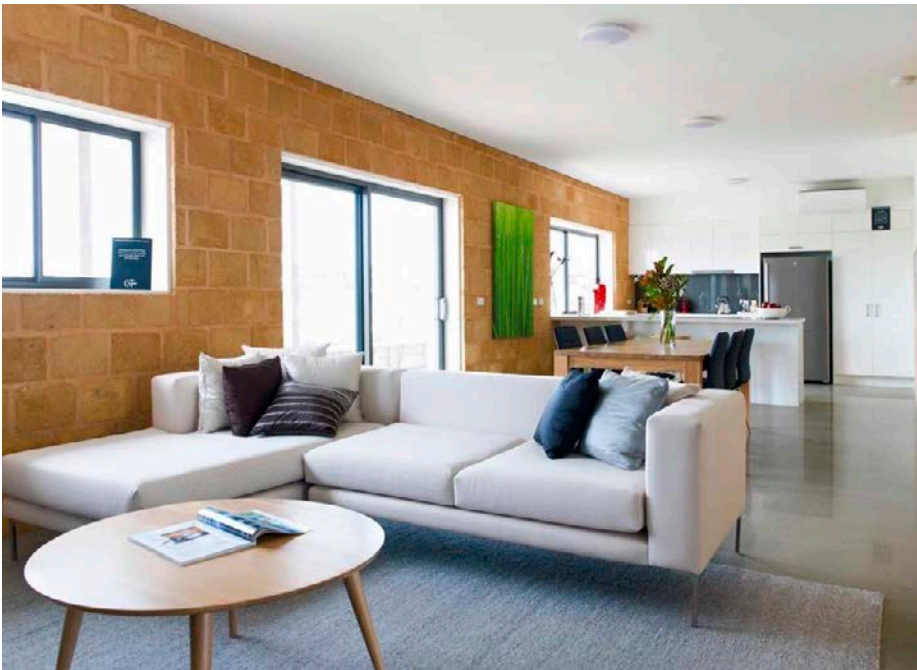


Pressed into service DIY earth bricks



Creating pressed earth bricks isn't hard when you have a machine and willing helpers. John Hermans describes the process and advantages of this low embodied energy approach to construction.



↑ A decorative use of the pressed bricks in the display home at the ecovillage at Cape Paterson.

THIS article aims to inspire owner-builders to minimise the carbon footprint of their new sustainable dwellings by using pressed earth bricks. By explaining the many virtues of this building material, I hope to spark interest in my offer to share the amazing machine that I use to make them.

I started making and using pressed earth bricks in 1988, shortly after commencing excavation for our house site. I had seen a hydraulic brick press working very effectively around this time and, with the intent of making a copy, I took several photographs of it in operation. I then found four aspiring owner-builder friends who were willing to become 'shareholders' and finance the brick

press fabrication; my input was to build it.

The machine I built back then is still going strong today. To date, this press has made in excess of 70,000 bricks and has been responsible for some very creative, cost-efficient and low embodied energy housing.

What's in a pressed earth brick?

A pressed earth brick is simply a brick made by compacting soil that has a high percentage of clay. The machine compacts the soil by 50% using the power of a hydraulic press. The result is an attractive and easy-to-use brick that needs no firing and can often be made from subsoil excavated from the house site—and thus has much lower embodied energy

than the average house brick.

My machine makes bricks that are 300mm long by 220mm wide by approximately 130mm high, so quite a bit larger than the average house brick (dimensions 230 x 110 x 76mm). The height of the brick depends on the amount of clay mix put into the press, but averages around 130mm. At that size, the brick ends up weighing around 15kg.

It is important to seal the bricks to prevent surface erosion. There are many earth brick sealing products available now (e.g. *Your Home* suggests linseed oil and turpentine; or you can use one of the Bondall products).

Quality bricks are achieved by using a clay-based subsoil that will bind well and dry hard. This is often an excavation waste product, with little commercial value. Using a press to make several test bricks is a sensible idea.

An addition of 5% to 10% cement will form a brick that will handle days of total water submergence, although this is a condition rarely encountered! No cement is needed in the mix if the bricks are used indoors. If used in exterior walls that are likely to be impacted by rain, then the use of cement is recommended.

The pressing process

In preparing to make these bricks, there are a few additional items that are essential to ensure a smooth operation;

- a medium-sized 5HP rotary hoe
- at least a dozen 15L plastic buckets
- two shovels
- water
- a team of four enthusiastic and fit workers
- several old wooden pallets.

The first step is to break up the clumps of earth using the rotary hoe to create a smaller

↓ Filling buckets with freshly hoed clay mixture.



↓ One bucket of material fills the press.



↓ The team working at Cape Paterson.



↑ The ram ejects the brick from the mould.



↑ The 15 kg brick is firm and easily handled.

Warning

Hydraulic machines such as this brick press have the potential to cause serious injury if used incorrectly. Extreme care should be taken when operating such machines, with a full understanding of the machine's operation.

particle size mix that has the correct moisture content and facilitates easy shovelling. Adding water from a trigger-jet hose to the earth pile while hoeing gets this job done easily. The amount of water added is low, to make the mix more like plasticine than wet mud.

The next step is to shovel the finished hoed mix into 15L plastic buckets ready for the brick press; each bucket will create one brick. The brick press operator empties one bucket of hoed earth into the mould cavity of the press, then closes the lid and operates the hydraulic lever to compress the loose mix. With practice, this takes less than 30 seconds per brick.

To achieve uniformity in the height of bricks, you need to get a consistent amount of mix in each bucket. This is not too difficult, with small

adjustments able to be made by the brick press operator as a bucket is poured into the mould.

The bricks are quite firm as they are taken from the press, and can be stacked on pallets to over six layers high.

As the amount of water used in the mix is so low, the time taken for the bricks to dry is quite quick, in summer perhaps a few weeks. And as the compression force is around 20 tonnes, there is little, if any, shrinkage of the finished brick. I have never seen evidence of shrinkage.

The ideal number in a team is four: one on the press, one carrying the finished pressed bricks away to the stack and two people on shovels, filling the 15L buckets with equal amounts of earth mix. In this way 120 bricks per hour can be produced.

Laying the bricks

The bricks can be laid flat, 220 mm wide, or on their edges to create a double wall, which minimises the wall thickness and allows for a cavity for inclusion of a good R-value insulation. A double cavity wall like this can also have concrete poured in the centre gap, making a wall which will take a significant load. Pouring concrete in between the bricks is so easy to do. I have made some very strong curved 3m high walls using this method to create wildfire/ember shielding walls.

For the mortar between the bricks, a traditional sand, cement and lime mix is recommended. This mortar uses minimal cement and is the fastest way to do the job.

"To date, this press has made in excess of 70,000 bricks and has been responsible for some very creative, cost-efficient and low embodied energy housing."



↑ The drive motor is connected to the hydraulic pump and reservoir.

Advantages of pressed earth bricks

I believe that using these bricks in internal and external walls has several advantages over traditional building materials.

1. Less cost. The material is often part of the site excavations or can be bought at a low rate per cubic metre.
2. Low embodied energy cost. There is no brick firing and little transport required.
3. Owner-builder layable bricks. The large-format bricks make it easier to create a flat, straight wall.
4. The bricks can be used to provide highly effective thermal mass if used internally or in a cavity wall. This gives the living space a narrower internal air temperature range.
5. Individual rooms are quiet due to the sound deadening of the heavy earthen walls.
6. You end up with a home that is more 'earthy'.

Copying the machine

A few years ago, an owner-builder wanted to hire my brick press, but as he wanted to make

a large quantity of bricks I suggested that he take the machine and have it copied. A local engineer did a great job of this for around \$4000. You could reduce this cost by doing as I did and sharing the cost with others who would also use it, or perhaps you could sell it when you are finished with it.

I am certainly no salesperson, telling a virtual stranger to take my machine to have it copied, although I did receive a lovely selection of homemade wines. Nothing is for nothing!

Since having made the brick press, I have not seen another like it apart from the copy made from mine. I would love to encourage more owner-builders to consider pressed earth bricks as a great option—please contact me through *ReNew* (renew@ata.org.au) if you would like to take up my offer to copy the design of the earth brick press. *

John Hermans has been living off-grid for 35 years on a highly sustainable property. He holds a BSc in forest ecology and is president of Gippsland Environment Group.

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