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Project: Block and Tackle

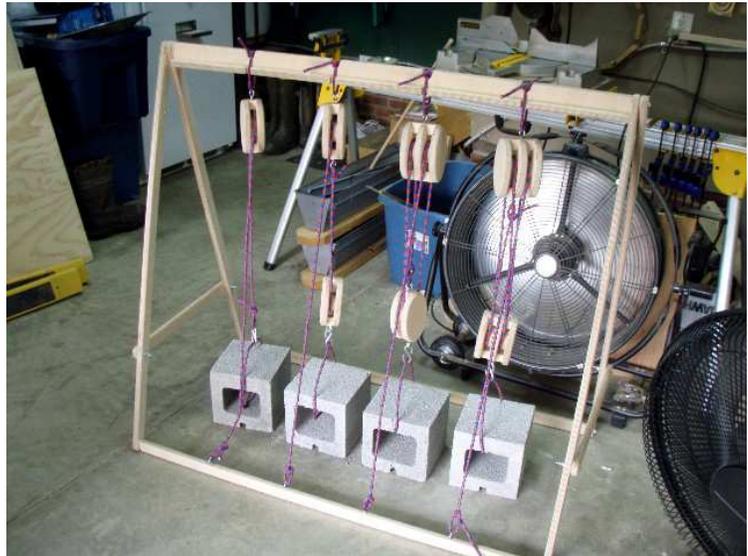
Overview: Introduction to adding two or more pulleys to the same given weight. This creates a mechanical advantage that can be useful for rigging and other applications. Here are four examples of rigging methods that can be used as a mechanical advantage.

Materials: 3/4" plywood, 1/4" lag bots, 1/4" eye bolts, 4 weights, 24" of 1/2" dowel

Minimum Cutting Area: 36" x 48"

Bit Size: 1/4"

Finishing: A clear coat or polyurethane over all of the wooden materials.



Always read the entire project details before starting to cut the file yourself

Account for the thickness of the physical material on hand and the material thickness in the file

This file is zeroed to the tables surface, Zero your bit to the tables surface



Included with the cut file is a hold down tool path that shows where it is safe to put screws. Run this file separately from the cut file so you can screw down the work piece, or if you have a different size board or different type of hold down disregard the file.



As the file starts cutting the profile of the parts make sure the cut is going all the way through the work piece and into the table surface. If you need to adjust any part of the file make sure you do not remove the hold down or you will loose position.



Tab are use to hold all the pieces to the scrap wood attached to them. Use a utility knife to score these edges. Never try to push a piece out without cutting the tab, it will tear the grain on your project. Sand remaining tab flat.



The outsides of the pulley's and all of the long pieces that make the frame could use a 1/4" round over bit.



The inner circle tabs can easily be removed with a disc sander.



Thoroughly sand all of the pieces faces and edges. They will be handled by many over their lifetime.



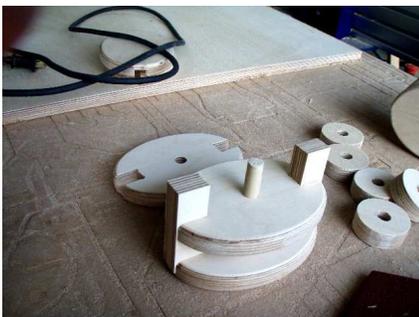
The first step to assembly is attaching the two top pieces by adding glue to the dado and pushing the notched piece down into place.



Start by assembling the three double pulley's. For this example 3 dowels were cut at 3 1/16" long for the double pulley's.



Note the arrowhead is pointing to a piece that needs to be custom cut. The file provides 46" of this material, once you have dry fit your assembly use a crosscut saw to cut these pieces to length.



Assembly from the bottom up. Keep in mind the center wheels need to spin, so keep the pulley lose at these points.



There are four single pulley's that have a dowel length of 1 9/16" long for this example.



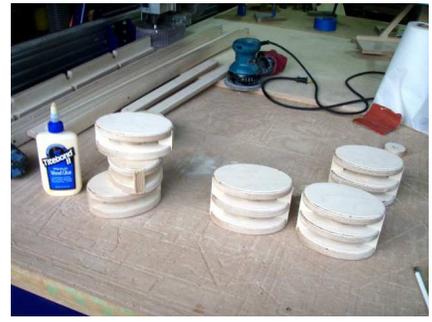
Glue is not needed on any part of the dowels. The more the spin the better the pulley will work.



Place both halves of the single pulley over the center round.



As done with the double pulley's measure what length is needed for the straight spacers. Remember to leave space so the center pulley assembly spins.



Let the glue setup on all of the straight spacers before moving on. It is a good idea to resand all of the edges to make sure the pulley's assembly fits perfectly.



Using 1/4" hardware assemble both ends so they make an "A" frame shape.



Hold this "A" frame up to the end of the top support and make a pencil mark for layout.



Pre-drill with a 1/4" bit so the lag bolt does not blow the plywood apart during assembly.



A socket wrench or impact wrench can be used to assemble the ends of the frame. Be careful not to over tighten.



Do the same procedures to attach the bottom supports to the frame.



Using the last few assembly pictures in this manual see which pulley gets why eye hook and go ahead and pre-drill and assemble these at this point.



Find a rope that has enough strength to pull up whatever weights you end up using.



Using a tape measure layout eyehooks on one of the bottom supports to match the distance that the pulley's are from each other.



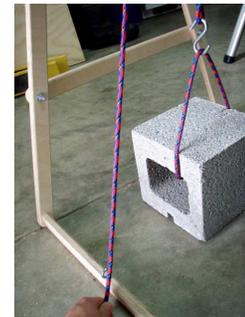
Set the four top pulley's and place your four equal weights in place. This example used 18" of rope to hang each pulley with a square knot.



Using a single cinder block for pieces of rope 36" long with a square knot work perfectly.



A bowline knot is tied to each "S" hook. These rope patterns can all be searched for on the internet.



The "S" hook is attached to the rope of the weight. This way the weights can easily be removed when transportation of this project is needed.



Crimping the "S" hook onto the pulley's is a good idea to help keep the rope in place.



If your pulleys are not lining up like the picture above, simply twist the eye hooks on them until they do.

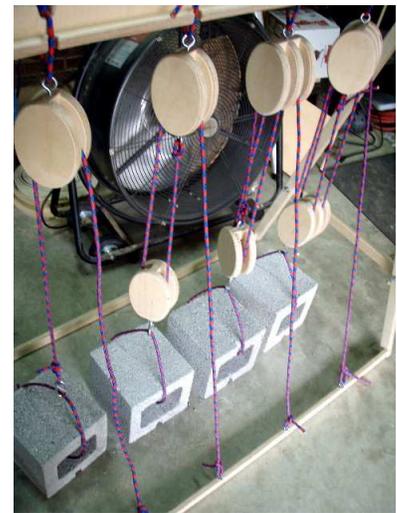


Spray all of the wood with a clear coat or a polyurethane to help protect and seal the wood.



1. Far Left
Name: Whip

A straight forward pull that is direct weight.



2. Second from left.
Name: Gun Tackle

Uses two single pulleys to offset the weight.



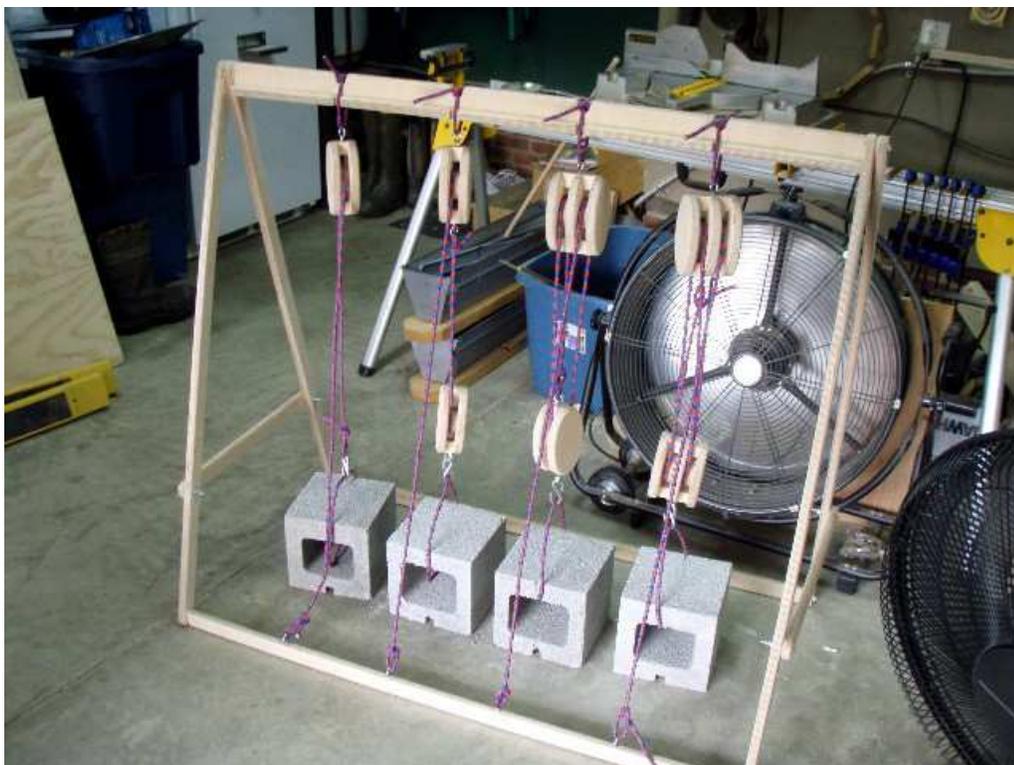
3. Third from left
Name: Single Luff Tackle

A double pulley with a single on the bottom. Just might be the best setup for the weight in this example



4. Far right assembly
Name: Two Fold Purchase

Using two double pulleys to lift the weight.



These are four of many different setups for block and tackles. Use this example to teach what different rope and pulley setups can create, then have students cut different sized pulleys and see which group can lift 100lbs or more with the simple pull of one hand!!!!