"Factum preserves evidence..."

Katrina Kufer on Factum Arte
Harper's Bazaar Arabia, 2019

A DIGITAL MEDIATION STUDIO
An overview of the workshops of
FACTUM ARTE and FACTUM FOUNDATION

AHMED MATER, Mitochondria: Powerhouses
Noor Light Festival, Riyadh, 2021

video link Ahmed Mater, Mitochondria: Powerhouses

AHMED MATER, Mitochondria: Powerhouses
Galleria Continua, San Gimignano, 2017
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FACTUM ARTE & FACTUM FOUNDATION

FACTUM ARTE was founded in 2001 in Madrid and has a reputation for its innovative approach to fabrication merging digital technology and craft skills.

Factum Arte consists of a team of artists, technicians and conservators dedicated to digital mediation. The main focus is on the production of works for contemporary artists and to the application of new technologies to the creation of objectively accurate facsimiles that are part of a coherent approach to understand and read the importance of material evidence. The emphasis is on cross-disciplinary communication, innovation and sharing information and ideas. Factum’s goal is to demonstrate what can happen when technology is developed and applied by creative thinkers and where the line between the digital and the physical no longer exists.

Led since 2001 by Adam Lowe, who funded Factum Arte with Manuel Franquelo and Nando Guereta, the workshop was conceived as an interdisciplinary studio where diverse skill sets collide on a daily basis. Artists such as Marina Abramović, Anish Kapoor, Maya Lin, El Anatsui, Ahmed Mater, Paula Crown, Wang Yuyang, Marc Quinn, Gillian Wearing, Cornelia Parker, Grayson Perry, Akram Zaatari, Joana Hadjithomas, Khalil Jorige, Rachid Koraichi, Maniko Mori, Abdulnasser Ghaem, Manal AlDowayan, Hrair Sarkissian, Shezad Dawood, Sarah Sze, Subodh Gupta, Michael Hansmeyer, Jenny Holzer and many others have enjoyed and taken advantage of Factum Arte’s craftsmanship and bespoke technology to create new works of art. There are operational spaces in Madrid, London and Venice.

The FACTUM FOUNDATION was founded as a non-profit organisation in 2009 by Adam Lowe with the aim of using Factum Arte’s innovative processes and technologies for preservation, education and the development of thought-provoking exhibitions. Factum Foundation’s approach is effective and its facsimiles of Veronese’s Wedding at Cana and the tombs of Thutmose III, Tutankhamun and Seti I have been widely acclaimed for their forensic accuracy. The Foundation regularly carries out projects and supports the documentation of artworks in institutions such as the British Museum, the Louvre Museum, the Metropolitan Museum of Art, the Museo del Prado, The V&A and the Pinacoteca di Brera. It is running and developing projects in conjunction with the Peri Foundation, Community Jameel, Juma Al Majid centre for Conservation and Heritage, Iconem, and the Fondazione Giorgio Cini. It currently has projects in Egypt, Saudi Arabia, Portugal, Italy, Daghestan, Somalia, Nigera, United Arab Emirates, Finland, England, France and Spain, and many other parts of the world.

ARCHVe was formed in 2017 in Venice and rapidly established itself as an innovative hub for the Analysis and Recording of Cultural Heritage. In a new collaboration with the Bodleian Library in Oxford (ARCHiOx) the model is being applied to the role of high-resolution 3D recording in library management.

New collaborations are starting in 2022 with the Bodleian Library and with Aalto’s Silo in Oulu.
The emergence of computers and the opportunities offered by diverse types of digital mediation in 21st required a radical rethinking of the layout of a creative workshop and the way that contemporary artists work. Factum Arte is a direct response to this need. Its workshops have developed to create an experimental and open environment to meet the needs of artists from around the world.

Factum Arte has been run since it started by Adam Lowe, a painter trained at Oxford University’s Ruskin School of Drawing and at the Royal College of Art in London. Many elements of these two very different institutions have shaped the radical studio that has emerged in Madrid. The Ruskin’s emphasis on traditional techniques and the interdisciplinary intellectual community of Oxford prompted an interest in creative processes that intersect science, art and technology. The Bauhaus environment of the Royal College of Art in 1980s mixing painters, sculptors, printmakers, ceramicists, metalworkers, jewellers, silver and goldsmiths, automotive designers, photographers, textile designers, woodworkers, filmmakers demonstrated the importance of communication across disciplines.

The studios that have grown in San Blas, Madrid over the past 21 years are a direct reaction against a heavily compartmentalised model. Digital mediation has changed how people work together and divisions based on materials are being replaced by a different approach to mediation, transformation, and making. Curiosity, collaboration, innovation, and application have come to define Factum Arte’s working spaces that have been set up to maximise artists intentions. Everything is based on transforming an idea into its optimum form and understanding the mediations that are involved in the digital and the physical world.

Over 50 people work together in a space of 8000 sq meters. Their skills are diverse, architects, product designers, scientists, moulders and casters, welders, conservators, fine and applied artists, printers, electrical and physical engineers, machine operators, accountants, photographers, filmmakers, 3D scanners, textile specialists, typographers, sculptors and furniture restorers all work together. Teamwork is at the heart of this 21st renaissance and the workshops are only the tip of the iceberg. They connect to precision engineering, CNC-milling, foundry work in many materials (at every scale and level of detail), waterjet cutting, laser technologies of various kinds, structural engineering, architecture, museum collaborations, printing, exhibition design, 3D printing, electro-forming and electroplating, wood carving, stone carving, computer programming, filmmaking, anthropology, scientific innovation... the list responds to needs. The aim has been to create a ‘playground’ for artists who can work supported by skilled and creative digital artisans.

Factum Arte applies these skills to contemporary artists - Factum Foundation applies many of the same tools to the preservation of the past through high-resolution documentation, sharing information and the creation of exact facsimiles. What has emerged is an atemporal and anachronistic approach to art - the past shapes the present and is shaped by it - both shape the future.
Factum Arte uses digital technology to:

• Inspire experimentation
• Promote teamwork
• Create at the interface between the digital and the physical
• Generate and share knowledge in different forms
• Give ideas form – both physical and digital
• Connect the ideas of the past, the realities of the present, the aspirations for the future
• Inspire and facilitate a new generation of artists and creative individuals
• Preserve artworks and monitor change

Services for Artists and Institutions

• Outdoor installations
• Theatre production
• Framing – standard and specialist framing
• Art handling, installation services
• Logistics, crating and packing
• Conservation and maintenance
• Lighting
• Experimental installations and events

This multilateral and diverse approach draws on the skills of experts from around the world specialising in the following areas of creative production:

• 3D input and manipulation – 3D Scanning, Photogrammetry, Organic modeling, AR/VR/MR
• Engineering workshops. Electrical/Mechanical
• Printing Hub – re-thinking printing – bridging 2D and 3D printing
• Mechanical/Chemical/Digital – rethinking art production
• Photography – Contemporary and Historical processes
• CNC-milling – 7 and 3 axis CNC-milling for stone, wood and other materials
• Metalworking Studio – laser cutting, waterjet cutting, welding, forging
• Painting studios/paint chambers for artistic production and high-quality paint finishes
• Electroplating and Electroforming
• Fine art Foundry casting different alloys and metals
• Ceramic workshop
• Tapestry and Fabric workshop
• Facsimile production
• Long-term Archiving of digital data
A team of 60 craftsmen, painters, sculptors, specialists in casting, in traditional and digital printing, 3D modelers, engineers, programmers, colour specialists, software writers, electrical engineers, physical engineers, photographers, textile specialists, conservators, welders work together to create works for artists.

The goal is to demonstrate what can happen when technology is developed and applied by creative thinkers and where the line between the digital and the physical no longer exists.
A number of spaces have been designated for craft work. The ‘dirty workshop’ is for moulding and sculpting in materials such as fibreglass, resin, scagliola, wood and gesso. This space is large and various projects are carried out simultaneously. In this area, different teams work side by side.

The ‘clean studio’ specialises in metal assembly, glass works and special projects requiring precision. The ‘metal studio’ is composed of two designated areas, one for large complex fabrication and the other for precise work with metals. Other spaces are used for experimentation and innovation.

The rematerialisation of the tomb of Raphael Damián López Rojo working on ANISH KAPOOR’s concave mirror series.

Francesco Cigognetti and Javi Barreiro Pérez working on the recreation of al-Idrissi’s silver map.

Damian Lopez Rojo working on ANISH KAPOOR’s concave mirror series.
Robot for MUHANNAD SHONO’s On Losing Meaning: Artur Weber and Quinner Baird during the setting up, 2021
Photos by Muhannad Shono
Dichroic glass experiments for PAULA CROWN

Damión López Rojo working on one of SHIRAZEH HOUSHIARY’s Murano glass brick sculptures
Working on the facsimile of the sarcophagus of Seti I, 2016. Elevated colour prints were fixed onto a CNC-routed core. The original sarcophagus was recorded in high resolution at Sir John Soane's Museum in London.
BRONZE CAST

PAULA CROWN, Resilience
2019-2021, silver patinated bronze
The 3D files from the recording of a plastic Solo cup were scaled 27:1 and CNC-milled in polyurethane before casting.
"That immaculate eye for detail is typical of the work of Factum Arte, a Madrid-based studio whose combination of digital analysis with assiduous craft is transforming the way we see art. I have been watching their work develop for nearly a decade. I am now convinced it is the most important thing happening in 21st-century art."

Jonathan Jones – The Guardian, February 2017
“The vast size of many of the artworks in Factum, combined with the high-tech carving and 3D printing machinery, gives room after room the air of a Willy Wonka factory, but one where art, not candy, is the treat of choice. Lowe, who presides over all of it, is here to make sure that the artists who enter have the tools, technology, and support staff to make whatever they dream up.”

James Tarmy – Bloomberg, March 2018
“There’s a kind of community that’s been built there. You explore making art with the team there—it’s a process of exploration.”

El Anatsui on Factum Arte, in Bloomberg, 2018
"Bringing together these strands – technical, human, aesthetic – combined with fanatical attention to detail has secured the company’s reputation."

Matthew Sturgis – Patek Philippe, October 2017
“It is one of the curious places where, as an artist, you feel that it is possible to reinvent the process of ‘making’ works of art, and where at the same time the word ‘no’ almost doesn’t exist.”

Marina Abramović on Factum Arte – Harper’s Bazaar, 2019
"Because it connects the most advanced technology with the deepest care for the materiality, history and intricacies of works of art... what the Factum Arte team has managed to assemble allows for a set of skills impossible to find anywhere else....that has become synonymous with creation and innovation."

Bruno Latour, Sociologist of Science and anthropologist, Professor at Sciences Po, Paris & recipient of the Holberg Prize, 2013
"... But perhaps the most radical achievement of Factum, and one that’s acutely welcome in our new world of lockdown, is the way its creations can dissolve museum walls and reconnect their treasures not just with new audiences but with the raw, real world they came from."

Jonathan Jones – The Guardian, November 2020

EXHIBITION INSTALLATION
On the left, the facsimile of The Sacrifice at Lystra, one of the Raphael Cartoons at the V&A, compared with its correspondent tapestry at the Vatican Museums
"Reproduction today by companies of this sort of quality, is more than just a technical achievement - it is the window to lost works, to mysterious worlds of great beauty, and is a vital educational tool helping bring the stories of myriad cultures to a much wider audience."

Lucia van der Post – Spears, May/June 2018
“Anish Kapoor cares how different materials make different performances possible. To recover or generate order and form from more chaotic and randomly distributed material is a job for an artist of soft matter. The world of soft matter has been expertly compared to a frontier zone between empires, not a fiercely walled and defined boundary of bottlenecks, customs posts and border guards, but rather a fluid territory of nomads and vagabonds, constantly shifting its controls and patterns. A provocative region that is mobile, diffuse and active.”

Simon Schaffer – Unconformity and Entropy, 2009
TRANSFORMING
THE SENSES

FACTUM ARTE
Material Sound: The Dark Hours of the Sun, 2020

video link Factum Arte, Material Sound: The Dark Hours of the Sun
Factum Arte’s innovative production facility merges technology and traditional craft skills to meet the needs of the artistic community.

The workshops in Madrid are based on teamwork, curiosity, experimentation, specialised skills and sharing knowledge in order to make great works of art.

This experimental and open approach provides a complete range of services for artists, museums and institutions.

**A PLAYGROUND FOR ARTISTS**

- RACHID KORAICHI inspecting one of his calligraphic sculptures from the series *Les Vigilants*
- AKRAM ZATAARI and Adam Lowe at the digital print studio in Factum
- MARINA ABRAMOVIĆ and Adam Lowe sharing ideas on one of the pieces for the artist’s solo exhibition at the Royal Academy of Arts

Photo by Caterina Barjau for *El País*
Artists working with Factum Arte between 2001 and the present, who want the collaboration acknowledged. There are others who want to remain anonymous:

Abramović, Marina
Al Dhaheri, Afra
Al Dowayan, Manal
Allora, J. & G. Calzadilla
Anatsui, El
Angawi, Ahmad
Ansarinia, Nazgol
Arrechea, Alexandre
Baladi, Lara
Ballester, José Manuel
Bengtsson, Mathias
Blake, Quentin
Bourgeois, Louise
Carter, Rob and Nick
Casasempere, Fernando
Catalán de Ocón, Álvaro
Chivers, Mat
Collishaw, Mat
Cook, Mariana
Crown, Paula
Curto, Felix
Cyursek-Gedir, R. & K. Galos
Darkovich, Elena
Dartizio, Fabio
Dawood, Shezad
De Commarque, Cyril
De Francia, Peter
De la Rue, Denise
Deacon, R. & E. Parry
Dávila, Jose
Facey, Laura
Fischer, Urs
Franquelo, Manuel
Fuss, Adam
Garaicoa, Carlos
Gharem, Abdulnasser
González, Dionisio
Greenaway, Peter
Guajarro, Alejandro
Gupta, Subodh
Hadjithomas and Joreige
Hansmeyer, Michael
Hendrix, Jan
Hernandez, Jonathan
Horsfield, Craig
Houshiary, Shirazeh
Hudson, Henry
Höller, Carsten
Irijalba, Carlos
Jaffe, Lee
Kagan, Michael
Kapoor, Anish
Kato, Jimena
Koraichi, Rachid
Lacey, Andrew
Law, Roger
Leon, Glenda
Lin, Maya
Logsail, Rory
Los Carpinteros
Martynov, Vladimir
Mater, Ahmed
Mead Moore, G.
Mori, Mariko
Morrison, Jasper
Muntadas, Antoni
Nakhova, Irina
Nicolaissen, Bernd
Orozco, Gabriel
Parker, Cornelia
Perry, Grayson
Princen, Bas
Qasim Ashfaq, Mohammed
Quayola, Davide
Quinn, Marc
Rego, Paula
Sansour, Larissa
Sarkissian, Hrair
Sarmento, Julião
Savelev, Boris
Shawcross, Conrad
Shono, Muhammad
Smith, Dillwyn
Starling, Simon
Stuart Smith, Tom
Sze, Sarah
The Haas Brothers
Trabulo, Maria
Tszukui, Kyoichi
Vas, Abdul
Walker, Tim
Wall, Jeff
Wearing, Gillian
Winter, Clark
Yuyang, Wang
Zaatari, Akram
Zhou, Meng
Precision CNC-milling of the Mangour screens for the British Museum’s Albukhary Foundation Gallery of the Islamic World

AHMED ANGAWI, Mangour screens
British Museum, 2018
Walnut wood
MARIKO MORI, Infinite Energy and Renew Sculptures inside the Espace Louis Vuitton, Tokyo

Precision CNC milling, engineering and casting
CONRAD SHAWCROSS, Crossrail Moorgate Manifold, London
Highly engineered bronze casting in controlled alloys with x-ray testing of all welds.
RACHID KORAÏCHI, This Long Journey Into Your Gaze
Casa Árabe in Madrid and Córdoba, 2019
SARAH SZE, *Tracing Fallen Sky*
Fondation Cartier pour l’art contemporain, Paris, 2020
Finding fabrication solutions at various scales
Photo by Luc Boegly

Detail of the mirror-polished surface
Abdulnasser Gharem, *Hemisphere* was on display at Los Angeles County Museum of Art (LACMA), 2017 and Sharjah Art Museum, 2018.

Applying the gold foil.
Welding stainless steel

JAN HENDRIX, Puebla, Mexico, 2009

Waterjet cutting, powder coating and finding lighting solutions
Installed in Ciudad Real, Spain

ANISH KAPOOR, Steel Cube, 2009
Precision cutting and pavonation of steel
Detail of the 3D printed and cast elements (in six different alloys), clustered in Tetris-like shapes on a mirror-polished steel surface.
AFRA AL DHAHERI, Pillow Fort Playground
Expo 2020 Dubai, 2021
Photo by Afra Al Dhaheri
PAULA CROWN
Wine case in dichroic glass. 2020-2021
DIONISIO GONZÁLEZ, *Transfigured Schönberg*
Patio Herreriano, Valladolid, 2009

AHMED MATER, *Eagle*, Frieze 2021 with ATHR Gallery, 2021
Factum Foundation and Factum Arte have ongoing partnerships with the following institutions:

Art Jameel, Jeddah
Athr Gallery, Jeddah
Book Works, London
Capturing Reality, Bratislava
Divrod, Boulder
École Polytechnique Fédérale de Lausanne

Highlitied providers:

Caliper, Madrid
Dust and Scratches, London
Esfinge, Madrid
FADMESA, Madrid

We have also collaborated and continue to collaborate with many other institutions, either on one off projects/events or on a regular basis:

**Austria**

**Belgium**
Koninklijk Museum voor Schone Kunsten Antwerpen (KSMKA), La Monnaie de Munt (Bozar).

**Brazil**
Associação Indígena Kuikuro Alto Xingu, People’s Palace Projects, Spectaculo.

**Canada**
Antimodular Research Inc., Canada Digitization, Think to Thing (Toronto), Carleton University (Ottawa).

**Chad**
Ministry of Culture, Ministry of Tourism.

**Chile**
Museo Antropológico Sebastián Englert (Rapa Nui)
China University of Hong Kong, WorldSkills Museum.

**Denmark**
Aarhus School of Architecture, SMK - National Gallery of Denmark.

**Egypt**
American University in Cairo, Ministry of Antiquities, Tarek Waly Centre, TedX Cairo.

**EU**
European Commission

**Finland**
Arctic Drone Labs, Alvar Aalto Foundation, City of Jyväskylä, Oamk – Oulu University of Applied Sciences, Tampere University, The Oslo School of Architecture and Design, University of Oulu.

**France**
Ateliers Jean Nouvel, Bibliothèque Nationale de Bordeaux, Centre des Monuments Nationaux, Fondation Cartier, Galerie Didier Claes, La Concergerie, Musée Conde du Château de Chantilly, Musée Cluny, Musée des Arts Décoratifs, Musée des Beaux-Arts (Orléans), Musée du Louvre, Musée Jacquemart-André, Musée Quai Branly.

**Germany**
Alte Pinakothek Munich, Leipziger Museums der bildenden Künste (MBK), Museum der bildenden Künste.

**Greece**
Benaki Museum, Kaparos Fine Art Foundry, Greek Ministry of Culture.

**Ireland**
Mauritshuis (Den Haag), Museum Boijmans Van Beuningen (Rotterdam), Museum Catharijneconvent (Utrecht), Leiden University, Rijksmuseum van Oudheden (Leiden), Rijksmuseum Twenthe, TU Delft, Utrecht University.

**Italy**
AIB – Associazione Banche Italiane, ALES - Arte Lavoro e Servizi (Rome), Autogrill, BALLANDI Multimedia, Basílica de San Petronio (Bologna), Berengo Studio (Venetia), Biblioteca Nazionale Marciana (Venice), Biennale di Venezia, CARISBO, Casa Buonarroti (Florence), Castello Sforzesco (Milan), Cavina Terra Architettti, Complesso Monumentale della Piazzuola (Parma), Comune di Caravaggio, Comune di Urbino, Convento di Santa Maria delle Grazie e Cenacolo Vinciano, Diocesi di Bologna, FEC - Fondo Edilizi di Culto, Fondazione Giorgio Cini, Fondazione Palazzo Te, Fondazione Musei Civici di Venezia, Fondazione Querini Stampalia, Galleria Continua (San Gimignano), Galleria Nazionale d’Arte Antica di Palazzo Barberini, Galleria Borghesi, Gallerie dell’Accademia (Firenze), Gesù Nuovo. Musei nella città, ISIA Urbino, Itigala - Heritage Lab, IULM Università, Mart - Museo d’arte moderna e contemporanea di Trento e Rovereto, Michele de Lucchi, Musei Capitolini, Musei Vaticani, Museo Archeologico Nazionale (Firenze), Museo Canova (Possagno), Museo Civico Archeologico (Bologna), Museo Civico di Bassano del Grappa, Museo Palladio (Vicenza), Museo Corner (Venice), Museo della Città di Rimini, Oratorio di San Lorenzo (Palermo), Ordine dei Cavaliere di Malta (Venice), Palazzo Ducale (Mantua), Palazzo Grimani (Venice), Pinacoteca Ambrosiana, Pinacoteca di Brera, Pinacoteca Nazionale (Ferrara), San Luigi dei Francesi (Rome), Santa Maria dello Spasimo (Palermo), Scuderie del Quirinale (Rome), Sky Arte, UNIBO - Università di Bologna, Università Ca’ Foscari (Venezia), Università IUAV di Venezia, Villa Cagnola (Gazzada).

**Japan**
Tokyo University of the Arts.

**Kingdom of Saudi Arabia**
AFALULA French Agency for Allûa Development, Art Jameel, Athr Gallery, Community Jameel, MISK Foundation, Noor Riyadh Festival of Light, Royal Commission of Al-Ula, Royal Commission for Riyadh City, Oryx Contemporary Art Biennale (Riyadh).

**Lebanon**
Arab Image Foundation, Association pour la protection des sites et anciennes demeures au Liban (APSAD), Ministry of Culture.

**Mexico**
Universidad Autónoma de México.

**Netherlands**
Mauritshuis (Den Haag), Museum Boijmans Van Beuningen (Rotterdam), Museum Catharijneconvent (Utrecht), Leiden University, Rijksmuseum van Oudheden (Leiden), Rijksmuseum Twenthe, TU Delft, Utrecht University.

**Nigeria**
The Trust for African Rock (TARA), University of Calabar.

**Norway**
The Norwegian Department of the University of Oslo, Henie Onstad Kunstnner (Oslo), Norsk Fagsamling, Romsdal Museum.

**Portugal**
Faculdade de Engenharia da Universidade do Porto.

**Russia**

**Somalia**
Hargeysa Cultural Centre, Redsea Cultural Foundation.

**Spain**
Archivo Histórico Provincial de Sevilla, Asociación de los Amigos de la Catedral de Tudela, Asociación Española de Museólogos, Ayuntamiento de Arroyo Molinos, Ayuntamiento de Barbastro, Ayuntamiento de Priego de Córdoba, Ayuntamiento de Sevilla, Real Alcázar (Sevilla), Ayuntamiento Toralba di Ribotta, Banco Santander, Biblioteca Nacional (Madrid), Bilbao Fine Arts Museum, Cabildo de Gran Canaria, Cabildo Insular de La Palma, CaixaForum (Madrid and Valencia), Caja de la Seguridad Social de Alcázar de San Juan, Comisión de Al-Ula, Royal Commission of Al-Ula, Royal Commission for Riyadh City, Oryx Contemporary Art Biennale (Riyadh).

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**Somalia**
Hargeysa Cultural Centre, Redsea Cultural Foundation.
In Iraq, TEDx Madrid, Museo Universidad de Navarra, Thyssen-Bornemisza National Museum, Universidad Complutense, Universidad de Castilla la Mancha (UCLM), Universidad Politécnica de Madrid.

**Switzerland**

**US**

**UAE**
Department of Culture and Tourism Abu Dhabi, Green Art Gallery, Hay Festival, Juma al Majid Centre for Arts and Heritage (Dubai), Louvre Abu Dhabi, MEFA - Middle East Falconry Archive, The Museum of Al Ain.

**UK**
Two Lucida 3D Scanners recording Bartolomé Esteban Murillo’s *The Miracle of the Fish and Bread*.

Instituto Andaluz de Patrimonio Histórico, Seville, 2018.
There are various types of spaces devoted to digital input that are shared by programmers, engineers, digital modellers, colour specialists, photographers, 3D scanning specialists, digital conservators and experimental technicians. Their interdisciplinary background facilitates the development of technologies such as the Lucida 3D Scanner, designed by Manuel Franquelo, and the Veronica Choreographic Scanner, designed by Manuel Franquelo Junior with Factum’s team, but also the refinement of techniques and approaches to digital restoration, composite photography, 3D recording and photogrammetry.

**Equipment design and Engineering Studio**

The work in and out of the studio requires equipment that is not always available commercially. Over the years, Factum Arte’s engineers have designed and built systems to digitise fragile cultural heritage. Different systems have been developed to record the surface, relief and texture of objects at the highest possible resolution. All systems are 100% non-contact and work with specially written open source software.

Digitisation encompasses a series of activities that have expanded the creative process and the possibilities for making, studying and preserving works of art. Factum Arte’s digital specialists are using these technologies to restore objects digitally and produce applications to visualise data. The move from physical object or idea to digital data and back into the physical world requires new skill sets and a different way of thinking that is transforming the way artists work and the way cultural heritage is preserved and shared.

The technologies are being used to create new works of art, produce accurate facsimiles of existing objects and to recover and re-imagine lost works based on available records.
Abdo Ghaba and Alaa Ismail, part of the Theban Necropolis Preservation Initiative, working on the Lucida 3D Scanner inside the 3D Scanning, Training, and Archiving Centre at Stoppelaër House, Luxor.
Carlos Bayod Lucini and Teresa Casado recording Fra Angelico’s Annunciation at the Museo del Prado using the Lucida 3D Scanner. Oscar Parasiego records them as they work for a video about the process and reasons for doing this work.
Recording the Raphael cartoons, V&A, London, 2019. One of Factum Foundation’s most ambitious digitisation projects to date and has set new standards for large-scale, high-resolution digital documentation of low-relief surfaces. The Lucida 3D Scanner and panoramic composite photography were employed to capture detailed information for the surfaces of the seven monumental Cartoons and provided the original and processed data to the V&A for study and dissemination.
The Lucida 3D Scanner recording Michelangelo’s *Epifania*, British Museum, 2019

Gabriel Scarpa recording the colour of Anton Van Dyck’s *Philip Herbert, 4th Earl of Pembroke, with his Family* using panoramic composite photography, Wilton House, 2020

The Sala Bologna during the recording in 2010. The south wall, depicting the map of Bologna, and the west wall, depicting the map of the province of Bologna, were both recorded in high resolution.
Gabriel Scarpa recording the colour of a fragment from the frescoes from the Chapel of San Baudelio in Casillas de Berlanga, MET Cloisters, New York, 2016

Otto Lowe teaching photogrammetry in AlUla, Saudi Arabia, as part of an agreement with Art Jameel, 2019

Otto Lowe using photogrammetry to record one of the caves of Laas Geel, Somaliland, 2021

Abdo Ghaba recording the 3D surface of the tomb of Seti I, Luxor
Ferdinand Saumarez Smith using close-range photogrammetry to record the tombstones from the cemetery of the Khala Khoreysh mosque, Dagestan, 2016

The recording of the mosque also employed aerial photography using a drone

Preparing one of the Bakor monoliths on the Nkרוסg site for photogrammetry recording, Nigeria, 2016

Recording the sarcophagus of Seti I at Sir John Soane’s Museum, London, 2016
The 3D and photogrammetry room is where digitised objects become 3D models that can be printed or milled.

The dark room: a space for experimenting with photography and photogrammetry.

Portable Manuscript Scanner being used at the State Archives in Makhachkala, Dagestan to record their collection of Arabic manuscripts.

Irene Gaumé working on a 3D model.

Merging modelled and scanned data to make a silver coffeepot designed by Giambattista Piranesi.

Some of Shezad Dawood’s sculptures have been 3D modelled at Factum Arte.

3D modelling from an 18th century print.

3D animation produced by Grégoire Dupond.
Rematerialising the sepulchre of Cardinal Tavera by Alonso Berruguete. Close-range photogrammetry, LiDAR and a white-light scanner were employed to record the object and its environment in high resolution before producing a highly accurate 3D model.
The various layers of information acquired and collected by Factum Foundation and the Museo del Prado during the recording of the Black Paintings by Francisco Goya in 2014.

X-ray, colour, infra-red, 3D surface, ultraviolet and historical picture by Jean Laurent over Two Old Men.
The Virtual Tour of the tomb of Seti I, made in collaboration with the University of Basel and the Egyptian Ministry of Antiquities

LiDAR scan of the tomb of Seti I
Details from the high resolution viewers of the tomb of Seti, freely available online.

The 3D model of the sarcophagus of Seti I.
In 2015, using the high resolution viewers of the tomb of Tutankhamun, Egyptologist Nicholas Reeves theorised the existence of two additional chambers behind the North wall of the burial chamber.
The engineering team (Jorge Cano and Matt Marshall) works to develop new technologies for both cultural heritage and contemporary artists. Irene Gaumé, Factum’s 3D sculptor, works on a variety of projects involving digital mediation and digital restoration. Video link: Experiments with Unreal Engine: the Tomb of Tutankhamun.
In the colour and composite photography lab Gabriel Scarpa, Teresa Casado and Eduardo López work to stitch together and restore digital images.

The digital team specialises in digital restoration, colour matching and the production of various means of visualising data.

Composite photography stitching and colour registering on the Portrait of Madame de Pompadour by François Boucher.
Not all heritage exists in physical form: composer and sound designer Nathaniel Robin Mann is involved in projects aiming to preserve sounds.
New experiments in vermiculated rustication by Charlotte Skene Catling and Adam Lowe designed to introduce light and shadow into the surface of buildings.
The techniques, technologies and processes of re-materialisation adapt to each project. Many projects involve CNC-milling in stone or metal and 3D printing prototypes in nylon, resin and plastics. These spaces remain flexible and evolve as new technologies become available. The facilities are equipped with six CNC-milling machines, a cement printer, a fulgurite printer, a 7-Axis robot, and small 3D printers. Factum Arte uses a number of local and international companies for specialised process and large-scale 3D printing.
3d modelling and finding new ways to visualise and display data is an increasingly important part of Factum’s work.
Innovative exhibition displays are increasingly interested in recreating objects in 3D: giving materiality to the ideas of artists and designers of the past is also part of Factum’s work.

Recreation of Giambattista Piranesi’s Helix Tripod for the exhibition The Arts of Piranesi, 2014
Large-scale precision engineering

Laser cutting

Robot polishing

Stone cutting

Waterjet cutting

Large-scale stone lathe

Laser sintering

Wire cutting stone

Stone carving

Large painting chamber

Centrifugal casting

3D printing with Materialise’s Mammoth SLA printer
The digital printing area is at the heart of studios and plays a central role in Factum’s approach to the relationship between tone and form. It has been developed around a flatbed printer designed by Dwight Perry. A new version of this printer is currently being developed by Quinner Baird. Both systems enable Rafa Rachewsky, Jordi Pons and Eduardo López to print onto diverse surfaces (coated in house) by building up layers of colour. This approach has created new possibilities for artists and facilitated the creation of exact facsimiles of paintings.
The coating room where gesso, gelatine and other materials are applied to different surfaces.

General view showing the creative chaos in Factum Arte's digital print studio.

The first flatbed printer in 2001.

Factum's engineering and printing team developed a new flatbed printer in 2019, able to print an area of 1.6 x 4.5 meters.
Elevated printing technology, developed by Canon Production Printing, allows the creation of full colour textured prints. It works similarly to flatbed printing, although in this case, layer upon layer of UV-cured ink is deposited onto a surface to produce high-resolution three-dimensional surfaces. The thickness of each layer varies between 2 and 4μm. It works similarly to flatbed printing, although in this case, layer upon layer of UV-cured ink is deposited onto a surface to produce high-resolution three-dimensional surfaces. The thickness of each layer varies between 2 and 4μm.
The cutting-edge digital printing technology co-exists with a traditional printing presses making intaglio and relief prints. Traditional techniques such as mezzotint and woodburytype are being reinvigorated by the possibilities for plate making with CNC machines. Cyanotype is another process that has benefited from the ability to print large scale negatives. Historical photographic process are also in use.
A variety of prints derived from the same plates, belonging to the Arab Image Foundation (AIF) in Beirut, for AKRAM ZAATARI, 2017

Cyanotype (top) and CNC carved salt panels: Harmonic Distorsion by MATT CHIVERS, 2017
Arthur Prior experiments with Mezzotint plates and CNC milling
Digital drypoint test for WAQAS KAHN
EL ANATSUI’s Benchmark series was developed at Factum Arte.

EL ANATSUI, Eclipse series, chine collé handpainted and foil blocking.
Experiments with resin and electricity are taking place both in Factum’s studios and in Chicago.

Development of Material Sound
A number of spaces have been designated for craft work. The ‘dirty workshop’ is for moulding and sculpting in materials such as fibreglass, resin, scagliola, wood and gesso. This space is large and various projects are carried out simultaneously. In this area, different teams work on diverse projects.

The ‘clean studio’ specializes in metal assembly, glass works and special projects requiring precision. The ‘metal studio’ is composed of two designated areas, one for large complex fabrication and the other for precise work with metals. Other spaces are used for experimentation and innovation.
The workshop for mould-making and casting

Different teams carry out different processes and work with diverse materials

A studio for precision finishing

Electronic and audio work being carried out in an experimental studio

The workshop for mould-making and casting
Different stages of the production of the facsimile of the Risen Christ by Doménikos Theotokópoulos, known as El Greco.

MAT COLLISHAW, All things fall, 2014
Preparing JENNY HOLZER’s installation for Abu Dhabi Louvre in Factum Arte’s largest workshop space

Foamglas® building design by Skene Cating de la Peña for Material Sound
The textile studio is used for the design and preparation of all digital stages involved in Jacquard weaving. Factum doesn't have a loom and works with craftsmen in Belgium to weave the tapestries. All finishing and assembly is done in Madrid. The Textile Studio is also involved in making replica tapestries and fabrics for museums and historic buildings where the fragile original materials can no longer be exhibited. Hand-tufting and embroidery is also carried out under the supervision of Blanca Nieto and Isabel Fernández.

Factum Arte works with artists to push the boundaries of this versatile medium by researching new formats, fabrics and fibers.
The conservation studio led by Silvia Álvarez applies traditional conservation and restoration skills to finish the objects made in the workshops.

3D scanning and printing are leading to new innovations in frame making that depend on both new technology and traditional skill.

Experts in gilding and conservation create facsimiles of frames. The frame making studio specialises in traditional gilding and finishing over 3D printed surfaces.
The transfer of data between image and form means we often depend on painting and manual work as well as printing.

The workshop also contains a pressurised heated painting chamber for special paint finishes.

Jordi Garcia Pons working on the recreation of Gustav Klimt’s Medicine for the tv series Mystery of the Lost Paintings (Sky Arts, 2018)

Fluorescent paint experiments on prints for PAULA CROWN
This section of the studio is reserved for special activities requiring a large and quiet space. This area is often used to mount exhibitions or to teach special workshops about art techniques and recording technology, but also hosted special events and dinners.

**DIGITAL OUTPUT**

**MULTIPURPOSE SPACES**

Recreating Raphael’s tomb, 2019-2020

Celebratory dinner hosted for MARINA ABRAMOVIĆ in 2019

Multipurpose space used for preparing exhibitions and teaching courses
The ‘techne’ shelves for Madame de Pompadour in the Frame at Waddesdon Manor, 2019. These shelves contain fragments and samples from a range of projects using diverse materials and processes.
Stainless Steel: MARC QUINN, 8-meter long fragment of a shell cast in stainless steel 316 at Fademesa foundry, Madrid.

Brass tree for the Mercato del Duomo, Milan. Cast at Esfinge, Madrid.

Aluminium: MARIKO MORI’s Möbius strips cast in aluminium.

Flexible alloys: experimentation and material science.

Bronze: RACHID KORAICHI calligraphy cast in bronze.

Concrete: MARC QUINN Eye of History cast in concrete.

Bronze: Giambattista Piranesi’s coffeepot cast in silver cast at Pangolin, UK.

Glass: Antonio Canova’s Paolina Borghese cast in glass by Giberto Arrivabene, Venice.

Corten: CONRAD SHAWCROSS Manifest cast in corten.

DIGITAL OUTPUT
CASTING PROCESS IN DIVERSE MATERIALS
The Serpentine Tree, 2021. Cast in bronze

LOS CARPINTEROS, Susurro del Palmar, Galerie Peter Kilchmann, 2018
ADAM LOWE for TOM STUART SMITH, Moon Tree, Connaught Hotel, London, 2013

ADAM LOWE for MICHELE DE LUCCHI, Autogrill Olive Tree, Mercato del Duomo, Milan, 2015
The Bronze Oak project, 2016

JENNIFER ALLORA & GUILLERMO CALZADILLA, Entelechy, 2021
Facsimile of a 1st century Roman horse statue, 2021

Work in progress for CONRAD SHAWCROSS, Crossgate Moorgate Manifold, London
**DIGITAL OUTPUT**

**MATERIAL TRANSFORMATION**

- Cast lava
- Salt: MARINA ABRAMOVIĆ cast in salt
- Micro CNC-milling and gold plating
- Laser engraving glass
- Electroplating
- CNC-milled alabaster: MARINA ABRAMOVIĆ, 5 Stages of Maya Dance, 2013
- Fibreglass: SHEZAD DAWOOD, Why Depend on Space and Time cast in fibreglass with trichromate paint
- CNC mezzotint burnishing
- CNC-milled woodburytype mould
- 3D large-scale stereolithographic printing
Experiments with Foamglas® heated to different temperatures

Handmade glass tears for MARINA ABRAMOVIĆ
SPECIAL INTERIOR FITTINGS

Waney-edged oak screens designed by Charlotte Skene Catling for The Woodshed, North Mimms, 2021

Alabaster table with bronze legs designed by Adam Lowe for Louisa Guinness, 2012

Hood for 12 metre light system, for a house in Virginia Water, 2021

Alabaster firesurround designed by Charlotte Skene Catling for The Woodshed, North Mimms, 2021
Installing the bronze Autogrill Olive Tree into Mercato del Duomo in Milan, 2015. The 7-meter sculpture of an olive tree and its roots was made in collaboration with the Italian architect and designer Michele de Lucchi.
LARISSA SANSOUR, Monument for Lost Time, 2019. A vast spherical structure is made from glass-fibre-reinforced epoxy resin installed in the Danish Pavilion at the 58th Venice Biennale.

Installing the facsimile of Tutankhamun’s sarcophagus inside the replica of the burial chamber, donated to Egypt in 2014.

Installing one of the two facsimiles of the Nimrud lamassu statues at the University of Mosul, 2019. This was carried out in collaboration with the British Museum in London, the University of Mosul, the Rijksmuseum Van Oudheden, the Spanish Ministry of Defense and the Iraqi Government.

Installing the replica of the Borgherini Chapel, from the convent of San Pietro in Montorio in Rome, inside the National Gallery, 2017.
EXHIBITIONS

IN ICTU OCULI – IN THE BLINK OF AN EYE: TRANSIENCE AND ETERNITY IN THE SPANISH GOLDEN AGE,
Spanish Gallery, Bishop Auckland, 2021
Photo by James Morris
EXHIBITIONS

THE ARTS OF PIRANESI: ARCHITECT, ENGRAVER, ANTIQUARIAN, VEDUTISTA, DESIGNER. THE EXHIBITION
Fondazione Giorgio Cini, Venice, 2010

FACSIMILE OF THE TOMB OF TUTANKHAMUN
Installed at the entrance of the Valley of the Kings, 2014

PENELOPE’S LABOUR - WEAVING WORDS AND IMAGES
Fondazione Giorgio Cini, Venice, 2011

MINDFUL HANDS. MASTERPIECES OF ILLUMINATION FROM THE FONDAZIONE GIORGIO CINI
Fondazione Giorgio Cini, Venice, 2016
IL POLITTICO GRIFFONI RINASCE A BOLOGNA
Palazzo Fava, Bologna, 2020. Photo by Paolo Righi for Genus Bononiae

THE MATERIALITY OF THE AURA: NEW TECHNOLOGIES FOR DIGITAL PRESERVATION
Palazzo Fava, Bologna, 2020

THE VERONICA SCANNER: LIVE 3D PORTRAITURE
Royal Academy of Arts, 2016
The rematerialised tomb of Raphael on display in the Chiesa dei Carmelitani Scalzi, Urbino
Photo by Comune di Urbino

IL RITORNO DEI CAPOLAVORI PERDUTI
Palazzo Abatellis, Palermo, 2019
Facsimiles of Caravaggio’s St. Matthew paintings, from the church of San Luigi dei Francesi in Rome, installed in the church of St. John the Baptist. Caravaggio, 2010

Facsimile of Caravaggio’s Nativity with Saint Francis and Saint Lawrence, in the oratory of San Lorenzo, Palermo, 2015

WORDS OF STONES
The State Hermitage Museum, St Petersburg, 2017
Victoria and Albert Museum, 2017-2018

MICHELANGELO & SEBASTIANO
Recreations of Antonio Canova’s Paolina Borghese are part of the V&A Cast Court since December 2018.

Facsimile of the south wall from the Sala Bologna, depicting the map of the city made by Lorenzo Sabbatini, was installed in the hall of the Museo della Città di Bologna in 2011.

Facsimile of Thutmose III made by Factum Arte. A touring exhibition organised by United Exhibits Group, that opened at the National Gallery, Washington in 2002.

DOMUS GRIMANI 1594 – 2019
The facsimile of Francesco Salviati’s ceiling painting The Dispute between Minerva and Neptune was installed at Palazzo Grimani, Venice, in 2019.
IN ICTU OCULI - IN THE BLINK OF AN EYE: TRANSIENCE AND ETERNITY IN THE SPANISH GOLDEN AGE
Spanish Gallery, Bishop Auckland, 2021. Photo by James Morris