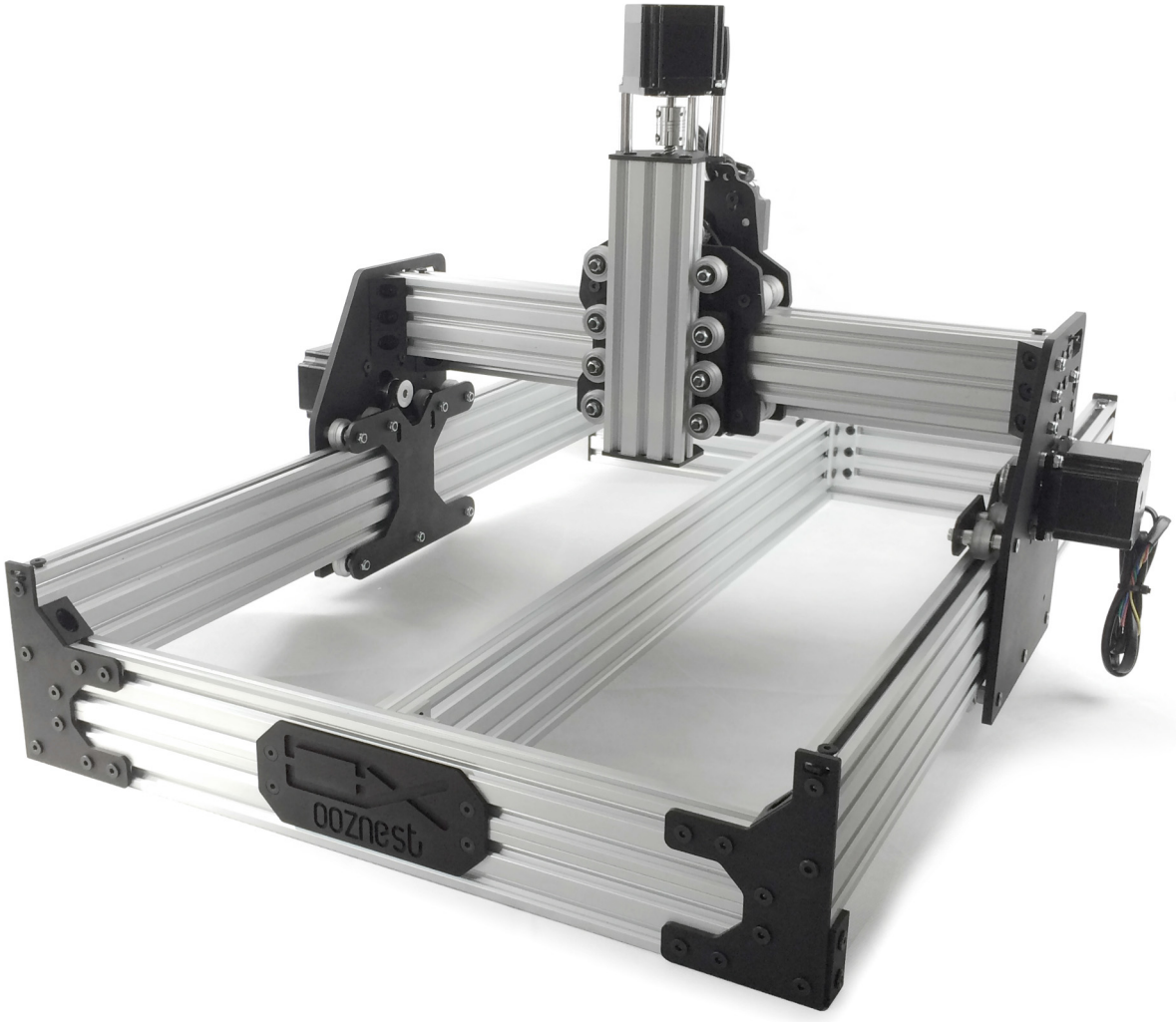
OX CNC

Mechanical Assembly Instructions

ooznest



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1.0 Getting Started

1.1 About The Kit

The ooznest OX CNC Machine Kit is based on the OX CNC Machine designed by Mark Carew of Openbuilds (http://www.openbuilds.com/builds/openbuilds-ox-cnc-machine.341/), and incorporates many upgrades from the Openbuilds community. Mark Carew based the OX on the Routy, which was in turn based on the Shapeoko. The OX CNC Machine uses the excellent V-Slot Extrusion, which provides a strong, smooth, and accurate linear motion system.

We would like to give a big thank you to Mark Carew and Openbuilds for designing an excellent CNC Machine and V-Slot system, which they have allowed to be freely shared, remixed, and sold. We would also like to thank the Openbuilds and wider community for sharing their upgrades to make the OX even better.

1.2 Check Product Contents

The first thing you should do when you receive your kit is to check the contents against the list in Appendix A. For small parts, a few more spare is included than the quantity shown in Appendix A. If anything is missing or damaged or you have any other problems, please contact us at sales@ooznest.co.uk, and we will aim to resolve the issue as quickly as possible.

1.3 Tools Required

The list below shows the main tools that will be required to complete this build:

- 1.5mm Allen key (Provided)
- 2.5mm Allen key
- 4mm Allen key
- 8mm spanner
- 10mm spanner

1.4 Notes on Assembly

It is recommended that you read through the whole manual before beginning the build. This is so you can get a rough idea of how it all goes together. Before starting each step make sure you have studied the diagram and fully understand what you are doing at each step. The PDF version of the manual is available on our website. Use it if needed. This will allow you to zoom in on the diagrams.

This instruction manual follows Mark Carew's build videos on the Openbuilds website. Use his videos if needed to gain a different look into each step. The videos can be found at: http://www.openbuilds.com/builds/openbuilds-ox-cnc-machine.341/

When attaching parts, make sure they are sensibly squared and aligned. Everything should easily fit together. If a part is requiring significant force to attach, then stop, take it off, re-read the instructions, and try again. Do not overtighten bolts, as you may strip the threads.

If you forgot to insert a Tee-Nut when instructed, there is no need to worry or undo any of the work you have done. In the kit we have included 5 x M5-Drop-In-Tee-Nuts for this situation. These M5-Drop-In-Tee-Nuts do not have to be inserted from the end of the extrusion. Simply place them in the V-Slot, then screw in the bolt. This will turn them, and engage them into the underside of the V-Slot.

This manual has been written for the construction of a 500 x 750mm version of our kit. If you have a larger version, everything is exactly the same, except you will be working with longer V-Slot extrusions. Use the table below to convert the dimensions in this manual to the sizes for your machine size.

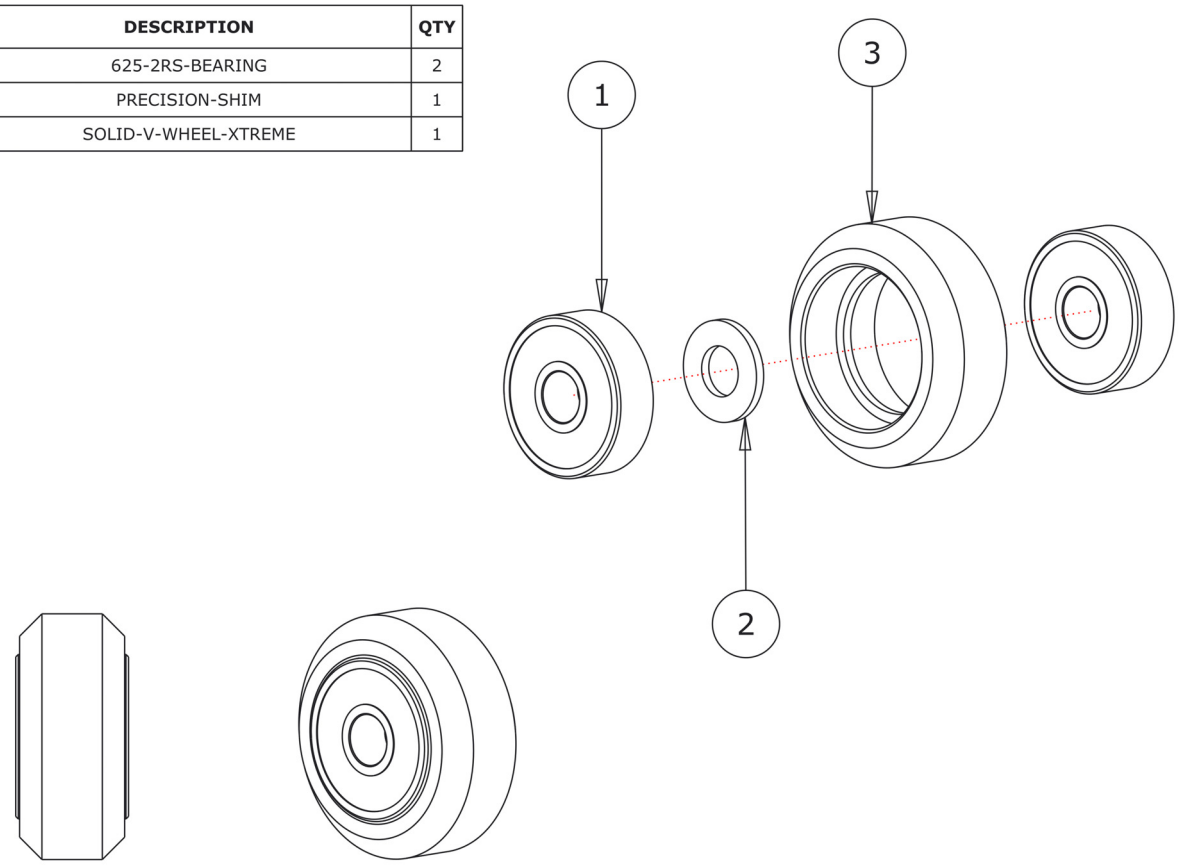
The 500 x 750mm version only has one spoiler board support. Larger versions, have one or two extra. This means you will have to repeat steps, 2.6.3 - B, 2.6.6 and 2.6.7, as many times as the amount of spoiler board supports you have. For the 500 x 750mm version, the spoiler board support should be centered. If you have more than one, they should be evenly spaced across the X-Axis.

Machine Size					
500x750mm	750x750mm	750x1000mm	1000x1000mm	1000x1500mm	1500x1500mm
20x40x454mm	20x40x704mm	20x40x704mm	20x40x954mm	20x40x954mm	20x40x1454mm
20x40x494mm	20x40x744mm	20x40x744mm	20x40x994mm	20x40x994mm	20x40x1494mm
20x40x500mm	20x40x750mm	20x40x750mm	20x40x1000mm	20x40x1000mm	20x40x1500mm
20x60x200mm	20x60x200mm	20x60x200mm	20x60x200mm	20x60x200mm	20x60x200mm
20x60x500mm	20x60x750mm	20x60x750mm	20x60x1000mm	20x60x1000mm	20x60x1500mm
20x80x710mm	20x80x710mm	20x80x960mm	20x80x960mm	20x80x1460mm	20x80x1460mm
20x80x750mm	20x80x750mm	20x80x1000mm	20x80x1000mm	20x80x1500mm	20x80x1500mm

2.0 Assembly

2.1 Wheel Assembly

ITEM NO	DESCRIPTION	QTY
1	625-2RS-BEARING	2
2	PRECISION-SHIM	1
3	SOLID-V-WHEEL-XTREME	1



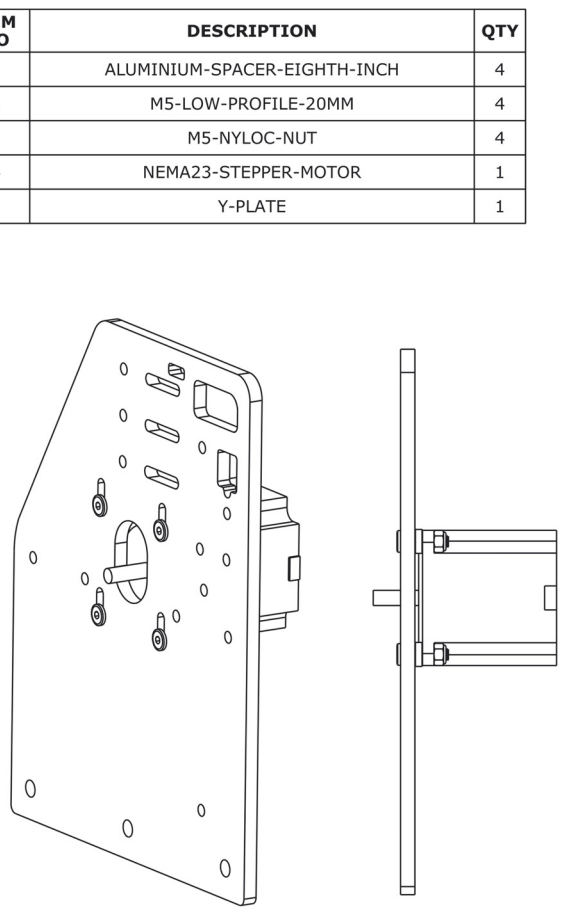
A. With a Precision-Shim in between, insert a 625-2RS-Bearing into either side of the Solid-V-Wheel-Xtreme.

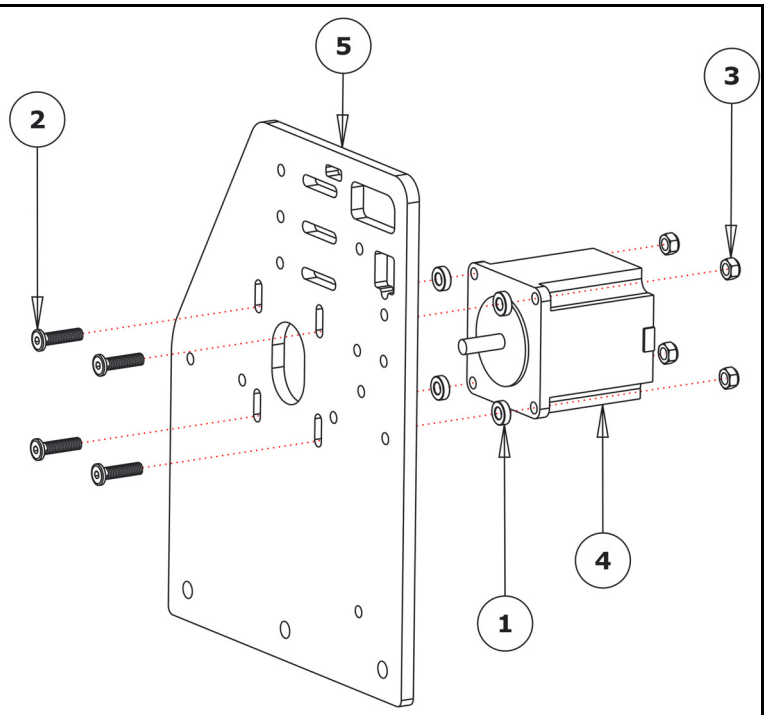
B. Repeat this for all 30 Solid-V-Wheel-Xtremes.

2.2 Side Plates

2.2.1 Attaching Motor

ITEM NO	DESCRIPTION	QTY
1	ALUMINIUM-SPACER-EIGHTH-INCH	4
2	M5-LOW-PROFILE-20MM	4
3	M5-NYLOC-NUT	4
4	NEMA23-STEPPER-MOTOR	1
5	Y-PLATE	1



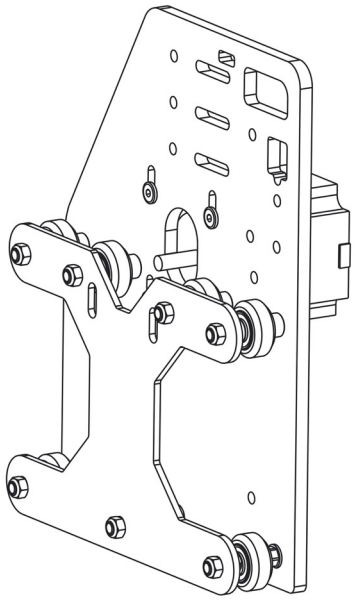


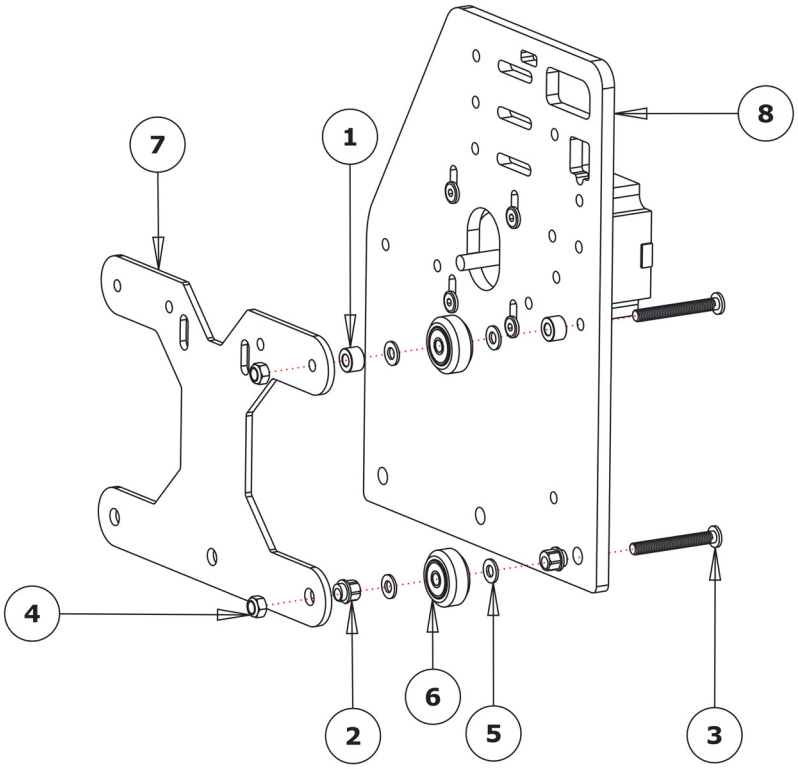
A. Attach a NEMA23-Stepper-Motor to one of the Y-Plates using 4 x M5-Low-Profile-20mm Bolts and 4 x M5-Nyloc-Nuts. Make sure you place an Aluminium-Spacer-Eighth-Inch in-between the NEMA23-Stepper-Motor and the Y-Plate. The NEMA23-Stepper-Motor should be orientated so the side that the wire is coming from is facing toward the back of the Y-Plate (the straight vertical side).

B. Only loosely tighten the bolts for now. These will be tightened later once the GT3-Belt has been attached. Make sure the M5-Low-Profile-20mm Bolts are sitting on the bottom surface of the elongated holes.

2.2.2 Wheel & Brace Assembly

ITEM NO	DESCRIPTION	QTY
1	ALUMINIUM-SPACER-QUARTER-INCH	8
2	ECCENTRIC-SPACER	6
3	M5-LOW-PROFILE-40MM	7
4	M5-NYLOC-NUT	7
5	PRECISION-SHIM	14
6	SOLID-V-WHEEL-XTREME	7
7	Y-BRACE	1
8	Y-PLATE	1





A. First attach the top right Solid-V-Wheel-Xtreme in between the Y-Plate & Y-Brace using the components shown above. Note that the top row of the wheels uses Aluminium-Spacer-Quarter-Inches. Only screw the M5-Nyloc-Nut on the end of the M5-Low-Profile-40mm a small amount so the rest of the wheels can be attached.

B. Repeat Step A for the bottom right wheel. Note that the bottom row of the wheels uses Eccentric-Spacers. The smaller rounded section of the Eccentric-Spacer should be inserted into either the Y-Plate or Y-Brace, depending on which side of the wheel it is. Again, only attach the M5-Nyloc-Nut a small amount.

C. First repeat Step B for the other 2 wheels on the bottom row, then repeat Step A for the other 3 wheels on the top row.

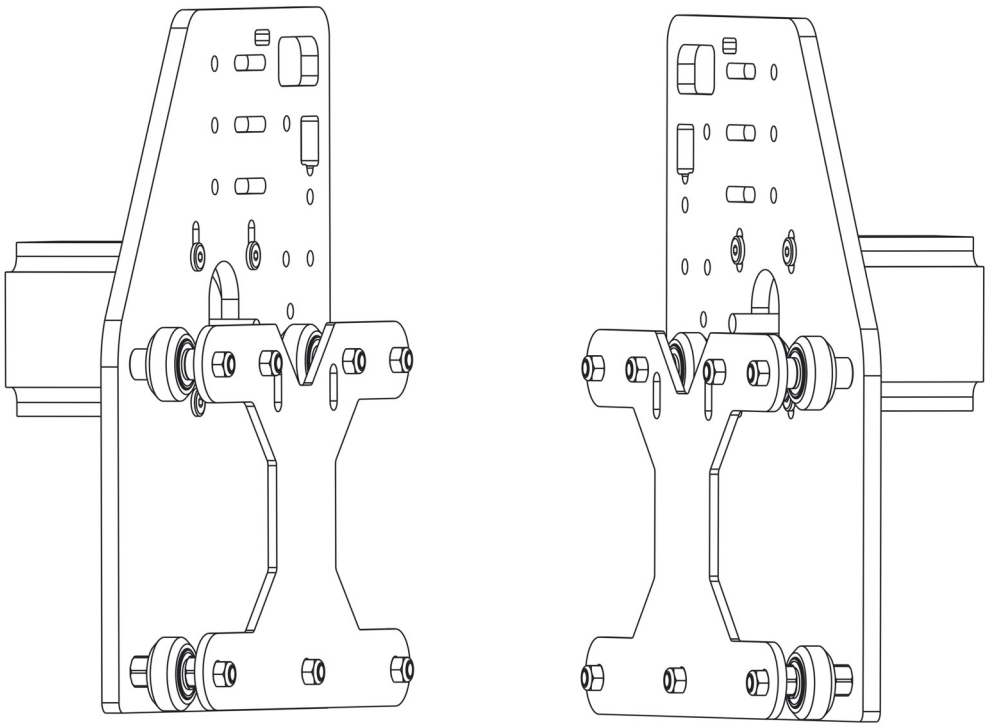
D. Once all the wheels are attached, they can be tightened down. However, make sure they still rotate freely. For the bottom row of wheels, leave these slightly loose, and initially set both Eccentric-Spacers on all 3 wheels so the divot on the larger rounded section is facing downwards. Doing this maximizes the gap between the top and bottom row of wheels.

E. Run any piece of 20x80mm V-Slot Extrusion in-between the two rows of wheels. Initially the V-Slot should wobble in between the wheels. Push the V-Slot up against the top row of wheels and adjust the Eccentric-Spacers on the bottom wheels so the V-Slot runs smoothly without any wobble. There should be a small amount of friction. Make sure that, when adjusting the Eccentric-Spacers, the divots on each side of the wheel are kept in-line– i.e whatever is done to one side of wheel should be done to the other.

F. Once you're satisfied, the bottom row of wheels can be tightened down. Once tight, recheck that the 20x80mm V-Slot still runs smoothly.

2.2.3 Repeat

ITEM NO	DESCRIPTION	QTY
1	Y-PLATE	2

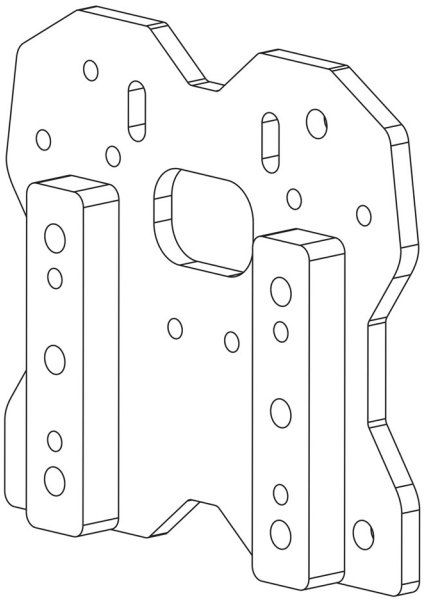


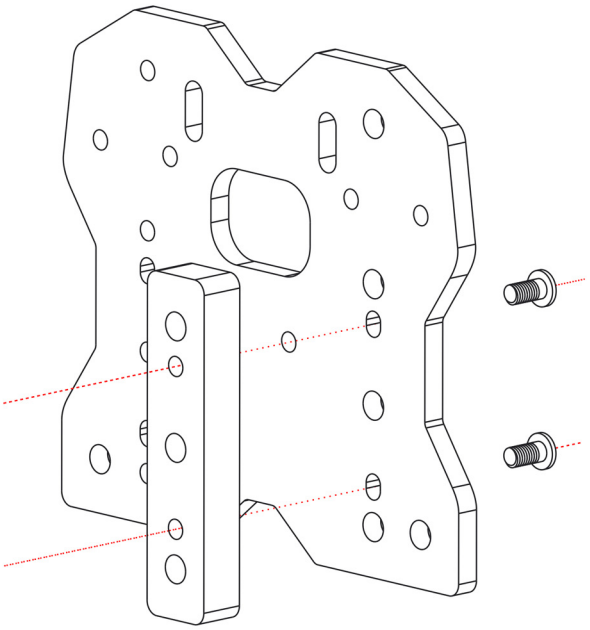
A. Repeat Section 2.2 for the other Y-Plate. However, this time it should be a mirror image of the first Y-Plate, as shown in the image above.

2.3 X-Carriage Assembly

2.3.1 Front Plate Spacer Blocks

ITEM NO	DESCRIPTION	QTY
1	M5-LOW-PROFILE-10MM	4
2	SPACER-BLOCK	2
3	X-PLATE-FRONT	1



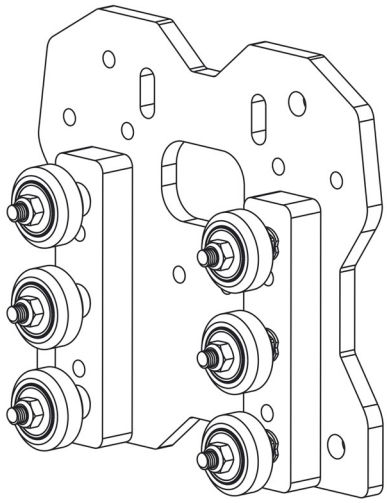


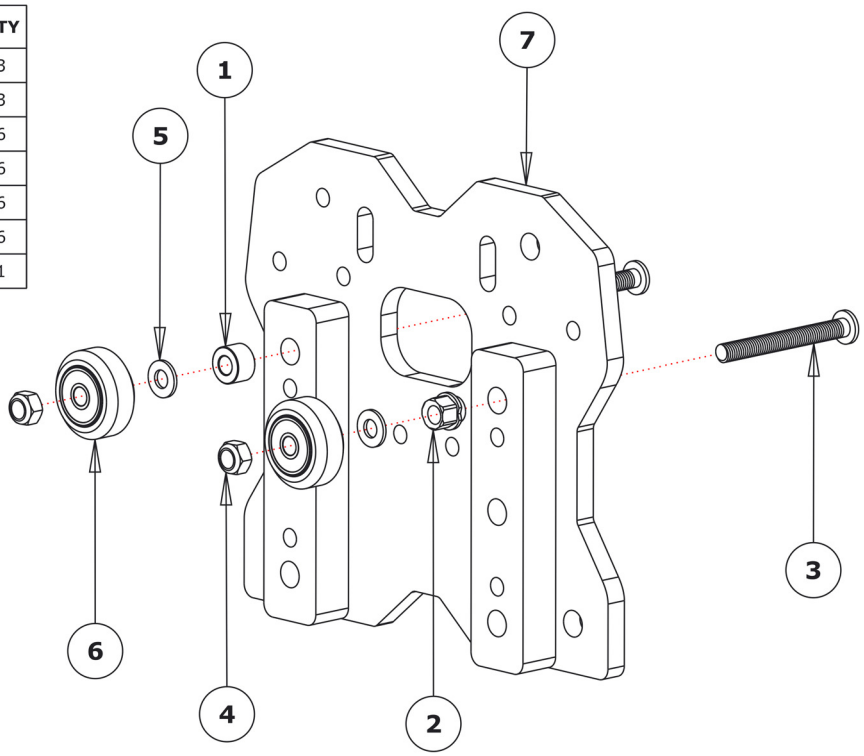
A. Attach one Spacer-Block to the X-Plate-Front using 2 x M5-Low-Profile-10mm's. The holes on the X-Plate-Front are slots to allow for some adjustment, however the bottom of the Spacer-Block should sit flush with the bottom of the X-Plate-Front. The other 3 holes on the Spacer-Block should align with the 3 holes on the X-Plate-Front.

B. Repeat Step A for the second Spacer-Block.

2.3.2 Front Plate Wheel Assembly Part 1

ITEM NO	DESCRIPTION	QTY
1	ALUMINIUM-SPACER-QUARTER-INCH	3
2	ECCENTRIC-SPACER	3
3	M5-LOW-PROFILE-45MM	6
4	M5-NYLOC-NUT	6
5	PRECISION-SHIM	6
6	SOLID-V-WHEEL-XTREME	6
7	X-PLATE-FRONT	1





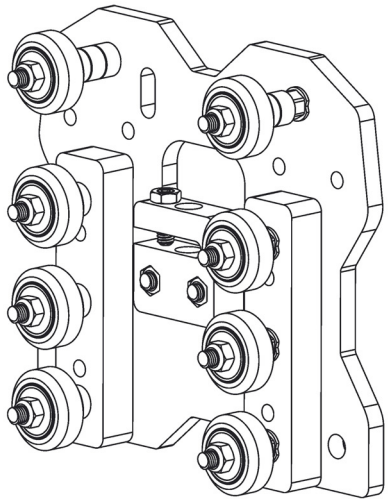
A. First, attach the top left Solid-V-Wheel-Xtreme onto the Spacer-Block using the components shown above. Note that the left row of wheels uses Aluminium-Spacer-Quarter-Inches. The wheel can be tightened down, but make sure it still rotates freely.

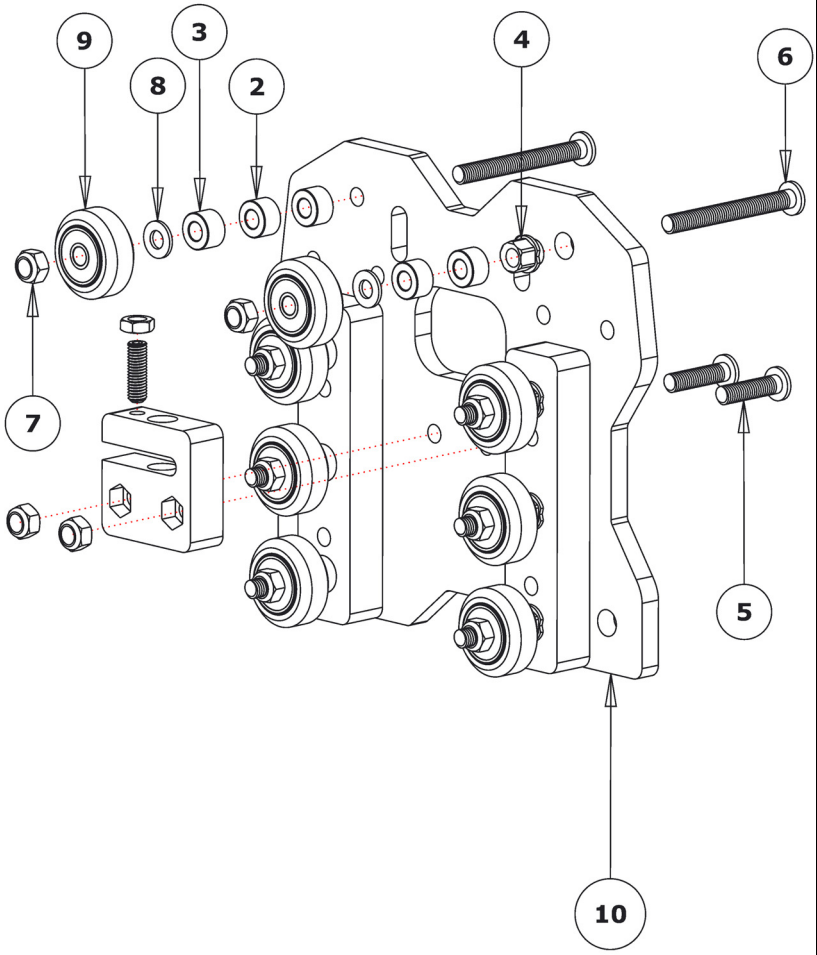
B. Repeat Step A for the top right wheel. Note that the right row of wheels uses Eccentric-Spacers. The smaller rounded section of the Eccentric-Spacer should be inserted into the Spacer-Block. The wheel can be tightened down, but leave it slightly loose and initially set the Eccentric-Spacer so the divot is facing right.

C. Repeat Step A for the other 2 wheels on the left row, and repeat Step B for the other 2 wheels on the right row.

2.3.3 Front Plate Wheel Assembly Part 2

ITEM NO	DESCRIPTION	QTY
1	ACME-AB-NUT-BLOCK	1
2	ALUMINIUM-SPACER-6MM	4
3	ALUMINIUM-SPACER-QUARTER-INCH	1
4	ECCENTRIC-SPACER	1
5	M5-LOW-PROFILE-20MM	2
6	M5-LOW-PROFILE-45MM	2
7	M5-NYLOC-NUT	4
8	PRECISION-SHIM	2
9	SOLID-V-WHEEL-XTREME	2
10	X-PLATE-FRONT	1





A. First, attach the top left Solid-V-Wheel-Xtreme to the X-Plate-Front. Note that the order of the spacers for this wheel should be (starting from the X-Plate-Front): Aluminium-Spacer-6mm, Aluminium-Spacer-6mm, Aluminium-Spacer-Quarter-Inch, Precision-Shim. The wheel can be tightened down, but make sure it still rotates freely.

B. Attach the top right Solid-V-Wheel-Xtreme to the X-Plate-Front. Note that the order of the spacers for this wheel should be (starting from the X-Plate-Front) Eccentric Spacer, Aluminium-Spacer-6mm, Aluminium-Spacer-6mm, Precision-Shim. The wheel can be tightened down, but leave it slightly loose, and initially set the Eccentric-Spacer so the divot is facing right.

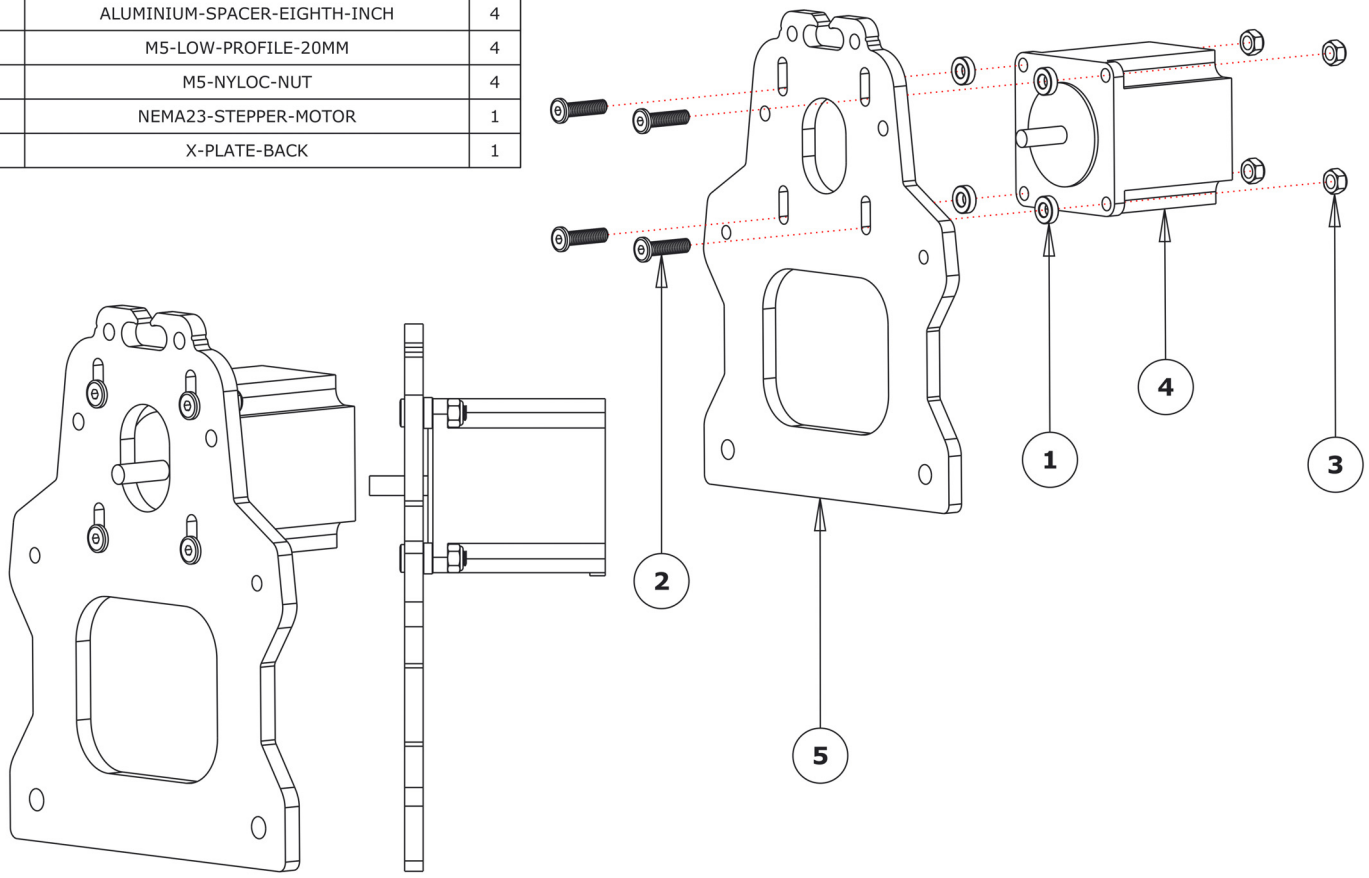
C. Run any piece of 20x60mm V-Slot Extrusion in-between the two rows of wheels. Initially the V-Slot should wobble in-between the wheels. Push the V-Slot left against the left row of wheels, and adjust the Eccentric-Spacers on the right wheels so it runs smoothly without any wobble. There should be a small amount of friction.

D. Once you're satisfied, the right row of wheels can be tightened down. Once tight, recheck that the 20x60mm V-Slot still runs smoothly.

E. Attach the ACME-AB-Nut-Block to the X-Plate-Front. The M5-Nyloc-Nuts go into the insets and should be facing away from the X-Plate-Front. Screw the set screw provided with the ACME-AB-Nut-Block into the smaller threaded hole on the top, until it is just before the point of touching the surface on the opposite side of the gap. Slightly screw the provided nut onto the end of the set screw. The set screw will later be used to remove any back lash from the system.

2.3.4 Attaching Back Plate Motor

ITEM NO	DESCRIPTION	QTY
1	ALUMINIUM-SPACER-EIGHTH-INCH	4
2	M5-LOW-PROFILE-20MM	4
3	M5-NYLOC-NUT	4
4	NEMA23-STEPPER-MOTOR	1
5	X-PLATE-BACK	1

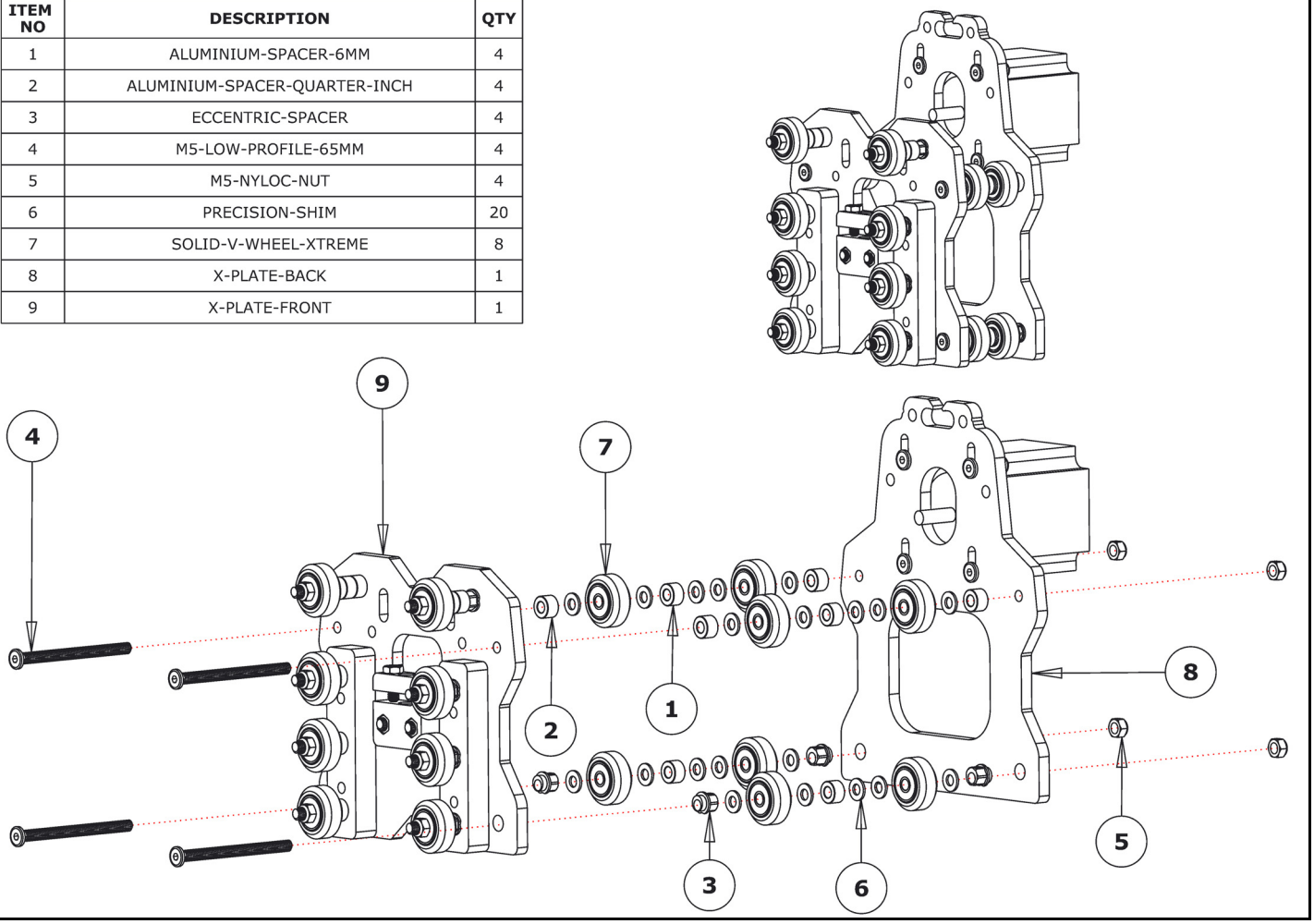


A. Attach a NEMA23-Stepper-Motor to the X-Plate-Back using 4 x M5-Low-Profile-20mm Bolts and 4 x M5-Nyloc-Nuts. Make sure you place an Aluminium-Spacer-Eighth-Inch in between the NEMA23-Stepper-Motor and the X-Plate-Back. The NEMA23-Stepper-Motor should be orientated so the side that the wire is coming from is facing downwards.

B. Only loosely tighten the bolts for now. These will be tightened later once the GT3-Belt has been attached. Make sure the M5-Low-Profile-20mm Bolts are sitting on the bottom surface of the elongated holes.

2.3.5 Mating Front & Back Plates

ITEM NO	DESCRIPTION	QTY
1	ALUMINIUM-SPACER-6MM	4
2	ALUMINIUM-SPACER-QUARTER-INCH	4
3	ECCENTRIC-SPACER	4
4	M5-LOW-PROFILE-65MM	4
5	M5-NYLOC-NUT	4
6	PRECISION-SHIM	20
7	SOLID-V-WHEEL-XTREME	8
8	X-PLATE-BACK	1
9	X-PLATE-FRONT	1



A. First, attach the top right two Solid-V-Wheel-Xtremes in between the X-Plate-Front and X-Plate-Back using the components shown above. Note that the aluminium spacers used in between the two wheels is an Aluminium-Spacer-6mm and the aluminium spacers used on the outer side of the wheels are Aluminium-Spacer-Quarter-Inches. Only screw the M5-Nyloc-Nut on the end of the M5-Low-Profile-65mm a small amount so the rest of the wheels can be attached.

B. Repeat Step A for the bottom right wheel. Note the bottom row of wheels use Eccentric-Spacers on the outside. However they still use an Aluminium-Spacer-6mm in between the wheels. The smaller rounded section of the Eccentric-Spacer should be inserted into either the X-Plate-Front or X-Plate-Back, depending which side of the wheel it is. Again, only attach the M5-Nyloc-Nut a small amount.

C. First repeat Step B for the bottom left wheel, and then repeat Step A for the top left wheel

D. Once all the wheels are attached, they can be tightened down. When doing this, place the bottom of the assembly flat on a table to make sure the X-Plate-Front and X-Plate-Back are square with each other. Make sure the wheels still rotate freely. For the bottom row of wheels, leave these slightly loose, and initially set both Eccentric-Spacers on both wheels so the divot is facing downwards.

E. Simultaneously, run 2 pieces of 20x60mm V-Slot Extrusion in between the two rows of wheels on both sides. Initially the V-Slot should wobble in between the wheels. Push the V-Slot up against the top row of wheels and adjust the Eccentric-Spacers on the bottom wheels so the V-Slot runs smoothly without any wobble. There should be a small amount of friction. Make sure that, when adjusting the Eccentric-Spacers, the

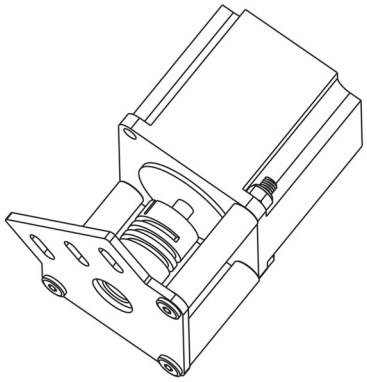
divots on each side of the two wheels are kept in-line where possible– i.e whatever is done to one side should be done to the other.

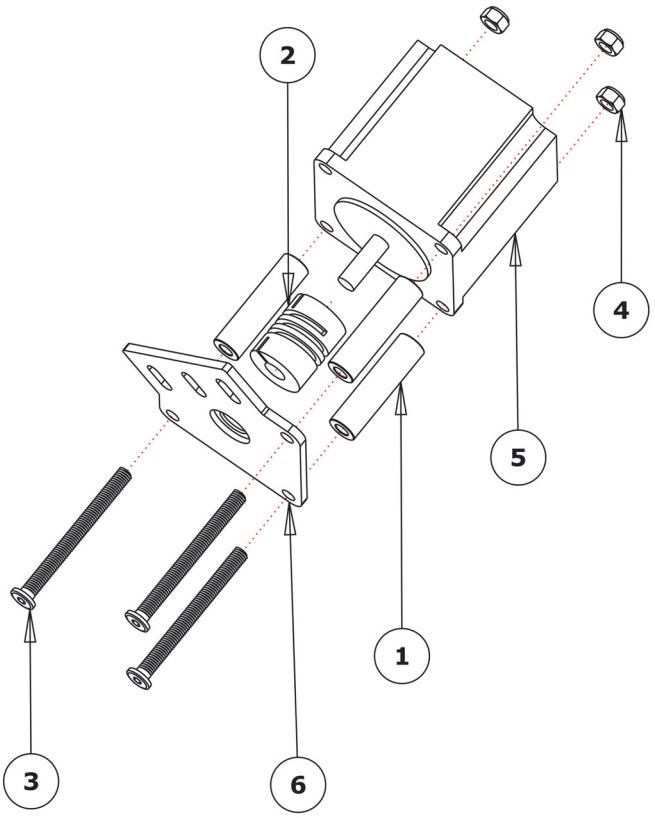
F. Once satisfied, the bottom row of wheels can be tightened down. Once tight, recheck that 2 x 20x60mm V-Slot still runs smoothly.

2.4 Z Axis Assembly

2.4.1 Motor Assembly

ITEM NO	DESCRIPTION	QTY
1	ALUMINIUM-SPACER-ONEHALF-INCH	3
2	FLEXIBLE-COUPLER	1
3	M5-LOW-PROFILE-55MM	3
4	M5-NYLOC-NUT	3
5	NEMA23-STEPPER-MOTOR	1
6	THREADED-ROD-MOUNT-MOTOR	1



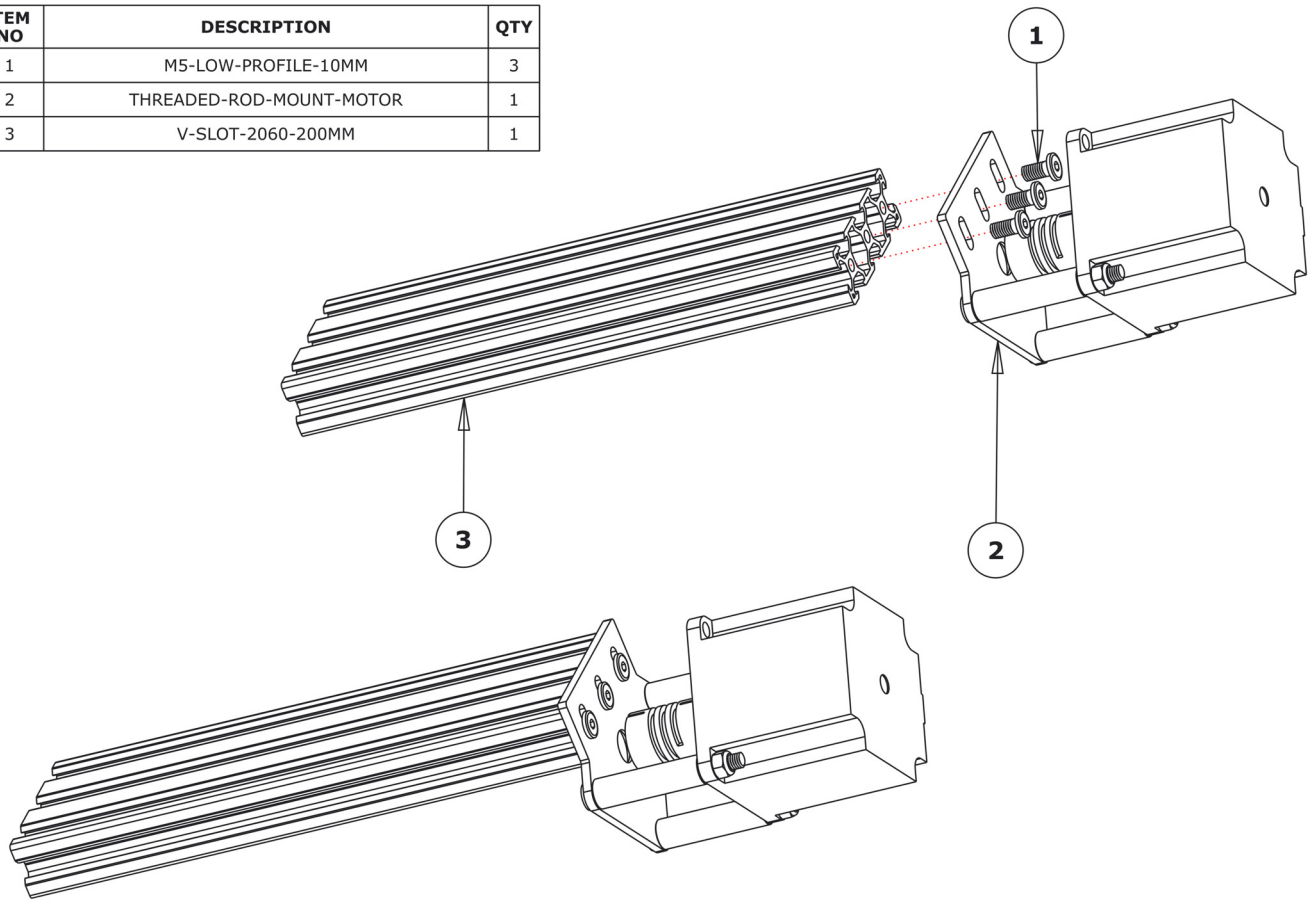


A. Slide the 1/4” side (the side with the smallest hole) of the Flexible-Coupler onto the shaft of the NEMA23-Stepper-Motor. Don’t tighten it down at this point.

B. Then attach the NEMA23-Stepper-Motor to the Threaded-Rod-Mount-Motor. Make sure the inset for the 688ZZ-Bearing is facing away from the NEMA23-Stepper-Motor.

2.4.2 Attaching V-Slot

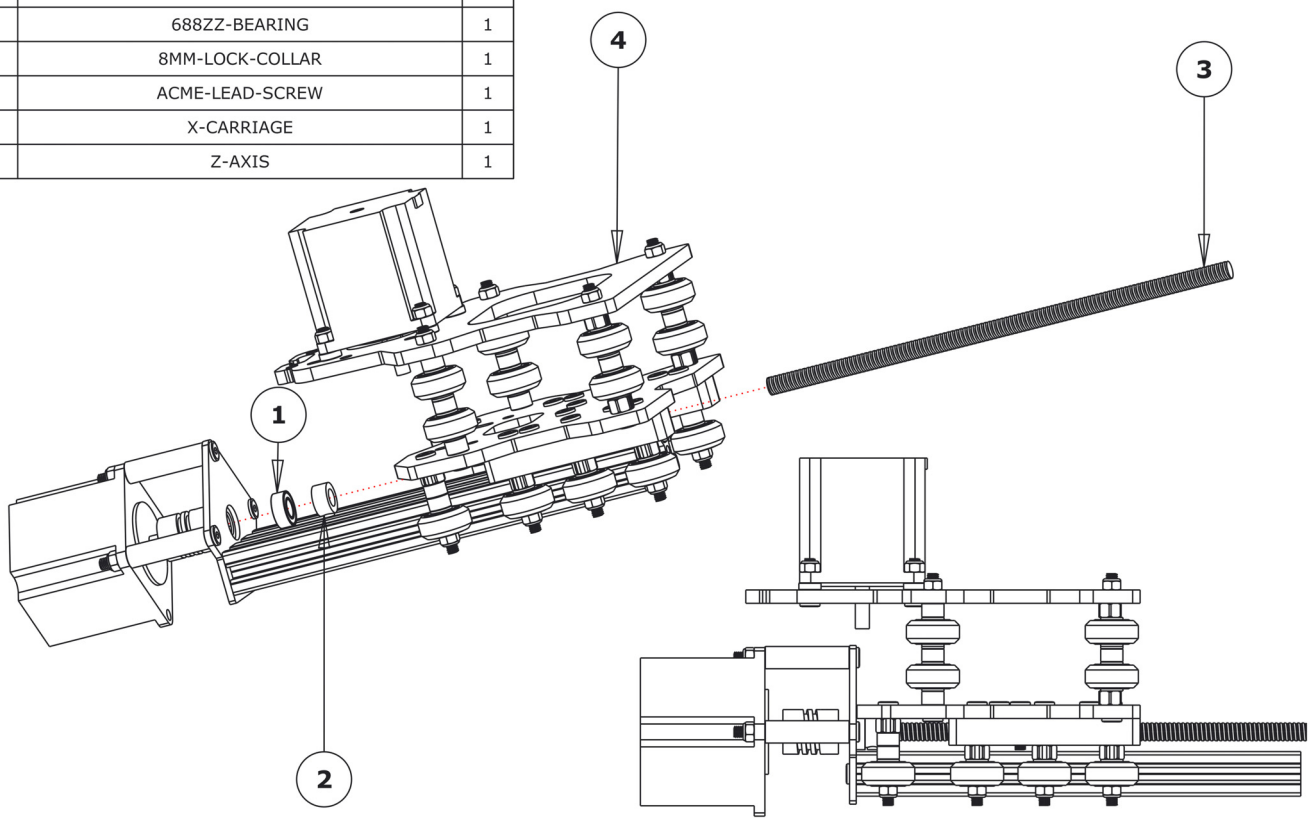
ITEM NO	DESCRIPTION	QTY
1	M5-LOW-PROFILE-10MM	3
2	THREADED-ROD-MOUNT-MOTOR	1
3	V-SLOT-2060-200MM	1



A. Attach the V-Slot-2060-200mm to the Threaded-Rod-Mount-Motor using 3 x M5-Low-Profile-10mm. For the middle bolt, the short end of the Allen key may need to be used. Leave these bolts initially loose so the Threaded-Rod-Motor-Mount can be adjusted forward and backwards.

2.4.3 Attaching ACME-Lead-Screw

ITEM NO	DESCRIPTION	QTY
1	688ZZ-BEARING	1
2	8MM-LOCK-COLLAR	1
3	ACME-LEAD-SCREW	1
4	X-CARRIAGE	1
5	Z-AXIS	1



A. Thread the ACME-Lead-Screw through the ACME-AB-Nut-Block on the X-Carriage about half way, this may require a lot of force for the first time threading. Then slide a 8mm-Lock-Collar and a 688ZZ-Bearing on to the ACME-Lead-Screw.

B. Slide the Z-Axis through the front set of wheels on the X-Carriage in the orientation shown above. Slide it on until the ACME-Lead-Screw goes into the Flexible-Coupler and is touching the shaft on the NEMA23-Stepper-Motor.

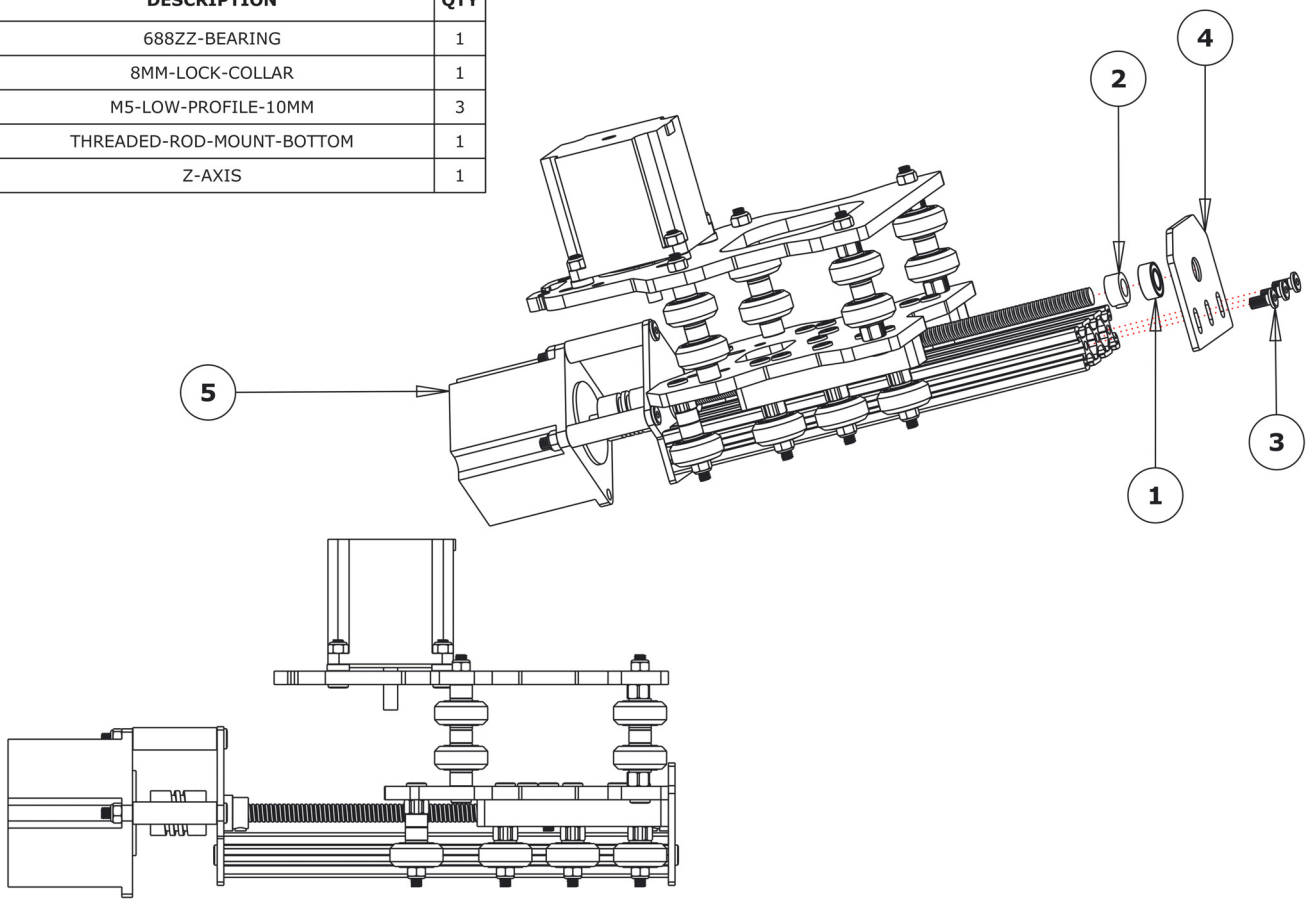
C. Slide the 688ZZ-Bearing down the ACME-Lead-Screw until it seats into the inset on the Threaded-Rod-Mount-Motor. Push the 8mm-Lock-Collar down on top of the 688ZZ-Bearing, and lock it in place with the grub screw.

D. The top of the X-Plate-Front on the X-Carriage needs to be just touching the Threaded-Rod-Mount-Motor. If it isn't, the Threaded-Rod-Mount-Motor can be moved up or down by turning the ACME-Lead-Screw in the appropriate direction.

E. Once they are touching, make sure the back edge of the Threaded-Rod-Mount-Motor is square with the V-Slot-2060-200mm, and tighten the M5-Low-Profile-10mm bolts attached in the previous section.

2.4.4 Threaded-Rod-Mount-Bottom

ITEM NO	DESCRIPTION	QTY
1	688ZZ-BEARING	1
2	8MM-LOCK-COLLAR	1
3	M5-LOW-PROFILE-10MM	3
4	THREADED-ROD-MOUNT-BOTTOM	1
5	Z-AXIS	1



A. Slide a 8mm-Lock-Collar and 688zz-Bearing onto the ACME-Lead-Screw.

B. Attach the Threaded-Rod-Mount-Bottom on to the Z-Axis using 3 x M5-Low-Profile-10mm bolts. Only loosely tighten. The 688ZZ-Bearing should sit in the inset on the side of the Threaded-Rod-Mount-Bottom.

C. The bottom of the X-Plate-Front on the X-Carriage should be just touching the Threaded-Rod-Mount-Bottom to move the Z-Axis up or down turn the ACME-Lead-Screw in the appropriate direction. Once in position, square the Threaded-Rod-Mount-Bottom with the V-Slot-2060-200mm, and tighten the M5-Low-Profile-10mm bolts.

D. Push the 688ZZ-Bearing into the inset on the Threaded-Rod-Mount-Bottom, and secure the 8mm-Lock-Collar on top.

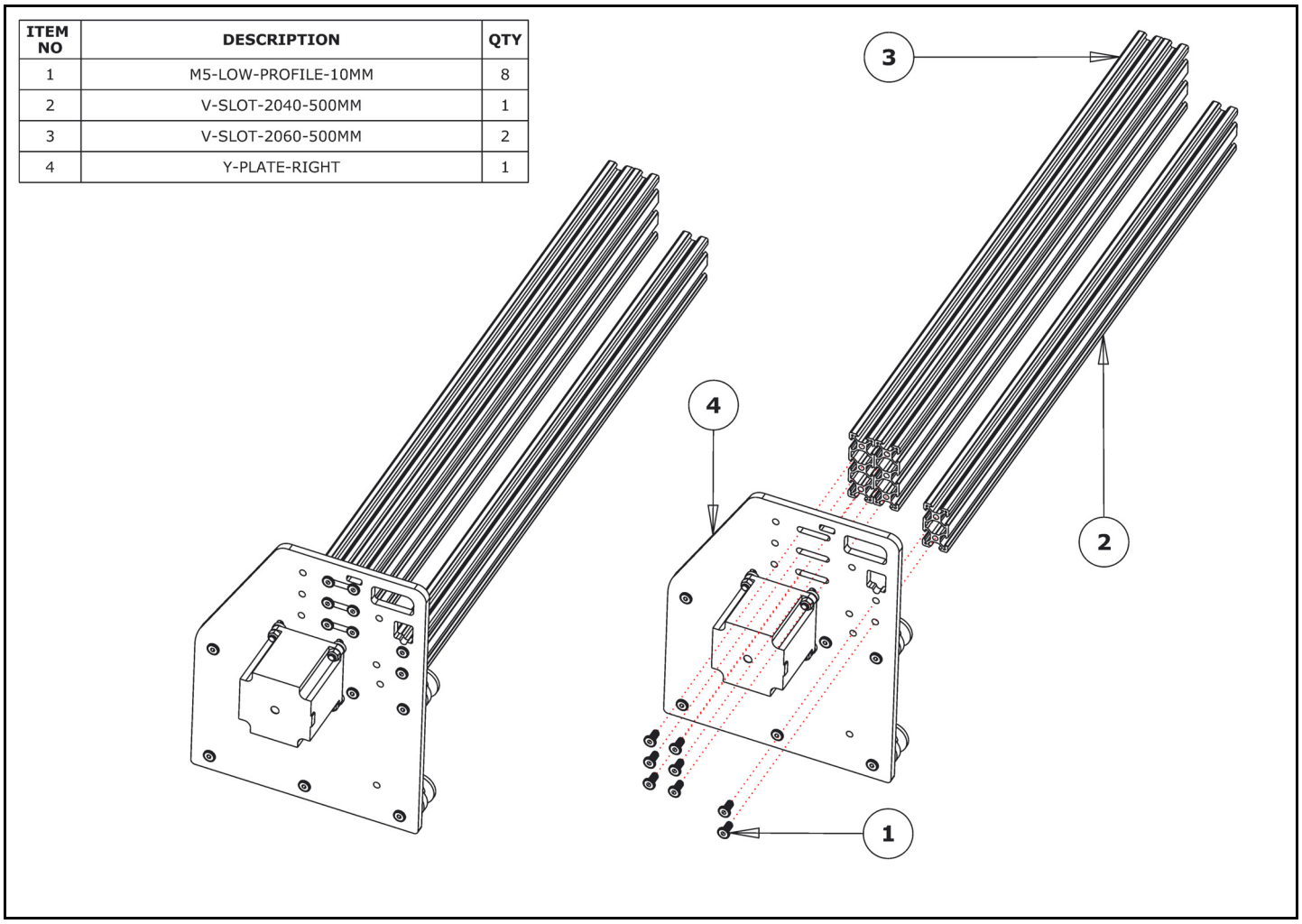
E. The Flexible-Coupler can now be locked in place. Make sure one of the grub screws is on the flat section of the shaft on the NEMA23-Stepper-Motor and that the ACME-Lead-Screw and motor shaft are touching.

F. Sturdily hold the assembly, and check for any up and down play in the Z-Axis. If there is any, this is due to backlash in the ACME-AB-Nut-Block. The set screw which was inserted in Step 2.3.3 Part E into the ACME-AB-Nut-Block can be screwed downwards to remove this. The nut can then be tightened on top to lock it in place. This will need to be re-checked once you have attached your router and began using the machine.

2.5 X Gantry Assembly

2.5.1 V-Slot

ITEM NO	DESCRIPTION	QTY
1	M5-LOW-PROFILE-10MM	8
2	V-SLOT-2040-500MM	1
3	V-SLOT-2060-500MM	2
4	Y-PLATE-RIGHT	1



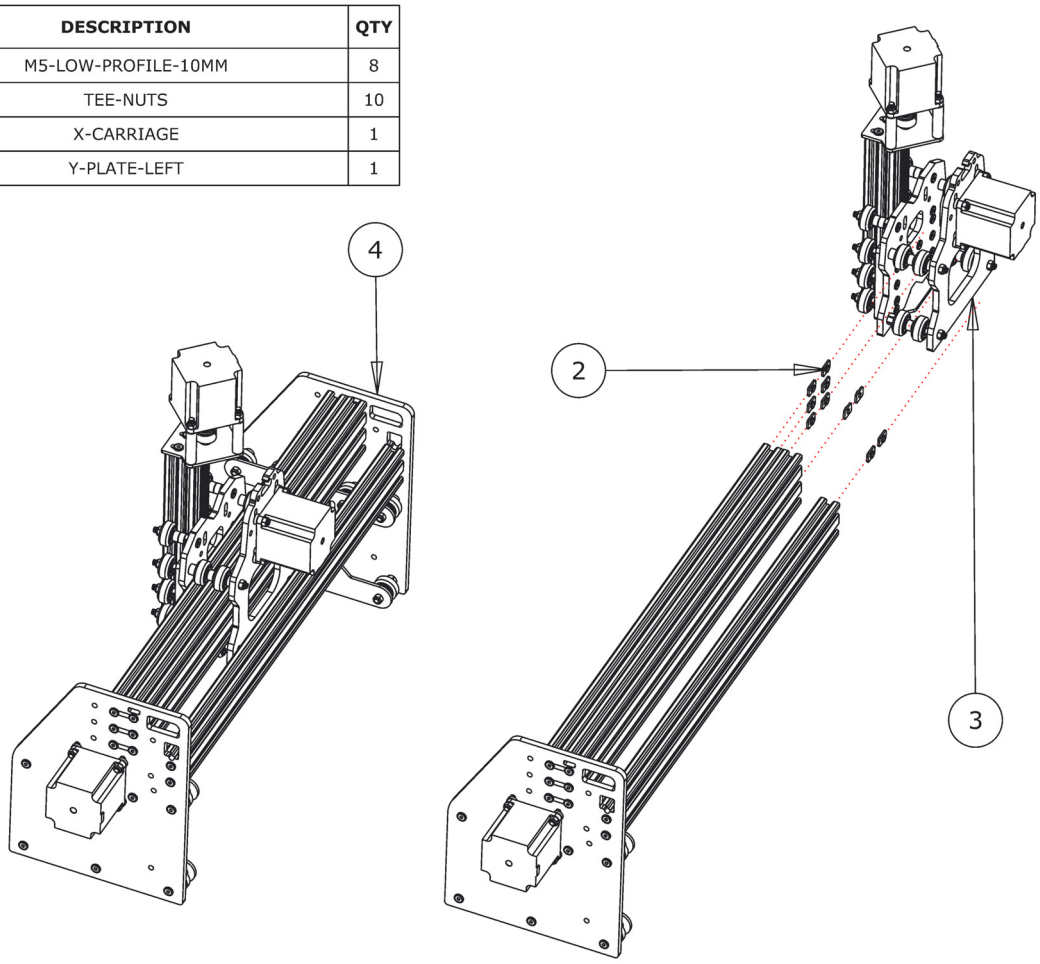
A. Attach the V-Slot-2040-500mm to the back two holes on the Y-Plate-Right using 2 x M5-Low-Profile-10mm Bolts.

B. First, attach the back V-Slot-2060-500mm (the middle one in the image) to the Y-Plate-Right. Only loosely tighten the 3 x M5-Low-Profile-10mm Bolts.

C. Attach the second V-Slot-2060-500mm to the Y-Plate-Right, next to the one in Step B. Tighten the screws down, and when doing so, make sure you squeeze and push both rails to the back so the screws on the back rail are touching the back of their respective slots. Also keep the top of the rails flush with each other. Tighten all 6 bolts holding the rails.

2.5.2 Tee-Nuts & Carriage

ITEM NO	DESCRIPTION	QTY
1	M5-LOW-PROFILE-10MM	8
2	TEE-NUTS	10
3	X-CARRIAGE	1
4	Y-PLATE-LEFT	1



A. Before the Y-Plate-Left can be attached, Tee-Nuts need to be inserted. Tee-Nuts should be inserted so the flat face is facing outwards. Therefore, insert 2 x Tee-Nuts in each of the 3 front-facing slots on the front V-Slot-2060-500mm and 2 x Tee-Nuts in the middle back-facing slot on the back V-Slot-2060-500mm. 2 x Tee-Nuts should be inserted in the bottom front-facing slot on the V-Slot-2040-500mm.

B. Slide the X-Carriage onto the two V-Slot-2060-500mm's in the orientation shown above.

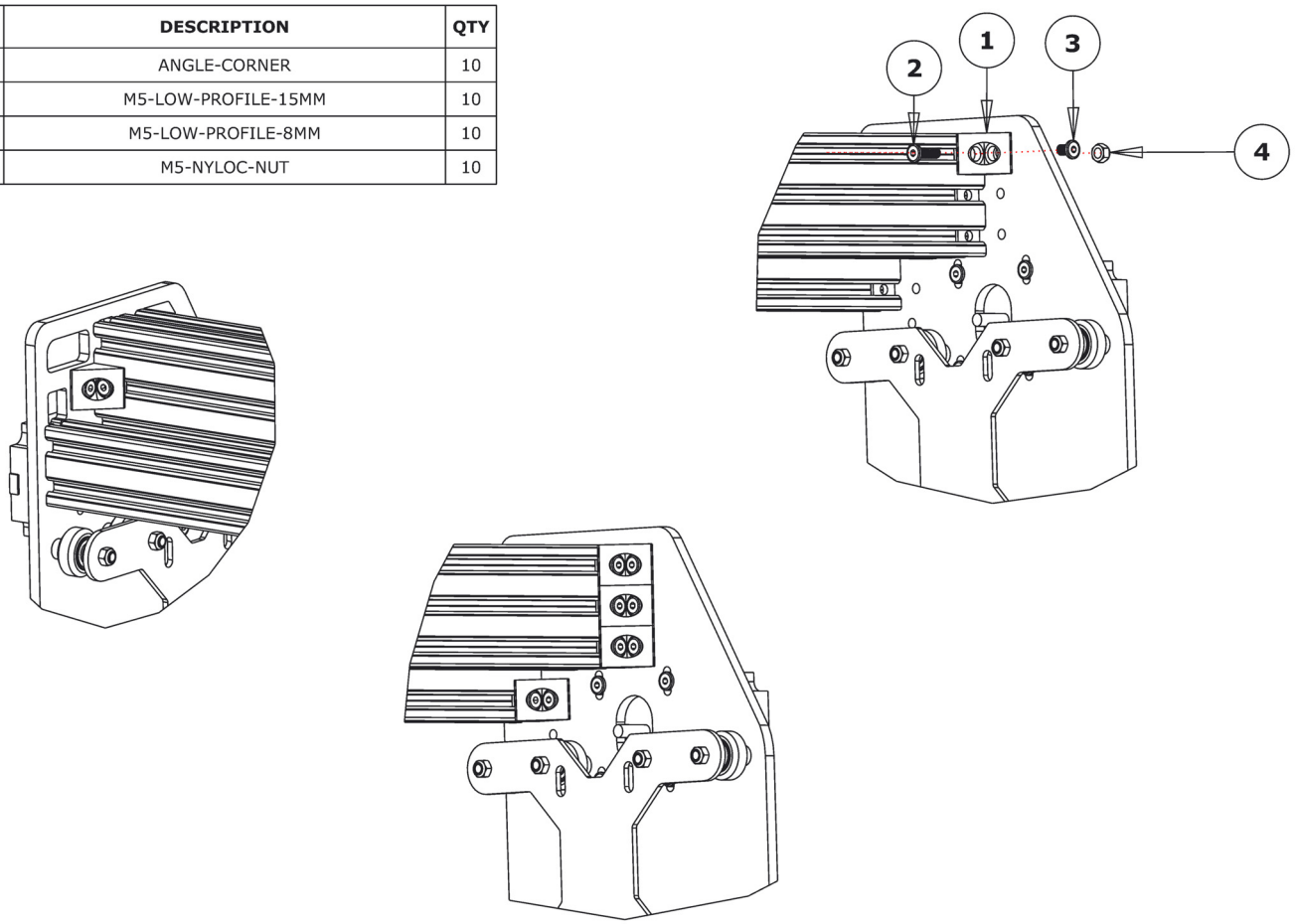
C. Now the Y-Plate-Left can be attached in the same way as in the previous step.

D. Recheck the bottom Eccentric-Spacers on the X-Carriage to make sure they are touching the rail and there is no wobble in the X-Carriage.

E. Slide the X-Carriage along the gantry to make sure it runs smoothly. If it doesn't run smoothly, recheck the Eccentric-Spacers. If the Eccentric-Spacers are correct and it still doesn't run smoothly, loosen the bolts holding the 2 x V-Slot-2060-500mm's and readjust the rails.

2.5.3 Angle-Corners

ITEM NO	DESCRIPTION	QTY
1	ANGLE-CORNER	10
2	M5-LOW-PROFILE-15MM	10
3	M5-LOW-PROFILE-8MM	10
4	M5-NYLOC-NUT	10



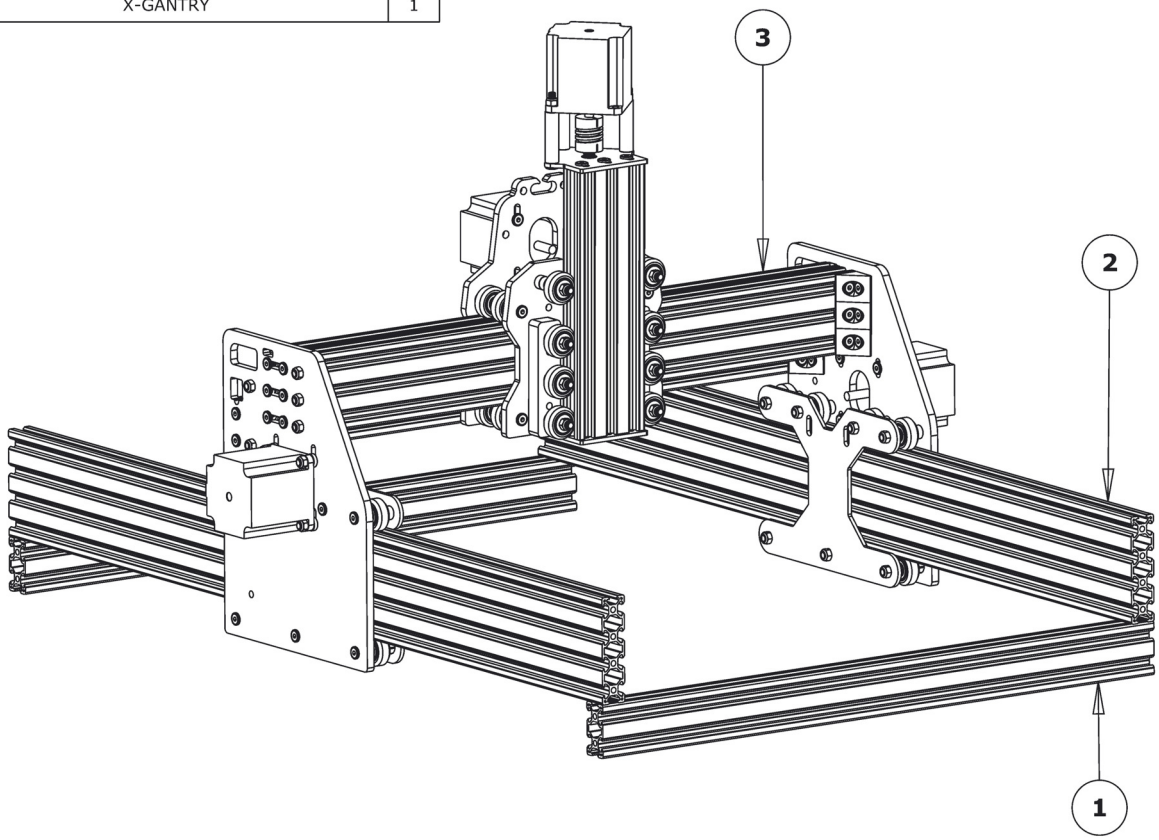
A. Attach an Angle-Corner to the Y-Plate-Right & the top slot of the front V-Slot-2060-500mm. A M5-Low-Profile-8mm screws into the Tee-Nut previously inserted, and the M5-Low-Profile-15mm goes though the Angle-Corner and attaches to a M5-Nyloc-Nut on the Y-Plate side.

B. Repeat Step A for the other 4 Angle-Corners on the Y-Plate-Right in the positions shown above. Repeat again for the 5 Angle-Corners on the Y-Plate-Left in the same positions.

2.6 Base Assembly

2.6.1 V-Slot Positioning - 1

ITEM NO	DESCRIPTION	QTY
1	V-SLOT-2040-494MM	2
2	V-SLOT-2080-750MM	2
3	X-GANTRY	1

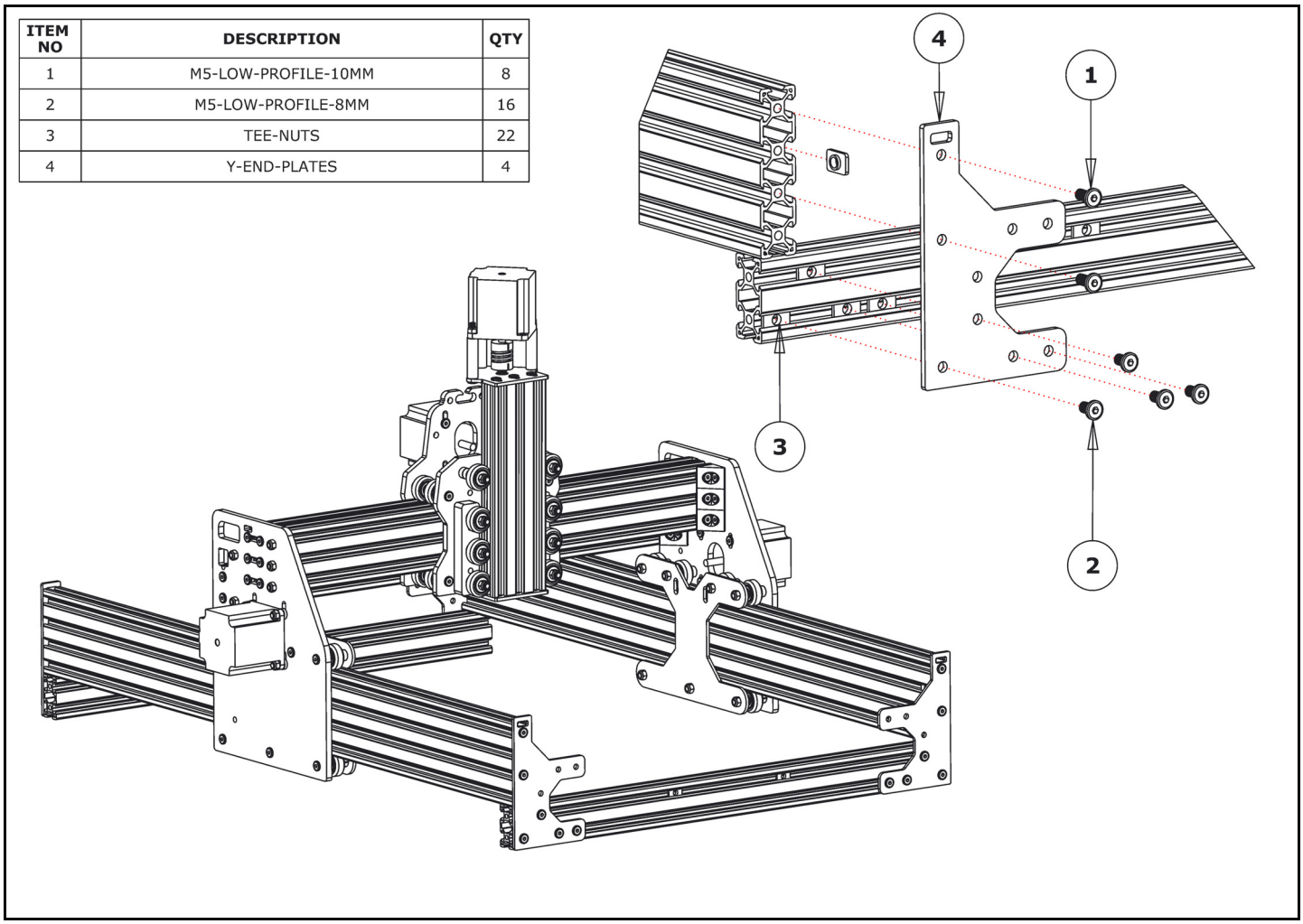


A. Slide a V-Slot-2080-750mm through each set of wheels on the X-Gantry. Note that not all of the holes are tapped on each end of the V-Slot-2080-750mm's. The V-Slot-2080-750mm's should be orientated so that the tapped holes go in the order, starting from the bottom: not tapped, tapped, not tapped, tapped.

B. Rest the ends of the V-Slot-2080-750mm's on top of a V-Slot-2040-494mm rail at each end. This is shown in the picture above. The ends of the V-Slot-2040-494mm's should be flush with the side of the V-Slot-2080-750mm's

2.6.2 Y-End-Plates

ITEM NO	DESCRIPTION	QTY
1	M5-LOW-PROFILE-10MM	8
2	M5-LOW-PROFILE-8MM	16
3	TEE-NUTS	22
4	Y-END-PLATES	4



A. Insert a Tee-Nut into the second slot down on the inward face of the of the V-Slot-2080-750mm.

B. Slide the X-Gantry to the front, and attach a Y-End-Plate to the front left corner, first using 2 x M5-Low-Profile-10mm's, which screw into the tapped holes on the V-Slot-2080-750mm.

C. Next slide 1 x Tee-Nut into the top slot of the V-Slot-2040-494mm and 3 x Tee-Nuts into the bottom slot of the V-Slot-2040-494mm. Adjust the Tee-Nuts so they line up with the holes on the Y-End-Plate.

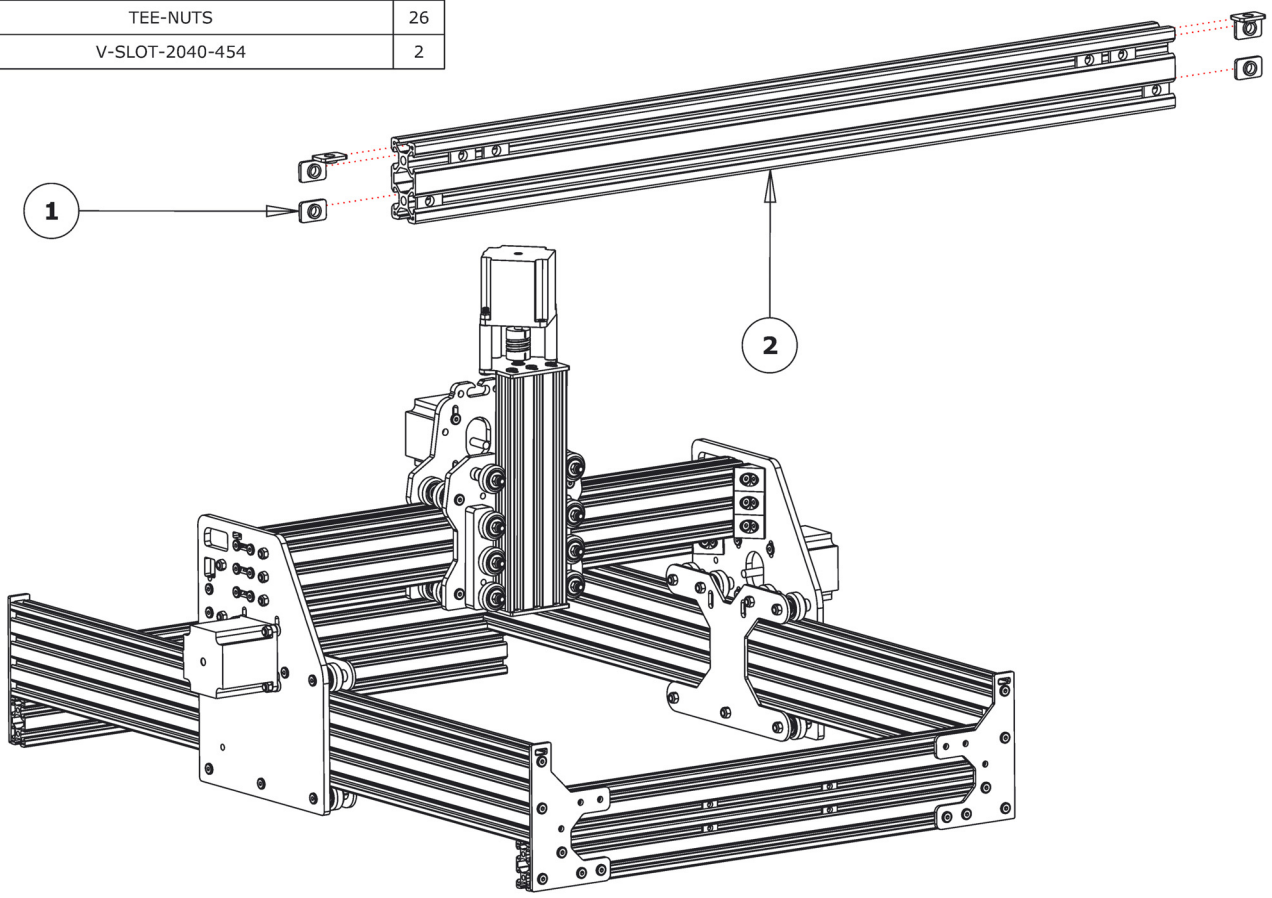
D. Secure the Y-End-Plate to the V-Slot-2040-494mm using 4 x M5-Low-Profile-8mm's. Ensure the end of the V-Slot-2040-494mm is flush with the side of the V-Slot-2080-750mm.

E. Square the base, and repeat Steps A,B,C & D for the front right Y-End-Plate. When inserting the Tee-Nuts, insert 2 extra into the top slot. These will be used to attach the Face-Plate later. If possible, get a second person to hold the base square while tightening the bolts.

F. Slide the X-Gantry to the back. Square the base, and repeat Steps A,B,C & D for the back two Y-End-Plates. Again, if possible, get a second person to hold the base square while tightening the bolts.

2.6.3 V-Slot Positioning - 2

ITEM NO	DESCRIPTION	QTY
1	TEE-NUTS	26
2	V-SLOT-2040-454	2



A. With a V-Slot-2040-454mm in hand, designate which sides are the top and outward facing. On the outward face, insert 4 x Tee-Nuts in the upper slot and 2 x Tee-Nuts in the lower slot. On the top face, insert 2 x Tee-Nuts into the slot. If this is the front V-Slot-2040-494mm, insert two extra Tee-Nuts into the front bottom slot. These will be used to attach the Face-Plate later.

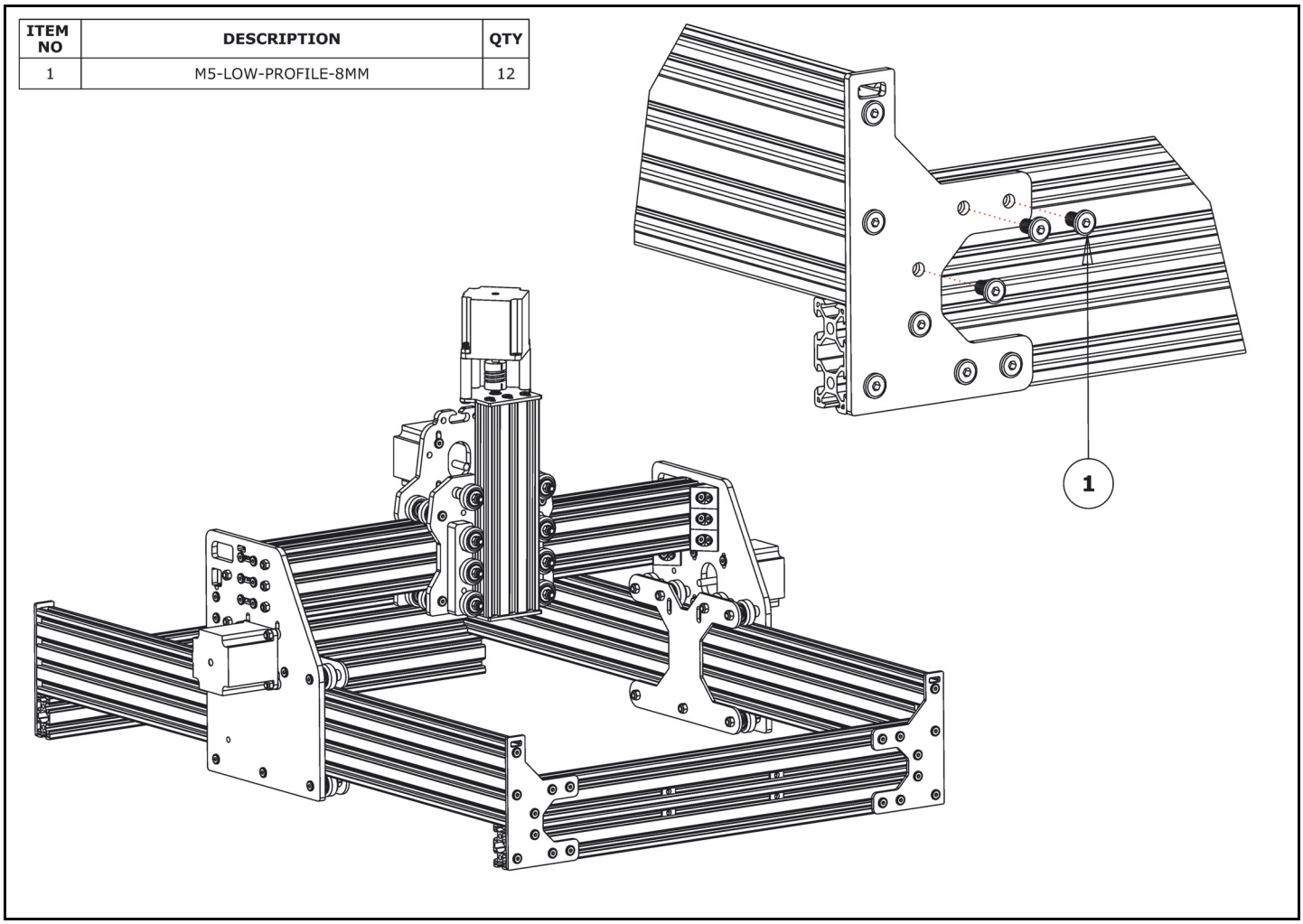
B. On the inward face, insert 2 x Tee-Nuts in both the upper and lower slots.

C. Insert the V-Slot-2040-454mm in between both V-Slot-2080-750mm's so it sits on top of the front V-Slot-2040-494mm. The outward face should be against the Y-End-Plates.

D. Repeat Steps A & B for the back V-Slot-2040-454mm. There is no need to insert the two extra Tee-Nuts.

2.6.4 Y-End-Plates - Final Bolts

ITEM NO	DESCRIPTION	QTY
1	M5-LOW-PROFILE-8MM	12



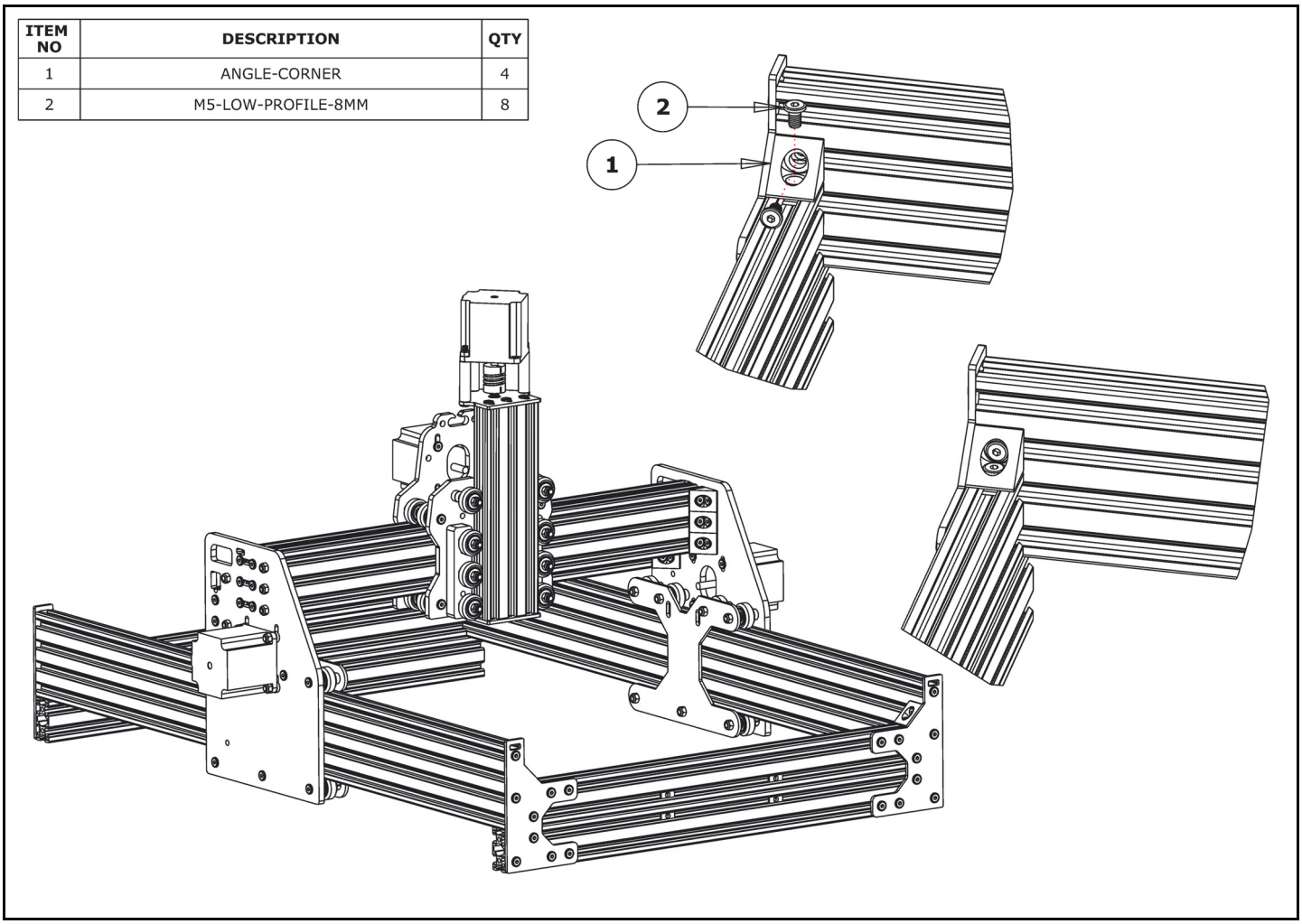
A. Align the Tee-Nuts inserted on the previous step with the holes on the front left Y-End-Plate.

B. Attach 3 x M5-Low-Profile-8mm’s through the last remaining holes on the Y-End-Plates. If possible, get a second person to hold the base square while tightening the bolts.

C. Repeat Steps A & B for the other 3 Y-End-Plates. Again, If possible, get a second person to hold the base square while tightening the bolts.

2.6.5 Angle-Corners

ITEM NO	DESCRIPTION	QTY
1	ANGLE-CORNER	4
2	M5-LOW-PROFILE-8MM	8



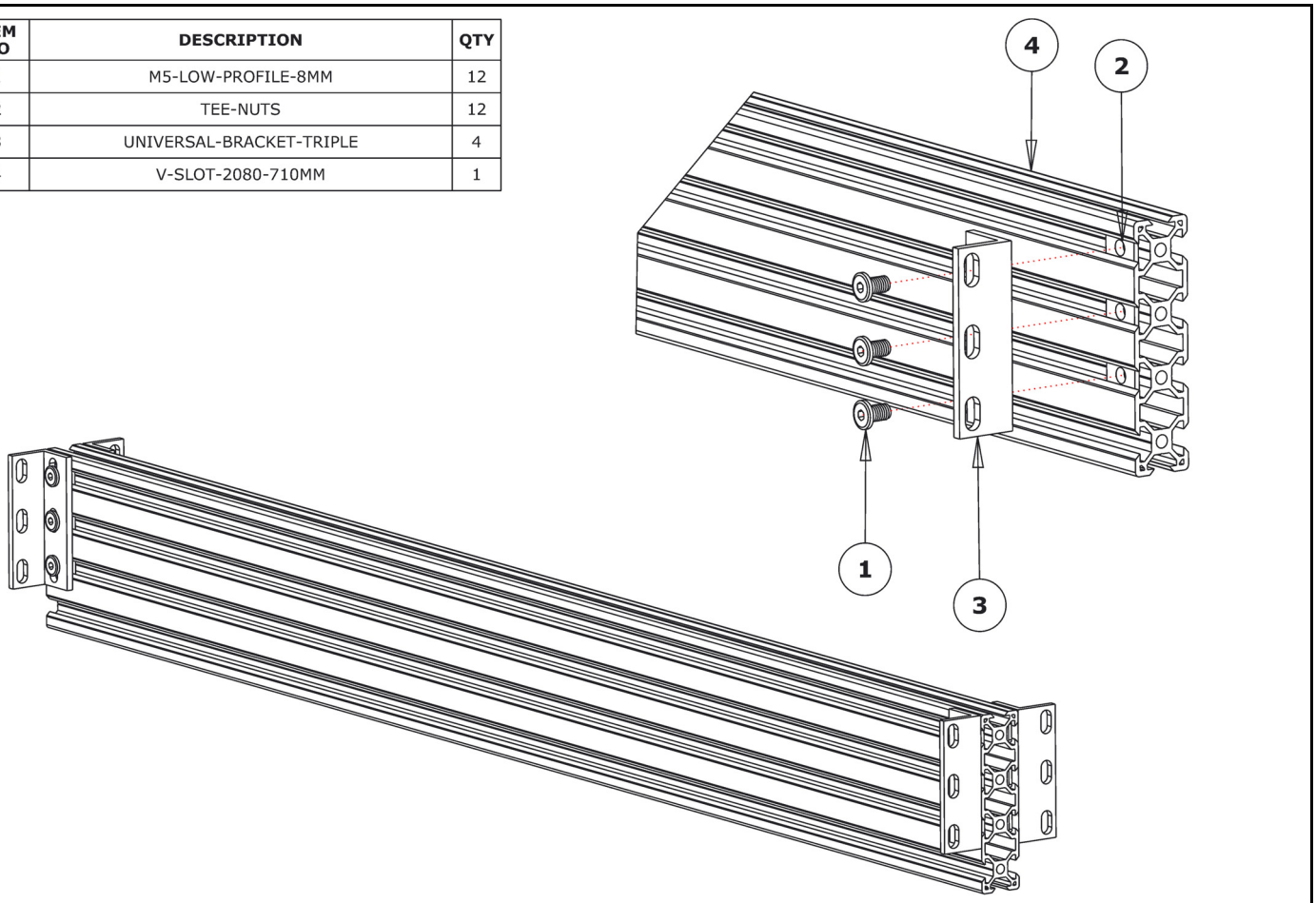
A. Attach an angle corner using 2 x M5-Low-Profile-10mm's so it sits in the corner joint between the V-Slot-2080-750mm and the V-Slot-2040-454mm rails. The Tee-Nuts needed for this were inserted in Step 2.6.2.

B. Repeat Step A for the other 3 corner joints between the V-Slot-2080-750mm and the V-Slot-2040-454mm rails.

C. Check that the base is square by sliding the X-Gantry to the front, the left and right side of the X-Gantry should reach their maximum positions at the same time, do the same for the back. If one side is maxing out before the other then the base needs re-adjusting, do this by slightly un-tightening the bolts on the Y-End-Plates and then pull the base in the right way to square it, then re-tighten the bolts.

2.6.6 Spoiler Board Support - 1

ITEM NO	DESCRIPTION	QTY
1	M5-LOW-PROFILE-8MM	12
2	TEE-NUTS	12
3	UNIVERSAL-BRACKET-TRIPLE	4
4	V-SLOT-2080-710MM	1



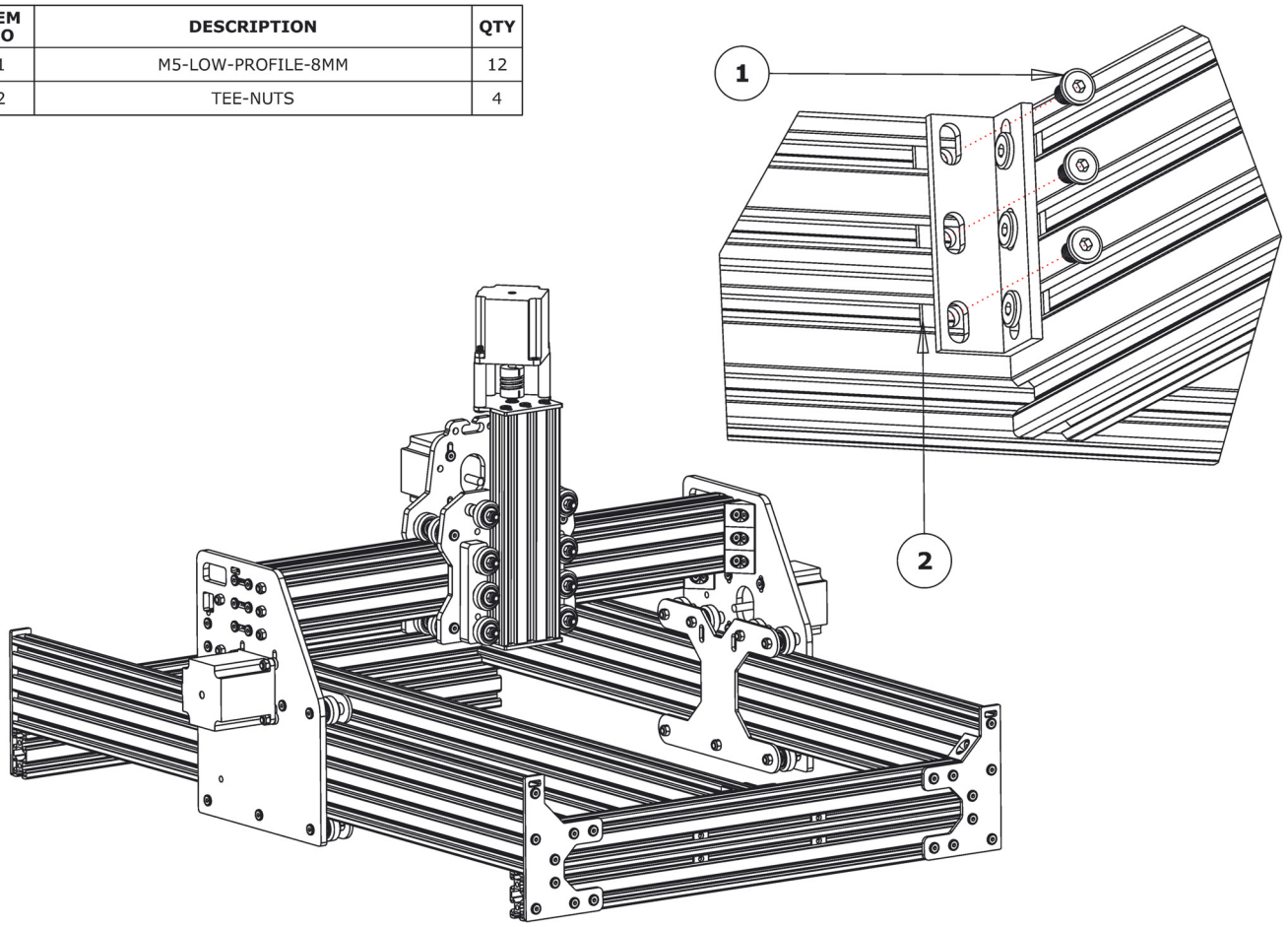
A. Insert 3 x Tee-Nuts into the top 3 slots of the V-Slot-2080-710mm.

B. With a Universal-Bracket-Triple in hand, notice that the holes down one side are not the same distance away from the corner edge as the holes on the other side. The side with the holes closest to the corner edge should go against the V-Slot-2080-710mm. With the top of the Universal-Bracket-Triple flush with the top of the V-Slot-2080-710mm, secure it using 3 x M5-Low-Profile-8mm's.

C. 3 more Universal-Brackets-Triple need to be attached to the V-Slot-2080-710mm as shown above, repeating Steps A & B.

2.6.7 Spoiler Board Support - 2

ITEM NO	DESCRIPTION	QTY
1	M5-LOW-PROFILE-8MM	12
2	TEE-NUTS	4



A. Insert 2 x Tee-Nuts in the top slot on the inward face on both the front and back V-Slot-2040-494mm's.

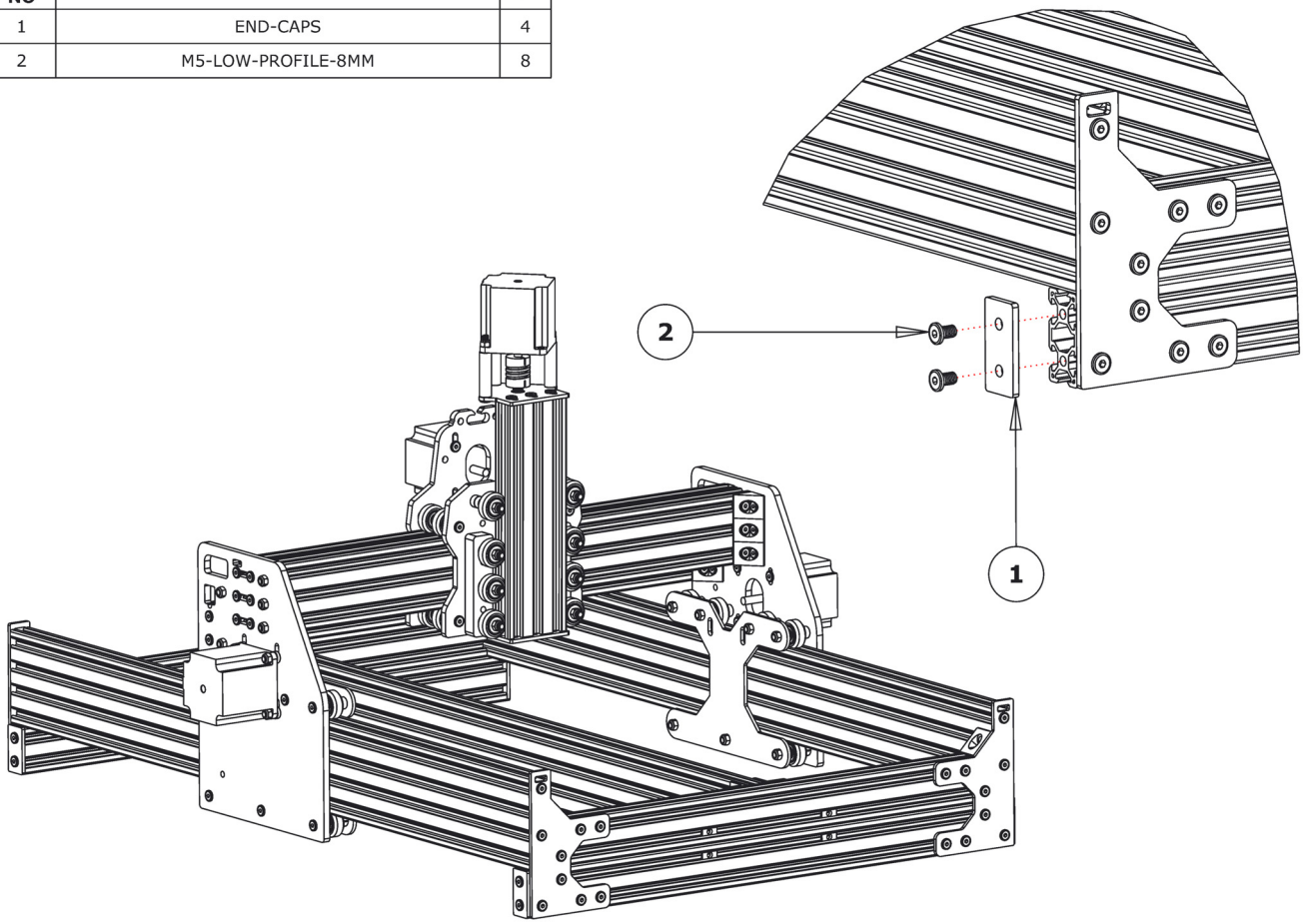
B. With a pencil, mark the center of both the front and back V-Slot-2040-454mm's. Place this mark on the top of the rail.

C. Bring the previously assembled spoiler board support down in between the front and back sides with the Universal-Bracket-Triple towards the top, and line up the center of the V-Slot-2080-710mm with the center marks made in Step B.

D. Line up all the previously inserted Tee-Nuts with the holes on the Universal-L-Brackets-Triple, and secure the spoiler board support using 12 x M5-Low-Profile-8mm's.

2.6.8 End-Caps

ITEM NO	DESCRIPTION	QTY
1	END-CAPS	4
2	M5-LOW-PROFILE-8MM	8



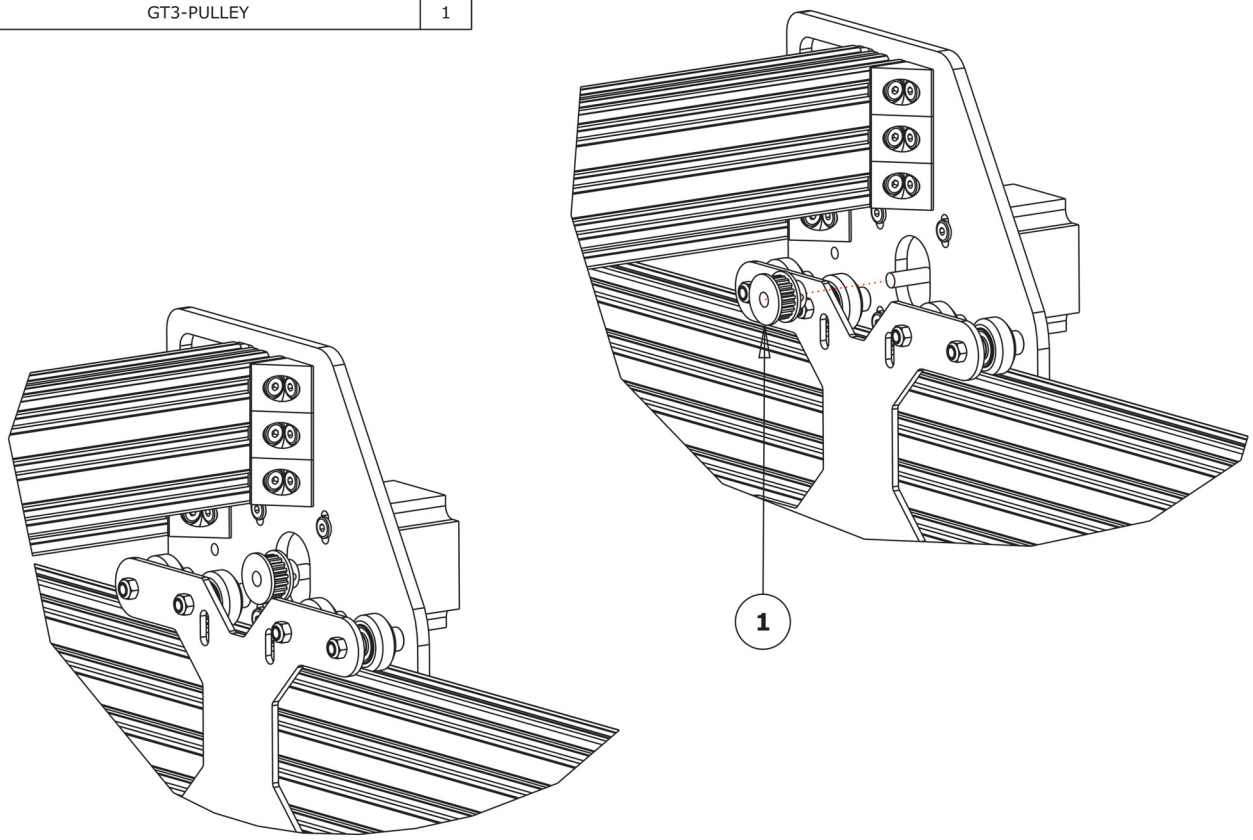
A. Attach an End-Cap to the left end of the front V-Slot-2040-494mm using 2 x M5-Low-Profile-8mm's.

B. Repeat Step A for the other 3 bare ends of the V-Slot-2040-494mm rails.

2.7 GT3-Pulley & Belt Assembly

2.7.1 GT3-Pulley

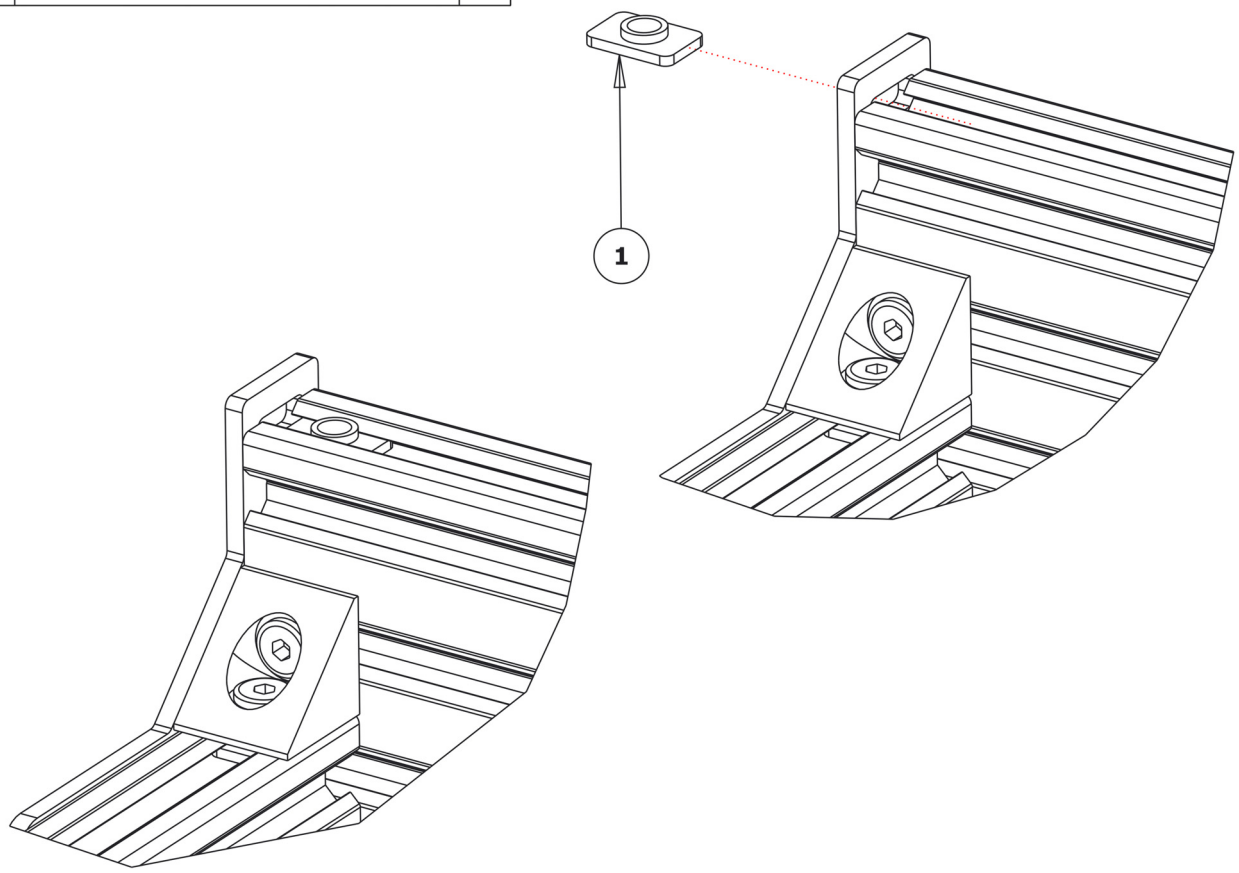
ITEM NO	DESCRIPTION	QTY
1	GT3-PULLEY	1



A. Attach a GT3-Pulley to the shaft of the NEMA23-Stepper-Motor on the Y-Plate-Right. Align the GT3-Pulley so the centre of the toothed section is aligned with the centre of the V-Slot-2080-750mm and so one of the grub screws will be against the flat section of the motor shaft. Secure it using the two grub screws provided.

2.7.2 Tee-Nuts

ITEM NO	DESCRIPTION	QTY
1	TEE-NUTS	2

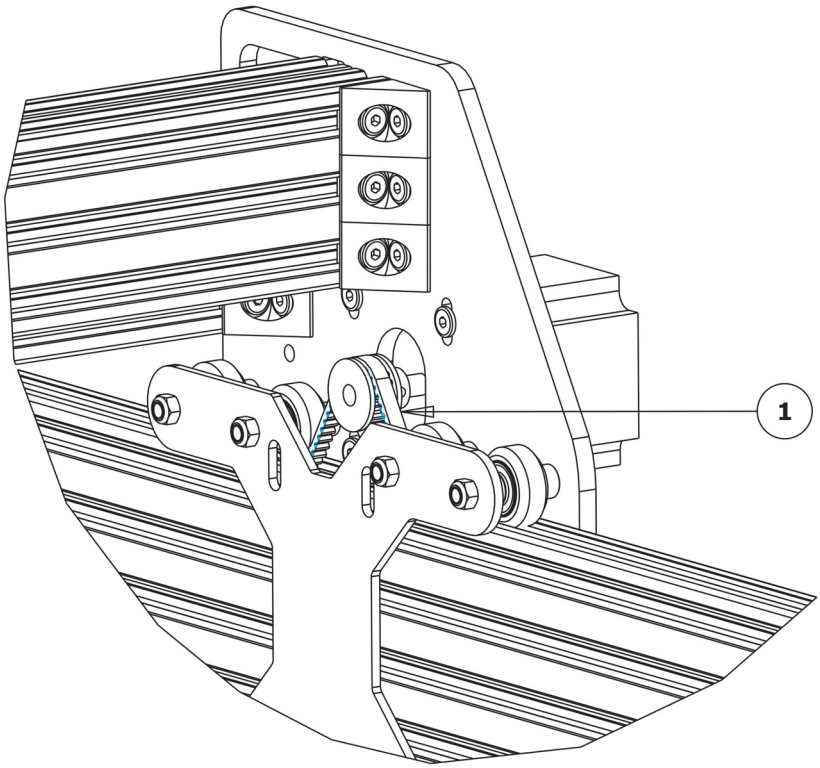


A. Slide a Tee-Nut, flat face down, through the slot on the back right Y-End-Plate and into the top slot of the V-Slot-2080-750mm.

B. Repeat Step A for the front end of the same V-Slot-2080-750mm.

2.7.3 GT3-Timing-Belt

ITEM NO	DESCRIPTION	QTY
1	Y-GT3-TIMING-BELT	1

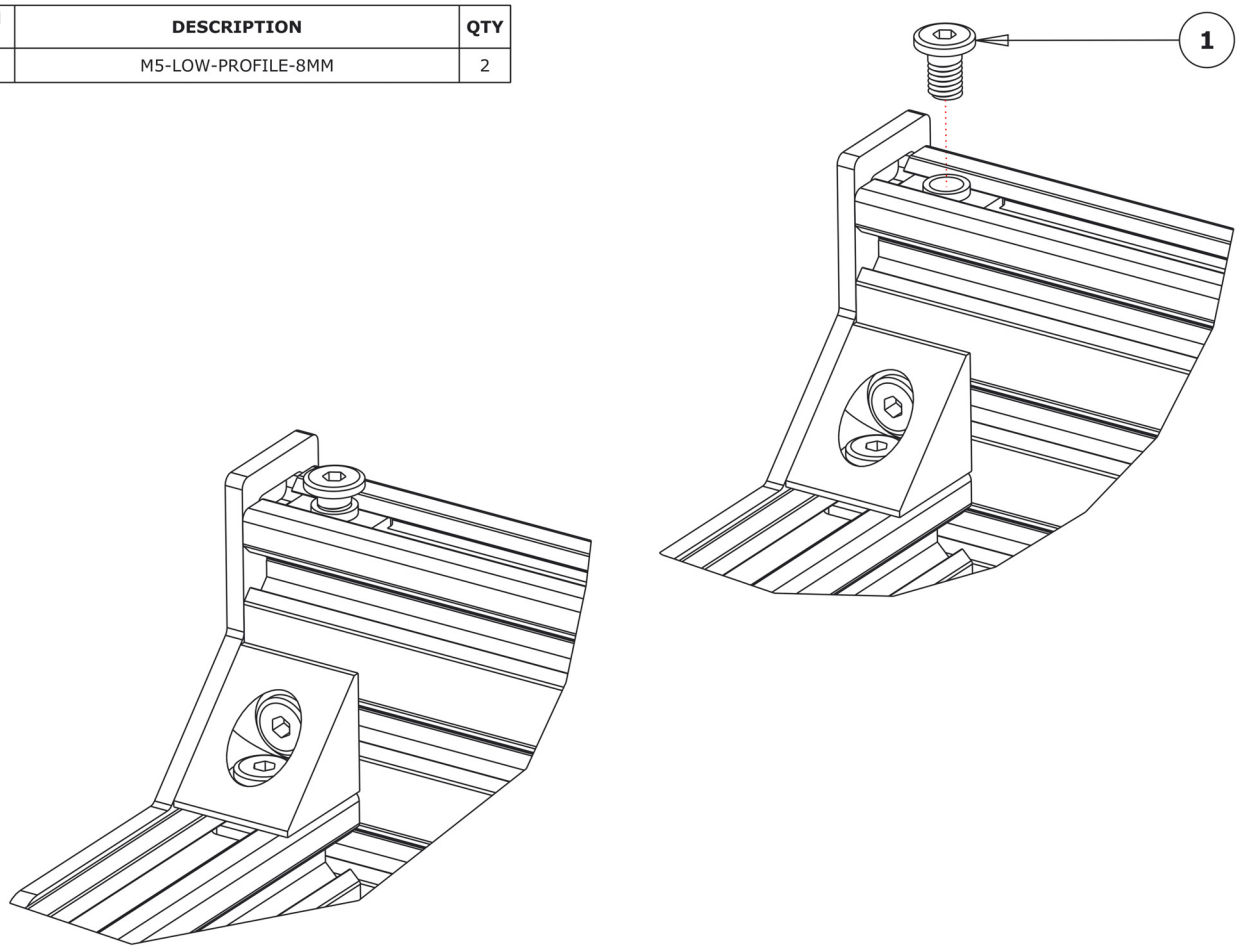


A. First, feed a Y-GT3-Timing-Belt, with the teeth facing downwards, over one side of GT3-Pulley and then under both Solid-V-Wheel-Xtremes. Next, with the end just fed, feed it towards the end of the V-Slot-2080-750mm, under the Tee-Nut, and out through the slot on the Y-End-Plate. Repeat the above, but go under the other 2 Solid-V-Wheel-Xtremes, and towards the opposite end of the V-Slot-2080-750mm.

B. Currently, the NEMA23-Stepper-Motor should be loosely sitting on the bottom surface of it's slots. Lift the NEMA23-Stepper-Motor up just over halfway up it's slots, and tighten the 4 x M5-Low-Profile-20mm bolts holding it. If you can't access the bolts, lift it up higher as needed.

2.7.4 Securing the GT3-Timing-Belt

ITEM NO	DESCRIPTION	QTY
1	M5-LOW-PROFILE-8MM	2



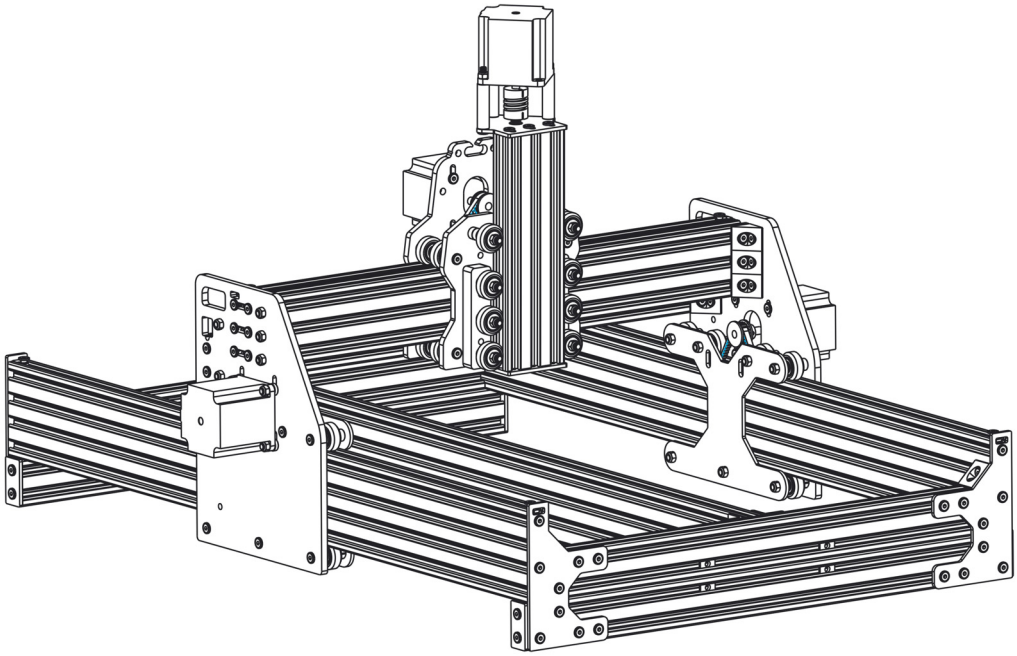
A. Screw a M5-Low-Profile-8mm bolt through one of the previously inserted Tee-Nuts and onto the Y-GT3-Timing-Belt to secure that end. Do not overtighten, otherwise the Y-GT3-Timing-Belt will go off centre in the V-Slot.

B. Repeat Step A for the other end of the Y-GT3-Timing-Belt, but while screwing in the M5-Low-Profile-8mm bolt, pull the end of the Y-GT3-Timing-Belt to tension it.

C. Slide the X-Gantry back and fourth a couple of times, and while doing so, check that the Y-GT3-Timing-Belt does not rub against the side of the GT3-Pulley. If it does, adjust the GT3-Pulley as needed.

2.7.5 Repeat

ITEM NO	DESCRIPTION	QTY
1	GT3-PULLEY	2
2	M5-LOW-PROFILE-8MM	4
3	TEE-NUTS	4
4	X-GT3-TIMING-BELT	1
5	Y-GT3-TIMING-BELT	1

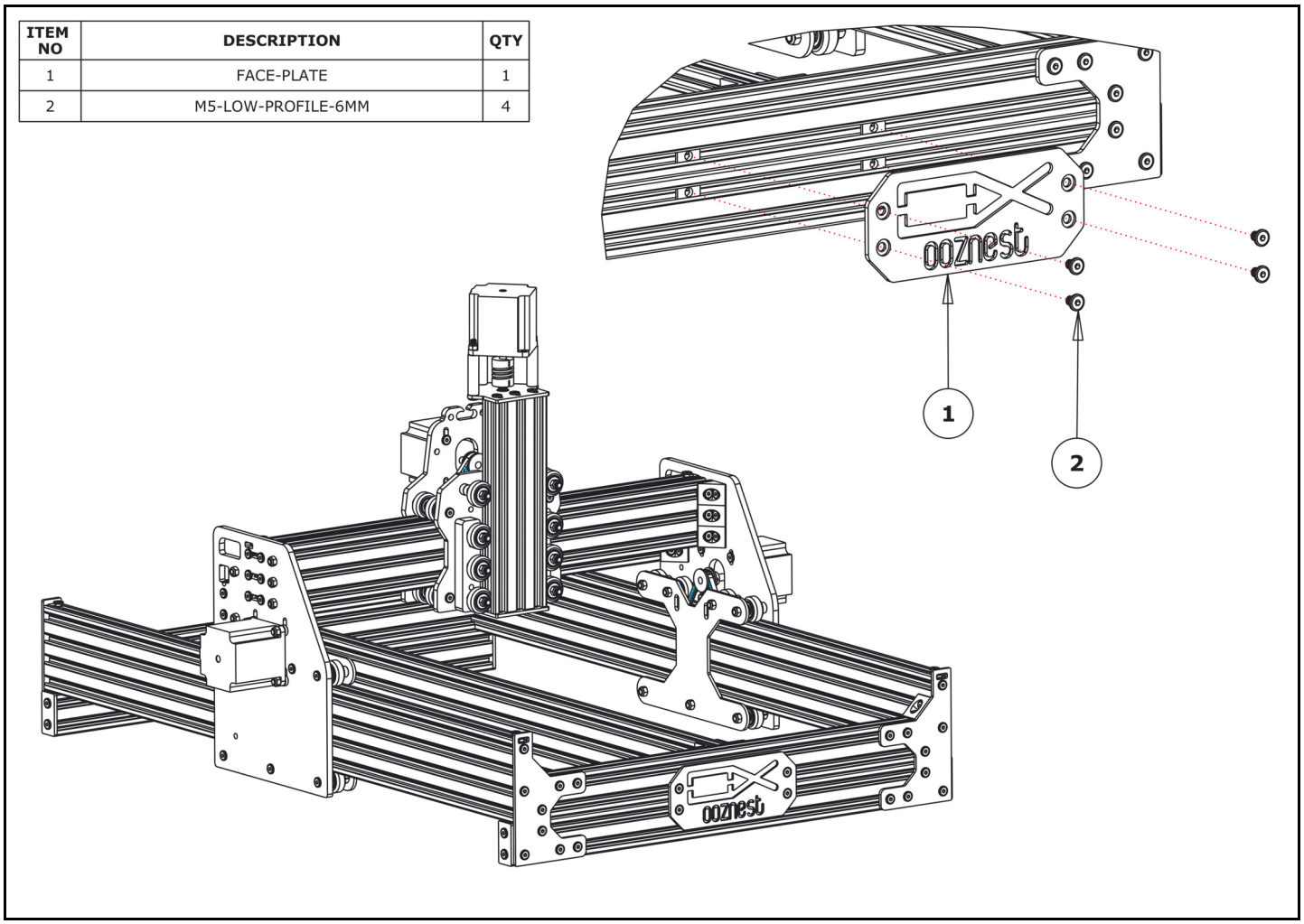


A. Repeat Section 2.7 for the left Y-Axis V-Slot-2080-750mm. Try to keep it consistent so whatever was done on the right side is repeated on the left.

B. Repeat Section 2.7 for the back X-Axis V-Slot-2060-500mm, but this time use the X-GT3-Timing-Belt.

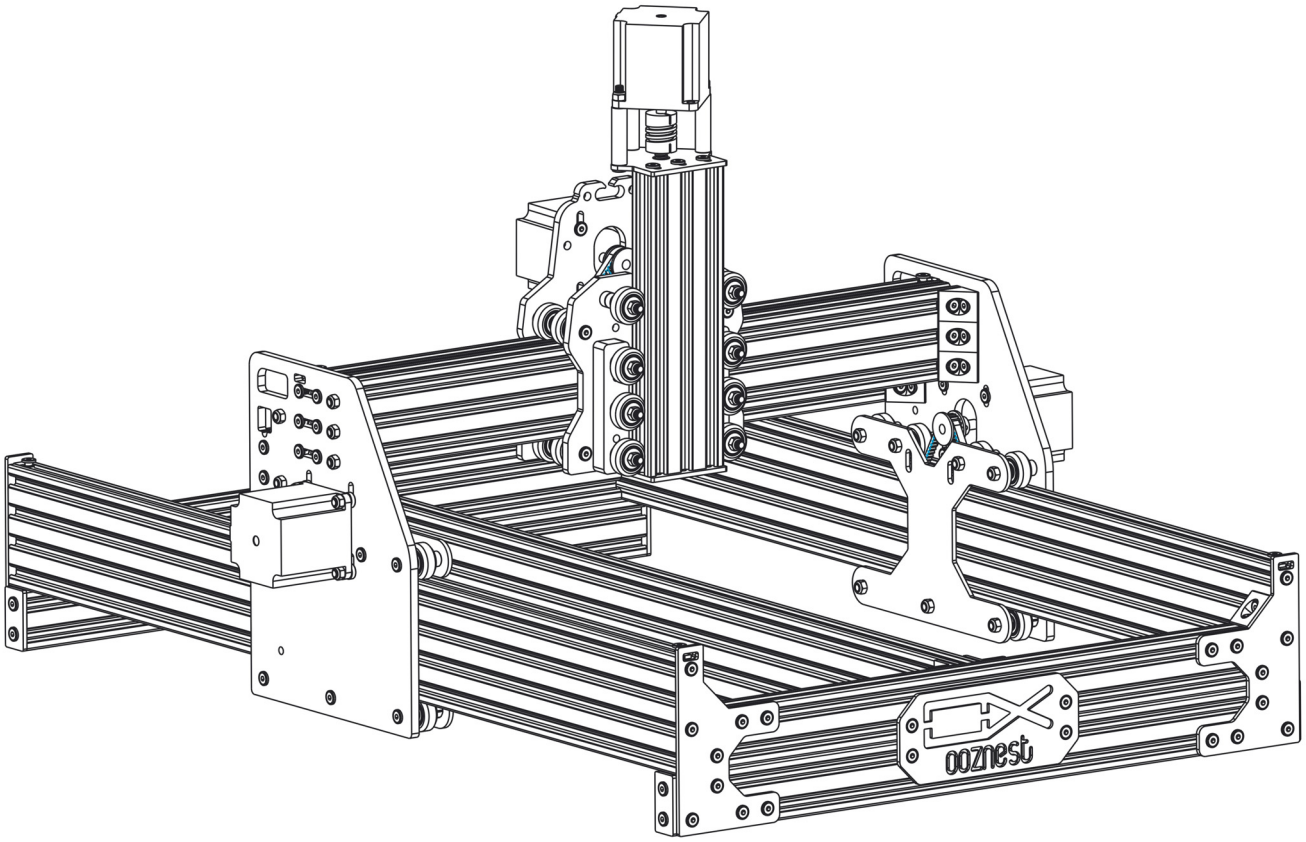
2.8 Face-Plate

ITEM NO	DESCRIPTION	QTY
1	FACE-PLATE	1
2	M5-LOW-PROFILE-6MM	4



A. Attach the Face-Plate using 4 x M5-Low-Profile-6mm's to the already inserted Tee-Nuts on the front V-Slot-2040-494mm & V-Slot-2040-454mm.

2.9 Complete



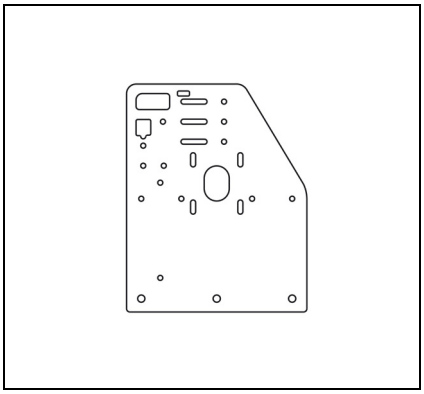
Congratulations you have completed the ooznest OX Assembly. We hope you have enjoyed the build and will continue from here and bring your OX to life!

3.0 Appendix

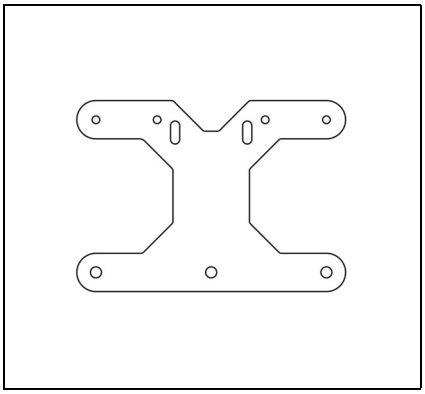
3.1 Appendix A - Kit Contents

Plates

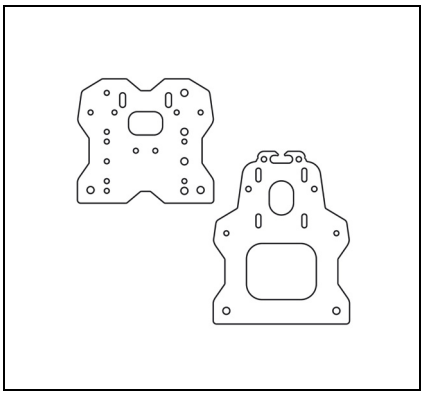
2 x Y-Plate



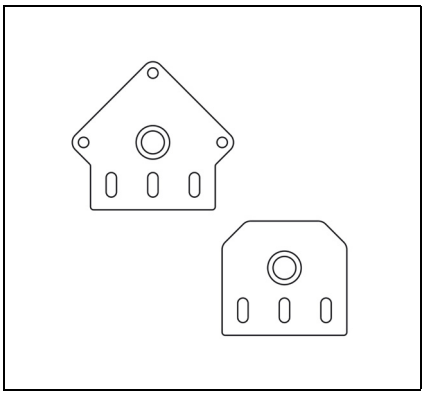
2 x Y-Brace



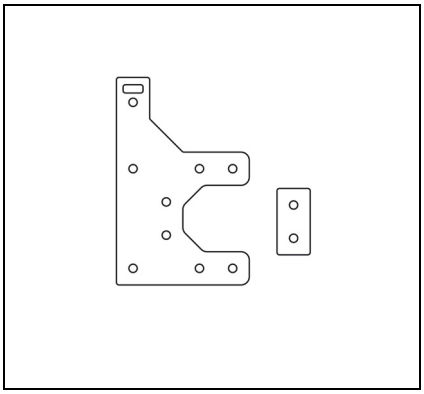
1 x X-Plate-Front
1 x X-Plate-Back



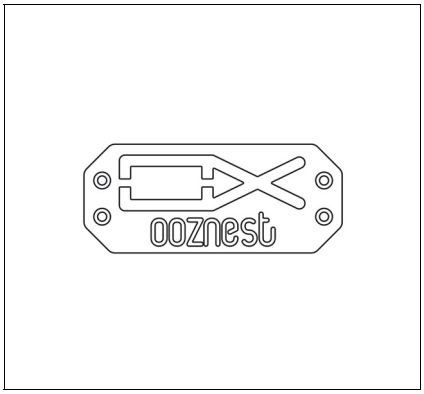
1 x Threaded-Rod-Mount-Motor
1 x Threaded-Rod-Mount-Bottom



4 x Y-End-Plates
4 x End-Caps

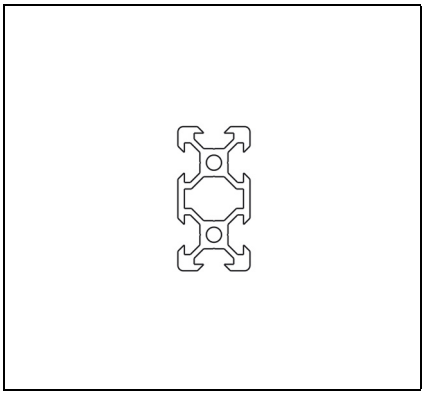


1 x Face-Plate

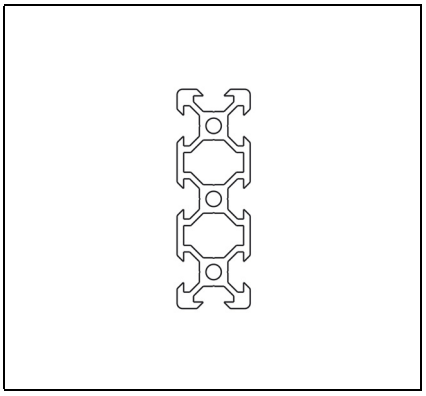


V-Slot Rails

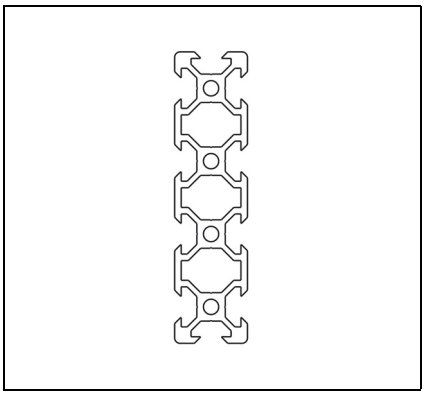
2 x V-Slot-2040-454mm
2 x V-Slot-2040-494mm
1 x V-Slot-2040-500mm



1 x V-Slot-2060-200mm
2 x V-Slot-2060-500mm

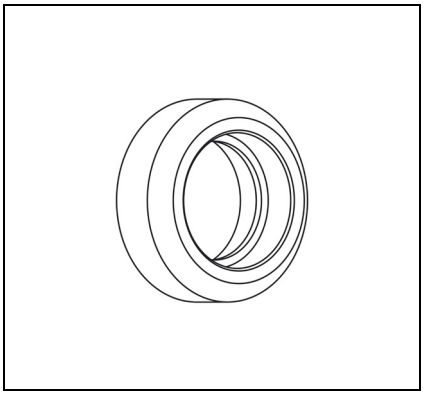


1 x V-Slot-2080-710mm
2 x V-Slot-2080-750mm

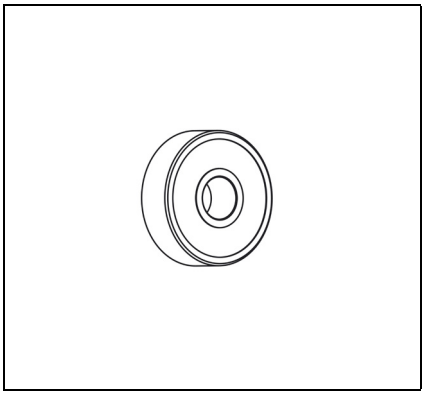


Motion Components

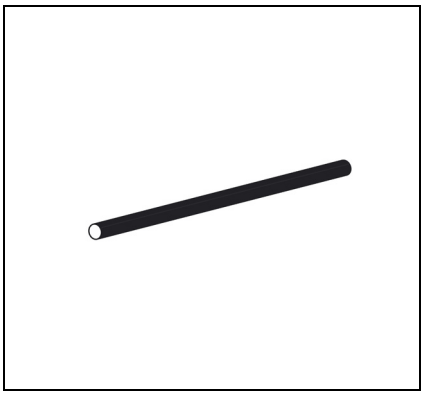
30 x Solid-V-Wheel-Xtreme



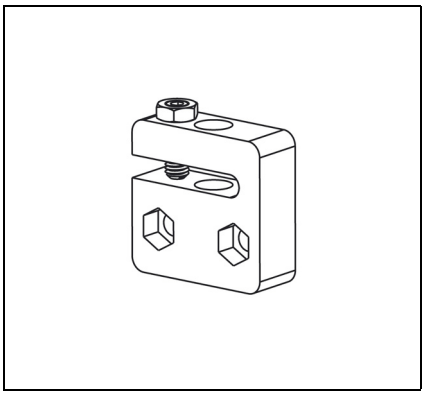
60 x 625-2RS-Bearing



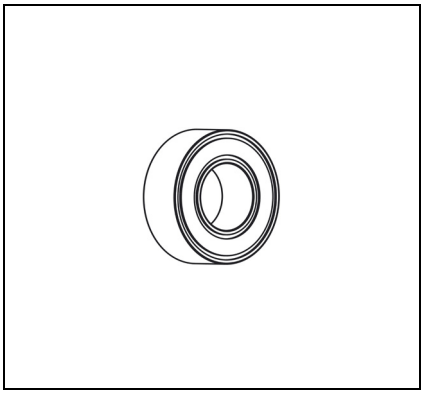
1 x ACME-Lead-Screw



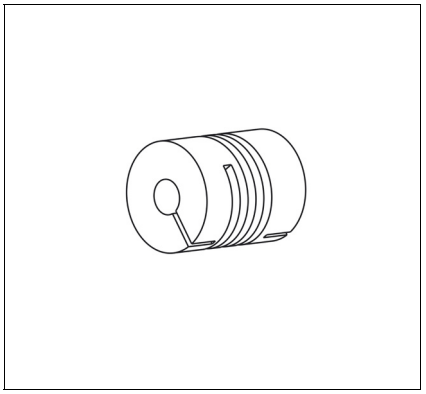
1 x ACME-AB-Nut-Block



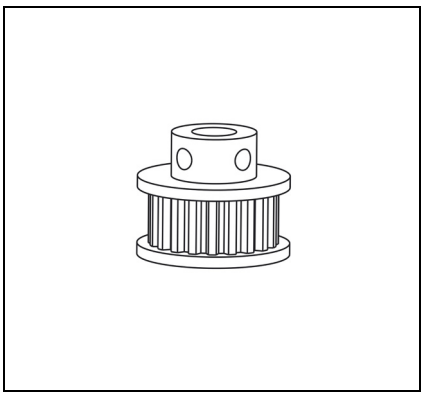
2 x 688ZZ-Bearing



1 x Flexible-Coupler

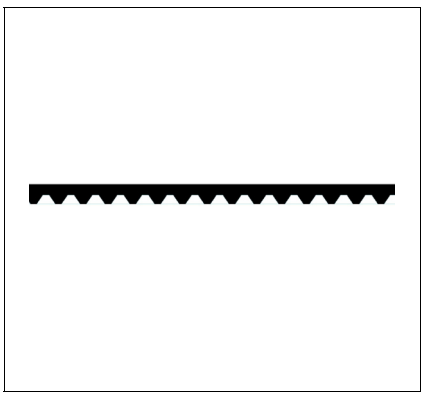


3 x GT3-Pulley



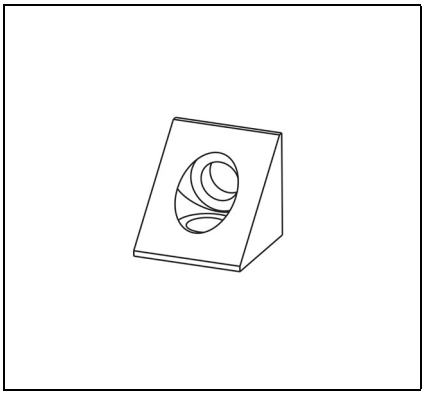
2 x Y-GT3-Timing-Belt

1 x X-GT3-Timing-Belt

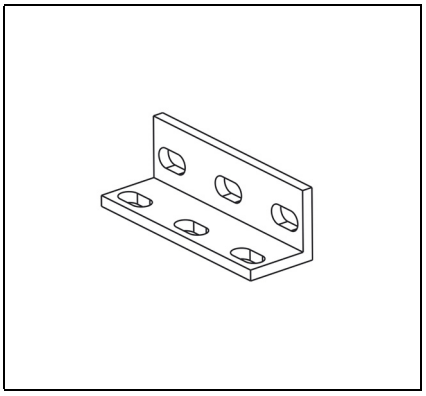


Brackets & Spacers

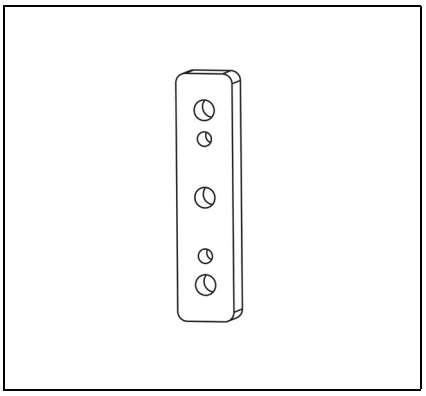
14 x Angle-Corner



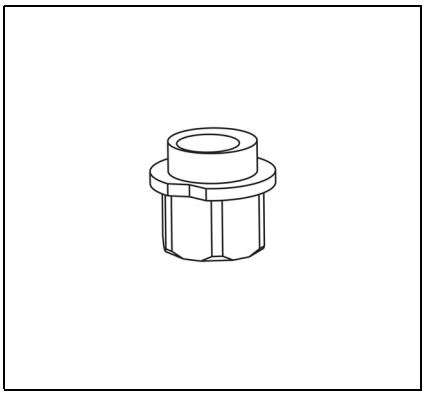
4 x Universal-Bracket-Triple



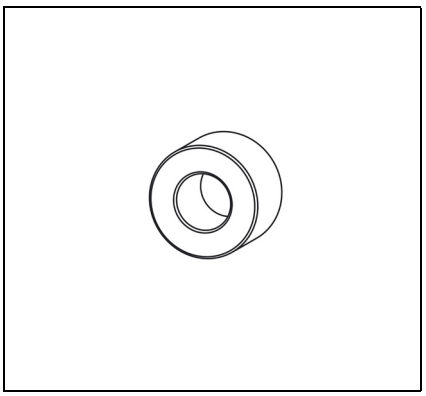
2 x Spacer-Block



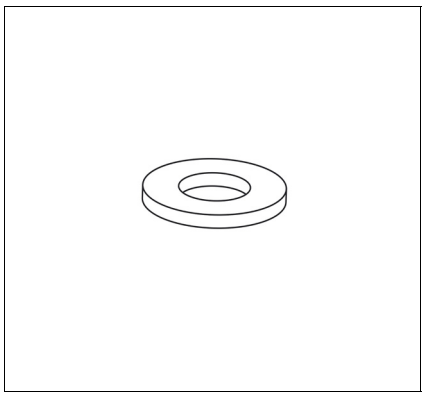
20 x Eccentric-Spacer



12 x Aluminium-Spacer-Eighth-Inch
8 x Aluminium-Spacer-6mm
24 x Aluminium-Spacer-Quarter-Inch
3 x Aluminium-Spacer-Onehalf-Inch

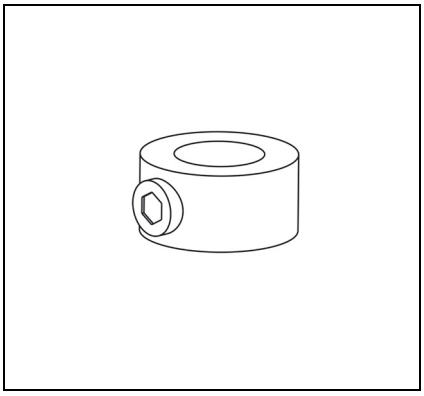


86 x Precision-Shim

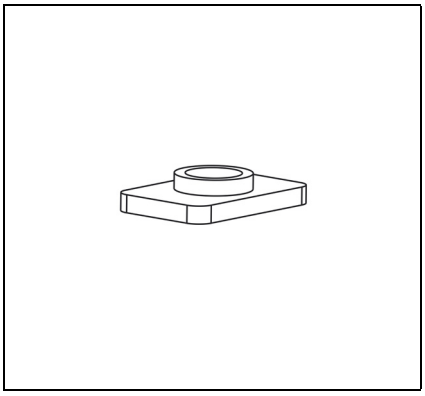


Hardware

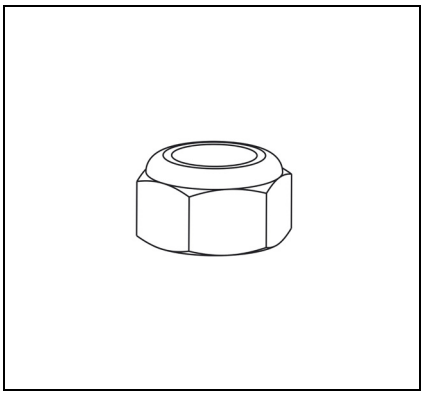
2 x 8mm-Lock-Collar



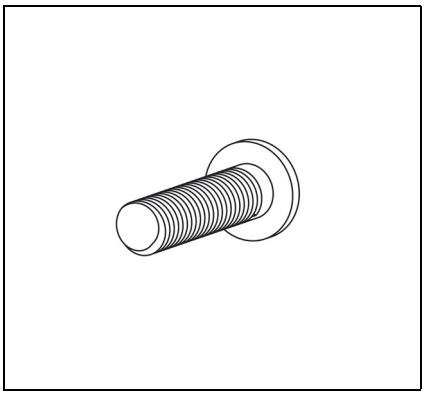
80 x Tee-Nuts



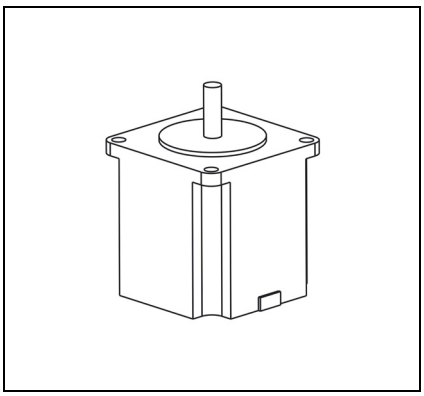
53 x M5-Nyloc-Nut



M5-Low-Profile:
4 x 6mm
84 x 8mm
34 x 10mm
10 x 15mm
14 x 20mm
14 x 40mm
8 x 45mm
3 x 55mm
4 x 65mm



4 x NEMA23-Stepper-Motor



5 x M5-Drop-In-Tee-Nuts