

Method
Timber frame
Build cost
£81,800
Location
Cornwall

Woodland house

At the age of 19, Joshua Penk started work on his own self build project. Four years, several new skills, a lot of ingenuity and just a bit of luck later, Joshua has a unique and sustainable home

WORDS + PICTURES
ALEX PRATT

On Joshua Penk's 20th birthday in 2009, he poured the steps for his new home. "Building had always been on the cards for me. The plot has been in the family for quite some time," he says. In fact, Joshua is in the third generation of his family to self build. The large, stunning plot where his home now stands is set deep in Cornish woodlands near the south coast and was bought from his grandmother in 1989.

Joshua first became inspired by sustainable building when he did work experience on an award-winning local school with his father's design practice, ARCO2. Five years later, he delayed going to university so he could work; first in the practice's offices, and later on his self build. "It was important to learn the system of building. The practice does all the elements of a job, from planning to production," says Joshua, who drew up his own home's design at the same time. The result is a striking, single storey, two bedroom property built in a curve, using a post and beam system with cedar cladding and a spectacular glazed south elevation.

"I knew that a single storey would be easier to keep low impact, and it was also much simpler to stick to a small budget. I just thought it was a wiser choice than going up," says Joshua. "But primarily, it was a stylistic decision inspired by the design of Japanese homes. Thankfully, this also had financial benefits and was easier to construct."

The hands-on self builder did almost all the construction work himself on a shoestring budget, so was keen to avoid using heavy machinery and permanent scaffolding. "We managed to do the building with no scaffolding at any stage of the project, using a block and tackle," says Joshua. The lightweight structure sits on pad foundations, with a cantilevered room over a stream to the north. The design embraces many of the latest sustainable building techniques. "It is very eco-friendly," says Joshua. "There's no synthetic materials, so it's extremely breathable."

From planning to reality

Joshua's family had gained permission on the plot in the 1980's and had laid services at the time, which helped with the budget. He was initially advised simply to apply for 'revised matters' planning consent and a change of detail. Subsequently, however, the planning department decided that the original permission had lapsed, and Joshua had to re-apply for full consent. In keeping with the ethos of the whole project, he did his own tree, soil contamination and mining surveys (with a little help from a geologist neighbour), presenting them in the official formats, which were accepted, and permission was granted.

Joshua not only avoided using consultants (a family friend checked the structural calculations as a favour), but also sub-contractors, with the exception of a plumber and an electrician to do the final fix, commission and sign off. As a result, he quickly learned various new building skills.

"I was gradually improving, as there is so much repetition. I learned to start in an inconspicuous area first," he says. With such a wealth of experience in his own family, Joshua was able to turn to them for advice and support, and even some



Left: The site during the initial stages of the build. Joshua did most of the labour himself, although he occasionally got help from friends and family



occasional manual labour. "On each birthday, I would recruit the entire family to do different jobs; there were three generations of us. It was a lovely experience," he says.

The key to the success of this build has been Joshua's choice of materials and construction method. His basic principles were that the house should be raised off the ground, with big roof overhangs (so the straw and wool insulation doesn't get wet). Not only are all the materials natural, but they were sourced as locally as possible, too.

For example, the wool is a by-product of the fleece industry in the south west, and was collected for Joshua by an agricultural merchant. The Douglas fir posts came from Duchy Timber in Cornwall, straw came from his uncle's farm and the cladding came from a tree on the plot, which was felled during the preliminaries. "We think it is white cedar – or maybe macrocarpa – we milled it on site into large planks in 2008 and left it to season until needed."

The radial frame is built from gulam beams (sourced from Finland, as there were no production manufacturers in the UK at the time) and is knitted together with home-engineered joists in the floor, roof and walls. The lightweight building rests on 50 pad foundations, each filled with low grade concrete. The posts sit on top of these and are protected by a thin piece of lead, inside concave saddle stones. "We were proud of those, as they

I don't regret experimenting with materials and ideas. It's been a wonderful experience, even if it doesn't always work out!

cost about £2 each, while the proprietary feet were more than 10 times that cost."

The roof is similarly homemade and low impact. Rather than buy a ready-made green roof system, Joshua designed his own "breathing roof", using water-resistant bitumen board, a rubber-based liner, battens and a structural 'bubble wrap'. The vital principle was not to get condensation underneath the liner, which has a life of between 20 and 50 years. The top is spot planted with little sedum and ferns, which were free seconds rescued from a commercial project as they came off a damaged roll. ☺



The green roof and extensive glazing give Joshua's home a contemporary finish, although the design was inspired by traditional Japanese architecture



What I learned

- ✦ I don't think I'd change the design of this building, but I would advise first time self builders to start smaller than I did, or design in a way which allows you to make additions easily in the future. I also think you shouldn't rush things
- ✦ Don't buy furniture until the building is finished. I admit my passion for furniture meant I spent too much on these items before the structure was completed, especially on chairs
- ✦ We made all our own joinery, but for the sliding doors, the timber wasn't seasoned enough. If I could do it again I would kiln dry the timber first. Nevertheless, I'm happy with most of the finishes. I don't regret experimenting with different products and materials, even if it didn't always work out. Self building is a learning process, and I have certainly come away much wiser

builder, this was much simpler to do. It looks like concrete and also transfers heat well and is easy to repair," he says.

The solar room on the south elevation, which runs the length of the house, is designed to buffer heat loss and gain, keeping the living space at an optimal temperature. Joshua is very proud of this element of the design. He freely admits, however, that some of his other ideas were less successful, such as his 'air supply windows.'

The thinking behind this was to add a fourth layer to the glazing to maximise passive heat recovery, where the escaping warmth would drive convection. However, as the extra layer is not sealed, in reality it allowed moisture to settle. So, Joshua decided to downgrade the windows to triple glazing retrospectively. An experiment with clay flooring also failed when it cracked, but Joshua remained unfazed. "I don't regret experimenting with materials and ideas. It's been a wonderful experience, even if it doesn't always work out!" he insists.

"I'm definitely as interested in interior design as I am in architecture. The finished feel is one of muted tones and reflected light from the solar room. It's all about minimal fuss, nice materials and making sure they complement each other. It's been a very interesting part of the project, although a lot of time and effort goes into creating a simple and elegant detail."

It seems the whole experience has been enjoyable one, despite floods in 2010 that ripped up the long drive and the foundations for the gulam bridge over the stream, which leads to the property. This forced Joshua and his father to put drainage under the road as a preventative measure. Indeed, the most difficult part in Joshua's extraordinary journey was the weather. "It was horribly cold at times. We had two winters of snow and ice when we were doing roofs," he says. "I'm glad that time is over!"

For now, while he remains an architecture student, Joshua's house is let to his aunt, but he returns in the holidays to enjoy the result of all his hard work, energy and vision. "It's nice when I get to come home and spend time here," he says. ◉



Above: Joshua has kept the interiors neutral and very simple to allow the views to take centre stage. However, he is a furniture lover and collects chairs, which he's dotted around the house as features

Eco interiors

When it came to heating, Joshua has chosen to combine the traditional with the cutting edge. "I knew I wanted to go log-fuelled, as the woodland can amply support my needs," he says. He searched the internet and found Welsh company Grey Metal, who supplied him with a woodburner, backburner and oven for just £650. "This heats two cylinders of hot water, one of which supplies the underfloor heating," says Joshua. "In the summertime much of the domestic hot water is provided by rooftop solar thermal panels from Navitron."

The interior finish is as original as the construction, and Joshua describes it as "neutral, modern design." Most immediately noticeable are the walls, which are finished either with birch plywood or with a product called Panelmox, which is pressure treated gypsum and wood fibre. "It's more expensive than plasterboard, but I didn't have to plaster and paint it. I just did it as a dry system, left shadow gaps instead of skirting and finished the edges with our own maple," says Joshua.

He sanded and painted the floor with a water-based acrylic varnish to look like poured concrete. "As a self



Useful contacts

INTERIOR WALLS AND FLOORS PANEL The Panel Agency 01474 872578
www.panelagency.com **BOILER, WOODBURNER AND OVEN** Grey Metal 01244 913320 www.greymetal.co.uk **LOCAL TIMBER** Duchy Timber 01208 872338 www.duchytimber.co.uk **BUILDERS MERCHANTS** Bradfords www.bradfords.co.uk
Travis Perkins www.travisperkins.co.uk **KITCHEN** Ikea www.ikea.com **GLULAM BEAMS** www.glulambeams.co.uk **ROOF MEMBRANE AND ASSOCIATED DRAINAGE LAYERS** Flexible Lining Products 01594 829297 www.flexibleliningproducts.co.uk **WOOD SCULPTURES** www.thecarvingworkshop.co.uk **ARCHITECTURAL EXPERTISE** ARCO2 01208 721000 www.arco2.co.uk **BUILDING SYSTEM** Eco Fab 01208 722000 www.eco-fab.co.uk **STRUCTURAL ENGINEER** Mathew Crompton www.cedcengineering.com



The Penk file

Owner Joshua Penk
Occupation Architecture student
Location Bodmin, Cornwall
Type of build Self build
Style Contemporary
Method of construction Lightweight post and beam on pad foundations
House size 220m² (2,368ft²)
Plot size 0.35 hectares

Land cost £35,000 in 1989
Build cost £81,800
Total cost £116,800
Cost per m² £372 (35 per ft²)
Date work commenced Preliminaries started in 2008, construction began in 2009
Current value £500,000 (including planning permission for an extension)

Build timetable



The plot has been in the Penk family for years. In 2007 Joshua decided to build on it. The site was cleared in 2008, and a planning application was submitted in early 2009, which was granted in May that year.

Schedule of the build	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Preliminaries	08	08	08	08								
Foundations				09	09	09						
Frame construction								09	09	09		
Roof structure & covering	10	10	10	10	10							09
Internal walls & doors									10	10	10	10
Floors, walls & ceiling finishes	11	11							10	10	10	10
Joinery & fittings	11	11							10	10	10	10
Plumbing & heating		11	11		11	11	11	11				
Electrics	12	12	12									
Decorating & kitchen	12	12	12								11	11

12 Work in progress by year and month

Total build cost breakdown

Elements of the build	Cost %	Cost m ²	Total cost*
Groundworks	14%	£53	£11,600
Main frame	13%	£47	10,300
Subframe (engineered joists & external shell)	9%	£32	£7,000
Internal frames & shell finish	9%	£33	£7,200
Wool & straw insulation	1%	£3	£600
Green roof	4%	£16	£3,500
External joinery	1%	£3	£700
Internal joinery	3%	£11	£2,500
Glass	12%	£45	£10,000
External cladding	1%	£3	£700
Plumbing & heating	8%	£30	£6,500
Solar thermal	2%	£9	£1,900
Electrics	6%	£22	£5,000
Kitchen	6%	£23	£5,200
Floors	4%	£16	£3,500
Wet room	3%	£11	£2,500
Paints & finishes	2%	£6	£1,300
Sub contractors	1%	£3	£600
Tools	2%	£6	£1,200
Grand total			£81,800