

9.5 - Alignment

All components used in the [Ilios Kit](#) are quite strong and very rigid when it comes to movement and tolerances. However, these components need to be properly aligned in order to operate correctly. If you do not align all components properly, you may have very strong forces applied to components which need to operate freely and as a result can be damaged.

Before proceeding with any sort of motion through Electronics and motors, you must follow the steps described below and ensure that all parts of the assembly are properly aligned. Do Not try to operate the machine unless you went through these steps since by doing so, you are taking upon you the responsibility of any damage and cost for repair.

Step 1 - Spindle Bearings

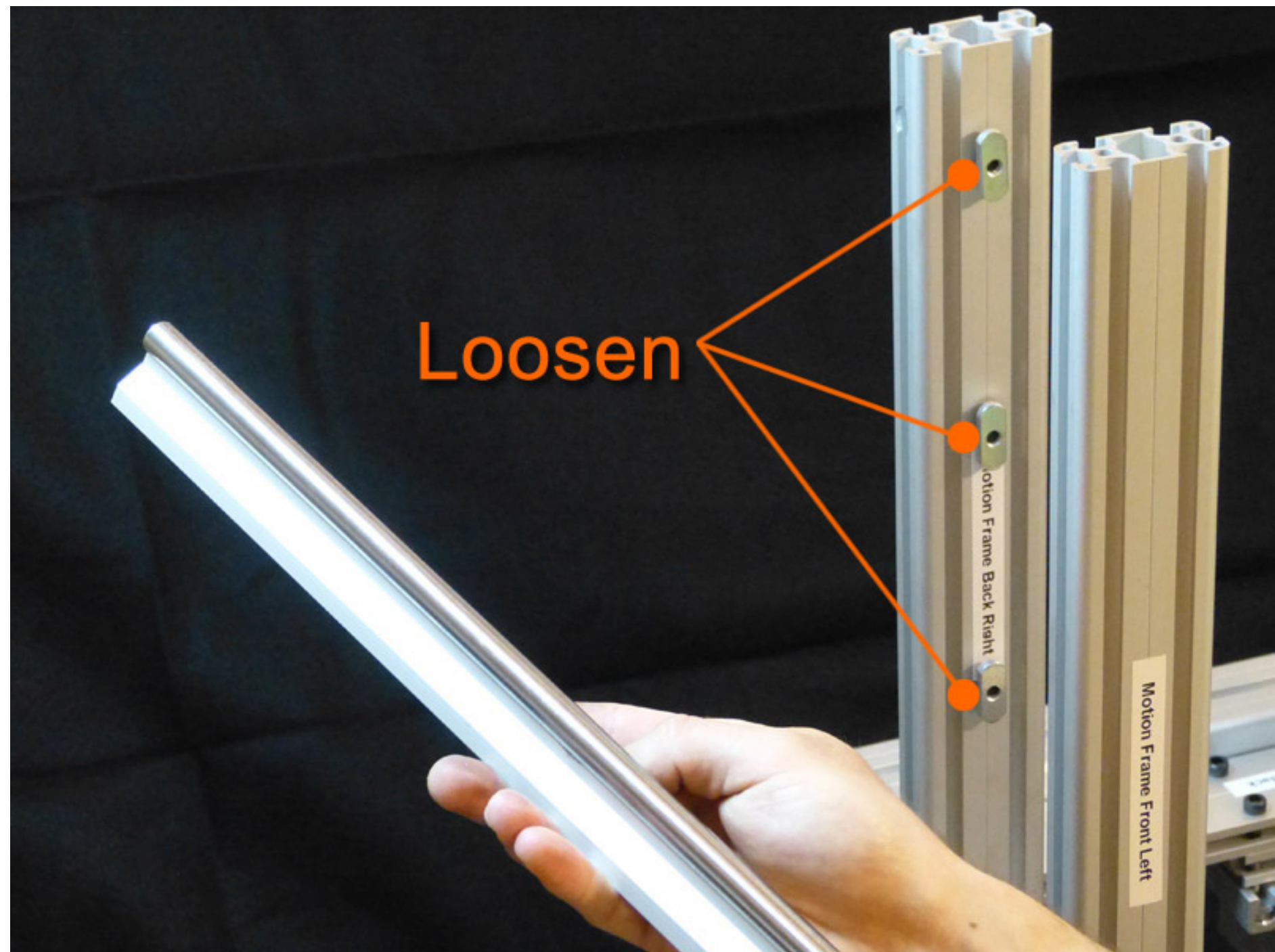


While you assembled the spindle bearings you may have noticed two Allen bolts on the bearing supports. The first one is for holding the bearing in place. The second (middle) bolt is used to adjust the tension on your spindle.

The best way to do this is have both spindles in front of you and use your fingers to spin them. The spindle should be slightly tensioned but not too much. You can hold the spindle by the bearing assembly and if you see that the spindle is spinning freely by gravity then you need to tension it so it is barely stopping while being held vertically by the bearing.

Over tightening the bearing may cause damage and is not necessary.

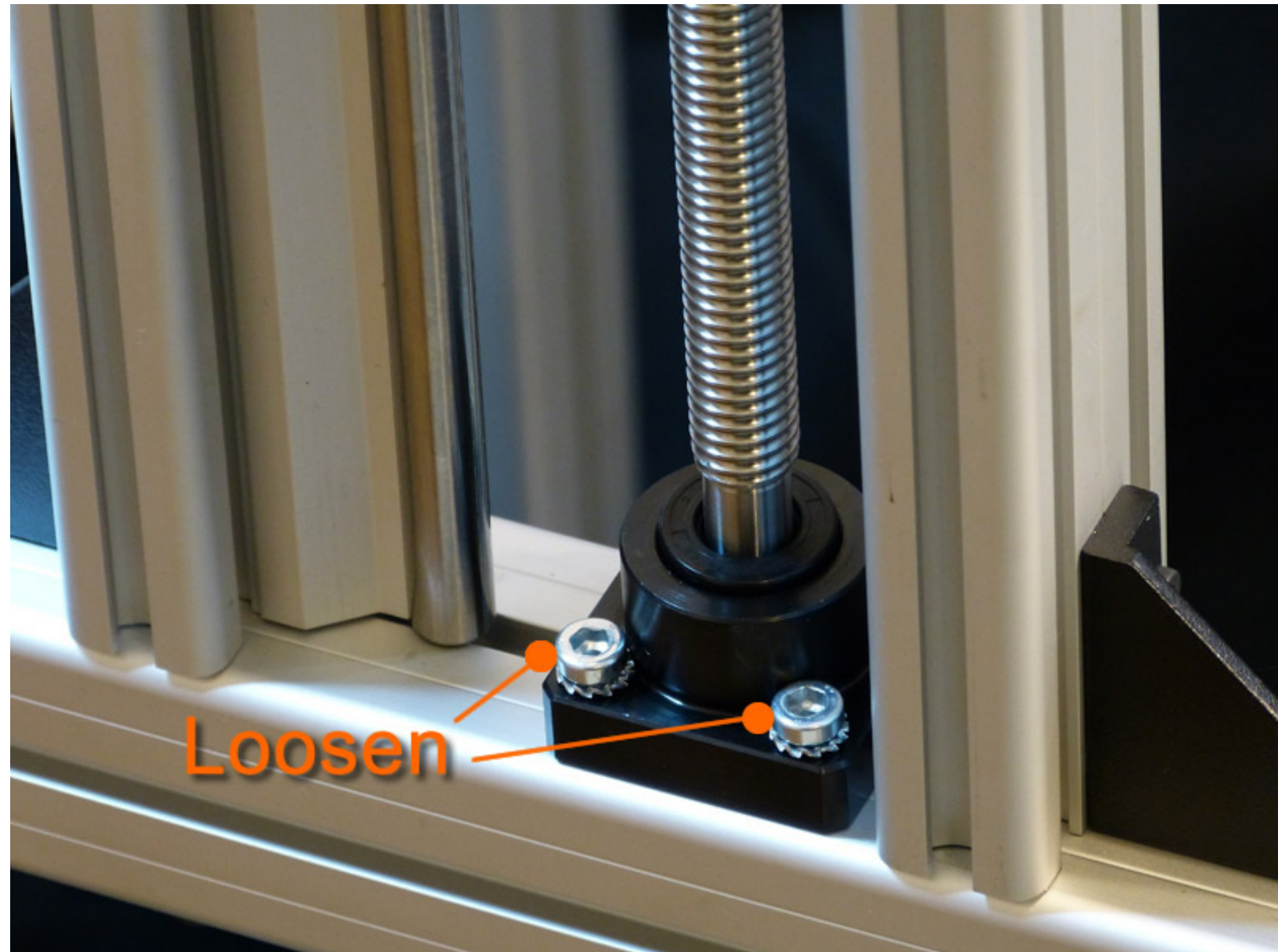
Step 2 - Slide Rails



Before we tighten the bolts that hold all of the motion parts together, we must loosen them up and make sure that everything aligns properly and there is no binding during the movement.

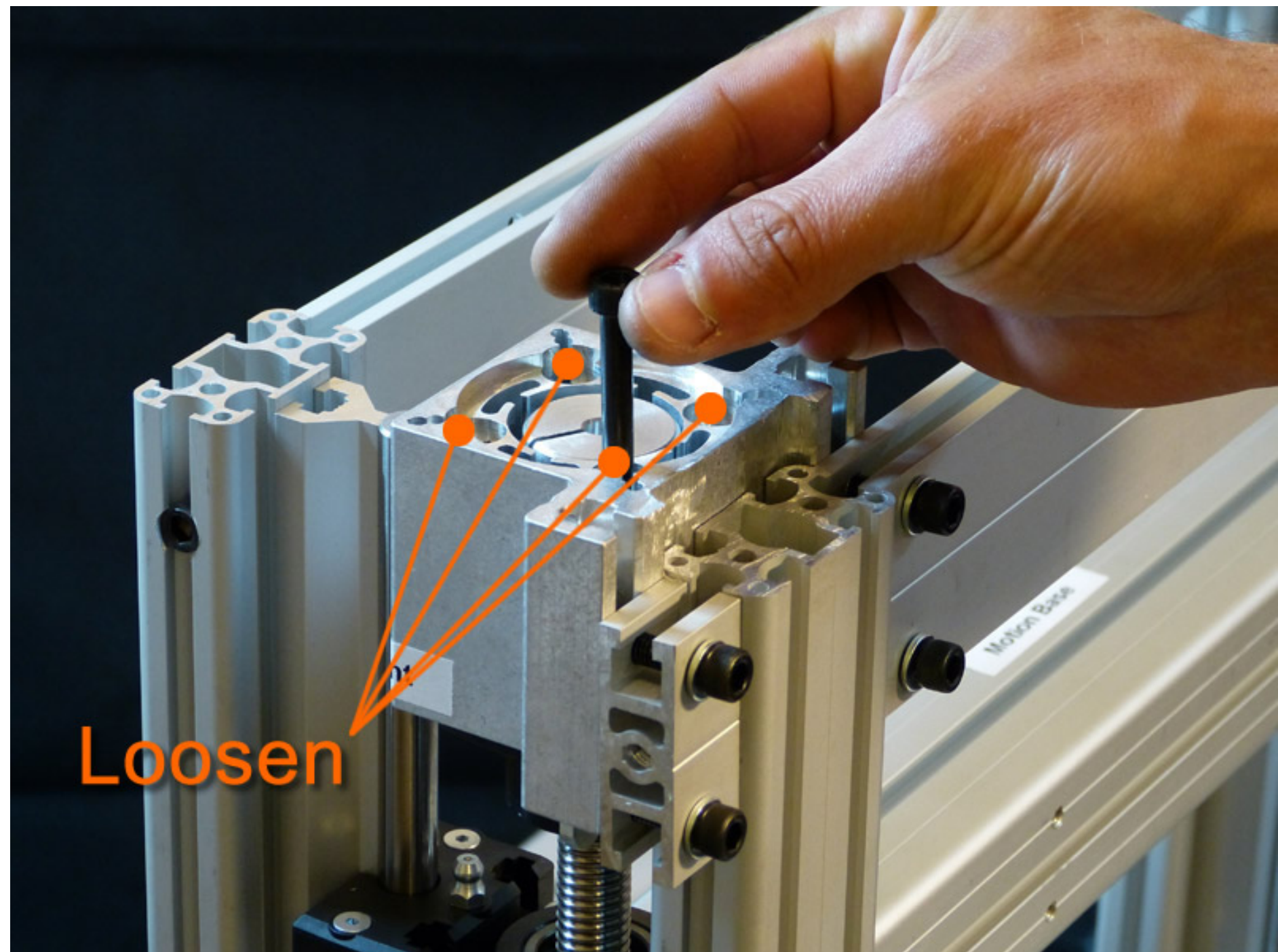
The first thing you should loosen are the Slide Rails. It is important to loosen ALL bolts that hold the rails so they have some free movement. This must be done for both sides of the lift

Step 3 - Lower Bearing



After the Slide Rails have been loosened, loosen then bolts that hold the lower bearings of the spindle. We do this so the bearing can have some free motion when we align the rest of the components. Make sure you loosen ALL 4 bolts that hold the bearing in place.

Step 4 - Motor & Motor Bearing



It is also critical that the Nuts that hold the motor bearing in place are loose. Additionally you need to loosen the 4 smaller bolts that hold the actual motors in place. This way we have the entire assembly loose and no tension is applied to it.

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Now that all of the motion assembly is nice and loose, here are the steps to follow and make sure that the alignment is properly made and the motion operates as smoothly as possible.

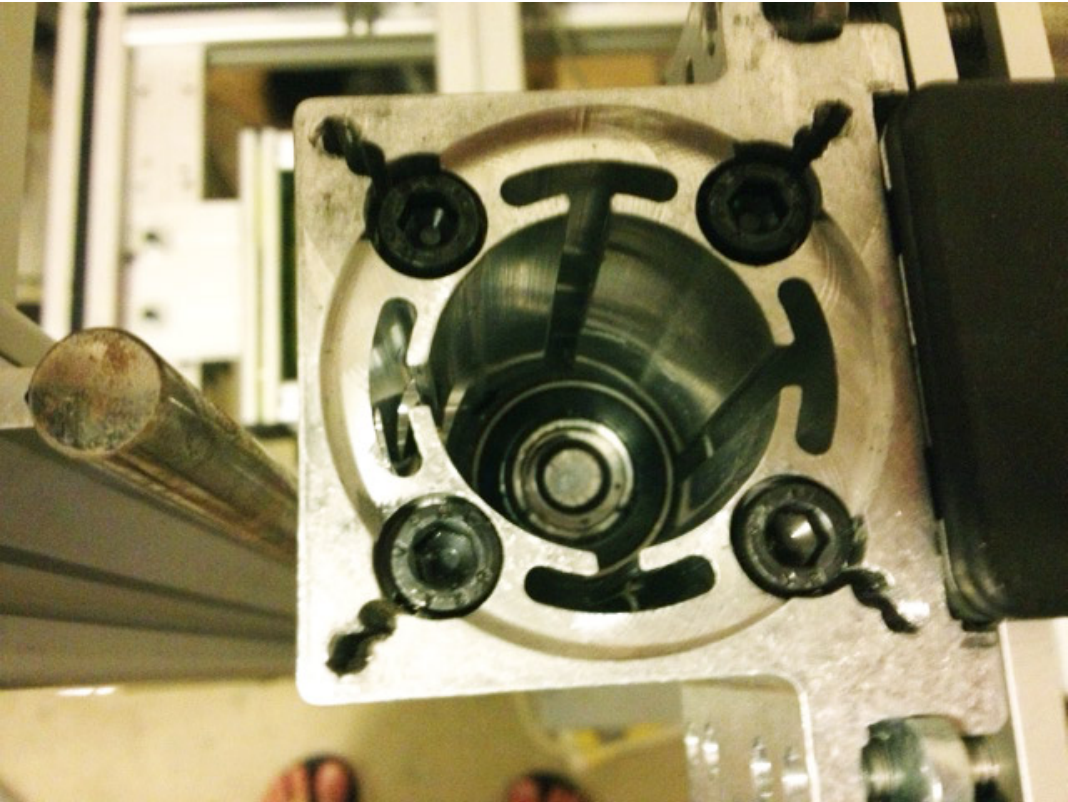
1. Turn ON your electronics and prepare to move the lift through MACH 3 or Creation Workshop.
2. Move the lift all the way UP so that the spindle bearing has as little clearance from the motor bearing as possible.
3. Tighten the 4 NUTS that hold the motor bearing in place.
4. Tighten the 4 Bolts that hold the motor in place.
5. Tighten the 2 upper bolts that hold the Slide Rails but not too tight yet, just so the slide is barely being secured.
6. Move the Lift to the approximate middle of the motion.
7. Tighten the Top 2 bolts of the slide rail.
8. Slightly tighten the middle 2 bolts of the slide rail but not too much yet.
9. Move the Lift all the way down so the Spindle Bearing has as little clearance from the Lower Bearing as possible.
10. Tighten the rest of the Slide Rail bolts.

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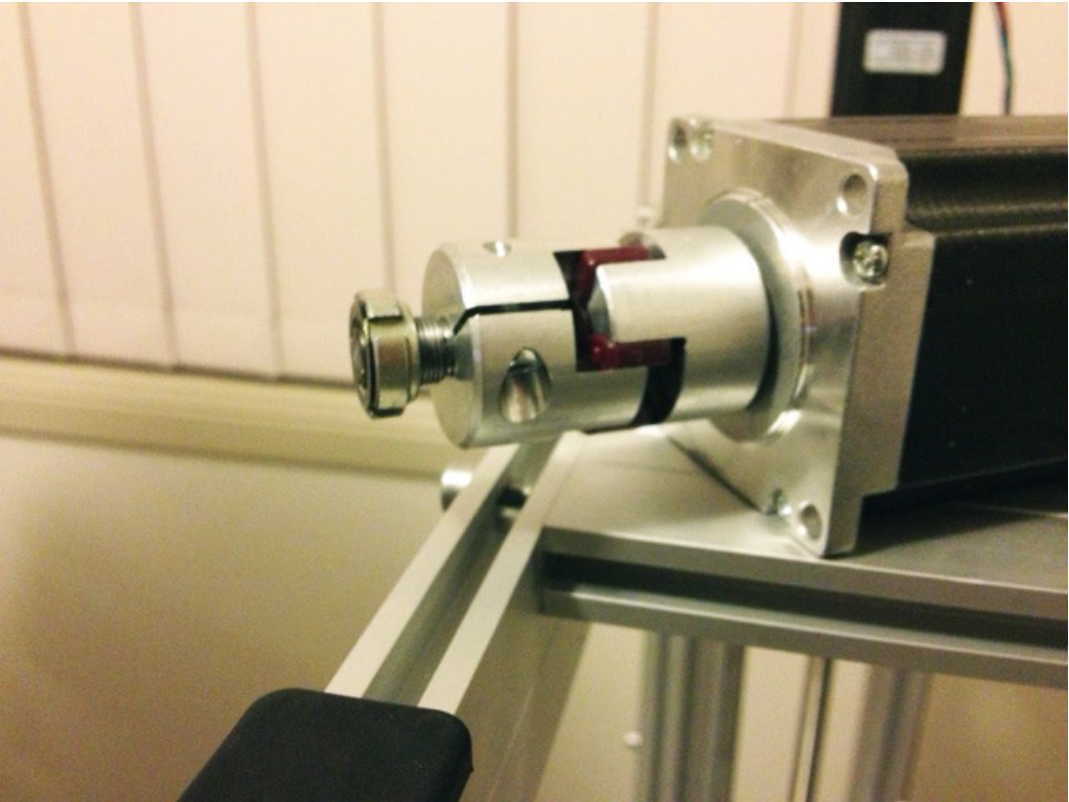
- 11. Tighten the 4 Bolts that hold the Lower Bearing.
- 12. As a final step, lubricate the spindle with Grease. Put a thick coat of it just before the Spindle bearing and let the lift go up and down few times so the grease is absorbed into the Spindle Bearing. This is the case where more than enough lubricant won't hurt the assembly.

What happens if you do not follow these steps

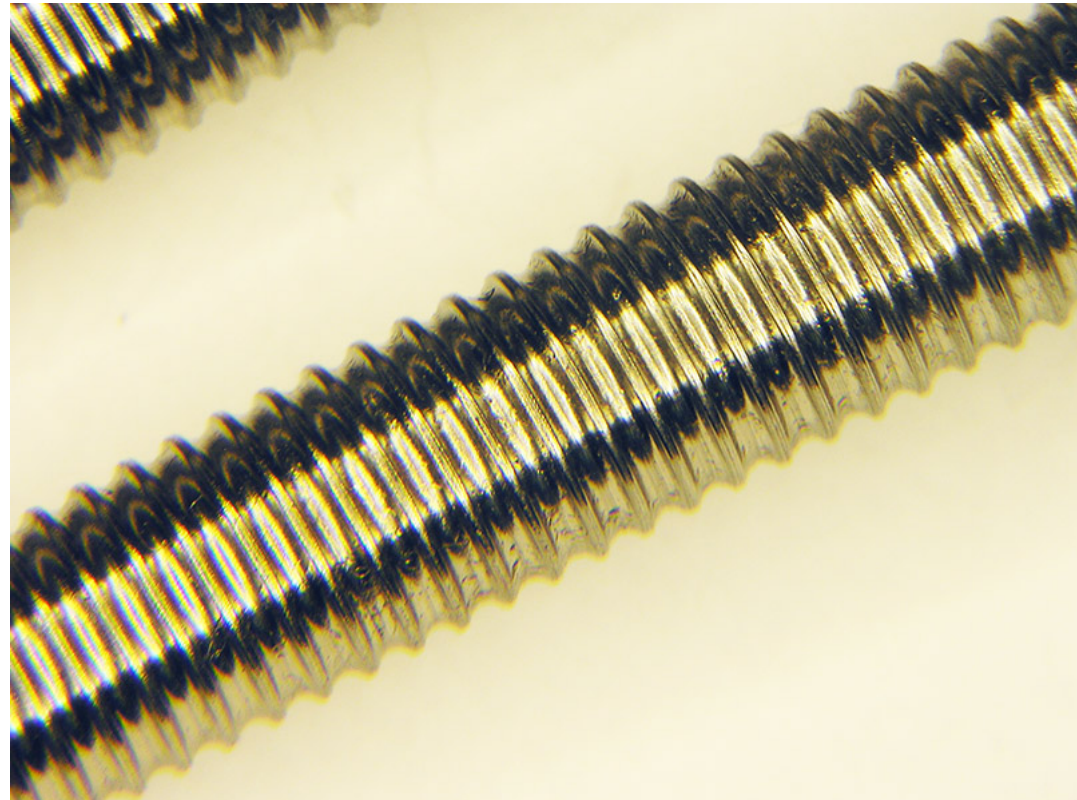
Below are some images of damaged parts that were caused by improper alignment of the components. The strength that the High Torque motors apply to the assembly is so vast that the metallic parts which normally require enormous amounts of torque, just snap under the huge load which the rigidity of the Ilios frame provides.



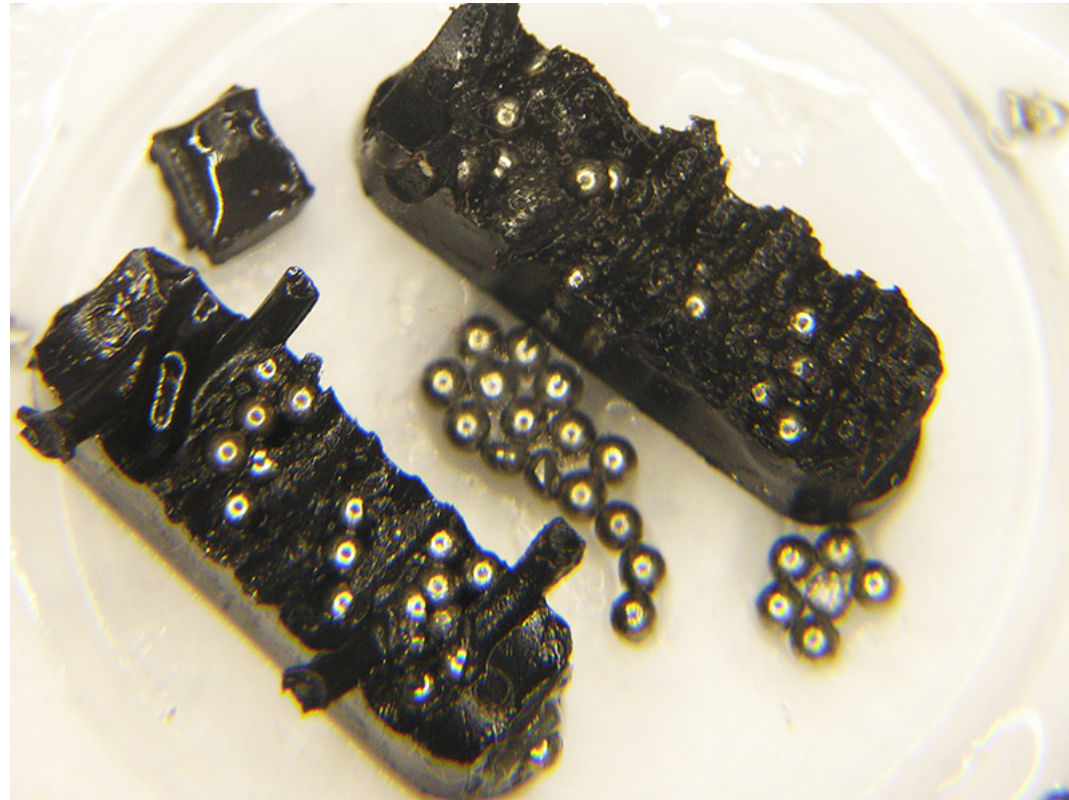
Spindle shaft snapped due to the large force applied to it, while not being aligned correctly with the bearing and motor.



The remainder of the shaft, left on the motor side of the assembly. Note the coupling which also was damaged during the incident.



Scored spindle, damaged while the spindle bearing was tightened too much.



What remained after the spindle bearing was taken apart. Note the shape of the ball bearings which are made from reinforced steel.

As a closing statement, take good care of your machine and the important parts of it. Assemble it with care and use common sense

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when aligning it and testing for the first time. It can be confusing at first but there is no better support than the one you shall be able to provide your self once you get familiar with the machine and can easily diagnose any situation that may arise.