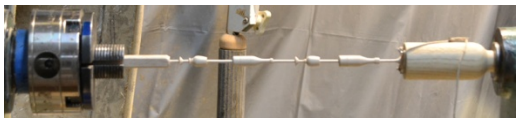
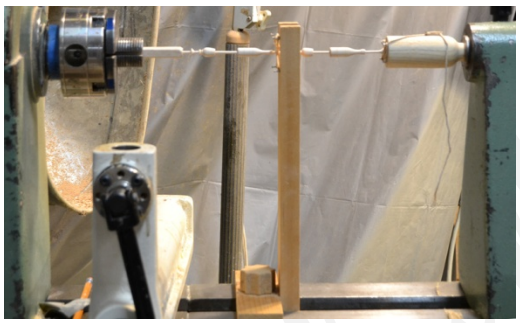
String Steady Rests

Steady rests come in all sorts of purposes, mechanisms and sizes; some for bowl turning, some for spindle turning; some 2-wheeled, some 3-wheeled; some big, some small; some commercially available, some homemade. For the most part, these steady rests are not suitable for very long thin turnings, such as finials, tremblers, long-stem goblets, and the likes.

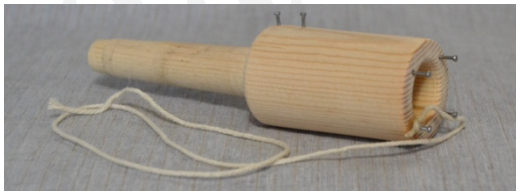
Eli Avisera, internationally renowned woodturner from Israel (www.eliavisera.com), came up with the idea of a string steady rest to resolve the shortcomings, which was dubbed with the name Elineta. One method of making an Elineta, or string steady rest, is described here in two forms, a tailstock-mounted string steady rest and a bedway-mounted string steady rest.

Typically, when turning very long thin items, the process starts at the end furthest from the headstock and proceeds incrementally toward the headstock end, in an attempt to maximize support through the turning process. As more and more wood is removed, the end of the turning furthest from the headstock may require gentle but firm support in an attempt to minimize flexing caused by wood movement and to absorb vibration. The Elineta, or string steady rest, is ideally suited for this purpose, providing the gentle but firm support required.





In most situations, a tailstock-mounted string steady rest is all that is required to minimize flexing caused by wood movement and to absorb vibration. The tailstock-mounted string steady rest with its morse taper is mounted in the quill of the tailstock. The end of the long thin turning is trapped by a wrap of string which is fixed to four posts (nails) of the string steady rest. In cases of extremely long thin turning, most notably tremblers, intermediate support may be required between the headstock and the tailstock-mounted string steady rest. In such case, one or more bedway-mounted string steady rests may be required.



A tailstock-mounted (MT1, MT2, or MT3) string steady rest is a simple homemade lathe accessory to steady long thin turnings on the lathe. With the string steady rest mounted in the tailstock, move the tailstock toward the headstock until the end of the turned item is partially inserted inside the hole of the string steady rest. The string is then wrapped around the protruding nail heads of the string steady rest, trapping the end of the turned item, thus absorbing any vibration resulting from concentric deviation caused by wood movement at the end of the turned item.

The following procedure will document the making of both a tailstock-mounted string steady rest and a bedway-mounted string steady rest. In the case of a tailstock-mounted string steady rest, measurements are for an MT2 taper. Measurements for MT1 and MT3 are included at the end of the document. All measurements throughout the document are given in imperial, though an imperial-to-metric conversion table is included at the end of the document.

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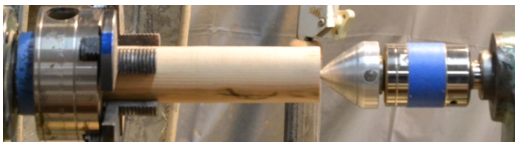
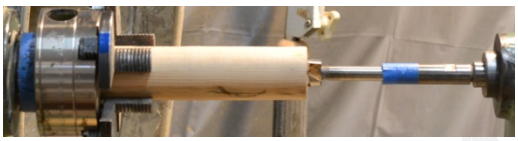
Practically any scrap wood, of appropriate dimensions, can be used to make a tailstock-mounted string steady rest, for example, a scrap piece of 2”X2” construction-grade spruce is used in the following procedure to make an MT2 tailstock-mounted string steady rest. In this case, the turning blank should be at least 1 ½” square and at least 5 1/2” in length.

Using diagonal pencil lines, mark the centre on each end of the turning blank, and create a dimple at the intersections with an awl. These diagonal lines will serve a secondary purpose later in the procedure.

Mount the square blank between centres and round to an even cylinder. In this case, a construction-grade spruce blank is mounted between a 3/4” steb centre drive and a Oneway live centre.



Once the blank is round, remount the cylindrical blank in a 4-jaw chuck with suitable jaws, in this case, a Oneway Talon chuck with spigot jaws. Use a live centre to ensure accuracy during the remount.



With the cylindrical blank securely mounted in the chuck, remove the live centre, and replace with a 3/4” drill bit mounted in the tailstock. Mark the drill bit to show a 2” depth. At a reduced speed on the lathe, to avoid overheating the drill bit, drill a 3/4” hole in the end of the cylindrical blank to a depth indicated on the drill bit.

With the hole in the end of the blank drilled to depth, replace the drill bit mounted in the tailstock with a live centre to support the blank. True the outside of the blank to ensure concentricity with the drilled hole. Draw a circle on the end of the blank halfway between the outer diameter and inner diameter, which will intersect with the diagonal lines, marking the placement of posts (nails) in a later step.

Reverse the turning blank, end for end, in the 4-jaw chuck. Use a live centre in the dimple created by the awl in the end of the turning blank to align the turning blank and to support that end. With a pencil, mark a distance 2 1/2” from the headstock end of the turning blank.

Between the marked pencil line and the tailstock end of the turning blank, turn a cylinder which is 3/4” in diameter. From the tailstock end of the turning blank, make a pencil line 1/4” from the end, and then make another pencil line 2.56” from the previous pencil line. This marks the bounds of the morse taper, an MT2 in this example.

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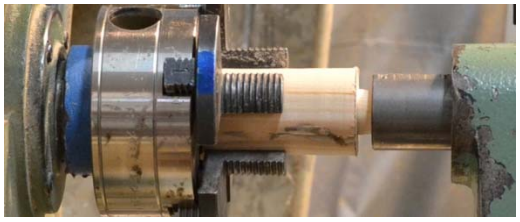


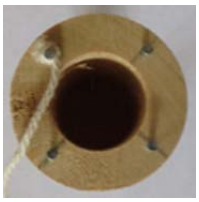
Between the rightmost pencil line and the tailstock end of the turning blank, turn a cylinder which is 1/2” in diameter.

To the left of the rightmost pencil line, carefully size that end to a diameter of 0.57”, which is the small diameter of an MT2 taper. To the right of the leftmost pencil line, carefully size that end to a diameter of 0.7”, which is the large diameter of an MT2 taper.

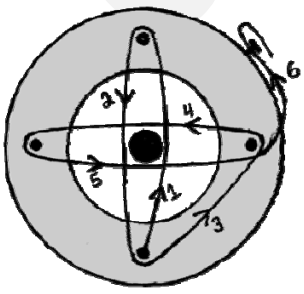
Using these two diameters, turn an even slope between the large diameter and small diameter, thus forming an MT2 taper. Care must be taken not alter either the large diameter or the small diameter ends of the taper in order to ensure a proper fit for an MT2 taper.

Without removing the turning blank from the 4-jaw chuck, remove the live centre from the tailstock, and then move the tailstock to slide over the turned taper to test the fit. If adjustments are necessary, using the live centre for support, refine the fit. This may require a couple of iterations to fine tune the fit. Only the size of large diameter end and the small diameter end of the taper are critical. The slope between can be slightly concave, thus simplifying the fitting process.

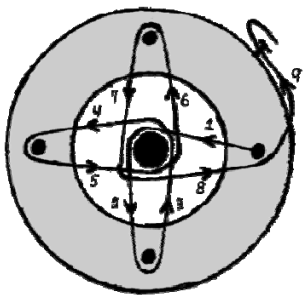
Once the taper of the string steady rest fits properly into the tailstock, round off the sharp corner of the cylinder to the left of the taper.



With the turning process complete, remove the string steady rest from the 4-jaw chuck. Hammer in short nails, around 5/8” in length, at each intersection of the original diagonal lines and the circle drawn afterward on end of the string steady rest. Fasten a length of string around one nail, about 12” in length. Hammer in 2 more short nails, approximately 1/2” apart, on the circumference of the string steady rest near the bottom of the drilled hole. See a picture of a completed tailstock-mounted string steady rest on the first page.



To use the tailstock-mounted string steady rest, after turning the end portion of a very long thin turning, mount the string steady rest in the tailstock, slide the tailstock to insert the end of the turning inside the opening of the string steady rest, and then, wrap the string as shown in one of the drawings here, snug but not taut, and tie-off the string using the side-mounted nails.



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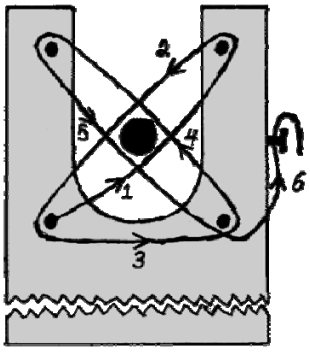
String Steady Rests

Practically any scrap wood, of appropriate dimensions, can be used to create a bedway-mounted string steady rest, for example, scarp pieces of 1”x2” construction-grade spruce. The upright of the string steady rest must be at least 1” taller than the height of the bedway to the turning centre of the lathe. As shown in the picture of the bedway-mounted string steady rest, attach the base of the upright to a cross member which sits on top of the bedway. Attach a thin block, which is the width of the bedway gap, centered on the bottom of the cross member. Make a clamp block, which fastens to the string steady rest cross member from under the bedway, typically by a bolt and nut.

Drill a hole, around 3/4” in diameter, through the top of the string steady rest upright, at a height of the bedway to the turning centre of the lathe. Using a saw, cut open the circle to form a u-shaped opening at the top of the string steady rest upright.

Hammer in short nails, around 5/8” in length, evenly spaced around the face of the u-shaped opening of the string steady rest upright. Fasten a length of string around one nail, about 12” in length. Hammer in 2 more short nails, approximately 1/2” apart, on the side of the string steady rest near the u-shaped opening.



A bedway-mounted string steady rest can be used in place of or in tandem with a tailstock-mounted string steady rest. After turning a portion of a very long thin turning, support the turned item with the bedway-mounted string steady rest by wrapping the turning with the string as shown in the drawing, snug but not taut, and tie-off the string using the side-mounted nails.

Morse Taper Specifications

Morse Taper	Large Diameter		Small Diameter		Taper Length		Blank Length	
	Imperial inches	Metric mm	Imperial inches	Metric mm	Imperial inches	Metric mm	Imperial inches	Metric mm
MT1	0.48	12.1	0.37	9.4	2.13	54.0	5.25	133.3
MT2	0.70	17.8	0.57	14.5	2.56	65.1	5.50	139.7
MT3	0.94	23.8	0.78	19.8	3.19	81.0	6.25	158.7

Imperial to Metric Conversion Table

Imperial inches	Metric mm	Imperial inches	Metric mm	Imperial inches	Metric mm	Imperial inches	Metric mm
1/4	6.3	1/2	12.7	5/8	15.9	3/4	19.0
1	25.4	1 1/2	38.1	2	50.8	2 1/2	63.5
5 1/2	139.7	12	304.8				

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