

# Six Years of Education in the Conservation of Digital Prints

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## Abstract

*As an increasing number of artists and photographers have been using digital printing processes in their work over the past two decades, conservators, curators, museum registrars, and related professionals are grappling with issues associated with the acquisition, preservation and conservation of digital prints. This has not been an easy journey, since museum personnel are, for the most part, used to dealing with artists' techniques that are not subject to continuous change; it is precisely this characteristic of the digital world, however, that has delayed the conservation field from tackling the preservation issues of digital prints, some of them of fundamental novelty to the field. The intimidating speed and technological complexity of the many printing processes, their individual surges in popularity and their passing, and the often ample variants in each process can best be handled in the conservation environment by creating a categorized hierarchy of processes, structures, and materials. This, in turn, serves as a basis for developing recommendations for storage, exhibition, and practical conservation treatment.*

*The authors began jointly teaching about digital printing processes in the conservation field in 2001, and have given a large number of seminars and lectures, individually and in collaboration, on the topic to over 400 conservation professionals and artists since then. A number of lessons have been learned during this time, among them the fundamental fact that the identification of the printing process is the most valuable tool in conservation practice, since it necessitates an understanding of the technical details of print production; this results in information on the materials involved and thus allows the conservator to make decisions regarding handling, storage, exhibition, and treatment. To this purpose, a guide to identification has been developed and is currently awaiting publication. Further topics of the seminars have been managing the often conflicting sets of terminology used by the digital printing industry and the conservation field, and the advantages of close collaboration between the conservator, the printmaker, and the artist.*

## Introduction

The field of conservation has always been a melting pot of professionals of different backgrounds, in which a great variety of interests and skills are mixed, and individuals benefit from each other's expertise. Particularly since the efforts to unite and professionalize those working in conservation through national associations such as the American Institute for Conservation and similar groups in other nations have been successful, the common readiness for sharing information to expand our body of knowledge has been beneficial in tackling the issues involved in the conservation of modern materials. This is especially apparent in the number of conferences, workshops, and publications on these materials that may be found in the past years. Early

conservation articles on digital prints are few but show an analytical approach to materials and problems. [1-8] In recent decades in particular, three trends may be observed in the conservation community: the thinning of traditional boundaries between the individual specialized conservation fields in view of the complexities of contemporary art; the growing inclusion of scientists and professionals from the industry in conservation research; and the ease of communication and collaboration between international conservators in research and teaching thanks to modern technology.

The response that conservators have chosen to deal with the challenges that the field of digital printing poses reflects these trends. Archives were among the first to realize that the nature of the documents entering their vaults was changing. In the museum world, the conservation specialty for contemporary art and modern media developed parallel, but with a certain delay, to the evolution of digital applications. An increasing number of artists and photographers have been using digital printing processes in their work over the past two decades, and their works have entered many museum and private collections. Conservators, curators, museum registrars, and related professionals are still grappling with issues associated with the acquisition, preservation and conservation of digital prints, however. Museum personnel are, for the most part, used to dealing with artists' techniques that are not subject to continuous change; it is precisely this characteristic of the digital world, however, that has delayed the conservation field from tackling the preservation issues of digital prints, some of them of fundamental novelty to the field.

By crossing the barriers between the conservation specialties, particularly between the fields of photography, painting, the graphic arts, and modern materials, a number of collaborative projects have been carried out. As an example, a current German thesis project on discolored *Scanachrome* inkjet prints on canvas is being supervised by a paintings and a photograph conservator. Similarly, by including the departments of research and development of major manufacturers of digital printing materials, conservation research projects have benefited greatly. Of great advantage was also the ready acceptance of the importance of print stability by the manufacturers in their quest for improving their products. This has always been an issue close to the heart of the conservation community.

## The Collaborative Seminars

In recognition of the growing interest in the conservation issues of digital prints, an early seminar on the subject, entitled "Identification and Treatment of Digital Prints", was carried out for graduate students in photograph conservation at the Metropolitan Museum of Art, New York, NY, in 2001. Since then, the authors have given a large number of seminars and lectures, individually and in collaboration, on the topic to over 400 conservation professionals, museum staff, archivists, collectors,

framers, gallery owners, photographers, and artists, in countries all over the world. The latest workshop was a three day collaborative meeting funded by the Andrew W. Mellon Foundation, held in New York City. Lectures were given by seven teachers, and three artists spoke of their experiences with digital printmaking. Over 100 participants from many corners of the world attended. The teaching tools developed during these many seminars have become more precise and effective with time, and will be discussed in detail in the following.

## Identification

To the private collector, archivist, curator, conservator, or conservation scientist, the identification of an object of interest is always the first step in an examination. Clues for an object's identification can best be recognized if there is a certain understanding of the materials and technology involved in the production of the print. A direct thermal transfer print, for example, will show a characteristic differential gloss in the printed versus the non-printed areas that is not found, for example, in a direct thermal print. Thus, it is important for the seminar participants to know the printing process, the nature of the inks or toners, and the resulting structure of the print, in particular the locality of the colorant in relation to the print media: in this case: *on the surface* versus *within the top layer*. It has proven very helpful to make cross-sections of typical prints of all processes, which allow for a direct comparison of the layered structures of the different processes and print media. More recently, a series of comparative photomicrographs have been made with different lighting. Whereas frontal lighting at 45° incident angle shows the image as we would see it in a standard lighting setup, brightfield illumination only gives us information on the surface characteristics of the print.

In the hands-on sessions of the workshops, participants are typically asked to compare a number of different prints in order to see the often subtle differences between them and recognize key clues for their identification. They first examine the prints with the naked eye and handle them carefully to acquire a *feel* for them – this includes their weight, stiffness, surface sheen, and color. Consequently, the prints are examined under magnification, either using hand-held loupes with up to 30x magnification or, ideally, stereomicroscopes with variable lighting possibilities. The participants are usually encouraged to work in small groups, since discussion and sharing what one has found greatly helps them appreciate the finer characteristics of the print. In a wrap-up session, the groups may be requested to present one or two prints of their choice to the other participants with a detailed account of the clues and characteristics they have found. This is helpful in that it enables each person to use the new technical vocabulary in his or her articulation. Experience shows that identification can be very confusing to novices in digital printing technology, and the number of processes and process variations to be taught in a workshop must be judged carefully to avoid overwhelming the participants.

## Sample Collections

These comparative studies can only be carried out if there is a large collection of samples to pick from. Over the years, a number of sample collections have been put together for precisely this purpose. One of the first collections of prints was put together by

Adam Lowe in the mid 1990s. [9] In using a single digital file for printing in the different processes, a direct comparison of the different ways of rendering the same image area is made possible. Particularly with the use of a microscope, the different continuous tone or halftone patterns may be compared. Lowe's sample collection was sold to a number of libraries worldwide. A continuously growing collection of prints of a single digital image is in private hands, and currently comprises 164 different prints, many of which are variations of paper and ink combinations or simply many different prints from different printers that belong to the same process: there are, for example, currently 14 different dye diffusion thermal transfer prints in the collection. This growing mass of comparable prints validates by sheer number alone the print characteristics that are helpful in the identification process, but it also shows that there are exceptions to every rule, within certain limits.

In 2006, for a workshop at the Museum of Modern Art in San Francisco, it was decided to produce a sample collection of digital prints that would be sold to the participants, museums, and to the conservation teaching programs in the USA.

A Digital Process Identification Target was developed with the help of Franz Sigg and Patricia Russotti from RIT. The main parts of the target consist of two photographs containing lots of detail and various colors, CMYK wedges, white text on black background and black text on white background in various font sizes, a "Granger rainbow target", and lastly three Lissajou figures. Close to 30 different prints have been produced at this point; they range from various inkjet prints to exposure to photographic material, a dye transfer print and offset prints using different screening techniques. The samples are mainly examined visually with a loupe or a microscope.

## Terminology

When confronted with a technology that is evolving as rapidly as is that of digital printing, it is easy to lose track of the many processes and of the many variables contained in each process. For this reason, it is practical to sort the printing processes and materials into generic groups, a categorized hierarchy of processes, structures, and materials. This approach also relieves the conservator from the otherwise constant necessity for updating his or her state of knowledge whenever a new printer appears on the market. It also allows for the categorization of processes and materials without the immediate use of proprietary terms, and simplifies decisions on exhibition and long-term preservation issues. The terminology used by the industry was adopted from the beginning, since this would facilitate communication between the conservators and the manufacturers. Some terms have not been easily digested, however, such as the use of print media as a generic term for anything that is being printed on. In conservation, the term medium is conventionally used for the description of a substance applied in an artwork (as in acrylic medium or mixed media). There has also been much discussion about the industry's current use of the term photograph for any print that looks or feels like a traditional, silver halide based photograph. Critics in the conservation community point out that the word photograph indicates the action of light in the production of the print; its use for other prints such as current high resolution inkjet prints on glossy RC papers is thus inaccurate. Although it is desirable to be able to communicate with amateurs and manufacturers in a

common language, it is equally important to the conservation community to use a highly accurate language that is relevant primarily to the materials involved, and thus to their preservation, and only then to the perception and use of these materials in other fields.

### Gallery Labels and Artists' Questionnaires

The question of an accurate, common terminology also plays an important role in many museums' internal registration systems. The information pertaining to acquired artworks is entered into a database, and it is common to use a standardized terminology for the different fields. Not only does this allow for efficient searching within the museum collection, but it facilitates communication between curators, registrars and conservators of different museums in the case of loans. Thus it has been very important to develop and use a consistent set of terms during the workshops, and a hierarchy of terms has been collated and now proposed to the conservation community by a group of five photograph conservators from different institutions. These terms will also be recommended for gallery labeling, which at present is very confusing, since a great range of different, often proprietary terms are currently found in exhibitions.

With this system in development, museums will have a more authoritative stand toward the artists they are currently buying digital artwork from. It has been very common in the past for a collection to acquire digital prints from artists or photographers without information on the materials used. Over the years, and often discussed in the seminars, a number of questionnaires have been developed at different institutions. The questionnaire is ideally filled out by the artist for an acquisition of a digital print. It addresses information on the printer, the ink or toner, the print media, finishing techniques, and mounting or framing. As much detail as possible is requested, since the more information one may have on a print in the future, the more informed the decisions pertaining to its storage, exhibition, and possible treatment may be. With a set of standardized terms present, the artist is more likely to take this type of questionnaire seriously.

### Treatment Experiments

Following lectures on processes and materials and some identification practice, some workshops have offered the chance for the participants to carry out a number of treatment experiments on disposable sample prints. This option is generally only offered at workshops for practicing conservators who actually do perform treatments on objects for museums, archives, or in private practice. The experiments that have been designed are based on common treatment methods for photographs and paper objects, and include retouching, tear repairs, creating infills for areas of loss, mounting and hinging, tape and stain removal through heat and solvent application, and flattening by humidification. The experiments are closely based on the participant's acquired knowledge of the materials: since an electrophotographic toner remains heat sensitive, for example, a tacking iron, often used in tape removal treatments, with a gradually increasing temperature at its tip may be applied to an area until a change in the surface gloss is observed. At this point, the treatment has obviously become destructive to the object and it is terminated. This experience sensitizes the conservator to the limits of treatments for each different process, and he/she will act accordingly careful in future

treatments on valuable object in his or her care. In the context of this part of the workshop, a disaster situation may also be simulated by placing individual prints or stacks of different prints in water and experimenting with different methods of drying. These tests simulate actual experience with catastrophes and may be very valuable in the case of a real flood.

### Preservation Issues

The workshops often wrap up with lectures on questions of stability, testing, and preservation. Identification of process and materials is a prerequisite for all decisions on preservation. If a print can be identified as having a substrate that is prone to deteriorate quickly, for example, then different archival environments, housing, or exhibition parameters might be chosen by the conservator than if the print is of a very stable material. Although not included in a standard to date, practical recommendations for storage and exhibition have been compiled for the individual processes and are discussed with the seminar participants.

Discussions on preservation issues during the workshops also include the preservation of the digital file used to produce the print. The authors are convinced that it is important to sensitize photographers, conservators, and collectors alike to the challenges of digital preservation. All too often "one can make another print in case the initial print has degraded too much" is thought of as the ultimate solution, not considering that this might simply not be possible. The file might not exist or be readable anymore, the new print will likely look different since printing technology and materials have changed in the meantime, or the rendering intent has not been encoded in the file in the first place, just to mention a few reasons.

### Outlook

It has been found that the identification of the printing process is a very valuable tool in conservation practice. To simplify and improve this skill, a guide to identification has been developed and is currently awaiting publication. The use of a flowchart-type guide, however, may give its user a false sense of security, however, since there are many exceptions to the necessarily simplified guidelines that this format allows for. Thus, an in-depth understanding of the printing processes and materials will still remain the preferred choice of teaching. Further topics of the seminars that would benefit from further discussion pertain to managing the partially conflicting sets of terminology used by the digital printing industry and the conservation field, and the advantages of closer collaboration between the conservator, the printmaker, and the artist. It is hoped that the consciousness for digital prints in archives and museums has been raised through these seminars, and that many conservators have been able to develop their own connoisseurship in the examination and evaluation of the prints before them.

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*Martin Jürgens studied photography and design at the Technical University in Dortmund, Germany. Martin holds an MS from Rochester Institute of Technology and a Master of Art Conservation (MAC) from Queen's University in Kingston, specializing in paper conservation. Since 2001 he has been working as a photograph conservator in private practice in Hamburg, Germany. His areas of research and teaching include, next to historic and contemporary photography, the materials, chemistry, and preservation of digital prints.*