

# The digitisation and restoration of the film ‘Office Baroque, a project by Gordon Matta-Clark’

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This case study looks at the preservation of the art history documentary *Office Baroque, a project by Gordon Matta-Clark* by Cherica Convents and Roger Steylaerts, about the realisation of the eponymous work by the American artist Gordon Matta-Clark in Antwerp in 1977. The original reversal film montage and magnetic audio tape (16 mm) were digitised and restored by Argos in the context of the European digitisation project *Digitising Contemporary Art*.



© Cherica Convents & Roger Steylaerts

## 1. About the ‘Digitising Contemporary Art’ project and the Argos collection

The *Digitising Contemporary Art* (DCA)<sup>1</sup> project is supported by the European Commission’s CIP-ICT PSP programme and focuses on art produced after 1945. The DCA consortium consists of 25 partners from 12 European countries. Over a period of 30 months (1 January 2011 to 30 June 2013) 26,921 works of art – paintings, photos, sculptures, installations, videos – and 1,857 contextual documents are being digitised, and made accessible and searchable via the Europeana portal. The delivered content, which also included masterpieces by important artists from most European countries, fills a gap in the current supply of content to Europeana, which has little contemporary. Europeana.eu is a portal site supported by the European Commission, giving internet users access to the (digital) European cultural heritage that is housed in museums, archives, libraries and audiovisual collections. Europeana was launched in November 2008 and now comprises 26 million items from more than 2,200 European cultural heritage

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<sup>1</sup> For more information about the DCA project : <http://www digitisingcontemporaryart.eu>.

institutions<sup>2</sup>. Within the DCA project, Argos is digitising 700 artists' films and videos which were previously only available on reel and magnetic carriers.

Argos has the biggest collection of audiovisual art in Belgium, with more than 4,000 artists' films, videos and installations dating from the 1960s to the present day. The collection includes a rich and diverse legacy of artistic productions which are excluded from the regular cinema and television circuits. Argos pursues an active collection policy. As far as domestic production is concerned, the art centre has managed over the last few decades to procure a fairly comprehensive overview and in so doing has built up a unique and representative collection. In recent years various initiatives and campaigns have been undertaken to secure the audiovisual collection for the future. Works risked being lost because of the chemical composition and perishability of their supports or because the playing and reproduction equipment is becoming antiquated.

The majority of the collection has since been conserved. The first round of conservation consisted of transferring works from older tape formats to Digital Betacam. Since current technological advances involve tapeless archiving rather than saving analogue and digital videotape formats, Argos switched to saving uncompressed digital files on a server in a second conservation round. Argos is currently in an interim period in which its preservation policy is evolving from analogue to digital and from 'media-dependent' (tape) to 'media-less' (tapeless). In addition to digitising endangered analogue audiovisual material, Argos is also developing and implementing long-term preservation strategies for '*digital-reborn*' (digitised) and '*digital-born*' audiovisual material. Argos adopts a proactive preservation policy with regular migration to other media and formats, the development and maintenance of an infrastructure for compatible and intact storage, the correct description of the collection, quality assurance, etc. In so doing, account is taken of the applicable international standards. In anticipation of technological advances, this policy is being continuously evaluated and adapted.

## 2. Short biography of the artist

Gordon Matta-Clark (1945-1978) is an American artist best known for his site-specific artworks from the 1970s. Like his father, the Chilean surrealist painter Roberto Echaurren Matta, Gordon Matta-Clark studied architecture. Although he never made a career of it, architecture was his medium and his subject material in the practice of his art – with its inextricable relationship to private and public space, and to urban development and decay. His work is characterised by a fusion of the criticism of cultural institutionalisation typical of Conceptual Art, the direct involvement with the environment which was typical of Land Art and the preference for the physical typical of Performance Art.

His most famous projects are the spectacular *Cuttings*, in which he cut geometrical shapes from walls, floors and ceilings of derelict and dilapidated buildings. His interventions transformed architecture into sculpture and laid bare the soul of a building. In addition to *Splitting* (1974), which consisted of sawing a whole building in two, *Office Baroque* (1977) in Antwerp is one of his most renowned projects. The film of the same title is a documentary by Cherica Convents and Roger Steylaerts about this project.

## 3. Short description of the work

**Title:** Office Baroque

**Year:** 1977-78

**Country:** België

**Languages:** English, Dutch

**Duration:** 44 min

**Credits:**

**Camera:** Cherica Convents

**Assistant:** Dirk Geens

**Sound:** Roger Steylaerts

**Montage:** Roger Steylaerts, Cherica Convents

**Music:** André Stordeur (Syntheses)

**Director:** Cherica Convents

**Producer:** E.C.F., Roger Steylaerts

**With thanks to:** I.C.C., Flor Bex, Marcel Peeters, Varia Film, Luvox, Agfa Gevaert, Mi Huybs, Patricia Hautekeete

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<sup>2</sup> State of affairs on 18 March 2013 (source: <http://www.pro.europeana.eu/web/guest/content>).



© Cherica Convents & Roger Steylaerts

This documentary reveals the thought and creative processes around *Office Baroque*, a site-specific work that American artist Gordon Matta-Clark brought to life in 1977 in a derelict building in the centre of Antwerp. Cherica Convents and Roger Steylaerts followed the artist and other people involved in the project for months, from the preparations for the project until its completion. The film-makers deliberately stay in the background: the style of the video is record-keeping, distant. Shored up by the ominous electronic soundtrack (*Syntheses* by André Stordeur), the documentary leans towards the abstract. The makers refrain from comment. They opt instead for sobriety and detachment, thereby creating space for their subjects: the building, the artist, the curators and the workers on *Office Baroque*.

Throughout the entire documentary, we repeatedly see the end result, even at the point where Gordon Matta-Clark is still busy with the preparations. *"In this contemporary art movement, the process is as important as the result – as the work itself"*, explains Flor Bex. The interview with the curator and initiator offers a clear insight into the working process of the architect-artist and highlights the problems facing Gordon Matta-Clark when he was realising his concepts. There were many in Antwerp. For example, originally the artist wanted to make a cut-away in the facade of a free-standing five-storey medium-sized office building on the Scheldt, opposite the Antwerp fortification 'het Steen'. He wanted to make a spherical cut-away whose central point would lie outside the building. However, this proposal was turned down by the city council. So Matta-Clark decided instead to make an internal design of an external design – an exception in his work. In the end, the artist-architect made cut-aways in the different storeys of the building, creating a vertical deconstructivist sculpture extending from the cellars to the roof. In concrete terms, Matta-Clark opted for a pattern of two semi-circles, one in the centre of the building, and the other at the distance of the golden ratio. The intersection of these two spheres formed the main opening, a tear shape. What is remarkable is that Matta-Clark carried out most of the work himself, with the critical eye of an architect and the precision of a painter. The realisation involved serious physical labour: we see the artist taking measurements, drawing, hammering, cutting, sawing, chopping and drilling. *"It is my first project that goes vertically through the building. The visitor is in fact walking through 'drawings' instead of spaces"*, says Matta-Clark. *"The concept is the product of a complex drawing and not a facade reading like in my former work. There is no overall viewpoint which gives an instant impression of the work. The complexity and depth of it is almost impossible to summarise or document"*.

Convents and Steylaerts slowly record every detail: their camera ‘scans’ the architecture and the actions of the artist. The soundtrack is astonishing and the images of passers-by and life outside – a brass band, stilt-walkers and tourists squinting at the cameras – are a stark contrast with the thoughts and world of the artist himself. The artist himself regarded *Office Baroque*, his last large-scale work before he died of cancer in 1978, as the best work he had ever made “because it was largely invisible”.

#### 4. Selection criteria

For Argos, making the *Office Baroque* documentary accessible is especially important for several reasons:

##### Gordon Matta-Clark and his work

- Despite his short career, Gordon Matta-Clark is one of the most important figures in the contemporary art of the 1970s. His influence can be found in the work of important young artists active today (e.g., Rachel Whiteread, Gregor Schneider, Rirkrit Tiravanija etc.). Matta-Clark created *Office Baroque* in 1977 and died in the summer of 1978. It was his last major work. The film by Convents and Steylaerts closely follows the creation of *Office Baroque*.
- In contrast to many of his minimalist and conceptual contemporaries and friends, such as Daniel Buren, Robert Morris, Dan Graham, Donald Judd, Richard Serra and Robert Morris, Gordon Matta-Clark produced no critical essays or texts. He felt no need to back up his work with discourse, by reflecting on his own projects or taking up theoretical positions in relation to his colleagues. Matta-Clark only talks in a limited number of interviews. The film *Office Baroque* is therefore a special document, because in it Matta-Clark exceptionally talks about his own work.
- Although the film *Office Baroque* is not actually the work of Gordon Matta-Clark himself, but that of Cherica Convents and Roger Steylaerts, it is of such historical importance that it is almost always present in programmes that include films by Gordon Matta-Clark himself.

##### History of contemporary art in Flanders

- The work *Office Baroque* was made by Gordon Matta-Clark in Antwerp in 1977, when he was invited by curator Flor Bex to put on an exhibition in the I.C.C. Matta-Clark had the opportunity to work on a derelict building on the Ernest Van Dijckkaai, right by ‘het Steen’. In honour of the four hundredth anniversary of the Antwerp baroque painter Rubens, it was named *Office Baroque*.
- Shortly after the death of Matta-Clark in 1978, Flor Bex proposed that *Office Baroque* be preserved as a tribute to the artist, and that it be integrated into a museum of contemporary art to be built on the surrounding site. The idea was received positively and the Gordon Matta-Clark Foundation was set up to raise the necessary funds. Numerous artists from Belgium and abroad donated work in an attempt to secure the life of *Office Baroque*, or if that should fail, to serve as a basic collection for the new museum of contemporary art. In the end, despite all efforts, *Office Baroque*, the only remaining architectural sculptural work by Gordon Matta-Clark, was demolished. In response to the call for a museum of contemporary art in Antwerp, the Flemish Community decided to build the Museum for Contemporary Art in Antwerp (M HKA) in 1982. The work of Gordon Matta-Clark finally assumed a key place in the M HKA collection.
- The sound track of *Office Baroque* consists of the tape composition *Syntheses* by André Stordeur, one of the Belgian pioneers in the area of electronic music and a pupil of Karel Goeyvaerts and Morton Subotnick.

##### Argos collection

Argos collects not only artworks produced using audiovisual media; it also has a series of films and videos about contemporary art. Good examples of this are the works of Jef Cornelis. In the context of the DCA project, some portrait films by Jan Florizoone have also been digitised; these films are about artists such as Koen Theys, Franky D.C., Gorik Lindemans, etc. The acquisition and showing of *Office Baroque* therefore fits nicely into the Argos collection.



© Cherica Convents & Roger Steylaerts

## 5. Rights issues

Before Argos could start digitising and restoring *Office Baroque*, a year was spent sorting out the rights issues surrounding this work. In 2009 PACKED vzw in collaboration with Argos and M HKA carried out a preliminary study<sup>3</sup>. First and foremost, the rights to the film needed to be checked. Who had the author's rights, who the producer's? What rights did M HKA have as successor to the former I.C.C.? And what rights did the descendants of Gordon Matta-Clark have? An answer to these questions was made more difficult because back in 1977 it was not the norm to draft a contract when producing this sort of film. Furthermore, artists like Gordon Matta-Clark often regarded film and photo images about the creation process as a part of their work. The actual works of art, such as the intervention in the office building in Antwerp, were often temporary in nature. In order to be able to determine who the entitled parties were, PACKED vzw tried to map the production history of the film. This was done by means of interviews with the filmmakers and exhibition curator and an examination of the correspondence with the artist. A legal expert was also engaged to examine the intellectual property rights. The conclusions of this investigation are as follows:

1. It is assumed that the persons mentioned as authors in the credits are the actual authors. In casu this is therefore the director (Cherica Convents) and the composer (André Stordeur). The credits do not confirm Gordon Matta-Clark as an author.
2. The credits mention E.C.F. and Roger Steylaerts as responsible for the production. ICC and Gordon Matta-Clark would have difficulty making a claim to be the producer because they do not appear in the credits as producer.
3. The descendants of Gordon Matta-Clark cannot object to the reproduction of his image, because the image rights expired on 22 August 1998, twenty years after his death. The descendants of Gordon Matta-Clark, or

<sup>3</sup> For a more in-depth report on this preliminary investigation, you can consult the SCART website: <http://www.scart.be/?q=nl/content/case-study-rapport-office-baroque-1977-cherica-convents-en-roger-steylaerts>.

other relatives, cannot object to a new use of his image on the grounds of 'right of memory', which is intended to protect the memory of the deceased, because Gordon Matta-Clark himself consented to the filming and because it does not damage the right of memory. In addition, Gordon Matta-Clark's work is itself shown in the documentary, apparently with his consent. If the film-makers can show that Gordon Matta-Clark imposed no restrictions on the use of the documentary, the descendants will not be able to dispute this.

In addition to the author's rights, the status of a restored copy of *Office Baroque* which is circulating in the United States must also be investigated, as well as whether Argos with the existence of this restored copy is not at risk of undertaking double and superfluous work by itself restoring the film. This was investigated by PACKED vzw in consultation with the American distributor Electronic Arts Intermix and the descendants of Gordon Matta-Clark. The conclusion of this investigation is that the restoration (and successive use) in the US took place without the consent of Cherica Convents. She can appeal against this as author of the film (if the rights have not been transferred to a producer).

In 2002 on the initiative of Flor Bex both a distribution and an archiving contract were signed by Argos with Cherica Convents and Roger Steylaerts. As a result of the confusion about the *Office Baroque* version restored in the US in 2005 (originating from Electronic Arts Intermix), the plans to restore the Belgian version were put on hold for a considerable time. At the end of 2007 Argos submitted a request for funding to the Flemish Community to restore the film. The film material was blocked in 2008 at the Color by DeJonghe lab by Cherica Convents, after Argos requested an offer for restoration. In 2012 a new distribution and archiving contract was signed with the film-makers. As a result, the digitisation and restoration of the film could begin.

## 6. Method

The actual digitisation process of *Office Baroque* was divided into several stages:

1. Setting the objectives and digitisation budget
2. Selection criteria
3. Settling the rights
4. Material analysis
5. Setting quality criteria and choice of supplier
6. Material preparation
7. Digitisation
8. Quality control
9. Description
10. Storage and archiving
11. Accessibility

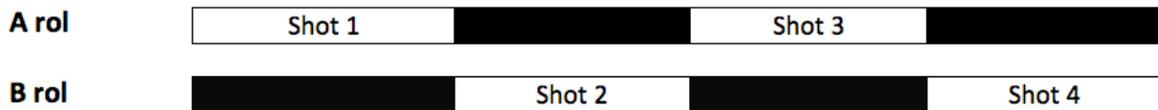
The first three steps were taken before the start of the DCA project. Conservation and accessibility were the two predominant reasons for digitising *Office Baroque*.

### Material analysis

*Office Baroque* is a 16mm colour reversal film montage (Gevachrome/Kodak Ektachrome) in A/B band. The documentary was filmed with a 16 mm Beaulieu camera. *Reversal film* comes directly out of the camera and instantly gives a positive image that can be projected. In contrast, 'normal' film (negative) gives a negative image and first has to be made into a positive copy to view the result. Reversal film is cheaper than negative film because the negative-positive chain is shortened.

The support is composed of triacetate. Acetate film is also called safety film, because from the 1950s onwards it replaced the flammable nitrate film as a standard image support worldwide. Film with an acetate basis is more stable than nitrate film, but is more susceptible to the vinegar syndrome.

A/B montage (also called *checkerboard cutting*) is an 'old' method used to finish off negative or reversal film (usually 16 mm film) when fades or dissolves have to be made between picture transitions. This can be done by creating two separate rolls, the A roll and the B roll. It is put together as follows:



- shot 1: A
- shot 2: B
- shot 3: A
- shot 4: B
- shot 5: A
- shot 6: B
- ...

When the images are on one roll, a black *leader* is applied to the other roll. This was previously only possible by overlapping one negative/reversal original with the other, sometimes with some black between both. Now this is done digitally, but an A/B montage is still recommended for the neatness of the montage for printing. The seams are less visible in the transition from one shot to the next. The image montage of *Office Baroque* was not carried out in compliance with the norms (poor adhesive splicing, ...).

The soundtrack for the film *Office Baroque* was simultaneously and synchronously recorded on a separate perforated 16 mm magnetic tape/sepmag. (*Separated magnetic sound*) with a portable Nagra ¼-inch tape recorder. The two spools (one for sound and one for picture) have to be laid simultaneously on the projector or vision table in order to get a simultaneous sound and picture.

#### Determining the quality criteria and choice of supplier

Argos has years of experience in the area of video preservation, but relatively little in the area of film digitisation. In order to determine the quality requirements, it was therefore necessary to carry out a preliminary investigation. On this basis it was possible to determine the desired properties of the digital copy, establish the technical parameters and weigh up the costs of certain technical choices against the added value for the end result. A suitable supplier was also sought and various price quotes were requested. Argos selected DeJonghe Film Postproduction in Kortrijk<sup>4</sup>, because this digitisation laboratory has years of experience in film and also has the right infrastructure and analogue equipment for film scanning. In order to justify why certain choices were made, some technical aspects of the digitisation process will be explained in more detail below.

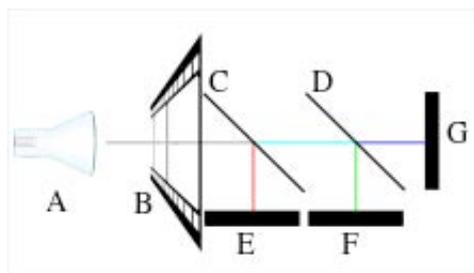
#### Digitisation process: telecine vs. scanning

There are two possible methods for digitising film: telecine or scanning. Telecine machines work in real time (24, 25 or 30 frames/second), in other words the conversion of a one-hour film takes one hour. They have no data output, but a video output (tape or digital video file) usually in *Standard Definition Video*<sup>5</sup> or sometimes also in *High Definition Video*<sup>6</sup>. Telecine machines allow for colour correction and image manipulation during the conversion process. There are two kinds of telecine machine: flying spot or CCD (*Charged Coupled Device*). The flying spot machine exposes the film with a beam of light (B) generated by a cathode ray tube (A). The result of this exposure is split into red, green and blue via a system of lenses and dichroic mirrors (C & D), and recorded by three photomultiplier tubes (E, F & G). These tubes then produce electrical signals which are used to make a video signal. However, in a CCD telecine machine the film surface (B) is exposed with a white light from a Xenon lamp (A). The result of this exposure is split via a prism (C & D) into the three primary colours red, green and blue. Each ray of coloured light is then projected onto three different CCDs (E, F & G), one for each colour. A CCD is a chip that converts electromagnetic waves into an electrical charge.

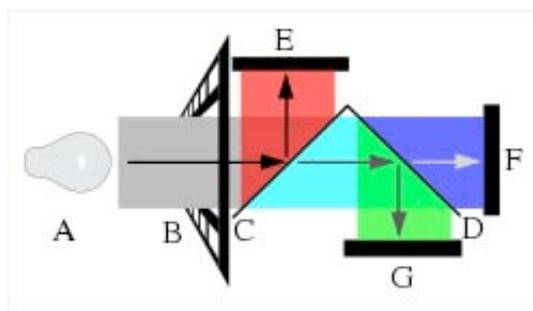
<sup>4</sup> For more information, see <http://www.postproduction.be/>

<sup>5</sup> A Standard Definition video image is composed of 720 pixels x 576 image lines (PAL) or 720 pixels x 480 image lines (NTSC).

<sup>6</sup> A High Definition video image consists of 1920 x 1080 image lines (1080i or 1080p).



Flying spot (bon: Wikipedia)



CDD (bon: Wikipedia)

One problem with telecine is the synchronisation of the film speed with the video speed. Film has an image speed of 24 frames/second, while for video this is 25 (PAL) or 29.97 (NTSC) frames/second. Film (24 frames/second) is often converted into PAL (25 frames/second) by playing the film at 25 frames per second, thus accelerating it by 4%. This slightly reduces the duration of the film. The increase in the image speed also means that the pitch of the sound is a little higher, which can be rectified using a *pitch shifter*. For NTSC (29.97 frames/second), however, it is more difficult to use this technique, because the difference between 24 and nearly 30 frames per second is too big to go unnoticed. The pull-down process is often used in this case, and involves the doubling of certain film images.

In contrast to telecine machines, film scanners do not work in real time (one frame per two seconds). The scanning of one minute of film does not last one minute, but about one hour. Film scanners have a data output, but no video output. Colour correction or image manipulation cannot be carried out during scanning. The film is scanned frame by frame in high resolution (2K, 4K, ...) and then saved as a sequence in a digital file. A film scanner consists of a film transport system, a light source, a digital sensor, electronics that convert the frames into bits (that have a value of 0 or 1) and a computer workstation. During scanning the film is moved along the light source and digital sensor of the scanner. There are two methods for transporting the film during scanning. With some scanners the film is transported in a continuous motion (comparable with what happens with telecine). The other type of scanner moves the film downwards with interruptions and one frame at a time. During scanning the footage is held in place with pins (*pin registered*). The perforations in the film are used for this purpose.

The advantage of a scan over telecine is the image resolution and sharpness. Since during a scan three recordings per frame are made, namely red, green and blue (RGB), and the perforations are used to ensure stability, the picture is really sharp and contains all the information present in the negative. In the case of *Office Baroque* the quality of a telecine transfer would not have sufficed in the later post-production and in particular for the grading. The downside of film scans is, however, that they require a lot of storage space and it takes a long time to copy files from one disk to another. Furthermore, in contrast to telecine machines, it is usually not possible to digitise sound and picture simultaneously with film scanners. The sound is digitised as an audio file separately from the DPX files. This means that a synchronisation phase is required in the workflow.

### Digitisation parameters

Digital image formats for film scanning support various bit depths and can be divided into two categories: linear and logarithmic. The most common formats are TIFF (*Tagged Image File Format*) and DPX (*Digital Picture Exchange*). DPX files can be both linear and logarithmic; TIFF files are only linear. A logarithmic scan is a way of saving image data in the same *'response curve'* as negative film. In contrast to video, film does not react linearly to light intensity and has a characteristic curve<sup>7</sup> that is logarithmic. The human perception of light contrast and details is also logarithmic. The human eye can distinguish more grey levels in black sections and shadows than in lighter parts (highlights or *'super whites'*). In a linear image bits are equally divided between black and white. Conversely, in a logarithmic image the same bits can be used to accentuate details in the black and white parts of the image.

DPX<sup>8</sup> was chosen as an archiving format for *Office Baroque*, because it offers the possibility of logarithmic scanning. It is an uncompressed format and open standard for digital film. DPX is an extension of the Cineon format developed by Kodak and has been established as standard 268M-2003 by the Society of Motion Picture and Television

<sup>7</sup> The 'Hurter & Driffield' curve shows the optical density on the vertical axis and the amount of exposure in logarithmic units on the horizontal axis. When the silver halide crystals in the film layer come into contact with photons (light particles), they become opaque. The optical density is the degree of opacity of a film. The term exposure refers to the interaction between the film layer and the photons. The characteristic curve of film consists of three basic components: the toe, the straight line area and the shoulder. The straight line area, the middle section, represents 80% of the image. The toe is the representation of the 'almost-black' to black parts of the image and the shoulder 'almost-white' to white parts of the image. The bend in the curve on the shoulder and toe are the areas where detail begins and disappears.

<sup>8</sup> For more information about the DPX format: <http://www.digitalpreservation.gov/formats/fdd/fdd000178.shtml>.

Engineers (SMPTE). Because each frame is saved as a separate .dpx file, there are no problems regarding image speed in contrast to telecine. DPX is a suitable archiving format, for the following reasons:

- it is open and documented and not tied to a certain software or manufacturer;
- it is standardised;
- it is interchangeable;
- there is storage without information loss (uncompressed);
- it is possible to save extensive technical metadata in DPX files;
- it retains the authenticity of the film original (see below).

Image information can be saved linearly or logarithmically with a resolution of 2K (2048 pixels) to 8K (8192 pixels – IMAX) and with a colour depth of 8 to 64 bits per colour component. The archiving file of *Office Baroque* is a 2K DPX file (2048 x 1556 pixels) with 10 bit logarithmic RGB pixels.

For 16 mm film, 2K resolution (2048 x 1080 pixels) is sufficient, because the 16 mm image is smaller than the 35 mm image. Scanning to a higher resolution (e.g. 4K) makes no sense in the case of *Office Baroque*, given the quality of the source material and the fact that the film is not intended to be shown in the cinema. The added value of the end result does not justify the higher digitisation and storage costs. A 2K scan will take about 1 terabyte per hour of film material; a 4K scan as much as 4 terabyte. The Office Baroque footage consists of 59,681 DPX files each of 816 gigabytes. The uncompressed audio file is 662 megabytes.

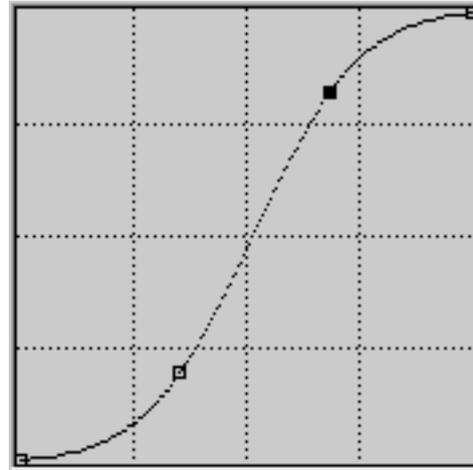
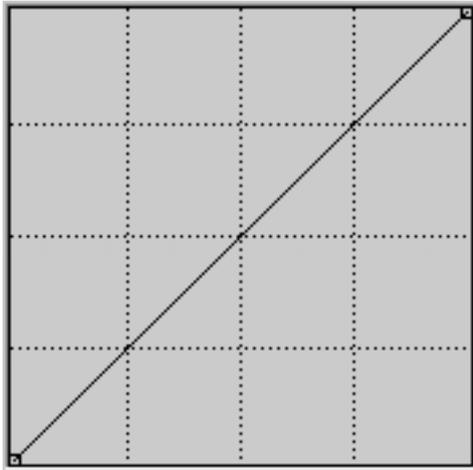
The bit depth determines how much colour information is available for every pixel in a frame. The more bits, the more colours and the more accurate the colour representation. A colour depth of 10 bits has 1,024 possible values for each of the three colour channels and that means 1,073,741,824 possible colour values. A DPX 10-bit logarithmic file can be compared to a TIFF 16-bit linear file. This means that 10-bit logarithmic scanning has several advantages over 16-bit linear scanning:

- fewer bits are needed to prevent ‘banding’<sup>9</sup>;
- the complete dynamic range<sup>10</sup> of film can be digitised without loss of the ‘super whites’;
- less storage space is required;
- it offers the greatest flexibility for colorimetry (highest latitude).



<sup>9</sup> ‘Banding’ is the existence of visible clarity levels/colour stripes when the available colours are limited, instead of a gradual transition.

<sup>10</sup> The dynamic reach is the difference in clarity between the darkest point and the lightest point in the filmed scene.



The disadvantage is that not everyone can handle logarithmic files. Before being able to process (colour grading etc.) or convert them to other formats, they must first be converted into a linear image. This happens internally in the software at the point of *grading*. Look-Up Tables (LUT) are used for this purpose. The conversion from a logarithmic to a linear image does not change the quality of the picture.

## 7. Material preparation

Material preparation includes transport, inspection, cleaning and where necessary physical restoration of the material.

The original reversal film montage and magnetic audio tape (16 mm) are kept in the depot of the Royal Belgian Film Archives and were picked up from there by DeJonghe Film Postproduction after written consent was given by the film-makers Cherica Convents and Roger Steylaerts.

The inspection, cleaning and physical restoration process were entrusted to DeJonghe Film Postproduction because Argos didn't have the necessary expertise and machines in house. Since the splicing was crooked, thick and dirty, it was decided not to clean the analogue footage manually. Prior to scanning, the film was superficially cleaned using a Lipsner-Smith CF9200 ultrasonic cleaning machine. This involves putting the film in a warm bath of 3M™ Novec™ Engineered Fluid HFE-8200. This hydrofluoroether liquid is a colourless and almost odourless solvent. The ultrasonic bath contains elements (transducers/vibrators) that make the liquid vibrate by sending sound waves through the reservoir. This gives rise to a mass of small imploding air bubbles, which causes shock waves that remove the loose dirt and grease from the film. This phenomenon is also called cavitation. Then the film is dried with hot air blowers which blow away most of the solvent and evaporate the rest. The machine is also equipped with rotating roller brushes that tackle the more stubborn dirt particles and squeegees that remove the liquid from the surface of the film before drying. The remaining dust and dirt particles can be removed after digitisation in the digital file.

The lab made a pre-selection of the sequences of the A/B montage to be digitised. This means that only the frames containing images are scanned and not the black leaders. This means no unnecessary work is done and the duration of the scanning process is shortened. Given that there were no EDL lists for *Office Baroque*, this selection had to be done manually. An Edit Decision List or EDL is an ordered list with the numbers of the spools and time codes indicating where each usable shot begins. *Office Baroque* lasts 44 minutes. So with a scanning rate of one frame per two seconds, scanning should normally take about 44 hours.

## 8. Digitisation

The picture and sound of *Office Baroque* were digitised separately by DeJonghe Film Postproduction in compliance with the set quality requirements:

1. 2K scan 16 mm reversal film montage to DPX 10 bit logarithmic;
2. digitisation of magnetic audio tape using telecine to uncompressed WAV 24 bit.

The digitisation of the footage was done by scanning and carried out using an Oxberry Cinescan 6400. This

scanner has a CCD sensor and LED lamp and is equipped with:

- a *wetgate* application: in this procedure the image window of the scanner is filled with clear liquid (perchloroethylene), making scratches on the carrier of the film less visible during digitisation;
- an optical zoom: since the scanner is equipped with a sort of rail, the camera can be placed physically as close as possible to the film. This makes it possible to zoom in on the frame without scanning unnecessary things alongside (perforations) which then have to be cut out later using software and which deform the picture;
- pins that hold the film, enabling a very good sharpness to be obtained.

The digitisation of the magnetic audio tape is done using telecine and was carried out with a Sondor '*sepmag follower*' used to play 16 mm and 35 mm magnetic film synchronously with the telecine in real time.

### Post-production

The A and B rolls were scanned separately and combined again in the digital postproduction in their correct place: 1A, 2B, 3A, 4B, 5A, 6B, etc. This was done by loading the DPX files into the Baselight grading system (Truelight, Filmlight calibration). The reference for conformity was achieved amongst other things by numbering the digital files. Example: barok.001510.dpx has to fall on the 1510th frame in the montage. In addition to the digital merging of the A/B montage there was also an automatic and manual *dustbust/dirt removal* (PFClean, Pixelfarm). This involved removing dust particles, scratches etc. from the (digitised) footage.

Colour grading was also carried out in the presence of the film-makers Cherica Convents and Roger Steylaerts, using the Baselight *grading system* on the basis of the projected proxy images (JVC 2K projector). This involved optimising the colours of the various film images again and adapting them to each other. The results of the colour grading are:

- the removal of major differences in lighting;
- the removal of the differences between Gevachrome and Ektachrome;
- the removal of flickering in the frame resulting from problems with the camera;
- the removal of most scratches, dust, visible seams, stabilisation (camera problems);
- zooming in on some shots to improve framing;
- optimisation of skin tints on Gevachrome which were often too orange or too red.

Because the sound and picture were on another support and were digitised separately, these had to be merged and synchronised again in digital form after digitisation.

### Output

In order to obtain an archive file with merged and synchronised sound and picture, DeJonghe Film Postproduction were asked to transcode the mother files to an Apple QuickTime MOV 10-bit video file with 24-bit audio.

At the request of the film-makers, a watermarked version was used as a reference file, with the logo of Argos made by FXProduction in Apple QuickTime MOV ProRes 422. The watermarked version was to be used as a copy and distribution safeguard to discourage illegal use of the work (see above 'Rights issues').

Given that *Office Baroque* is not intended to be shown in the cinema, no DCP (Digital Cinema Package) was made as a distribution copy. If this should prove necessary in the future, Argos can make its own DCP using the post-production files.

## 9. Results

The DeJonghe Film Postproduction lab delivered the following digital files:

- a processed DPX file with *colour grading*, *dustbust* and *dirt removal* (DPX linear 16 bit) for archiving;
- an uncompressed WAV 24-bit file for archiving;
- an Apple QuickTime MOV uncompressed 10-bit file with V210 videocodec and uncompressed 24-bit file in PCM codec for archiving;
- an Apple QuickTime MOV lossy 10-bit file with Apple ProRes 422 videocodec and 16-bit audio in PCM codec with watermark for reference.

The DPX original without *colour grading*, *dustbust* and *dirt removal* (virgin clean DPX 10 bit logarithmic) has been saved on LTO-4 tape at DeJonghe Film Postproduction. This unprocessed copy is also kept at the lab in case a decision is made in the future to re-do the colour grading.

<b>ARCHIVING FILE PICTURE</b> (processed – with colour grading, dustbust and dirt removal)	
Picture	
File format	DPX lineair
Codec	None
Compression	None
TV standard	Not applicable
Frame size	2048 x 1536 pixels
Frame rate	None (frame sequence)
Frame aspect ratio	4:3 (1.33:1)
Pixel aspect ratio	1:1 (square)
Bit depth	16 bit
Colour space	RGB
Chroma sub sampling	None
<b>ARCHIVING FILE SOUND</b>	
Audio	
File format	WAVE
Codec	PCM
Compression	None
Bit depth	24 bit
Number of audio channels	2 (mono)
Sampling frequency	48 Khz
<b>ARCHIVING FILE PICTURE &amp; SOUND</b>	
Picture	
File format	Apple QuickTime MOV
Codec	V210
Compression	Lossless
TV standard	PAL
Frame size	2048 x 1536 pixels
Frame rate	25 frames/second
Frame aspect ratio	4:3 (1.33:1)
Pixel aspect ratio	1:1 (square)
Bit depth	10 bit
Colour space	YUV
Chroma sub sampling	4:2:2
Audio	
File format	Apple QuickTime MOV
Codec	PCM
Compression	None
Bit depth	24 bit
Number of audio channels	2 (mono)
Sampling frequency	48 Khz
<b>ACCES FILE PICTURE &amp; SOUND (with watermark)</b>	

Picture	
File format	Apple QuickTime MOV
Codec	Apple ProRes 422
Compression	Lossy
TV standard	PAL
Frame size	1920 x 1080 pixels
Frame rate	25 frames/second
Frame aspect ratio	16:9
Pixel aspect ratio	1:1 (square)
Bit depth	10 bit
Colour space	YUV
Chroma sub sampling	4:2:2
Audio	
File format	Apple QuickTime MOV
Codec	PCM
Compression	None
Bit depth	16 bit
Number of audio channels	2 (mono)
Sampling frequency	48 Khz

## 10. Aftercare and management

### Quality control

The delivered master files of *Office Baroque* were checked for completeness after digitisation by Argos. For the visual control, QuickTime Player 7 was used. A technical control was also performed. MediaInfo open-source software was used to see whether the delivered files were digitised according to the quality criteria laid down. This software can be used with a graphic user interface or via the *command line*. Before placing the files on the server, they were also given a unique file name consisting of the *MD5-checksum* and a unique *shelfmark*. For archiving purposes, the *MD5-checksums* of the digital files were calculated and registered to check the integrity of the archived bits and bytes. These checksums are calculated automatically using the open source software BSD MD5. The checksums are calculated so as to be able to track mistakes in the bit storage later.

### Description

Metadata on the audiovisual works from the collection are kept by Argos in a PostgreSQL database. The Argos collection does not comply with the museum hypothesis of the unique object. Films and videos are ‘time-based media’ and are characterised by their duplicability. This requires a different description method from that of museums, libraries and archives. There can be several copies of one film, on several kinds of support and in various versions. Since until recently there was no metadata standard to meet the needs of Argos, they developed their own metadata model for describing audiovisual works. The current data structure consists of several different entities: Works, Copies, Events, Agents and Resources.

Work is currently being done on developing a collection management system for audiovisual works on the basis of the EN 15907 standard. This recently developed European standard offers a scheme for describing the intrinsic characteristics of a production and its technical features. Instead of viewing the object and content of the object as a whole, EN 15907 approaches film and video in a more hierarchical way, whereby various levels, from concrete (the physical item or digital object) to abstract (the work as intellectual creation) are described. The four levels are based on the principles of FRBR (*Functional Requirements for Bibliographic Records*), an existing conceptual model from the library sector. A distinction is made between work (the artistic and intellectual concept, the idea behind a work), variant (small variations on a work which do not involve essential changes to the intellectual content, e.g. translations), manifestation (the published form of the work or the variant, but still distinguishable from the tangible item, e.g. DVCAM) and item (specific copy of a manifestation, e.g. DVD with shelfmark X on the shelf in organisation X). In addition, there are also entities for contextual information: agents and events. This structure is very similar to the current Argos metadata model. EN 15907 is a standard recommended by CEST (*Cultureel ErfgoedStandaarden*

Toolbox)<sup>11</sup>.



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### Storage and archiving

The archiving of the digital files is done as soon as they are created/received. Argos has a storage system that is managed internally. Three back-ups of every digital master are stored. Two conventional back-up methods are used for this purpose:

– *Disk-to-disk back-up* (D2D), i.e. the copying of data on the hard drive of the server to another server by creating a ‘mirror’ or exact copy  
– *Disk-to-tape back-up* (D2T, i.e. the copying of data from the hard drive of the server to an LTO-5 tape drive (incremental back-up). The LTO tapes (*Linear Tape Open*) are stored at various physical locations:

- on site (Argos)
- off site (bank safe)

The maximum capacity of an LTO-5 tape is 1.5 terabyte. These tapes have a long life ( $\pm$  30 years) and are not bound to a specific producer, which means they comply with a number of conditions that make them suitable as a support for digital files in the long term.

Argos uses a chassis with 16 hard drives in a RAID 6 configuration, of which 2 drives are configured as ‘*hot spares*’ which immediately begin reconstructing data as soon as a drive fails. RAID (*Redundant Array of Independent Disks*) is a configuration whereby several hard drives are combined with each other, and whereby the digital files and their parity information are continuously distributed among several hard drives. RAID 6 is comparable with RAID 5,

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<sup>11</sup> For more information, see <http://www.projectcest.be>

but uses two parity blocks distributed across all drives. This means that RAID 6 can handle the failure of several disks at the same time. With RAID 5, by contrast, a defect in two drives would lead to an irretrievable loss of data.

Mistakes in bit storage are spotted by recalculating the checksums and comparing them with the original value. This is a permanent and systematic process.

### Accessibility

Argos will make the metadata and the stills of Office Baroque available online via the following websites:

- Argos-website: <http://www.argosarts.org>
- Europeana portal: <http://www.europeana.eu>
- GAMA portal (Gateway to Archives of Media Art): <http://www.gama-gateway.eu>

The work itself will be available for consultation in the Argos mediatheque<sup>12</sup>.

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<sup>12</sup> The mediatheque is open from Monday to Friday and from 10.00 to 18.00 by appointment. An appointment can be made by e-mail: [medialibrary@argosarts.org](mailto:medialibrary@argosarts.org) or by calling +32 2 229 00 03. For more info: <http://www.argosarts.org>.