

DAMP PROBLEMS IN BRICK WINDMILL TOWERS



MILLS SECTION

Vincent G. Pargeter

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Untreated brick surface outside showing worn bricks, degraded pointing and crude cement repair. Vegetation starting to grow.



Tarred surface outside, in good condition.



Broken-down tarred surface outside. Bricks spalling and vegetation starting to grow.



Limewashed surface inside showing effects of incipient damp penetration.

There is no easy answer to the problem of leaky windmill towers. Some towers leak and some don't, and the problem is caused by variations in the quality and porosity of the bricks and mortar used, as well as the mode of building. In most brick towers the brick courses slope inwards, and this results in rainwater following the bed joints inwards to saturate the brickwork in times of heavy rain. Where the bricks or mortar are porous, the rainwater penetrates deeply into the brickwork, and will not easily dry out. The damp bricks then suffer frost damage when the water freezes and expands. The water continues through the wall thickness to the interior where any salts occurring in the bricks emerge to induce spalling and powdering of the surface inside. The damp brickwork causes the built-in ends of floor beams and joists to become rotten, and eventually the floors collapse.

Conventional brickwork repairs, such as re-pointing and renewing damaged facing bricks should be tried first on a leaky tower. Matching bricks of a similar hardness and nature to the existing ones should be laid in a suitable lime mortar. Where the original pointing is defective, joints should be carefully raked out to a depth in excess of the joint width, and re-pointed flush with lime mortar. The original mortar should be analysed, and a mix of similar hardness and composition created.

In some cases, brickwork repairs may not cure the problem, because, in effect, the towers were never entirely satisfactory in the first place. When the mill was in use, the doors would be open every day, and there would have been a good circulation of air within to help any moisture to dry out. Today, mills often remain shut up most of the time, or may even be double-glazed and draught-proofed if used as dwellings.

Silicone proofing liquids have been tried on mills, but the results have been mixed. Such products will not turn bad brickwork into good brickwork, and SPAB does not support their use. Generally speaking it is not advisable to introduce more chemicals to add to those already present in the walls.

Often, millers tried to solve damp problems by tarring the towers, and this is why so many towers are tarred today. The tar was actually a mixture of pitch and coal tar in appropriate proportions to make the coating flexible, but not too runny. The mixture would, very gradually, flow down the tower in hot weather becoming thinner at the top and remaining thick at the bottom. Tarring cured most of the problem by keeping the rain out, but the tar had to be maintained by applying it regularly, say every four years or so. If the tarring was not kept up, the tar could worsen the problem. This is because water got in where the tar had broken down, but as most of the tower would still be coated with tar, the water would not be able



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to evaporate off outside. Thus it would all migrate to the interior exacerbating the problem. Due to its potential carcinogenic properties, genuine coal tar pitch is difficult, but not impossible to obtain today. There are many modern products available, but these cannot be recommended as they have not been tested over time, and some have been used with poor and expensive results.

Rendering a tower may work, but it depends on the lasting qualities of the render and how it is applied. If the water gets behind the render, through cracks for example, it can accelerate the water and frost damage by harbouring the dampness. Pockets are created between the bricks and the render which trap and collect water causing it to soak in and cause damage when frosted. It is essential to use a lime-based render that is permeable, and has some flexibility so that it can move a little without cracking. Render should be encouraged to adhere to the brickwork by removing any loose material and carefully cleaning down. Portland cement render is likely to be ineffective and may actually damage the brickwork behind it.

There is no such thing as a "quick fix" to mill tower problems. Whatever is done there will need to be ongoing monitoring and maintenance to sort out minor problems before they cause severe damage. One of the reasons that we have many mill tower problems today is that the mills are locked for long periods of time and no-one goes inside. During their working life, the mills would have been opened up daily, and the resulting ventilation would have helped keep them dry inside. The miller would have noticed a leak and would have done something about it to prevent it damaging his flour and affecting his livelihood.

If the brick surface is very bad, a combination of tar over render may be necessary, but the finished work will need close monitoring and regular maintenance for the above reasons. Half-bad bricks will need to be chiselled to remove the loose material, and the mortar joints raked out 10mm deep where the mortar is crumbling to give a good key to the render. The render should then provide a good smooth surface for the tar. It's no good tarring rough, damaged brickwork because the tar won't "take" well, and water will collect in the recesses and eventually soak through. Once tar is applied over the render and regularly overcoated, the problem should be under control.

There is one problem with tarring: The effect of rising damp. The tarring system may not work near ground level because rising damp will affect the brickwork, and it won't be able to evaporate off the outside. This may cause the tar to flake off outside and increase dampness inside. This is likely to affect the bottom metre or so of brickwork. Every effort should be made to improve the drainage around the base of the tower, bearing in mind that all the rain that falls on the mill will end up there. The mill walls are thick, and chemical damp-proofing usually doesn't work. Good drainage is the best answer, and a shallow gutter can be created around the base of the tower filled with shingle and provided with a drain or drains to take water away. This is known as a "French drain." If this is done, care should be taken not to dig too deeply which could compromise the mill's footings, which may be shallow.

A solid concrete ground floor can affect tower dampness, particularly if it has been laid on a damp-proof membrane. Any damp rising from the ground is prevented from percolating through the concrete disc and evaporating from the floor surface, and instead is concentrated into the surrounding walls. A permeable floor of earth or rammed chalk is better, but best of all is a wooden floor on brick piers as often provided originally. Air bricks need to be provided so that air can circulate beneath the floor and moist air is evacuated through the air bricks.

The timber floors of a leaking tower mill often become unsafe as the ends of joists and beams decay where they are built into the brickwork. In most cases, this timber-work can be repaired rather than renewed. A traditional repair was to build a hardwood corbel into the brickwork below the affected beam end. This would project a short distance from the wall, where it would be bolted to the beam above. The visible end of the corbel would often be rounded or moulded to improve its appearance. Cast-iron or stainless steel shoes have also been used, and joists may be supported on flat stainless steel bars bolted to the joists and built in below them.

Millwrights are constantly dealing with the kind of problems that affect mill towers, and it would be wise to engage one to advise on any repairs required. Often, the millwright will be able to carry out the repairs as well. A list of practising millwrights can be obtained from the SPAB Mills Section office.

The SPAB recommends that any work carried out to a mill tower should maintain the former appearance. Any change to the character of a mill tower will require Listed Building consent, and this will not normally be given unless it can be proved that the proposed change is essential for the survival of the building. It is best to carry out good repairs consistent with the original work, and allow for adequate ventilation. Continuing repair may be necessary, but this can be kept to a minimum by vigilance and care.

Membership

The Society for the
Protection of
Ancient Buildings
37 Spital Square
London E1 6DY

Tel 020 7377 1644
Fax 020 7247 5296
info@spab.org.uk
www.spab.org.uk

A charitable company limited
by guarantee registered in
England and Wales
Company No 5743962
Charity No 111 3753
VAT No 577 4276 02

The SPAB Mills Section

- **Protects** hundreds of traditional Windmills and Watermills from proposals to demolish or damage them each year.
- **Campaigns** for the sympathetic repair of mills, and works to return buildings and machinery to working order.
- **Circulates** its newsletter "Mill News" to members four times per year.
- **Helps** to find new owners for mills at risk by issuing a list of old mills which are for sale.
- **Arranged** a programme of lectures, meetings and visits to mills.
- **Works** to raise public awareness of the need to save and conserve the country's dwindling number of wind and watermills by generating press interest.
- **Co-ordinates** and publicises **National Mills Weekend** on the second weekend in May each year. **Supports** the work of traditional **millwrights** across the UK.
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