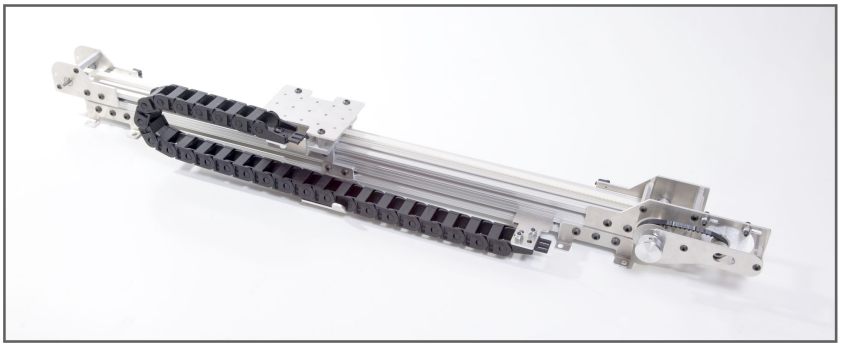
tGLIDE

Modular Automated Positioning System



Assembly Guide

ARRICK ROBOTICS

ArrickRobotics.com

Updated 9 Feb 2009

tGLIDE

Contents

Specifications

Minimum travel distance: 1in (25mm)
Maximum travel distance: 14ft (4.2m)
Positioner Length: 17in (431mm) + travel distance
Payload capacity: 25# (11kg)
Accuracy: .01” (2.54mm) per foot (300mm)
Repeatability: .01” (2.54mm)
Duty Cycle: Continuous
Rotary to linear translation ratio: .8” (20.32mm) travel per motor revolution
Maximum Speed: 10” (250mm)/Sec with MD2b Motor Driver
Depends on payload, mounting orientation, etc.

Contact Information

To contact us for technical support or additional information, see:

ArrickRobotics.com

Unpacking

When unpacking:
Avoid cutting or damaging parts.
Prevent components from hitting each other or falling.

Single-Axis Positioners are shipped completely assembled and simply need to be unpackaged and have the plastic ties removed. Details about mounting the motor can be found near the end of this document.

Dual-Axis (XY) Positioners are typically packaged and shipped in 2 boxes. After unpacking, the system components must be assembled.

Components of a Dual-Axis positioner:

- Y-axis and cable carrier (if purchased).
- X-axis left (drive) side and cable carrier (if purchased).
- X-axis right (slave) side.
- 2 connecting rails (1”x1”)
- Slave shaft.
- Bag with tools and this assembly guide.

The X-axis is on top and the Y-axis is on bottom. If the travel distance is not the same on X and Y, the X-axis is normally the longer of the two.

Identify all these components before proceeding.

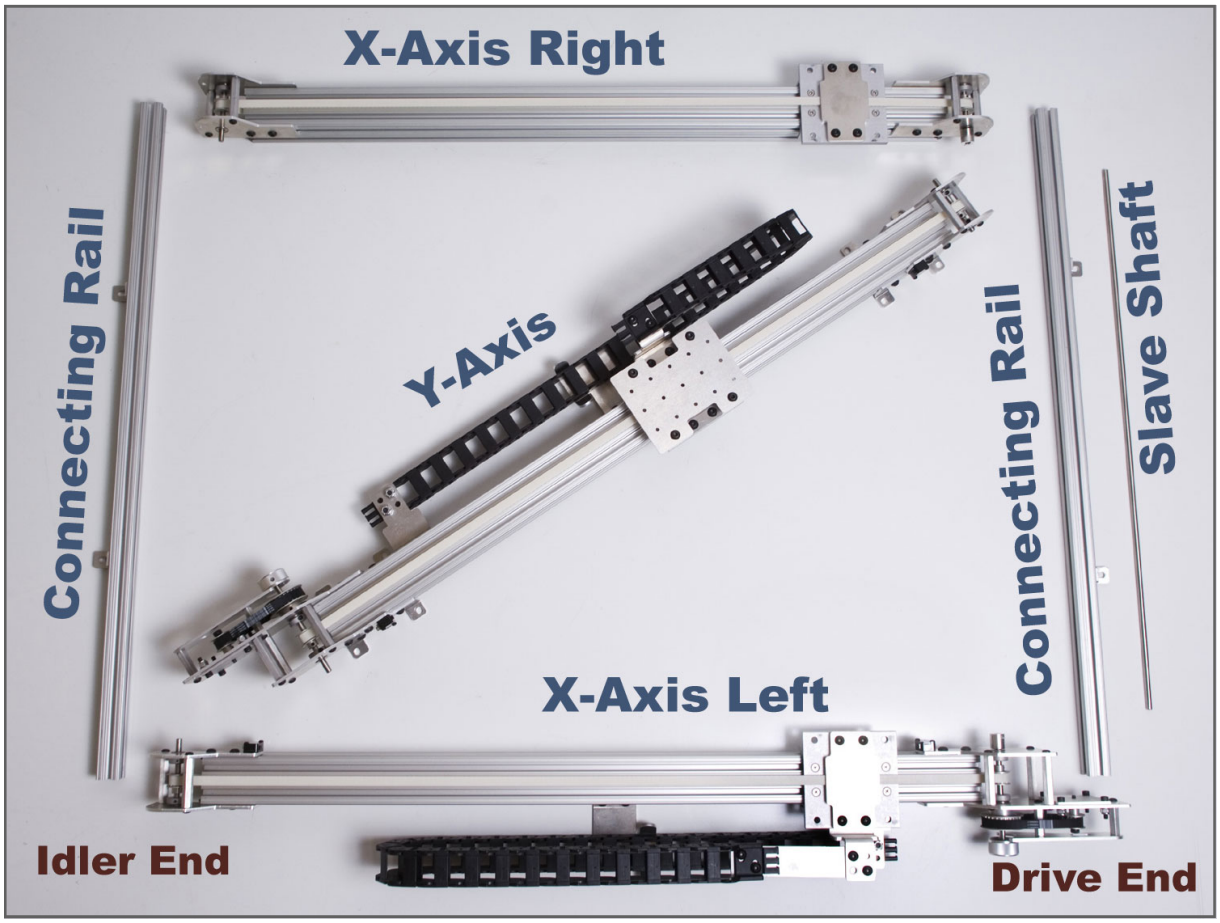
Keep the packaging material.

Assembling a Dual-Axis Positioner

Arrange the components on a large, flat surface according to the picture below.

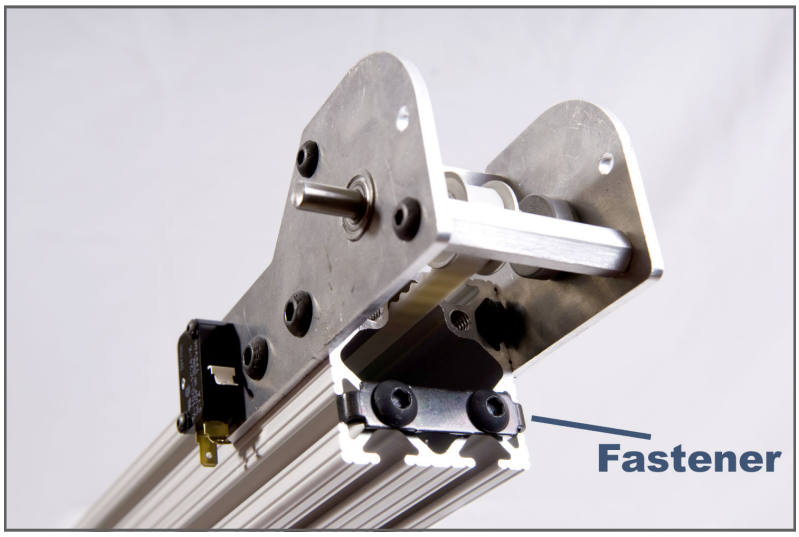
Insure that all tape and plastic ties used for packaging are removed from each component.

Assembly and alignment is fairly simple and tools are included with the system.



Attach Connecting Rails to X-Axis Left and X-Axis Right Rails

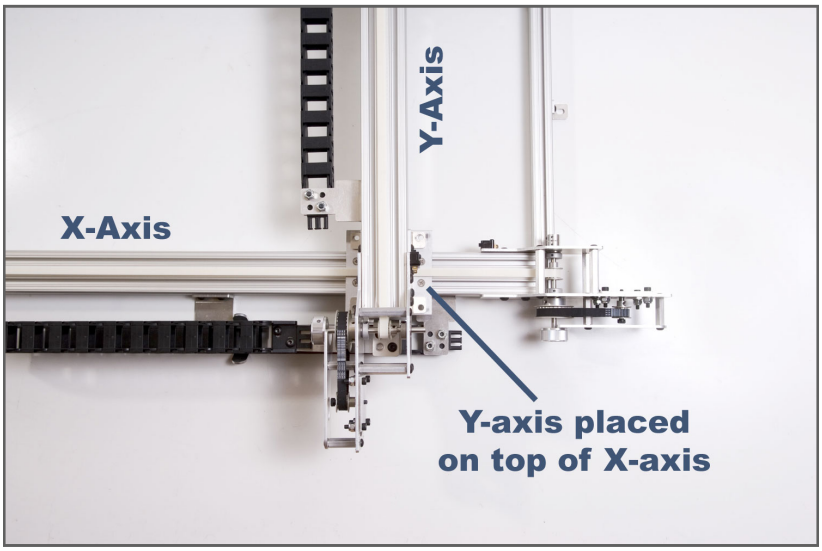
The end of each X-axis rail has a special fastener with 2 screws.
Loosen these screws and slide on the connecting rails.
Notice the position of the L-bracket(s) attached to the connecting rails—see picture.
The fastener will fit into the T-slot on the connecting rails.
You may have to adjust the screws to get the fastener to slide into the T-slots.
After connected, tighten the screws through the access holes provided.
The end of the connecting rails should be flush with the end of the X-axis rails.

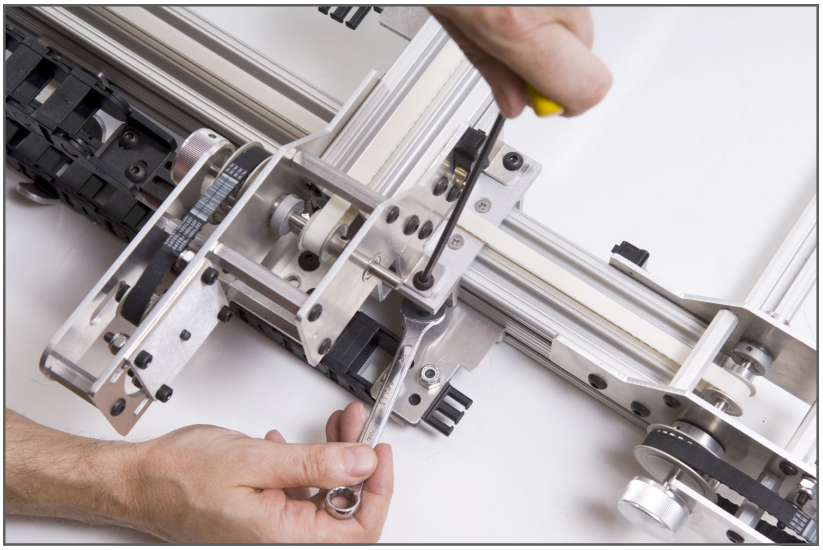


Attach The Y-Axis

The Y-axis is pre-assembled and simply needs to be attached to the X-axis.
This is done with 8 bolts (1/4-20 x 1”) and 8 locknuts.

Move both X-axis bearings all the way to the drive motor side.
Place the Y-axis assembly on top of the X-axis bearings according to the picture.
The mounting holes should line up.
Insert all 8 bolts and tighten the locknuts.
Do not move the X-axis to the other end until the alignment procedure.

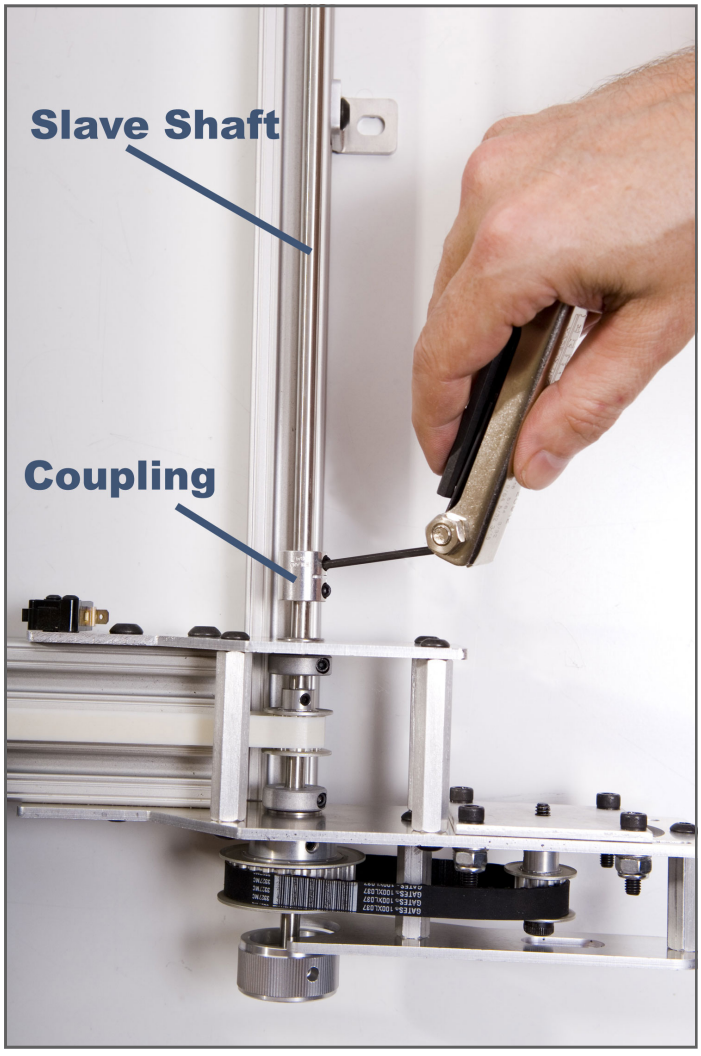




Attach the Slave Shaft

The slave shaft transfers power from the drive side of the X-axis to the slave side, and keeps the system square during movement.

Check that both X-axis bearings are completely against the drive end of travel.
Loosen the 2 shaft couplings (See picture) and slide them onto the slave shaft.
Insert the slave shaft between the drive and slave shaft, then slide the couplings to connect all of the shafts.
The slot in the center of the coupling should be empty of shafting.
Tighten the couplings in place.
Test by turning the knob on the X-axis drive and see that both sides drive together.



Align the X-Axis

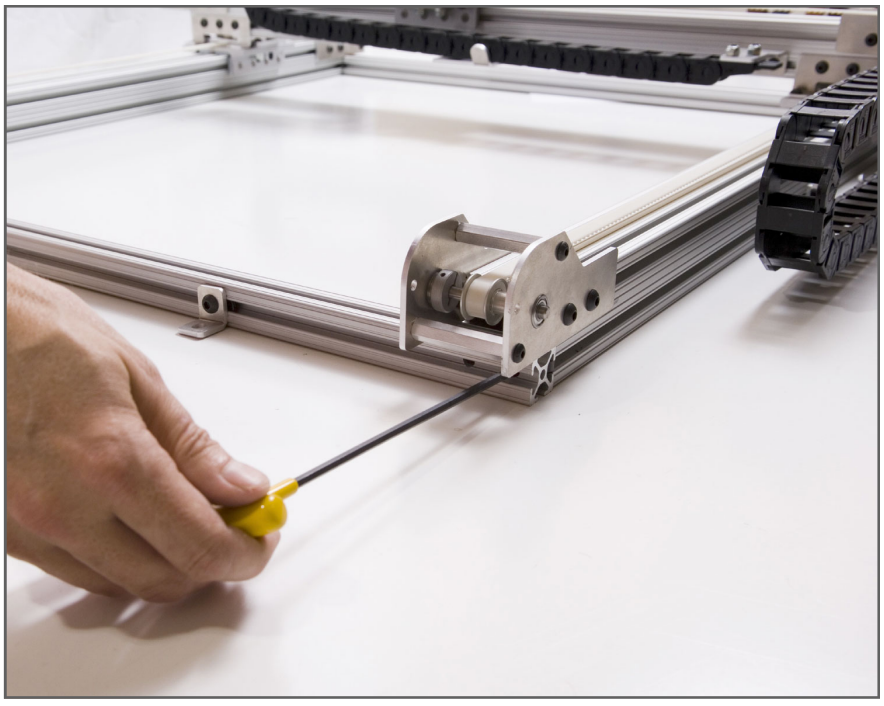
The left and right rails of the X-axis must be exactly parallel to prevent binding. The system was aligned and tested before shipping, but minor adjustments are needed after reassembly.

If you followed the previous steps, then

The screws for mounting the Y-axis should be tight.
The screws for both connecting rails should be tight.
The X-axis should be positioned all the way to the drive end.

Now,
Loosen the connecting rail (4 screws) on the idler end.
Move the X-axis all the way to the idler end.
Tighten the connecting rail.

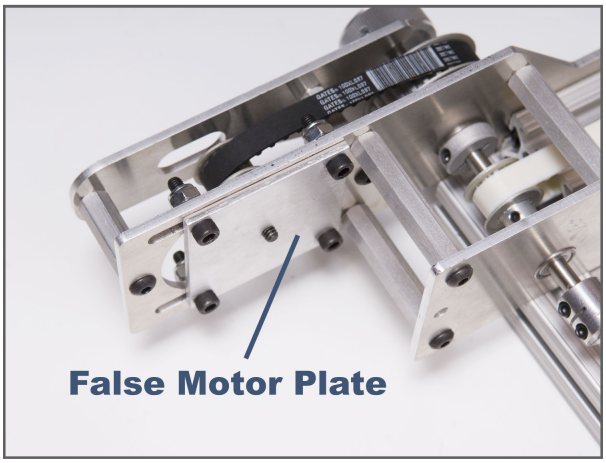
The X-axis should now drive back and forth from one end to the other without binding. If it does not, move then X-axis to each end, loosen the connecting rod (4 screws) at that end, and retighten.

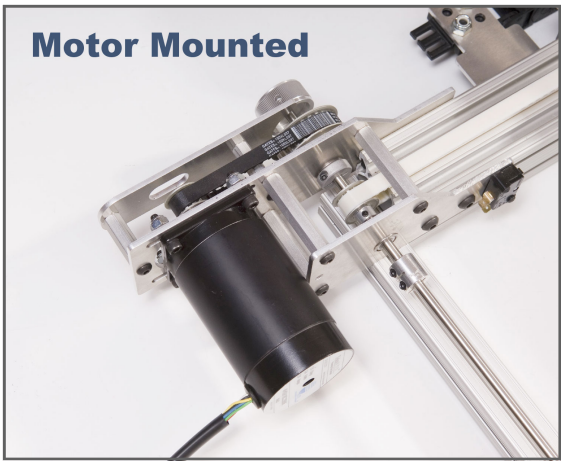


Mounting Motors

The positioner can be powered with a standard NEMA #23 motor—stepper or servo. Approximately 100 in/oz of torque will move the positioner for most payloads.

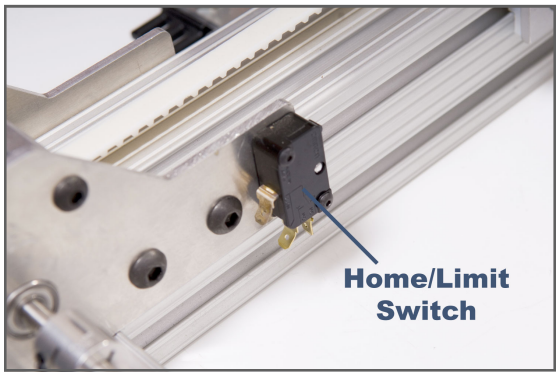
False motor plate(s) are mounted before shipping. Remove this plate and the pulley. Slide the pulley over the motor shaft (1/4" dia.) without tightening it, then insert the motor into the bracket opening. Slip the belt around the pulley and insert the 4 screws provided (10-32 x 3/4). Use washers and locknuts as shown in the picture. Pull the motor to tighten the belt, then tighten the motor mounting screws. This may take 3 hands. Then tighten the pulley on the motor shaft so the belt is aligned.





Home/Limit Switches

Standard plunger-style home/limit switches are provided on the end of each axis. These switches are used by the motor control system to prevent over-travel, and to establish a home (zero) reference position. Normally open (NO) and normally closed (NC) terminals are provided.

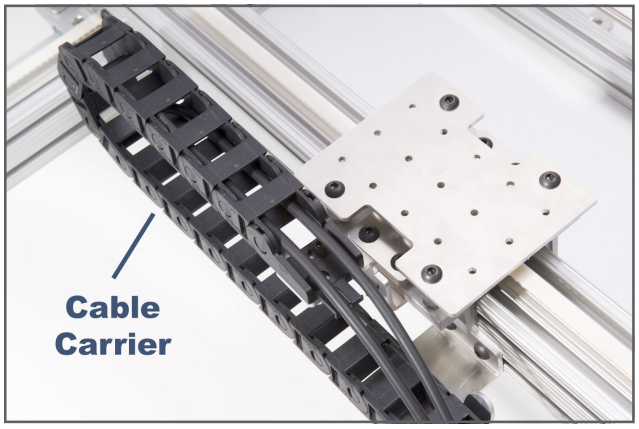


Cable Carriers

Positioners can be outfitted with flexible cable carriers. This greatly simplifies cable management and reduces tangles and hang-ups during motion.

A bracket at the end of each cable carrier has fingers so cables can be attached using plastic cable ties.

Links of the cable carrier can be snapped apart by inserting a flat-head screwdriver in the slot at the joint, then prying the link apart. Reconnect by simply snapping the links together. Links may be inserted or removed to change the carrier's length as necessary.

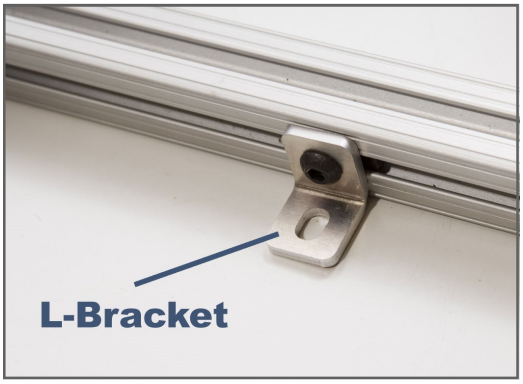


Mounting Positioners

The XY positioner provides multiple L-brackets for mounting to a work surface or frame. The L-brackets are mounted on the connecting rods instead of the X-axis rails to prevent misalignment during mounting. Your application may require further mounting in order to improve flex of the system with heavy payloads, or to improve straightness. Holes in the L-brackets will accept 1/4-20 or 6mm bolts.

Upside down mounting is not suggested because it reduces the surface contact area of the bearings and reduces payload capacity and accuracy.

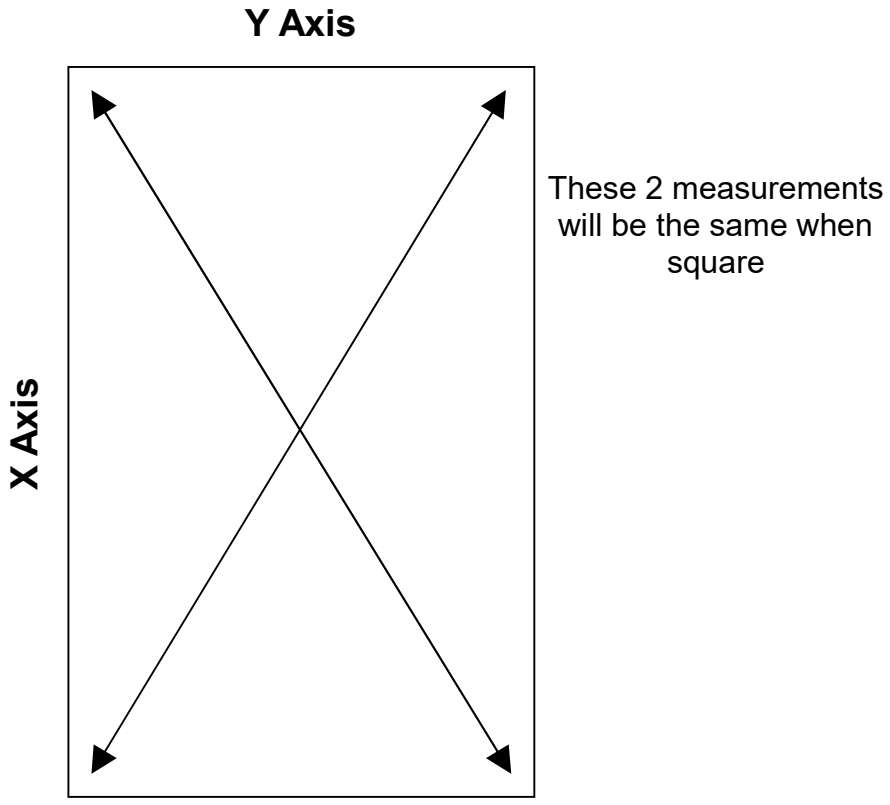
Vertical mounting (where one axis must work against gravity) can be accomplished with light payloads and sufficient motor power. Larger payloads can be accommodated by using a counter-balance or a spring loading system. Constant force spring systems are available for use in tool-holding applications by suppliers such as McMaster-Carr, and are offered in various capacities.



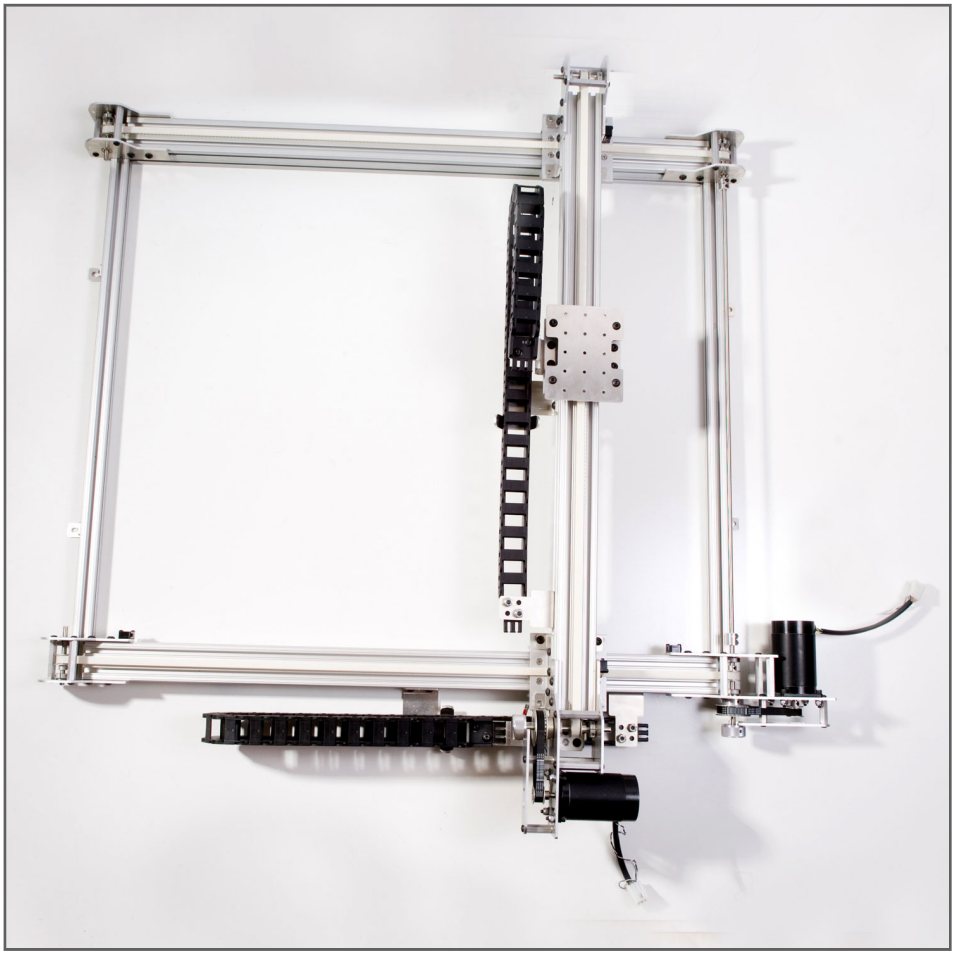
Squaring an XY Positioner

Squaring of the XY positioner can be done by attaching one end of the positioner to the customer-provided mounting surface, then adjusting the mounting position of the other end while measuring for square. Measure for square using a tape measure from corner to opposite corner.

Alignment for a parallel X-axis may be required after squaring to prevent binding and to allow smooth motion.



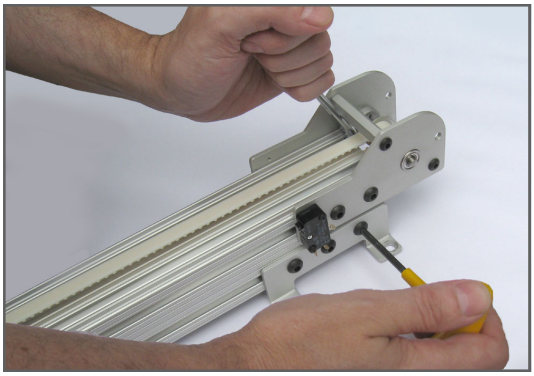
Completed Dual-Axis XY Positioner



Idler Adjustment

The idler assembly at the end of each rail, opposite the motor drive end, is used to adjust belt tension.

Loosen the 4 mounting screws (2 on each side) that attaché the idler assembly to the rail. Use a wrench or large screwdriver between the end of the rail and the spacer to pry the assembly away from the end of the rail, creating tension on the belt. Tighten the screws while belt tension is being applied.

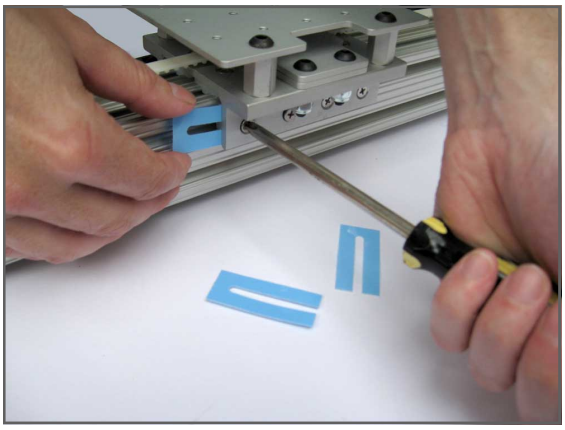


The belt can be very tight. With the bearing assembly moved to one end, the belt should be suspended in mid-air at the center, not sagging down to touch the rail.

Bearing Adjustment

The bearing material is mounted to an aluminum frame with screws. Thin shims can be placed under the bearing material to reduce play between the bearing and the rail which will increase positioning precision.

To add or remove shims, loosen the bearing screws to expose a gap between the bearing and the aluminum frame. Add or remove shims as needed and tighten screws. Access to the gap is difficult while the system is assembled, but preferable to disassembling the entire unit.



Too many shims can result in binding along the rail at various locations. Too few shims can result in a loose fit and reduced positioning accuracy.

Component Source List

8020
Machine framing components, brackets, rails, etc.
8020.net

McMaster-Carr
Screws, springs, hinges, raw material, tools, etc.
Mcmaster.com

Stock Drive Products
Gears, pulleys, bearings, etc.
SDP-si.com

Arrick Robotics
PC-based motor control systems, XY positioning systems.
ArrickRobotics.com

Troubleshooting

Bearing assembly binding
First, determine if the bearing is binding due to alignment of a parallel axis by removing the cross axis and testing for binding. If binding still exists, check for scratches, dents or bends in the rail assembly, and for excessive bearing shims. Ensure that the rail is clean of debris.

Belt jumping teeth on pulley
Ensure that the belt is tight—see the idler adjustment section. The motor and its pulleys and belt must also be tight.

Positioning errors
Typical issues causing positioning errors are bearing binding (see above), non-parallel rails on XY positioners, obstructions caused by debris, cables, etc, loads exceeding motor capacity (torque and/or speed), and loose or lost set-screws on pulleys.

ArrickRobotics.com