Stoves and thatch

*Intelligent stove selection could assist in thatched house fire safety, suggests **Jim Glockling**, based on his own experiences of wood burning stoves in his thatched home*

HERITAGE PROPERTIES present many challenges when it comes to fire prevention and protection. Construction methods and materials mean that often as not, if a fire starts, the concluding loss is total, and nowhere is this more so than in thatched properties. The convergence of heritage properties and modern lifestyle requirements can be at the heart of this conflict, and the popular inclusion of wood burning stoves is an area requiring urgent attention.

Research and testing

Over the last two years Historic England and NFU Mutual, in association with the Fire Protection Association, have undertaken the first ever full-scale laboratory testing of wood burning stove configurations intensely instrumented to understand every conceivable contributing parameter to thatch fires.

This was a ‘fresh eyes’ look at the issue, where theories of prevalent cause were entrenched in the thatching community, yet also under suspicion of not being quite the full story – leading to solutions that at best might not be useful or address the core issues, and at worst could cause unnecessary damage to heritage material. I will not dwell on the findings in this article, as the purpose of this story is to further the work by floating the idea that if owners of thatched properties are to install a wood burning stove, they can make design choices that might influence overall fire safety.

Details of the programme of work and the derived definitive guidance are reported elsewhere, but suffice it to say that assured and demonstrable ways of fire raising included birds nesting, faulty chimney brickwork and poor stove operation. Less likely would be fire raising resulting from conduction and thermal accumulation through perfect brickwork and linings. It is important to say that we are talking about 'likelihood' in the context of already unlikely events.

I am a thatch owner myself and, on the basis of the above work, I have decided to remove the wood burning/multi fuel stove from my house. To be clear, the initial recommendation made as a result of that work is to not install a wood/multi fuel burner – which seems unthinkable – but it does go on to give helpful mitigation advice if one is present. At the time of installing it, I believed it to be a safer option than the open fire that it replaced: this is incorrect as the statistics clearly point to a risk associated with stoves and not open fires. Whilst this might seem initially odd, I hope by the end of this article you will understand why it's actually quite obvious.

Stove design/operation

For the purposes of discussing stove design, we need to take it as read that there are certain 'essentials' that are covered off, including the need for approved installers; adherence to building regulations; the need for regular sweeping and inspection by those appropriately certified to carry these out; the fitting of a bird guard; and a knowledge of the latest advice on stove ignition procedures, operation and installation (see the new HE/NFUM/FPA [Historic England/NFU Mutual/Fire Protection Association] guidance pamphlet, *Guidance for owners of thatched buildings with wood burning and multi-fuelled stoves*).

As the technical director of the FPA, who is meant to know about fire safety, let me tell you about how we live(d) with our wood burning stove:

- it has a flue thermometer on it that everyone in the house knows how to read – from the age of four, my children knew to inform me if it went into the red zone
- instruction is given to anyone using the house when we are not, especially my rogue brother-in-law who craves the idea of a roaring fire to lounge in front of on the sofa (and ultimately to fall asleep by!) as he seeks respite from London living.
- everyone in the house can identify from the sound of its operation when it might be over ventilating
- the glass window's normal state was black; it provided heat and burned steadily, but did not provide the idealised beautiful glow of the brochures – to achieve that required it to be hotter than I (or the stove thermometer) felt appropriate
- I could at all times evidence to my insurer that their requirements were adhered to
- ignition and refuelling/rekindling were always 'attended' events until the ventilation controls were returned to their steady operational conditions

This will sound odd to many, but I'm a bit of a worrier and I do get to see all too often the consequences of when things go wrong. Safe stove operation is complex and for every good attribute there is usually a balancing counter argument, so the solution will inevitably be a compromise.

Managing ventilation

Once a stove is lit, control is achieved through management of ventilation; mostly through restriction of the air entering the combustion chamber and sometimes additionally through the control of smoke and gases egressing it. If a stove is over ventilated it will run very hot. Pro arguments will claim a stove that is hot will fully combust material in the flue so the likelihood of sparks emerging the stack to threaten the thatch is less likely. It might also be true that tar deposition in the flue will be less.

Counter arguments may say that the additional heat may challenge imperfect brickwork to potentially set fire within the thatch itself, and that the increased velocity within the flue will be able to lift heavier material out of the combustion chamber which might well have enough energy to emerge as worst case 'heavy sparks'. These are sparks that drop on exit to the thatch rather than float off out of harm's way.

Example of multi fuel stove with separate doors for providing fuel loading and ash pan removal

High velocities and very high smoke temperatures might also combine to initiate chimney fires and perhaps even cause tar deposits on pot top devices to dislodge and fall to the thatch surface. Many of these aspects have been demonstrated to be correct in the laboratory, and the nature of the spark

emergence can additionally depend on both what you are doing at the time (refuelling and riddling), and what you are burning/using as ignition materials.

Focusing on ventilation, stove design has a vital role to play in constraining the user to conduct this in a responsible fashion. The critical elements are:

- how much air the controls allow in
- where the air enters in relation to the fuel bed
- whether there is scope to 'illegally' abuse the stove configuration to introduce great quantities of air over and above the maximum achievable through use of the controls

Stoves will often have more than one controllable point of entry for air. In a traditional log burner, where there is no ash pan and the logs sit on the bottom of the stove in the bed of ash itself, ventilation may be provided from a sliding or rotating control in the door, and via an air wash system designed to keep the glass clean (this enters from the top of the stove through a sparge pipe arrangement). The only means of getting extra air in is to open the fuel loading door, which makes the system during these periods no different to an open fire. All of these points of air entry are above the fuel – it is a gentle form of ventilation in comparison to the next scenario.

Stoves of the multi fuel variety, and some dedicated wood burning stoves, incorporate an ash pan; a location for ash from coal/coke burning to fall. With this simple change comes the scope to introduce air under the fuel: intensely aggressive ventilation can be achieved through under fuel ventilation, and, like a blacksmith's forge, very high temperatures and flue velocities can quickly be achieved. Obviously, the maximum level of ventilation achievable is capped by the limit of the controls that supply to this region of the stove, but for the reckless and impatient, other methods may be possible.

Where the presence of the ash pan is an 'optional extra', allowing a wood-burning stove's capability to be extended to also burn coke and coal, it may have its own door that is separate to and can be opened separately from the fuel loading door. These are the type of stoves we have been using in the laboratory for the test programme, and using the door as ventilation (obviously against the advice of the manufacturer's operation manual) the stove will sing like an organ pipe and eject significant matter from the pot top without trouble, and raise temperatures universally well above anything that would be considered normal.

Looking at the full range of stove designs out there, I'm of the opinion that this is a known issue. Some designs have a combined fuel loading/ash pan door that prevents this method of over ventilation being possible. Many designs interlock the two doors such that, whilst they are separate, the fuel loading door can be opened in isolation but the ash pan door cannot. In the light of the work done, these are excellent features to see, but can thatch owners or anyone else in the supply chain appreciate that some stove choices may be cleverer than others at curtailing risks in at least one area of thatch house ownership?

Programme review

The next obvious stage of this work would be to work with the stove manufacturers to discuss the findings of the work and – while we might have identified a desirable feature here – what other beneficial features are out there, such as automatic ventilation control, easier cleaning provision etc.

Used well, all stoves are 'safe', but the human element at the root of many risk problems can be reduced by good design and end user selection.

Finally, why might open fires be safer than stoves? Simply put, large amounts of cool air are entrained over the fuel and up the chimney with the smoke and combustion gases, resulting in significantly lower flue temperatures. Additionally, the cross-sectional area of the stack is generally very much greater than the small for 6in liners commonly used with stoves, so velocities are significantly less. At the end of the day though, all this may account for little when relatives at Christmas throw balls of wrapping paper on to

the open fire, that zip up the chimney to emerge still burning from the pot to the cries and panic of a strangely overexcited host!

The future of the HE/NFUM/FPA research programme is under review. The final research for this study will be made available from the Historic England website and NFU Mutual in due course and a programme of educational events is being organised ❑

Jim Glockling is technical director of the FPA and director of RISCAuthority.