

DUST

FS 1/4

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Introduction

There are many types of dust particles. Dust found within a Historic Site or public building ranges from very small particles such as diesel soot at 0.5 -1.2 microns to large fibres. Although the tiny particles probably account for 97% of dust deposits it is the larger particles, over 2.25 microns, which are visually prominent. Collaboration between staff from The National Trust, English Heritage and Historic Royal Palaces have researched extensively the nature of dust, its deposition and effects. Research funding has been available from the Leverhulme Trust.

The **nature of dust:** deposits comprise what visitors bring, what is airborne and what is derived from erosion of the fabric of the building. The locality inevitably has a strong influence on the nature of the dust but some deposits are found UK wide such as (sea) salts.

For many public buildings, access remains a prime objective and due to economic pressures it is often over-extended to increase revenue. Research has proved that dust levels increase proportionally with the increase in visitor numbers. It is therefore strongly advisable to manage dust over a period of time otherwise the need for quick results may place too much pressure on staff, more accidents may happen and fragile objects may be inappropriately or over cleaned.

Trends in deposition and general advice: the greatest amount of dust is likely to be deposited at entrances - so have good mats and cloakroom areas (if possible, because they can reduce humidity fluctuations on wet days) that are cleaned vigorously every day.

Reduce staff or visitors' activity near vulnerable areas because deposition is raised by movement.

Simplify visitor routes because deposition is raised in routes with returns.

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In urban areas particularly, look at brush dustguards (or equivalent) in casements and do not open windows, which can lead to the dumping of the equivalent of 132 days of dust in just one day into a room!

If dust levels are chronically high, other more complex options might have to be considered, such as purification systems.

Visitors bring dust in so think about the surface of walk ways immediately outside the property. Avoid loose, powdery and dirty grave because it is likely to generate large quantities of mineral dust throughout the building. The larger particles rise little above 30 cm from the ground, but they are very abrasive and can contain minerals and salts that aid cementing. Incorporate in the visitor route floor coverings that can act as sinks for dust and dirt.

As the deposition of dirt falls off with distance, money could be directed at protecting objects that are less than two metres away from the public. For more delicate materials, barriers should be shoulder height, because most fibrous dust is deposited 80-150cm above floor level (roughly between hip and shoulder). Bespoke covers and curtains could also be made and removed in rotation.

Not only is dirt visually unattractive, it also causes physical and chemical damage and its removal is expensive. The average National Trust housekeeping costs per house are £6,000 on equipment, £4,000 on humidity control and £30,000 in cleaning time. This represents £1-2 per visitor and the costs per visitor often increase in a smaller property. Costs cannot be reduced if visitor figures increase because dust levels also increase. Targeting dust management is cost effective and if policies have been successful in reducing dust at source, remedial conservation expenditure may be reduced.

Can investigating **perceptions** of dust help us to devise an effective management strategy? Perceptions are generally coloured by a person's background and expectations but some management is possible. Dust is easier to spot on some coloured surfaces than others for example black, shiny and red surfaces. Most people will accept a certain level of dust but research has quantified a threshold above which people start to notice it. Different people also respond to dust in different ways; conservators worry about the welfare of the object, managers are concerned about presentation and visitors, whilst they appreciate that dust represents history, also like to see it removed.

How are dust depositions measured? At present **researchers** have been using two methods. One is a manual method using a dust kit which consists of sticky samplers and eye glass for a manual count. The other is a black box (containing microscope, light source and digital camera) mounted on an arm over a glass

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slide. This automated system takes fifty images per day and the dust is counted by soft ware to produce an average coverage as a percentage. The threshold at which dust is noticed is 6-7% coverage.

Due to the macro nature of the research we have a better understanding of how dust cements onto a surface. Dust that has been cemented is much more difficult to remove and leads to the graying of affected surfaces. It is more likely to happen in higher humidities (humidity fluctuations create dimensional changes that can embed dirt) and in the presence of sugars and salts. The presence of salts in dust is particularly worrying because it acts like a catalyst facilitating chemical reactions at acceptable RH levels of 50%. Finally, dust is a potential food source and the life cycles of micro-organisms affect textiles and can help to cement dust in place.

Conclusions

Manage the amount of dust brought into your public areas and falling onto objects. All arguments are easier to win if research can quantify problems and solutions can be explained to managers and accountants in terms they understand. Sampling can help to design a cleaning regime that is much more targeted; cleaning can often be done too systematically. Ensure control of humidity to a level appropriate for the collection, remembering that salts act as a catalyst and dust can be hygroscopic. If seasonal changes are unavoidable remove dust before the wetter months arrive to prevent it becoming cemented.

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