

## Compact Machining Systems for Microscopy in the Home Shop

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In a previous article in Modern Microscopy (<http://www.modernmicroscopy.com/main.asp?article=108>), I mentioned that I was planning to use the adjustable thread lead attachment to make metric threading patterns for my much modified Unimat DB/LS lathe. This follow-up article shows the making of these patterns. First, I wish to give some additional background information.

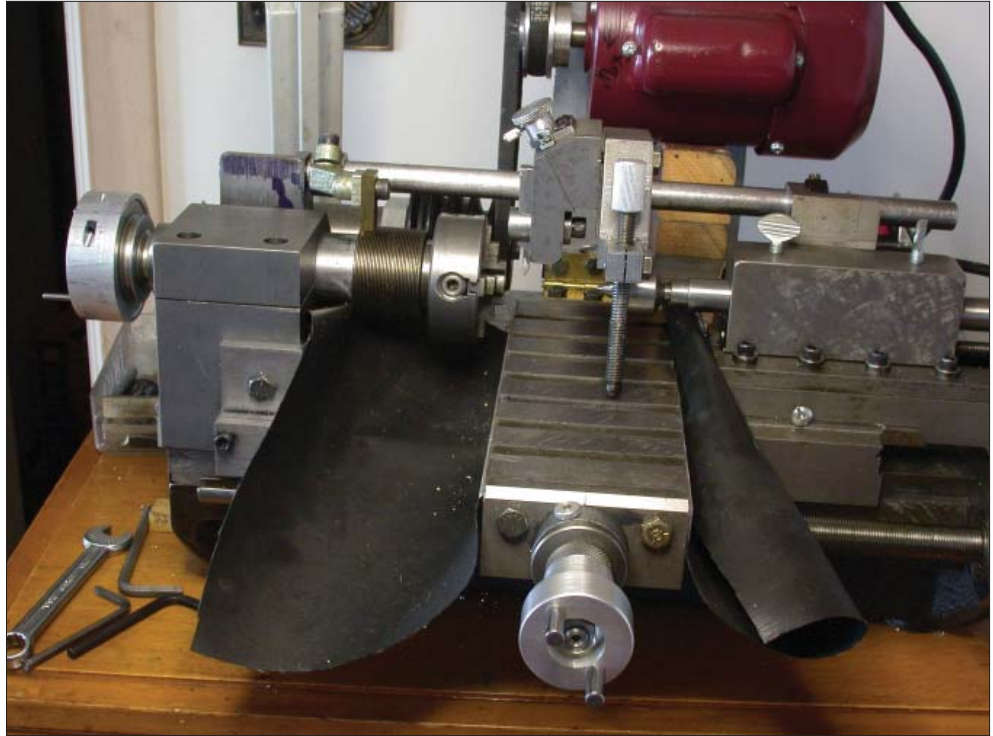
I purchased a Unimat DB/SL miniature, multipurpose machine tool system in 1965, shortly after graduating from Northwestern University, where I had been an undergraduate research assistant using machine tools in the student shop to make instruments for materials research. This Austrian-made machine tool was the first of its type and very popular at the time, especially because it was affordable for home hobby users like myself. I soon modified my Unimat after rigidity and accuracy limitations were discovered. Others had discovered the same issues with the Unimat DB/SL. The Sherline lathe came out in the USA market in the mid-1970s to compete as a far more rigid and accurate machining system. The Sherline lathe can cut all the standard, fine metric thread pitches. EMCO, maker of the Unimat, responded in the late 1970s with a vastly improved Unimat 3 design. Subsequently, the Unimat 3 was replaced with an Asian-made Unimat 4. Subsequent versions of the Unimat 4 are available from many sources, such as Micromark ([www.micromark.com](http://www.micromark.com)). About six years ago, I started designing and making a compact machining system built on a cast iron surface plate. This system is in some of the photographs which show making the 0.35, 0.40, 0.45, and 0.60 mm thread pitch patterns unavailable for the Unimat DB/SL. Further design details of this system are shown in my Photobucket album (<http://s1078.photobucket.com/user/theodoreclarke/library/?sort=2&page=1>).

Figure 1 shows the thread patterns and brass followers made using the variable thread lead attachment. The Unimat four-jaw chuck can be mounted on the conventional threaded spindle or on the watchmaker's spindle with the mounting adapters shown. The base of the threading pattern is sandwiched between the back face of the chuck.



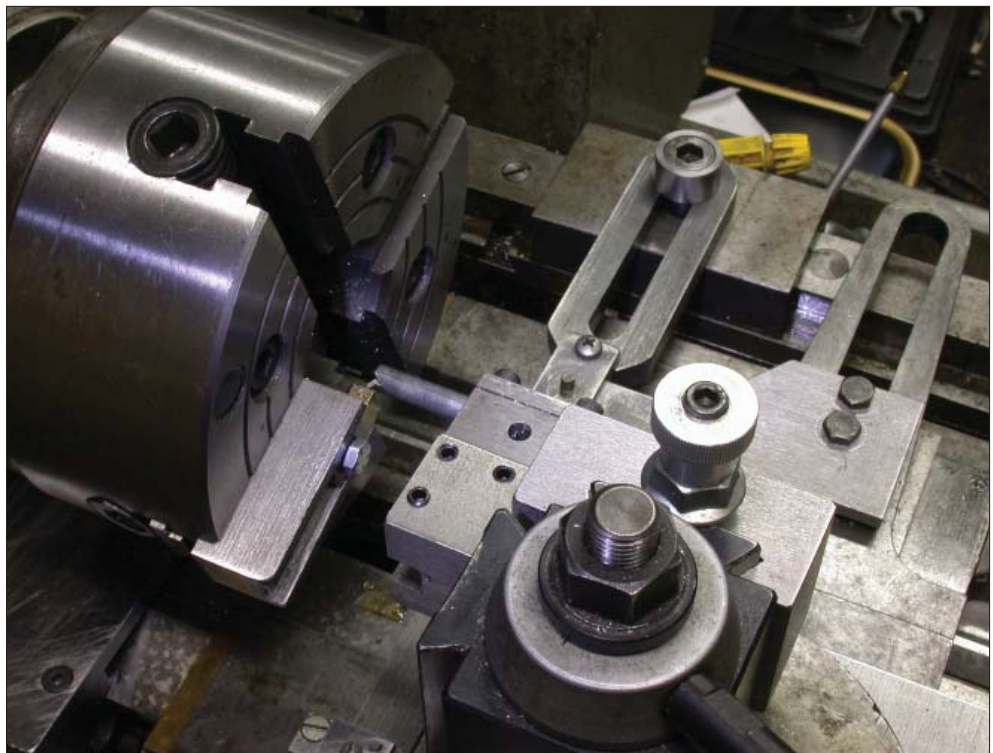
**FIGURE 1**

Figure 2 shows the watchmaker's spindle fitted for threading.



**FIGURE 2**

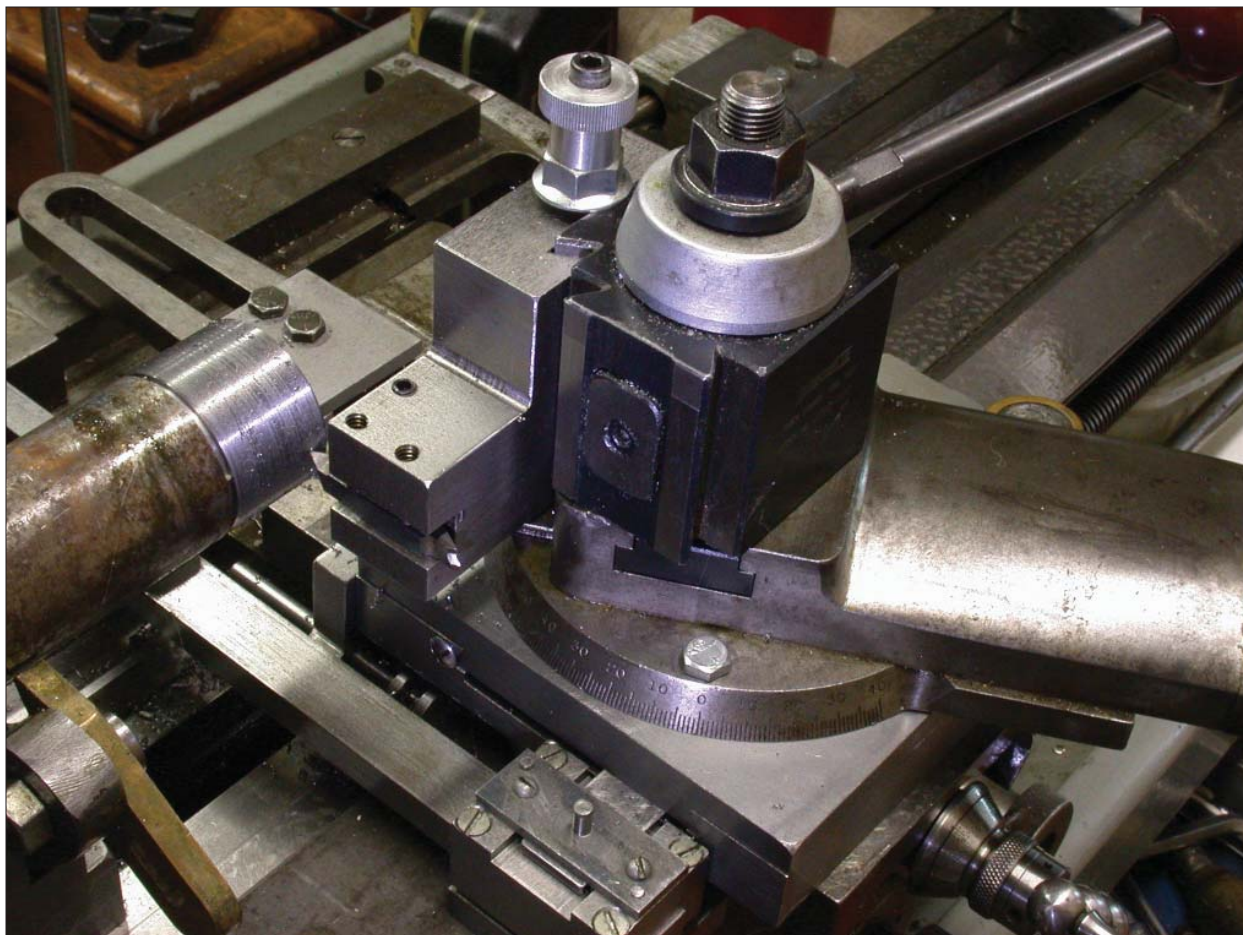
Figure 3 shows a brass follower being threaded using the variable thread lead attachment on my Wade 8A lathe.



**FIGURE 3**

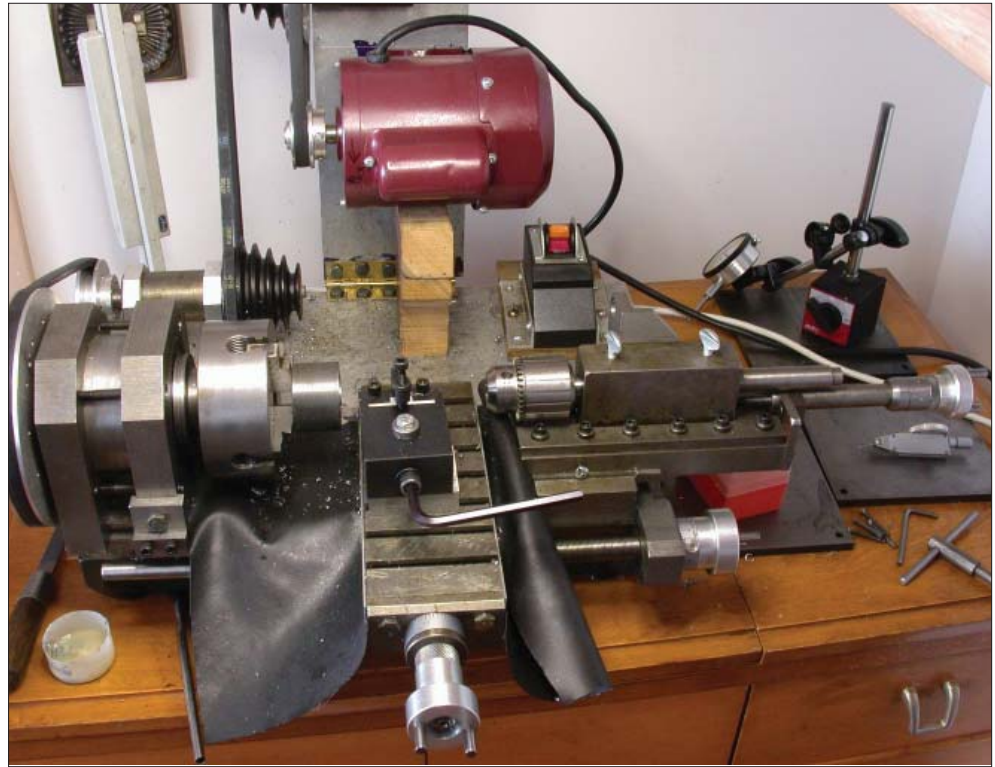


Figure 4 shows threading of a pattern. In order to assure accuracy, all of the machining of a pattern was done with single chucking before cutting off the pattern.

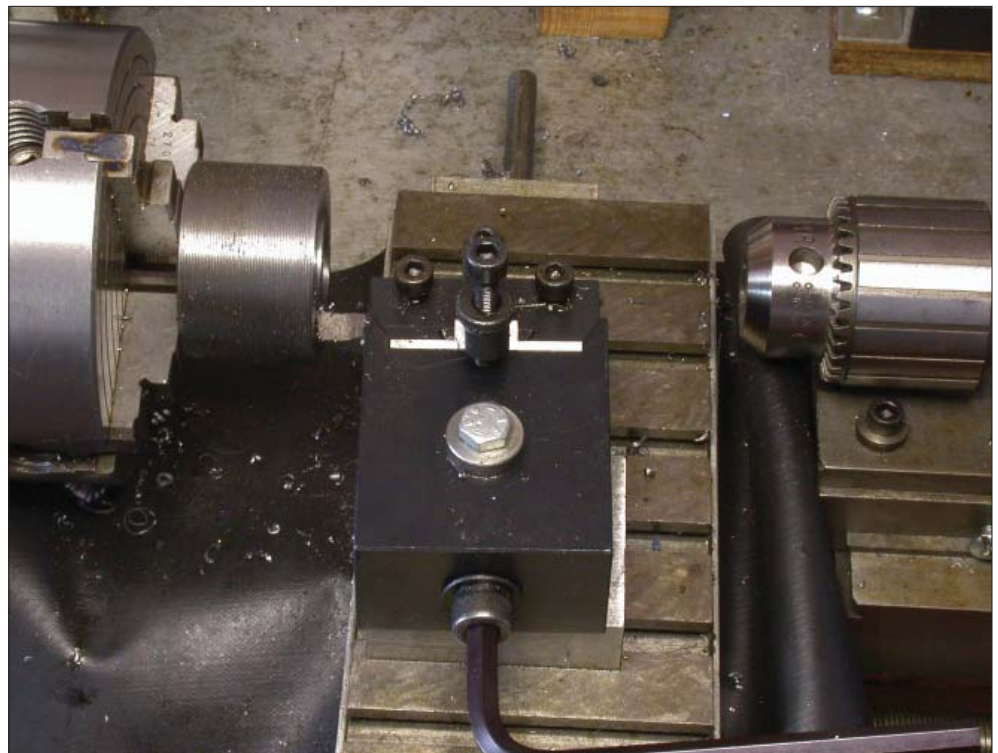


**FIGURE 4**

Figures 5 and 6 show facing the ends of a pattern using the heavy ball bearing headstock of my compact machining system.



**FIGURE 5**



**FIGURE 6**



Figures 7 and 8 show the bases of the patterns being checked for parallelism with the mouth ends. The out-of-parallel condition was corrected by hand scraping.

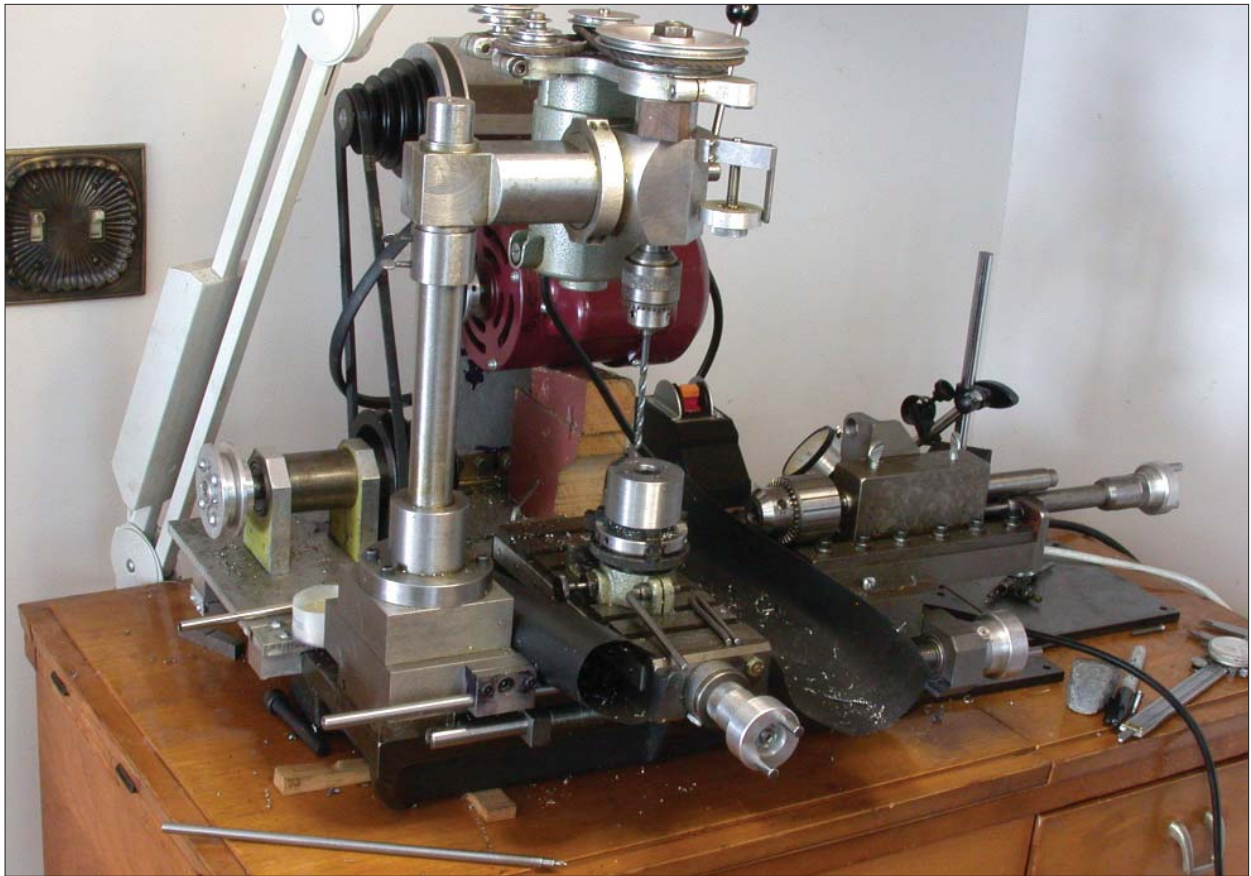


**FIGURE 7**



**FIGURE 8**

Figure 9 shows the mounting holes being drilled through a pattern base using the Unimat dividing head and three-jaw chuck of my compact machining system.



**FIGURE 9**