



LINCOLN

CONSERVATION

Research and conservation of historic decorative schemes in the built environment



HISTORIC MATERIALS ANALYSIS



HISTORIC INTERIORS



CERAMICS & TILES



OBJECT CONSERVATION



DIGITAL HERITAGE



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Lincoln Conservation is one of the UK's leading centres for the analysis, conservation and restoration of historic decorative schemes and finishes.

Our conservators utilise some of the very best conservation technologies to rediscover our decorative past and have helped to reinstate many iconic buildings, historic interiors, royal palaces, maritime heritage, military vehicles, structures, theatres and historic artefacts.

With a team that includes accredited members of the Institute of Conservation, our unrivalled experience and facilities will ensure the best outcome for your project.

OUR SERVICES INCLUDE:

Architectural Paint Research

APR is a technique to understand the decorative and architectural history of the exterior or interior of an historic building, structure or vessel, and is often a precondition for listed building consent or funding for development.

Lead Paint Analysis

Lead contained within accumulated paint layers in historic buildings can be significantly high. Lincoln Conservation are able to analyse the accumulated paint layers and provide an indication of which layers contain lead and the amount.

Mortar Analysis

We are able to scientifically analyse mortars, stone, cement and lime based materials for building conservation projects where the specification and replication of historic materials is required.

Conservation of Historic Interiors

Practical conservation, reinstatement and consultancy of historic interiors, wallpaper, architectural ceramics and tiles, gilded and specialist surfaces.

Object Conservation

In situ and laboratory-based conservation of single and multi-media historic objects; easel paintings, stone, ceramics, textiles, wooden, polychrome, gilded objects and modern materials.

Digital Heritage: 3D Scanning and Replication

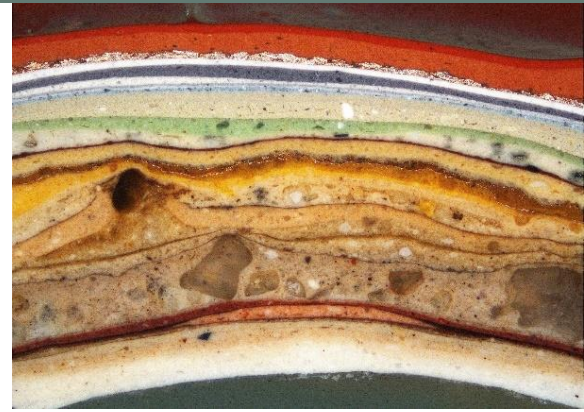
Our team offers a complete service from initial 3D colour scanning and the digitisation of objects, interiors and buildings, through to replication of virtual environments or fabrication of replica artefacts and architectural features.

OUR CLIENTS INCLUDE:

English Heritage, Historic England, Historic Scotland, National Trust and National Trust Scotland, Snowdonia National Park Authority, Manx Heritage, National Museum for the Royal Navy, Victoria & Albert Museum, Oxford University, Cambridge University, Church of England, the Catholic Church, numerous local authorities, preservation trusts, and leading architecture and design firms.

Images from top to bottom:

1. Cross section of paint sample revealing the complete decorative history
2. Optical Microscope with coupled ultra-violet fluorescence
3. Architectural paint research carried out for the reinstatement works for HMS Victory
4. Cleaning and re-instatement of the ceiling at Southwell Minster
5. 3D digital scanning and replication of a missing head for a collection of three Terracotta Warriors



ARCHITECTURAL PAINT RESEARCH

Architectural paint research (APR) is a powerful and highly specialised research tool, combining archival data and material analysis to determine the decorative history and archaeological development of a building. With a team of experienced researchers and some of the very best analytical technologies in the field, Lincoln Conservation has established a leading reputation in this area.

WHY COMMISSION PAINT RESEARCH?

- Architectural Paint Research is an increasingly common condition for projects seeking listed building consent or funding from a national heritage body.
- It is usually conducted in the early stages of a project to inform the conservation management plan of the building.
- It allows an in-depth understanding of the original or earliest surviving decorative schemes and their significance, as well as the architectural, decorative and socio-economic development of the site.
- APR can help to inform the various strategies of conservation, redecoration or replication of original finishes, and to understand the mechanisms for failure.
- APR can identify any underlying or potential issues of material incompatibility before the client embarks on a major programme of works.

HOW IS IT DONE?

APR should be founded on archival evidence where available, and all known information should be made available to the researcher. Such evidence helps the researcher to target suitable locations for sampling, and can confirm which architectural features are original or later additions. The process of paint research involves the discreet removal of paint samples from the façade, interior or individual architectural features of a building or structure. The locations of samples are fully recorded and given unique reference numbers.

Each sample is then polished and examined in cross-section at high magnification in visible and UV light. Photomicrographs are taken of each sample and this information is cross-referenced with archival data, allowing the researcher to develop a profile of each decorative scheme across a space. The results of the research may be supplemented with micro-chemical spot tests, polarising light microscopy, and instrumental techniques, such as Portable XRF, SEM-EDX, FTIR, ICP-OES, to determine the pigments and binding media used.



ARCHITECTURAL PAINT RESEARCH

REVEALING THE PAST

Uncovering tests can be carried out to fully understand the appearance of a particular decorative scheme which cannot be determined in cross-section. This technique involves the careful removal of later overpaint to expose windows of underlying paint schemes. Uncovering of this nature can reveal original or earlier schemes of hand-painted or stencilled decoration, complex decorative schemes with picking out of architectural detailing with polychromy, and finishes, such as wood-graining and marbling.

In addition, accurate colour references are taken from the exposed schemes and observations made about sheen. Historic colour palettes are recorded using NCS (Natural Colour System) references, and colour swatches can be provided on request. All investigative findings are recorded in an illustrated report, including sample locations, annotated microscope images and tables of stratigraphy.

ABOUT US

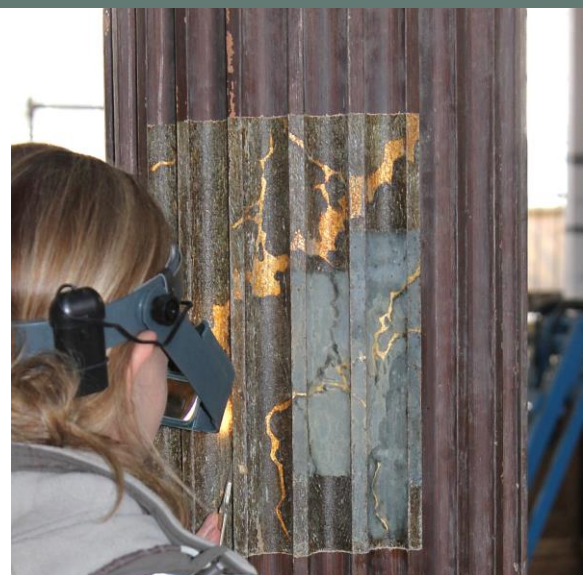
Lincoln Conservation is the largest practice of architectural paint researchers in Britain and Ireland. We have worked on some of the most iconic buildings and ships in the country. Our portfolio includes many other notable listed public and private buildings, royal palaces, maritime heritage, landscape structures and theatres. We have worked in partnership with English Heritage, Historic Scotland and the National Trust in raising the professional standards within the field, thus safeguarding many significant historic interiors and schemes UK-wide.

Our team of architectural paint researchers have a range of experience, ensuring the best outcome for your project. The team includes an accredited member of the Institute of Conservation.

Lincoln Conservation is committed to good health and safety practice and all researchers hold current CSCS and PASMA cards.

images from top to bottom:

1. Uncovering at St Georges Theatre, Great Yarmouth
2. Completed interior for St. George's Theatre, Great Yarmouth
3. Architectural paint research carried out for the reinstatement works on HMS Victory
4. Revealed surface decoration at the Grand Midland Hotel, St. Pancras
5. Historic paint research carried out for NMRN on board HMS Caroline, Belfast



LEAD PAINT ANALYSIS

Lead paint or lead based paint is paint containing lead, added as either a pigment to provide colour or as a drier to accelerate the drying process.

LEAD PAINTS

Typically lead chromate (sometimes referred to as chrome yellow), lead oxide (red lead) and lead carbonate (white lead) were added.

The toxic properties of lead are well established with legislation in place to protect workers and members of the public from exposure to lead.

If you damage or disturb painted material, the UK's Health & Safety Executive (HSE) advice is to assume ALL PAINT CONTAINS LEAD. Disturbing and damaging paintwork before measuring its lead content, risks illegal and unsafe working.

The HSE has issued Prohibition Notices in the past for dry scraping and sanding during a routine redecoration. Without a lead survey in place, to quantify the amount of lead in paint, your project could be at risk.

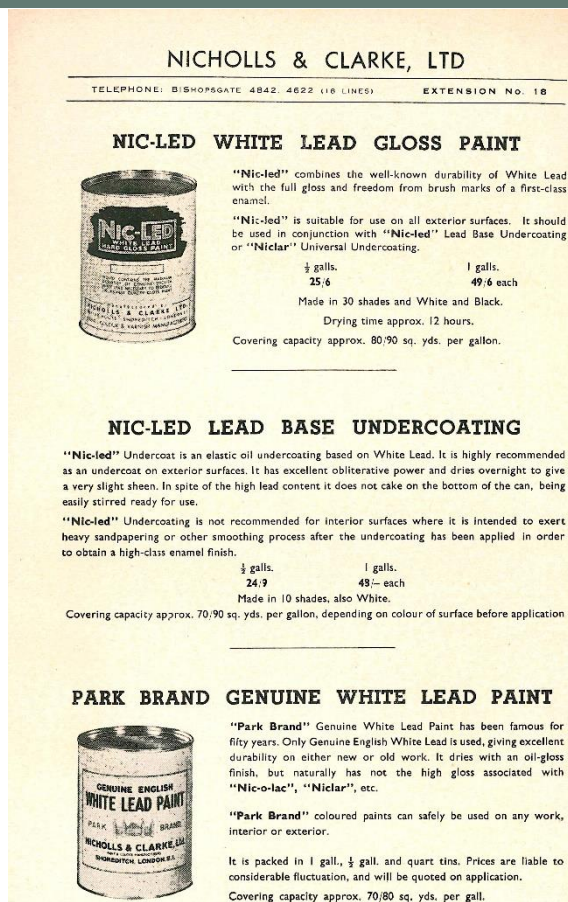
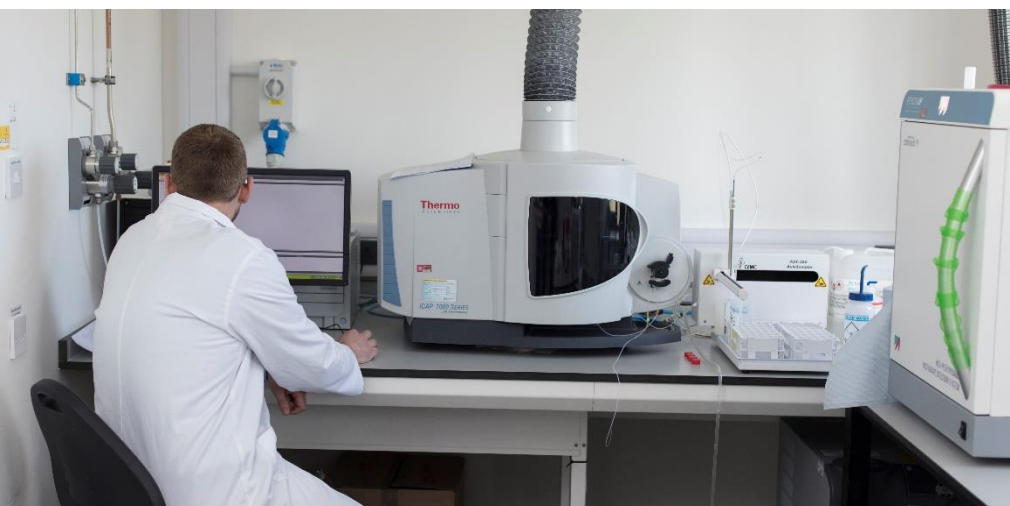
Remember: you may be surprised to learn that lead paint continued to be sold in the UK until 1992.

WHAT WE OFFER

Lincoln Conservation offer a full lead analysis service, ranging from a simple staining test to show which layers of paint contain lead to more rigorous testing in our laboratories to determine the amount of lead contained on a weight for weight basis. We will attend site and safely remove the required samples with final results presented in a jargon free and fully illustrated format.

Images from top to bottom:

1. Advertising lead paint in 1951
2. Portable XRF (X-Ray Fluorescence) detecting lead content whilst on site
3. Spectroscopy techniques. Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES)



ANALYSIS OF MORTAR AND SOLUBLE SALTS

MORTAR ANALYSIS

When repairing historic buildings, it is important to understand the nature of its early renders, mortar and plasters. This ensures that compatible materials are used, essentially on a like for like basis providing optimum performance in terms of colour, texture, compressive strength and overall characteristics. The new mortar will then behave in the same manner as the old, continuing to weather and age seamlessly, helping to maintain the aesthetic quality of the building and preserve its structural integrity.

Samples are first ground to an even powder for a simple visual analysis under an optical microscope, with the powder sieved and the binder separated from the aggregate.

- Both aggregate and binder are analysed in triplicate by powder X-ray diffraction to determine the mineral phases present. This identifies the binder type (e.g. lime, hydraulic lime, Portland cement etc) and aggregate type (e.g. siliceous sand, calcitic sand etc).

A fully illustrated report is issued upon completion, indicating the following

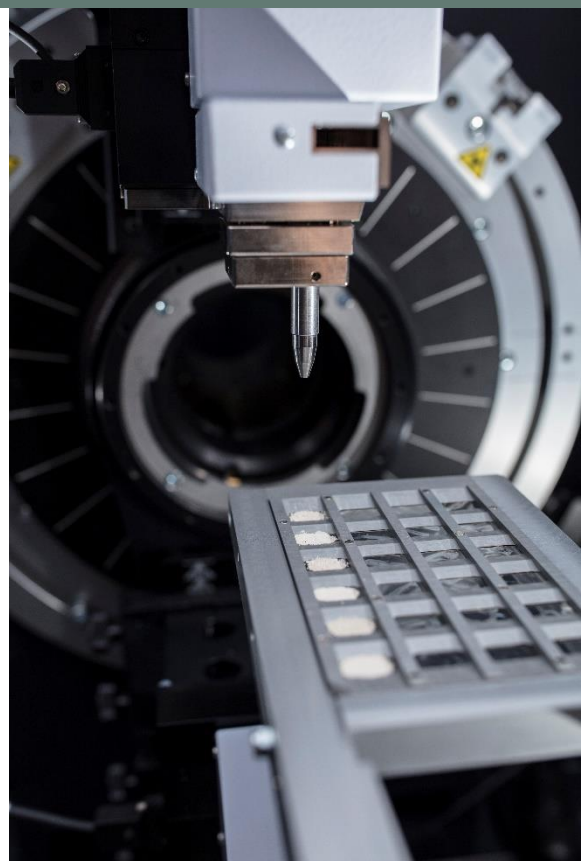
- Aggregate: Binder ratios by weight and volume.
- Aggregate and binder grain sizes.
- All mineral phases present (binder and aggregate)
- Summary of observations and conclusions outlining the make-up of the historic material

ADDITIONAL ANALYSIS: MECHANICAL AND PHYSICAL TESTING

- Compressive strength, tensile strength, flexural strength using an Instron Universal Testing Machine
- Moisture permeability.

SOLUBLE SALT QUANTIFICATION

- A portion of the sample (~0.5 g) is weighed accurately and placed in a vial.
- Deionised water (10ml) is added to the vial and the vial sealed.
- The sample is shaken and left to stand overnight.
- Each sample is then decanted, leaving the solid residue in the vial and filtered (0.45µm).
- A series of appropriate standards are prepared for calibration.
- Standards and samples are analysed by ion chromatography (IC) using a DIONEX ICS-1000. Both cations and anions are quantified.
- Simple results report issued.



CONSERVATION OF HISTORIC INTERIORS

Lincoln Conservation are recognised specialists in the cleaning, conservation and restoration of decorative finishes and architectural elements. Having worked on many iconic properties throughout the UK, the expertise offered by our conservation team includes:

DECORATIVE SURFACES

- Our work varies in scale from large permanent fixtures to smaller, portable objects or artefacts.
- Treatments vary from stabilising and cleaning surviving historic finishes to consolidating, repairing and reintegrating areas of missing decoration.
- We can sympathetically re-instate lost elements of design and decoration.
- We investigate the underlying causes for the loss of historic fabric and formulate programmes that will prevent or minimise failure in the future.

WALLPAPERS

The professional wallpaper conservation service offered by Lincoln Conservation aims to preserve historic wallpapers in situ. This may involve: reproduction and total reinstatement, cleaning and repairing, consolidating flaking or powdering pigments and strengthening papers and reintroducing missing detail, if appropriate.

GILDING

Lincoln Conservation are experienced gilding practitioners for large and small projects undertaken on-site or in our studio. Lincoln Conservation have the experience to conserve historic gilding as well as reinstate missing elements and re-gild using a variety of techniques.

PAINTING CONSERVATION

With a highly experienced, qualified and professionally accredited paintings conservator as part of the team, Lincoln Conservation are able to offer consultancy and conservation services to museums, art galleries and private clients. In addition to easel paintings, Lincoln Conservation are able to offer consultancy on paintings in an architectural context such as marouflage canvases, wall paintings and murals, dating from the 17th century to present day.

ARCHITECTURAL CERAMICS AND TILES

Specialists in the cleaning, care, restoration and conservation of all glazed architectural ceramics including tiles, faience, terracotta and Coade stone. We undertake treatments in situ, at the bench, or in the lab, and are able to compensate for lost areas by producing sympathetically accurate reproductions to harmonise with existing historic material. We offer treatment for architectural ceramics in interior or exterior locations from medieval to 21st century.

OUR CONSERVATION TEAM

As an organisation that only employs fully qualified professional conservators and restorers, we are able to assess the requirement of each individual project and are fully conversant in all conservation and redecoration techniques and remedial procedures.

Images from top to bottom:

1. The restoration of the Shell Alcove for English Heritage, Osborne House, August 2017
2. Cleaning, repair and reproduction of historic wall papers
3. Re-gilding of ceiling roundels
4. Conservation of 19th century wall paintings, St. James the Less, New Mills, Derbyshire
5. Repair and reproduction of ceramic tiles for the Smoking Room, The National Liberal Club.



OBJECT CONSERVATION

Lincoln Conservation are recognised specialists in the cleaning, conservation and restoration of decorative finishes and architectural elements. Having worked on many iconic properties throughout the UK the expertise offered by our conservation team includes:

CERAMICS

With many years of experience in this specialist area, Lincoln Conservation's awareness of the complexities of ceramics and our skill in repair techniques enables us to conserve historic ceramic artefacts dating from antiquity to the present day.

WOODEN OBJECTS

Advice on condition and the conservation of historic wooden artefacts, timber panelling and other carved architectural elements. Our services include remedial conservation treatments, cleaning, pest eradication and protective coatings.

we are also able to offer advice on:

- Conservation cleaning techniques
- Insect pest treatment
- Consolidation of friable and crumbling surfaces to retain as much of the historic material as possible
- Stain removal
- Application of suitable ground layers and paints
- Application of suitable protective coatings if appropriate
- Advice regarding on-going preventive conservation to minimise the risk of further decay.

TEXTILES

Textiles are all around us; as part of clothing, furnishings, furniture and decorative objects. The wide-ranging experience of Lincoln Conservation and their partners means that we can work with clients on textiles both as standalone objects, and as part of a more holistic, inclusive programme of conservation to an historic interior.

GILDING

Highly experienced gilding practitioners for large and small projects undertaken on-site or in our studio. Lincoln Conservation have the experience to clean, reinstate missing elements and re-gild using a variety of techniques from conservation to full restoration.

Our philosophy is one of minimal intervention using traditional materials, tools and techniques, providing a finish that is sympathetic to the historic integrity of the project being undertaken.

Images from top to bottom:

1. Cleaning, restoration and cataloguing of medieval glass fragments for Coventry Cathedral
2. Cleaning and restoration of historic wooden artefacts
3. Textiles conservation and repair
4. Re-gilding of The Statue of St Dunstan for the Goldsmiths Company



BUILDING SCANNING AND ARCHAEOLOGICAL SERVICES

Lincoln Conservation is a multi-disciplinary practice of buildings archaeologists and conservators. We can identify and record the key historic features of the structure of a building and offer solutions for their conservation. We work with architects in programmes of refurbishment and preservation to anticipate problems in the works programme.

WHAT WE OFFER

All historic buildings have been adapted, often many times, to serve changing uses. The careful recording of a building's structure may be a planning requirement and certainly allows the early identification of hidden problems which may be encountered during refurbishment works.

Standing building recording may be done by precise survey undertaken by laser scanning. Combined laser scanning and photography allows the construction of a 360-degree cloud of points and a full colour, 3D model. From these, it is possible to provide precise plans, sections and record of architecture detail. Elevations of the internal and external faces of walls can be produced and it is even possible to take 'slices' through a building.

Detailed scanned survey provides the basis for understanding the historic building fabric. Conservation issues can arise as parts of an historic structure are uncovered. By surveying and analysing the structural history and undertaking exploratory work in advance, we can ensure that necessary conservation work is identified at an early stage. Measures to preserve historic elements can be agreed with the conservation officer avoiding delays and extra expense.

If made at an early stage in a project, a scanned laser survey can also provide information for specifying works.

APPLICATIONS AND BENEFITS

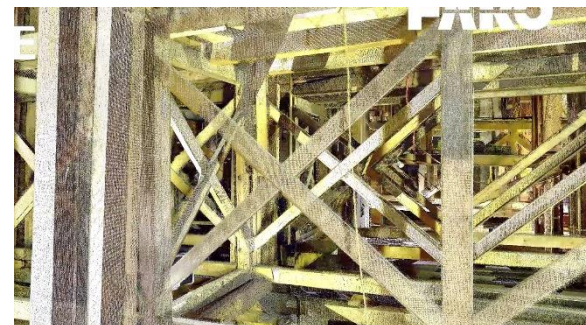
- Buildings survey is often required as a planning condition for work on listed buildings
- Information from a laser survey and fabric analysis allows decisions to be agreed with planning authorities.
- Historic elements of a structure can be recognised and conservation measures devised in advance.
- Laser survey may be used alone or form part of a suite of analyses, including mortar analysis and architectural paint research, to replicate the structure and decoration of an historic building.
- Laser scanning provides a permanent record of a building's condition and form.

WE CAN PROVIDE

- Precise building plans, elevations and 'slices' across a building
- Interpretative fabric surveys of historic structures with stone-by-stone records
- Analysis of key features, including mortar and decorative finishes

Images from top to bottom:

1. Scanning using the FARO scanner on site at the Greyfriars, Lincoln
2. Still from FARO 'fly-through' video in the under-stage area of Alexandra Palace
3. Ortho photo of elevation from Prebendal Manor House, Nassington



DIGITAL HERITAGE

Lincoln Conservation are at the forefront of exploiting 3D digital recording and fabrication technologies. Our team offers a complete service from initial 3D colour scanning and the digitisation of objects, interiors and buildings, through to the replication of virtual or physical artefacts and environments. We offer our clients new ways to digitally preserve and reimagine our heritage and to engage with audiences in new and novel ways.

SCANNING AND RECORDING

We utilise a number of 3D scanning and photogrammetry technologies to digitise surface geometry, complex 3D artefacts, interiors, structures and buildings. With this data we can create detailed records, digitally analyse and manipulate objects and create new digital assets.

We use a variety of modelling software tools to manipulate, digitally fix objects, re-size, mirror objects, measure, animate and create new digital assets.

REPLICATION

We use virtual reality and new digital fabrication technologies to visualise and replicate historic artefacts, architectural details and modelling the historic interior.

FINISHING

3D printing and various machining processes are used to create the substrate, but the finishing and surface patination is done by hand, which sets Lincoln Conservation apart from others in the field. There are few organisations that have the skill-set to follow a whole process through from scanning, digital modelling, print and finish.

BUILDING SCANNING AND BIM

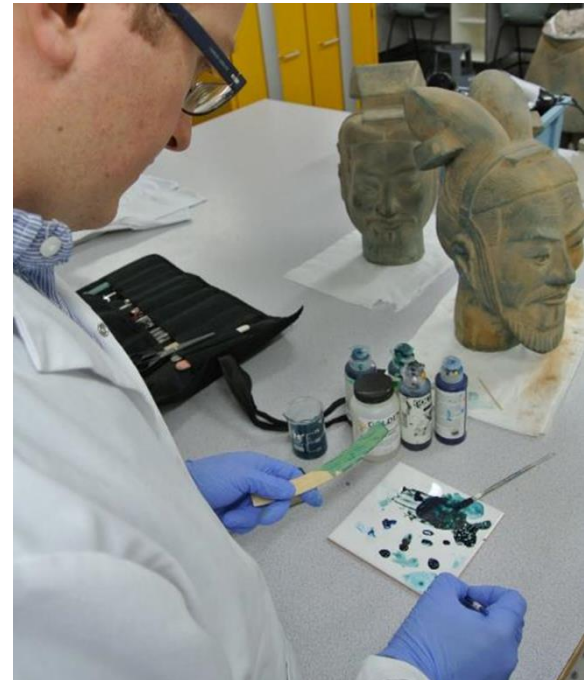
Our building archaeologists and conservators utilise FARO and Artec scanners to record 3D built structures and interior spaces. We are able to offer a full BIM for Heritage service to reverse engineer an historic structure and create accurate geometrical and visual documentation for disaster recovery planning or condition monitoring or as part of a scheme to reinstate an historic building.

APPLICATIONS AND BENEFITS INCLUDE:

- Minimal contact and contamination.
- 3D full colour digital imaging.
- Inspection, measurement and analysis.
- Collection of 3D evidence.
- Digital recording and archives
- Reverse engineering of objects or structures
- Creating virtual objects, collections and exhibitions.
- Digital fixing and repairs of artefacts.
- Bespoke fixtures, supports and mounts.
- 3D copies for visitor handling, records, public display

Images from top to bottom:

1. Scanning the Terracotta Warriors to recreate a replacement head.
2. Testing primers and finishes to be applied to a 3D printed Terracotta Warrior head
3. Two original Warrior heads and one 3D printed replica (in the centre)
4. 3D scan of the Shell Alcove at Osborne House, Isle of Wight for English Heritage





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Lincoln Conservation is a specialist research and consultancy centre within the University of Lincoln.