East Anglia's medieval rood screens: conserving sensitive painted artworks in uncontrolled church environments

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Abstract

England's East Anglian region has *c*.550 late-medieval screens still in their original churches, one of Northern Europe's most significant *in situ* collections of medieval panel painting. The churches are managed by non-specialist volunteers and are not museums. In many, congregations are shrinking and long-term sustainability will involve varying uses of the building. The buildings and their collections are at risk from, among other factors, weather, groundwater, fire, heat, humidity, light, pollutants and pests, as well as vandalism and theft. The same threats affect screens, causing flaking paint, microbiological growth, insect damage and photodegradation. A collaborative programme was forged between the Hamilton Kerr Institute, University of Cambridge, specialists in medieval panel painting conservation, and Tobit Curteis Associates, specialists in environmental deterioration in historic buildings, supported by the Church of England's Cathedral and Church Buildings Division. This project aimed to bridge the gap between the conservation of sensitive artefacts and the conservation of the buildings in which they are situated. A methodology, utilising materials analysis, environmental monitoring and building and object surveys, was devised for the assessment of the deterioration of screens and their churches to produce holistic recommendations. Through a pilot study, solutions that are passive, cost effective, innovative and sustainable are being implemented.

Introduction

There are more than 12,500 historic churches in the UK listed as being of architectural significance and almost all contain artefacts of historical, architectural, archaeological, and artistic interest. Rood screens, so-called because they originally supported a crucifix (rood), were a common feature of the late medieval church, separating the nave and chancel. They are often highly elaborate wooden structures comprising panelled and tracery-filled lower sections below a rood loft on which stood the crucifix, often flanked by paintings on the wall behind or on a timber tympanum. So-called parclose and tower screens separated other areas of the church, such as guild and family chapels (Bond 1908; Vallance 1936). These structures can be highly sophisticated, with detailed carving, applied decoration and elaborate paintings, typically of saints or decorative designs in the lower panels. In East Anglia, the highest concentration of screens has survived, with more than 550 recorded. Although many are now stripped of their original polychromy, medieval church screens were once all painted and around 200 in the region retain extensive decorative or figurative paint schemes (Baker 2011; Wrapson 2014).

Next to mechanical damage, environmental factors are the greatest risk to this type of sensitive artefact, whose mixed media respond differently to unstable or inappropriate moisture and temperature conditions. Traditionally, conservation of these types of painted screens has focused largely on the stabilisation and reintegration of the timber and painted structure itself with only limited measures to address the underlying causes of deterioration, i.e. the environmental conditions within the church building (Plummer and Hulbert 1990). This is partly due to traditional project structures, with the conservation of building and artefacts seen as discrete exercises, but also to the training process, where conservators are taught little about the buildings within which they work, and architects learn little about the conservation needs of artefacts within their buildings. The situation has been exacerbated by statutory and funding frameworks, which often separate the repair and conservation of buildings and collections. These issues are by no means unique to churches, nor to the United Kingdom, but are common throughout historic buildings where structure and collections are often considered largely in isolation. The East Anglian rood screen project was developed with the intention of bridging this gap. If the building structure and building environment do not perform adequately, sensitive artefacts will continue to deteriorate. Not only is this poor conservation practice, but it is also financially inefficient, particularly when dealing with buildings with a time horizon of centuries rather than years: unless the underlying causes of deterioration are controlled, investment in conservation treatment is wasted as failure continues (Staniforth 1990). This paper presents a methodology for the assessment stage, with one case study site discussed in detail, which demonstrates the importance of collaborative work during surveys to ensure that the treatments proposed address the long-term sustainability of both objects and buildings.

The East Anglian Medieval Screens pilot survey project

The initial stage of the project, funded by the Headley Trust, developed a survey methodology which was tested in 10 exemplar churches, chosen on the basis of geography, building, and screen type and condition. Because of the difficulty in identifying or training practitioners with skills both in painting conservation and architectural conservation, the test surveys were undertaken by two separate specialist practitioners, working in close collaboration. As well as allowing specialist investigation of both aspects, this approach had the additional benefit of identifying weaknesses in each practitioner's skill set that would need to be addressed to develop a more comprehensive single-practitioner survey programme.

The building survey involved an assessment of the liquid water and microclimatic performance of the building. An assessment was carried out of the building envelope, rainwater disposal system and underground drainage, to establish the efficacy of the historic design and the way in which defects reduced performance. In conjunction, a high level assessment was undertaken of the hydrology of the surrounding site based on published borehole data and reported conditions from the local community, including shallow geology, ground water, surface drainage and flood risk, as well as the impact of climate change with increasing short high-intensity rainfall events (Pender, Curteis, and Ridout 2014:377).

The study of the building microclimate included an assessment of the passive performance of the building envelope in providing buffering between external and internal conditions and identifying points of weakness. In conjunction, an assessment was carried out of any heating system and its use, alongside the assessment of the use of the building by people.

The survey of the screen involved an examination of the timber structure and an assessment of the past conditions and interventions. The current condition of the timber structure including deformation and cracking, beetle damage, dry and wet rot and impact damage was also examined. The paint layers were evaluated in terms of: overall loss and abrasion of remaining material; the level of cohesion within the paint and adhesion to the ground and substrate; photo- and chemical deterioration of pigments; the effect of microbiological growth; impact damage; and the effects of building use including cleaning materials, candle wax and even silver spray paints from the decoration of churches at Christmas time.

The results were correlated to evaluate the impact of the building condition and use, both historically and at present, on the past and current condition of the screen. Recommendations were made for passive conservation measures to control current causes of deterioration (including recommendations for building repairs, use and heating), as well as conservation treatment to stabilise damaged areas and improve presentation (Curteis and Wrapson 2013). Where treatment was recommended, overall budget costs were provided. In some cases, where the causes of deterioration were particularly complex, recommendations were made for more detailed investigations including liquid moisture surveys, environmental monitoring, materials analysis or intrusive building investigations.

Survey results: St Agnes, Cawston

For this paper, the results of a single survey are considered: St Agnes' Church, Cawston in Norfolk (Figure 1). Built largely in the mid-fifteenth century, the church is a large and impressive structure typical of the Perpendicular Gothic style. Although the interior now appears plain, it would originally have been rich and colourful with widespread wall paintings (some fragments of which survive), stained glass and a painted rood screen and loft (Pevsner and Wilson 1997:430; Mortlock and Roberts 2007:66–7). The rood screen is one of the finest surviving examples anywhere, with notable carving and painting, despite the loft and rood having been removed. The surviving screen retains much of its upper tracery and doors, and has 20 figure panels along the dado, painted by several different workshops. Cawston's screen is especially important because bequests in wills of various dates attest to its construction and decoration over an extended period, from 1460 to 1507 (Cotton 1987), telling us much about how rood screens were made and decorated (Figure 2).

The building is in poor condition, following many years during which maintenance was limited. The walls, which are of flint rubble with external render, were badly damaged, allowing water penetration to the core. The lead roofs were also in poor condition and, in conjunction with the damaged rainwater goods, allowed water penetration of the envelope and pooling at the base of the walls. The historic damage and repairs demonstrated that the deterioration is long term.[1]

The screen is constructed of oak, likely of English origin given the wavy grain, even of the wainscot boards, which are more typically made from straight-grained Baltic oak (Wrapson 2014:59–61). The ground is made of chalk, probably bound in animal glue, as is typically found on East Anglian

[1] At Cawston the initial survey results demonstrated the need for a fuller environmental survey and monitoring programme.

screens. The painting is undertaken in a drying oil, using pigments typical of the late-fifteenth/early-sixteenth century, including expensive gold leaf and azurite.[2] The screen was further elaborated using gilded tin relief and faux enamels set behind glass. Unusually, the last six figures on the south side are cut-outs, painted on paper rather than directly onto the wood (Wrapson 2016).

There is evidence on the screen of deliberate iconoclastic damage from the Reformation or Civil War. There is also evidence of repainting, likely during the nineteenth century. There was a major intervention in 1952 by J. Royal and D. Wormald, to treat death watch beetle damage and flaking paint. Since 1952, flaking paint on the screen was consolidated by Pauline Plummer on three recorded occasions, in the 1970s, 1990s and 2000s: there continue to be areas of flaking paint on the screen. The choice of wavy-grained wood, coupled with high and fluctuating relative humidity (RH), has probably contributed to the repeated occurrence of tented paint, which along with accidental/deliberate damage, death watch beetle infestation and light-induced pigment damage, constitute the main ongoing threats to the screen.

<u>Environment</u>

The building is well constructed with thick walls and provides a significant level of hygral and thermal buffering: large fluctuations in external weather are reflected by far smaller fluctuations inside. Thermal buffering is reduced by the large, single glazed windows and the large, uninsulated roof. Hygral buffering is undermined by air leakage through poorly-fitting or damaged windows and doors, as well as weak elements in the building structure, including the junction between walls and roof.

Close to the screen, annual conditions were 41–96% RH and –1 to 28°C with averages of 75% and 12°C. Diurnal fluctuations were typically less than 5% and 1°C, but when sunlight struck the screen fluctuations of greater than 20% and 6°C occurred (Figure 3). The high RH and the thermal inertia of the masonry structure lead to periodic condensation throughout the winter and spring. Condensation can also be anticipated at the base of the screen where thermal bridging with the floor, and evaporation of ground moisture through the timber, will cause localised cooling.

Heating is provided by a large number of freestanding propane heaters used only during events. These cause a swift variation in temperature and an increase in absolute humidity (AH) both from water vapour from the combustion process and evaporation from the building fabric.[3] The result is a sharp fluctuation in RH, causing stresses within the wooden structures that lead to paint loss and an increase in salt activity in contaminated stone and plaster.

The church congregation is small, averaging 20 people, who hold one service each Sunday as well as festival services, weddings and funerals. People radiate heat at a rate of *c*.100 W and generate 30

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[2] Identified by Lucy Wrapson using a portable Bruker Tracer III X-Ray Fluorescence Spectrometer.

[3] The bottled 'Calor gas' typically used in portable heaters in the UK comprises approximately 90% propane, 8% propyne and 2% butane. Each kilogram of gas burned produces around one litre of water. Pers. Comm. Calor Gas Technical Services.

to 70 g of moisture per hour – more if wearing wet clothing (TenWolde and Pilon 2007). In a building of this size the few regular users are unlikely to have a significant effect on the internal environment. If, on the other hand, large numbers of people were in the church on a damp day, e.g. for a winter service, the moisture input could result in damaging environmental instability.

The effects of the building environment on painted timber screens can generally be separated into issues associated with liquid water and those associated with microclimate. Liquid water at the base of the screen has caused rot, leading to the replacement of part of the timber sill in the nineteenth century. Where the screen is still in contact with the wall and floor, an elevated moisture content, which had led to an attack by death watch beetle (Figure 4), was confirmed by electrical capacitance and microwave measurements (indicative of liquid water rather than condensation).[4]

The unstable RH causes expansion and contraction of the relatively lightly constructed timber screen, which has a large surface area to volume ratio. The oil paint layers will reduce porosity and slow the response to short-term RH fluctuations but medium-term changes and seasonal fluctuations will induce greater movement in the timber, resulting in paint delamination and flaking (Figure 5).

Building repair and conservation treatment

At the time of writing, the church is undergoing a programme of repair and re-ordering addressing many of the issues identified in the survey. This will improve the environmental conditions, reducing the AH and RH by minimising the water penetration of the structure and stabilising the microclimate by reducing unnecessary air exchange with the exterior. Solar shades have been recommended for the windows on the south elevation and a new heating system is under development, based on radiant heat sources providing local thermal comfort with minimal effect on the overall air mass. Once the environmental conditions are improved, a programme of conservation treatment of the screen will be undertaken. Whilst this is a more costly approach than treatment alone, the fabric repairs ensure that the treatment of the screen is sustainable, as well as benefiting the whole building, its contents and the people using it.

Conclusion: ways forward

The history of conservation of sensitive artworks in churches in Britain, and elsewhere, has been one of treatment of the damaging symptoms of deterioration, rather than addressing the underlying causes. This pilot project produced results that enabled a holistic approach to conservation of the building and contents to be developed, understanding the environmental profile of the building and controlling deleterious factors, and also addressed the needs of the parish both now and in the future.

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[4] Measurements were taken with a Trotec T3000 handheld unit.

This type of approach is of particular importance at present as churches are struggling to fund even day-to-day maintenance and are often looking to expand use to wider community activities. The need for such developments was highlighted by the Taylor Review (2017), which concluded that greater strategic oversight of repair and maintenance was required, coupled with greater engagement of congregations with their local communities in using and caring for churches. With an increased variety of use comes a change in environmental conditions and, therefore, the conservation risks to sensitive fabric and artefacts. Thus, the understanding and control of the environment is also a key part of any successful church development programme.

The results of the project also demonstrated the difficulties with project funding. Much of the long-term deterioration that was observed was associated with lack of maintenance, often due to the challenge of adequately maintaining these complex buildings. Although it is problematic in the current economic climate, capital funding for conservation and repair is generally simpler than raising small funds for maintenance. Yet if the church is not maintained capital projects become unsustainable as the cycle of deterioration continues. There is now extensive work taking place with organisations including the Church of England, Historic England, The Churches Conservation Trust and the National Churches Trust to build capacity for integrated conservation and development projects with both heritage professionals and those who care for churches.

Following the success of the pilot, a large-scale project is now under development to raise funds to enable the survey of the entire collection of screens across the East of England and, ultimately, on a national scale.

Acknowledgements
Many thanks to the Steering Committee of the East Anglian Medieval Screens pilot survey project and in particular Dr Pedro Gaspar, formerly Senior Conservation Officer for the Church of England's Cathedral and Church Buildings Division. This project was generously funded by the Headley Trust under grant number HED5618.

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Captions

Figure 1. St Agnes' Church, Cawston, Norfolk and its rood screen
Figure 2. Detail of the painted decoration on the screen at St Agnes' Church, Cawston, Norfolk.
Figure 3. Chart showing the buffering between internal and external relative humidity and ambient temperature

Figure 4. Image of the building condition, showing pooled water and death watch beetle damage
Figure 5. Flaking paint on the Cawston screen.