

Adding reliability to a PPLC CNC gantry

Loosening of the set screws on a gantry will impact the accuracy of the system. **Tighten all set screws prior to operation and use the supplied Loctite 271 threadlocker to prevent loosening.** The Loctite 271 can also be used as a retaining compound for slip fit connections with a strength of **3000 psi**.

Loctite 271 threadlocker is a plastic which is used to prevent screws from loosening and lock gears / sprockets to a shaft. **(It is not glue)** Threadlocker is in liquid form until it is in contact with metal ions and oxygen is removed. Once this happens, the liquid changes to a rigid plastic. In liquid form, it fills the void between a gear and shaft and fills the microabrasions on the joining parts. Once the threadlocker cross links to become a solid, it acts like many small keys to prevent movement between the two parts. **It is unbelievably strong at 3000 psi.** The belt reduction units have a ½" main shaft and the gears are 1" thick. Using the formula of $\pi \times \text{diameter} \times \text{length}$ or $3.14159 \times \frac{1}{2} \times 1 = 1.57$ square inches of area $\times 3000 \text{ psi} = 4710 \text{ lbf}$ of holding power. If you run a 620 in-oz motor with the 3.5:1 reduction the shaft will see a torque of $620 \times 3.5 = 2170 \text{ in-oz}$. With 16 oz per lb, this is a torque of 362 in-lb. Since torque is force \times radius, and a ½" shaft has a ¼" radius, the force on the shaft is $362 / .25 = 1448 \text{ lbf}$. Since the threadlocker is rated at 4710 lbf and the motor can only apply 1448 lbf, the threadlocker is over **3 times stronger** than the force of the motors. The setscrews also add to the strength of the connection.

NOTE: If the Loctite 271 threadlocker is used on the belt reduction units, the connections between the shaft and gears will never slip.



Directions for use: Assemble the belt reduction units to dry fit the parts before applying the threadlocker. Once you know that the shaft is in the correct position, remove the gear and outside plate to allow you to remove the shaft with timing sprocket locked in place. Mark the shaft to maintain the correct position. Clean both the shaft and timing sprocket bore to remove any oil residue. Apply the threadlocker to the shaft all of the way around where the sprocket will be attached. As you slide the sprocket into place, rotate the sprocket to allow the threadlocker to work its way all the way around the bore.

NOTE: the threadlocker will start to cure immediately, so get the part into place within 15 seconds. Rotate the sprocket so that one setscrew will be located over the flat of the shaft and tighten to lock into place. The threadlocker will be at full strength in 48 hours. Repeat this procedure to apply the gear. Do not use the threadlocker on the bearings, just the gears and sprockets.