GREEN DRAGON OPERATING INSTRUCTIONS

I invented Green Dragon because I believe that Aerated Concrete (AirCrete or AC) is a key ingredient in the development of low-cost, high-quality homes. Until now producing AC was too costly for the budget builder. Now almost anyone can make AC with ease. Green Dragon is a compact lightweight continuous air-crete mixer that produces about 10gals of AC per minute continuously, which is equivalent to heavy machines that cost over $20,000. Just pouring one floor slab will save you enough money to pay for your Green Dragon.

AC is a lightweight masonry product that is infused with tiny air bubbles that expands it’s volume many times. It provides good thermo and acoustic insulation. It’s fireproof, waterproof and impervious to termites and other insects. Made of completely non-toxic materials - it will not rot, warp, or corrode. Unlike concrete which is hard, heavy, cold and difficult to work with, Air-crete is easy to work with. It dries overnight and can be cut, carved, drilled and shaped with wood-working tools. It accepts nails and screws and is easily repaired. And because it’s main ingredient is air; it’s inexpensive.

AC has gained international recognition as an ecological building material. It is simply a mixture of water, cement powder and a water-based foam. The foam is produced with a foam generator that mixes a foaming agent with compressed air. Green Dragon comes with a continuous foam generator that works famously with ordinary dish detergent as the foaming agent. 1 quart of detergent in 10 gallons of water makes 70 ft² of AC.

See Green Dragon in action on youtube - https://youtu.be/5DQtdX4t500
To make AirCrete with Green Dragon you need a 1/2" slow speed drill, a pressurized water source, an air-compressor, cement, electricity, foaming agent and a container for the foaming agent.

**CHOOSING A DRILL.** Green Dragon has holes for mounting spade handle drills with 3 position side handles. Use a 1/2" reversible drill with a maximum rpm speed between 500 and 700 rpm.

The Dewalt DW130VR drill is a good choice. You might find reconditioned models for a discounted price at this link [http://toolsandmore.us/dewalt-dw130vr-spade-handle-drill.aspx](http://toolsandmore.us/dewalt-dw130vr-spade-handle-drill.aspx)

Harbor Freight Tools has drills for as low as $54 [http://www.harborfreight.com/catalogsearch/result?q=spade+handle+drill](http://www.harborfreight.com/catalogsearch/result?q=spade+handle+drill)

Note how the Ridgid drill's handle holes are closer to the front of the drill.

The Ridgid drill from Homedepot was a good option but they changed the handle hole position on the new model. We don’t recommend the Ridgid drill unless you can get one of the older models.
MOUNTING THE DRILL

The weight of the drill is suspended entirely from the top bolt. The two side bolts merely add stability. Place the drill over the end of the hexagonal shaft that runs through the center of Green Dragon. Leave the chuck loose on the shaft while partially installing the top bolt. 

Now tighten the drill chuck onto the shaft. The drill naturally aligns with the shaft when the chuck is tightened. Carefully adjust the top bolt so that all the weight is supported by the bolt, but not too much. Be precise, like tuning an instrument. When you have it correct, tighten the lock nut. Turn the drill on momentarily to see if everything spins freely. Once it is properly positioned install the side bolts. Lock the drill switch ON in REVERSE. If your drill doesn’t have a switch lock, then a hose clamp, zip tie or other suitable device can be used to hold the switch ON. Make sure the drill is set for REVERSE rotation. The auger needs to spin counter clockwise.

SETTING UP THE FOAM PUMP

Remove the yellow plugs from the pump. Insert the elbow stud into the inlet of the pump.
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To operate Green Dragon’s foam generator you need a container for the foaming agent. A 5 gallon bucket works for small jobs but for larger projects a larger container is better. A large plastic trash can with lid works perfect.

Position the pump on top of the lid.
Drill a 3/8” hole in the lid and install a length of tube from the elbow in the pump inlet to the bottom of the container.
Screw the pump to the lid through the 4 rubber feet.

Make a strainer with the screen and rubber bands provided. Put it on the end of the suction tube so that your pump won’t be damaged by sucking up small bits of debris.

3/8” tubing is provided to connect between the outlet of the pump and the needle valve on the right hand side of the foam generator.
Pass the tubing over the rear leg bracket.

One flick of a switch activates electric solenoid valves so the water, compressed air, foam pump and drill all turn on simultaneously.

Compression fittings connect the tubing to the needle valves as shown.

Before using Green Dragon for the first time you need to adjust the needle valves on the foam generator. The needle valves controls the amount of foam injected into the AC. See page 5 for instructions.
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Start with the foaming agent valve open about 1/8 rotation as shown above.

Open the foaming agent valve about 1/8 of a rotation. With the drill and water disconnected, turn the switch on. The switch opens the air solenoid valve and activates the pump. Wait a little while for the pump to fill the foam generator the first time. When liquid comes out of the foam generator open the air needle valve slowly until the foam sputters heavily. This means you have too much air. Close the air needle valve so the sputtering stops and then open it so there is a little sputter.

To produce more or less foam, first adjust the foaming agent needle valve open or closed. Then adjust the air needle valve accordingly as described above. Turn the switch off and snap the foam generator tube in place. The test foam will dissolve back to liquid and can be reused.

Here’s a youtube link about adjusting the needle valves - https://youtu.be/TWQv5c3803g

Remove the foam generator tube from the two snap clamps by lifting the elbow first.

Reattach the foam tube by first inserting the elbow in the hole.

A NOTE ABOUT FOAMING AGENTS.

We tested several commercial foaming agents, car wash concentrates and different brands of dish detergent. We found that protein based foaming agents produced the most stable foam. Seventh Generation Natural Dish Liquid performed best out of the detergents we tested. Dawn Ultra and Safeway Home concentrate were close but not as stable. Following is a list of foaming agent suppliers for your information.

http://www.greenfroth.com/
http://www.richway.com/construction/pdf/CMX.pdf
http://www.richway.com/construction/?page=CellularConcreteProductHome&sub=Conc
http://www.sakshichemsciences.com/foaming-agent.php
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3397519/
http://www.eabassoc.co.uk/Foamed-Concrete-Foaming-Agent.php
http://www.litebuilt.com/general.html
http://vermillionassociates.com/varimax-concentrate.html
http://www.clcchemicals.com/chemical-foaming-agent.html
WATER

Typical household water pressure of 30 - 50 psi is all that is needed to supply water to Green Dragon.

Attach a garden hose to the garden hose adaptor. Or use a quick release fitting.

As soon as the cement enters the mixing chamber it is hit by two water jets, one on each side.

ADJUST THE WATER FLOW

The amount of water you need depends on your drill speed. Set the ball valve so that the water flow is between 1 and 1.5 gallons per minute for 500 - 700 rpm drills.

Unplug the drill and the pump. Turn the switch on and let the water flow out the mouth of Green Dragon into a container. Adjust the ball valve so that it takes about 50 seconds to fill a 1 gallon container. Note the setting for future reference.

CEMENT

To produce light-weight AC that can be worked with woodworking tools, use cement powder without sand. Any type of Portland cement or its equivalent will work. Sand, fly ash, fiber or other additives can be added. But note, Green Dragon is not designed to mix concrete with stone aggregates.

It takes at least 2 people to operate Green Dragon. 1 person needs to keep the hopper full of cement while the other person handles the AC. For continuous use, open the bags of cement you intend to use before you start so you won't have to stop Green Dragon between bags.

AIR-COMPRESSORS

For continuous production of AC use a 4 cfm air-compressor or bigger. Smaller compressors work but you may have to shut Green Dragon off to let the compressor catch up. Set the pressure between 65 - 90 psi.

CLEAN UP

When you are done lift the rear end to empty the content in the mixing chamber while it is running. Then shut it off, empty the excess cement through the trap door, disconnect the air-compressor and unplug the foam pump. Let it run with only water until the water comes out clean. You can give it a deeper cleaning by running it with sand and water. Or take the shaft out and clean it with a brush or pressure washer.