Monday, October 1, 2018

FmK Architecture was founded in March 2009, by managing directors Jason Fleck & Ronan McKee.
Since then FmK have went on to expand and specialise not only in Bespoke Dwellings & Extensions, they have also went on to specialise in low cost, low energy ECOHomes.
In 2013 managing director Ronan McKee decided to embark on his very own selfbuild ECOHome.
This blog will take you through all the highs and lows you can expect through the whole selfbuild process.
The blog will be written by myself; Ronan McKee, as I go through the entire process. Hopefully you will find it interesting, informative and enjoyable.
Please feel free to write your comments or share your selfbuild experiences also!!

Planning

Without doubt, the most dreaded stage of the selfbuild process!! I am originally from a farming background, and as such I always wanted to move back home and build on our land with my very own designed home.
With all the extensive knowledge of the planning process and particularly PPS21 (since it was introduced in Nov 2008) that I had gained through our practice FmK Architecture; – I thought I had enough of a chance to try for **Outline Planning Permission.**

Outline Planning Permission
So in December 2011, I submitted our Outline Planning Application. After many discussions, drawings, letters, phone calls, emails and some compromisingon my side, I finally got my site approved in February 2012.

The outline application process took just 3months, which I would add is faster than normal, as this can be anything up to 6months!
We have quite a good relationship with working with planning and put quite a lot of effort into our applications, and as a result, we receive quite speedy and positive results – see our planning approval list here

The Design
Without doubt, as a client and a soon to be self-builder, this is the most exciting and enjoyable part of the whole process!! Seeing all your years of wanting your own bespoke home; all your ideas, dreams, aspirations come to life on a page and then in a realistic 3d Model - it really is a brilliant feeling.
For me, as the designer and the client, I found it the most difficult!!
Trying to design a home of your own after designing hundreds of homes for other people.
I decided not to rush this process and just take my time, eventually, after many, many, many drafts and re-designs - i finally got there!!

3D Concept View - Front

3D Concept View - Rear

Photomontage of House on the Site

So, after I had finally managed to get to this stage it was down to the making the planning application for reserved matters - which is based on the rules previously set out by the Outline Planning Permission!
I lodged the application in October 2012 and that was it - the waiting game... the bit every self-builder fears - will it get approved??
Again, based on all the experience gained through our practice, I submitted a highly detailed application and I happy to report it received FULL PLANNING PERMISSION in just over a month later.

All be it there were a few issues and concerns along the way, but discussions with planning and again a few compromises it was all sorted.
I would like to add, planning service receive a lot of bad press when it comes to self builds, but with the knowledge & reputation our practice have gained, along with a good understanding and working relationship that we have developed over the years - we find the planning service and the application process relatively straight forward.
Our ethos at FmK architectures is really; if we think you have a good chance, we make a application - if we think you are wasting your time and more importantly, you hard earned money - then we don't make an application
This ethos has stood us well since PPS21 was implemented in 2008; as a result we have only received a handful of refused applications - these were mostly high risk applications which the clients were aware of, or ones which vital information was held back from us.

This has resulted in our practice enjoying a 98% approval rate to date!!
so;
Pheww...
A huge relief!! I can now relax; until i start the next stage - detailed drawings & a Building Control Application to the local council.

Building Control - Detailed Drawings

So, after receiving planning permission in November 2012, I set into moving the planning drawing drawings on, into more complex, detailed drawings; to enable my house to be constructed.
This process is often referred to in a few different ways; either detailed drawings, construction drawings, building control drawings or specifications, either way it's all the same.
This is the point where you have to make up your mind and make that all important final decision on what products, materials etc to use where.
Although during the concept design stage and also the planning stage we would have a fair idea of what the client would be using for most aspects of the build, there is lots of little questions to answer.
These can range from first floor construction of timber joists or engineered joists or precast concrete slabs. One of these methods must be chosen, and each method is detailed in its own specific way, and each method brings different pros and cons to your design.

Timber Floor Joists

Engineered Floor Joists

Precast Concrete Slabs

Another major choice is the heating system; Do I use oil? Do I use a renewable? Do I want solar panels etc. Like most things in life and particularly in a selfbuild project, it usually comes down to Cost! Money! Budget! The dreaded words used regularly through the building process.

Solar Thermal & Solar PV Panels

On top of these decisions, there are lots of junctions and details to be thought about, behind the scenes, by the designer. These go towards make your building what it is and how it will perform, both in comfort and efficiency; you will often hear Kevin McCloud from Grand Designs refer to the quote “the devil is in the detail”.
So again, coming at this project from two angles; as the client and also the designer, I had plenty to think about. This stage for me was the scariest. This was mainly because I was so afraid that a new technology may appear, a new product or material might come on to the market or even a totally new method of doing the same old detail would be developed, and I would have missed it, and I would be forever cursing myself for missing it, or not thinking of it. Unfortunately, I think even after the build is completed, I will still be torturing myself over these issues – the fear factor of doing something wrong or detailing something that could have been detailed in a fractional better way, this will haunt me for the rest of my days I think.
But the reality is, this is what happens, evolution, technological advances etc, so its all about research and development, constantly testing your methods, trying to rethink details and junctions, and in the end hope to come out at the front – or as close as possible.
In our practice, we constantly strive to better our designs and construction methods in order to achieve better performing houses, more efficient, more comfortable and above all more economic.
Our FmK ECOHomes range is at the forefront of this. We constructed and completed our first one back in December 2012, and are constructing our next one at present.

FmK ECOHome No.01

FmK ECOHome No.02 - under construction

Our first home was over double what the current building regulations were at the time of build. These regulations increased in Nov 2012 and as a result we decided to further increase our own methods to stay well ahead again.
We decided to bring in a specialist air-tightness company, to advise and train all our FmK team and all our FmK Approved Contractors, so we could move forward with buildings which are more air tight.

Why build air tight?

To put this in perspective; a standard home built to current regs, only has to achieve 10 air changes per hour – that's the volume of air in your home, changing ten times, every hour; so, ten times that you have to heat that air up. An airtight home built to the passive house standard has to achieve a maximum of 0.5 air changes per hour! Quite a difference? I would add that this isn't easily achieved, it requires a lot of detailing and thought out junctions and this is what we are trying to achieve on ourECOHome - Templepatrick
Why Build Passive / Passivhaus?
An indirect result of this training has now resulted in us deciding to open an online ECOhomes STORE, where our clients, contractors and the general public can purchase the airtightness products as well as other specialist products which we use but can be hard to obtain or source.

fmk ARCHITECTURE LOW ENERGY DESIGN

Another step we decided to take as a practice, was to undertake training to become Certified Passive House Designers, but I will talk more on this later.

On Site – Construction (this is where the fun starts!!)

The building control drawings have been lodged to the local council and have been approved, so I can now set about getting on with the works on site.

Being a selfbuild which I am overseeing and carrying out some of the work myself, I won't be using a main contractor on the job. I will oversee sourcing and ordering materials, as well as the different trades at the different times.

A main contractor is an excellent way of doing a selfbuild, you get a fixed price and you know where you stand. You also have the hassle free benefit when you use a contractor, as it is they who sorts out all the aspects of the project, you just have to make some small decisions on windows, positions of appliances etc!!

The other side is you must pay slightly more for this peace of mind, hassle free method of doing a selfbuild. I have chosen to selfbuild myself, as firstly I relish the chance to get my hands dirty and get stuck in where I can, while also being on site to make sure everything is done to the high level I am hoping to achieve. Then normal factor here also applies – Budget! I am also doing this as it's the only way we can afford to do a new selfbuild home., as I said, always comes down to money…

Clearing the site

March 2013

The first step was to hire a digger and driver and get the topsoil stripped back off the site:

The site was then filled up with hardcore and loose fill, around the perimeter of the site, while also being used to construct the lane/drive way into the site. The loose-fill around the outside of the footprint where no building taking place, then the hardcore used inside the footprint where founds will be needing dug.

Once the hardcore stones have been laid where the footprint will be, the site is now ready to be marked out.

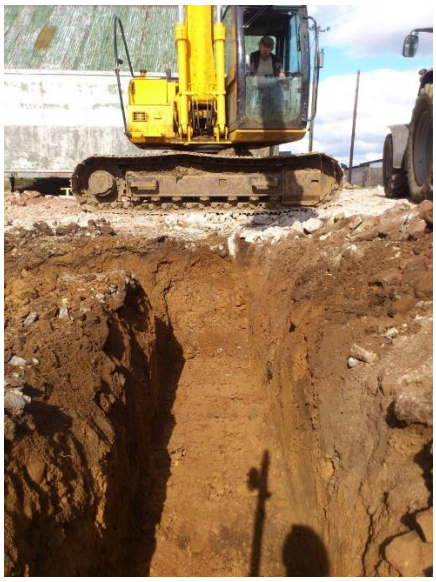
This can be done by using the traditional method of lines and cross-bars; or by using the more modern method of a digital theodolite.

I opted for the digital method as my footprint has quite a lot of out-shots and corners. Using the theodolite meant I could get it marked out quite easily and accurately.

I could have still marked it out using the lines & cross-bar method but this would of taken a lot longer and meant a lot of lines and parallels being pulled and can increase the chances of human error.

Firstly, the main external corners are marked out, then from these you can find all the necessary internal walls. When marking out initially for the founds, the centreline of the wall is marked out. A bag of lime is used to mark out all the wall lines and the digger can take it from here.

The digger then digs out each wall, lining up the centre of the digger bucket or jig of the digger, with the white line on the ground. This process is repeated until all white lines are replaced with dug out trenches.



This usually could take at least a full day to dig out but obviously depends on your site conditions, size and shape of house and storing of the excavated material. I got mine all dug out just in time as the sun was shining as we were digging and we enjoyed a lovely dry site; this was quickly replaced with Snow the next day!!

The next step then is to insert steel rods into the centre of all the foundation trenches. These are hammered into the earth to a depth of 300mm (foundation depth) above ground level, starting at the highest point of any of the trenches. Then using a laser level, taking the level from the first steel rod, and inserting the next rod until it is level with the first. This is repeated until all the trenches have been covered. The foundations are now ready for the concrete!!

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So, the first actual building onsite, the first material being installed; concrete! The steel rods act as markers for pouring the concrete, idea being; when the marker disappears, you have a min of 300mm thick concrete installed in the foundation.

An easy way to install the concrete is to use the same digger bucket, but put on backwards, so the bucket now acts in reverse.

The concrete is then distributed by the digger around founds and is then levelled by use of the good old fashioned shovel; powered by man I'm afraid!

It is now the 27th March 2013 and once all concrete has been poured in the founds, we await it to cure and harden and ready to start building the footings. In my case i left it approx. a week and started the blockwork.

So on 01st April 2013 I started on site with the footings. Before I done this I got the external corners of the walls marked out on the concrete founds again. Previously I had the centre lines all set out for digging; this time round we set out the external corners for building by hammering in a nail at each corner into the concrete foundation. The builders then use these nails to set out the wall lines.

In my case I installed a row of Quinnlite thermal blocks to the top of all my walls to minimise the cold bridging effect from the ground up into the walls, this is for all internal and external walls. This is probably a bit of overkill in this detail, but I wanted to maximise where i could. We use a slightly different detail for all our Low Energy designs, but which is more cost effective but has the same effect.

By using them the way i have, you need to paint the external face of the Quinnlites with bitumen to stop them from absorbing moisture from the earth. This only applies to areas where the blocks will be below ground level.

So a few weeks on and my footings are complete. I am now ready to back fill with hardcore and install all the internal drainage. So firstly, the internal rooms are filled with course rubble/stone and compacted every few inches. As you build it up layer by layer the stone gets smaller. Once you get to the desired level, small stone blinding is used and compacted very thoroughly; the more it is compacted, the less the chance of cracks in your subfloor.

Any rooms which require drainage; bathrooms, kitchen, utility etc, these all need the drainage pipes installed prior to the blinding being installed. Each point has a small upstand which should be slightly above the future finished floor level.

July 2013 and i am now ready to pour my concrete subfloor.

Before we can pour the concrete, the DPM (plastic membrane) layer must be installed, which covers the entire foot print link a large black blanket.

Its now the morning of the 11th July 2013, the sun is absolutely beaming down and some final tweaks to the DPM layer eagerly awaiting the arrival of the first load of concrete!!

After a hectic few hours of pouring, levelling and tampering the floors are complete.

As it worked out I was half a metre of concrete short as you have to order in lorry loads and work out how much you may need, I was half a metre short in the end, so I had to make some quick arrangements to go and get some more to finish the job! In the photo below, you can see the join where we were short as it was tampered in a different direction, but I would add this is no problem at all in the end result.

So floors all in, sun is blistering away and I had to keep a tight eye on so as not to dry out too quick or it may lead to cracks; hard to do in 30deg heat!

Superstructure

It's now the twelfth holidays and I got stuck straight into the building work.

This stage is one of the quickest and most impressive as you go from nothing to a building shape or form in very little time!

I decided to go with Quinnlite thermal blocks on the inner leaf of all my external walls. They are a bit more delicate to work with but they are 4 times as thermally efficient as a normal concrete block. They are roughly twice the price though, but you only need them in the external walls, so overall, across the entire footprint, it's only a few hundred; and in my opinion, well worth it!!

I decided to use an extra wide cavity of 200mm, and therfore required to use specialist suitable wall ties. The Outer Leaf on the left of the picture above shows the Concrete Block, the Quinnlite Thermal Block on the inside shown on the right. The 200mm cavity is between and the Qwik-Fix Thermal wall ties

are shown between leafs; we supply these thermal wall ties through our ECOHomes Store at www.ecohomesni.com.

Some openings require specialist lintels to be used instead of normal concrete lintels; such as gothic windows or corner windows. Here you use steel lintels.

These are measured on site to suit your openings.

As I have an extra wide cavity of 200mm, I decided to use these steel lintels in all my opening across the entire house. This was an added expense, but at the time, it was better than using an additional concrete head to reduce the

space above the windows and close the cavity; as this reduces how much insulation you get into this space.

After installing these, and once my build was near complete, I realised these created a very small tiny cold bridge through the steel lintel from outside to inside. This prompted me to investigate a completely new detail to combat this problem.

We have now came up with our own FmK Thermal Detail for heads, and it's this detail that we now use on all FmK Designed Buildings. Too late for me, but its through your mistakes that you strive to do better!

I would also add that you can now get a thermal steel lintel which reduces this cold bridge. If I was to do again, I would use our FmK Detail, then in specialist openings, I would use the thermal steel lintels.

From starting the superstructure, the walls fly up in comparison to the early stages! Suddenly rooms appear and you start to get a sense of the whole building. For me I could visualise this from the beginning anyway, but this is what I do every day, so is easier for me. For people doing a selfbuild, and my other half; you can see why this is such an exciting stage of the build!!

First Floor

I'm now a level higher and start to see my first-floor view, brilliant! Intermediate floors can be done in a variety of ways;

Standard timber floor joists

Precast Concrete Floor Slabs

Or Engineered timber floor joists

I decided to go for the later. We use these engineered joists quite a lot on our projects as they offer a option that has benefits of both the other two options. They can be sized for strength, have a service void and no waste, not to mention speed due to off-site manufacture!

Engineered floor joists can span large distances, are made to suit each project so no waste, and have the benefit of being hollow so can pass services through the void space.

If you want, you can size these accordingly to carry a thin concrete floor screed also, so they are just like a solid concrete floor, on your first floor.

Basic timber is the cheapest option, but has more labour, more time and more waste.

Concrete slabs is the most expensive, has specialist installation required and also needs additional work to cater for services; but they do present the best option for sound and a solid floor. The choice depends on the client, their lifestyle and what services they will be using.

I went with the engineered joists with just a 22mm timber floor covering, no screed on first floor, but that was just my choice.

An important detail when installing your intermediate floor is to think of air tightness. Again, there is a variety of ways to do this and at FmK we have our own detail, used on all FmK projects. My joists are installed on hangers and the wall is covered with a scratch coat of plaster before the joist is put in place to insure the bare blocks are sealed.

My main lounge I went with a different chimney breast just as a feature, this is sometimes referred to as a "Bee Hive" Chimney.

As previously mentioned, the thermal blocks are only needed on external walls, areas where the walls are internal walls (between two heated room, usually 100mm thick) ordinary cheaper concrete blocks can be used. Basically, you don't loose heat between two heated rooms.

This applies also to the space above the thermal envelope, ie your attic. If your attic is a cold, unheated space like my house is, you can change back to concrete blocks above the thermal ceiling line and again save money.

The next photo shows the forming of a chimney. The flue projects as it extends upwards, the outer concrete blocks from the visible chimney breast, the space between is filled with a mix of cement and vermiculite, which expands when heated, thus absorbing any heat from the flue, when the fire is lit.

At eaves or wallplate level there is quite a lot of options as how to detail this and close the cavity. I went for a DPC cavity closer which maximises how much insulation you can get into this area which is often overlooked and therefore creates a week spot; a common problem even if you build to regulation standard.

It is easily remedied and one detail we have also combated by our very own FmK Thermal detail specific to each roof type and project.

Roof Construction

In any selfbuild, it's great to get to the watertight stage; first protocol is get your hat on! In other words, get the roof on your house. Again, options here to choose from.

Cut Roof - where a joiner builds the entire roof structure from single pieces of timber.

Or

Trussed Roof - where a truss company manufactures the structure off-site and then is just set on to your build.

Both options have pros and cons like most choices, and are specific to the project. Cut roofs have more labour, time and waste associated, but have additional space benefits in the attic; BUT may require the use of steel as support which is very costly!

Trusses because they are made off site can be set straight on, no waste and usually no steel, or very limited use of steel.

For this part of the build, I opted for the Trussed Roof method as it presented the fasted cheapest method for me and the speed is a good thing to factor in if you want it closed in quickly weather-wise.

The photo above shows the first Truss set on, resting on and fixed to, the wallplate (previous picture). You can also see on this photo where i have changed from building with the thermal Quinn-Lite blocks, to ordinary concrete blocks. This is because this is above the insulation line on the flat ceiling, therfore the thermal blocks are provididing no benefit; therefore, there is no point installing them when they cost twice as much as a standard concrete block.

Another benifit here of the thermal block, is that it prevents a cold bridge on the inner leaf from travelling from the "cold" attic space down into the "warm" heated space. This is where a cold bridge occurs via the internal leaf which can by-pass the thermally insulated zone - also know as a thernal by-pass. By installing the thermal block above this point - this significantly reduces the risk of this happen, almost fully preventing it; mainly due to the Quinn-lite block being almost 4times more thermal than a standard concrete block.

After all the trusses have been spread out, they are spaced, plumbed and braced into position.

This photo shows how this part of the roof structure looks when complete - You can see the bracing at ridge level, diagonal bracing in the middle and more bracing on the flat at the bottom - she's going nowhere now!

Here you can see the allmost all the roof trusses spread and braced. The LHSide shows the bunch of trusses for this zone, stacked vertically against the gable awaitng being spread out and tied to the other main roof.

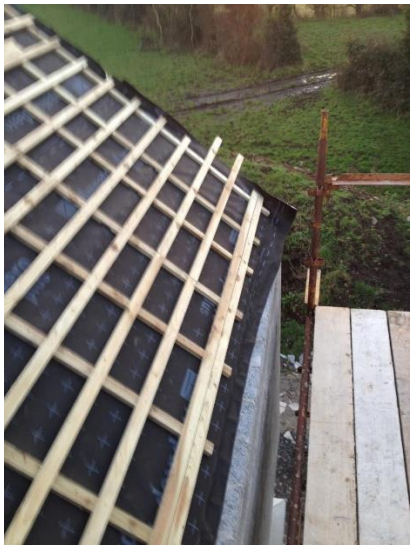
With the roof structure mainly complete, I can turn my attention back to the bricklayers. Next job is to extend the chimney up to lead-flashing level for water-proofing; this can now be determined from the height of the trusses or where the two intersect.

This picture shows the lead-trays ready to be installed. These can be pre-ordered and made off site, or can be measured and made on-site by specialist companies. This tray basically sits on top of the chimney stack at the roof intersection, with the flue circle positioned to fit inside the flue, and the outer lip designed to turn out over the edge of your chimney stack. It has also been painted with bitumen to help improve the seal and aid waterproofing.

Now the lead is installed, the chimney stacks can be extended to the required height - there is a minimum height for this, but can be increased further for appearance if you wish. Once at full height, a dip is installed and the precast chimney coping is lowered on by crane or a telescopic handler; or if light enough, can be lift and laid by hand - though I wouldnt recommend the later!

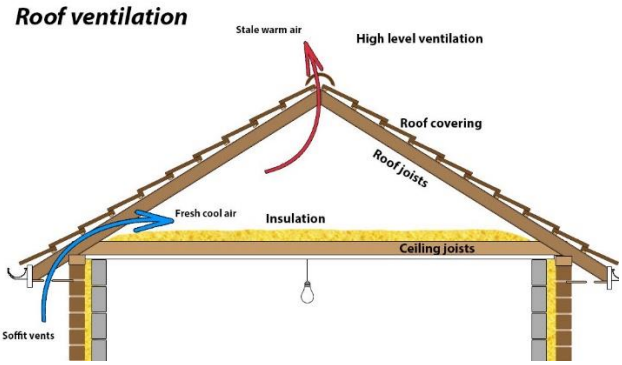
Next, the flues are extended to suit your desired chimney posts

Both chimney copings installed and completed - luckily with plenty of help, we got them done just before dark! Looking Good, another happy milestone reached.



Now that the Chimneys are more or less complete, we can revert back to the main roof and getting it made watertight. This stage is know as felt n lathing, and a hugely important stage - by getting the at least the "roof of the building" watertight will help to speed up the next job inside.

Most dwellings just use a basic "breathable roofing membrane, then install the timber battens across and then the roof finish of slate or tiles. In my case, I have went for a a differnt approach, I will be using a "Wind-tight roof construction" (click for more info).



The image above shows a basic ventilated cold roof. Cold air is forced in at the eaves and out at the ridge. While this is effective and works well to ventilated the roof structure, it also provides a "wind-chill effect" on your insulation. Basically when you install your insulation, you are hoping for the insulation-value the manufactures state, however, but ventilating the roof and creating the wind-chill, this insulation value is reduced.

To address this problem, you create a "Wind-tight roof construction" (click for more info). This is where the roof membrane on the outside is completely sealed to the builing, so at eaves, verge, ridge, valleys and any penetrations

suchs as rooflights and chimneys. The roof is then insulated along the slope, with an air-tightness system installed below (I will discuss this in more detail further on in the blog). This then creates a "breathable construction sandwich" from inside to outside with no need for the ventilated eaves and ridge, and most importantly, no wind-chill factor on your insulation.

The photo above shows the the wind-tight roof membrane (black Ampatop Aero-plus), with counter battens (required when doing wind-tightness) and then the normal primary battens - this full roofing system can be fully supplied by our sister company, ecohomesstore.co.uk, which can help with any queries you may have.

The Aero-plus membrane is a Triple-layer, extremely tear-proof PP fleece with coating. it also features an integrated taped/self-adhesive joint. Simply align and over-lap the membrane, peel off the cover strip and stick the joint - easy!

The photo above shows the roof-chimney junction. Here the membrane is turned up the face of the chimney below the lead and taped to the masonry to seal the joint, the lead is then turned down over and ready to salting/tiling. The masonry firstly recieves a primer (blue-glue creating a fully-adhered bond), which then after left to go tacky, will join the wind-tight membrane to the masonry using air-tight tape.

Primer applied and left to set/ "go tacky" - ready for taping

Roof membrane fully sealed to masonry and creating a fully wind-tight seal around the penetration.

The completed chimney with the lead flashing around, covering the wind-tight junction. It is important when creating a wind-tight construction to ensure all joints, penetrations, gaps and holes are taped and sealed. The photo above also shows an overlap in the membrane which didnt have a sel-adhesive strip, so this was manually taped and sealed using wind-tight tape (res & white XT60 Tape).

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The completed chimney with the lead flashing around, covering the wind-tight junction.

This shows the junction where a valley meets the chimney. The membrane runs across to the valley with a over-lap lip or flap left hanging.

Another strip of membrane is then added to the valley.

The lip or flap is then turned over the top of the valley strip and taped.

Again this is taped using the XT60 Air-tight tape with a peel-off strip to help with the installation.

Simply peel off a small section of the strip...

And stick to the membrane joint, continue until all joists are fully sealed - preferably on a dry day as the tapes will stick better!

Again, seal around the chimney and where it meets the valley

Taping both sides of the valley, both overlaps

The finished job - nicely taped and sealed - nice and wind-tight!!

Once all taping is complete, it can then be flashed with lead

Some nice lead flashing at the valley - ridge by my roofers - done a great job!

Now that the junction of the roof is all sealed and flashed, you need to get the chimneys rendered before the rest of the roof is covered -

this is to prevent any mortar or render from spilling on the roof finish. So stop-beads installed and scratch coat applied.

Once dry, the final render coat can be applied - this can be rubbed up smooth like mine, and later painted, or use a pre-coloured render like K-Rend, or dashed with stones or chippings. Obviously as this is a render - you have to work to the weather. As you can see from the back ground of all my roof photos, this was around the time of Christmas 2013/ January 2014 - one of the wettest Christmas's we have ever had - not great time to be doing a roof, or rendering for that fact! Never-the-less, we prevailed on and got wee bits done here and there in between rain showers, chancing our arm!

DISASTER STRIKES!!!!!!

Unfortunately, the weather was against us; prevailing winds, rain and even frost, all eventually took their toll and the outcome was some of the plaster falling off.

Nothing for it then - only to chip it all off (by hand-hammer and chisel) and start again!

Here you can see the completed re-rendered chimney. This time I'm taking extra precautions and covering the chimney with a plastic cover to give it a better chance!

Thankfully the cover worked and done its job, so that's the chimneys complete which means we can now proceed on to the next stage; installing the chimney pots. Here you can see the chimney coping has a kind of hollow centre to allow for the flue and post to extend through. In my case I had to adjust these to allow for my specific pots.

Here you can see we have chosen a more ornate, detailed style chimney pot; these are called "octagon pots" and come in different sizes, styles and shapes (and costs!). There are lots of styles out there to choose, you can go for plain black round pots, or tall detailed terracotta pots. We just choose these as we had always liked them. So, that's the chimney complete; stepped-out base, chimney rendered, profiled coping in place, and pots fixed in position. one thing you can notice up here is that you can also see is the background, to the left, just how wet it was this year with all the flooding in the fields - the worst reordered flood ever for this area.

Back on the ground then, we can get moving with my natural stonework parts of the house. I have stonework in three separate locations; the main front porch, the feature gothic window to the hall/stairs & the feature bay-window to the dining area. Here you can see the stonework starting below ground level at either side of the porch opening. This will extend all the way to roof level with a self-supporting stone gothic shaped arch, matching the gothic shaped steel lintel behind, which supports the masonry of the cavity wall. You can also use man made stone-effect blocks; which is basically block shapes, with a stone effect face, usually with a repeating pattern.

There are other options for this to suit what look you are after and of course what your budget is like. Another alternative is natural-stick-on stone, which is a lot faster to build and doesn't require any foundations.

Another option is stone-effect plastering, which the plaster is applied to the wall, the stone shapes drawn on, then once hard, the render can be coloured to the required colour/style of stone you are after.

Now that I have my chimney complete, I can get the roofers back, to get on with the slates, and get my roof finally finished!

While the roof is being completed, I can move things along in terms of getting closer to ordering my windows & doors and get the house water tight. First thing is to get my door thresholds set; this is the structural part that the door rests on but gets covered up as it's usually below floor or ground level.

Normal practice here is to just use a basic precast concrete head of door-block. This is a terrible detail though as this creates a huge cold-bridge; this basically means a cold part/junction/detail that will draw & absorb the heat from inside the house, and dump it or lose it to the cold outside air/ground etc, so the warm heating you are paying for inside, is dissipating and being lost to the outside through these cold areas around the house – there are loads & loads of these if nor carefully detailed out.

There are expensive thermal-bridge free products on the market for this junction, be we have come up with our very own cost-effective thermal detail of how to construct this. Basically you form the shutter/mould for each of your doors; the height of each threshold depends on the depth of the door frame, how flush it is to the floor finish or if it's a level-access for example.

The shutter is then filled with a thermal concrete mix. This can be made using ordinary concrete mix, mixed with vermiculite (used in and around chimney flues to contain & absorb heat), which then when hardens; forms a poured thermal concrete door threshold. Nice one !!

2017 update; we now use an off the shelf product for this junction, called Compacfoam, which is like a structural insulation, costing around £30 per door

See https://ecohomesstore.co.uk/products/thermal-bridging

Another common problem area in terms of a cold-bridge, is steel corner posts in corner windows, or bay-windows. Here you can see my 80x80mm steel post in the corner, which normally would get covered by a PVC sleeve, coloured to match your windows. This then hides the post, then your windows simple butt against it. So, if you think about it, if you buy the best, passive certified windows on the market, you still have a steel post on the corner, no insulation, no protection, no nothing – just a huge cold spot in the corner – not good!!

I didn't want this problem, so I came up with a detail where we wrap the steel post with a super-skinny, 10mm thick super insulation called "aerogel". It's an expensive product, but you only order & buy the exact amounts you need; eg 100x2400x10mm with a foil back edge. You then stick a piece to all 4sides of the post, and then tape the exposed edges/corners with foil-backed tape.

As an added extra, I painted the post with thermal-paint prior to the insulation, just for extra belt & braces. I don't know if its scientifically proven to make a difference, but for all the cost it was, I thought I would do it as I have no fewer than 5no. Corner posts to cover!!

The post comes a grey painted colour, while the thermal paint is a green colour once dry. The aerogel is a grey colour insulation, which is a very odd product. It dries you fingers when touched & if you were to drip water on to it, it would bead and run off!

***2016 update; we have redesigned the corner-post detail with the steel lintel suppliers so the post is now on the inside of the windows, and therefore doesn't need to be wrapped with insulation. this is a much improved detail, & doesn't cost anymore to construct**

Here you can see the aerogel on two sides, with the green thermal painted post between.

The finished post with all 4sides clad in aerogel insulation. The corners just need taped & that’s it all nicely warmed up..

fmk ARCHITECTURE LOW ENERGY DESIGN

The windows guys can now come & measure their PVC sleeve to fit over & around my insulated post.

This shows the finished cured thermal-concrete mix which now forms my door threshold.

Woohooo – windows have arrived!!! Not a great day for them, but who cares!!

I have went for Baskil's or Munster Joinery's Passive Certified Triple-Glazed windows – this was an absolute no brainer for me. When it comes to low-energy * passive homes, triple-glazed windows are a must. The benefits you get with triple glazed is brilliant. The soundproof qualities are brilliant, especially for me living on a farm. The heat loss & heat gains when compared to double are fantastic and the main benefit; the inside pane always stays in or around the same temperature of the room, whereas on double glazing, the inside pane is much, much colder, which leads to heat loss & the effect of draughts at windows..

First they apply a moist putty-like rubber to all the window sills

Bi-fold doors fully installed. Foamed in place and fixed with metal restraints around the bottom, top & side reveals

The view from the outside; bi-folds doors to the living area, double doors from the upstairs den (to future balcony) and corner windows in kitchen

Now that all windows have been installed, I can now start to construct the external steel balcony structure

Here you see the two steel posts which carry the main weight. They are fixed to the edge beams around the outside creating the first floor balcony area.

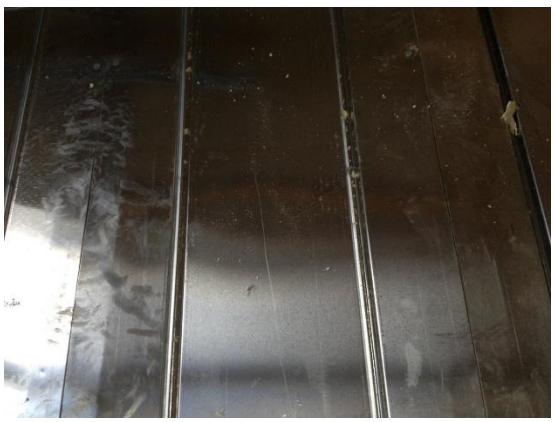
Above then has the two eaves beams & ridge beam which meet the apex lintol on the outside face. This will then create an outside balcony area, with open-vaulted ceiling

Back at the stone work at the front porch; things have been progressing well with the stone arch starting to form. This was done by getting my joiner to make a timber template. The stone mason then measures and marks out how he wants to shape/size the stones to make the self-supporting arch

WOW – that's all I can say!! The completed self-supporting arch with the stonework up to roof level above. To the right you can see the finished stonework around the gothic window in the hall/stairs, while on the left you can see the almost complete stonework around the bay-window to the dining area.

Ok – so one of my first after-thoughts of the build. Originally we were opting for some sort of renewable heating system (defo not oil), with underfloor down stairs & just basic radiators upstairs. After more in depth research & discussions with heating engineer; it was more advisable to install underfloor over the two floors as the efficiency would be better.

Unfortunately for me, the best way to do this is have the pipes within a floor screed, on top of the first floor structure. As I was using engineered joists, these can be designed to take the weight of a floor screed and so the pipes can be installed. Unfortunately for me when I had decided on this option, and contacted my floor joist suppliers, they had already my order in production, so was too late to change and up-spec them. The first of many learning curves – one which has served us as a practice well, as we can now inform our clients of these things at a very early stage of the design so they have lots of time to decide.



So what that means is I had to look at alternative ways to install my underfloor. This option here is small aluminium trays fixed between each joist and which have two groves for the pipes to be pushed in. the flooring is then installed over the pipes and trays and there you go – underfloor done..

Underfoor pipes looping around at each end to form the heating loops for each room.

The next big stage then is fitting the MVHR system (Mechanical Ventilation with Heat Recovery), as well as the roof insulation and also the hugely important Air-Tightness system; consisting of Air-Tight Tapes and Membranes.

Here a piece of membrane is fitted prior to the stud wall going up to make air-tightening this area a lot easier later on; so basically easier to join up and with less materials used - ie forward planning! The sequence is one of the most import parts of achieving a simple air-tightness solution.

You can also see the red pipe which is part of the MVHR supply/extract ducts; again installed prior to the stud so it can incorporated within the wall structure

Here you can see some of the white ridged-ducting part of the MVHR system, fitted prior to the insulation. All joints in the ducting I have taped with air-tight tape and the ducting is also wrapped with a foil backed insulation to prevent heat loss.

I made the rafter parts of my trusses quite deep; 225mm in total. As I used a wind-tight membrane on the outside of the roof, and going to be using and air-tight membrane on the inside of the house; this means I can full fill the rafters with insulation, with ventilation gap required (usually 50mm).

I chose HD Glass Mineral Wool insulation as it's a lot easier for me to fit, will fit (squeeze, squish, bend etc) into place a lot easier than say foil backed insulation, which to be done correctly, needs to be cut mm perfect for each individual place – which in the construction industry doesn't really happen. So this means all these gaps, spaces and holes you have in an around the insulation is all heat loss spots which leads to draughts and higher heating – no thanks!

Air-Tight tape to all the ductwork joints, with foil-backed insulation wrapped around all ductwork, which will then get buried within the main ceiling insulation.

The ducting is then left to stick down into the room below, which will then be trimmed off flush before the valve cap is fitted. All ends must be taped up now to prevent dust and dirt getting into the ductwork system while the house is being constructed.

Here you can see my SVP (Soil Vent Pipe) roof vent. I, like many of our clients do not want an ugly SVP attached to the outside of the building, and especially on a two-storey build, as this becomes quite tall. We combat this by designing it out; all SVPs are internal and the pipes go to roof level where they attached to the roof vent.

In this case, as I have a wind and air-tight system, so all outlets, penetrations and pipes must be taped to prevent both moisture and air infiltration. So a few small strips of air-tight tape and all is nicely sealed up before the pipe work is installed.

So here is the finished project!
My own self build!