AUSTRALIAN HEMP MASONRY COMPANY

Newsletter issue 1, Winter 2023

Feature Build: Kin Kin

This 10 star-rated hempcrete home won the Master Builders Sunshine Coast award for excellence in sustainable living.

We talk with designer Andrew Webb about designing to combat climate change and the potential of hempcrete to transform the Australian building industry.

"Saying that a building is energy-efficient sounds technical and uninspiring, but what it really means is that the building is comfortable year-round with little or no artificial heating or cooling needed most of the time. "

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Retrofitting

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Research in the U.K assessed the benefits of 200 mm of hemp-lime insulation added externally to the brick walls of 3 styles of Victorian terrace dwellings with impressive results.

Research :

ARC Linkage Grant

The last year has seen the Australian hemp masonry company get underway with a 3 year research project with the University of Technology, Sydney supported by an Australian Research Council Linkage Grant.

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Hemp processing

Ashford Hemp Industries has a vision to establish hemp processing facilities across Australian regions, creating opportunities for primary, secondary and tertiary industries at a regional level, while reducing impacts on the environment.

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Builder's tip

Shane Hannan, of Hannan Build shares his tips for making beautiful hemp feature walls.

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Update on Tasmanian Hemp Association

Tours of The Bruny Island Hempcrete Homes
Tasmanian Hemp Association
Executive Officer Andi Lucas offered free tours of the hempcrete houses she built on Bruny Island.

tasmanianhempassociation.org.au

Feature Build: Kin Kin

Designed by Andrew Webb, director of WD Architects.

Built by Overland Design and Construct, led by Phil Schou, winner of the Master Builders Sunshine Coast award for excellence in sustainable living.

Andrew, what first attracted you to designing buildings out of hemp?

I have used most natural building methods throughout my career. The owners initially wanted a straw bale house...however, we were starting the Kin Kin build in early 2020 when Queensland had been suffering drought and the southern states had major bushfires, so straw bales were virtually impossible to find in the quantities we needed.

I had read good things about hemp building and it seemed to be a viable substitute in every respect.

Did you discover other values in using the material once you were drawn in?

The house was designed as 10 star-rated and this proved to be as easy to achieve with hempcrete as with straw bale.

Hempcrete is much more suited to conventional construction techniques, skills, and timelines.

The thermal performance of the walls was felt immediately, with indoor summer temperatures being well below the outside ambient temperature even before windows and doors were installed.

The Kin Kin hemp home you designed won the Master Builders Sunshine Coast award for excellence in sustainable living. What is the "lived" feedback?

The owners love the house. It was the feel and aesthetic that they wanted, with wide window reveals and soft, rounded forms.

The indoor air quality is excellent, passive solar performance is ideal.

How much value do you see in supporting Australian hemp farming and manufacturing, rather than using imported building materials?

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Hempcrete has the potential to transform the Australian building industry and increased supply is one of the major hurdles to help that to happen.

Hemp building requires no retraining or retooling, it results in a solid "bullet-proof" building which far exceeds the energy and air quality performance of conventional housing construction.

Like mass timber, I believe hemp could be astrong contender for improving the environmental performance, livability, and appeal of multi-storey construction as well. So there seems to be a good potential market.

The building industry has strong inertia to keep doing things the way they've "always" been done, but hempcrete is one of those good ideas that should have no barriers to wider adoption.

Hempcrete ticks so many boxes: environment, sourcing, aesthetic, acoustic, thermal, local, strength, healthy, easy, desirable, marketable, cost-effective.

How much do you believe designers can influence effective action on climate change?

Andrew Webb
andrew@overlandqld.com.au

The initial concept design is where the majority of cost and environmental impacts of a building start to be settled.

Designing to combat climate change ideally needs to start from the first "napkin sketch." It is not enough to add some solar panels at the end of the job; climate-responsive design can and should be so much more.

People need to be aware when they see "6-star" homes advertised as energy-efficient, that 6 stars is the very minimum thermal performance allowable; less than that and it doesn't meet building code in most climate zones.

Often times the 6 stars is achieved with legislated bonuses so the actual thermal performance of the house is even lower.

Saying that a building is energy-efficient sounds technical and uninspiring, but what it really means is that the building is comfortable year-round with little or no artificial heating or cooling needed most of the time.

That not only means lower install costs, it means lower running costs/lower power bills. It isn't hard or expensive; it just requires the will to do it; to get beyond "the way we have always done it."

The building industry needs to step up and lead the way by design.

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Builder's tip: Creating beautiful feature walls

interview by Tara jones

"The feature wall is one part of the house used to express the beauty of hemp, some are full walls, others are small like a truth window." Shane Hannan, of Hannan Build.

Where did your interest in making feature walls come from?

Being creative with hemp, looking at different tones, adding oxides to create bold statements.

I enjoy getting my work crew really involved with the process and taking time to tamp to an agreed pattern, and the clients reaction.

Oxbow Place feature wall, Hannan Build

Challenges are keeping formwork tight, washing off oxides between batches, keeping to the desired plan/pattern, making sure no hemp balling goes to the face.

The design inspiration for Oxbow Place came from the roof pitch and the natural tones of the hurd. Mannering Park the inspiration came from a Brett Whiteley calligraphy.

Helpful tips for creating feature walls;

- Try to use new formwork if possible (or very clean) for a better finish
- Wash off any oxide on form before adding a new layer, also clean pan mixer completely after oxide to help create bold lines
- Trace the pattern you are going for with chalk on the form
- If taking a few days to make, always vacuum or blow off any dry hemp, wet down and dust lightly with binder. This helps eliminate any day joints
- Tamp very neatly in a line or a wave
- Try not to take oxides to the end of the wall (just looks better)
- Fillet moulds are good to create borders, ie bevelling off the hemp and for creating shadow lines
- Over-tamp the face to create a smooth finish

Blue oxide ripple, Mannering Park feature wall, Hannan Build

Shane Hannan
hannanbuild.com.au

www.hempmasonry.com.au

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ARC Linkage grant

by Klara Marosszeky

Australian Hemp Masonry Company is the contributing industry partner and we're investigating Decarbonising built environments with hempcrete and green wall technology.

The project aims to develop an integrated prefabricated building panel solution combining green wall and hempcrete technology to address environmental problems associated with the use of carbon intensive construction materials, dense urbanisation, climate change and biodiversity.

The research will investigate a number of low carbon binder options including alkali-activated binders and biomineralization technology, as well as the use of glass waste to replace natural sand. Hempcrete green wall panels will be designed to be carbon positive, improve the thermal performance of buildings, provide better acoustic insulation, reduce the risk of mould proliferation, control indoor humidity and air quality and improve indoor thermal comfort.

Apart from this innovation work the project is creating the opportunity for us to gather comparative thermal and acoustic data as well as comprehensive data on indoor air quality in hemp in situ construction compared to construction with our hemp structural panels,

hemp/ green wall panels and brick veneer construction which remains the most common form of construction in Australia.

Later in the project we'll also get an understanding of whether retrofitting brick veneer with hempcrete, improves indoor air quality. We know from UK data that thermal performance is improved.

Getting ready for the roof to be put onto the first of the 4 builds happening at UTS, the Hemp build using cast-in-place or in situ construction.

Next hemp building workshops :

Online theory; 12, 19 & 26 October

Practical workshop; Cressy, Tasmania
11 November

Practical workshop; Sydney
25 November

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Hemp Processing: Connie Minos, Ashford Hemp Industries

interview by Tara jones

I remember filming you working on this farm back in 2011 and taking a photo of an old chaffer. What's changed in recent years?

Since then we've made a lot of improvements and we're really proud of what we've accomplished so far.

By 2018 we had developed a hemp processing system on our farm that provided good quality hurd for the building industry.

Ashford Hemp processor

We then focussed on modifying our processing system to one that could be situated inside a 40' shipping container, and after three years of further development we sold our first Ashford Hemp Processor to X-Hemp in Tasmania.

It was a great triumph for us. Hemp is a busy industry for us now as we grow hemp, process it on site, and manufacture Ashford Hemp Processors for other areas.

What was the opportunity you were trying to create and the vision you had?

We were trying to create an opportunity for ourselves and other farmers to access hemp processing facilities, enabling greater hemp production throughout Australia, particularly where more standard crops are not viable.

At that stage, the inability to access hemp processing facilities was a huge bottleneck to the industry.

Our vision is to establish hemp processing facilities across Australian regions which will create opportunities for primary, secondary and tertiary industries at a regional level, while reducing impacts on the environment.

For example, having an Ashford Hemp Processor in our rural area has enabled our family to stay rural, provide employment for five additional workers, and create local business growth utilising the bast fibres, hurd and fines products collected from the processor.

While our primary product is hemp hurd for the building industry, there are many exciting opportunities these hemp products lend themselves to.

Minimising transit between where the hemp is grown, processed, then sold is a key feature of this model.

A community using locally grown hemp to build local houses will be testament to this model

Connie Minos

connie@ashfordhempindustries.com

Retrofitting: Storing carbon, improving affordably and staying comfortable

by Klara Marosszeky

There's some pretty impressive data that's come from the UK that quantifies the benefits of retrofitting brick and block construction with hemp.

Undertaken by researchers from University of Plymouth in 2012 the modelling assessed the benefits of 200 mm of hemp-lime insulation added externally to the brick walls of 3 styles of Victorian terrace dwellings originally built between 1840 and 1918 with external solid brick walls 220 mm thick, single glazed and with loft insulation.

The study considered the values of carbon sequestration through the use hemp, the thermal benefits, the minimal waste to landfill and the potential to reduce occupant fuel poverty.

Based on the research the CO_2 produced in manufacturing the lime binder in hempcrete products is 0.427 $kgCO_2$ per kg of binder and the sequestration of CO_2 by hemp as -1.41 $kgCO_2$ per kg of hemp shiv. (Weight et al (2010)) with the net sequestration of carbon dioxide by the hemp-lime material varying with the density of the mix.

Using varying mix densities of 330 kg/cub m, 270 kg/cub m and 200 kg/cub m the research found net carbon sequestration rates to be 61, 85 and 108 $kgCO_2$ per kg of hempcrete.

Hemp retrofit, NSW Central Coast. Situated on a BAL 29 bush block on the Central Coast hinterland, what was originally a timber framed, fibre cement clad build with gyprock interior walls was retrofitted with hemp to improve thermal performance and fire safety.

External cladding was removed for the hemp to be installed and the gyprock was retained as the internal formwork and finish. The exterior was sponge finished with 10mm of AHMC Hemp-lime Render. As with all hemp builds the end result has been transformation into a thermally comfortable space.

Applying 200 mm of the wall mixture to hall to hall party walls, mid terrace and living room to living room party walls, the carbon dioxide sequestration was found to be 385, 212 and 352 tonne of carbon dioxide respectively.

The mean reduction in heat loss through retrofitting was found to be 2470 W per dwelling.The dwellings were modelled for the London area where the reference temperature is 18C, (CIBSE (2006)) and the energy saving was found to be 7517 kWh per year per dwelling.

The article concludes "assuming gas fired central heating, where 1 kWh gas heating produces 0.184 kg CO_2, Carbon Trust (2010), then the insulated dwelling provides a CO_2 saving of 1380 $kgCO_2$ per year per dwelling.

Assuming that 20% of the 3.4 million dwellings in London achieved this CO_2 reduction, the saving for the UK from retrofitting these buildings is 0.94 $MtCO_2$ per year. This represents a 5% contribution to the proposed saving of 17 $MtCO_2$ per year sought by 2050. If electricity is used for space heating in these dwellings, instead, then the potential saving is about 15%, since 1 kWh of electricity produces 0.544 $kgCO_2$, Carbon Trust (2010)".

(Griffith, R & Goodhew, S., Carbon and the Sustainability of solid brick walls with retrofitted external hemp-lime insulation, University of Plymouth 2012)