Historic England

Historic Fibrous Plaster in the UK

Guidance on its Care and Management

Summary

Fibrous plaster is a form of decorative plasterwork composed of plaster of Paris, reinforced with layers of hessian and secured within a timber framework. It was used to imitate more expensive and time-consuming traditional lime-based, hand-modelled plaster. Although fibrous plaster is often associated with the Victorian and Edwardian theatre and music hall, it was fitted in a wide range of buildings in the UK. However, it is often unrecognised, and has been ignored in technical research and conservation guidance over recent decades.

This document is interim guidance for conservation professionals and building managers responsible for buildings with fibrous plaster in the UK. It was prepared by Historic England in association with Historic Environment Scotland, Cadw, Welsh Government, and the Historic Environment Division of Northern Ireland. Historic England is undertaking research on the material and more detailed information will be published in due course. This guidance focuses on fibrous plaster ceilings, since they present a potential risk of collapse if neglected. It begins with the history of fibrous plaster, and then explains forms of deterioration, current survey standards, methods of repair and finally, management of buildings with the material.

Front cover: Wyndham's Theatre, London.

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Introduction

Fibrous plaster consists of a cast of plaster of Paris reinforced with hessian fabric and timber laths. Patented in 1856, it was one of the many architectural innovations of the Victorian period. Its production was more expedient than traditional lime-based decorative plasterwork. Fibrous plaster was well suited to forming pre-cast complex panel shapes such as niches, eccentric vaulting and serpentine box fronts. It was also used to mass produce small surface enrichments and elements such as cornices and columns.

Since the late-19th century fibrous plaster has been employed extensively throughout commercial, cultural, institutional and high-status residential buildings in the UK. After the Second World War, its application evolved within modern structures. Fibrous work continued to be taught in colleges and was, and still is, widely used to produce cornices and ceiling roses, for the domestic and 'restoration' markets.

Knowledge about the condition and repair of fibrous plasterwork is confined to a small number of specialist plastering firms and other professionals across the UK. There is no published history of fibrous plaster, or advice on its survey, repair and maintenance.

To address this oversight, Historic England, supported by other UK heritage bodies, is undertaking new research to better understand the history, deterioration, assessment and repair of fibrous plasterwork. This initiative is on-going, and more detailed information will be published at the end of the project. Meanwhile, this guidance is intended to promote better understanding of fibrous plaster, its identification, condition and care. It includes the theatre industry's survey standard, which provides a model for assessment of the material.

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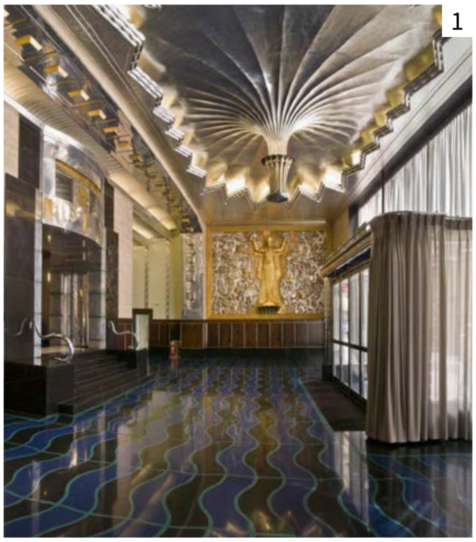
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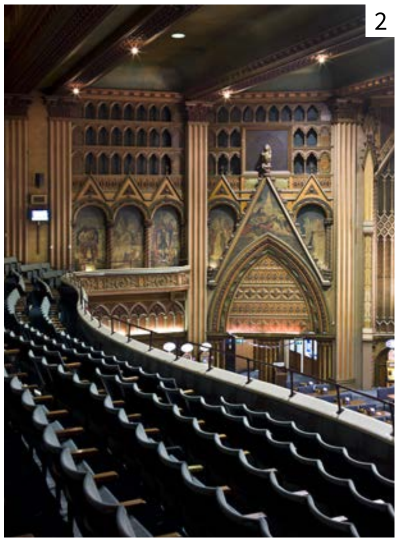
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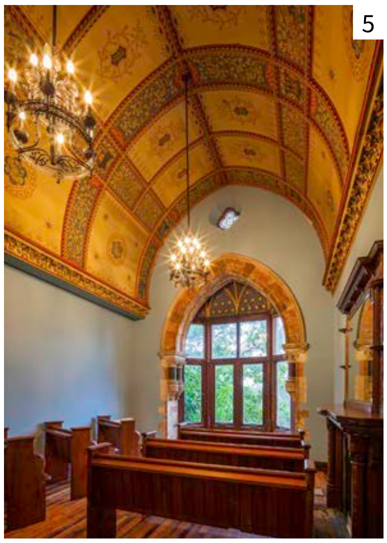
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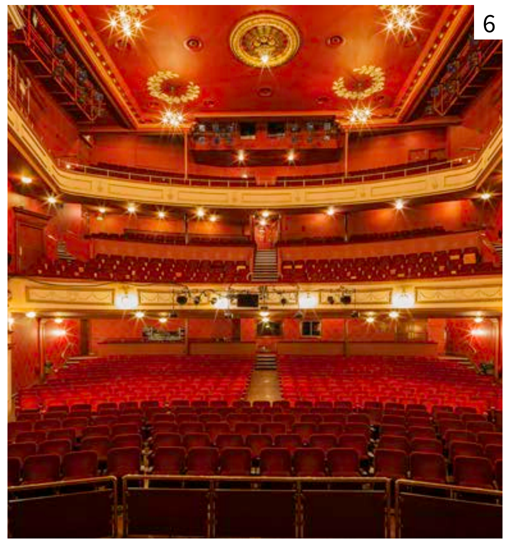
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Fibrous plasterwork across a variety of buildings in the UK
1: Daily Express Building, London (Herbert Owen Ellis and William Lee Clarke with Sir Owen Williams, 1932)
2: The former Granada Cinema, Tooting, London (Cecil Masey, 1930-31; interior Theodore Komisarjevsky)
3: Glasgow City Chambers (William Young, completed 1888)
4: Marble Hall, Gosford House, Longniddry (William Young, 1890; fibrous plasterwork by George Jackson & Sons)
5: Library, Insole Court, Llandaff, Cardiff (possibly George Robinson and Edwin Seward, 1873)
6: New Theatre, Cardiff (Ernest Runtz and George McLean Ford, 1906)
7: Guildhall, Londonderry (Matthew Alexander Robinson, 1909)
8: Ormiston House, Belfast (David Bryce 1860–79)

1 History of fibrous plaster

1.1 The formative years: 1856–1880

From antiquity, decorative plasterwork was hand-modelled in lime-based plasters, which was a lengthy process. Gypsum was also used where locally available. Casting of low-relief lime decoration in moulds began in the 16th century. By the end of the 18th century, casting elements in gypsum had become common. Another 18th century cast material was composition (or 'compo'), formed of pine resin, animal glue and linseed oil. This was followed early in the 19th century by cheap cast decoration or enrichments that were essentially glue and paper: *papier mâché* (paper with animal glue or flour paste), and *carton pierre* (boiled paper-pulp, whiting and animal glue and sometimes flour). Once painted, they imitated modelled plaster or carved wood, while costing just a fraction of handcrafted decoration. This was the beginning of the 'democratisation of ornament' that was part of the culture of the industrial revolution.

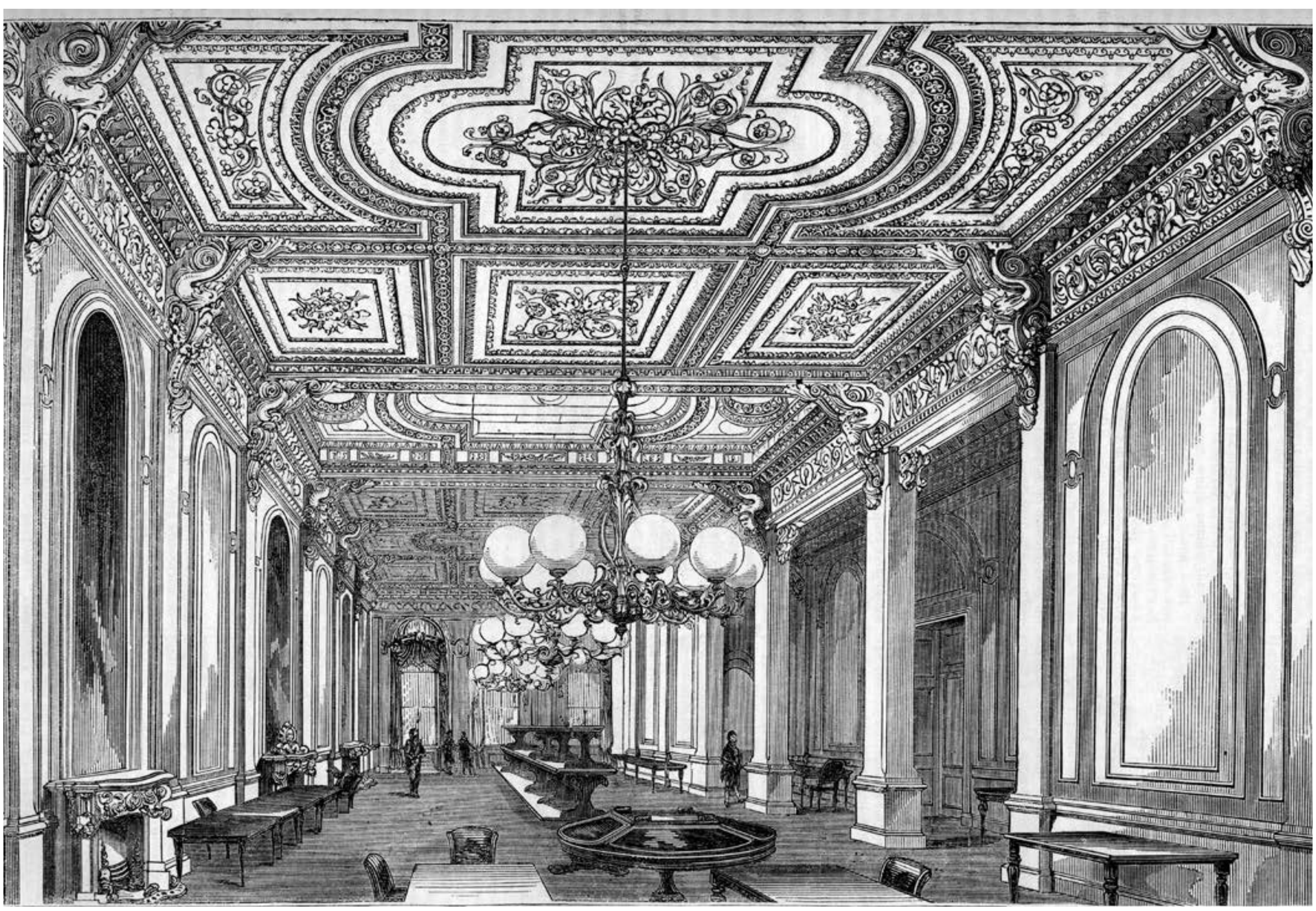


Figure 9: Army and Navy Club, London (Charles Octavius Parnell and Alfred Smith, 1848–51), with extravagant *papier mâché* enrichments by George Jackson & Sons. Within a few decades papier mâché was largely usurped by fibrous plaster.

Figure 10: St George and the Dragon (original by Donatello, *c.*1410–15): replica cast in fibrous plaster by Alexandre Desachy and acquired by the South Kensington Museum (now the Victoria and Albert Museum) in 1864. Desachy was best known in his native France as a purveyor of sculpture casts.

Compared with traditional plaster and lath work, fibrous plaster offered many advantages: the ability to create complex forms; relative lightness; speed of production off-site during building construction; and quicker installation periods. Fibrous plaster could also be decorated soon after installation, unlike traditional lime plasterwork that needed time to carbonate. Also, the wet plaster trades that traditionally slowed building progress were considerably reduced.

The Frenchman Léonard Alexandre Desachy (1817–1886) patented fibrous plaster in the UK in 1856. From 1848 he was the head of the plaster cast workshop at the École des Beaux-Arts in Paris. He also worked in private practice. Desachy sought work in the UK as well, and by 1856 he had a showroom in Great Marlborough Street, London. There he exhibited a 'selection of *chefs-d'œuvre* in statuary of plastique plaster and real bronzes, ancient and modern sculpture'.

In London, Desachy worked with architect Owen Jones (1809–1874), author of the influential *Grammar of Ornament* (1856). Desachy produced the first architectural fibrous plasterwork in the UK in Jones' St James's Hall in Piccadilly, London, inaugurated in March 1858. Simultaneously, Desachy was engaged on another prestigious commission: the new Royal Italian Opera House, Covent Garden (now known as the Royal Opera House) designed by Edward Barry (1830–1880). This opened in May 1858.

Over the next two years other prominent commissions followed. However, there were few after 1860 and Desachy ultimately returned to France, financially indebted to Owen Jones. George Jackson and Sons bought the patent from Desachy in 1864.

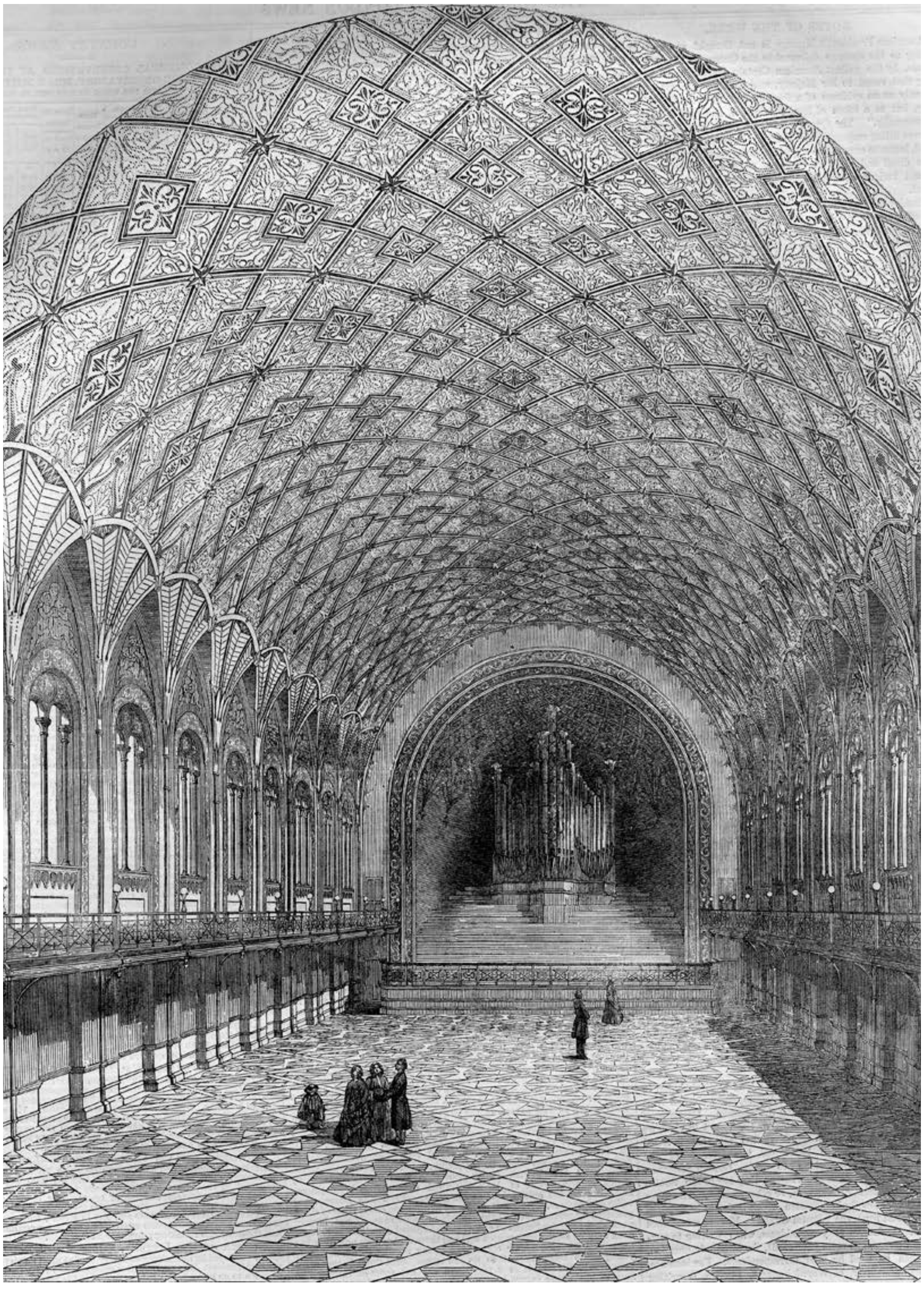
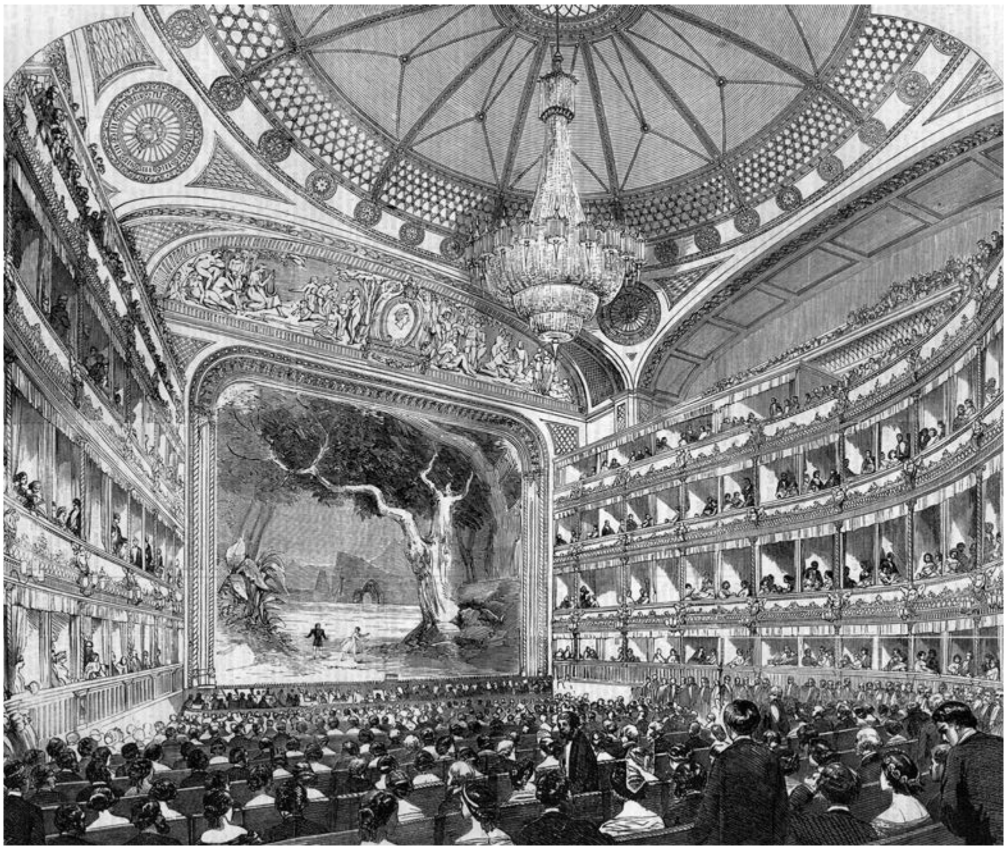


Figure 11: St James' Hall, London (1858, demolished 1905), was praised by the architectural press for its innovative design. It became the city's premier concert venue.

Figure 12: The Royal Opera House, London, contains the oldest surviving fibrous plaster in the country (1858). Desachy was responsible for the bas-relief in fibrous plasterwork within the proscenium arch and enrichments on the balcony fronts.

Figure 13: 16 Carlton House Terrace, London. The masterful interior designs of Owen Jones include some of the earliest surviving fibrous plaster ceilings in the UK, probably executed by George Jackson and Sons, *c.*1866.



After the expiry of the patent in 1870, Jacksons advertised the company as 'Carton Pierre, Papier Mâché, and Patent Fibrous Plaster Works'. As they registered no new patent after 1870, they had no legitimate claim to a fibrous plaster patent. Therefore, Jacksons' promotion of their 'patent' fibrous plaster remains a mystery. Documentary research infers that Jacksons remained the sole purveyors of the material until around 1880, when they dropped their company's reference to 'patent' fibrous plaster, and other firms began producing and installing it.

This coincides with the earliest acknowledged use of fibrous plaster in Scotland, in 1880, when Jacksons produced and installed a significant decorative scheme in the Theatre Royal, Glasgow. Soon after, Jacksons developed a professional relationship with Hay & Lyall, an Aberdeenshire firm of 'carvers, gilders and framemakers'. They first started promoting fibrous work in 1886, had a stand at the Edinburgh International Exhibition that year and were soon carrying out fibrous work throughout the north-east of Scotland. This is an example of how Jacksons helped disseminate knowledge of the material in their work around the country.

1.2 Popularisation: 1880–1910

Fibrous plaster was ideally suited for places of entertainment, being an imitative material complementing imaginary sets, plots and fantasy. It became ubiquitous in theatres and music halls, and the boom in theatre and music hall construction from 1880 to 1910 helped to popularise the material over a wide geographical area. Theatre commissions in fibrous plaster of the period were not just for new construction, but also for partial or full refurbishment, or rebuilding after a fire.

However, it was not limited to places of entertainment. A fibrous company catalogue of 1891 lists its commissions in places of entertainment (40 in number), private residences (36), public halls (17), hotels, restaurants and clubs (17), banks (8), and various others (20), though only one church. Fibrous plaster was also sold from showrooms as isolated enrichments, applied by plasterers to lime plaster and lath in more modest domestic buildings. Due to the lack of research, the extent of fibrous work throughout the UK is not yet fully known, but its use has probably been greatly underestimated.

Figure 14: Haymarket Theatre, London (interior by Charles Stanley Peach, 1904).
The illusion of sumptuous decoration is created by fibrous plaster, formed of simple materials.

1.3 Normalisation and decline: 1910–today

By 1921, there were some four thousand cinemas in the UK, near the 1949 peak number of 4,800. The earliest cinemas were simple, but soon evolved to include elaborate halls, cafes and restaurants; their interiors were as extravagant as those of earlier theatres and music halls. Much of this fanciful decoration was in fibrous plaster. Exotic interiors complemented the fantasy of the screen.

In this period fibrous plaster was firmly embedded in the architect's palette of materials, including plainface slabs replacing some wet plaster and lath work. However, conventional wet plaster and lath continued to be used in building into the 1930s.

After the Second World War the introduction of lightweight gypsum plasters and plasterboard in new construction contributed to the decline of both traditional lime-based plaster and fibrous work. However, specialist manufacturers survived to furnish bespoke services for conservative clients preferring plasterwork of traditional design and materials, and for use in other buildings, such as cinemas. Fibrous plaster was also used to restore some of the country's heritage that had been damaged during the war, including many churches in the City of London.

Throughout the 20th century fibrous plaster has been used extensively to provide film sets for the cinema industry. Production in the form of Glass Reinforced Gypsum (GRG) also flourished during the last two decades of the 20th century to meet the demand from the shopping centre boom. GRG is reinforced gypsum similar to fibrous plaster, using chopped glass fibre instead of hessian.

1.4 Current practice

There are a variety of fibrous plaster companies operating in the UK today. They produce architectural elements and enrichments and create interiors in a variety of historic styles for clients at home and abroad. Some provide apprenticeships to sustain the trade. A small number undertake surveys and repair of historic fibrous plaster. Their specialist knowledge in this domain is unique.

Despite the propagation in recent decades of research and publications about other historic materials, such as lime mortar and masonry, fibrous plaster has been largely ignored. This may be due to a lack of awareness of how widely it was used, and perhaps because it was considered to be a less 'noble' material. Therefore, many owners or managers of historic buildings may be unfamiliar with this material and unaware of its existence in their properties.

2 Materials and construction

2.1 Materials of fibrous plaster

The main materials of fibrous plaster are plaster of Paris, hessian and timber.

Plaster of Paris

Plaster of Paris is a form of gypsum, a naturally occurring mineral composed of calcium sulphate dihydrate ($CaSO_4 \cdot 2H_2O$). When heated in a kiln at comparatively low temperatures (between about 150°C and 160°C), water molecules are driven off to form calcium sulphate hemihydrate ($CaSO_4 \cdot ½H_2O$). This is ground to a fine powder that is commonly known as plaster of Paris, because of the exploitation of large deposits to the north of Paris from the medieval period. Traditional burning in a kiln produces 'beta' plaster. From the 1930s 'alpha' plaster has been manufactured, from high-purity gypsum minerals within an autoclave. It has much lower porosity and higher mechanical strength than beta plaster.

To make plaster for casting, the ground hemihydrate is mixed with water (called 'gauging the plaster') to form a creamy slurry or paste. This sets within minutes. The setting process recombines water into the crystal structure, forming hard crystalline gypsum. During setting, heat is generated and there is a slight increase in volume.

In fibrous plaster, plaster of Paris functions to:

- give a decorative finish
- provide the bulk or 'body' of the cast
- create 'wads' of plaster and hessian, to form bands used to fix suspended ceilings
- stiffen casts, wads and ties by setting around the hessian and laths in a final rigid shape
- protect the hessian and timber from microbial attack
- consolidate wires and preventing them from untwisting under load
- fix joints between panels and filling holes

Hessian

Hessian, traditionally referred to as 'scrim' in the trade, is a natural woven fabric composed of bast fibres (the inner bark) of the jute plant, a woody species that is mostly grown commercially in the delta of the Ganges River. It is basically a wood fibre consisting of cellulose, hemicellulose and moderate lignin content. However, jute fibres have none of the chemicals that confer durability to the heartwood of timber. Jute fibres are flexible, naturally strong with a high tensile strength, capable of carrying large loads, resist stretching, and are strongly absorbent.

To make hessian, jute fibres are formed into threads that are woven into fabrics of different thicknesses and weights. With its natural fibres and loose weave, it readily allows both liquid water and water vapour to pass through it. Hessian performs several functions within a fibrous plaster cast:

- provides tensile strength to the cast
- holds timber laths in position within the cast
- forms ties, or wads, to fix the panels to structure above
- laps joints between adjacent panels

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Figure 15: Modern hessian for producing traditional fibrous plaster, with a loose plain-woven fabric of twisted jute or hemp yarns. Plaster of Paris easily penetrates the widely spaced weave.

Figure 16: Section through historic fibrous plaster.

Figure 17: Section through a typical fibrous plaster wad, without wire reinforcement.

Timber

One late-19th-century source stated that timber laths used for strengthening and fixing plaster casts were generally from ‘second pine’ (essentially second quality material, not suitable for joinery), red-wood or ‘any old wood not liable to twist or warp’, cut and left rough. Softwood was machine-sawn throughout the 19th century.

Modern materials

Materials for fibrous plaster today include: ‘alpha’ and 'beta' plaster, polymer-modified plasters, hessian, and woven and non-woven glass reinforcement. Generally, these produce casts that are much stronger, thinner and lighter than traditional ones, enabling the production of larger pieces.

2.2 Production of fibrous plaster

Manufacturing techniques have changed little over the years, except for moulding materials. For ornate decorative plasterwork, the sculptors and model shop still produce full-scale models of the individual decorative features, made from a variety of materials. Each model is then passed to the moulder, who makes a reverse mould from which the fibrous casts are taken.

Earlier mould materials consisted of gelatines with animal glues. Today, moulds are made of plaster, wood, silicone, fibreglass or a combination of them. Depending on the shape, contours and size of the desired fibrous plasterwork, various reverse moulds may be needed to form the full production model.

To make the cast, plaster of Paris is brushed over the mould to form the first coat (‘firstings’). This is followed by another coat of plaster (‘seconds’) gauged with size (animal glue). The first layer of hessian is pressed into the plaster. A second layer of hessian is then laid with more seconds plaster. Timber laths are laid into the seconds plaster as reinforcement and then sealed with more hessian and plaster. The size of the fibrous plaster cast is generally limited to the reach of the plasterer’s arm: approximately 2m x 2m for general handling, and safe access to the back of the cast for the installation of fixings.

After the cast has set and been removed from the mould, suitable storage, drying and monitoring are required to ensure that twisting, bowing and distortion do not occur. Careful delivery plans are required to meet construction programmes and safe access into the installation areas of the site.

Modern production of traditional fibrous plasterwork moulding, which is slightly different from panel production
18: Brushing on plaster of Paris over a silicon rubber reverse mould.
19: Application of the first layer of hessian, followed by brushing on a second coat of plaster.
20: Placement of longitudinal timber laths.
21: After a third layer of plaster, placement of timber cross bracing, reinforced with plaster and hessian.
22: Application of the final coat of plaster.
23: The hardened fibrous plaster cast after removal from the mould.

2.3 Fixing

The method of fixing depended upon the position of fibrous plaster. Panels were fixed to solid masonry walls with galvanised nails or screws secured into wooden fillets embedded in the wall. Fibrous plaster ceilings installed below ceiling joists, beneath intermediate floors, were nailed or screwed into secondary timber grids between the joists. Nails were probably used in preference to screws in early work, being cheaper and quicker to apply.

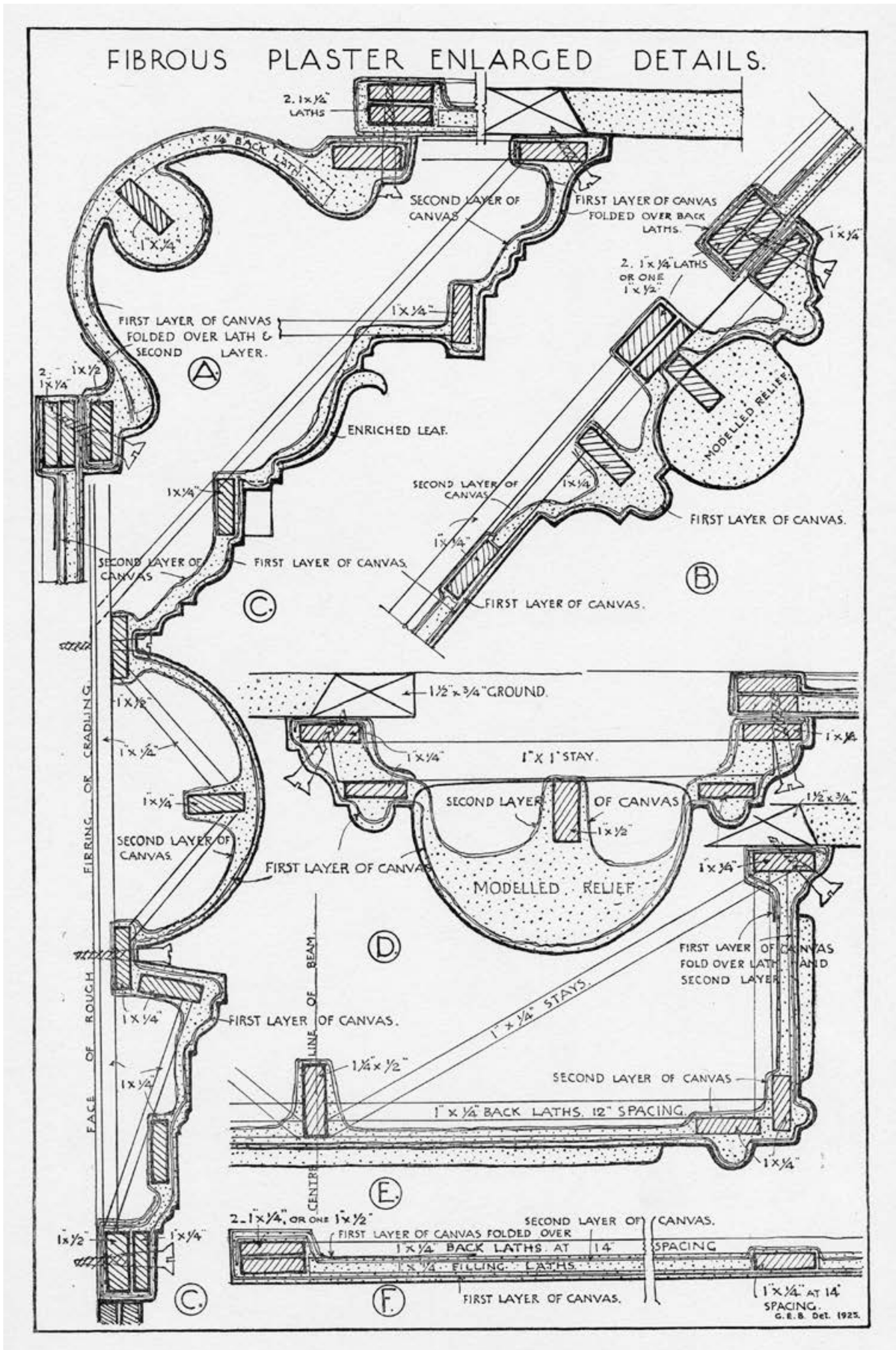

Figure 24: Rare illustrations of the fixing of fibrous plaster to timber or masonry substrates (from George and Edward Bankart, *Modern Plasterwork Construction*, 1926).

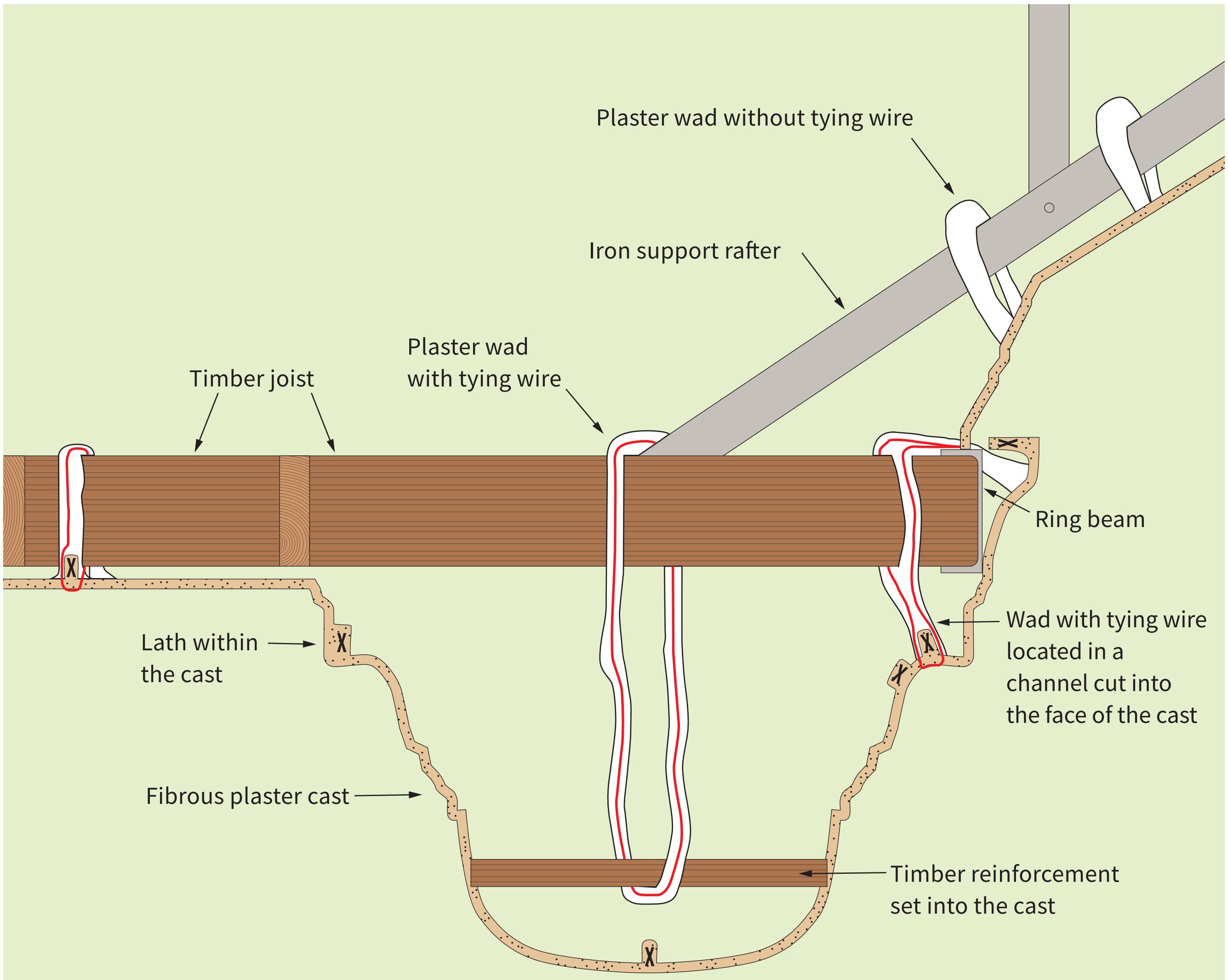

Figure 25: Section though a fibrous plaster ceiling showing wads connecting it to structural elements above. The nature of such construction can vary widely. In this example, some wads have wires tied to the underside of the cast. Other wads, without wire, are simply fixed to the cast by means of plaster within the wad.

When installed below roofs (within the area called the 'ceiling void'), fibrous plaster panels were suspended from the roof structure by means of an intermediary network of iron rods or timber battens. Fibrous panels were fixed to this network by means of wads (also known as wadding) made of hessian encased in plaster. When all plaster casts were in place each one would be wadded into the correct position, and then further support wads were incorporated. All joints to the back and face of adjacent plaster casts were made good with plaster of Paris and hessian reinforcement.

Galvanised wires were sometimes included in the wads as well. These needed to be of sufficient strength and quality, with suitable load-bearing strength, to support the fibrous plasterwork safely. However, in early fibrous plasterwork wire reinforcement of wads was not common.

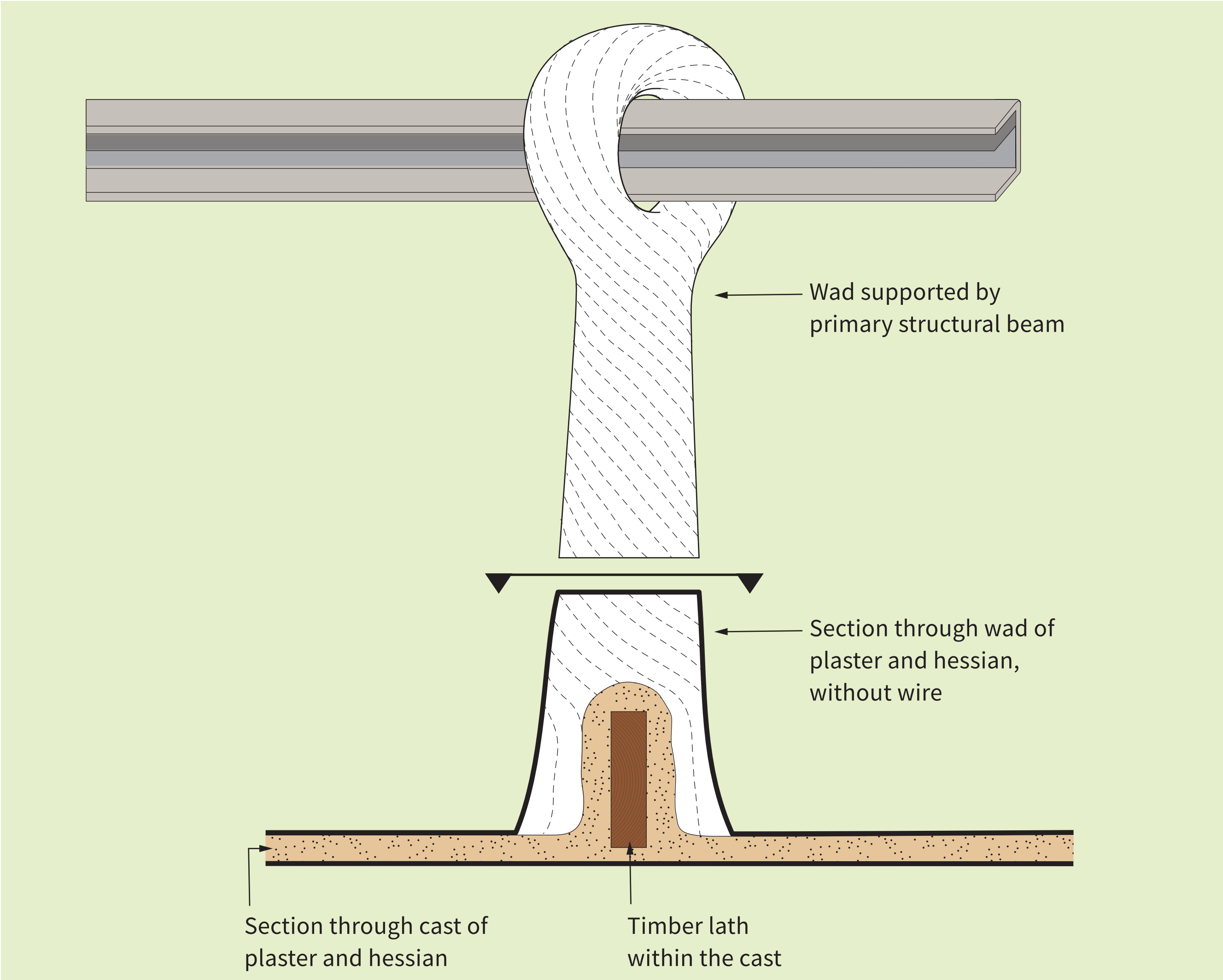

Figure 26: Section though a wad of plaster and hessian, without wire reinforcement. The adhesion between the cast and the wad is only by means of plaster-upon-plaster contact, with the fresh plaster of the wad fixed to the hardened plaster of the cast.

Small enrichments were either applied onto fibrous panels with plaster of Paris or other adhesive, or fixed with screws or wires and stopped with plaster around the edges. Fibrous plaster enrichments were added to conventional lime plaster and lath as well.

Simple model specifications published at the end of the 19th and early 20th centuries described the fixing of panels to walls or joists with nails or screws, but not the fixing of suspended panels with wads. These were usually far more complicated in design. It was invariably left to the discretion of the plasterer to determine the best method of fixing panels of different shapes and dimensions to structural elements provided within the roof structure.

2.4 Associated products

Plain fibrous plaster slabs

Fibrous plaster was used to form plain plaster panels, or 'plainface slabs'. These were intended as substitutes to plain lime plaster and lath, perhaps offering special qualities, such as fire protection of steel and concrete. A variety of such slabs were patented at the end of the 19th century. These were the predecessor of plasterboard sheets.

Fabrication was similar to conventional fibrous plaster. Plaster was poured onto a workbench within a timber frame, and the hessian pressed well into it. This was followed with a layer of plaster and size, into which laths were embedded and reinforced by hessian layers. The mould was then struck off to the top of the laths with plaster to create a level surface for fixing against a level background. When the cast had set, it was then lifted to expose the finished face.

Cement:lime plaster on expanded metal lath

Fibrous plaster components often formed part of complex curved ceilings, which may also have contained areas of plain fields. These were sometimes formed with expanded metal lath and cement and lime plaster. Expanded metal lath (EML) appeared in the late 19th century, following the patent for expanded metal in 1884. EML and a similar metal support called rib lath became increasingly common in the early 20th century as a replacement for traditional timber laths. Solid plaster on these supports was extremely common in theatres and cinemas from the early 20th century, offering quicker and cheaper methods of forming plaster ceilings in steel-framed structures with larger spans.

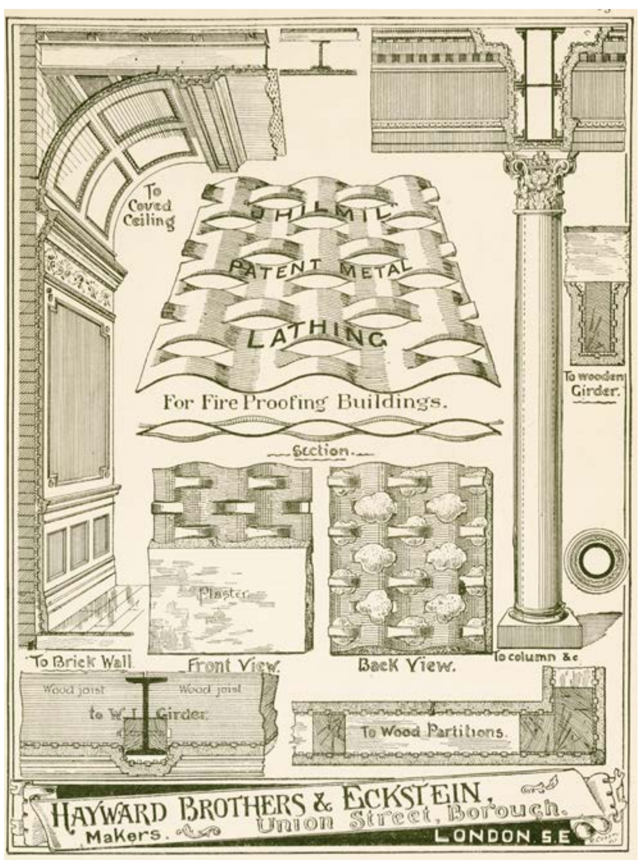

Figure 27: Advertisement for expanded metal lathing, from W. Millar, *Plastering, Plain and Decorative*, 1897.

3 Deterioration and damage

Fibrous plaster can fail for several reasons: defects in the structure to which it is fixed; degraded materials within the plaster casts; inadequate fixing methods; imposed load; and physical damage. This section summarises some of the main problems affecting the deterioration of fibrous plaster ceilings in particular. Of course, other types of ceilings can also fail, under poor conditions or with lack of monitoring and maintenance.

Harmful environmental conditions and physical stresses can compromise the integrity of fibrous plasterwork. However, the full range of their potential effects on fibrous plaster remains to be investigated.

As fibrous plaster is a composite system, decay of one material can compromise the performance of the others. In suspended ceilings, failure of part of a panel can strain and break wads under loading if they are not sufficiently reinforced with wire. Failure at one point adds additional strain on neighbouring panels. Their wads can subsequently fail by way of a 'domino effect'.

Suspended fibrous plaster ceilings can be of an ad-hoc nature and it is important to consider not just the strength of the supporting elements, but also the robustness of the overall system. However, the survival of so much fibrous plasterwork – for well over a century – illustrates its longevity in favourable conditions, particularly in well-maintained buildings.

3.1 Problems in the supporting structure

Structural movement, such as subsidence or deflection of roof timbers, can distort the structural elements to which fibrous plaster is fixed. This can then lead to tension and breakage of the casts themselves. Imposed loads from later service installations and walkways can also cause deformation.

Water ingress and poor environmental conditions can cause decay in structural timber and corrosion of structural iron or steel elements.

3.2 Fibrous plaster deterioration due to dampness

Moisture, including high ambient relative humidity, is one of the most important agents in the deterioration of fibrous plaster. It can degrade plaster of Paris, hessian and timber. Suspended fibrous plaster ceilings below roofs are particularly vulnerable if the roof is not well maintained and the void has poor environmental conditions. Water damage can also occur on ceilings on lower floors if defective plumbing is present. Moisture from condensation on structural iron and steel or faulty air conditioning in ceiling voids can drip onto plaster casts, resulting in degradation and cosmetic staining. Moisture can migrate through ceiling systems and appear far from the point of origin.

Deterioration of plaster of Paris

Plaster of Paris is slightly soluble in water. In prolonged damp internal locations it can soften over time, and if subject to persistent wetting, will disintegrate. As well as damaging the cast, this exposes hessian to greater risk of microbial infestation.

Decay of hessian

Hessian survives in fibrous plaster from 1858, which has retained some tensile strength. In contrast, it has been observed that much younger hessian has rotted due to mould attack. This invariably depends on environmental factors.

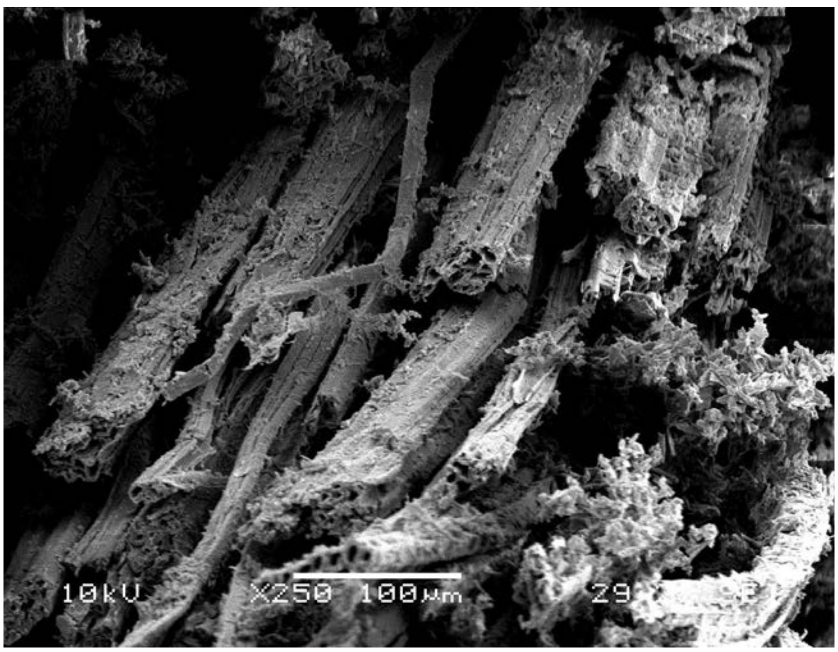

Figure 28: Scanning electron microscope image of hessian fibre bundles emerging from fractured fibrous plaster, showing clusters of ultimate fibres in each fibre bundle (x250). Anaylsis of the role of hessian in degradation is key to understanding fibrous plaster.

The long-term tensile strength of hessian in fibrous plasterwork in stable conditions has not been appraised. It is not known how much physical stress it can tolerate before it loses its ability to reinforce the cast. However, hessian has poor durability, on a par with sapwood. Therefore, it is prone to attack by any fungus that can degrade its cellulose content. Breakdown of the cellulose in hessian will cause a rapid and significant loss of strength.

It is currently assumed that hessian is protected from microbial decay if it is fully encased in sound plaster and in a stable environment; this requires confirmation by controlled testing. However, if there is insufficient plaster coverage, if the plaster is damp, or the hessian tears under tension, mould can grow. This occurs especially if the environment is warm and the relative humidity is over 70%. Growth rates tend to be zero at 0°C, rising to an optimum around 24°C. If relative humidity remains above 90%, wood-decaying fungi and bacteria may develop. Biodegradation of hessian can result in a failure of the fibrous plaster element. However, it takes a few weeks for the decay fungi to develop in these favourable conditions. Silverfish can attack exposed hessian if it is damp.

3.3 Fibrous plaster deterioration due to dehydration

Calcium sulphate dihydrate is sensitive to very dry conditions. In prolonged dry periods, dihydrate can lose water molecules and convert to the hemihydrate form of gypsum. The results are loss of cohesion and a powdery surface. At temperatures above 40°C, dependent on relative humidity, there is a possibility that the dihydrate form of gypsum will dehydrate to its hemihydrate form. In damper conditions it reverts to dihydrate. Cycles of dehydration and rehydration weaken the material. A local heat source and variable relative humidity are factors potentially affecting plaster within a building. This process has not yet been clearly identified in fibrous plasterwork, so research is required to determine if it actually occurs.

3.4 Faults due to materials, defective installation or modern repair

Materials and methods used to produce fibrous plaster may have been of poor quality. For example, the lower quality timber commonly used as lath is prone to decay by insect attack of its sapwood. Early fibrous plaster casts often contained hessian of a very tight weave, which restricted the absorption of plaster through the cast.

The quality of craftsmanship varied across buildings. Initial installation of fibrous plaster may have been poorly executed. The speed of construction of some buildings with fibrous plaster was extraordinary, with contractors working to very tight targets. This could have introduced defects into the system, such as: insufficient suspended timber to carry plaster panels; insufficient number of wads for the panel size or weight; wads without wire reinforcement; lack of secure nail or screw fixings, such as nails driven through an enrichment into an insubstantial plaster panel.

Modern repairs, such as reinforcement of the back of a suspended ceiling that was not sufficiently cleaned, can form new defects (see Section 5).

3.5 Faults due to alterations and use

Any ceiling is vulnerable to the poor installation of electrical services, as well as plumbing or air handling units. In some historic theatres and music halls, ceiling voids now house an array of plant and equipment that produces additional loading, so structural reinforcement is required to accommodate them. The increased visual and sound requirements of changing theatre productions also demand new rigging, with frequent access by contractors. These create the risk of damage during installation or maintenance.

Figure 29: Large area of ceiling installed without sufficient wad connections to the panels. This can be easily detected in an inspection and remedied in subsequent repairs.

Figure 30: Poor bearing of a timber ceiling joist on a small steel T bar. The hessian has insufficient plaster cover to protect it from degradation. This illustrates how defects can be concentrated.

If poorly designed, walkways erected over joists that support the ceiling may cause joists to flex under live loading from foot traffic, affecting the ceiling panels and ties attached to them. However, access requirements can be engineered by proper design and facilities management (see Section 6). Good practice has been demonstrated in many theatres where standards are high and exacting.

3.6 Lack of maintenance

Most voids above suspended ceilings have poor access for maintenance and inspection and little headroom for safe access. Fibrous plaster ceilings fixed to joists beneath floors have no designed access at all. These conditions impede inspection and maintenance.

Accumulated debris over a ceiling from vermin, pigeons or detritus from building works can impose additional loading for which the fibrous plasterwork was not designed. Furthermore, debris may obscure defects and make the ceiling more difficult to inspect. It also provides a medium for moisture retention, which may reduce ventilation and initiate the decay of organic materials.

4 Survey and assessment

Any type of historical ceiling may be at risk of collapse if it has not been well executed, repaired, maintained and regularly inspected. Certain fibrous plaster components are very heavy. Their collapse can cause serious injury or fatality. A high standard of survey is essential to understand the condition of, and risks to fibrous plasterwork, in order to enable a proactive strategy of repair and maintenance. Building professionals need to have greater understanding of the material and the awareness to retain competent engineers and plaster inspectors when required to survey and repair it.

4.1 Procedure

Documentation

Assessment of the condition of any historic feature should begin with a desktop survey to identify records of original construction and previous building defects, repairs and other associated interventions. The asbestos register for the relevant ceiling void should be consulted as a matter of course, and if this does not exist, one should be created (see the following box on asbestos surveys).

A thorough condition survey requires measured survey plans and sections. Ideally these show how the structure and fixings relate to large fibrous panels, and enable accurate recording of the location of specific defects. Measured drawings should include reflected ceiling plans, which consist of one plan of the decorative surface of the ceiling, and a mirror plan of its upper surface. As the creation of these plans is costly, it may need to be phased according to the budget available.

Laser scanning, such as 3D laser photogrammetry, is cost effective for the production of reflected ceiling plans for recording survey information. Laser scanning of the underside of a ceiling can assist monitoring, but at the time of writing is still not sufficiently accurate to detect very small movements. However, the technology is improving rapidly.

Asbestos surveys

Asbestos survey and management is a legal requirement. If it is suspected that asbestos is present in a building, an asbestos survey should be carried out by an accredited or certificated surveyor. The objective of an asbestos survey is to:

- identify the location, amount and condition of asbestos-containing materials (ACMs) and create an asbestos register and plan for the building
- determine if remedial action is required
- manage asbestos within a building
- identify all the ACMs to be removed before refurbishment work or demolition

There are two types of asbestos survey: a management survey to identify and manage risk; and a refurbishment or demolition survey in advance of building work.

Materials identification and condition surveying

Fibrous plaster can be present in a building erected anytime from the patent of 1856, but is most common from the early 1880s to the Second World War. However, it can be found in buildings erected before the patent, if it was installed as part of a subsequent renovation. Fibrous plasterwork and traditional lath and plasterwork may be found together within a decorative scheme.

Upon tapping, fibrous plaster produces a very hollow sound, distinct from that of lime plaster and lath (and delaminated lime plaster). It is not easy to identify it from its visual surface attributes alone, but some clues may be apparent. Lines and levels of fibrous work are usually more regular and 'true' than hand-modelled lime plaster and fibrous work has less undercuts and more repeated patterns. From the topside of a ceiling, fibrous plaster is characterised by the presence of panel construction, hessian and plaster wads, and sometimes small exposed areas of hessian.

Surveying fibrous plaster requires identification of the materials and composition of the different components and methods of fixing. Invasive investigations might be needed to determine this precisely.

There are essentially three levels of survey that are relevant for the assessment of fibrous plaster, as defined in this document:

- **Pre-inspection survey**: this determines the basic structure and condition, the scope of work, access arrangements, state of documentation and therefore the cost of a full baseline survey. Model forms for pre-inspection have been devised by the FIS (Finishes & Interiors Sector), the trade association for plasterers (see Section 9).

- **Baseline survey**: this constitutes the first thorough inspection of the condition of the plasterwork and associated structure, and it becomes the reference for all successive surveys. The back of suspended ceilings obscured by dirt and debris needs to be carefully cleaned by a competent plasterer in advance of a baseline survey. Removal of any insulation is also required, as well as walkways that obscure the ceiling. The baseline survey needs to verify the integrity of the following elements:

    - structural elements, such as the roofs above a suspended ceiling or the joists to which ceilings are affixed
    - all connections and fixings between the structure and the fibrous plaster panels
    - hessian wad fixings and the presence or absence of wire reinforcement
    - individual fibrous plaster panels
    - enrichments applied to the surface of the panels or other substrates

- **Re-inspection survey**: this reviews and updates condition against the previous condition survey, on an agreed and programmed basis.

These surveys should only be entrusted to a structural engineer and competent plaster inspector who are familiar with the material and its defects (see Section 7). They need to work closely together to align investigations and agree on spatial overlap or borders. For example, the plaster inspector may be responsible for fibrous plaster panels and their primary fixings, whereas the engineer may take responsibility for all other structural elements above. These principles should be discussed and agreed between the relevant parties, including the building manager, during a joint site visit prior to the commencement of the survey.

Each room with fibrous plaster wall and ceiling components needs a robust access plan enable the accurate survey of fibrous plaster elements. The most accurate method of survey requires the plaster inspector to have tactile contact with fibrous plaster panels, their fixings and applied surface enrichments. It is accompanied by close-range high-resolution photography to record conditions. The structural engineer may deem that some form of monitoring over time is required, such as crack monitoring.

If the survey identifies an area at risk of collapse, the structural engineer and/ or plaster inspector will recommend urgent protective measures, such as closing of access below, the placement of safety netting or the erection of a crash-deck scaffold.

Access arrangements for surveying wall enrichments and the underside of ceilings

To examine these elements, the type of access is determined by the height and complexity of the space:

- a conventional tower scaffold is sufficient in most simple spaces
- in theatre auditoria or other complex spaces, several methods are employed, sometimes together; however, only the first two enable thorough tactile contact:
    - a mobile elevating work platform gives the best, most flexible access; it requires a feasible route and initial assessment of the floor loadings for the proposed access route of the vehicle
    - a suspended cradle or scaffold
    - abseiling rope from rigging points
    - careful visual inspection, by eye and with binoculars to identify early warning signs such as cracks and deflection from line and level

Figure 31: In ceiling voids bulky mechanical plant and boarded walkways (lower right) obscure the fibrous plaster ceiling below and impede its inspection.

Figure 32: A tower scaffold is the most flexible means of access to inspect the underside of a ceiling, in a room with a clear, flat floor.

Access arrangements for surveying the upper surface of ceilings

- **Within the ceiling void of a suspended ceiling:** access walkways are used to inspect adjacent ceiling areas. These walkways may be extended with temporary timber platforms or fixed over joists, subject to assessment by the structural engineer. Surveyors may need to wear fall restraint systems. Inaccessible areas require abseiling access with eyebolts specially fixed in the structure. Specialist plaster companies employ rope access personnel.

- **Ceilings fixed to joists beneath traditional timber floors:** these are inspected by the lifting of floorboards.

- **Ceilings fixed to fireproof floors of concrete and iron/steel:** these need to be appraised by suitably qualified building professionals to determine means of access.

4.2 Industry survey standards

The only standard for the survey of fibrous plaster ceilings is the guidance written by the theatre industry: *Guidance Note 20: Advice to Theatre Owners and Managers regarding Suspended Fibrous Plaster Ceilings; Survey, Certification, Record Keeping etc*. (2015) by the Association of British Theatre Technicians (ABTT). This advice is mirrored in the ABTT's *Technical Standards for Places of Entertainment*.

The ABTT guidance constitutes the standard required to give formal certification that a theatre is safe for public access. The theatre industry, supported by the Health and Safety Executive (HSE), required all theatres in the country to carry out inspections following these recommendations by 1 September 2016.

The guidance is also relevant for fibrous plaster ceilings in all types of buildings. Architects, surveyors, and building managers responsible for buildings with fibrous plasterwork are advised to follow its recommendations. The guidance addresses suspended ceilings, as these are customary within theatres. However, ceilings fixed to solid floor structures in other types of buildings can also fail, so they should be subject to the same concerns, considerations and survey requirements. The ABTT guidance describing inspection, and how it should be carried out, is summarised in the Appendix.

Practical application of the guidance

The following table frames the processes recommended in the ABTT guidance. It adds the pre-inspection survey, which includes an estimate of the cost of a full baseline survey. Where funds are lacking, the pre-inspection survey provides a basis for fundraising to finance the baseline survey on a phased basis. For example, a pre-inspection survey may be followed by several partial baseline surveys before reaching full baseline status.

Some local authorities recommend a re-inspection in places of entertainment on a regular basis (every three years, for example). However, the structural engineer and plaster inspector should advise on the period of re-inspection according to the needs of the specific building, which may be more frequent than advised by the local authority.

Ceiling inspection process (based on *ABTT Guidance Note 20*)				
	Task	Objectives	Personnel	Comments
1 Pre-survey activities				
1.1	Identify documentary material: measured survey drawings, asbestos surveys, etc.	Support future condition survey and repair record	Owner or facilities manager	
1.2	Identify existing access or new access requirements	Determine ease of access (above and below)	Architect or surveyor on behalf of owner or manager	
1.3	Identify presence of fibrous plaster	Determine extent of material to be surveyed	Architect or surveyor on behalf of owner or manager	Need reasonable access to identify (touch) potential fibrous plaster
1.4	Close off access to area if there is apparent risk	Protect users of the building	Owner or facilities manager	
1.5	Identify structural engineer and competent plaster inspector	Ensure survey is carried out by relevant expert	Owner or facilities manager	See ABTT *Guidance Note: Appendix B* and FIS webpages
2 Pre-inspection survey				
2.1	Pre-inspection survey	Characterise condition and risk and provide quote for: ■ Baseline survey ■ Access requirements	Structural engineer and competent plaster inspector	Baseline survey and repairs will have to be phased where funding is not available
2.2	Close access to areas deemed at risk	Protect people and property	Owner or facilities manager	
2.3	Write survey report with recommendations	Produce prioritised list of next steps	Structural engineer and competent plaster inspector	
2.4	Fundraising for baseline survey	Ensure adequate funds are available to complete the work to satisfactory standard	Owner or facilities manager possibly with support from their architect or surveyor	As funds become available, follow subsequent steps

Ceiling inspection process (based on *ABTT Guidance Note 20*)				
	Task	Objectives	Personnel	Comments
3 Baseline survey				
3.1	Identify contractor for measured survey of ceiling (above and below)	Obtain quote for measured survey drawings to be used for baseline survey. Determine access requirements	Owner or facilities manager	
3.2	Specify access for surveys	Ensure safe access for measured survey and condition survey	Structural engineer or competent plaster inspector	
3.3	Install access in ceiling void	Enable access to ceiling void	Competent plaster inspector	
3.4	Cleaning risk assessment and cleaning of ceiling void	Remove detritus/insulation concealing ceiling. Clean back of ceiling so its condition can be accurately recorded	Competent plaster inspector	Must not damage ceiling or associated structure
3.5	Carry out measured survey	Provide plans for the condition survey	Survey contractor supervised by competent plaster inspector	Must be accompanied to ensure safety of contractor and ceiling
3.6	Structural survey of the walls and roof, the structure supporting the ceiling	Record materials, structure and condition of supporting structure as basis for remedial works programme	Structural engineer	Liaise with plaster inspector
3.7	Plaster survey	Record materials, structure and condition of plaster as basis for remedial works programme Label each individual wad and wire fixing	Competent plaster inspector	Liaise with structural engineer. Note any obstructions to inspection, also on drawings, and assess risk
3.8	Write survey report with recommendations	Propose prioritised remedial works programme.	Structural engineer and competent plaster inspector	Uninspected areas thought to be at risk or of indeterminate risk should be logged as a defect and dealt with as soon as possible
3.9	Install interim protection if needed	Protect people and property	Owner or facilities manager	
4 Re-inspection survey				
As 3.6–3.9				

Listed building consent in England

When a building is listed, the entire building, both inside and out, is protected, as are any fixtures and fittings, including any attached and curtilage buildings or other structures.

Listing helps to protect buildings from harmful interventions by requiring that a special authorisation, known as 'listed building consent', be obtained from the local planning authority for all works of demolition, alteration or extension to a listed building that affects its character as a building of special architectural or historic interest. This can also include some repair works. It is a criminal offence not to seek consent when it is required. The local planning authority's conservation officer can advise on the need for listed building consent.

Churches managed by the Church of England, Roman Catholic Church, Methodist and United Reformed Churches and the Baptist Union of Great Britain are exempt from the requirement to apply for listed building consent, but must instead apply for permission to the appropriate church authority for advice and authorisation.

When deciding which works need consent, the relevant authority must consider the effects of the proposed works on the special interest of the building, taking into account the significance of the building, its history, the extent to which the historic fabric might be harmed by the works, and the authenticity of the materials and methods proposed for repair and alteration.

Churches belonging to the denominations covered by ecclesiastical exemption may require denominational authorisation even for minor works that would not need listed building consent.

Listed building consent in Scotland, Northern Ireland and Wales

For procedures in Scotland see:

- www.historicenvironment.scot/advice-and-support/applying-for-consents/listed-building-consent-and-conservation-area-consent/listed-building-consent/

For procedures in Northern Ireland see:

- www.communities-ni.gov.uk/topics/historic-environment
- www.communities-ni.gov.uk/articles/buildings-advice-and-maintenance

For procedures in Wales, see:

- www.cadw.gov.wales/advice-support/historic-assets/listed-buildings/listed-building-consent
- www.cadw.gov.wales/advice-support/historic-assets/listed-buildings/historic-places-worship#section-ecclesiastical-exemption

Responses to dangerous conditions or collapse

In the event of the collapse of a fibrous plaster ceiling, or if it is suspected that a ceiling is in imminent danger of collapse, the following steps need to be taken:

- Close off all access to the affected area, or any adjacent areas that might be at risk of further collapse.
- Contact the local authority building control team, which will be able to provide urgent advice regarding whether the building is a dangerous structure.
- Contact the local authority planning team, which will advise on temporary support that might be put in place pending submission of listed building consent for full repair. For Grade II* or Grade I listed buildings, the local office of Historic England can also be contacted for pre-application advice.
- Agree a method statement for repair works in writing with the local authority (and Historic England if relevant).
- Implement agreed repair or reinstatement works, ensuring contractors have suitable training, skills, experience and knowledge.

It is recommended to keep an up-to-date record of relevant local planning authority contact details to enable swift action where urgent work is required.

5 Repair

When there are structural defects, the structural engineer will recommend that they be repaired before fibrous plaster is treated. Repairs need to be designed and planned by the structural engineer in consultation with the plaster inspector. The primary structure may need to be reinforced for the introduction of extensive new supports for plaster repair. Fibrous plaster might need to be protected during such work.

Repairs to fibrous plaster need to be carried out by a competent plasterer with experience in the repair of fibrous plaster (as defined in the ABTT guidance). The approach to repairs may differ between specialist plaster companies. The scope of repairs, as identified in the survey, can include:

- insertion of new node points as strong fixing locations to support plaster panels
- insertion of new suspended supports for plaster panels
- addition of new wire-reinforced wads to fibrous plaster panels
- securing of heavy mouldings by wires, fixed to timber joists above
- insertion of new metal fixings to secure fibrous plaster panels or enrichments
- reinforcement or consolidation of fibrous plaster panels
- removal, repair and reinstatement of fibrous plaster panels

It is particularly important to replace any missing or failed wads; one failed wadding adds to the loading of adjacent ones and increases the risk of a progressive collapse of a panel.

Fibrous panel reinforcement (also known as re-lamination or backsticking) is executed when the integrity of the composite panel is severely weakened and at risk of collapse. Consolidation is carried out to the back of the panel with the addition of a new layer of plaster of Paris and hessian or a proprietary acrylic binder and modern synthetic fabric. This adds additional loading to the panel. Reinforcement should only be applied where required and following an assessment of the effect of the additional load.

As a last resort, fibrous plaster that cannot be safely repaired and that presents a risk to the public may be replaced with a replica. In a listed building, this will have to be fully justified as part of a listed building consent application, and permission must be obtained before any work is undertaken. A new fibrous plaster ceiling in traditional materials is likely to be required.

A repair programme also presents the opportunity to create better access to a ceiling void, such as new hatches or walkways. New hatches obviously need to be in areas with the least aesthetic and structural impact on the historic fabric. In a listed building, they will require listed building consent.

Figure 33: Fibrous plaster fretwork, given supplementary support with a new beam and wire-reinforced wads. This is a standard method of improving the stability of suspended ceilings.

6 Building management and maintenance

Public buildings with fibrous plaster ceilings are usually serviced by a building facilities management team. In such buildings a 'ceiling champion' should be appointed. The ceiling champion should be trained by the structural engineer and plaster inspector to an agreed level, defining their specific responsibility, the standard of documentation and line of communication.

If a building facilities team does not exist, a member of staff should be designated by the management to take responsibility for fibrous plaster. The individual should be given basic training to carry out regular monitoring and reporting of new cracks, water ingress or other material changes.

Signs of failure, such as cracking, can occur at any time in ceilings. Regular, in-house inspection of ceilings is essential. The contracted plaster inspector should be notified of significant changes in condition.

The ABTT guidance identifies some of the tasks that a building manager needs to administer for theatres. This is also applicable to the management of other types of buildings.

Key management tasks are:

- **managing risk assessments**: including for fibrous plaster
- **appointing a ceiling champion**: to train and manage housekeeping staff to:
    - visually monitor ceiling and wall condition and other relevant components (for example, for cracks or water staining, air conditioning units in the ceiling void) on a regular basis
    - record the location of any detached paint or plaster found during routine cleaning, retain the sample, and document the event
- **regularly checking roof drainage and rainwater goods**: particularly after storms, and cleaning as necessary

- **controlling access to ceiling void**: issue contractors requiring entry into a void with a permit-to-work form, provide a member of staff (the ceiling champion) to accompany them, and ensure that the contractor and the ceiling are not put at risk

- **requiring contractors to safely remove any rubbish from their work**

- **creating a building register**: if one does not already exist, create an accessible register to file all previous building records and new ones, and ensure ease of access

- **preparing access plans for each part of the building fabric**: including routes for mobile elevating work platforms

- **scheduling maintenance, monitoring and remedial works**: a regular programme of these activities should be agreed with the competent plasterer and structural engineer, on a frequency appropriate for the needs of a particular building

- **reviewing professional qualifications**: assess the competency of contracted plaster companies and structural engineers on a regular basis and assess the experience of the lead person undertaking the inspection

- **managing the installation of new mechanical and electrical installations** (mainly in theatres or other places of entertainment, but can be applicable for other building types): review and approve proposals by contractors; engage competent plasterer to agree location of new installations (such as rigging with riggers) and access issues; and closely supervise their installation

- **improving access within a ceiling void**: where access can be extended or enhanced (replacing a walkway that cannot be easily removed for ceiling survey, or one that stresses the ceiling, for example), the design should be created in consultation with the competent plasterer and engineer (in a listed building, consent must be obtained)

The environment within a ceiling void can contribute to the deterioration of fibrous plaster. Real-time monitoring of air/surface temperature and relatively humidity can help to characterise the environment and flag hazardous conditions (see Section 3). Simple and relatively inexpensive equipment is available to record this information. However, it needs to be downloaded, processed and analysed by someone who can properly interpret the data and understands the implications for the building fabric.

7 Determination of competency

Competency means that an individual has the combination of training, skills, experience and knowledge to carry out a task safely, and the experience and knowledge to manage health and safety.

Building managers who commission condition surveys and repairs from fibrous plaster contractors are responsible for ensuring that they have the necessary competence to carry out the required tasks. Plaster contractors are obliged to ensure that their employees who undertake the work are competent to do so.

Structural engineers are a regulated body (by the Institution of Structural Engineers) with specific professional qualifications and a regulatory industry accreditation. Suspended fibrous plaster ceiling contractors may be members of a trade association, but do not have specific professional regulatory accreditation. The ABTT guidance states:

> Plaster specialists are currently unlikely to hold recognised professional qualifications or industry accreditation. In the absence of such third party assurance, theatres are expected to undertake independent assessments of the competence of plaster specialists for the scope of services they wish to contract.

The Heritage Plastering Forum of the FIS has produced two questionnaires to assist determination of competency: the Manufacturing and installation competency questionnaire and the Inspection competency questionnaire.

The ABTT *Guidance Note 20* has a statement relating to competency in relation to fibrous plaster; the HSE provides more generic advice on the topic.

Determination of competency is an ongoing process, as personnel can change in a plaster company, and/or require CPD training.

8 Appendix: *ABTT Guidance Note 20*

The following text summarises *ABTT Guidance Note 20* with respect to ceiling surveys. The full document should be consulted for its comprehensive recommendations.

The principles

- The structural parts supporting suspended fibrous plaster ceilings should be inspected by and a report confirming their satisfactory condition be provided by a competent structural engineer.
- The plaster parts of a suspended fibrous plaster ceiling should be inspected and certified as satisfactory by a competent plaster inspector.
- All suspended fibrous plaster ceiling surfaces should be inspected from both above and below unless access is not possible.
- To determine source(s) of any past, present and future water ingress as well as building movement, all relevant interior and exterior parts of the theatre where water ingress and movement should be inspected.
- Ceilings should be inspected regularly and each inspection report should make recommendations for individual timescales for re-inspection.

Baseline survey

- This is a thorough one-off survey of existing conditions that should be carried out by a competent structural engineer and by a competent plaster inspector.
- The output is a clear, detailed, documented record (including sketches and photographs) of the construction of the ceiling and how it is supported from the main structure of the building.

Access

- To enable access to ceilings from above or below, inspection hatches, platforms or other means of observing ceilings should be considered.
- Until any such necessary methods are employed, the ceiling should be regularly monitored for changes clearly visible to the eye and the advice of a plaster specialist sought as to any interim measures that are necessary.

Unreinforced wadding ties

- If it is not reasonably practicable to gain access to a suspended fibrous plaster ceiling from above or below, it should be presumed that unreinforced hessian wadding ties (without wire) may have been used.
- If plain (unreinforced) hessian wadding ties have been found to be present and there is evidence of failure in any, consideration should be given to the consequences of further failures.
- The employment of a method to maintain the safety of the ceiling such as netting should be considered.

Obstructions to inspection
■ Any obstructions to the visual inspection of suspended fibrous plaster ceilings should be removed wherever reasonably practicable.
Cleanliness of ceiling voids
■ Ceiling voids (the volumes above ceilings) should be cleaned to such a standard as to allow reasonable visual inspection of all attachment points.
Caveats and disclaimers
■ The conclusions and expert advice as to matters of fact contained in inspection reports and surveys provided by structural engineers and plaster inspectors should be expressed as clearly and categorically as possible. ■ The structural engineer or plaster inspector carrying out the inspection or survey should not seek to limit or exclude liability via a general or blanket limitation.
Re-inspection intervals
■ The baseline survey and each subsequent inspection should give recommendations as to the maximum interval before the next inspection of the various suspended fibrous plaster ceilings.
Maintaining records
■ Theatre operators and employers should compile and maintain a register of all suspended fibrous plaster ceilings in their theatre. ■ The baseline survey should form the basis for all future inspection and maintenance of suspended fibrous plaster ceilings.
External parts
■ The suspended fibrous plaster ceiling management system should include regular inspection of the external roof and roof void above for signs of disrepair and water ingress including reactive inspection after heavy storms and any adjacent building works.
Management system
■ Theatre operators and employers should have in place a robust management system for the regular visual inspection of suspended fibrous plaster ceilings for obvious signs of damage or disturbance that ensures any such obvious damage or disturbance is reported to and reviewed by a plaster inspector and if necessary a structural engineer to establish its priority as soon as is reasonably practicable.
Ceiling certificates
■ Ceiling 'certificates' should be obtained as confirmation and evidence that the premises may be safely opened to the public in accordance with the latest guidance in the *Technical Standards for Places of Entertainment*.
Competent persons
■ Inspection, repair work and maintenance should be carried out by competent persons of sufficient demonstrable experience (both in the technical aspects of the work and compliance with current health and safety regulations) in the inspection and maintenance of theatres with suspended fibrous plaster ceilings.

9 References

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Stagg, W D, and Masters, R 1986 *Decorative Plasterwork: Repair and Restoration* (2nd ed) Builth Wells: Attic Books

Webpages

FIS (Finishes and Interiors Sector). Pre-inspection form, Inspection form; Manufacturing and installation competency questionnaire; Inspection competency questionnaire

Health and Safety Executive (HSE). What is competence?

10 Where to get advice

10.1 Useful organisations

The Association of British Theatre Technicians (ABTT)
4th Floor
55 Farringdon Road
London
EC1M 3JB
Tel: 020 7242 9200
Email: office@abtt.org.uk
www.abtt.org.uk

FIS (Finishes and Interiors Sector) Heritage Group
Olton Bridge
245 Warwick Road
Olton, Solihull
West Midlands
B92 7AH
Tel: 0121 707 0077
Email: info@thefis.org
www.thefis.org

Historic Environment Scotland
Longmore House
Salisbury Place
Edinburgh
EH9 1SH
Tel: 0131 668 8600
www.historicenvironment.scot

Cadw
Welsh Government
Plas Carew
Unit 5/7 Cefn Coed
Parc Nantgarw
Cardiff
CF15 7QQ
Tel: 0300 0256000
www.cadw.gov.wales

Historic Environment Division
Ground Floor
9 Lanyon Place
Town Parks
Belfast
BT1 3LP
028 9081 9226
www.communities-ni.gov.uk/topics/historic-environment

Theatres Trust
22 Charing Cross Road
London
WC2H 0QL
Tel: 020 7836 8591
www.theatrestrust.org.uk

10.2 Contact Historic England

East of England Regional Office
Brooklands
24 Brooklands Avenue
Cambridge CB2 8BU
Tel: 01223 582749
Email: eastofengland@HistoricEngland.org.uk

Fort Cumberland
Fort Cumberland Road
Eastney
Portsmouth PO4 9LD
Tel: 023 9285 6704
Email: fort.cumberland@HistoricEngland.org.uk

London & South East
Regional Office
4th Floor
Cannon Bridge House
25 Dowgate Hill
London EC4R 2YA
Tel: 020 7973 3700
Email: londonseast@HistoricEngland.org.uk

Midlands Regional Office
The Axis
10 Holliday Street
Birmingham B1 1TF
Tel: 0121 625 6870
Email: midlands@
HistoricEngland.org.uk

North East & Yorkshire Regional Offices
Bessie Surtees House
41-44 Sandhill
Newcastle Upon Tyne NE1 3JF
Tel: 0191 269 1255
Email: northeast@HistoricEngland.org.uk

37 Tanner Row
York YO1 6WP
Tel: 01904 601948
Email: yorkshire@HistoricEngland.org.uk

North West Regional Office
3rd Floor, Canada House
3 Chepstow Street
Manchester M1 5FW
Tel: 0161 242 1416
Email: northwest@HistoricEngland.org.uk

South West Regional Office
29 Queen Square
Bristol BS1 4ND
Tel: 0117 975 1308
Email: southwest@HistoricEngland.org.uk

Swindon
The Engine House
Fire Fly Avenue
Swindon SN2 2EH
Tel: 01793 445050
Email: swindon@HistoricEngland.org.uk

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Contributors

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