

# CAPSTAN TUTORIAL

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There are a lot of small parts that go into making a set of upper and lower capstans but the finished goods add a lot to the look of a finished model ship. An otherwise fine model can be ruined by a rough looking capstan, but there is no reason anyone can't make a professional looking piece with either hand tools or basic power tools. I would like to preface this tutorial by noting that while I have the good fortune of having added some decent power tools and attachments to the shop over many years, these only make the going less time consuming. They do not necessarily add to the look of the finished piece.

First up, use a good set of drawings. Rex has prepared a set that will serve you well. I used these and drawings from *The Fully Framed Model* by David Antscherl, so you may note some small differences in the photos compared to the drawings. Adding the small additions are easy, do not require any special tools, and are up to the individual builder.

I begin by making all of the individual parts. Starting with the barrel, you can start with square stock or round stock. The barrel is faced differently for the upper capstan and lower capstan as the upper has six whelps and the lower has five.

I cut the faces with an end mill but they are easily filed by hand. If doing this by hand, I suggest starting with a round piece that is nothing more than a dowel. I know there are a lot of opinions as to what wood to use on a model, but there are so many small pieces in this project that it is important to use close or no grain hard wood to get sharp clean edges.



*Barrel showing facets for lower whelps and facets and groves for upper whelps.*

The grooves for the whelps were made using an Xacto #11 to mark the groove edges and act as a guide, and a hand chisel to cut the actual groove.

Note that the top of the barrel is squared off. This will mate with the square hole in the drum head when the upper capstan is assembled.



*Barrel showing squared top and bottom portion not yet grooved for whelps*

The lower capstan grooves were then chiseled in the same manner as the upper. Again, there are 6 grooves in the upper, and 5 in the lower portion.



*Finished barrel*

The next items to make are the whelps and chocks. The whelps are tapered as they get closer to the barrel. I made a strip of material, including the tapering, before cutting the individual whelps.



*Strip of tapered material for the whelps*

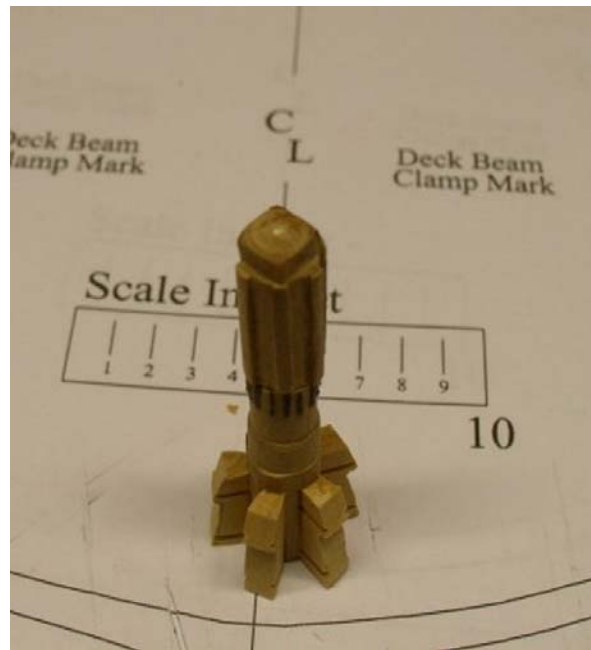
I next make a whelp template for the lower capstan and another for the upper capstan. Note that the two are not exactly the same, dimensionally.

With the template, I draw the whelps on the strip of wood. The whelps are then cut out by whatever means you prefer. You may want to temporarily glue a thin wedge to one side so it sits flat when sawing, or you can cut way outside the lines, then trim with chisel and file to the file size. I make one perfect whelp for both the upper and lower capstans. These are used as a guide for the balance of the whelps. To me it is better that they all match exactly, even if they are a hair off dimensionally. Each whelp needs grooves cut into them for the chocks. These must match up on every whelp or the chocks will not align properly between the whelps and look awful.



*Lower capstan rough cut whelps with grooves for chocks*

The next step is to dry check the whelps in the barrel grooves. If all went well in the prep work, they should fit. If they do not, trim the grooves a few thousandths at a time to make sure the whelps seat all the way into the groove. Then glue them in place.



*Lower Capstan whelps in place. Note that the “iron” bars are also in place on the barrel where it passes through the partners and iron sleeve.*

In the picture above you can see the small “iron” bars. These were well greased and sat inside a crude bearing, which was no more than an iron sleeve in the partners. I used black construction paper to simulate the bars. In real life a groove was cut for each bar. The bars were let down into the grooves and bolted in place. They stood proud of the barrel just enough to make contact with the sleeve, evenly, all the way around.

The next step is to cut the chocks, which are wedges that sit between the whelps. There are two sets for each capstan. In the case of the lower capstan, the chocks or wedges were all 2” thick. In the case of the upper capstan, the topmost pieces are 2” thick, and the lower pieces are 3.5” thick. If everything has been cut and assembled perfectly, you can cut a set of chocks and install. If not, each one needs to be made and fit individually. Most of mine were the same size, but a few needed to be a bit wider or narrower. I make a vee shaped template to fit, and then use it as a guide to cut the chocks. Note in the photo that the chocks stick out quite far when roughed in. I find it easier to assemble all of these before trimming to fit. If you have a drill press or lathe they can all be evened out once glued in place. If you don’t, you need to make the chocks just about the right size so as to have only minimum filing and sanding once they are in place.



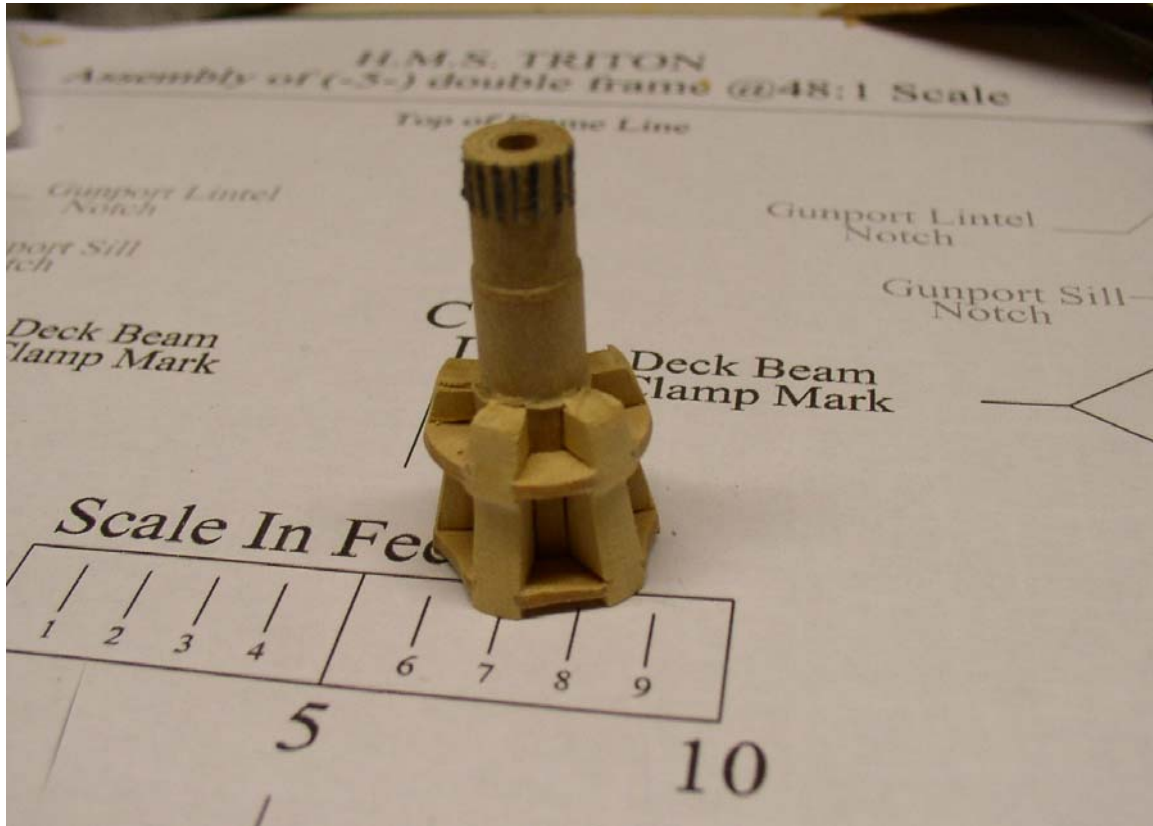
*Rough fit chocks*

Before going on to the capstan trundle head, I chuck the parts in the photo above into my small lathe, and round everything off. I start with a bit, then go to a file, then to sand paper. The same will be done with the upper capstan and can be seen in the next photo.



*Filing the upper capstan. Note the TEMPORARY dowel that is chucked in the lathe*

Once this is complete the whelps need to have the outer face flattened as the lathe action put a small convex surface on them. The lower chocks have a concave surface. I used a sharp blade and carved these curves, then finished them with sander paper wrapped around a small piece of dowel.

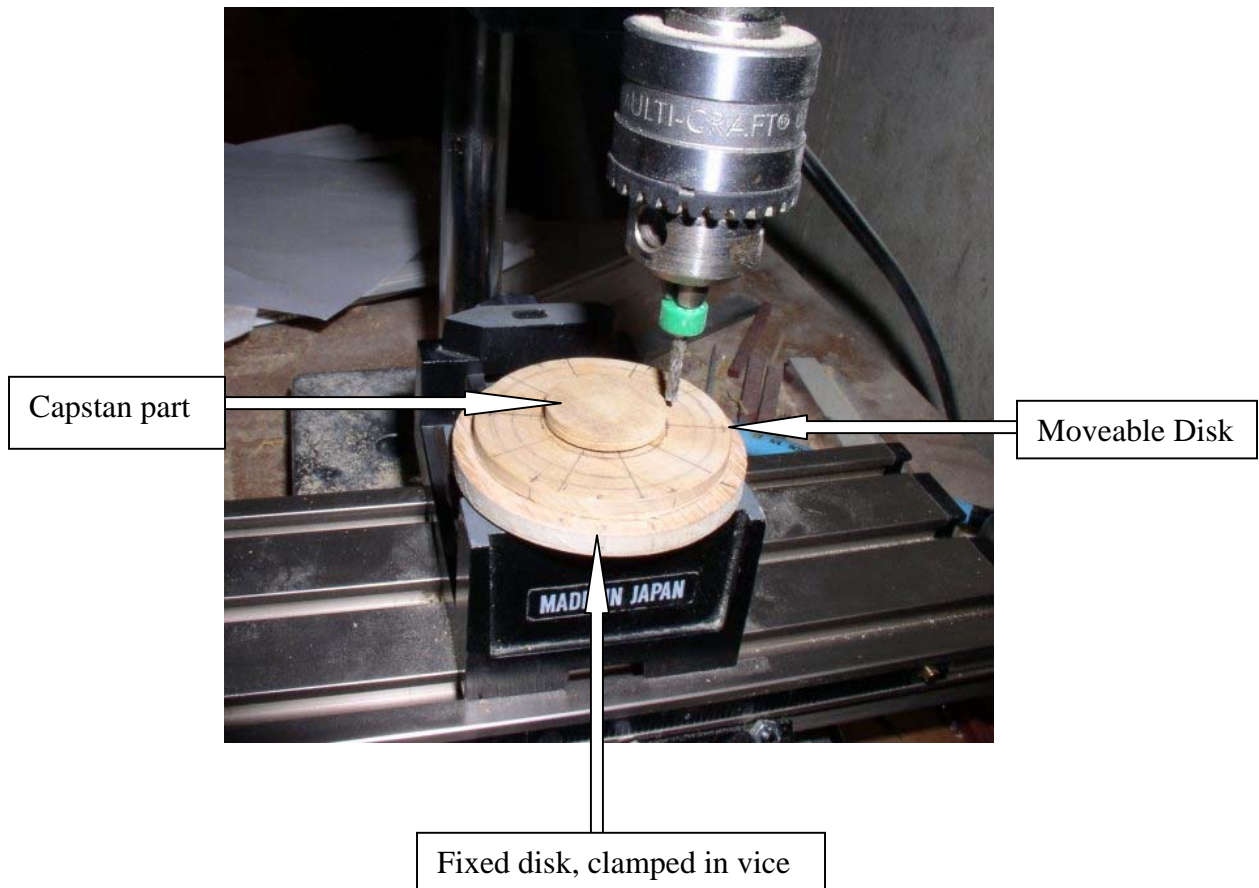


Once this assembled unit is satisfactory, I marked, drilled, and treenailed the whelps and chocks.

The next part to go on is the lower capstan head, or trundle head. This was made, in real life, in four pieces. I made mine in two, making two disks instead of four half disks. These trundle pieces can be made by cutting two disks with a scroll saw, hand or power. The lower head has a hole through it that is not round, but matches the facets on the barrel. Truth of the matter is that this will never be seen and it is easier to make a round hole in the head and make this portion of the barrel round as well. Your choice.

The bar grooves are a tricky task. If you have the benefit of an XY table and small drill press they are easily cut with an end mill. I made a small turn table device that has the proper angles marked. The lower portion sits tight in a vice that is attached to the XY table. The second disk on the lower disk and is attached with a small dowel pin and can turn. The top disk is the one half of the drum head for the upper capstan and is temporarily glued to the disk that rotates. I used the same concept described for making a ship's wheel in David Antscherl's *The Fully Framed Model*.

I think the following photos will give you the idea if you want to make your own. Volume II of *The Fully Framed Model* gives a detailed explanation of these parts.



The first groove is cut, then the middle disk is turned to the next mark and a groove is again cut. Once complete, the part is popped off the moveable disk and the matching head piece is temporarily glued on. The grooves are then cut into the matching piece. If you are doing this by hand (This is the first time I have used this XY table set up, it was always by hand before now) mark the grooves and cut or chisel with a sharp blade. Cut one side as exactly as you can. Take this piece and clamp to the matching piece. Use the first grooves to mark where they should go on the second piece. If you can make grooves in each piece perfectly, you can just mark the spots at the right places, and cut the grooves. If you are just a little off though, you have grooves that do not match.



*The moveable disk is clamped in place while a groove is cut.*

At some point, the barrel needs to be cut into two pieces and a wooden pin or peg made for when the barrel is reassembled. This is the easiest way to handle the installation on the lower then upper decks with attendant beams, partners, and such. To make it in one long piece with both capstan makes installation of both the capstans and surrounding parts difficult, and there is no reason to make it more difficult than necessary. Some of the remaining photos show the upper and lower capstans in separate pieces.

Once the trundle heads and drumhead pieces are glued together, some trimming of the square holes may be necessary. A sharp blade or small jeweler's file will work fine. A thin steel reinforcing ring was let into the top of each capstan head. I made these from black paper and glued them onto the top of the heads without machining a groove in the head. Making these little rings is not easy without a circle cutter. I do not have a circle cutter, thus I know what a pain it is to cut out. I used a circle template and new #11 blade to cut the inside. I used my trusty barber shears to cut the outside as closely to perfect as possible. The ring was then glued to the head and let dry. Now it is pretty easy to use the blade to trim teeny fragments to make the ring as close to perfect as possible. I thought the lower one was good until the upper one was complete as it came out much better. Like anything else, practice makes perfect.





*Lower capstan assembled*



*Upper capstan head and body with temporary dowel*

The upper capstan parts are made and assembled the same way as the lower. Once each head is complete, the reinforcing ring holes and capstan bar retaining pin holes can be drilled into the tops of the heads.



*Lower capstan left, upper capstan right*

When assembled later, the complete unit will look as in the following photo.



The finished assembly can be clear coated with your preferred finish.



*Finished lower and upper capstans*



**Conclusion:** There are over 40 parts, not including the treenails, to be made and assembled, but the time to make this item is not too bad and is well worth the effort as it adds a nice bit of professionalism to the finished model if made with care.