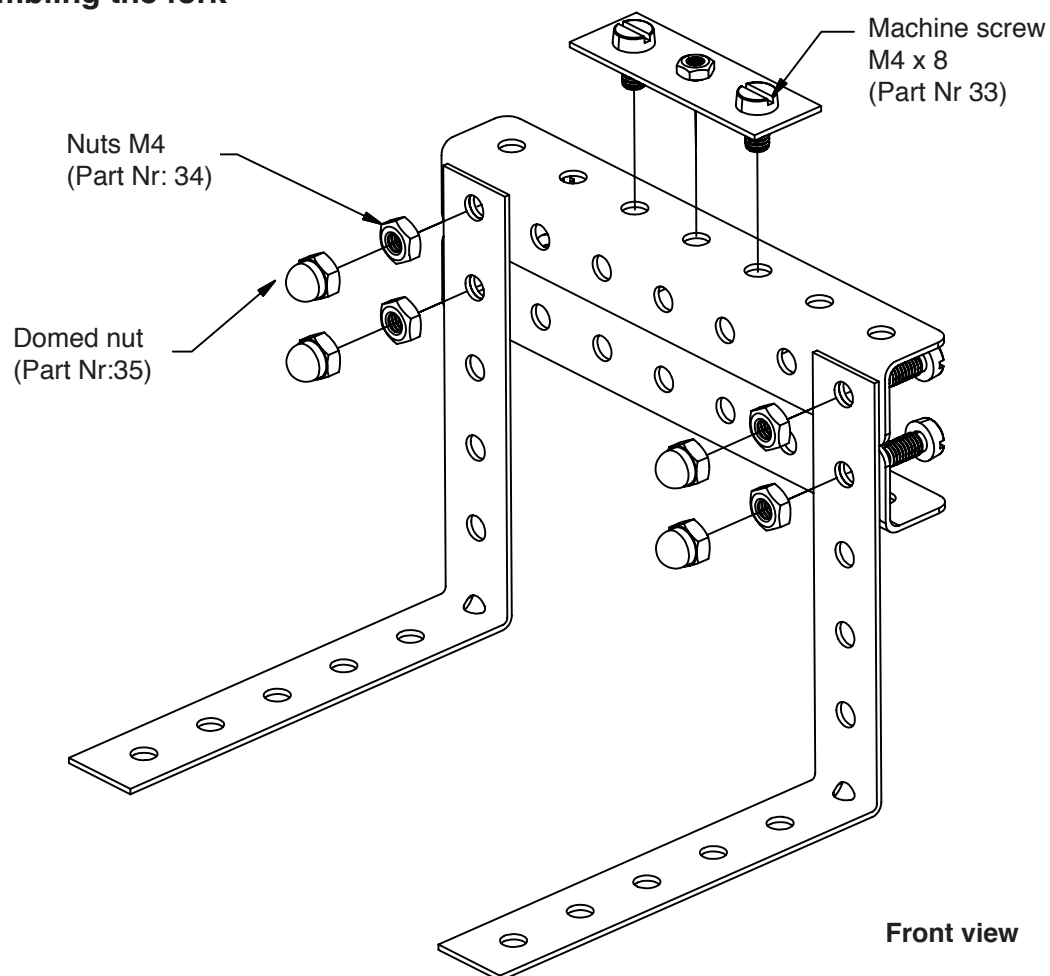
Cut off a piece 45mm long from a remaining piece of holed metal strip
Glue (2 part epoxy glue) or solder a M3 nut (Part Nr: 21) over the middle hole and fit to Part Nr:20
Use the machine screws (Part Nr:33) and nuts (Part Nr:34)



Glue or solder
in position

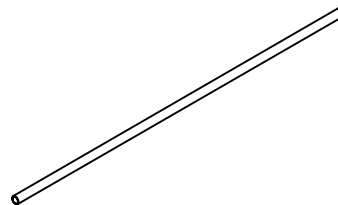
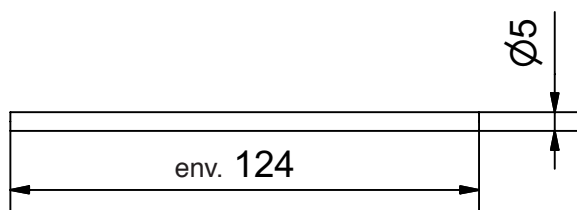


Assembling the fork



Part 27

Saw brass tube to length as shown, with a Junior hacksaw

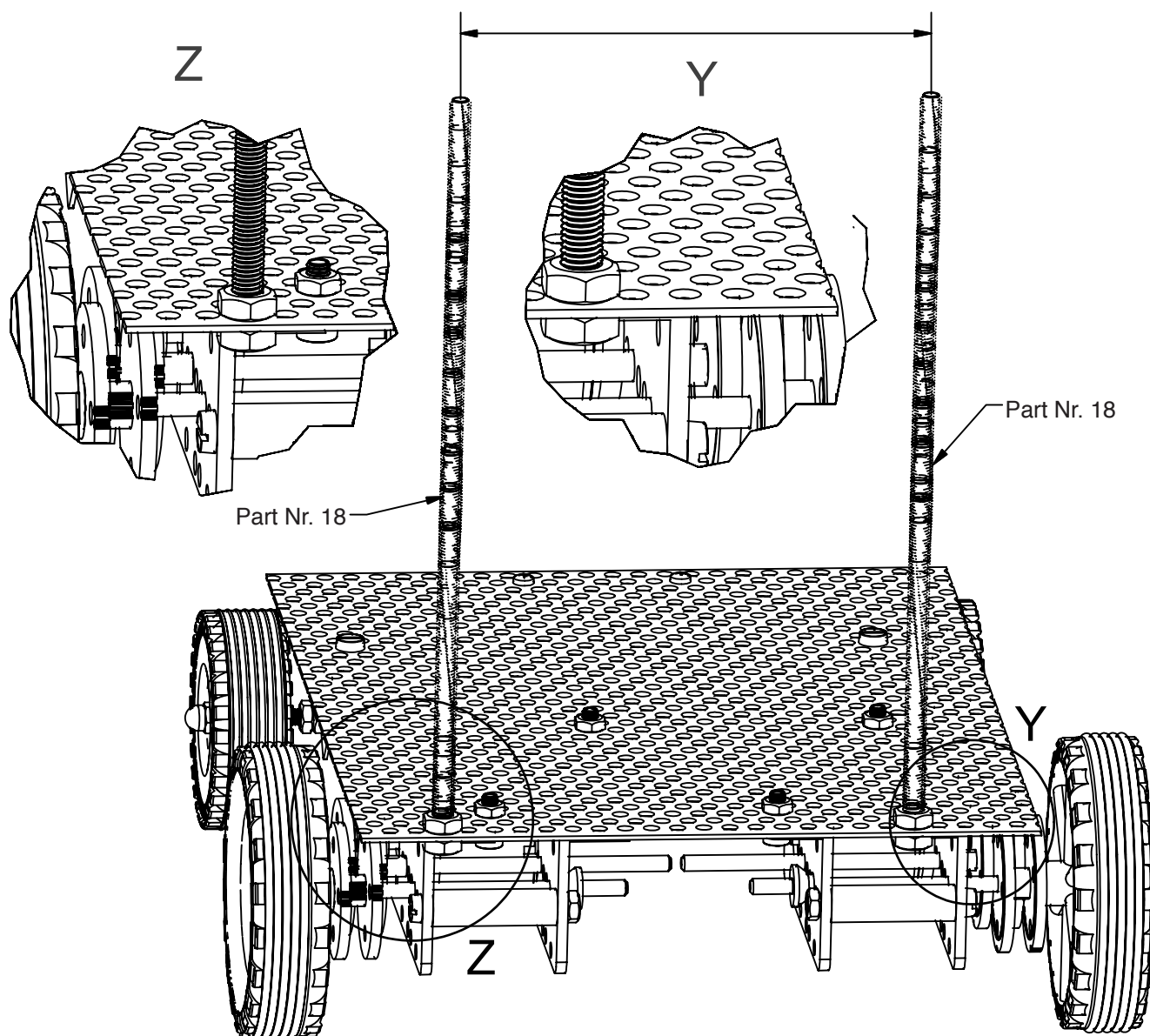
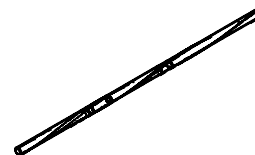


Part Nr: 18

In drive direction

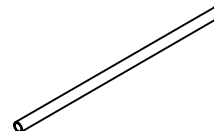
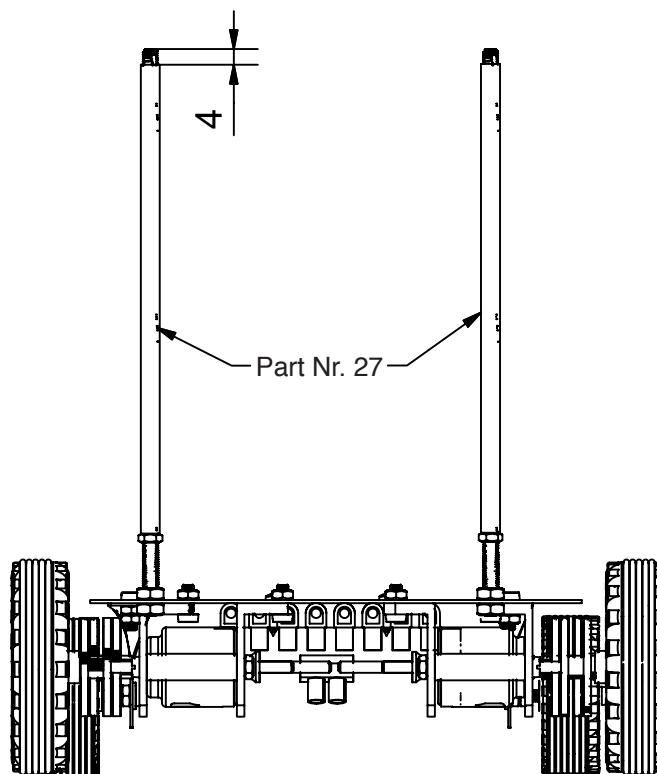
Mount the right hand fork guide (Part Nr: 18) in the first row of holes in the 3rd or fourth hole in from left. Fix with two nuts M4 (Part Nr: 34) as shown in diagram Z

Mount the other fork guide (Part Nr: 18) at a distance of 90mm (Seen from centre to centre) and also in the first row of holes (See diagram)



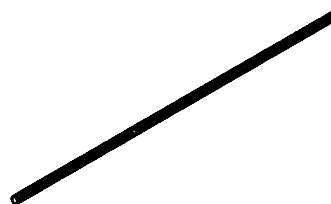
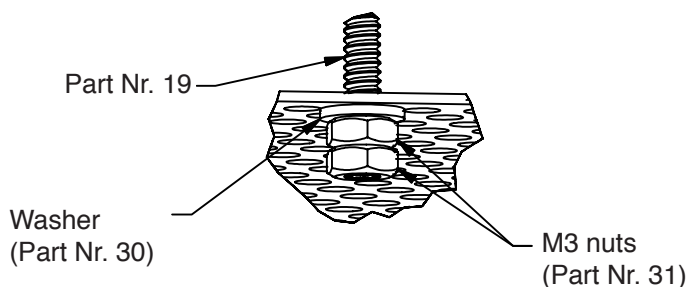
Part: 27

Place M4 nuts (Part Nr: 4) on each fork guide (Part Nr: 18) and then place a brass tube (Part Nr: 18) on each guide, finish with M4 nuts
Adjust all the nuts so that the guides protrude 4mm on either side.



Part :19

Mount the fork drive (Part 19) in the middle between the two fork guides.
From underneath place a washer (Part 30) and lock with two M3 nuts (Part 31)

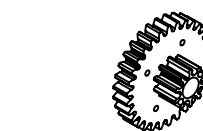
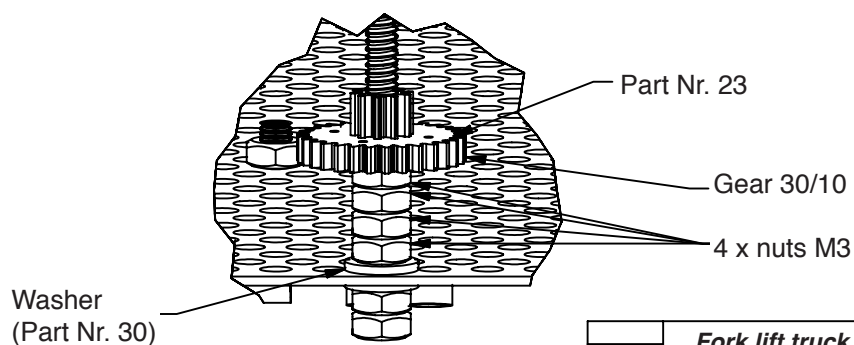


Part Nr: 23

Finally from above place a washer M3 (Part Nr:30) and 4 M3 nuts (Part 31)

Note: the drive (Part Nr. 19) should be able to turn.

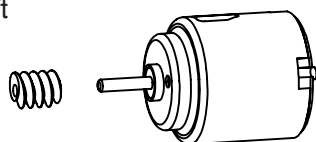
Then then add the drive gear (Part Nr:23) and glue it to the four nuts (Use a two component epoxy glue or super glue)



} Glue together

Parts Nr: 24 and 26

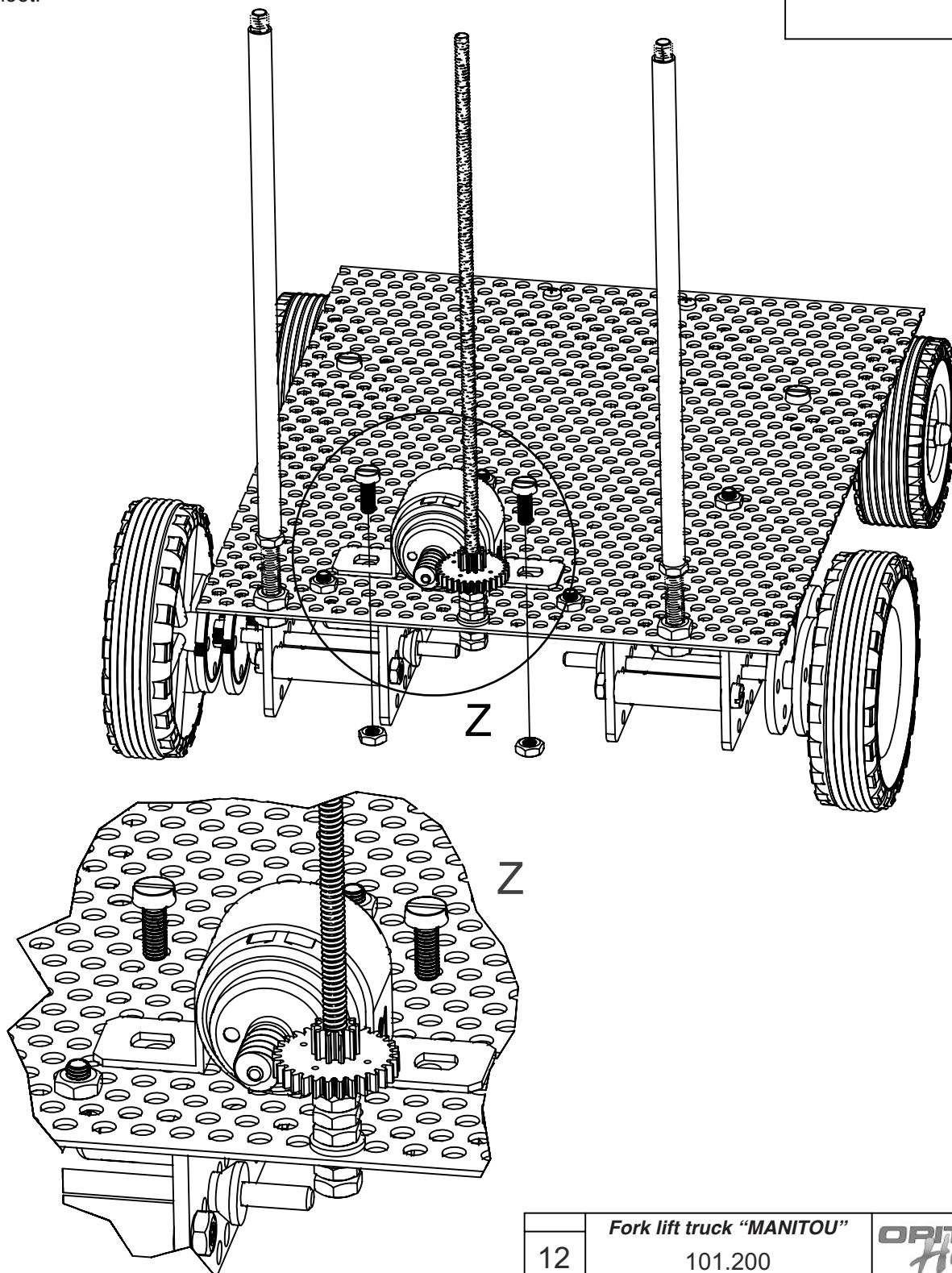
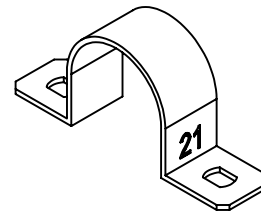
Place the worm gear on the motor shaft



Part Nr: 25

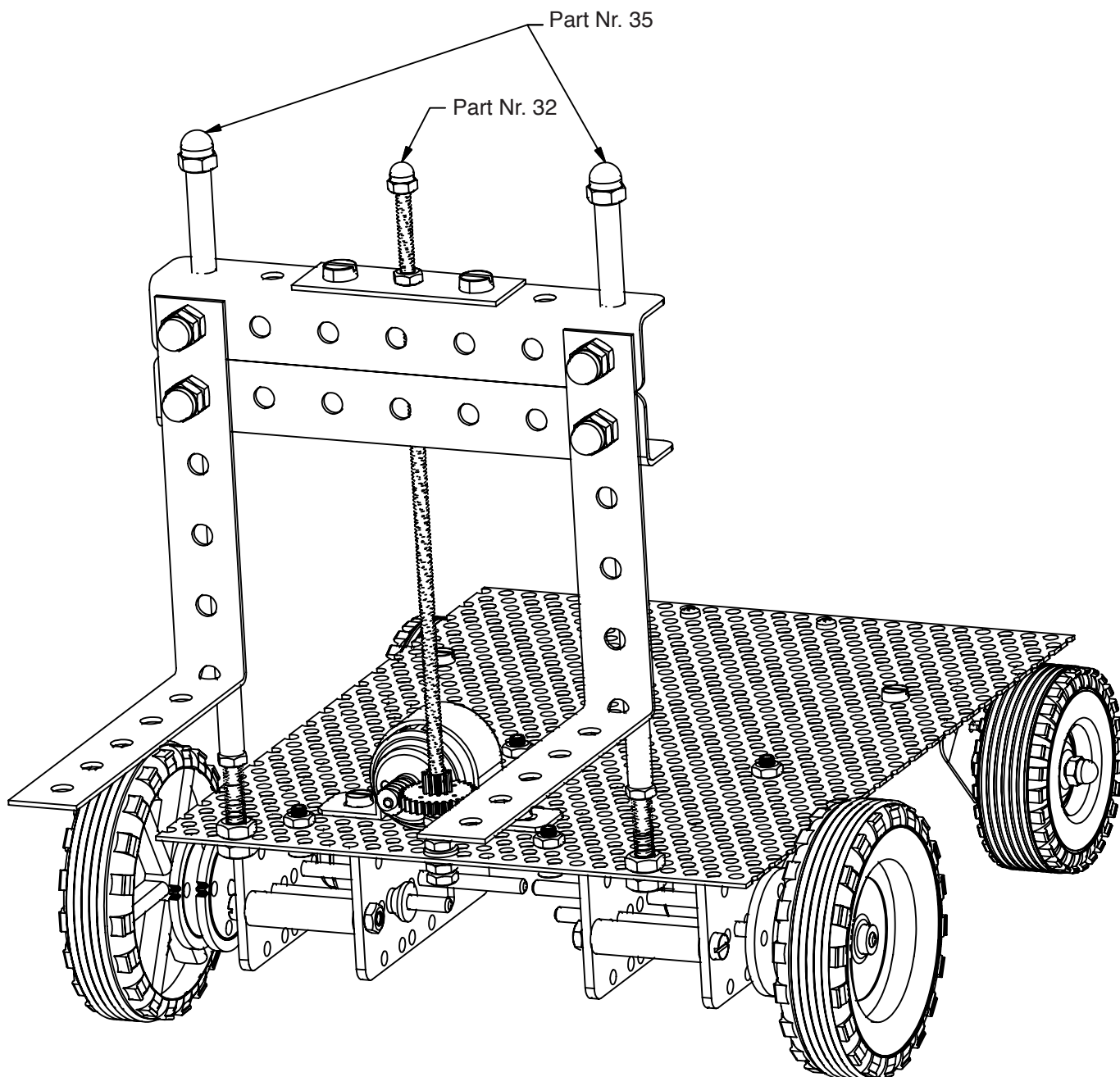
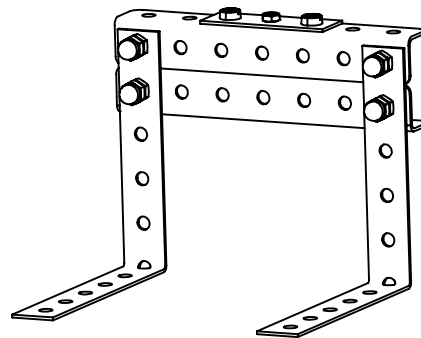
Mount the motor and gear so that the worm gear engages lightly with the Fork drive gear.

Fix the motor in position with the metal loop holder (Part Nr: 25) and two machine screws M3 x 8 (Part Nr: 28) and suitable nuts (Part Nr:31) to the holed metal sheet.



Part Nr: 20 22

Mount the completed fork assembly. Turn the worm by hand so that the fork assembly lowers by about a centimetre
Finally add a domed nut to the tops of the guide and drive (Parts Nr: 35 and 35)



Bodywork

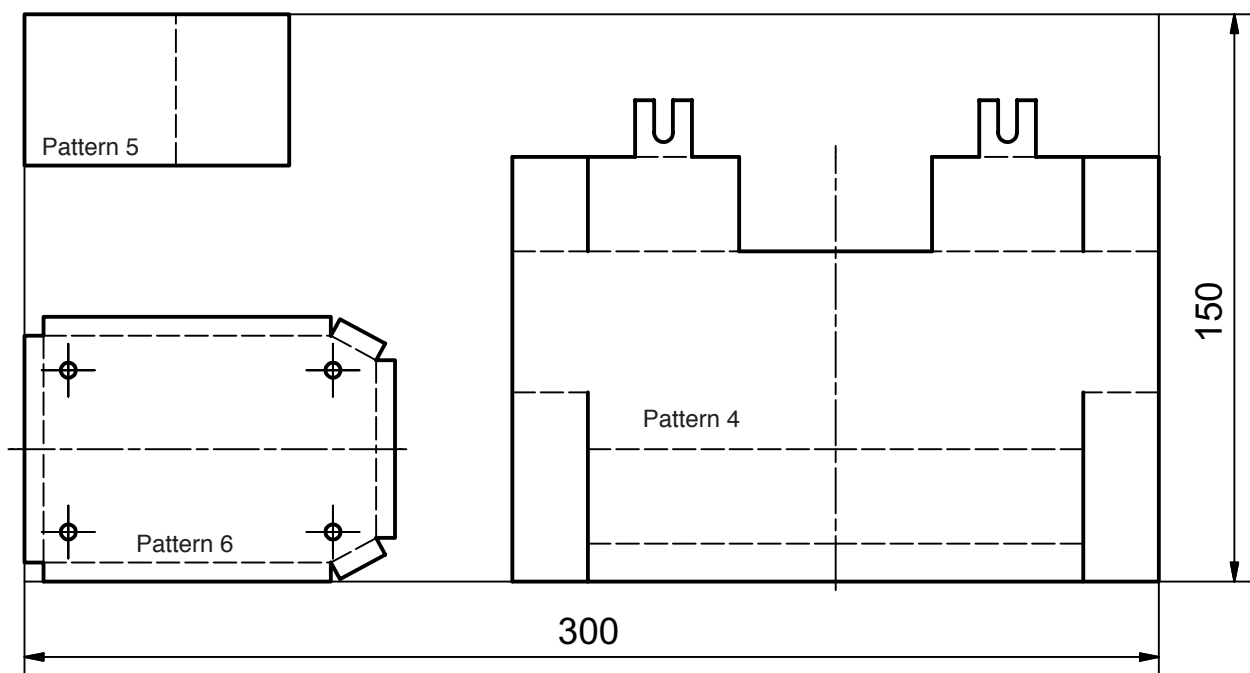
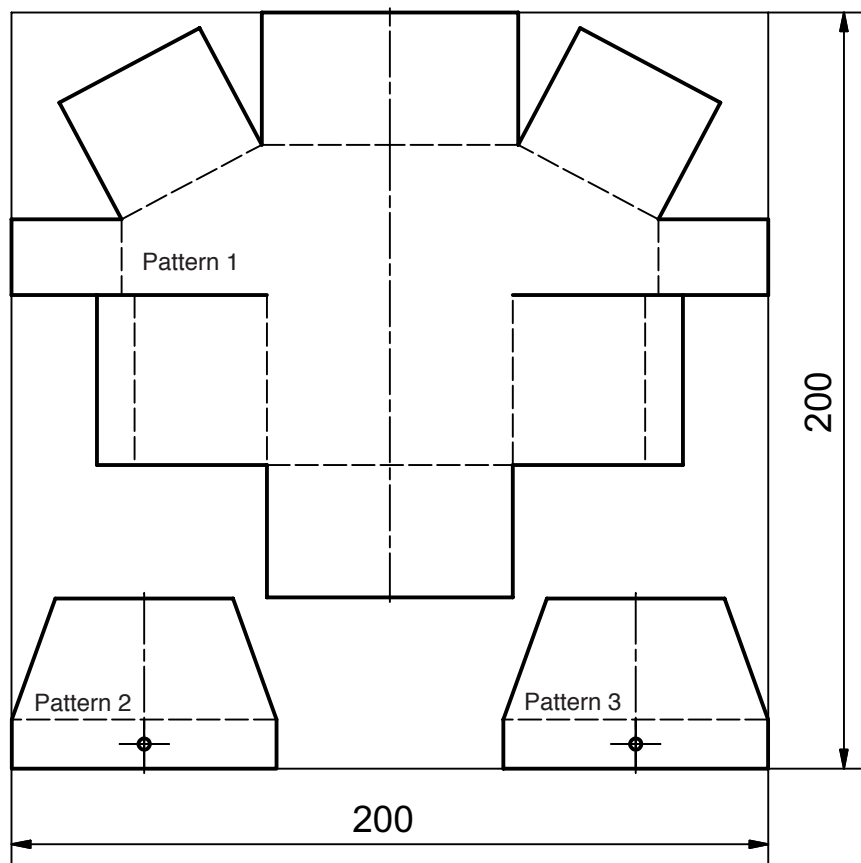
Parts Nr: 39-43

Cut out the patterns 1-6 (See page 23 & 24) and lay them out on the metal sheet, hold them in position with tape or glue

Cut out the shapes with metal snips along the thicker lines.

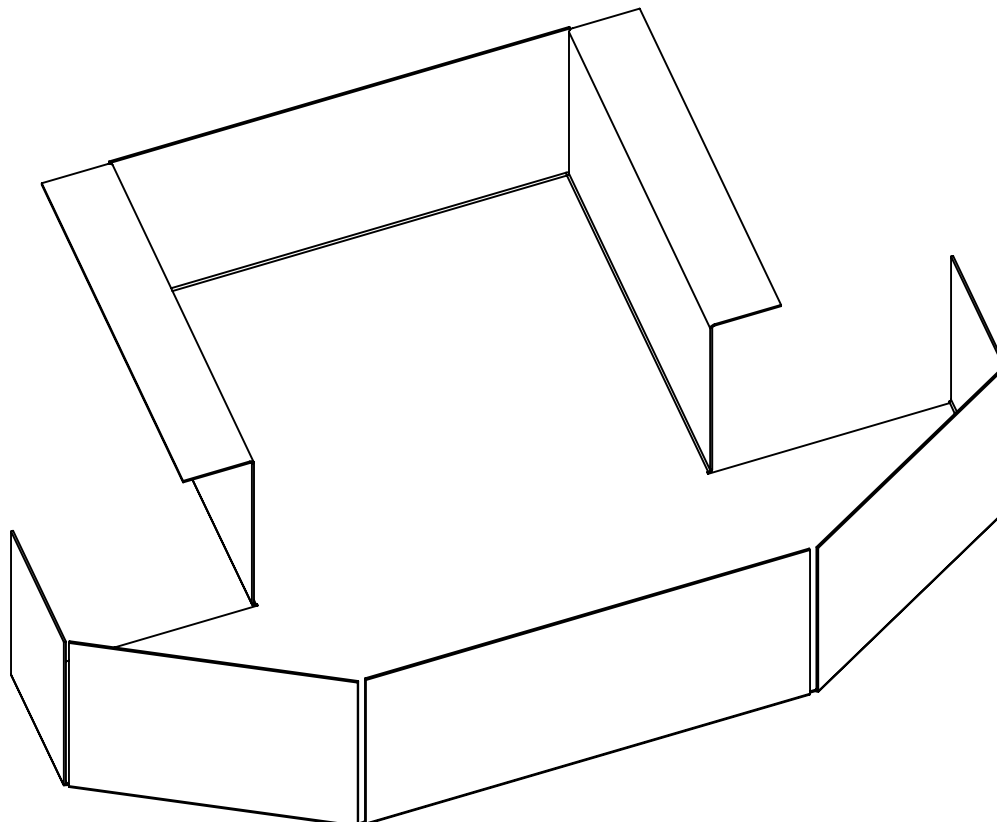
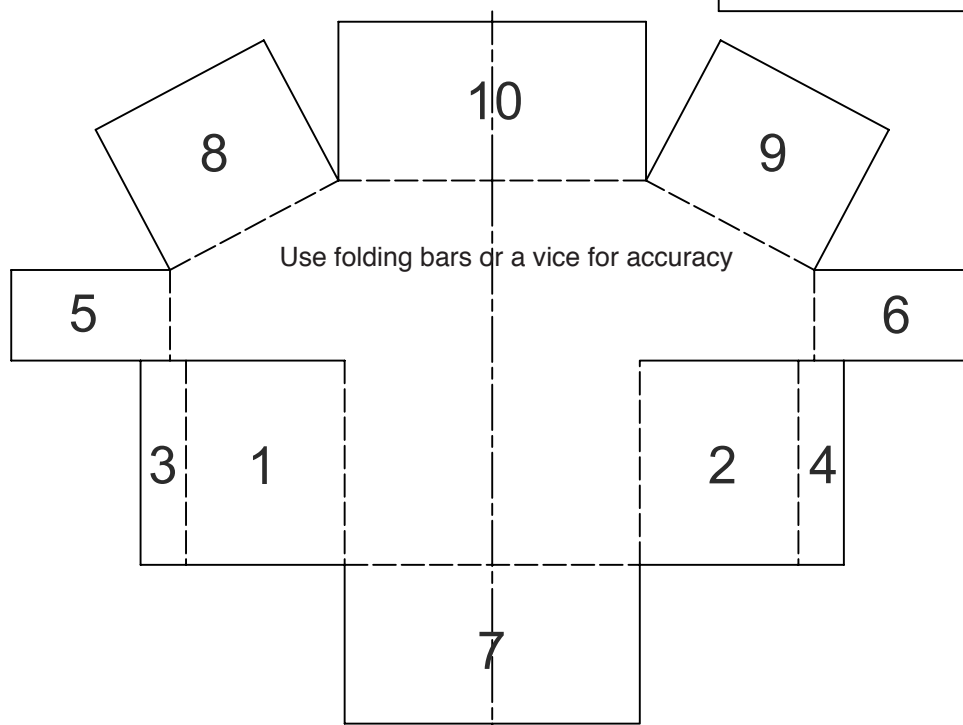
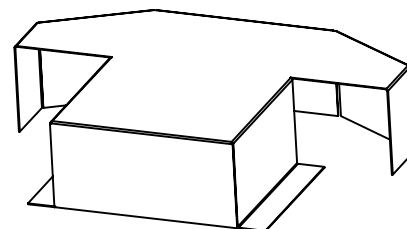
In patterns 1 and 4 along with the contour lines other inner cuts must be made. (Along the thickened lines)

In patterns 2/3 there are also 3mm diameter holes to be drilled. In pattern 6 4mm holes.



Part 39

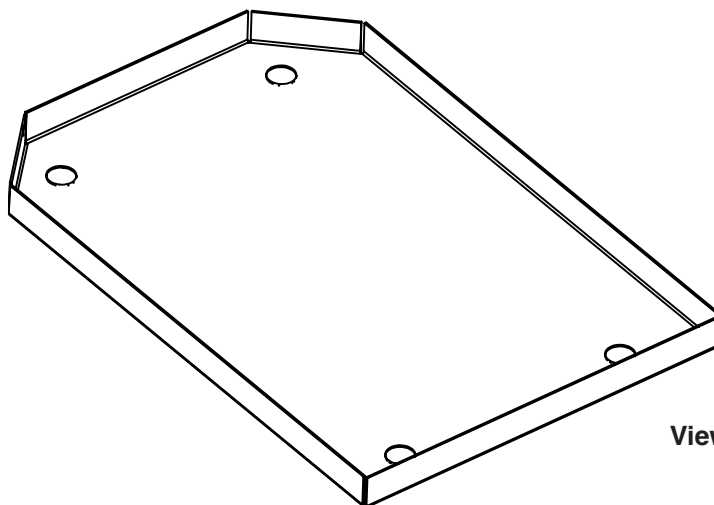
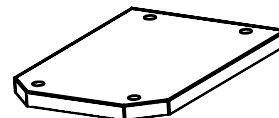
After cutting out pattern 1 (Motor cover) fold the metal sheet along the broken lines



View from underneath

Part Nr:42

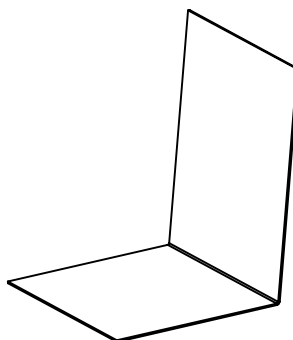
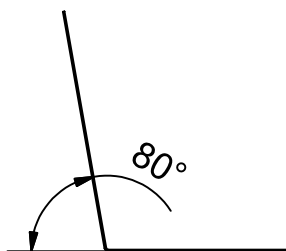
Once you have cut out the pattern Nr. 6 drill the 4mm holes
Fold the edges as shown using vice or folding bars.
The small short folds can be folded with pliers



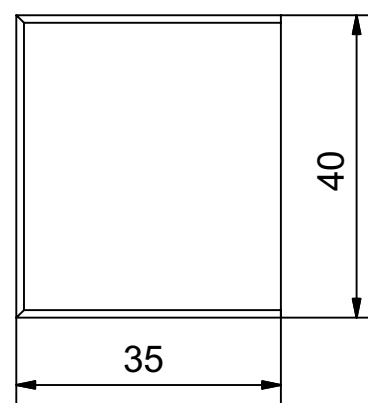
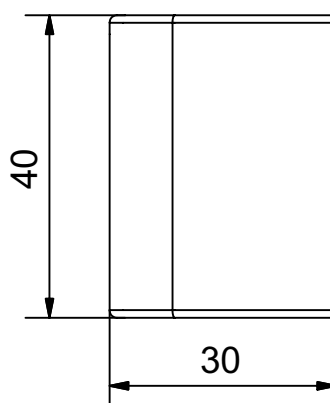
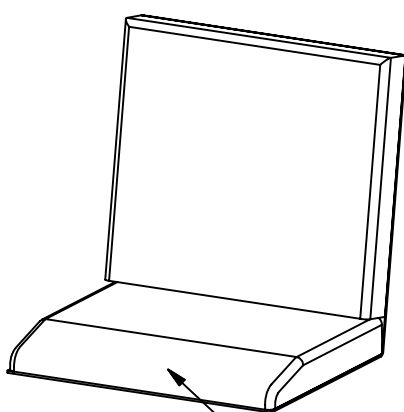
View from underneath

Part Nr:43

Cut out the pattern 5 from the metal sheet. Bend using a vice (Use soft jaws) at an angle of 80 degrees



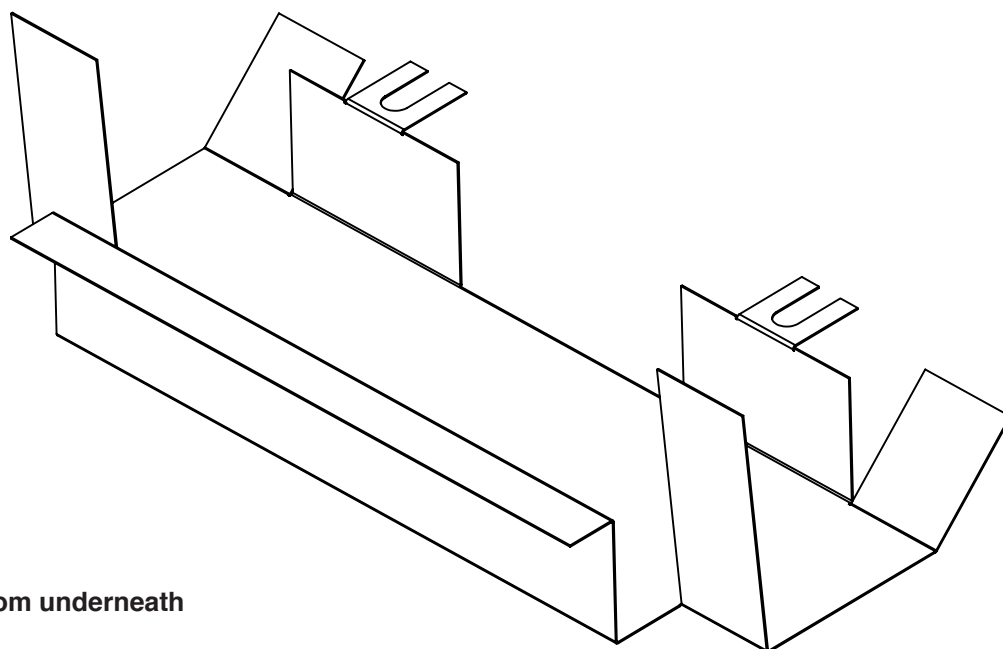
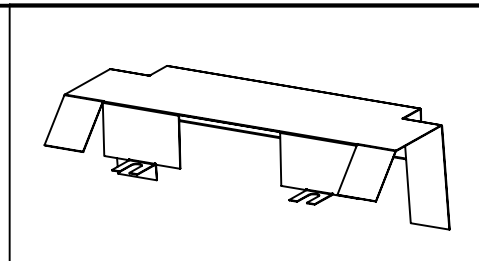
Finally add the foam squab and back (Part Nr :38) use contact glue



Shape to suit with a file or sandpaper

Part No 41

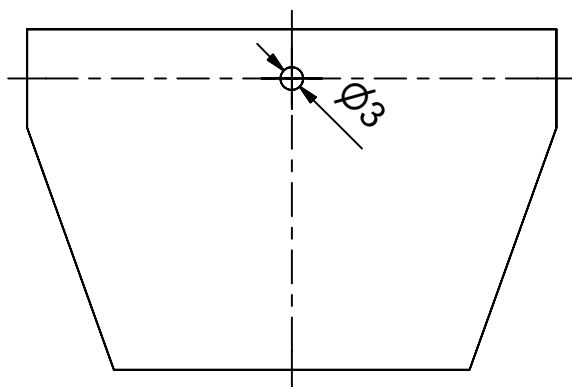
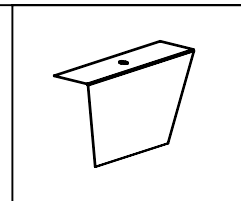
Cut out pattern 4 . Centre punch and drill the holes. Finally cut out the slots with a Junior hacksaw. Clean up all edges of the slots with a needle file



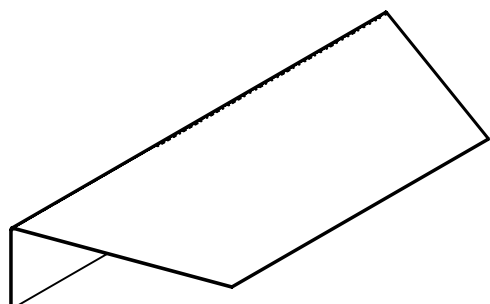
View from underneath

Part Nr:40

Cut out the sides according to patterns No 2 and 3 and drill the 3mm holes



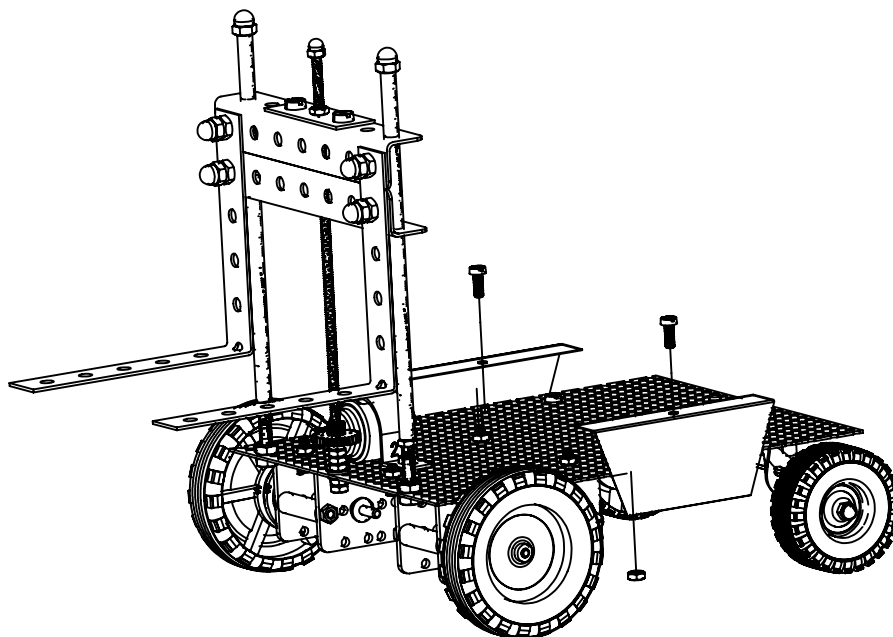
Fold using a vice with soft jaws



Part : 40

Mount the side panels so that the wheels can turn without rubbing

When you are happy with the position mount the panels with the M3 x 8 (Part Nr: 28) machine screws and nuts

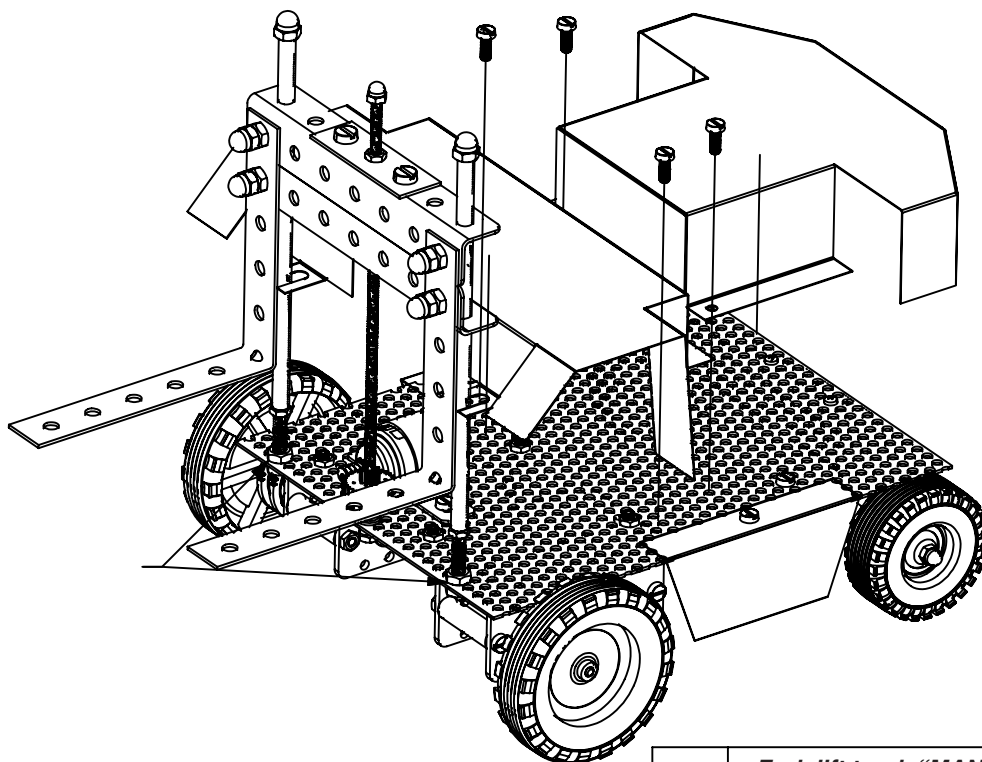


Part Nr: 39 and 41

To fit the bodywork you will need to loosen the nuts on the fork guides where they join the chassis (Holed metal sheet)

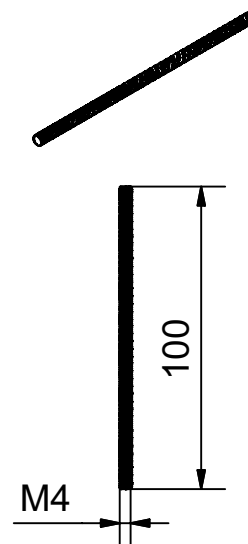
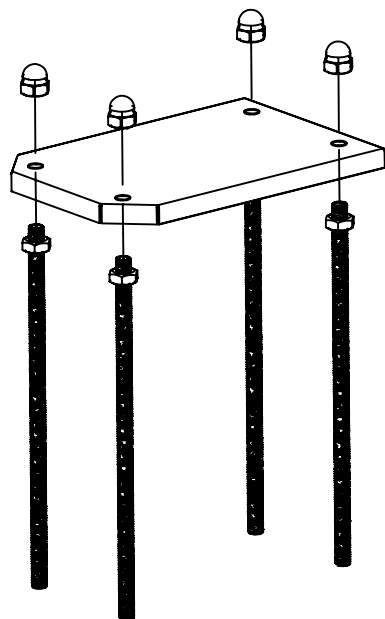
Now mount the bodywork (Slide one part under the loosened nuts) and adjust to fit. Mark the holes for parts 39 and 41 from underneath with a felt tip pen. Centre punch the positions and drill them with a 3mm hole.

Now fit the bodywork with 4 machine screws (Part Nr:28). Do not add nuts underneath



Part Nr: 44

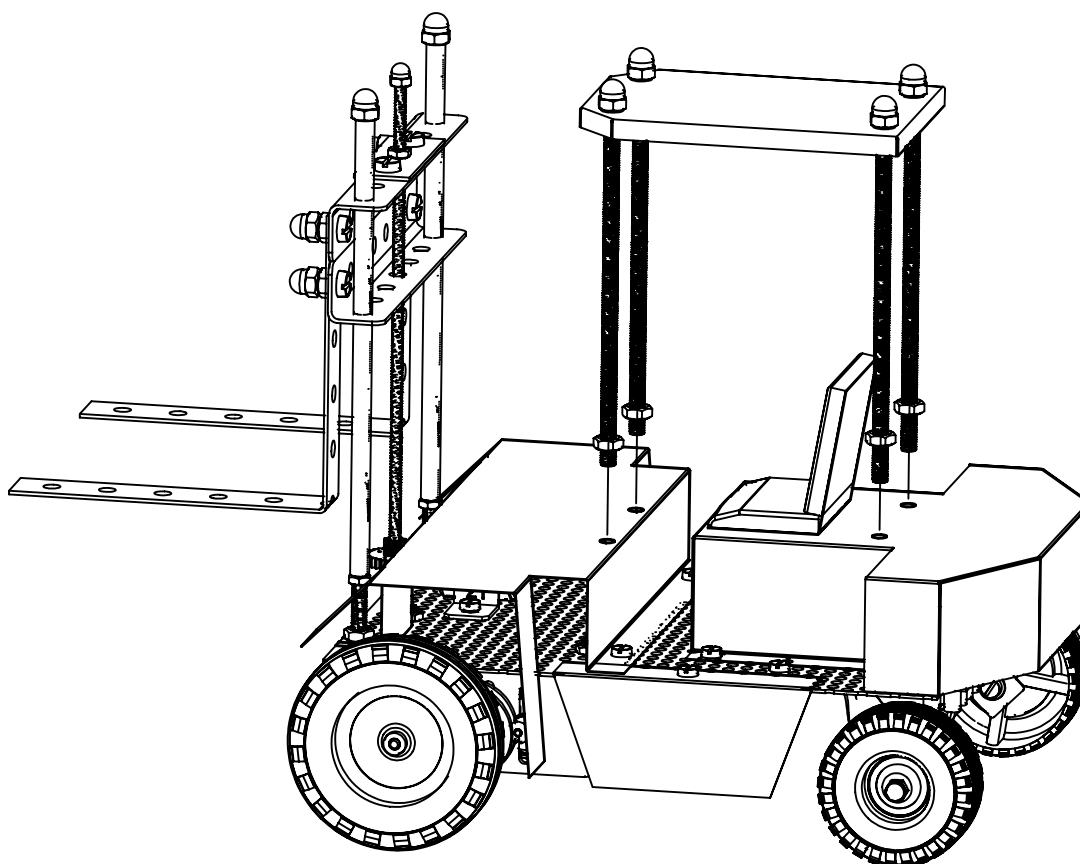
Mount the finished roof (Part Nr 42) with hex.nuts and dome nuts on the 4 pillars (Part Nr:44)



Now hold the roof and pillars in position on the bodywork and mark the four holes.

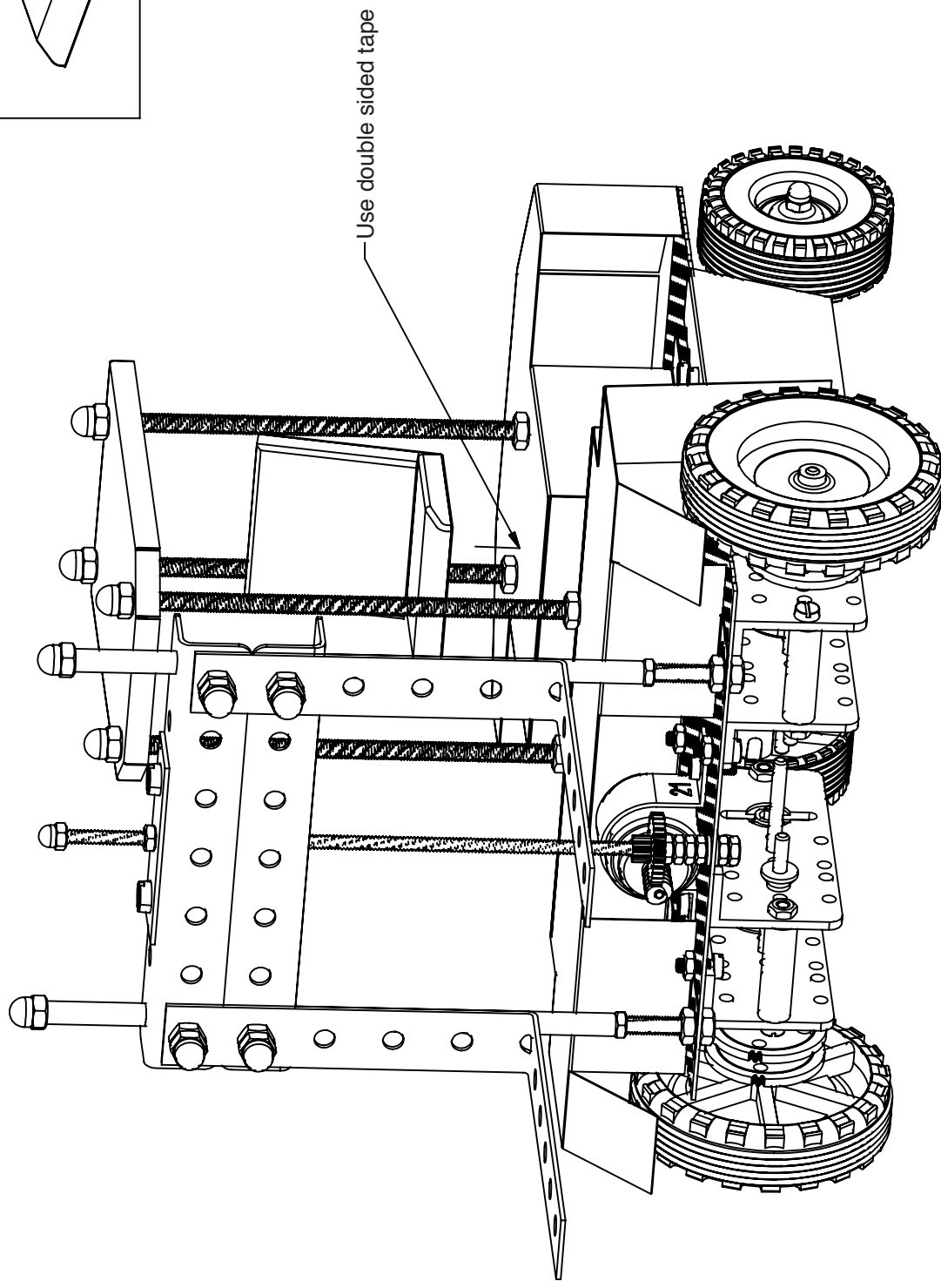
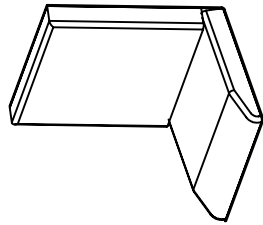
Centre punch and drill the four 4 mm holes

Add another set of M4 (Part Nr:34) nuts to the bottoms of the pillars then mount the cabin on the holed chassis with M4 nuts



Part Nr:37

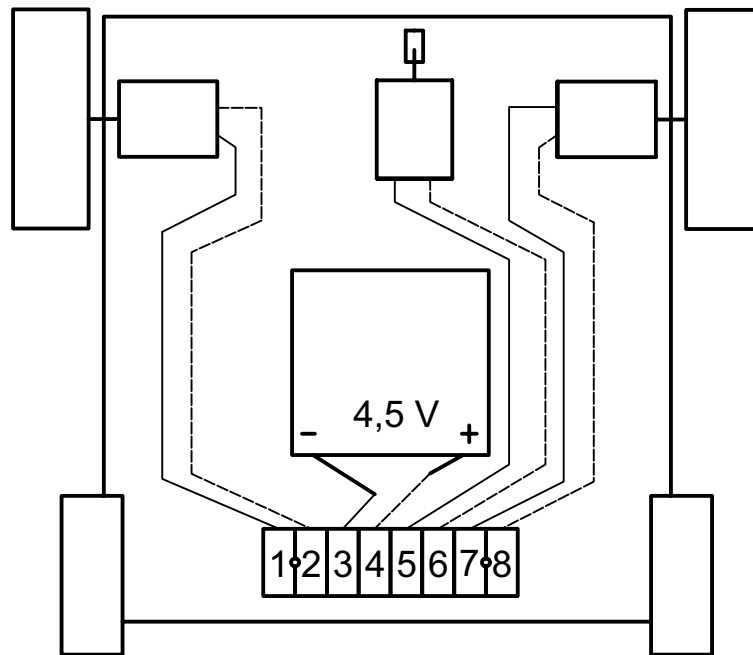
Finally fix the seat using double sided tape
(Part Nr: 37) Use the second pad to fix the battery



Electrics

Part No: 45-51b

1. Mount the battery under the bodywork using the remaining double sided sticky pad
- 2 Insert a piece of cable in the joiner block 3 and 4. Solder or crimp a connector on the ends and join to the battery
- 3 Wire up the components according to the diagram

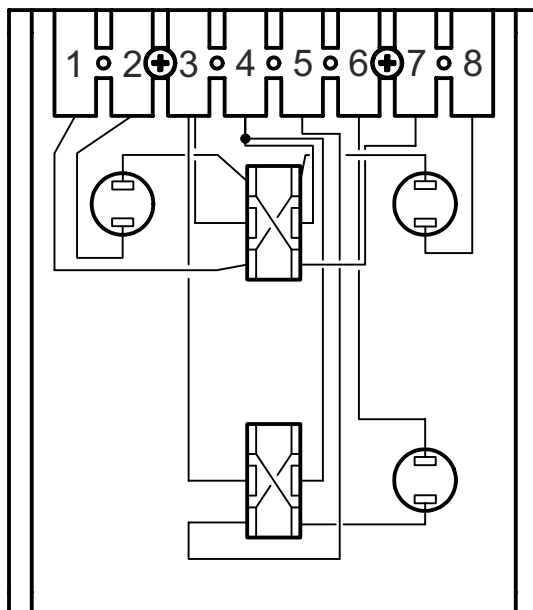


View from underneath

Broken line represents the red wire = Plus pole
Continuous line represents the black wire + Minus pole

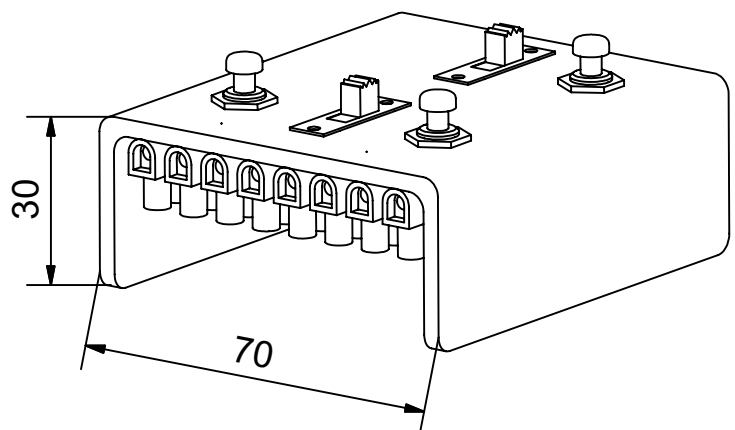
4. Hand steering set

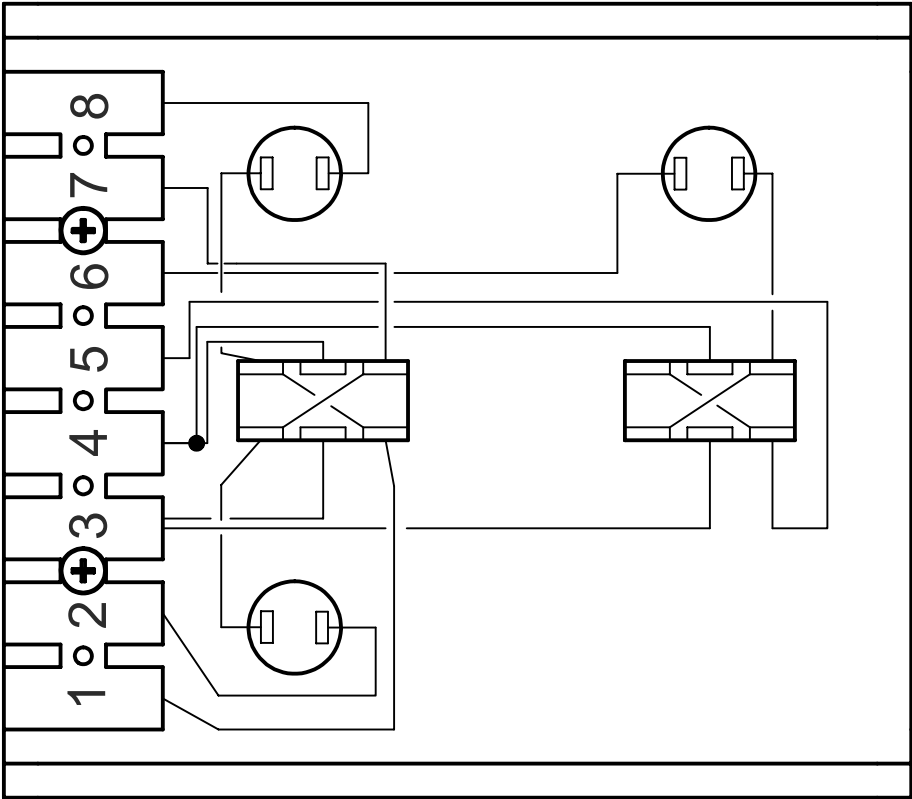
Mark out and drill the holes in the polystyrol sheet (Part Nr:47) for the switches 7,5mmdia and file out the long shaped hole (Pattern A , page 22).
Finally bend the U shaped form. Use a hot air gun or strip heater (Attention !! N.B. be careful of burns)
Glue the switches with super glue (Be careful not to get glue in the switch)
Fit the connector block with two self tapping screws (Part 46) see plan (See page 22)



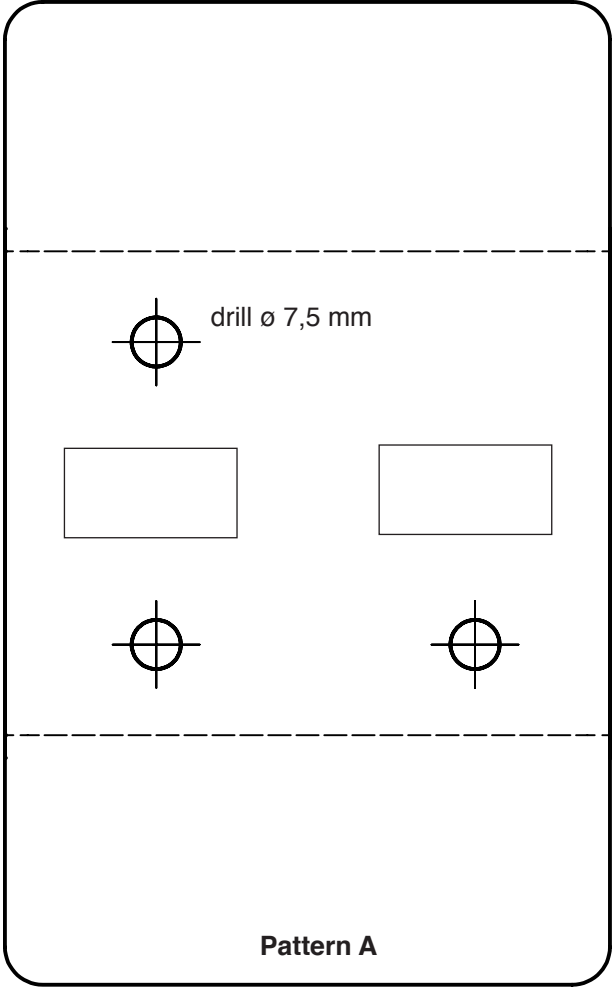
View from underneath

5. Connect the hand control, with the flat band cable to the model. Connect the numbers from the hand control to the corresponding numbers on the chassis connector.

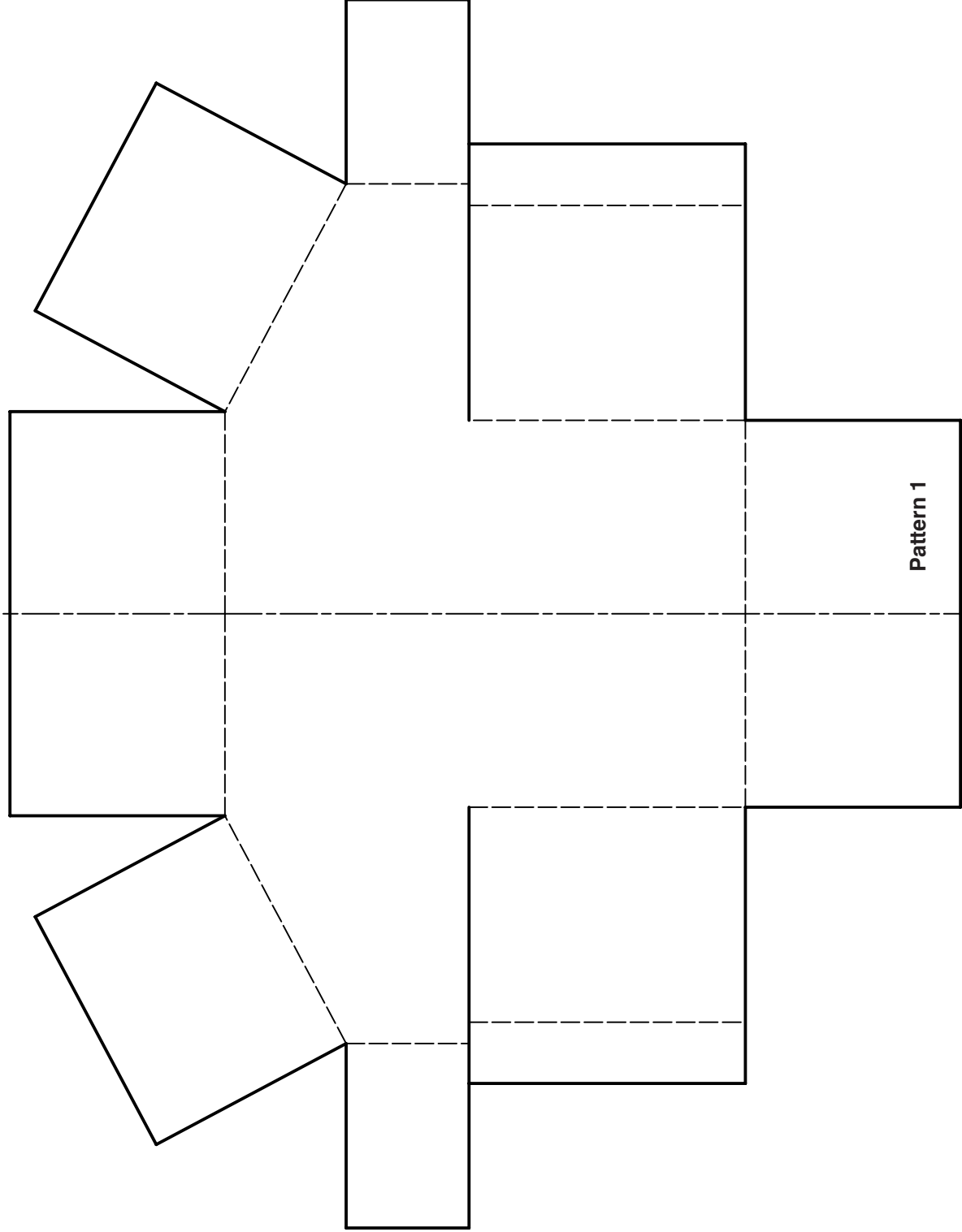




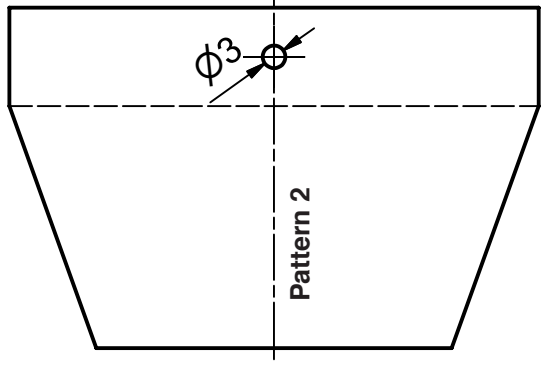
Vergrößerung des Verdrahtungsplans



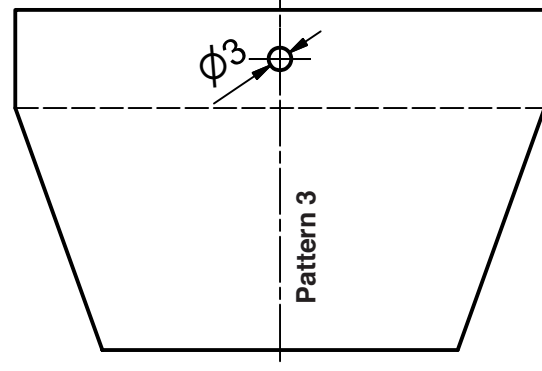
The broken lines denotes folds
The thick lines represent the outer shape of the pattern



Pattern 1

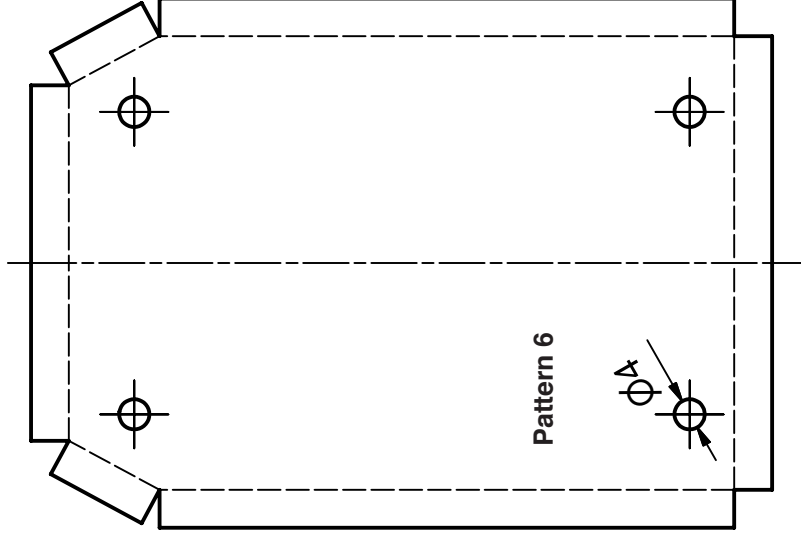
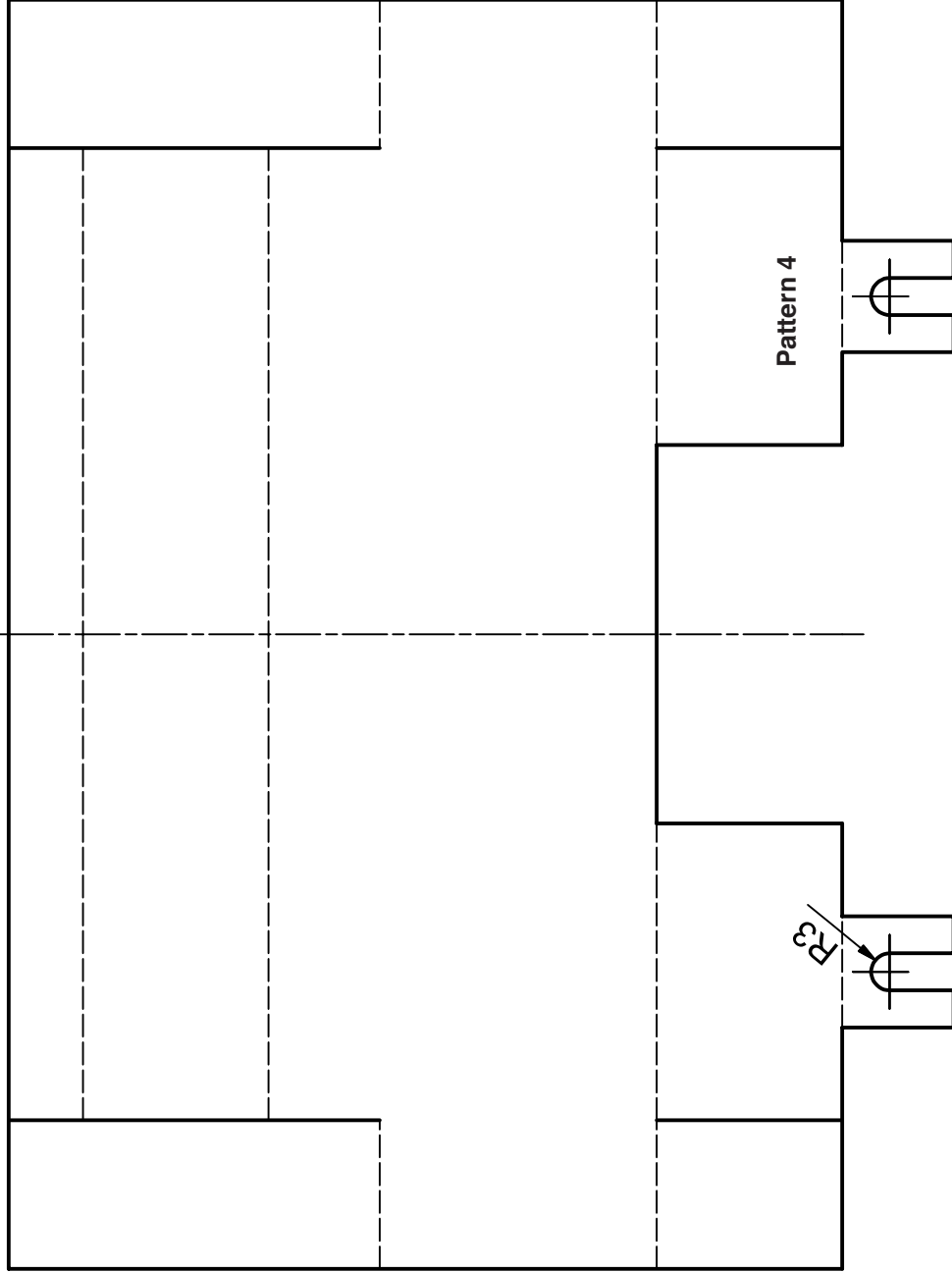


Pattern 2



Pattern 3

The broken lines denotes folds
The thick lines represent the outer shape of the pattern



The broken lines denote folds
The thicker lines represent the outer shape of the pattern

Pattern 5

Fork lift truck "MANITOU"

101.200

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