

Episode 230

What is lime render? – with Martin Brown from Best of Lime

The show notes: www.houseplanninghelp.com/230

Ben: We often start these interviews by asking for a little bit of background about you.

Martin: I'm a decorator by trade. From the late Eighties, I worked with my father in the family decorating business. We specialised in handprinted papers and worked a lot on traditional buildings. That led me into an interest in lime plaster, wattle and daub, timber frames.

From there, I followed that into lime plaster with a particular interest in some old, traditional mixes that have been lost. And then eventually, led me to set up Best of Lime and we've been doing that for four years now.

Ben: What is lime?

Martin: Lime is burnt calcium carbonate. So, chalk, limestone, shells can all be fired in a kiln to make quicklime which you then slake and use as a binder. So, lime is a binder.

Ben: Where does it come from?

Martin: It can come from a number of places. It's not hugely commercially available. France have got a long tradition of manufacture. The Bordeaux area of France is a big producer of lime.

In the UK, hydrated lime is made in large quantities, mostly around the Buxton area. So, limestone. There's also Singleton Birch in Lincolnshire which is more of a chalk lime.

Ben: What are the differences between render, mortar, all of these things that you can do with lime?

Martin: As opposed to modern materials?

Ben: Go on then. Let's head down that route.

Martin: I suppose going back to the beginning of what lime is, using calcium carbonate to make the binder uses a lot less energy than to make cement. Cement is fired at thirteen-hundred degrees, lime between nine-hundred and a thousand. So, there's about twenty percent less energy used to make lime as a binder, so you've got that sustainable side to it.

The aesthetic side to it, it's a lot more attractive visually than modern materials.

It's breathable so, it creates a healthier environment. Twenty percent of our housing stock in the UK is pre-1914, often solid wall construction, so it needs to behave differently. The moisture in the house needs to move through the fabric of the building and sand, cement and modern plasters inhibit that whereas lime allows free transport of moisture through the building.

It's more flexible.

Ben: This is something that's been used for a long time, isn't it? How far back does it go?

Martin: Mesopotamia, certainly. I think you could probably trace it back seven-thousand years.

It's had lots of things done to it over the years, lots of tweaks and additives that make it perform differently, but basically it's the same material, seven-thousand years plus.

Ben: Often you add something to it when you're using it as a product to render on to the side of buildings. How has that changed historically?

Martin: The Romans, who were particularly good at this, used something that's classed as a pot porcelain which is basically any fired clay. If you add a fired clay to lime, you speed up the set. You effectively have a hydraulic set, so a reaction with water, as opposed to an air set, so just absorption of carbon dioxide. So, it changes the physical nature of the binder.

Lots and lots of things done over the years. I've got a book at home from about 1830 with lots and lots of recipes in that include bone ash, urine, beer, cheese ...

Ben: Horse's hair as well? That was one, wasn't it?

Martin: Yes, animal hair is a reinforcement. You find a lot of horse hair, but particularly cow hair. Certainly, in the East Anglian plasters, the chalk plasters, there's lots of cow hair.

Ben: You have got into coming up with your own mixes. We had a little talk before we started recording. So, how did that come about?

Martin: Mostly, a particular obsession with a plaster that's found on East Anglian timber frame buildings. I probably know more about it because I live in East Anglia and most of our buildings are timber framed.

Building with green oak throws up a very serious problem, which is background movement. If you use sand and lime on a green oak frame, the frame will twist and shrink, and the sand and lime will crack and fail. So, this was obviously known about in the sixteenth century and a particular mix was used which was lime and chalk. So, there's no sand in it. Lots of cow hair, and what that does is give you a mix that's very, very flexible and very bendy.

You can also use it very thick. So, pargeting is a particular art in East Anglia. Heavy relief pattern work on the outside of buildings.

It very quickly dawned on me that this mix worked a lot differently to a sand mix. You could do a lot more with it. You can also put heat on it, which you can't really do with normal sand mixes. You can use it in hot weather, you can use it in relatively cold weather.

It had a lot going for it, so I've been slightly obsessed with that for twenty years and that's got us to certainly the lime coat which we can put on three inches thick or put a thin skim on and put it on red brick in July this year, south facing, which I think the plasterers were suffering more than the plaster.

Ben: Let's talk a little bit about plastering as a trade. Did you mention that that's what you did?

Martin: No, I'm certainly not a plasterer. I'm a decorator by trade. But I own my own trowel.

Ben: That's fair enough. I remember chatting to Mark Brinkley who comes from your neck of the woods, the Housebuilder's Bible, and he said he's done a mixture of all of the trades over the years, but plastering is one of the toughest ones and he doesn't touch it. So, why? What skills do you need to be a plasterer?

Martin: It's physically hard work. You're spending a lot of time working over your head with heavy, wet materials. It's probably one of the hardest parts of the whole construction.

Lime itself, a lot of plasterers don't like working with lime. It's seen as a bit of a dark art. There have been a lot of issues since the reintroduction of lime because it's been finding its way as far as mixes and workability go, and it has been difficult work and there have been a lot of failures.

Ben: Reintroduction I heard you say.

Martin: So, as we mentioned earlier, lime has been a building material for seven-thousand years plus. The introduction of Portland cement and gypsum plasters mainly in the mid-twentieth century, effectively took lime out of the equation as far as building goes.

Ben: Almost completely?

Martin: Yes, pretty much completely.

So, even important conservation jobs in the Seventies – St Paul's Cathedral, buildings like that – sand cement was being used, albeit weaker mixes but they were still being used.

Then a number of people in the Eighties – John Ashurst being one of the leading figures amongst them – reintroduced lime as a conservation building material. And it's been a learning process since then.

Going back to the problem with timber frame buildings, three coat sand and lime is still regularly specified for timber frame buildings and there are a lot of problems associated with that. Part of the reason for that is that when the initial work was being done to reintroduce lime, old textbooks were used to look at potential mixes. But most of those textbooks are Victorian and the Victorians weren't building timber frame buildings, they were building nice, solid, stable brick ones. And the timber used was slow grown Baltic fir as opposed to green oak.

So, since the reintroduction of lime, I suppose there's been a fine tuning and an understanding of different materials for different jobs and different exposure levels.

Ben: Does it work best with timber frame or can you render on to any build system?

Martin: We're happy rendering on to anything. We're mostly involved in building conservation but as we're sitting in a nice, brand new ...

Ben: We're going to talk about this, yes.

Martin: Brand new, sustainable build, I'm very keen on being involved in that. So, we have to deal with a lot of modern backgrounds, a lot of the boards, the wood fibre boards, wood wall boards, lightweight clay blocks, thin joint clay blocks. Right through to wattle and daub or clay lump clunch, all sorts of real traditional – reed as another one. Straw bale, we get involved in a lot of straw bale building.

So, yes, practically anything.

Ben: We followed a case study called Buckinghamshire Passivhaus and they had a Steico boarding that they rendered on top of with lime, but they had polystyrene in it. Is that again, just one of these many things that you can add to your lime render?

Martin: Yes, I suppose you can add practically anything to a lime render. What you need to look at, and what my particular interest in it is, is the mechanical performance of the render.

From a sustainability point of view, polystyrene balls, I wouldn't be keen on. But you've also got to look at the physical ability of the render to do its job. Lime is a relatively weak binder, unlike cement. You can hold anything together with cement, but lime relies to a certain degree on the aggregate giving it strength.

So, polystyrene balls, for instance, are all going to be pretty much perfect spheres. So, you're potentially stacking marbles rather than lots of irregular shaped blocks.

There's a lot of different things to factor in, but we use lightweight mineral for the warm coat, and that works well.

Ben: We're going to talk about how we've used it on my build and the process that we go through. So, mixing it first of all, what does it take? I've seen all this with my own eyes. I can just about remember it, but is it just like mixing some other type of render?

Martin: Yes. I think really the drive behind Best of Lime has been to bring a very ancient material into the modern world and make it perform workability wise and actually on the building, in a way that is as good as, if not better, than a lot of modern materials.

So, all our plasters can be mixed with an ordinary plasterer's paddle drill, or in a standard bell mixer. The advantage of having it mixed

with a paddle is that you can do it up on the scaffold. You don't have to lug heavy, wet material up ladders or up hoists. You can do it all at the spot where you're using it.

Unlike traditional lime, it doesn't need to be banked up and left. There's no dark art to it at all. You mix it up and you spread it up the wall and that's pretty much it.

Ben: Water gets added to it?

Martin: Absolutely. They all come as twenty-five kilo dry mixes. There's fibre reinforcement that comes separately in the bag, so you add the fibre into the mix when you mix it up ...

Ben: How have you chosen that fibre?

Martin: The fibre I arrived at because it's very thin – shall we go down the Denier route?

Ben: Go on, tell me.

Martin: I'm pretty sure that one Denier is nine-thousand linear metres per gram, I think. Our fibre is three Denier. So, three-thousand metres per gram. We put a hundred-and-fifty grams of fibre in each of our bags. That's a huge amount of fibre. Something you couldn't possibly achieve with traditional methods, animal hair, or screeding fibres, which are much thicker.

So, being able to get a vast volume of fibre reinforcement into the plaster but not losing that workability. So, it goes in the top coat as well but trowels in and you don't see it. You can lose it.

I think that equates to about two-hundred-and-eighty miles of fibre per twenty-five kilo bag.

Ben: Is there anything in the consistency that's important?

Martin: Workability, really. We don't specify how much water you put in. The lime coat particularly, it will find its own level. A plasterer will shout at the labourer if it's not workable and then more water will go in. Likewise, if it's too wet.

With the lime coat, you can knock it up very thick. So, going back to the more traditional side of it with the pargeting, there are lots of examples of pargeting that are two or three inches deep, all done in one coat. For that, you'd mix it up very thick. I've mixed it up and rolled it into balls and stuck it on things.

Ben: For this project, how would you prep up to begin with? What do you need to do around windows and all sorts?

Martin: Mostly looking at the substrate to see what the building is constructed of, and I suppose a large part of what I get involved in is looking at the detailing on buildings, working out where potential problems might lie.

I believe you're blockwork here, aren't you on this one? So, if it's real lightweight blocks, we'd probably look at meshing, certainly meshing off window heads at forty-five degrees because they're all points where the load on the building changes and it's very common for buildings to settle after they're built. So, it's just trying to offset any potential cracking in detailing like that.

Ben: And you work with Duncan every so often, don't you? You said something quite interesting about how you get feedback from him. He's down here on the ground with decades of experience.

Martin: Absolutely. Dunc's not only a great plasterer but he thinks a lot while he's plastering. So, he's out there using the material daily and telling me a) if it's going well, or b) if there's something we can think about doing to slightly tweak things.

We're there with the warm coat and the lime coat but we're working on other products all the time. So, that's a great resource.

Ben: We use some cork as well, around certain points. I can't remember exactly where. So, why that product? How is that helping? Does that interact at all with trying to get Passivhaus?

Martin: I think if I remember rightly, Dunc did the window reveals in cork. Cork is a great product. It very much ticks all of the sustainability boxes. No trees are harmed in the production of cork. It's harvested from the cork oak. It has a very good lambda value. I think it's about zero three eight.

So, I think what Dunc was doing here was trying to make sure you didn't have a cold bridge on the window reveals. So, that bit of cork as a background just helps with that bit of insulation.

Ben: The feel that we were after on this building was rounded corners – it's quite interesting because although in some ways it's traditional, I personally feel it's also contemporary because of the windows. So, how do you achieve that effect because it doesn't have a seam really, does it? Although it has got one somewhere around the building.

Martin: Yes, lime lends itself to that sort of feel. Contemporary but traditional. I quite like the idea of that.

Ben: I'm probably talking rubbish.

Martin: Well, no. I noticed you've got the rounded windows and the corners, and I noticed Dunc has put his trademark chamfer stop on the bottoms which always looks nice.

Lime does lend itself to that because it's a much softer material. It's slower setting so, you have a bit more time to play about with it and get it how you want it. It has an organic soft aesthetic to it. So, when it is finished, it has a much softer look to it. And of course, you've got the mechanical side of it being a much more lightweight, less dense material than sand and cement. You don't need to have movement joints everywhere. So, you have a much more traditional look to a building without big mastic joints all the way down it.

Ben: Is the one downside of it this having to keep up with the weather almost? You know, what would Duncan be doing today, on this drizzly day?

Martin: If he's managed to plan properly, he's got some inside work to do.

This time of year is always tricky. We're extraordinarily busy this time of year as it dawns on the plastering community that summer isn't going to last all year. So, there's an enormous push to get everything done.

Again, the materials that we produce are a little more robust. I've had two conversations today on the way down with plasterers about jobs that are coming up, and weather reports that we're expecting very cold weather. So, we'll deal with that as it comes. There are lots of things that you can do going into the colder weather.

We live in the modern world, and again going back to making materials that perform to modern standards, unfortunately modern work programmes mean that you don't stop until the spring and work has to carry on.

There are lots of ways around that. We do a whole sheet of information on working in winter conditions and offsetting potential problems.

Ben: Is one of those just covering up your build, have a tin hat on it?

Martin: Absolutely. In the end, it all comes down to water. Water that's in the mix, being able to dry the plaster out. The trouble is that coming

in to this time of year – we’re now mid-October – humidity is beginning to rise eighty, ninety percent and will get fairly soon to the point where the air is effectively saturated.

So, getting the plaster to dry outwards, especially if you’ve got a building where it can’t dry inwards, if you’ve got a particular background that doesn’t suck the moisture back in, then we have to look at air movement, warm air if possible, covering in scaffolds.

There’s lots and lots you can do but in the end, it’s all water based. And keeping water off.

Ben: I noticed as well that it can actually get too hot. It’s not just one end of the spectrum.

Martin: It’s the plasterers who break first, generally. One job particularly stuck in my mind this summer, which was up in Norfolk on a south facing red brick wall, and the plaster was going off very fast. The plasterer was close to throwing it down and going home, but they kept going.

It doesn’t materially affect our lime plaster. Again, going back to traditional mixes with lime putties and sharp sands, you’d be in an awful lot of trouble if you put it in, in hot weather, because it wouldn’t set. So, we’re over that.

Ben: What is the natural colour of lime render and does it change at all as you use it?

Martin: The colour of lime is mostly dependent on the aggregate that you’re using with it. So, traditional mixes using sand, a very white sand – there’s one over near Stansted Airport that’s quite white. If you go up into Norfolk, you can find ones that are quite brown and that will definitely change the colour dramatically. As with mortars and brickwork.

We use a lot of chalk. Chalk is a creamy off-white. So, we tend to get a creamy off-white plaster, just a neutral really.

Ben: Well, it’s suited us perfectly because we had all our colour charts and things and we’re so pleased with how it did come out. What if you want to have something that is a strong colour?

Martin: Apart from decorating it, you can look at tinting plasters. I tend to avoid it if at all possible. There’s a lot that can potentially go wrong with tinted plasters.

Ben: What does that mean?

Martin: Effectively, putting a pigment into the plaster. Modern building sites, virtually all renders are pre-coloured. So, the big companies, K Rend and Webber, you see virtually all the new builds are coloured plaster.

That doesn't make it necessarily brilliant. It saves some money on a building site, but if you look at a lot of them four or five years down the line, they're not looking quite so good. And these are modern sand and cements and pollens and all sorts.

So, yes, you can tint lime plaster. One of the reasons I tend to avoid it is if there's a slight change in aggregate colour then obviously that's my base colour and that might show.

Ben: Did you say you can paint it?

Martin: Absolutely. Traditionally, limewash. Limewash is effectively thin plaster. Either white or with pigments. So, limewash is at the traditional end of the scale, right through to modern silicate mineral paints, all of which are breathable. It's important to maintain the whole breathability with it. Modern silicate paints look and perform more like a masonry paint but have that element of breathability.

Ben: What maintenance will we have to do and what might be the timescale of that?

Martin: Maintenance depends very much on exposure levels and detailing around the building. So, hopefully all your gutters are working perfectly well. Today would be a good day to walk around them and have a look.

Ben: We'll be keeping an eye on them.

Martin: Assuming everything is working there, the south west wall will take more weather generally. Limewashes particularly are sacrificial. They generally just wear away. Unlike a modern masonry paint that just gets grubby, a limewash will gradually wear away. So probably four or five years and you should look at putting a couple more coats on it. More sheltered areas may last much, much longer.

On your building, we have put a clear, breathable coating because you want to keep the colour of the plaster. This isn't an uncommon situation. So, you have got a product manufactured by St. Astier in France called Uniprotect, which is a suspension with PTFE in, Teflon, and that helps with water shedding and keeping the dirt and organic growth at bay. So, hopefully that will last a good four or five years. Again, down to exposure.

Ben: Maybe we could talk for a moment about costs then. How does this compare to other ways of rendering a building?

Martin: Materially, more expensive. We're always going to be more expensive than a tonne of sand and some bags of Portland cement.

Ben: We did have a value engineering time when we had to make the decision about do we reduce the thickness of the render and all of this, and we just thought no, we're going to keep going here.

Martin: One of the advantages – and we've supplied a number of timber frame new build projects – is that compared to sand and cement, we can do two coat work, whereas a lot of sand and cement projects, if they're going for the rounded corners and a traditional look, in sand and cement that's generally done in three coats. So, what you lose in money on the material, you gain with the labour saving.

So, we haven't been cheaper than sand and cement, but we've been close enough that we've supplied a number of projects, new build.

Ben: Really appreciate your time today, Martin. Thank you very much.

Martin: Thank you, Ben. A real pleasure.