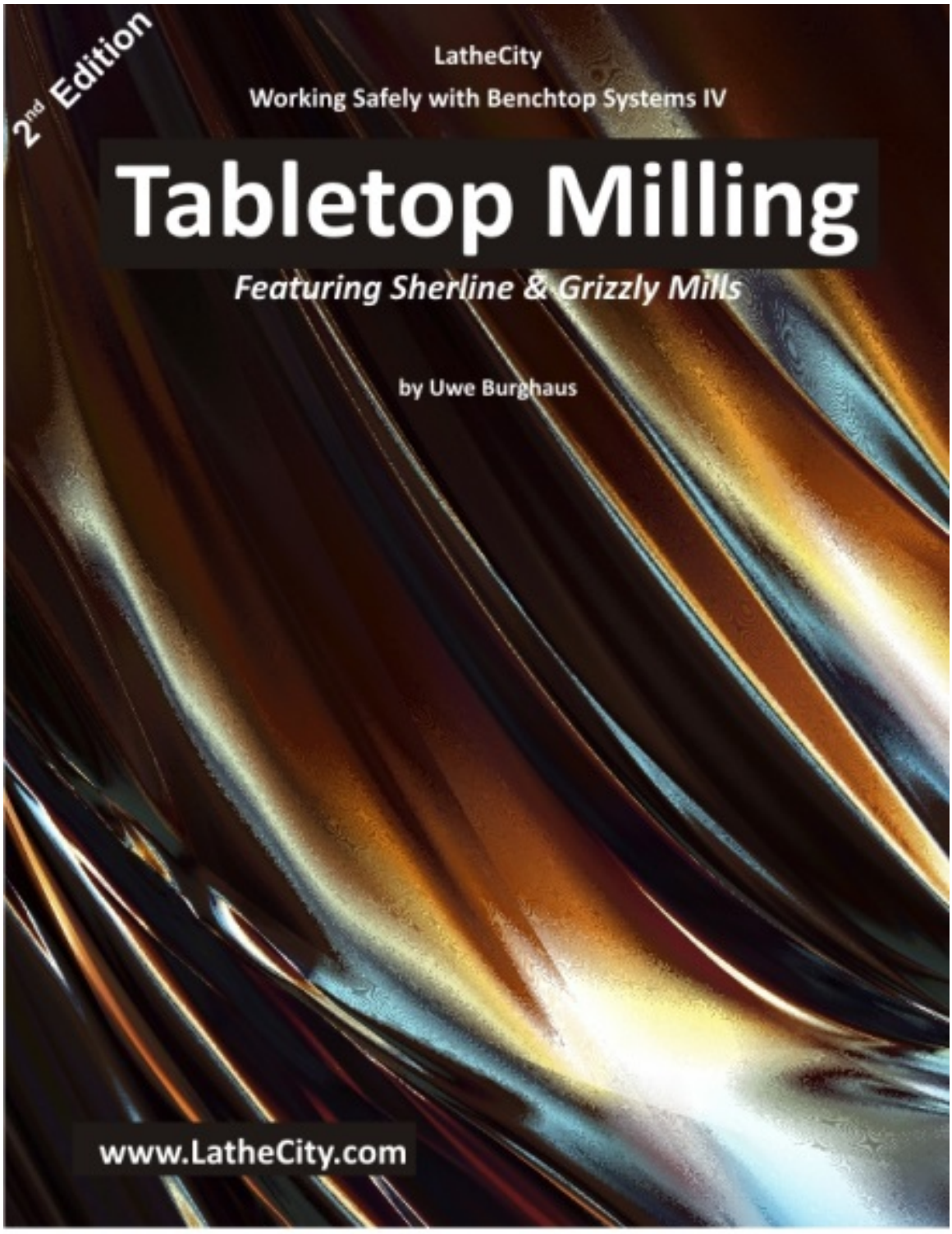


Reprinted from "Tabletop Milling"

Getting started with a larger "tabletop" mill

Home delivery of heavy equipment

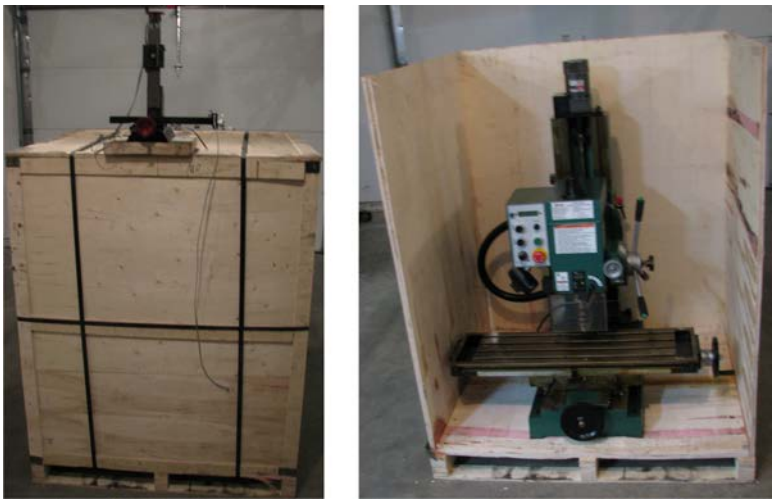


Fig. 26.1: Just arrived – fully assembled in one piece. Sherlines mill is on top of the box as a size comparison

In particular professional milling machines can have a weight comparable to a small car. When I turned in my on-line order for the Grizzly mill, their web site had no options whatsoever to request a "liftgate truck" (apparently $40 in 2012) or "inside delivery" (+$37 in 2012). (There web form had a little box restricted to a few characters with the note that more information would be provided later. That's what I have seen in 2012.) Both options exist, however, perhaps, call-in the order, rather than going through their web store. Truck drivers will typically not move even their little finger (understandable). That's a curb side delivery. You have a few minutes getting the wooden box out of the truck; you cannot open the box and move the equipment piece by piece (see below) – no time for that. Thus, if you don't have 5-10 friends lifting regularly weights or have connections to a local wrestling club or something, then you need at least a "liftgate truck" and rent a "pallet jack", have a "large car jack", or small "fork lift car". Easy enough. However, most likely you will not know when the delivery arrives. The "motor truck company" hired by Grizzly had a nice website to track the order. However, the delivery day was not available unless you lock-in there every few hours to track the movement of the truck yourself. When the truck suddenly arrived, that website did state that it would still be 500 miles away …

I have had similar issues with equipment deliveries to my research lab. (Universities, however, have loading docks, fork cars, etc.) It's always a hassle and none of the truck companies I dealt with had a good customer service. For example, one guy handed nice paper work to me which clearly stated "call ... before delivery". Did you call my cell phone? Nope. Why? ... You will be on your own with perhaps 641 lbs. (mill + shipping box, manual p. 4)!

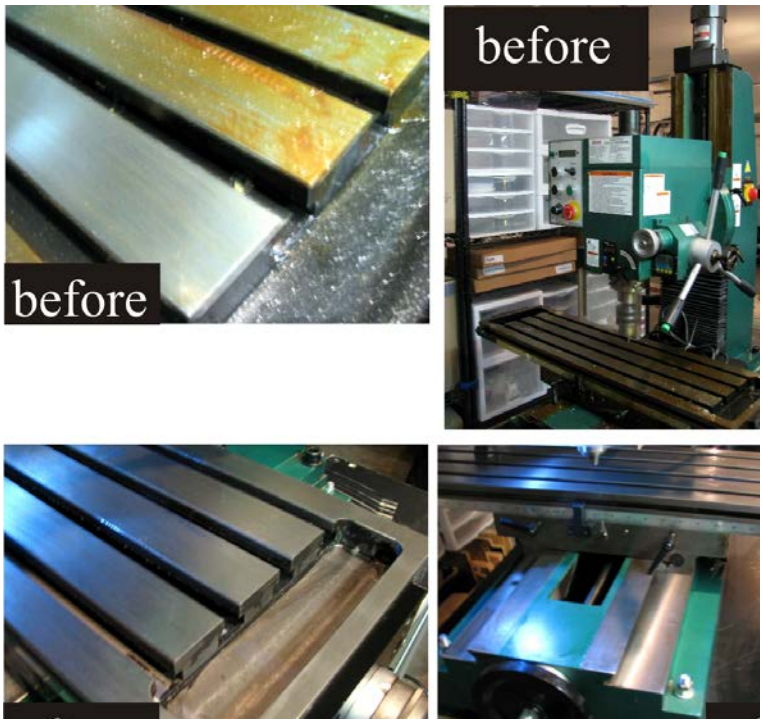
Inspect the box carefully all around. Little scratch anywhere?! Mark it on the paperwork or you will most likely have major trouble with the transport insurance. Have a digital camera ready.

Don't send an e-mail and call shortly afterwards. Grizzly's, for example, do well in responding to e-mails (Sherline's not always ...). However, most large companies have internal communication problems ... writing this politely. Call the vendor and not the freight company.

Good luck.

Home delivery of heavy equipment – part II

According to Murphy's law there is always a second problem. When I opened the shipping crate (finally home delivered after several phone calls with Grizzly's…), I thought something would hit me. I should have known it better having dealt with heavy equipment in my lab before, but guess what? The entire mill, 596 lb., was completely assembled and bolted on a pallet. Any mill consists of at least 4 segments that can be separated: the mill table (additionally one can typically remove the X slide of the mill table rather easily), column, base, and headstock. Would it be good to ship it that way? Each component could be lifted by a single person (or two), etc. Even Sherline ships their mini mill separated in components. Unfortunatelly, in this case, the headstock is basically hard wired to the electric box on the column – no easy way to separate these. Removing the entire headstock? Well, that one is bolted on the base, i.e., lifting up the mill to remove the nuts would be required (it didn't look like tapped holes in the base). Also, the weight of the entire headstock assembly probably amounts to 50% of the total weight. Unfortunatelly, there is no hook on the mill to hang it on a shop crane or car hoist! In addition, the mill base is basically flush with the pallet, i.e., no way to move anything underneath (e.g. using a pallet lift). Using the four mounting bolts of the mill table to attach a chain or something? Well, how to get the bolts out there afterwards. Sliding a steel chain/cable under the mill – obviously not safe. Hanging it on the mill table or headstock – nope! (Well, I am not in the moving business of heavy equipment, perhaps there is a smart way to move the thing, but ...) Congratulations! To me or Grizzly's? This is still a hobby "benchtop" size mill and not really professional shop size equipment. Never mind, making a longer story short: one may rent an engine hoist, cherry picker, pallet lift, shop crane, gantry crane ($40/day in 2012) after welding a hook on the mill, or, find 4-6 strong friends. Grizzly's manual (p. 11) does state correctly use "hoisting apparatus" and find "an assistant". The crane thing is a good suggestion, but there is no simple (and safe) way to attach the mill to a shop crane, in my opinion. And, I would triple at least the nose count: get at least three guys to lift the ~600 lbs with a crane since one needs to balance the mill on the crane.



Work bench

If you design your own stand for the mill, please realize that you need a heavy beam in the middle of that table. Just a frame and a thick wooden plate would not work, I guess, the mill may go right through that plate. Also keeping the center of mass low would be a good thought, i.e., don't design the stand too high. Add crosses to your table if it is not welded together or it may shear sideway under the load as a house of cards (perhaps you know IKEA book racks which have crosses on the back side). I used a framing system, however, screwed-together tables have the tendency to swing and vibrate. Add crosses and a heavy load (some concrete bricks for $1/each) to the bootom of the table. Perhaps go better with Grizzly's mill stand. If you want drawer in your table, design the table around the tool box, right.

Cleaning the mill (?)

Yes, you have to clean the mill, which took me about 2 hours and 4 rolls of kitchen paper towels. All un-painted surfaces are covered with a rust preventing grease (in my case also the plastic hand wheels were basically covered). I used oven cleaner which also removed the black staining color on the inside of the T slot table – that was likely not recommended. Grizzly recommends WD-40. Don't forget the lower side of the mill table and move the mill table all the way to the column to find more grease. (I found grease still a month after using the mill.) Perhaps this is standard for new larger mills – I cannot tell, however, storing it in a heated warehouse may also be a way to prevent rusting…

Fig. 26.3: Front side of the mill. (1) milling/tapping selection; (2) start; (3) RPM; (4) emergency off; (5) chip guard; (6) column up/down; (7) spindle feed; (8) spindle fine feed; (9) column "DRO"; (10) reverse spindle rotation; (11) digital protractor

Loose handle on mill table?

Loose handle – perhaps not. The X-handwheel of the mill table did rotate freely when the mill arrived. Since also the hand wheel handle was removed, I first thought the wheel was loosened for transportation. However – nope. The X-handwheel is connected to the X-feed

spindle by a simple clutch mechanism (two slotted disks). Push in the wheel and rotate a little to engage the "clutch". The Y-handwheel has no clutch. When a power feed for the table is installed that feature makes sense otherwise it is a hassle when machining parts. That handle frequently pops out when moving the table. (The manual p. 26 is mixing up X and Y directions, i.e., text and images are not consistent. There are too many mistakes in that manual for my taste.) Also larger lathes have that kind of clutch handle on the carrier.

Running spindle in

After a test run, as described in Grizzly's manual, the mill needs to be lubricated. Rub oil on all ways and fill the ball oiler. A ball oiler is an oil reservoir that is sealed with a small ball-spring seal. Grizzly's manual (p. 31) informed me that that mill would have nine ball-oiler although the images in that manual, which came with the mill, did show only eight. I did also find only eight – I hope there is not another one on the bottom (I would not like to lift that mill any time soon again). Instead of a ball oiler there is only a hole on the left side of the table on my mill. The mill comes without oil and an oil gun is recommended for the procedure. You may want to order one together with the mill. (Or, go to e.g. MaxShop, these cost $1.99 – would be terrible adding this to the tooling package …)

Next is the spindle break in. As detailed in Grizzley's manual, it consists of running the mill for 10 min each at increasingly greater RPM.

Writing also something very positive here. The mill did work perfectly (through that test and startup) without any trouble! (However, see below.)

Basic features and controls of that "heavy duty benchtop mill"

Fig. 26.3 shows the controlls of that mill: somewhat more complex than on Sherline's system.

Starting the mill. To start the spindle, select tapping or milling mode (1). Next, push start button (2), assuming that speed control (3) is set to zero. The spindle RPM can be set variably by the speed dial (3) (1600 max RPM, the manual states RPM 3600 on p. 4 for motor speed, spindle speed 1600 RPM, a little misleading for my taste). I was used to a variable RPM from Sherline's mini mill, that's why I liked that feature. The spindle stops when the emergency button (4) is pressed or the chip guard is open (5). (The mill has also a main switch.) That chip guard (thin polycarbonate plate) is not locked in position; it's just held with a small magnet. Therfore, I doubt somewhat that it provides a lot of protection, but may often be in the way. It will block chips and cutting oil, however. It's a chip & oil guard rather than a safety guard, I would say. The lever to lock the quill basically blocks that chip guard which is a daily pain in the neck. The spindle doesn't start up if emergency switch is pushed in or chip guard is open. If you push the start button, the spindle will start up. Therefore, always turn the speed dial to zero (as

on Sherline's system). I like safety features, but that's a little of a cheapo design, for my taste. A digital display shows the RPM. In tapping mode the RPM is reduced to 50 – 800 RPM. Max RPM is 1600 !

Headstock feed. The headstock can be moved up/down with a motor when pushing the corresponding buttons (6) – that's a rather slow one-speed-only movement, but it is cool not to crank on a handwheel as crazy anymore. A great feature available as a standard for that mill. A rough scale is on the mill column. The column has stops.

Spindle. The quill can be moved up/down with the downfeed handle (7) similar to a drill press. When locking that handle, a fine feed (8) can be used. The spindle position is displayed (9), i.e., the mill has a DRO for the column height (Metric/English), but not for the mill table. The column DRO, however, has only 3 digits, good to remember when setting the cutting height of a face mill. DRO's typically have at least four digits. The cutting depth for milling is typically set by the quill position assuming that the total cutting depth is not too large. Extending the spindle too much can result in unstable milling conditions. Fortunately, it turned out that this is not a big problem. The downfeed handles have a button at their ends (10). Pushing one of these in tapping mode reverses the spindle rotation. (I basically never use this.) That's probably only needed when trying to tap holes directly. Tapping attachments (see next Chapter) have a clutch and RPM reversal anyhow. That mill comes with a professional R8 spindle taper. R8 tools are hold with a drawbar (a long 7/16"-20 bolt). The mill comes together with a Jacobs drill chuck that has an R8/B18 taper.

Fig. 26.3: Grizzly's drawbar with R8 collet, also shown is Sherlines Morse taper for the headstock and the drawbar for it

Tilt. The headstock can be tilted. A feature I will probably never use (I did never used it on Sherline's mill). Unfortunatelly, there was no option of a fixed and more rigid mill column. The tilt of the column is displayed using a digital protractor (11). These mini protractors are in the meanwhile available for $40 or less (, i.e., perhaps glue one on your mill if you don't have it). I cannot understand why rather fancy features are built in which most customers will rarely use, but a DRO for the mill table is not a standard … The DRO and protractor use separate batteries, not really great, these little button batteries start to burn a hole in my wallet. Unfortunatelly, they are very common for caliper and mini DROs and don't work too well in a colder shop (I am in ND).

Dovetail column. All ways use dovetails which is great and one reason why I purchased that mill. Pure mill drills typically don't have a dovetail column. That design should be a lot

more rigid than a drill/mill. All ways can be locked – great and full size standard. All dovetails have adjustable gibs – double great (actually also standard on any better system). The lead screws are held at both ends using bearings (I think) – they don't dangle in air as on Sherline's system or other mini benchtop mills. The ways are covered. The X-direction has table locks (i.e. adjustable endposition stops).

So far, I would write: it's a great system with, however, a number of unnessesary features, which I would rather replace by a simple DRO keeping the price. I don't need a DRO that calculates the fuel consumption for a trip to the moon – I would never use that either. Just a basic and sturdy DRO (X, Y, and Z) … All of this is just my opinion based on my current knowledge and experience with that system. Build your own opinion. It's a great system, a quantum leap from the Sherline mill when mostly interested in engineering type projects.

Fig. 26.4: Lifting the mill with low budget equipment from Harbor Freight Tools. Don't copy this, the risk is yours. High stand jacks tip over easily, to my experience

Make perfectly sure that you fix the mill vise on the mill table properly. If the vise starts to shift while cutting you will run in serious problems or a least mess up your work piece. This is a close to full size mill. The forces generated are significantly larger than on Sherline's mini mill.

Trouble shooting (added to the 2nd edition) ! - G0722R or G0722 – sold as heavy-duty bench top milling machine by Grizzly. I purchased the machine Oct 17th, 2012.

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Trouble shooting – (Nov 12th, 2012): After spindle run-in, cleaning, and (ball) oiling, I started now to work with my new Grizzly mill. The system was just fine for about two weeks, but I didn't use it very much – no time to do so. Then the trouble started. The mill runs without load (e.g. RPM 600) for 2-3 min and then suddenly stops, stop label shows up in display, nothing else, no error displayed. Playing around like that for one hour the mill started to run more stable (warming up?). However, the problem persisted with or without load (cutting something), the mill frequently stopped. After a delay of at least a week, I replaced the controller board (P0720218), as a warranty replacement. That one costs officially apparently $1,500! It was a major hassle getting the boards exchanged. There is not enough space getting this out properly. The board is fixed by four screws. However, the setup was so

imprecisely machined, in my opinion, that I could get only two screws back in. The hole positions simply did not line up. The electronics looks like a b/w TV from the 1980s, in my opinion – I am not a specialist in electricity (I would not call this electronics). Hurrah, the mill was running again – for now.

Trouble shooting – (March 14th, 2013): I did not do much mill work except, drilling a few holes, cutting key ways, and T slots – mostly work on aluminum. I was busy with projects which mostly required lathe work. Anyway, one day, after working for 30 min or so with the mill (drilling small O.D. holes in aluminum), the mill suddenly triggered the breaker in my shop. Try to switch it back on, breaker triggered again. Another try, some noise comes out of the electronics box at the back (a capacitor exploded as I found out later), but I could switch the main switch of the mill on again. The column motor worked, but main panel was dark, green main light was on, opening the safety door appeared to switch a relay inside. The RPM display did not show anything and spindle did not start. I opened up the back to search for a fuse etc. There appears to be a household-type breaker switch inside of the mill which appeared OK. The spindle moved hard when trying to move it by hand. Motor shortened out?? Perhaps? (I did not try much to rotate the spindle by hand before, however.) I may add that the mill did never trigger the breaker before and I did try a different power outlet. The breaker max current is fine. Next day, I did look at the mill again more carefully and find three more fuses in the mill. (Look at the wiring diagram of the manual and you may find these fuses.) Two on the back of the headstock box (1 A and 2 A), these two were OK as measured with an Ohm-meter. One more fuse was at the top right of the controller broad. This one was exploded (Fig. 26.5). A replacement fuse was not included with the mill. This is a 30 Amps. / 220 V fuse. Scary, isn't it, a 30 Ampere fuse was burned out. In addition: It's a little dark behind the mill in my shop. Therefore, I did not see this earlier. A flat capacitor, on the right upper corner of the board was also exploded; probably some other components were damaged too. That controller board was broken again. 2nd time within a few months! Get some 30 A fuses, I would suggest, these are not simple to find in town (at least not in Fargo, 10 A is typically the end of the scale.) I contacted Grizzley's customer service March 9th, the 3rd controller board (on warranty) arrived March 14th. That's pretty good for a private customer, but still not great of a small company since without that mill we are dead in the water for a number of projects. Hurrah, however, with that 3rd controller board (2nd replacement), the mill was running again – for now.

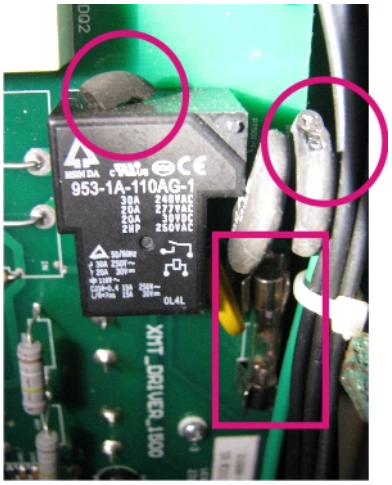

Fig. 26.5: "Exploded" capacitor and burned 30 A / 220V fuse (see rectangle) on Grizzly's controller board for G0722R heavy-duty

bench top milling machine. The piece that was shot off the capacitor landed on a small relay box. This is not staged, that's how it looked like when I opened the back panel of the mill.

Trouble shooting – (March 15th, 2013): The mill, now equipped with the 3rd controller board, broke down again. While milling aluminum, after one minute or so the mill suddenly stopped, switch back on, mill stopped again shortly afterwards, this time I cannot switch it back on. Checking breaker, the 30 A / 250 V fuse on the controller board is broken again. This time I don't see an exploded capacitor, but I don't have a 30 A / 250 V fuse at hand and will not get one in town. Again a delay of a week, smart as I am (?), I did order fuses in already a few days ago – however, still waiting for these. There is no motor wiring diagram in Grizzly's manual, I start to believe that the motor is shorted out or something. What draws 30 A in a mill?

I am not writing that all of Grizzly equipment is like that, I have had "only" one of these mills in my shop, and the mill is the first piece of machinery I purchased from Grizzly, advertised as a new model at that time. However, my description here is accurate. The hardware of that mill is solid, but the "electric" …

Trouble shooting – (March 18th, 2013): I had the option to send in the mill for repair or replacement or to change the spindle motor and board (the 4th one in the meanwhile) myself. I initially preferred to do the repair myself, lifting up again 800 lb. was not too appealing and do-it-yourself is typically the fastest option when it comes to repairs. However, I got the advice not to do anything beyond maintenance myself since this may compromise warranty. Check with your vendor and get a written statement, would be my suggestion. I did follow that advice. Initially I lifted the mill on my shop table with help of 5 guys. I would not like to bather these fellows again and purchased a low budget shop "crane" (see into boxes, Fig. 26.4) – a total of $500 for that carne and lifting hardware. That's still a low budget version. Finally, I got new fuses shipped in, but these "exploded" just by turning the main switch of the mill on – clearly the motor is shortened out. I got the final shipping agreement ("bill of lading") from Gizzly on March 26th (basically waiting for this since March 18th). They did pay for the shipping. The mill was mounted on a pallet on March 21st and was picked up on March 27th. Since March 14th I cannot use that mill which was purchased as new in October last year. This starts to affect sales of my micro business and who knows how long the repair will take?

Trouble shooting – (April 10th, 2013): The mill came back; they send me a new machine. Great, I guess, but degreasing, spindle run in, etc… And, this did not reset the warranty time. (That machine indeed has all the ball oilers, as described in the manual.)

Trouble shooting – (April 24th, 2013): The mill works OK so far, but the RPM display occasionally (at random) disappears. Need to switch the mill on/off to reset the display. Bad connection somewhere, I guess. The electric still has some issues. I count the months to the expiration of the warranty and hope for the best … In addition, the work light burned out in no time; same thing with the 1st mill. I do measure 27 V on the halogen light bulb socket. 6 V, 12 V, and 110 V light bulbs are available anywhere, 24 V need to be ordered in, 27 V light bulbs don't exist. When drawing current, the 27 V will drop down somewhat, I guess it's a 24 V system. No

note in the manual, no label on the provided light bulbs. I would speculate that Grizzly put a regular 12 V lamp in there. Therefore, these burn out after a week.

Trouble shooting – (June, 2014): I am just finishing up the 2nd edition of this mill book and the Grizzly mill is still working without major trouble. –☺

Trouble shooting – (November, 2014): so far so good.

Warranty. Your grandma would probably tell you the same: Note that some companies offer only 6 months warranty on major equipment and even restrict this, i.e., motor excluded from warranty, or only 3 months on the motor. Some companies do not cover shipping costs of returns and/or exchanged parts. Grizzly's warranty is indeed good!

The first thing I do now when ordering in new equipment: read the warranty and business terms carefully. The cheapo motor and controller boards appear to be the main issue with import systems, in my opinion. If you have a choice, go for the larger motor and select a US or European motor. In the meanwhile, I have seen that option for some lathe models.

Although that mill is advertised as a tabletop mill, one approaches professional shop size level with that system. Apparently different standards are here in place when it comes to shipping and startup procedures. Grizzly's customer service was helpful solving the issues with the home delivery. However, one may need to be aware of: this is (close to) industrial standard rather than hobby machinist standard.

Tip:
....

That my first mill did break down was probably bad luck, the 2nd one I got does now work properly. Bad luck also that Grizzly delivered it to a guy that writes books. By the way, we have an equipment review section on our website (http://www.lathecity.com/ProductTestsLatheCity.html). Provide your story if you like.