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BUILD A COOLER MASH TUN

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The heart and soul of any all-grain homebrewing system is the combination mash/lauter tun. "Mashing" is the hot water steeping process that results in sweet fermentable wort, while "lautering" is the process of separating the wort from the spent grains.) A third critical step in the process is sparging (technically a part of the lautering process), which is the post-mash rinsing of the grain in order to capture as much as fermentable sugar from the barley as possible. (For some ideas on building a continuous sparging system, see page 10. For more information about sparging, go to www.byo.com/component/resource/article/1016.)

Commercial brewing setups may split the processes of mashing and lautering into their own respective vessels (commercial brewers have a mash mixer or mash tun and a lauter tun, but there is not a third vessel for sparging; the sparge water does come from a hot water tank, but that is not considered a brewing vessel), but for small-scale homebrewing, combining these functions into one is more efficient in terms of time, money and space.

There are two main functional requirements for a quality mash/lauter tun: the ability to hold the mash at a constant temperature for at least an hour, and a way to drain off the wort while leaving the crushed malted barley behind. The first requirement is very nicely accommodated by a typical insulated beverage cooler. And the wort separation (lautering) can be accomplished with the combination of a gravity-fed ball valve and a straining manifold made from copper pipe and fittings.

During the initial mashing phase, the grain and hot water mixture (the mash) needs to be held at a constant temperature for approximately one hour. A cooler with thick, well-insulated walls is ideal. Also, choose a cooler with a removable drain valve or spigot. I have had great luck with the Coleman Xtreme line of coolers. For 5-gallon (19-L) batch sizes, a 52-quart (49-L) cooler is a good volume that will allow even fairly high-gravity recipes with some headroom left over for stirring. That is the model used in this project.

Parts and Tools

Hacksaw
Sandpaper
Pliers

For the ball valve:
A "cooler conversion kit" from your local homebrew shop
or

- ½-inch FPT pipe coupling, approximately 3 or 4 inches long
- ½-inch pipe nipple, approximately 3 inches long (this may vary based on cooler wall thickness)
- ½-inch FPT ball valve
- ½-inch MPT to ⅜-inch hose barb adapter
- Silicone (or other food grade material) gaskets to fit
- Pipe tape
- Optional: small rubber sheet for cutting custom gaskets/o-rings

For the manifold:

- Approximately 5 feet (1.5 m) of ½-inch hard copper pipe (type M or type L)
- (4) ½-inch 90-degree copper elbow fittings
- (3) ½-inch "T" copper fittings
- (1) ½-inch 45-degree copper street elbow fitting
- (1) ½-inch copper male pipe thread adapter

If you plan to build your project with metric pipe, you will need to choose your fittings appropriately.

1: CONVERTING THE COOLER

Once you've chosen a well-insulated cooler with an existing drain plug or spigot, it's time to install a ball valve. This is a major step in converting a mere cooler into an indispensable piece of homebrewing gear. For the sake of simplicity, I highly recommend purchasing a "cooler conversion kit" from your local homebrew shop or an online homebrew supplier. These kits are composed of two main parts: a bulkhead fitting and a ball valve. The bulkhead is further composed of gaskets and washers that fit together to form a water-tight seal through which your wort will flow when lautering and sparging. A hose barb is then added to the ball valve to allow the connection of tubing.

Follow the directions that come with whichever cooler conversion kit you purchase.

2: ASSEMBLE THE VALVE

If you choose to make your own ball valve, start by wrapping both threaded ends of the pipe nipple with pipe tape. Now attach the pipe nipple to the pipe coupling, apply a gasket to the exposed threads of the pipe nipple, and then slide it through the spigot hole from the inside of the cooler. Next, add a gasket over the threads of the pipe nipple on the outside of the cooler. Screw the hose barb adapter into the outlet threads of the ball valve, then screw the ball valve assembly onto the pipe nipple. Hand-tighten the whole assembly from the inside of the cooler by turning the bulkhead (this may require pliers to get a water-tight seal). If you find that you need extra padding around the bulkhead, you can cut your own flat gaskets from a small sheet of flexible rubber, which are available in most hardware stores — however, they are not foodsafe and should only be used on the exterior fittings that do not come into contact with the wort.

3: BUILDING THE MANIFOLD

The manifold is an array of systematically perforated piping that lays at the bottom of the mash tun and allows the wort to runoff while leaving the grains behind. The perforated side of the pipe faces downward, and gravity pulls the wort out of the grain and out through the open ball valve. The perforations are actually very thin cuts, which allows the flow of wort but prevents even small particles of crushed grain from entering the manifold. You can make a copper sparging manifold for about $15. And because there isn't significant pressure put on the pipes during mashing and lautering, there is no need to solder the joints together. Since it isn't soldered together, it can be broken down for cleaning and storage after each use.

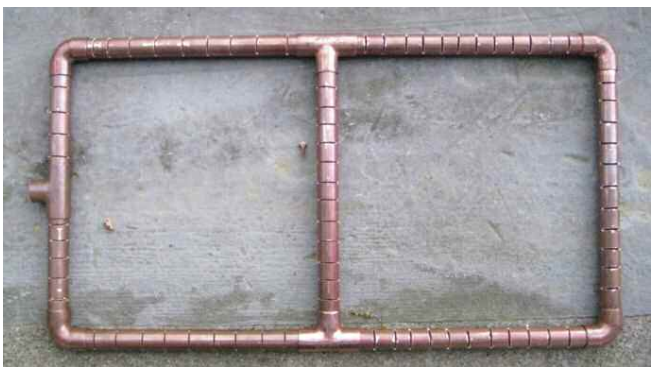
4: MANIFOLD FABRICATION

You should test the integrity of all the connections before your first brew day with your new mash tun. Put at least 2.5 gallons (9.5 L) of water in the cooler and let it sit for 30 to 45 minutes. If you notice a leak — even a slight one — you need to work backwards through the installation, retighten each connection and then test again.

The idea of the manifold is to run the pipe around all areas of the bottom of the mash tun to minimize "dead spots" (from which wort is difficult or impossible to collect), and also to reduce "channeling" of the grain. Channeling is mostly an issue in fly (continuous) sparging, since in batch sparging the grain is stirred, but pulling the wort from all areas of the mash tun simultaneously is never a bad thing.

5: MANIFOLD ASSEMBLY

Cutting the copper pipe is fairly straightforward. A common hacksaw is probably the best tool for the job. Be sure to account for the length of pipe that is "lost" inside each pipe fitting, which on average is about half an inch. Since all of the pipe sections in the project will be attached to two pipe fittings, you should add approximately 1 inch (2.5 cm) to each length to be cut to compensate. It is important that the manifold sit flush with the bottom of the tun, or as close as you can get it. This is so that as much wort as possible is recovered, and also so that you won't hit the piping with your mash paddle while stirring the grain. Attach the 45-degree street elbow to the ½-inch male pipe thread adapter and screw that into the bulkhead fitting on your mash tun. This elevates the manifold above the trough level and makes it flush with the bottom of the cooler.



6: FINISHING THE JOB

All that's left now is to add some holes to allow the wort to flow through the pipes and out through the ball valve. You can use a drill with a small bit (⅛-inch is a good starting point), but I highly recommend going back to the hacksaw for this. Drilling is next to impossible on round tubing unless you center-punch at each drill spot. On each section of pipe (the straight pieces, not the elbows and other fittings), make a cut with the saw about every half an inch. Each cut should be no deeper than a little less than halfway through the pipe. Once all the cuts are made, wash all of the pipe sections and fittings in a mild detergent solution. Reassemble the manifold and it's ready for your next all-grain brew session. If you find that any of the joints don't fit snugly, or that they loosen over time and repeated use, you can manually crimp the loose fittings with pliers to tighten them up. You may also want to go over the cut sections with sandpaper to remove any burs. BYO

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