

## Gears, Pumps, and Windlasses

Neither Sid Wotman nor Bob Filipowski are sure how they got the idea to use a lathe to make gears, windlasses and log pumps, but there is no doubt about the results. Both started out by stating that it is not a process for people in a hurry. It can be time consuming and tedious. Come to think of it ... how many things in this hobby aren't?

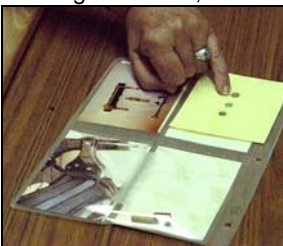


Sid has his Sherline turned towards the membership in this photo, as he demonstrates the adjusting of his cross feed. Note the pointer taped to the top of the head stock. Simple, yet accurate!

Anyway, Sid kicked things off by demonstrating his technique for making gears on a Sherline lathe. The key to this process is that you need some means of accurately indexing the lathe chuck a certain number of degrees before making your next cut. Wotman solved this problem by counting the knurled grooves on the three jaw chuck, and simply dividing the number by the quantity of teeth required on the gear. He then put a strip of tape over the knurled surface, counted off the grooves, and marked the location of each tooth as he proceeded. A pointer was then mounted on top of the head stock.

Sid makes his gears out of soft brass, and will turn the stock down to a diameter three or four thousandths greater than the finished piece requires. He then installs a tool bit, which will give him the necessary grooved shape when the process is complete.

The procedure is started by first lining up a tooth mark on the chuck with the pointer. Each cut will be approximately .002" to .003" deep, so adjust the cross slide accordingly. It then becomes a matter of running your carriage back and forth, indexing the chuck, and making another cut.



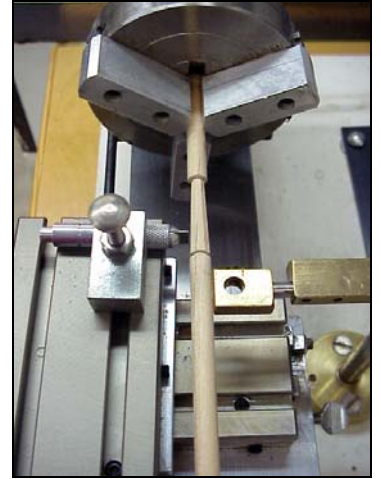
Once you have completed a full revolution of the chuck, adjust the cross slide another .002" to .003", and repeat the process. When Sid is satisfied with the depth and shape of the teeth, he carefully removes the gear with a slitting blade.

Someone asked if locking the chuck in position after indexing it wouldn't increase the accuracy? Wotman stated that it wasn't necessary. For

whatever reason, the chuck will not drift during the cutting process, and stays exactly where you put it.

Bob Filipowski refers to his TAIG as a poor man's lathe since it costs about \$200 less than a Sherline, but in reality, it's a pretty good machine. The availability of a compound slide allows the TAIG to do short tapers and angular cuts. Bob uses this capability to make windlasses and log pumps, which are eight-sided and tapered.

The indexing concept is the same as Sid's, except that Bob has permanently punched eight tick marks on his 3 jaw chuck. For anything requiring more graduations, a marked strip of paper or tape is affixed to the chuck surface. Filipowski recommends apple wood for this technique. It holds a nice edge and is fine grained. Although apple is fairly hard, it's a good idea to "define" the width of the gear or length of the pump by cutting a pair of slits in the stock. This serves two purposes. It makes for easier cuts, and eliminates the possibility of chipping



the finished piece when it is removed from the stock.

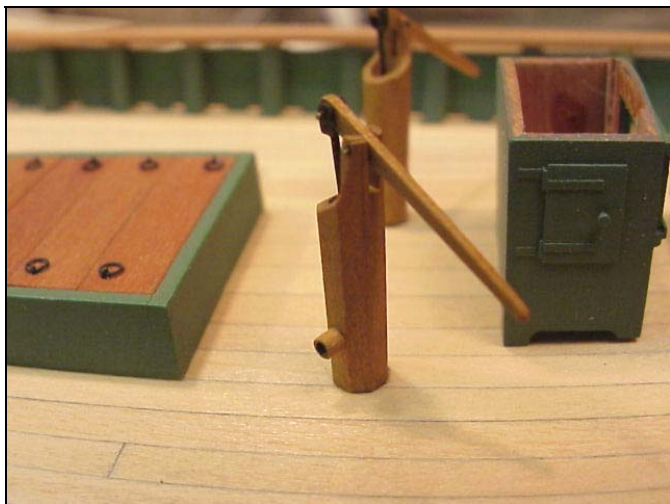
Bob also came up with a use for old EXACTO blades. Using two pair of pliers, he carefully snaps them in two. **Please use eye protection when doing this procedure!** The

"cutting" portion is safely discarded, and the remainder is ground down to whatever shape you might require. A shortened knife holder is used for mounting the modified blade in the tool post. Have as little of the blade as possible extending from the holder. This prevents "flexing", and gives you cleaner cuts.

Speaking of "flexing", Bob incorporated an adjustable device on the back side of the lathe, which prevents the work from moving away from the blade as the cuts are made. It's similar to a machinist's steady rest in concept, except for the fact that it gives you support in just one direction, which is all that's needed.



Sid and Bob both agree that gears, pumps, and windlasses can be made with files and emery boards, and in all probability they will look OK. However, if you want accuracy, you're not in a hurry, and you have access to a lathe, give this a try. The results will be worth it!



The basic outside shape of the pumps were made on his TAIG lathe, and then removed. The center and nozzle holes were drilled out by hand with a pin vise and needle file. The handle supports were then carved from the upper part of the piece.



The windlass drum was made the same way as the pump, except that it is composed of seven pieces. All the main components were separated to accommodate the supports and gear. The gear was constructed using Sid Wotman's method, and is "sandwiched" between two brass washers, which were blackened before mounting.