

EPS Foam Shredder



To make EPS-crete, it's necessary to have ground foam. The shredder detailed here works best on sizable pieces of foam. It does not work on small scraps, foam peanuts or drink cups. A hammer shredder with a screen is needed for that size foam.

These are rough instructions, more of a general idea on how to build a shredder than detailed specifics. You will need to use ingenuity and common sense.

Parts:

- a couple pounds of short roofing nails. $\frac{1}{2}$ " is best if you can find them, $\frac{3}{4}$ " will work. $\frac{1}{4}$ " would be better but I don't think they make such a thing.
- A piece of 4" diameter PVC pipe. The length will determine what size to cut your foam. If you make the roller too big you can overwhelm your motor, so bear this in mind. Bigger isn't necessarily better.
- a piece of ~1" diameter metal pipe to use as a shaft
- two mountable bearings to carry the shredder roller – must fit shaft pipe
- a pulley to fit on the shaft pipe
- a frame or large wooden box to mount the assembly on
- a piece of plywood to mount the shredder head on
- a motor to drive the pull
- a belt to connect the motor to the pulley
- cement to fill in the PVC pipe and hold the shaft centered in the PVC pipe
- something to act as a shield to keep the foam from flying around while you're shredding.
- block of wood to act as a stand, temporary end and cement form

Before you start building, here is something to consider. How are you going to store the ground foam? I use 35 gallon garbage bags, but I think the bags designed to fit into a 55 gallon drum would work better. They're heavier plastic. If you're using 55 gallon drum bags, why not convert a 55 gallon drum or make a frame that will hold the 55 gallon drum bags so you can change the bag when it's full instead of pulling the head to shovel the shredded foam out of the box and into a bag?

To build the head of the shredder, you must first drill holes in the PVC pipe. They should be about $\frac{1}{2}$ " apart to allow the heads of the roofing nails to lay flat without overlapping. This will allow the roofing nails to protrude from the PVC evenly.

Each hole must be filled with a roofing nail with the head inside the pipe and the pointy end sticking out. The points of the nails are what will be shredding the foam. You will need to install an section of roofing nails and then cover the heads with tape to hold the nails in place while the pipe is rotated and another area is filled.

Once all the nails are mounted into holes and secured in place, drill a hole in the block that will accommodate the metal pipe. Run the pipe through the block and set the PVC pipe over the metal shaft

pipe. Make sure everything is centered and fill the inside of the PVC pipe with cement. This adds weight, stabilizes the shaft and holds all the roofing nails in place. You may want to drill a hole in the center shaft pipe and run a nail through it to ensure the pipe cannot slip free of the cement and rotate.

When the cement has set up, remove the block of wood, mount the bearings, cut a hole in the plywood on which the head will be mounted and mount the head. Add the pulley. Mount the head assembly on the frame. Mount the motor. Connect the motor to the head pulley with the belt.

Wear a particulate mask when you grind the foam. Add ~1 quart of dish-soapy warm water to each bag of shredded foam before you tie the top of the bag shut. Rotate the bag to distribute the water. This is an important step as that small amount of dish soap will act as an emulsifier allowing the cement/sand/paint to stick more readily to the foam. The more you rotate the water and the more it sits out in the sun to warm and is rotate, the more the treated water will cover the foam. This also has the benefit of reducing the amount the foam will fly around when being measured and mixed. The goal is to pretreat the foam so it will lose most of its static property and mix more thoroughly with the other ingredients.

The Recipe -

For each part cement you use, add

- 1 part sand
- ½ part latex paint
- ½ part water
- 9 parts ground EPS foam

If you double the above recipe, it can be mixed comfortably in a large wheelbarrow or large mortar tray and will yield about 5 square feet of EPS-crete.



If you are mixing in a wheel barrow or mortar mixer tray, mix in this order.

1. Measure the latex paint and water and mix together in a separate container. This step helps prevent paint balls developing in the mix.
2. Spread the ground EPS evenly on the bottom of the wheel barrow or mortar tray. It's the lightest ingredient and the sand and cement on top will help contain it during mixing.
3. Spread the sand evenly over the top of the ground foam.
4. Spread the cement evenly over the top of the sand.
5. Pour the paint/water mixture over the top avoiding pouring it on the sides of the mixing vessel.

Mixing can be done by hand easily with a short handled shovel. This is a dry fluffy mix and will initially appear too dry. Don't add any extra liquid. Keep mixing and folding until everything is fully integrated. You can use a mortar mixer (not the paddle on a hand drill, but an actual machine)



or you can do the mixing by hand. Don't try and use a cement mixer. It won't work. The paint, cement and sand will stick to the inside of the barrel and won't mix with the foam. Because the mix is light, mixing by hand will not be a difficult job. This is not a mix that can be poured, it must be shoveled and packed.

The forms to shape it can be light duty. The form shown is a 9" wide piece of 5/8" OSB with a 2x4 fastened to the center lengthwise to act as a stiffener. The forms are covered by plasticized cardboard slip sheets which act as a form release.

Tamp the mix into the forms using the end of a 2x4 or similar implement. Pack it into the form in layers to ensure consistent packing and to prevent air pockets.

Reinforcing can be added to the structure. The examples shown here are of EPS-crete being used as infill. I used 6-6-10-10 wire fastened to the center of the posts using fencing staples and to the foundation reinforcing using hog-tie wire.

The wall shown here will be stuccoed on one side (sun porch) and lime plastered (living space) on the other.