



KDN Tool & Automation Engineering Co. LLC
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CX2



CNC RETROFIT FOR SIEG X2 MINI MILL

**DESIGNED WITH BUDGET CONSCIOUS
HOBBY, EDUCATIONAL, AND LIGHT
INDUSTRIAL USERS IN MIND.**

**TWO BASIC CONFIGURATIONS, ONE
FOR SERVO BELT REDUCTION, AND
ONE FOR IN-LINE FLEX COUPLING
STEP MOTOR PROPULSION**



**DUPLEX DEEP GROOVE RADIAL BALL
BEARINGS WITH PRE-LOAD ADJUSTMENT
LOCKNUTS**

**LEAD NUTS FEATURE ADJUSTMENTS
FOR WEAR COMPENSATION AND
BACKLASH**



**TRUE ACME LEAD SCREWS REPLACE
STOCK SCREWS AND RACK/PINION**

**COMPLETE ILLUSTRATED CONVERSION
INSTRUCTIONS**

STEPPER VERSION



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KIT SPECS:

- **LEAD SCREWS = 1/2"-10 ACME**
- **LEAD NUTS = BRASS ADJUSTABLE W/ WEAR COMPENSATION (X&Y ONLY)**
- **PRECISION MACHINED 6061 ALUMINUM BEARING RETAINER PLATES**
- **DUPLEX DEEP GROOVE RADIAL BALL BEARINGS**
- **BEARING PRE-LOAD ADJUSTMENT THREAD WITH LOCKNUT**
- **REMOVES Z AXIS RACK AND PINION**
- **REPLACES FACTORY LEAD SCREWS AND NUTS**
- **ALL MAJOR COMPONENTS MADE IN USA**
- **TWO BASIC CONFIGURATIONS: ONE FOR SERVO AND ONE FOR STEPPERS**
- **INCLUDES ALL NECESSARY INSTALLATION HARDWARE**
- **DETAILED ILLUSTRATED INSTRUCTION PACKAGE**
- **SOLID PERFORMANCE AT A BUDGET CONSCIOUS PRICE!**



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CNC Safety

All machinery has a certain level of danger about it. CNC machinery has a heightened level in that it has the potential to move, turn the spindle on, to run off course, etc without any input from you. The wisdom to not “reach-in” or “place your hand too close” while a machine is operating is common place for some, learned the hard way knowledge for others, and still some may never comprehend it at all. Body parts are not replaceable!! End mills, drills, reamers, scales, and clamps, even machine tables are. Respect, good judgment, and common sense are a must for operating CNC machine tools and all the guarding and/or bright colored stickers in the world will not protect you better than they can!!!! Safety Glasses are also a no-brainer when you are in the trajectory range of an operating machine. Try to fathom the thought of a smoking chip of steel penetrating your eye and it will become quite obvious why you need them.

I recently ordered an industrial sized package of straight edge razor blades and sure enough, printed on the sticker, it said “CAUTION: Blades are sharp”. I stopped and thought to myself, “sharp razor blades, what a novel idea”.

By assuming the role of a CNC machine tool operator you place yourself at risk of bodily harm / dismemberment or even worse unmentionable dangers. Take this responsibility, apply your own respect, good judgment, and common sense; and you will benefit from an enjoyable CNC machining experience.

Ken Cardolino
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SPINDLE MOUNT MODIFICATION & ASSEMBLY

<p>1. Locate spindle mount to provide access to underside where dovetails are located. Modification is easily performed with an angle grinder.</p>	
<p>2. Modification involves increasing the depth of the rack gear slot that runs through the spindle mount casting.</p>	
<p>3. The slot depth needs to be increased by approximately 5/16" or 8mm to provide clearance for the Z axis lead screw.</p>	
<p>4. Cover any moving components to protect them from grinding dust prior to performing the modification.</p>	
<p>5. Once modification has been performed and all grinding dust has been cleaned, install Z axis lead nut into housing boss.</p>	
<p>6. Install lead nut retention shaft thru boss in spindle mount casting and engage into bore in end of lead nut.</p>	
<p>7. Adjust retention shaft position to allow lead screw to run centered in clearance slot, then install shaft retention plate using an M5 SHCS.</p>	

KDN Tool & Automation Engineering Co. LLC will not be held responsible for injuries sustained while operating CNC machinery retrofit by us or with one of our kits.



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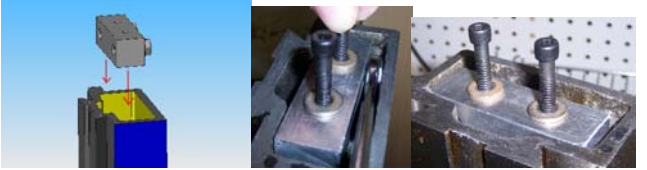



<p>8. If necessary, replace spindle mount casting onto spindle box. Use a straight-edge and shims to assure proper alignment of both castings.</p>	
<p>9. Z axis is now ready to install onto column.</p>	

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<p>1. Install Z mount block into top portion of column as shown. Center in opening. Rotate hex bolts as to loosen them from block, thus causing them to grip inside of column. Adjust bolts uniformly to provide the best grip. Remove the two 1/4-20 Z mount screws.</p>	
<p>2. Install spindle/mount, gib strip, and adjust gib screws for a good sliding fit.</p>	
<p>3. Allow spindle/mount to slide down column until Z bearing plate contacts top of column. Align two mounting holes with Z mount block holes and install two 1/4-20 mount screws.</p>	
<p>4. Adjust mount to provide a parallel relationship between the lead screw and the column. Tighten the two mount screws and rotate lead screw to assure smooth travel. Loosen mount screws and adjust as necessary.</p>	
<p>5. Axis is now ready for drive motor.</p>	



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<p>1. Installation process is the same for all three axes. Only one will be referenced here.</p>	
<p>2. Install four standoff retention studs into bearing plate. Leave 3/8" exposed for standoff engagement.</p>	
<p>3. Install one end of flex coupling onto lead screw shaft. Tighten set screw in coupling hub onto the lead screw shaft extension.</p>	
<p>4. Install four motor standoffs and tighten with 3/8" box wrench.</p>	
<p>5. Axis is now ready for installation of your chosen step motor.</p>	
<p>6. Insert motor shaft into bore of flex coupling. If motor shaft has a flat on it, align it with the set screw on the coupling hub. Lightly push on motor until it's mounting flanges reach the standoffs. Rotate motor until mounting holes line up with standoff threads. Install four #10-32 X 1/2" screws to retain motor. Finally, tighten coupling setscrew onto motor shaft.</p>	
<p>7. Axis is now ready for wiring.</p>	

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Suggested sources for Step motors, motor drivers, and control software:

Motors

1. www.homeshopcnc.com (Good prices on imported steppers)
2. www.xylohex.com (Imported steppers and domestic drivers)
3. www.clickautomation.com (Mycom / Nyden motors and drivers)

Motor Drivers

1. www.xylohex.com (Imported steppers and domestic drivers)
2. www.stirlingsteele.com (US rep for Canadian driver boxes)
3. www.geckodrive.com (The Ultimate Motor Drivers)
4. www.clickautomation.com (Mycom / Nyden driver lines)
5. www.embeddedtronics.com (Raw pc boards for do-it-yourselfers)

Control Software

1. <http://www.dakeng.com/turbo.html> (Home of the infamous DOS based TurboCNC)
2. www.deskcnc.com (Home of windows based DeskCNC)
3. www.artofcnc.com (Home to Mach I, II, III software)

Complete Systems

1. www.kdntool.com (Complete system integration)
2. www.cadcamcadcam.com (DeskCNC rep with compatible servo systems)
3. www.timgoldstein.com/secure/eStore/ (Driver and software packages)