Introduction

If you're reading this, you must have made the very sensible decision to learn basic strawbale building via this online course. Congratulations! Although there is never a true substitute for the real thing, we hope this course gets you as close as you can to experiencing a live strawbale building course without putting on the gloves. It includes all the basic techniques and methods you will need to begin working with straw, introduces you to the highly complex tools you will need (that's a joke!) and explains the construction methods required for a simple building. The biggest thing that's missing is the fun and excitement of working together with others, and the great feeling of empowerment that brings – but hopefully that will come later as you make friends in the strawbale world and start real building.

What you'll get from this course

This series of videos, pdfs and photos are designed to give you a beginner's introduction to strawbale building. They cover all the basic practical tasks you'll need to start building with straw, together with an overview of how to build a simple strawbale building. Subjects covered include foundations, carpentry for base and wall plates, customising and dressing bales, roofing and plastering. We hope you will also find it inspiring, and that it will encourage you to do more, attend a live course, buy your own plot of land, help other people build their house. Enjoy!

History

Straw has been used for building for thousands of years, but using it in baled up form began in the USA in the late 1800s, when baling machines were invented. The white settlers on the plains of Nebraska were growing grain crops in an area without stone or timber with which to build, and while waiting for timber to arrive by wagon train the following spring, they built temporary houses out of what was, to them, a waste material – the baled-up straw stalks of the grain crop. They built directly with the bales as if they were giant building blocks, with the bales themselves forming the load-bearing structure. This is known as the Nebraskan or load-bearing style. The settlers discovered that these bale houses kept them warm throughout the very cold winter yet cool during the hot summer, with the additional sound-proofing benefits of protection from the howling winds. Their positive experience of building and living in straw bale homes led to the building of permanent houses, some of which are still occupied dwellings today! This early building method flourished until about 1940, when a combination of war and the rise in the popularity and use of cement led to its virtual extinction. Then, in the late 1970s, Judy Knox and Matts Myhrman, among other pioneers of the straw bale revival, rediscovered some of those early houses and set about refining the building method and passing on this knowledge to an eager audience of environmental enthusiasts. Through the green and permaculture movements the ideas spread very rapidly, with most of the new buildings being this self-build, Nebraska/load-bearing style. Before long, new techniques were developed to improve the building method, and 'The Last Straw' journal was founded in Arizona to disseminate ideas, promote good practice, and provide a forum within which owners and builders could network.

The first straw building in the UK was built in 1994, and the first in Ireland in 1996. Today over 1,000 new structures are being built annually all over the world. There are close to a thousand in the UK and at least 50 in Ireland at the present time, most with full planning permission and

Building Regulation approval. Although the UK began building with straw bales earlier than any other European country except France, we have since fallen far behind in terms of official recognition and encouragement of this innovative and pioneering technique. However, the nature of straw is such that some pioneering individuals and institutions have taken the risk to prove just what straw can do.

In Stansted Mountfitchet is a saleroom built for Sworders Ltd. It is a compressive frame style, and at 1,100m^2 is the largest straw bale building in the UK. It won the East of England RICS Sustainability Award, 2009. It was built for the very competitive price of £950/m^2. In 2008, another innovative two-storey load-bearing straw bale house built with help from amazonails won the Grand Designs Eco-home of the Year Award. In 2009, North Kesteven Council In Lincolnshire was the first local authority to build semi-detached council houses out of straw, working with amazonails and a local construction company. Straw Works designed the first terrace of 2 storey loadbearing strawbale houses in 2011 built in 2012.

Why use straw?

Sustainability

Straw is an annually renewable natural product, formed by photosynthesis, fuelled by the sun. Over 2 million tonnes are produced surplus to requirements each year in the UK. Using straw can mean less pressure to use other more environmentally damaging materials, and in the unlikely event that the building is no longer required, it could be composted afterwards. It is low in embodied energy and has a seriously negative carbon footprint, storing carbon in its fabric for the lifetime of the building.

Energy efficiency and greenhouse gas emissions

Over 50 per cent of all greenhouse gases are produced worldwide by the construction industry and the transportation associated with it. If the surplus straw in the UK was baled and used for local building, we could build at least 430,000 houses per year. That's almost half a million super-insulated homes, made with a material that takes in carbon dioxide and makes it into oxygen during its life cycle. Coupled with vastly reduced heating requirements, thereby further reducing carbon dioxide emissions from the burning of fossil fuels, straw bale building can actually cause a net decrease in greenhouse gas emissions and hence have a negative carbon footprint. To improve the energy efficiency of houses is the design challenge of the twenty-first century. Strawbale building designs are extremely airtight, reaching Sustainable Homes Code 5 easily and Code 6 by adding a green roof and solar panels.

Highly insulating

Straw provides super-insulation at an affordable cost. In walls typically over 450mm thick the U-value is 0.13W/m^2K, two or three times lower (i.e. better) than contemporary materials, and much lower than current Building Regulations require. When used with a design with south-facing windows, incorporating some thermal mass to store heat and release it on a 24-hour cycle (e.g. clay plaster or limecrete floors), this maximises solar gain. This will dramatically reduce the amount of fuel needed to heat a straw bale house.

Acoustically insulating

Straw bale walls are also super-insulative acoustically. There are two recording studios in the USA built of straw bales for their sound-proofing quality and insulation, as well as one in Wales, the Strawdio. Straw bale wall systems are increasingly being used near airport runways and motorways as sound barriers in the USA and Europe. amazonails pioneered the use of loadbearing strawbale party walls as thermal and acoustic barriers for semi-detached houses, and this work is being continued by Straw Works.

Low fire risk

Plastered straw bale walls are less of a fire risk than traditional timber-framed walls. Research has been done in most European countries including the UK that shows straw to be extremely fire resistant. It is loose straw that is a risk, and this is cleared from site every day during construction.

Affordable

Straw is currently produced surplus to requirements and a construction-grade bale costs about £3.50 delivered or £1 from the field. The walls of a three-bedroomed, two-storey house can be built with 350 bales (but remember that the walls only represent about 16% of the total cost of a house). Also, because the building method is so straightforward, people without previous building experience can participate in the design and construction, thereby saving on labour costs.

The most significant saving on straw bale houses is in the long-term fuel reductions owing to the high level of insulation. Heating costs can be reduced by up to 75 per cent annually compared with conventional-style housing, and the savings therefore continue to accrue throughout the life of the building.

Structurally sound

Bales of straw are more than adequate to carry typical loadings of floors, roofs and winter snow. They have passed load-bearing tests both in the laboratory and in practice, and are used to build houses of at least two storeys. Imagine placing a new sheaf of photocopy paper on the floor and then standing on it. It squashes down with your weight. Now ask 2 or 3 friends to stand on it with you – it doesn't squash down any more than it already has done. This is what straw does too. We know how much a densely packed construction grade bale will compress under load, and once we've made it do this, it won't compress any more. Bales are not used structurally for framework methods, they simply infill the gaps between posts and it is the posts that carry the load (and take away an engineer's anxiety) although in most infill designs, the bales are also compressed.

A healthy living environment

Straw, particularly organic straw, is a healthy alternative to modern materials. It is natural and harmless. It does not cause hay fever since it's not hay (i.e. it doesn't contain pollen), and in fact it is the building material of choice for many allergy sufferers because it is so innocuous. Living within straw walls can enhance the quality of air we breathe, because it does not give off harmful fumes such as formaldehydes or dioxins, as many modern materials do, and because it is a breathable material, thereby helping to keep the inside air fresh. Coupled with the use of non-toxic organic finishes such as clay and natural pigments and paints, it can provide one of the

safest and most comfortable atmospheres in which to live. Another health benefit is the ambience inside a straw bale house, which is calm, cosy and peaceful. This is partly to do with the high level of sound insulation, partly to do with the air quality, and partly to do with the organic feel to the house – a beautiful, nurturing and safe environment to inhabit. Try it!

Empowering and fun!

The most unquantifiable aspect of a straw bale house has to be the way that the building process itself empowers ordinary people. It is accessible to many people who are otherwise excluded from the design-and-build process, and enables them to transform their living environment, and their lives, in a very enjoyable way. Even mainstream builders, who are some of the most sceptical people when faced with a new material, become transformed by working with straw, and firm believers in its qualities and performance.