



roundhouses



what are they?

Roundhouses are cylindrical - a common building shape that has popped up independently in many cultures and in many parts of the world throughout history. A circle would have been the most popular building footprint on the planet at one time - think mud huts, yurts, tipis (ish), igloos, wigwams (OK, they're both domes), as well as hogans, crannogs, trulli, pallozas, rondavels, clochans and brochs. They're not so widespread in the modern world, as buildings need to be square to fit closely together in today's high-density urban areas. The reason they became so popular is possibly that a curved wall is relatively stable and self-supporting, whereas a linear wall is not, and can be wobbly until it's fixed to something.

They can be made from most materials. The most popular construction method currently in the UK is a timber frame (round or square timber) with walling infill. Loadbearing walls without a timber frame can also be used, using straw-bales (which have to be bent to shape - tricky), cob, stone or rammed earth. There are more options with infill - all the above materials can be used, as well as wattle & daub, cordwood or hempcrete. The advantage with timber frame is that you can put the roof on and have a dry space to construct the walls / add fittings etc.

An interesting roofing option is the reciprocal frame roof. The most popular type has rafters radiating out like the spokes of a wheel - every rafter resting on the previous one, with no central support. The second most common reciprocal roof is the 'whirling log' variety, where there are no rafters, but instead, a set of ring beams radiate inwards from the walls, each one sitting on the previous one and twisted half a turn - i.e. the shape you would get if you sat one 50p on top of another so that the points of one overlay the flat edges of the one below - the coins getting smaller as they get higher. Alternatively, roundhouses can



Reciprocal frame roof from inside a roundhouse under construction.



Tony Wrench's famous 'that roundhouse' in Pembrokeshire – see thatroundhouse.info.

have a conventional roof where the tips of the rafters meet in the middle.

Because reciprocal roofs usually have quite a flat pitch, they are often turfed. A turf roof looks right on a roundhouse, somehow. However there are plenty of examples of higher-pitched shingle or thatched roofs. A reciprocal frame roof places very little spreading load on the ring beam and upright posts (so it doesn't tend to push the walls out), meaning that the roof needs no further bracing or tie beams.

what are the benefits?

- the reason they appeared so often in history is possibly practical - a cylindrical shape is one of the easiest ways to make things stand up
- a cylindrical building has a lower surface area to volume ratio than any other shape (except a dome), reducing heat loss
- they also have a lower wind profile / sail effect than square or rectangular buildings, so are more stable and secure in high winds
- they maximize interior space for any given amount of materials (again, apart from domes)
- many cultures have valued this shape for cultural and spiritual reasons; people enjoy them now because most of our buildings are right-angled and it provides a welcome change
- they create a non-hierarchical space, e.g. for school buildings - with everyone in a circle

what can I do?

Attend a course and read books (see resources) to learn how to do it yourself, or hire a specialist to build one for you. You can choose from various walling materials (see above), and they can potentially be more than one storey. Here are some tips for foundations and roofs.

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Foundations: there are two different types for basic roundhouses - buried post or free-standing. For a garden shed or playhouse, the buried post variety (i.e. Iron Age style) is the simplest, quickest and cheapest option. The frame is kept upright and rigid by burying the bases of the vertical posts into the ground. This requires very little in the way of carpentry skills - no complex mortice & tenon or other joints. Timbers can be tied, bolted, pegged or pinned together. The downside is that eventually the posts will rot off at ground level, making the structure unstable. There are a few ways to retard the rotting, however:

1. pack the holes that the posts stand in with hardcore; depending on where your water table is, this could help drainage
2. char the ends of the posts to make them more durable
3. you can buy bitumen sleeves that go over the bottom of the posts when they're buried
4. strip the perishable bark and sapwood from the posts before burying

For more serious buildings, roundhouses should be free-standing. Posts sit above ground level, away from moisture and soil. This means that the posts need to be properly jointed with mortice and tenons, with full, all-round wind bracing to ensure that the building is secure and stable.

Reciprocal frame roofs: are fun to build. If you've never done it before, try it first with twigs, then progress to a full-sized version at ground level before attempting the real thing. You'll need a 'Charlie stick' (prop) to support the first rafter. Each successive rafter is balanced on the previous one. If your calculations are correct, there will be sufficient space to slot in the last rafter, after which you can pull away the Charlie stick and the roof will drop to its natural point of equilibrium. Make sure there's no-one inside the building when you pull the stick out - just in case. Reciprocal roofs are easier to construct with roundwood. It's easier to get them to locate. There are various systems to predetermine the geometry of a reciprocal frame roof, that are too complex to go into in a factsheet, but the quantities that are interdependent are a) the pitch of the roof, b) the number and thickness of the rafters, and c) the size of the 'eye' hole in the middle. You can't determine these values separately - any two will determine the third.



Timber-frame roundhouse, waiting for the roof to be covered and walls to be infilled.

Leonardo da Vinci created a few interesting reciprocal structures, including a bridge. There are square / rectangular reciprocal roof designs, but the commonest shape is round. You can use some (long) matchsticks arranged reciprocally as a pub trick to hold a pint of beer above the table. This demonstrates the primarily downward rather than spreading load of the structure, and it stops you getting too drunk.

Reciprocal roofs often have an amount of natural flex or spring due to their self-supporting nature. This is a facet of the structure and not necessarily cause for concern. However, it's important to select strong timber for the rafters, like larch, douglas fir, ash or chestnut, and not brittle or radially-branching species like sitka spruce.

If the pitch is too shallow, it can go flat or invert/collapse. It's also possible to miscalculate and end up with a pitch too steep for turf, so you might have to dismantle it and start again, or use a different roofing material. NB: a turf roof needs to be battened between the rafters.

resources

- lowimpact.org/roundhouses for more info, courses, links, builders & books, inc:
- Tony Wrench, *Building a Low-impact Roundhouse*
- Olga Larsen, *Reciprocal Frame Architecture*
- wholewoods.co.uk - roundhouse builders
- thatroundhouse.info - Tony Wrench's famous roundhouse in Wales; after a long battle with the planners he's been allowed to live in it
- theroundhouse.org - enthusiasts with info and directory of roundhouses in the UK

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