



UNIMAT Accessories

Required **Safety Notes**
Product Description
Testing Procedures

Current prices are given on our website

**Most of our Sherline
accessories can also be
made for UNIMAT →
[contact]**

**You can find more
accessories and books at our
website.**

**Factory direct:
www.LatheCity.com
Or go to EBay**



Fast tool change system for your UNIMAT

Current prices are given on our website

Product description:

- Steel screw-on-type holders for various mill cutting and boring tools. The holders screw-on the spindle of a milling machine/lathe. The tool holders fit end mills, center drills, deburs, etc. **Add a fast tool change system to your benchtop milling machine.**
Holder fit on a UNIMAT M12-1.0 mm or M14-1.0 mm spindle. Sizes not explicitly shown in this manual can probably be made on request.
- Various adapters for using UNIMAT accessories on the Sherline system vice versa.
- Morse type adapters.
- Blanks – machineable end Morse Taper

Adapters are tested to a maximum revolution per minute (rpm) of 2800 for light metal work on a benchtop/tabeltop system.

Shipping & pricing: Current shipping costs are given on our website. Giving you an idea: a single adapter or a few will ship for \$4 (USPS 1st class); packages ship typically for about \$6 (USPS priority flat rate boxes). We reserved the right to change these rates any time as well as the price of the adapters. Current rates are

given on our website. Retail prices may vary depending on commission fees, etc. Generally you will find the lowest price directly in our on-line store.

Returns: Returns in resalable conditions are accepted within 30 days after the shipping date. (EBay will give you 14 days.) All shipping costs and credit card fees are the responsibility of the customer. (No fees on check orders and check reimbursements if requested.) No returns of custom designs or customized designs are allowed. General sells and business terms as given on our web site are active.

Safety/Disclaimer: Adapters are not cutting tools in themselves. Still, general safety rules for machine tools are in place. For an extended list of safety notes, consult the literature or go to our website for a free download of a safety booklet (<http://www.lathecity.com/Books/Safety-Booklet-Lathe-City.pdf>).

We do not warrant that any accessories can be used for any particular application. Damage on equipment (particularly damage on the spindle of the mill by over-tightened screws) caused by usage of accessories is the customer's responsibility. End mills are very sharp and have to be handled with caution. End

mills are not like lathe cutters and are sharp. Make sure that the auxiliary screw is tight at all times; otherwise, the end mill may pop out of the holder. In most cases, the end mill may land on the workpiece. However, this can result in unstable and dangerous situations with any end mill holder. Use end mills with a flat and clamp the end mill at the flat. If you encounter heavy vibrations then replace the steel set-screws with Nylock (vibration tolerant) set-screws. Hobby machinists tend to stick their nose too close to the machinery. Use safety glasses and protective clothing. This manual does not replace books about metal working and/or proper training.

Do NOT use untrue running cutting tools. If an end mill or drill does not run true it can generate unstable working conditions. This can be dangerous. Dispose end mill holders or Morse type adapters which do not run true or do not fit properly.

LatheCity disclaims to the largest extent possible by law any responsibility for the unprofessional use or misuse of LatheCity products.

Our products are made entirely in the U.S. by a small business. No China imports.

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This manual can be downloaded at our web site at
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<http://www.lathecity.com/Tools/UnimatAccessories.html>

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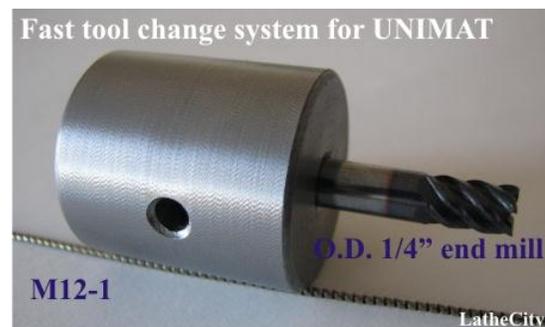
Fast Tool Change System

Typical application: Switch from center drilling, drilling, to milling in no time.

Procedure: Screw the tool holder on the UNIMAT spindle of the benchtop mill. The screw-on-type holder may have an auxiliary boring to fit a spindle bar (not included), but **fix the holder just handtight**. Don't overtighten it because it can damage the threads and can affect the centricity. Insert, e.g., an end mill or center drill and fix it by means of the set screw (at the flat of the end mill). Make sure that the set screw is tight. Otherwise, the eventually heavy vibrations of the mill may loosen the set screw (and the end mill). Nylock set screws which are vibration resistant may be used. Please note that end mills have to fit tight in the boring or they will not run true. Don't open up the boring. Some adapters come with more than one set-screw in order to improve further on the centricity of the cutting tool. In that case, index the tool holder and tighten the set-screws just a little bit in each revolution until all set-screws are tight.

Available sizes

End mills. Tool holders for 1/4" O.D. and short 3/8" shank end mills that fit on a M12-1.0 UNIMAT spindle. Other sizes can be made on request. The 2/8" holder will work only for single ended end mills.





drills are available. #1 and #2 adapters may have narrower noses than end mill holders. These holders can also be used for end mills or deburs.



Adapters for "mini" drill bits. Adapters for small diameter e.g. drill bits which are particularly tedious to mount in a Jacobs chuck, are available on request. We don't stock these sizes up, but they can typically be made to order within 5 business days. Contact us at sales@lathecity.com. Please note that small diameter drills can bend when hold with a set screw. Therefore, these holders typically come with more than one set screw which allows one to center the miniature drill bit.

Custom sizes. These are available upon request, typically at a rate not much above the price of standard pieces. Contact us at sales@lathecity.com.

Impact socket tool holders. These are not available yet. Stop by again.

Further technical notes

Runouts for short holders, as measured on an UNIMAT SL DB 200, amounts typically to ≤ 0.005 " Note that the runout of a lathe chuck is of that order and a typical UNIMAT spindle has a ranout of at least 0.002". Each adapter is measured before mailing it out. The longer the cutting tool and the larger the O.D. of the tool shank, the trickier it becomes to have a perfectly true running end mill, in particular considering the miniature M12 spindle on

Center drills. Tool holders for #1 (O.D. 1/8"), #2 (O.D. 3/16"), and #3 (O.D. 1/4") center

UNIMAT. Note that 3/8" shank sizes are at the limit of what is possible on an UNIMAT and these may have runouts as large as 0.010". Do not over tighten end mill holders. That will not improve on their centricity.

How good is our design? Some comments say that it is very difficult to machine screw-on, e.g., end mill holders. Indeed, it is trickier than it looks like. Our price is very moderate compared with our labor costs.

The holder must be trued perfectly. Otherwise, the end mill will not run true. A none-true running end mill holder would have the side effect of imprecise cuts. (In this regard, Morse-type holders are simpler to manufacture because they are automatically centered. However, it is a hassle to change these Morse-type or collet-type holders all the time when various cutting tools are in use. Also some lathes do not have Morse type spindles.)



This figure shows a test of end mill holders on a Sherline lathe. A 3/16 in. (0.1875 in.) end mill was used. The width of the keyway was indicated.

There is a simple way to test how good our design is. Make a test cut. Lock the mill column and mill table of your milling machine! Use an Al square bar (scrap metal) and cut a keyway using a midsize (for your mill) end mill. Use a not-too-large cutting depth. Measure the width of the keyway (or slot). How well does it fit to the nominal size of the end mill? If the end mill does not run true (if it jiggles around), then the

width of the keyway will be off quite a lot. Run this cut with our end mill holder (your new one we hope). Repeat the process with your best end mill holder. How is our system doing? We did run these tests, of course.

Trouble shooting: Please note that you need to lock the mill, or the keyway width may be off due to vibrations of the mill table. Similarly, the larger the diameter of the end mill and the longer the end mill, the stronger the vibrations (particularly on benchtop systems). The end mill should always cut fully into the workpiece. Cutting over an edge (end mill half in air) can cause heavy vibrations (interrupted cuts). The workpiece must be fixed properly. Using a milling vice would be the best. Furthermore, hard-to-machine materials, such as steel, are trickier to work with and cause stronger vibrations. **Restrict your work to aluminum, plastics, and wood when using a tabletop mill.** Ledloy is sometimes recommended as free machining steel. Because one would not like to measure the vibrations of the mill in this test, we suggested using Al, a midsize diameter end mill, and a not too deep cut. For our tests on a benchtop mill, we used 0.02 in. for the depth of the cut, 900 rpm, a 3/16 in. end mill (four flutes), and aluminum (see the figure). Small diameter cutting tools (e.g. 1 mm drill bit) can be harder to center perfectly than larger O.D. cutting tools. (The set screw may bend the cutting tool. Use holder with two or three set-screws.) Try different heights of the end mill inside of the holder. The shorter the setup the better. Due to manufacturing tolerances of the end mill holder and the lathe spindle as well as vibrations of you mill table you may expect deviations in the slot width of 0.0030" (0.08 mm) from the nominal size (for a 3/16" end mill).

If the end mill does not fit through the boring in the holder, then the end mill diameter, rather than the boring diameter in the end mill holder, is off. This rarely happens, however. The boring is cut using a reamer (high-precision drills)—this is ultra-precise. Don't

open up the boring of the mill holder. (We offer custom sizes.) You may not be able to do so precisely enough. As a result, the mill will not run true. Use a different end mill. The end mill has to fit tight into the end mill holder. The tighter the better.

We cannot guarantee that over-sized end mills (O.D. of the end mill larger than the diameter of the lathe spindle) will run perfectly true. The longer the end mill holder the harder it will be to true it. In this case, you may want to consider purchasing a blank and true the end mill holder directly on your lathe spindle. To improve on the centricity, you may try different positions of the end mill in the holder. Or, try to fix it the adapter hand tight or a little more than hand tight.

We do measure every adapter before sending it out. How to use a dial indicator is shown below.

UNIMAT / Sherline Adapters

We offer in the meanwhile adapters for all possible combination of sizes. If we missed one variation, then contact us.



Use this adapter for utilizing the myriads of Sherline accessories on an UNIMAT. M12 and M14 versions are available, as shown here.



Or, use this adapter to connect less expensive UNIMAT accessories on a Sherline system. Ask for M12 or M14 versions. The bolt end is flat.



Couplings bushing, i.e., tubing with internals threads. 3/4-16 at one end and M12-1 or M14-1 at the other end. These type of adapters are useful when machining your own accessories.

Further technical notes

If you encounter difficulties with the centricity of UNIMAT screw-on adapters then determine the runout of the accessory (e.g. lathe chuck) you want to mount on the adapter. The simplest way to do so is clamping a 4-5" long rod with a pin end in your lathe chuck without using an adapter. When you turn the chuck by hand you will see that the tip of this rod moves in a small circle. Measure the diameter of that circle (e.g. using a DRO or with help of e.g. a paper screen mounted in the



runout on flat
segment 0.002"
(total, diameter)
runout on threaded
end 0.008"

stock of your lathe). If the runout of your lathe chuck is already significant then you cannot expect that any adapter will help. The runout of your lathe chuck plus adapter cannot be smaller than the runout of your lathe chuck. It is also certainly clear that clamping pieces together will not give you the ultimate centricity. You may consider Morse type adapters which naturally provide the ultimate centricity (i.e. the smallest runout).

A more professional way to determine the runout is using a dial indicator (see figure below) mounted e.g. on the cross-slide and a drill rod or drill blank in the chuck. Typically using a 6" long rod is recommended.

We measure the runout for each of our Sherline-to-UNIMAT adapters and document the result (you will obtain it together with the adapter). A typical runout on the flat segment of the adapter is close to what we can measure with a 3-digit dial indicator, see images, it is below 0.002". When measuring the runout on a threaded end you will naturally obtain a larger runout (<0.008") since the tip of the dial indicator slides up and down inside of the threads. That measurement makes little sense.

The runout of a typical lathe chuck (in good condition) amounts to about 0.005".

tail

Morse Type Adapters

Tailstock accessories for benchtop lathes: the adapter has a Morse taper on one side and UNIMAT threads (M12-1.0 or M14-1.0) on the other side. Morse type adapters provide the greatest centricity.

Application: Use Sherline/UNIMAT accessories on a UNIMAT/Sherline system.



For Sherline (3/4-16 threads to Morse #0)

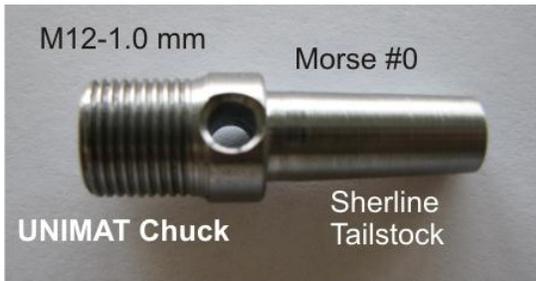


Morse Taper #2

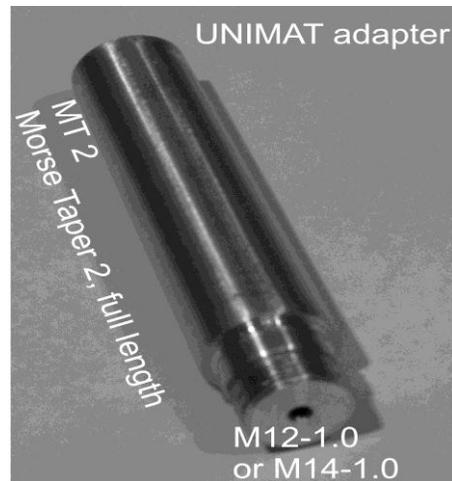
Machinable end blanks up to Morse #3



Morse #0 to UNIMAT



Morse #0 to UNIMAT



Morse #2 to UNIMAT. Drawbar style.



Morse #1 to UNIMAT

One special application: Accessory for benchtop / tabletop lathes. Adapter mounts e.g. in a Morse #0 arbor, e.g., in the tailstock spindle of a small tabletop lathe and connects e.g. to a lathe chuck.

Indexing tool: The adapter comes with glue on protractor (angle) scales that can be glued on the backside of a lathe chuck. That system forms a low budget indexing tool for e.g. precisely and fast boring of holes at different angles using e.g. the lathe-mill attachment. See figure below. The holes will be automatically centered assuming that the milling column is properly squared.

The angle scales fit to most Sherline chucks including 3 and 4 jaw chucks as well as 2.5" and 3.1" chucks.

Headstock drilling: The adapter can, in principle, also be used for headstock drilling. Here the work piece is mounted in the tailstock and the cutting tool in the headstock. Use e.g. a Jacobs chuck and drawbar in the headstock as well as this adapter and a lathe chuck in the tailstock. In so doing, somewhat larger diameter drill bits can be used on a small lathe. **However, don't over-do it!** Mounting a huge work piece in a Morse #0 adapter connected to a lathe chuck can result in unstable (dangerous) working conditions. **The lathe tailstock can be damaged beyond repair.** Similarly, the applications of this adapter for milling will be limited.

The main purpose is the use as an indexing tool.

Procedure: Extend the tailstock spindle by about ¼". For best fit, *slightly* (and carefully) slam the taper adapter in the spindle *by hand*. To remove the taper, pull back the spindle. Typically, taper arbors/spindles have an internal draw bar, which will push out the taper. Mount a lathe chuck on the other end of the adapter.

Specific Safety Notes, Trouble Shooting, and Disclaimer for Morse type accessories:

The adapter may start to rotate. Do not try to stop the rotating adapter with your hands. Make sure that the adapter is properly inserted in the Morse arbor – the quill typically needs to be moved out somewhat. **The tailstock needs to be locked.**

Do not reverse the lathe rotation direction or one may unscrew the lathe chucks. The spindle should rotate towards you (front side of the lathe bed).

When using large drill bits it's not too hard to jam the drill bit in the work piece, i.e., use the correct RPM and plenty of cutting oil. The larger the diameter, the smaller the RPM. Use a small feed of the drill bit and remove chips frequently. When pulling back the tailstock make sure not to pull the work piece out of the chuck.

Headstock drilling can be dangerous and can destroy the tailstock of the lathe beyond repair. Don't use unprofessionally too large drill bits on a benchtop lathe. Neither LatheCity nor its owner shall be liable for damage arising from unprofessional use or misuse of LatheCity accessories.

Morse taper: Please note the length and end style of Morse taper varies, depending on application and lathe model. Our version is tailored towards small benchtop lathes. The standard version we offer has a taper length of ~0.8" for short benchtop tailstock spindles. Other sizes are available on request as custom designs. A Morse #0 taper has per definition a larger end with an O.D. of ~0.36".

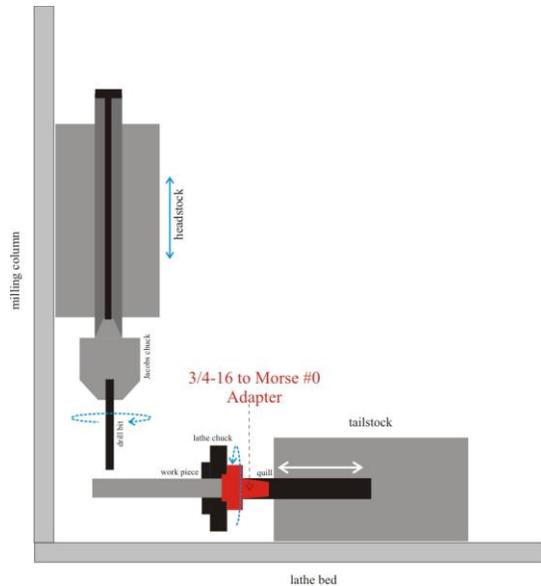
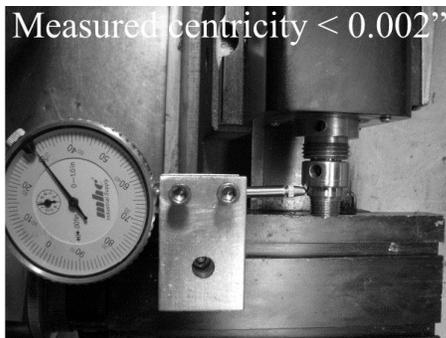


Fig.: Adapter (red) used as a tailstock indexing tool.

If you would like to machine Morse type accessories on your own, then consider using the LatheCity LASER protractor (only for Sherline system so far).

Testing of Morse Type Accessories



Test 1: Runout/centricity test.



Test 2: Testing the fit of a MT. MT are self-holding as evident here.

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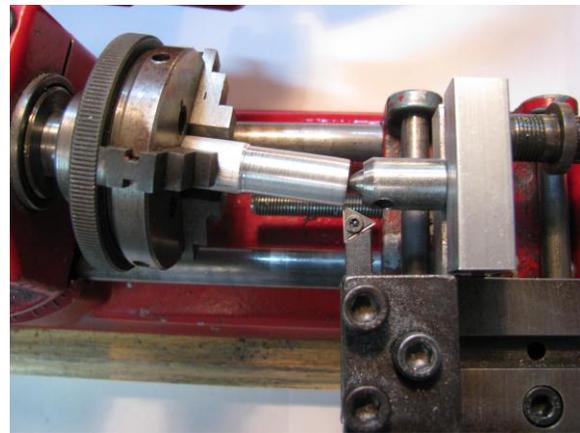
Benchtop Tailstock Accessories for UNIMAT SL DB

Adjustable Tailstock Center

For current prices see our [website](#).

Tailstock accessories for benchtop lathes: the adapter has a pin on one side that fits into an UNIMAT tailstock spindle and a dead center on the other side. Both steel pieces are mounted on a thick aluminum plate. In order to adjust the dead center to tailstock spindle distance the plate has a T-slot keyway and the dead center comes with a T-nut.

Typical application: Cutting taper in longer and/or larger diameter stock without a center is dangerous and basically impossible. This adjustable tailstock center compensates for the offset when cutting taper by rotating the headstock. Note that this accessory is designed for cutting small taper angle as those common on machine taper. **The dead center can be moved in and out of the center line. Therefore, very small and large adjustments of the dead center's position are possible.**



Procedure: Insert pin end into UNIMAT tailstock. Slide the dead center along the T-slot until it aligns with the center hole of your work piece. Tighten the dead center using a spindle bar.



Safety Notes, Trouble Shooting, Limitations, and Disclaimer: General safety rules for machine/power tools are in place. For an extended list of safety notes, consult the literature or go to our website. You can download free of charge a safety booklet, which is also typically included (free of charge) for first-time customers.

Use protective clothing including, most importantly, safety glasses for metal work.

This accessory is designed for assisting to machine small taper angle as those common on machine taper. For large angle settings (>5°) unstable and dangerous working conditions may appear. Don't use this accessory for large taper angles. A typical application may be machining MT2 or MT1 ends in somewhat longer stock rods.

The plate used to mount the dead center cannot be tilted (typically not required), i.e., use this design for small taper angles on not too long (metal) rods. Alternatively, a tilted pin (1-2°) can easily be machined. In doing so use a short aluminum round, drill and tap (10-32) it at one end to mount it on the T-slot table. Drill a 1/4" hole in the other end which is tilted by 1-2°. Use a milling attachment for that. Insert the toolsteel pin in that hole and you have a tilted dead center. However, again, this is typically not required.

Be aware of that you may generate significant side forces on the tailstock. The PIN used to mount that plate in the tailstock is only about 0.5". Therefore, don't overdo it with the size of the work pieces. In addition, working on hard to machine materials such as stainless steel will generate larger forces and is in any case not recommended on a small benchtop lathe. Similarly, the screws and bolt end holding the dead center must be tight. Large forces on the adapter may loosen these screws which may result in a sudden change of the position of the dead center.

RPM maximum are 2800. The adapter is tested only on UNIMAT and Sherline standard lathes.

We do not warrant that any accessories can be used for any particular application. Usage of accessories or damage caused by unprofessional use is at the risk of the customer. Neither LatheCity nor its owner shall be liable for damage arising from unprofessional use or misuse of LatheCity accessories.

Returns in resalable conditions are accepted within 30 days after shipment. All shipping costs will be covered by the customer. No restocking fees, no questions asked. No returns of custom designs or customized designs. No returns of bulk orders. All shipping costs are up to the customer. We also do not reimburse credit card fees (2-3%). For merchandise where the shipping costs were included in the price we reserve the right to charge these shipping costs to the customer in case of returns. Note, however, that the return rate of LatheCity products is below 2%.

General sells and business terms as given on our web site are active.

Pricing: This is a rather specialized application. Job-shops easily charge \$60/work hour + materials + tooling. Machining that piece takes longer than 60 min. Our price is fair and reasonable, in our opinion. We offered a low budget version for \$30 some time ago. However, that one does not allow for moving the dead center through the center line of the lathe which restricts its application rather severely. The current version is an improved design which allows one to machine very small and larger taper angles in short and longer stock rods.

Sherline version: We do also offer a version of this accessory for Sherline lathes which has a different tailstock adapter and is a little larger due to the larger swing over the carrier of Sherline lathes. When ordering an UNIMAT & Sherline package we provide two different tailstock adapters. The base design and size of the accessory is in that case the same.