BPG Inpainting

書籍與紙張群組全色（繁體中文）

Inpainting is the addition of appropriate media to fills, repairs, and areas of loss in a work of art or artifact to restore visual integrity by compensating losses of media, or in some cases support, without compromising original intent or materials. The intent is to suggest the continuity of image and/or background, to create the illusion of wholeness, and to minimize the distraction of losses. This page will deal primarily with the compensation of image loss with references made to the preparation of fills or inserts, alternatives to inpainting, disguising of stains, etc. (See Filling of Losses).

全色一詞意指於藝術品或文物上的補紙、修補和缺損處添加適當的媒材；藉由填補媒材或基底材的缺失，以恢復其視覺上的完整性，而不影響作品原意或材料。全色的目的為暗示圖像和（或）背景的連續性、使文物看似完整，及減小缺損所造成的視覺干擾。此頁面主要說明：根據補紙或嵌補紙的製作進行缺失圖像的填補、全色的替代方式、及掩蓋污漬等（參見填補缺失）。

The Photographic Materials Group has a related page on Inpainting of Photographic Prints .

相片材質部分於照相輸出的全色（Inpainting of Photographic Prints）有一相關頁面。

Translation 翻譯者： Hsin-Chen Tsai（蔡欣辰）
Translation Reviewer 翻譯審稿者： Hester Yip（葉梓圓）
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Original Compilers 原編撰者: Kimberly Schenck
For a full list of the original contributors to this page, see the section below on History of This Page. 如需此頁面的供稿者全部名單，請參見以下章節本頁面之起源。
Wiki Contributors 維基頁面供稿者: Debra Evans, Jennifer Evers, Stephanie Lussier, Kimberly Schenck

1. Factors to Consider 考量因素

1.1 Ethical Considerations 倫理上的考量

- The decision to inpaint is made in consultation with the curator, custodian, owner, dealer, or artist/ creator. It is important that the conservator inform the custodian or owner of the limitations and possible consequences of inpainting as well as the potential for aesthetic improvement.

全色的決定是由策展人、管理人、藝術擁有者、藝術品仲介或藝術家／創作者共同商討的結果；而修復師必須告知藝術管理人或擁有者有關全色的限制、預期結果及美學上改善的可能。

- Some conservators consider inpainting not to be a genuine and necessary component of conservation and that it is even a questionable aspect of restoration since the line between reconstruction and forgery or deception can be very ambiguous.

  有些修復師把全色認定為保存維護中有違真實且非必要的步驟，即使從修復的角度也是有爭議的，因重建（reconstruction）與偽造或欺騙之間的界線相當的模糊。

- Issue of reversibility: The new draft of the AIC Code of Ethics states under Compensation for Loss (#23) that "... such compensation should be reversible." On original artifacts, every effort should be made to inpaint in a reversible manner, recognizing that this is not always possible given the relatively simple structure of works of art on paper. Few, if any inpainting materials are completely reversible, especially since many inpainting media become increasingly insoluble with time. Inpainting on an original surface, therefore may become a permanent part of its structure. For example, pastel pigments can become permanently embedded in paper fibers; watercolors can be absorbed easily by soft-sized papers; coated papers may not withstand the manipulation necessary to remove dry or wet inpainting materials without harming the surface; etc. Exercising restraint is essential due to the inherently intractable and relatively non-reversible nature of compensation on paper. Application of an isolating layer may improve reversibility, as may using as thin and non-penetrating a layer of media as possible.

  可逆性的議題：美國文物修護協會（AIC）倫理規範最新的文稿中，在補全缺損（#23）下提到：”…這樣的補全必須具有可逆性。”在原作上，必須盡量使用可逆的全色方法，並然而也要明白在結構相對簡單的紙質藝術品上進行全色並非絕對可逆。極少、甚至沒有全色材料可以完全地被移除，尤其因為很多全色媒材常隨時間而變得更難溶解。(IB)舉例來說：粉彩顏料會變得永久性的嵌在紙張纖維中；施膠較輕的紙張更容易讓水彩顏料滲透；經塗佈的紙張可能無法承受為了移除全色材料所必要的各項處理，而保持表面毫無損傷…等等。修復師的自我約束是非常基本的，因為在紙上補全本就不易，亦是相對不可逆的處理方式。施加隔離層、以及儘量使用薄塗或不滲透的媒材，可能可以增進全色材料的可逆性，

- There is general agreement amongst conservators that inpainting and reconstructions are restricted to damaged or inserted areas, and should not be used to intentionally alter the original or existing character of a work of art. Inpainting to strengthen a weak impression or signature is not considered to be appropriate.

  修復師們基本上都同意，全色或重建層不應在受損或夾層區域，而且不應該有意的改變原有或已經存在的作品特性；以及強調不顯著的版畫印跡或簽名之全色都被認作是不合適的。

- Disguising damage may interfere with interpreting an artifact whether for historical or artistic information, or for condition assessment during resale of an artifact.

  掩蓋受損區域可能會對解讀文物歷史或藝術上的資訊、或拍賣文物時的狀況評估造成干擾

- Every effort should be made to render inpainting detectable by common examination methods (examination with microscopes, ultraviolet light, raking and specular light, radiography, etc.). Inpainting with the same media as found in the object may interfere with detectability of inpainting, but is considered by some conservators to be unavoidable, especially in cases where it produces the best results. Use of different pigments than those found in the object may increase detectability.

  所作的一切全色動作應該要能夠以一般檢視方法（如以實體顯微鏡、紫外光、側光或反射光線、放射線等）清楚辨識。

- Documentation, written and photographic, is especially important since inpainting on paper objects is not always removable or easily detectable. Documentation should include exact location of inpainting and the media and technique of application. Photographs taken before compensation and inpainting are particularly critical.

  因為於紙質文物上的全色並非都可以移除、或可辨識的，所以檢視登錄（文字或攝影記錄）非常的重要；檢視登錄應該包括全色的確切位置、使用媒材與技法，補全前的攝影記錄尤其重要。

- Consultation with the artist may be desirable in some cases, in particular regarding materials, techniques, and artistic impressions. There may be cases in which the artist is asked to repair his/her own work. Some regard inpainting by an artist less problematic, ethically, than inpainting by a conservator. It is important that the artist understand the ethical principles underlying compensation. Also, it is incumbent on the conservator to inform the custodian or owner that the nature and value of the artwork can be altered by an artist's proclivity to his/her former work rather than to simply restore it. It may be helpful to explain to the custodian/owner and artist that the skills required for inpainting differ than the painting skills used to create a work of art.

  在一些案例中，諮詢藝術家的意見可能是理想的，尤其是在考慮材料、技法和藝術表現上；也有可能藝術家要求要修復自己的作品。有些人認為：於倫理上的考量來看，由藝術家自己來全色，比起由修復師全色較沒有問題；然而非常重要的前提是：藝術家也必須了解在補全的倫理原則；另外，修復師有責任告知藝術管理者或擁有者：在藝術家本身的意向主導下對自己作品的加筆（相較於單純的修復），有可能會改變藝術品的本質意義或價值。因此對藝術管理者／擁有者和藝術家解釋清楚：全色所需和創作藝術所需的技巧有哪些不同，會很有幫助。

1.2 Determining Justification for Inpainting 確定全色的理由

- Owner (institution, collector, dealer, etc.): A range of opinions exists on the part of all owners and custodians (and conservators) about the justification for and degree of inpainting. Most people judge the merits and limitations of inpainting on a case-by-case basis. Factors of resale are often an issue in conservation retouching of objects from private collections.

  藝術擁有者（機構、藏家、拍賣者等）： 關於全色的理由，藝術擁有者和管理者（和修復師）有不同面向的意見。大部分的人評判全色的優點和限制因案例而異。針對私人藏品是否補筆通常亦會考慮到買賣交易的因素。

- Type of object (historical artifact or fine art): Works of art tend to be inpainted more often than are historical artifacts because aesthetics are more essential to the appreciation of an art object and less critical in a historical artifact.

  文物的種類（歷史文物或純藝術）：相較於歷史文物，藝術品更傾向進行全色，因其美感呈現為欣賞藝術品的本質，而在歷史文物上在這一點上則較不重要。

- Degree of distraction of losses, etc. which may compromise appreciation of artifact: Location (margin versus image), severity, and number of areas to be inpainted, should be considered as well as scale of damage or loss relative to the whole object. Also, size of the object and viewing distance affect choices.

  缺損的干擾程度等，這些可能妨礙對文物的觀賞：缺損部位（邊緣或圖像區域）、嚴重程度、需全色的區域，損害等級或於整個文物的缺損比例，應一同加入考量。另外，文物的尺寸大小和觀賞距離也會影響全色的決定。

  The degree of damage may render the object unexhibitable if left untreated, e.g., an extensive scratch which reads white against the colorful background of a watercolor. In this case, the conservator and custodian should evaluate the ramifications of not compensating the disfiguring loss since the alternative is to not exhibit or enjoy the object.

  The object may be so physically damaged that time-consuming inpainting may be inappropriate.

  損害程度可能使未經修復的文物無法展出，如在水彩作品深色背景上看起來白色大面積的擦痕，在這種案例上，修復師和藝術管理者應該考量不補全這些干擾視線的缺損之後果，因其結果可能是無法展出或欣賞此件文物。

- What may first appear as “losses” may actually be a result of an artist's working method or historically significant corrections or alterations. In addition, losses caused by use or wear may be an important determinant of the value of an artifact. Compensation of these “losses” would not be appropriate.

  有些第一眼看起來像是缺損處，可能實際上是藝術家創作技法或歷史上有意義的更動後的結果；還有經過使用造成的缺損或自然耗損，也許在文物的價值上是重要指標。補全這些「缺損」有可能是不適當的。

- Examples of inappropriate compensation of an artist's or creator's working methods: inpainting interruptions in design caused by an artist's vigorous technique or erasures; compensating gouges made as erasures or changes in a composer's manuscript; filling pin holes in paper documenting earlier placement of collage pieces; compensating fragmentary studio or outdoor sketches or studies, never intended to be “finished”; retouching or concealing disfiguring stains or marks that may have historical or sociological significance (e.g., oil deposits from artist's studio transferred onto working drawings; preparatory grid lines used for enlargement of the composition onto a mural or painting).

  以下為對藝術家或製作者創作方法的不適當補全之例：將藝術家創作時運用的技法如飛白線條或塗改處補全；將作曲家手稿中作為塗改的挖補處補全；在拼貼作品中對於記錄最初紙張安放位置的釘洞補洞；對畫室或戶外素描、習作等未完成之作的殘片補全；對可能在

歷史或社會學上具重要意義的污漬或痕跡（如：來自藝術家畫室且轉印到初稿素描的油漬、用以放大構圖到壁畫或油畫上的方格），作補筆或掩蓋。

- Example: An artifact was historically disfigured when eyes of the sitter were scratched out as a political statement. Inpainting would depend upon whether the original piece or the act of violation is considered more important.

  案例：一件在歷史上曾被破壞過的文物，其中人物的眼睛被刮去，以此作為一個政治上的聲明；於此案例應先考量，原貌或是破壞的動作何者更為重要，並據此進行全色。

- In some cases prior inpainting and repairs may be a significant part of the history of the object, but are distracting. The removed parts can be retained in a file, but there is no guarantee records, etc. will be passed on during resale. Though undoing prior restoration may present more wear and tear on the object than merited by small improvement in appearance.

  在一些案例中，前次之全色或修補可能為此文物歷史上重要的一部分，但視覺上卻相當干擾；被移除的部分應該記錄在案，但此等記錄常於轉手過程中未必會繼續流傳；移除前人修復並重作或許可使文物的視覺效果稍有改善，但亦可能會使文物的撕裂或磨損更為明顯。

- In some cases attempts to inpaint may be more distracting than the loss or stain itself. Inpainting dark-colored damages with a lighter, opaque medium will in most cases result in a noticeable mark. However, it is a judgement call depending upon the object because sometimes the result is less noticeable than the original mark.

  在一些案例中，嘗試全色的結果可能比缺損或污漬本身更干擾視覺，於深色的破損上全以較淺、不透明的媒材，在大部分情況下會形成明顯的痕跡。然而，這取決於不同文物，因為有時也會比起原本的缺損較不顯著。

- Cost-effectiveness: Sometimes meticulous color matching is not a cost-effective use of the conservator's time if one is attempting to service the conservation and preservation needs of a large collection.

  花費的時間成本效率：有時嚴謹的對色對修復師來說花費太多時間成本並不合算，假如其修復師必須處理大量藏品的修復和保存需求。

1.3 Determining Degree of Compensation 決定補缺程度

- Degree of compensation will vary according to object, collection, and custodian. After the decision to inpaint has been made, consider degree of compensation: general toning versus exact color match, reconstruction of missing design versus simply matching background color, and sympathetic, but detectable, versus more extensive compensation. Type and extent of inpainting should be discussed and agreed upon by owner or custodian and conservator.

  補缺程度常根據文物、藏品和藝術管理人的判斷決定。在決定全色後，也需考量補缺程度如：大致色調或精準對色、重建缺損線條或單純全背景色、同質但可辨識的補缺或更大面積的補缺。全色的種類和範圍應該經過和藝術擁有者或管理人和修復師的討論和同意。

- Viewing conditions (taking into account the size of object and viewing distance), matting and framing, and lighting should be considered during inpainting.'

  在全色中需要考慮到觀賞情況（如考量文物的尺寸大小和觀賞距離）、夾裱和裝框，以及打光條件。

- Low light levels in many exhibition spaces may lessen amount of inpainting necessary to achieve visual unity. However, in a study collection objects are often viewed unframed, mats are lifted, and thus are subject to closer scrutiny.

  很多展廳採取低照明，對全色顏色一致的需求就較低，然而研究型藏品常在沒有裝框、夾裱的狀態被近距離仔細觀賞，因此全色的準確度要求也就較高。。

- It is important to evaluate matting options. Areas covered by a window mat may not require inpainting. One might consider placing an object with losses on a sympathetically toned sheet instead of filling and toning losses on the object.

  評估夾裱的選擇很重要；挖窗卡紙會遮蓋到的區域也許不需要全色。有人可能會考量把有缺損的文物放置在同質同色調的紙（板）上，而不是對文物採取補洞全色。

- Reconstruction of missing design may be considered more appropriate and common if working on an insert rather than on the original.

  比較起直接在原作上補筆，在嵌補紙上重建佚失的線條被認為較為適當或常見。

- In cases where compensation is done on the original, the conservator should practice restraint. One or two dots of color may be all that is required to restore continuity of design. Addition of "soiling" to the edge of a fill may integrate the edge loss into the sheet.

  在於原作上補缺的案例裡，修復師應該自我克制；一到兩個色點也許就能達到續筆所需，在補紙的邊緣多餘的「全色髒汙」可能會從缺損洞口汙染到紙張。

1.4 Physical Characteristics of Artifact 文物的物理特性

Close examination and identification of physical characteristics of the media and support are important in order to match or approximate them during inpainting.

仔細檢視及鑑定媒材和基底材的物理特性，使全色中與其搭配及是非常重要的

- **Support**: Absorbency, color, texture, presence of coating, general condition, etc. See Support Problems. For example, determining the degree of absorbency of the support will dictate the amount and strength of an isolating layer required to increase reversibility of inpainting. In many cases, approximating the surface texture of the support may be as important as getting an exact color match during compensation.

  基底材：吸收性、顏色、質感、有無塗佈、一般狀況等，參見基底材問題。舉例來說，確定基底材的吸收性決定隔離層的份量與強度以增強全色的可逆性，在很多案例中，仿造基底材的表面質感和全到精準的顏色一樣重要。

- **Media**: General composition (binders, pigments, etc.), color, surface gloss, friability, texture, thickness of application, etc. See Media Problems. Note subtle characteristics of media when selecting and manipulating inpainting materials.

  媒材：一般的成份（黏著劑、色料等）、顏色、表面亮度、脆碎度、質感、塗佈厚薄度，參見媒材問題。選擇全色材料和調配時也要注意媒材的細微特徵。

- **Damage**: Nature of damage (abrasion of top paper fibers, superficial loss of support, loss of design, scratch in media or coating), location of losses (margin vs. image), extent and number of losses, etc.

  損害狀況：自然損害（紙張纖維的擦痕、基底材的表面缺失、圖像線條的佚失、媒材或塗佈層的刮痕）、破損的區域（邊緣或圖像）、破損處的面積和數量等。

1.5 Chemical Composition and Characteristics of Inpainting Materials 全色材料的化學成份和特性

- **Characteristics of Inpainting Materials**: Physical form (stick, pencil, powder, liquid), presence of binder and additives, viscosity, solubility (carrier solvent), translucency/opacity, friability, surface gloss, general covering power of pigment or media, ease of control during application, etc.

  全色材料的特性：物理形式（色料棒、色鉛筆、色粉、色液）、內含的黏著劑和添加物、濃稠度、溶解度（相對應溶劑）、透明度、脆碎度、表面亮度、色料和媒材的覆蓋力、施加時的可控度等。

  See listing of specific media in Compressed Stick and Pencil Colors and Wet Media.

  個別媒材請參見顏料棒和色鉛筆以及濕性媒材。

  All inpainting materials are comprised of a coloring agent, which may require a carrier on which to cast the color, and a binder which adheres the coloring material both to itself and to the artwork support. Some coloring agents may be derived from organic dyes, which may be cast directly onto the paper support, using the white of the paper fiber for reflection of light and color. Other coloring agents may be organic dyes cast onto an inert transparent particle, resulting in pigment that requires binder to adhere to the support. Pigments, both organic and inorganic, generally require some binder to facilitate adhesion. Due to the toothy or textural quality of many paper surfaces, coloring agents with little or no binder may be applied directly to the paper, holding by friction contact.

  全色材料由色劑組成，這些色劑多半需要一種展色劑（用以均勻的敷上該顏色），和可將色料和黏著劑本身附著在作品基底材上的黏著劑。有些色劑從有機染料取得，得以直接密佈在紙質基底材上且以白色紙張纖維反射光線和顏色；其他的色劑則有可能是密佈在惰性透明顆粒上，形成需要黏結劑的色料以附著在基底材上，無論是有機或無機色料，一般都需要黏結劑以提供黏著力。根據很多不同紙張的表面肌理，色劑也許只需一點或不需黏結劑，就可以直接上在紙上，以摩擦力附著其上。

- **Durability**: Natural aging characteristics (i.e., yellowing, cracking), sensitivity to abrasion, etc. may affect choice of inpainting materials.

  耐久性：自然老化特性（如黃化、開裂）、對磨損的敏感度等，可能會影響全色材料的選擇。

- **Reversibility (Solubility)**: Media which may have a water or organic solvent carrier during application may not be soluble in the same solvent upon drying. (For instance, acrylic dispersion paints are water-borne, but are not water-soluble when the film has dried.) Also, many media become increasingly insoluble or intractable with time.

  可逆性（可溶度）：媒材在施加時用以展色的溶劑（也許是水或有機溶劑），在乾燥以後有可能不再溶於相同的溶劑（例如：壓克力顏料本來是水溶性的，但在乾燥形成薄膜後就不再溶於水）；另外，很多媒材隨時間也會變得更加的不易於溶劑溶解與反應。

- **Light Stability**: See Stability (Lightfastness) Rating of Some Commonly Used Pigments. Light stability of pigments and dyes vary. In general, inorganic pigments are less susceptible to fading than organic pigments and dyes.

  輕度溶解性：參見常用色料穩定度（耐光性）評比。色料與染料的輕度溶解程度不一，一般來說，無機礦物顏料比有機色料或染料較不易受影響而褪色。

  Differential aging of the original versus additions is always a likely possibility. Repairs may differ in light stability than the original, resulting in lighter or darker inpainting than original media over time.

  原作與後加材料老化程度的不同是有可能的，修補和原作部分對光穩定性之不同會造成全色區域隨時間比原作或深或淺的狀態。

  Effects of Inpainting Materials on Artifact 全色材料在文物上的影響

- Some pigments contain transition metals which sensitize cellulose to oxidative reactions catalyzed by light and moisture. Sensitizing compounds/pigments include titanium dioxide, zinc sulfide, zinc oxide (found in zinc or Chinese white), and copper greens. (Media Problems, “These oxidizing species can accelerate the fading of several dyes and pigments when mixed together with zinc oxide.” (Daniels, 1990, 236)). A halo of discoloration in the paper may be observed surrounding the pigment.

  有些色料含有過度金屬，其易使纖維素在光和水分的催化下產生氧化反應；這些使纖維素敏感的化合物／顏料包括二氧化鈦、硫化鋅（常見於鋅白或另稱中國白）和銅系綠（參見媒材問題：與鋅白混合時，可加速數種色料和染料褪色的氧化物(Daniels, 1990, 236)），而在顏料周圍可能可以觀察到紙張中變色痕跡外圍的白圈。

- Oil paints are rarely used for inpainting on unprepared paper due to staining of the cellulose by the oil binder.

  油性顏料極少於單純紙張上用作全色材料，因其油性黏著劑容易於纖維素產生污漬。

- Media in the artifact may be sensitive to accidental contact with the liquid carrier of some inpainting materials. For example, red chalk, pastels, and certain kinds of crayons permanently darken upon wetting with water or organic solvents.

  文物上的媒材很有可能對無意中接觸到全色材料的液態展色劑而敏感，例如：紅色炭精筆、粉彩、和某些種類的蠟彩，會因為遇濕或有機溶劑而永久地變暗沉。

- Friable inpainting materials can be transferred and smudged unintentionally, and subsequently can be difficult to remove.

  易碎裂的全色材料會無意中被轉移或抹開，隨後變成難以移除的一部分。

- **Consideration of Effects of Subsequent Treatments (i.e., Washing) on Inpainting**: Works on paper may be subjected to wet treatment at some point and previous inpainting on fills, if not recognized as such, could bleed producing an irreversible mess. Therefore, the deliberate use of "permanent" (i.e., water-insoluble) materials may be justified on fills, only.

  考量後續修復處理對於全色的影響（如清洗）：紙質文物在修復中某一階段可能會面臨到濕處理，而全色後的補紙假如沒有被注意到，很有可能因顏料暈開而造成不可逆的慘狀；因此，考慮使用永久性（如不溶於水）材料需要審慎判斷，且只能用於補紙上。

1.6 Considerations During Inpainting 全色中的考量

- **Metamerism**: Metamerism is the phenomenon in which "two colors that match each other under one kind of illumination (daylight, fluorescent tube, tungsten bulb) differ from each other when seen under another light source. The main cause of metameric pairs is a difference in the coloring ingredients of which the substance is composed. For example, one paint may contain a single pigment, the other a mixture. Other factors may be variations in gloss, surface texture, and ratio of pigment to binder." (Mayer, 1985, 629)

  同色異譜：同色異譜指的是：「在同樣照明下（自然光、日光燈管、鎢絲燈泡）兩種看起來相同的顏色但在另一光源下檢視時卻不同；造成此情況的原因是：這兩種顏色有不同的成色材料及組成物質。舉例來說：一種顏料裡可能只含有單種色料，另一種則為混合色料；其他因素包括：光澤、表面質感和黏著劑和色料的比例。」(Mayer, 1985, 629)

  The simpler the mixture, the less chance for pronounced metamerism of the resultant color.

  混合物越單純、造成同色異譜的機會越小。

- **Lighting**: View the object and inpainting in a variety of light sources and angles (i.e., raking, specular and normal illuminations), to evaluate color, surface gloss, and texture.

  照明：在不同光源及光照角度（如側光、反射光或正光）下檢視文物和全色區域，以此評估色調、表面光澤和質感。

  Avoid inpainting under certain quartz or halogen lamps which may be characterized by a strong or excessive pink, yellow, blue or green coloration. If fluorescent lamps are used in combination with other inpainting light sources, be sure to select bulbs with relatively balanced wavelength

spectra, a high color rendering index (e.g., CRI equal to or greater than 88), and ultraviolet light shielding (factory applied absorptive coating or fitted with absorbing shields).

避免在某些鹵素燈泡下進行全色，可能會造成過多的粉紅、黃、藍或綠色調；假若日光燈管用來和其他光源一同使用於全色，必須確保選用相對來說較平衡的波長光譜、較高演色性指數（如：CRI 等於或高於 88）之燈泡，和紫外光過濾罩（工廠塗佈吸收層或安裝吸收罩）。

When inpainting, consideration of lighting conditions to be used during display may lessen the chance of problems with metamerism. Generally, for objects in private collections, inpaint using tungsten and daylight, for institutions, inpaint using lighting source found in exhibition areas. However, attempting to match lighting conditions during inpainting to anticipated gallery or viewing lighting may overlook subsequent display conditions as ownership or exhibition location changes.

全色時將文物展示時的照明條件列入考量，會減低同色異譜造成的問題，一般來說：對於私人藏品的全色使用鎢絲燈或自然光；對於博物館機構的藏品，全色時可使用等同展廳的照明。然而，全色時太過拘泥於使用展廳或觀賞時類似照明條件，可能會忽略到持有人改變或展覽地點改變的後續展示條件。

- **Orientation of Object**: An object can be inpainted in a horizontal or vertical position. If working on a table, the object should occasionally be viewed vertically as this is the orientation in which it will typically be displayed. View the object from all sides and angles, vary the viewing distance, and periodically use magnification.

  文物的擺置方向：全色使可將文物橫向或豎向擺置，假如在桌上進行，應偶而於豎向擺置下檢視，因其方向為正常觀賞方向；也要從不同方向和角度、不同距離，並且時不時以放大鏡檢視。

- **Matting**: Inpainting while the artwork is placed on a mat of appropriate color may be helpful in achieving a good color match due to translucency of the paper support and influence of the surrounding mat color. Sometimes mat color can be adjusted or locally toned to avoid inpainting the object.

  夾裱：由於紙張基底材的透明性和無酸卡紙色調的影響，將作品放置在適當色調的無酸卡紙上全色，如此可以幫助達到理想的色調；有時卡紙顏色也可以調整局部色調甚至除去了於文物上全色的必要。

- **Use of Reproductions to Help Reconstruct Losses**: Existing documentation (i.e., pre-damage photographs, photocopies), facsimiles, other impressions of prints, and copies after the original may aid the conservator in reconstructing areas of loss in design or support. The new computer imaging programs can help conservators and custodians determine how much compensation is acceptable.

  使用複製品來幫助重建佚失部位：現存的記錄（如損害前照片、影印）、摹本、其他印次的版畫和複印本，都可以幫助修復師重建佚失部位的圖像線條或基底材；此外新的電腦圖像處理程式可以幫助修復師和藝術管理人決定多少程度的補缺是可以接受的。

2 Materials and Equipment 材料與設備

Materials listed below can be purchased at art supply stores or through art and conservation supply catalogs. Note that any of the brand-name materials listed below, especially those of complex composition, may be altered by the manufacturer at any time. Lists of manufacturers and brands are only partial and do not represent an endorsement. Also see Media Problems.

以下列出的材料都可以在美術用品店或美術和修復用品目錄裡購買到，注意下列含商品名的材料，尤其是有複雜組成的材料，製造廠商可能會隨時間而改變其內容。下列只有部分有製造廠商和商品且並不代表贊助。同時也請參見媒材問題。

2.1 Sizing and Isolating Layer Materials 上膠和隔離材料

The following materials can be used to size insert papers or can act as local isolating layers for inpainting. See Adhesives.

以下材料可以用於全色前紙張嵌補紙上膠或作為局部隔離層

- **Wheat Starch Paste 小麥澱粉糊**
- **Cellulose Ethers** (primarily methyl cellulose, but also sodium carboxymethyl cellulose, hydroxypropyl cellulose, and ethyl hydroxy ethylcellulose).

  纖維素醚類（主要為甲基纖維素，但也有羧甲基纖維素鈉鹽、羥丙基纖維素和乙基羥乙基纖維素）。

  Consider viscosity grade and concentration appropriate for type of paper, i.e. shorter chain polymers penetrate while longer chain methyl celluloses form films on paper surface. For a discussion of stability see Feller and Wilt, 1990.

  按照紙張的種類選擇最合適的黏稠等級和濃度，如分子鍊較短的纖維素較易滲透入紙張，而分子鍊較長的纖維素則會在紙張表面上形成薄膜。對穩定度的討論參見 Feller and Wilt, 1990。
- **Gelatin and Parchment Size 明膠和羊皮紙上膠**
- **Acrylic Resins and Emulsions 壓克力樹脂和乳膠**
- **Polyvinyl Acetate Resins and Emulsions 聚醋酸乙烯酯和乳膠**

2.2 Pigments 色料

See Media Problems, Feller 1986, Gettens and Stout 1966, Gottsegen 1987, Mayer 1985, and Wehlte 1982 for description of individual pigments.)

對於個別色料的描述請參見媒材問題, Feller 1986, Gettens 和 Stout 1966, Gottsegen 1987, Mayer 1985, 和 Wehlte 1982

Pigments are described as organic (vegetable, animal or synthetic in origin) or inorganic (mineral, earth or synthetic in origin) particles which do not dissolve, but remain dispersed in a liquid. (Dyes are in

solution.) Lakes are pigments made by precipitating an organic color or dye onto an inorganic base. Particle size is dependent upon grinding and pigment type. Powdered pigments can be applied dry or mixed with binders.

色料分為有機（源自植物性、動物性或人造合成）或無機（源自礦物性、土質或人造合成）顆粒，不溶但懸浮於液體中（染料為存於溶液）；而色澱則是一種將無機材以有機顏色染色的色料。顆粒大小取決於研磨和色料種類，粉末狀的色料可以乾上或是混在黏著劑裡施加。

In dry form, the toxic aspects of pigments are more easily transmitted and absorbed by the human system; therefore, special caution should be observed in handling dry pigments.

在乾燥的型態下，有毒性的色料比較容易散播或被人體吸收，因此在處理乾性色粉時必須特別的小心。

Dry artists' pigments are manufactured and/or distributed by Winsor & Newton, Kremer Pigments, Daniel Smith, Conservation Materials, Ltd., Schmincke, Old Holland, Sennelier, etc. Pigments are available from manufacturers and through art supply stores.

Winsor & Newton, Kremer Pigments, Daniel Smith, Conservation Materials, Ltd., Schmincke, Old Holland, Sennelier 等幾家製造商皆有生產乾性的色料，並可於這些廠商和美術用品材料店購買。

- **White (and/or Inert) Pigments**: The classic Chinese (zinc oxide) white and titanium (dioxide) white, typically found in watercolor inpainting palettes, are in many instances too brilliant and opaque for paper inpainting, where the media and support are often warm, semi-transparent and inherently less brilliant. Other white pigments may be mixed with cellulose gums (methyl cellulose and carboxymethyl cellulose), other gums or resins to produce more effective watercolor inpaints.

  白色（和／或惰性）顏料：傳統的中國白（氧化鋅）和鈦白（二氧化鈦），常見於水彩畫的全色顏料盤裡，但在很多的案例中，這些色料顯得太過於明亮及不透明以致於不適於紙質文物全色，因紙質文物的媒材與基底材常顯得較暖色調、半透明及較不明亮。其他白色顏料可能可以和纖維素（甲基纖維素和羧甲基纖維素）、其他黏著劑和樹脂混合，以成為有用的水彩全色材料。

  Calcium carbonate whites such as chalk (whiting), marble white (ground marble) or oyster shell white (ground from mollusk shells) will provide softer, warmer, more transparent whites that will be closer in value to paper and media tones. Gypsum (calcium sulphate) may also be useful, particularly if a gesso underlayer needs to be reconstructed; however, it is not an ideal white pigment due to its low refractive index, its absorptive nature, and its affinity for water.

  碳酸鈣系的白色色料如白堊土（whiting）、大理石白（研磨的大理石）或胡粉（研磨的貝殼）提供較為柔和、暖色調且更透明的白色，較相似於紙張和其媒材的色調。石膏粉（硫酸鈣）也很好用，尤其是必須重建白土層的狀況下，然而這並不是很理想的白色色料，因其低折射率、吸水度和親水性高的特性。

  White china clay (kaolin, white bole) has a wonderfully warm and soft optical quality, that reads more naturally than zinc or titanium whites. Inpaints containing kaolin (frequently added as a filler in clay-coated and other papers) may be burnished after application and drying to align the

clay platelets and provide increased surface uniformity and sheen. When adding kaolin to inpaints, moderation is advised and additional medium is recommended; paints comprised primarily of kaolin pigment with insufficient binder have poor adhesion and may crumble and/or spawl.

中國白土（高嶺土）擁有相當好的暖色調、柔和的特質，看起來較鋅白或鈦白自然；含有高嶺土的全色（經常在白土塗佈或其他紙張中作為填料加入）可能在塗佈後經過砑光，或是在乾燥過程中因白土的板狀結晶的並列，形成表面的光滑與發亮。當加入高嶺土作為全色時，建議須適量，且加入額外的媒材；主要由高嶺土組成的色料倘若加入的黏著劑不夠的話，可能會造成粉碎或形成碎塊。

- **Extenders, Fillers, and Matting/Flatting Agents**: The conservator is encouraged to study and explore the use of inert fillers and matting or flatting agents used extensively by the paint formulation industry. Examples of particles that may have applications for paper inpainting are silicas (natural and fumed), glass balloons, talc, kaolin, alumina, and so on. For an introduction to the properties and applications of these paint modifiers, refer to bibliography entry under Federation of Societies for Coatings and Technology.

  稀釋劑／展色劑（Extenders）填料和消光劑（Matting/Flatting Agents）：修復師一向被鼓勵多研究並探索一些在顏料配方工業上常使用而又不易起反應的填料和消光劑（Matting/Flatting Agents），一些可能使用於紙質文物全色的填料粒子包括天然矽土（硅石）／矽灰（硅灰）、玻璃微珠、滑石、高嶺土、氧化鋁粉等。如想了解這些顏料添加物的性質及使用方法，請參見聯邦塗層技術協會之下的參考文獻。

- **“Natural” Pigments, Pigments with Low Tinting Strength, and Gritty Pigments**: The eye adjusts easily to pigments of natural derivation (i.e., natural iron earths) or pigments of low tinting strength, which can be added in tiny amounts to produce very subtle color shifts in inpainting, enabling great control. For some toning or inpainting situations, a pigment may be selected not as much for its color as for its individual appearance or configuration. For instance, charcoal black has large, splintery particles that stand out visually and produce a wonderfully gritty effect, very different from the uniform black produced by ivory black. Viridian, silicas (available in a wide range of mesh sizes, natural and synthesized), green earth, certain iron oxide earths, and Van Dyke brown (the latter not especially stable or permanent) have visibly gritty particles and may be effective for certain inpainting effects. To gain the benefit of the pigment grit, one must begin with pure pigments, rather than paints where the pigment grit has been negated by extensive grinding.

  「天然」色料、低著色力色料和砂質色料：我們的眼睛較易適應天然色料（如天然含鐵的土質顏料）或低著色力的色料；因此可以帶入一點這類色料來隱約地調整或控制全色色調。在某些調色或全色狀況下，之所以選擇某種色料可能並不是因為其顏色，而是因為其色料本身的微觀結構；舉例來說：炭黑有非常大的、尖刺狀的顆粒，使其相當顯眼而且有種非常好的砂質效果，和顯色一致的象牙黑非常地不同。鉻綠、硅土（有不同網目的大小、天然或合成的）、綠土、某些氧化鐵土質色料、和凡戴克棕色（晚期特別的不太穩定）等顏料就有具有砂質顆粒，可能可以達到某些全色效果。要取益於砂質質感的色料特

性，必須先從純色料開始，而不是使用已經所含色料被研磨過度且失去顆粒感的現成顏料。

- **Specialty Pigments 特殊的色料**

  Interference, iridescent, pearlescent or lustrous pigments: Nacreous pigments comprised of tiny mica platelets coated with thin films of titanium dioxide, and/or iron oxide or other pigment, to form a wide range of luster, “metallic” (emulating shades of metals such as gold, silver, bronze, copper, etc.) or color effects. These pigments are essential for matching iridescent or pearlescent colors appearing in modern prints and acrylic dispersion paints on paper. With good stability and lightfastness, pearlescent pigments are excellent substitutes for pigments made from metal flakes, which oxidize and tarnish. The pure pigment may be mixed with the medium of choice or mixed into other paints as needed. Refer to literature and samples from: Mearl Corporation (Mearlin Luster Pigments), 217 N. Highland Ave., Ossing, NY 10562, 915-736-3300, 800-253-8605 (fax); and EM Industries (Afflair Pearl Lustre Pigments), Plastics & Coatings Group, 5 Skyline Drive, Hawthorne, NY 10532, 914-592-4660.

  彩色干涉色的、帶有虹彩的、珠光的、閃亮的色料：珍珠色料是由小雲母片裹上一層氧化鈦和（或）氧化鐵或其他色料所組成，形成廣度的珠光、「金屬色澤」（仿金屬色調如金、銀、青銅、紅銅等）或其他顏色效果。這種色料主要是為了現代版畫和紙上壓克力媒材上，帶有虹彩的或帶珠光的顏色而配色；具有穩定性和耐光性的珠光色料，是針對容易氧化和鏽蝕的金屬箔優良的替代品。單一色粉可與所需的不同媒劑或其他顏料混合。請於 Mearl Corporation (Mearlin Luster Pigments), 217 N. Highland Ave., Ossing, NY 10562, 915-736-3300, 800-253-8605 (fax); and EM Industries (Afflair Pearl Lustre Pigments), Plastics & Coatings Group, 5 Skyline Drive, Hawthorne, NY 10532, 914-592-4660. ，參見文獻和樣品。

  Fluorescent pigments: Known under the trade name “Day-Glo”, these brilliant modern pigments are found in silkscreen or other prints from the 1960's to the present. Available in approximately ten colors, these pigments contain dyes that absorb invisible and near visible ultraviolet light, giving off a glowing emission of a longer wavelength than that absorbed. With exposure to light and aging, these pigments lose their fluorescent strength and the dye component may fade as well; nonetheless, Day-Glo's are indispensable for replicating the effect of Day-Glo paints used on artifacts by Pop and other artists. For literature and samples contact: Day-Glo Color Corp., 4515 St. Clair Ave., Cleveland, OH 44103, 800-289-3294.

  螢光色料：“Day-Glo”為常為人知的商品名，這些明亮的現代色料常見於 1960 年代至今的絹版畫或其他版畫，大約有十種顏色。這些色料含可有吸收可見光以及近可見紫外光的染料，並會反射出比其所吸收的更長的波長，形成發亮的效果。隨著時間與暴露在光線之下，這些色料會漸漸失去其螢光力，且染料部分也會隨之褪色；儘管如此，由普普或其他藝術家使用 Day-Glo 顏料創作的作品，仍然最好使用同一產品（進行全色）以重現其效果。 請於 Day-Glo Color Corp., 4515 St. Clair Ave., Cleveland, OH 44103, 800-289-3294. ，參見文獻和樣品。

  Metallic pigments: Bronze, aluminum, and other flake metal powder pigments are reactive and not recommended for most paper compensation applications as they readily tarnish, turn dark brown-green, and can interact with paper and/or metal.

金屬色澤顏料：銅、鋁和其他金屬箔磨粉顏料因其容易與紙張或其他金屬成分起反應而變色、鏽蝕，而不建議用在紙質文物的補缺全色上。

Gold powder and/or gold leaf: Powdered true gold (either commercially prepared, or prepared in the conservation studio by grinding scraps of gold leaf) is inert and may be mixed with a binder of choice (e.g., gelatin in water or Acryloid B-72 in solvent). Gold powder, and/or continuous gold leaf, are indispensable for accurately matching true gold found on artifacts. To produce gold powders in a wide range of colors, select desired shade of gold leaf; add leaf to a honey-water slurry and grind with a mortar and pestle; rinse with water, pour into a tall jar and allow gold to settle; decant rinse water, rinse and allow to settle again; decant water and allow gold powder residue to dry. Note, however, that the use of true gold to compensate gold losses may make it difficult to distinguish restorations from original.

金粉和金箔：真金粉末（商品化的成品或自行磨製金箔而成）屬性穩定，且可和不同的黏著劑（如明膠水或溶於溶劑的 B-72）一起混合使用。金粉（或）整片的金箔用於含金的紙質文物準確配色是不可少的材料。製作不同色調的金粉，可以選擇理想深淺的金箔，將金箔加入蜂蜜水漿中與沙和粉彩一起研磨，用水沖洗後倒入高罐使金沉澱；再次注入水沖洗之後再沉澱後，讓金乾燥。必須注意的是：使用真金來全色金色部分的缺損，可能導致與原作難以區分。

2.3 Compressed Stick and Pencil Colors 顏料棒和彩色鉛筆

- **Charcoal**: Made by carbonizing wood sticks and composed of grey-black splintery particles. Available as vine or compressed charcoal sticks, or in pencil form. No binder is present in charcoal sticks. (Jirat-Wasiutynski, 1990, 122–4) Some pencils, such as Conté brand charcoal pencils, may contain additives such as waxes, clay, and finely ground pigments.

  炭筆：由碳化的樹枝制成，含有許多灰黑色長條狀的顆粒；有葡萄藤炭筆、濃縮炭棒或鉛筆幾種形式，不含黏著劑。(Jirat-Wasiutynski, 1990, 122–4) 有一些鉛筆形式的炭筆，像是 Conté 牌的炭精筆，可能含有一些蠟、白土或精細研磨過的色料等添加物。

  Working characteristics: Charcoal can be blended depending upon degree of hardness; vine charcoal sticks are fairly friable. Vine charcoals often tend toward a warm brown-black, and cover less well than compressed charcoal sticks, which are usually a bluer black. A brushable black paste can be made when charcoal particles are mixed with methyl cellulose. (Horie, 1997)

  使用上的特性：炭筆根據其硬度可以混合使用，葡萄藤炭筆比較脆硬，比較頃向於暖色調的褐黑色，且較藍黑色調的濃縮炭棒覆蓋力較弱。可以用甲基纖維素和炭粉做成可用筆刷塗色的黑色漿狀顏料。(Horie, 1997)

- **Graphite**: Manufacturing process of synthetic graphite leads is basically the same as when first developed in 1794 - graphite powder is mixed with fine clays, dried, and then fired. Historically, antimony, spermaceti and other waxes, shellac, rosins, gums, and at times lamp black were added. (Watrous, 1957, 142) Graphite is available in stick, pencil, and powder forms. Hardness of stick or pencil varies with proportion of graphite to clay; “waxes or fatty oils are frequently used to impregnate rods to improve smoothness of marks”. (Newman, 1980, 33–34) Degree of

hardness ratings: H hard, HB medium, and B soft; numbers, in ascending order, designate higher degree of hardness or softness within appropriate category.

石墨：合成石墨的生產製造過程基本和 1794 年最初發展的情況沒什麼變化，石墨粉與細白土混合、乾燥，然後火烤。歷史記錄曾加入的添加物有銻、鯨臘和其他種臘、蟲膠、樹脂、樹膠，和當時常使用的燈黑(Watrous, 1957, 142)。石墨有棒狀、鉛筆或粉末等形式，棒狀或鉛筆的硬度多樣且和加入白土的比例有關；臘和油脂類使用於浸泡筆芯因而增進筆跡的滑順度。(Newman, 1980, 33–34)硬度級別分為：硬 H、中硬 HB 和軟 B；數字越大代表同級別內較硬或較軟的程度。

Working characteristics: Graphite can be blended depending upon degree of hardness. Appears shiny and slightly iridescent. Tone and metallic sheen are controlled by graphite hardness and application technique. Softer forms of graphite can be smudged or transferred if heavily applied.

使用上的特性：石墨可以依據硬度混合使用，帶有發亮或稍微平光的效果。色調和金屬亮感可以藉由石墨的硬度和塗佈技巧控制，軟一點的石墨在厚塗時可能會汙染周圍或轉移。

- **Chalks**: Natural and fabricated black, white, red, and brown chalks.

  粉筆：天然或特製的黑、白、紅、褐粉筆。

- Natural chalks: Black chalk's principal ingredients are carbon and clay. White chalk is composed of calcite (calcium carbonate); however, another chalk not often found is soapstone, a variety of talc (hydrous silicate of magnesium). (Watrous, 1957, 106, 108) Red chalk contains iron oxide from the mineral hematite and clay; presence of clay increases softness. Today natural chalks are rarely available in stores.

  天然粉筆：黑粉筆的主要成分為碳和白土。白粉筆是由方解石（碳酸鈣）組成，然而也有另外一種由皂石－一種滑石粉（水化硅酸镁）－組成的粉筆，其較不常見。(Watrous, 1957, 106, 108) 紅粉筆含有氧化鐵（由赤鐵礦所得）和白土，白土含量多寡增加其軟度。現今天然粉筆在市面上已非常難以取得。

- Fabricated chalks: Traditionally contained a binder of gum tragacanth; cellulose ethers often are used today. See **Pastel Sticks** under Compressed Stick and Pencil Colors).

  特製粉筆：傳統上含有黃著膠類的黏著劑，現今則以纖維素類取代。請參見顏料棒和色鉛筆下的粉彩棒。

  Working characteristics: Chalks are blendable and may smudge or transfer if heavily applied. Can be difficult to control in stick form when inpainting small areas. Chalks can be applied dry or wet with brush, etc. or mixed with binders.

  使用上的特性：粉筆具可混合的特性，且厚塗後可以使用抹開及轉印等技法；在棒狀形態下可能比較難以針對小區域作全色。粉筆可以利用其粉乾上、也可以筆刷濕塗，或和黏著劑混合後使用。

- **Conté Crayons**: Made of compressed pigments and binder; are grease-free and harder than pastels. Colored pigments or dyes appear to be added to obtain various shades of greys. Sanguine crayons have a kaolin base containing red iron oxide (Daniel Smith Inc. catalog).

  康緹粉彩條：以壓縮色料和黏著劑製成，無油且比傳統粉彩還堅硬；加入色料或染料以得到多樣深淺的灰，紅色粉彩條／紅色蠟筆中有含氧化鐵的高嶺土（Daniel Smith Inc. catalog）。

  Working characteristics: Conté crayons feel slightly brittle yet waxy compared to charcoal, chalk or pastel. They are somewhat blendable, but are more resistant to gentle smudging than pastels. Although, generally matte in appearance, they are more shiny than pastels.

  使用上的特性：康緹粉彩條和碳筆、粉筆和傳統粉彩比較起來，除了有臘的油光感還有點脆硬；某程度上可混合，但比傳統粉彩較難以推抹開來；一般來說看起來平光，但比傳統粉彩更光亮一點。

  Reversibility: Conté crayons tend to be more difficult to remove from paper than some other dry media possibly due to clay component and relatively fine particle size.

  可逆性：康緹粉彩條比起其他乾性的媒材，較難以從紙上移除，因其中白土成分的顆粒較小。

- **Pastel Sticks**: Composed of pigments, aqueous binder, and fillers. Binder was traditionally a vegetable gum (often gum tragacanth) or proteinaceous glue; today methyl cellulose or similar cellulose gums are used. Clay, plaster of Paris, kaolin, alabaster, zinc and titanium whites, silica, and aluminum are added as fillers to obtain tints and give body to the sticks. Fungicides may be added because pastels are susceptible to mold growth; however, synthetic binders, such as methyl cellulose, are less vulnerable. (Ellis, 1987, 85) Light stability is dependent upon pigments or dyes found in particular pastel sticks - most light-stable colors tend to be inorganic pigments; least stable tend to be organic pigments. Pastel sticks are sold in three grades - soft (most common), medium, and hard.

  粉彩棒：由色粉、水性黏著劑和填料所組成，黏著劑傳統上為植物膠（常是黃耆膠）或蛋白質膠；現今甲基纖維素或類似的纖維素膠也有使用。加入白土、巴黎灰泥、高嶺土、雪花石膏、鋅白和鈦白、矽土／硅土和明礬作為填料，以得到淺色調同時也給予粉彩棒實體感。有時加入抑黴劑因為粉彩常為黴菌所影響，然而，內含合成黏著劑（如甲基纖維素）的粉彩棒會比較不易長黴。(Ellis, 1987, 85) 其對光的穩定度因特定粉彩棒裡的不同色料或染料而不一。粉彩棒有三種等級可供購買：軟（最常見）、中等、及硬。

  Working characteristics: Pastels are blendable, but can be easily smudged or transferred if heavily applied. Are generally matte. Can be difficult to control in stick form on small losses. Pastels may be applied dry with brushes, absorbent tips, etc. or mixed with binders. Ground pastel can be applied with wet brush, then burnished or texturized afterwards.

  使用上的特性：粉彩棒具可混合性，厚塗時可以容易的抹開及轉印。一般來說為平光，棒狀型態對於全色小區域時比較難以控制；粉彩棒也可以筆刷或棉花棒乾上，也可以與黏著劑混合，研磨過的粉彩可以用濕筆塗上、之後拋光或製作表面質感。

Common brands/manufacturers: Rowney soft pastels (England), Schmincke soft pastels (Germany), Rembrandt soft pastels by Talens (Holland), Sennelier soft pastels (France), Grumbacher soft pastels, Lefranc & Bourgeois pastels (France), Girault soft pastels, and Conté Color Crayons.

常見的牌子／製造廠商：Rowney soft pastels（英國）、Schmincke soft pastels （德國）、Rembrandt soft pastels by Talens （荷蘭）、Sennelier soft pastels （法國）、 Grumbacher soft pastels、 Lefranc & Bourgeois pastels （法國）、 Girault soft pastels, and Conté Color Crayons.

- **Pastel Pencils**: Composed of pigments mixed with binder, fillers, and other components. See **Pastel Sticks** under Compressed Stick and Pencil Colors.

  粉彩鉛筆：由色粉混黏著劑、填料和其他成分所組成，參見顏料棒和色鉛筆下的**粉彩棒**。

  Working characteristics: Pastel pencils are blendable, appear matte, and are more controllable than pastel sticks. Water and organic solvent sensitivity depends upon brand and color composition of each pencil.

  使用上的特性：粉彩鉛筆具可混合性、看起來平光，比粉彩棒更好控制；對水和有機溶劑敏感度隨著品牌和每種鉛筆的顏色組成有所不同。

  Carb-Othello colored pastel pencils, manufactured by Schwan-Stabilo: Composed of 2.5% water-soluble cellulosic binder (added for durability), 70% mineral compounds (responsible for chalky character of these pencils), 10–30% organic and inorganic pigments, 2% metallic soaps, and 1% preservative. (Norris, 1993 draft, 11)

  Carb-Othello 彩色粉彩鉛筆，由 Schwan-Stabilo 製造生產：含有 2.5%水溶性纖維素黏著劑（為加強耐用性而增添）、70%礦物性成分（構成這些鉛筆的粉狀特性）、10–30%有機或無機色料、2%金屬皂和 1%防腐劑。(Norris, 1993 draft, 11)

  Conté Pastel Pencils: Leads of pastel pencils harder than pastel sticks (product literature). Seem to be more friable than Carb-Othello.

  Conté 粉彩鉛筆：比粉彩棒還要堅硬的粉彩鉛筆（產品資料），比 Carb-Othello 還要硬脆。

- **Colored Pencils**: Contain organic and inorganic pigments, fillers (clays or talc), cellulose ether binders, and wax. Proportions may vary greatly among brands. Cheaper versions contain less pigment and more wax, and are softer and have inherently lower color strength. (Owen, 1985, 58)

  彩色鉛筆：內含有機和無機色料、填料（白土或滑石粉）、纖維素黏著劑和蠟，成分比例因牌子而多樣。便宜的彩色鉛筆含有較少色料且較多的蠟，較軟同時也具較低著色力。

  Working characteristics: Colored pencils are blendable, but not overly friable; however, they can transfer if applied heavily. May appear more glossy on application than pastel pencils, especially on soft papers. This can be avoided by repeated light application of pencil versus a single heavy application. Water and solvent sensitivity depend upon brand and color composition of pencil

and amount of liquid present. Will transfer if heavily applied and not coated or fixed. Can be used directly or mixed with binders. Can be applied dry and then brushed over with mineral spirits, etc. to achieve a wash effect. Harder pencils can scratch the surface of some papers to which they are applied.

使用上的特性：彩色鉛筆較容易混合顏色、但不過於硬脆；然而厚塗時顏色很容易轉移。對水和溶劑的敏感度因品牌、每種鉛筆的顏色組成、以及液體分量有所不同，假如沒有上噴膠固定，厚塗時顏色很容易轉移；可以乾上，之後塗上礦精以達到淋洗（譯者註：或暈染）的效果。越硬的鉛筆在使用時可能會刮傷某些紙張的表面。

Reversibility: Colored pencils can be reduced partially by eraser. They tend to be more difficult to remove after having been applied wet. Use of isolating layer increases reversibility by eraser or damp swab.

可逆性：彩色鉛筆可以用橡皮擦移除，但遇濕後會比較難移除；上隔離層有助於增加使用橡皮擦或濕棉花棒的可移除性。

Stability: There is great concern for light stability of colored pencils: “In general, earth colors (including grays) exhibit excellent to very good lightfastness. Blues, greens and often yellows, however, are very inconsistent varying significantly in stability from one manufacturer to another. Finally, the violets, reds, oranges, and pale tints are often problematic and most susceptible to significant fading upon exposure to light.” (Norris, 1993 draft, 12–13) Lightfastness of lake pigments (e.g., purple magenta and dark violet) is poor. Manufacturers often vary pigments and dyes, so the conservator should test each individual pencil for lightfastness. ASTM and pencil manufacturers created specifications for artists' colored pencils (ASTM D6901). After testing, the National Artists Equity Association concluded that half of the pencils in any manufacturer's line fade significantly and no one brand is clearly superior to the others.

穩定性：一般對於彩色鉛筆的穩定性有很大的疑慮：「通常土色系（包括灰色）顯示極佳到很好的耐光性；藍色、綠色和黃色常常隨製造廠商不同呈現不是很一致的穩定性；至於紫色、紅色、橘色和淺色系常常是最有問題且最敏感的，隨光照而呈現明顯的褪色。」(Norris, 1993 draft, 12–13)。色澱（如紫紅色或深紫）的耐光性最為糟糕；由於廠商時常參雜多樣的色料和染料，修復師應該要測試各色鉛筆的耐光性；ASTM 和鉛筆製造商也已建立了藝術用彩色鉛筆的規格分類(ASTM D6901)。經過測試，國家藝術家權益協會發表結論：任何製造商產線上的彩色鉛筆有一半都有明顯的褪色情形，沒有哪一家品牌明顯的優於另外一家。

High wax content of some colored pencils increases the possibility of formation of bloom upon exposure to high relative humidity when media is thickly or heavily applied. (Norris, 1993 draft, 14)

厚塗的媒材在高濕環境中，某些彩色鉛筆的高蠟含量，會增加形成表面霧化的機會。

Berol Prismacolor pencils: Composed of methyl cellulose binder, kaolin and bentonite clays (for additional strength), 20–30% wax, and are heavily pigmented with both inorganic and organic pigments. High pigment concentration results in good covering power. (Norris, 1993 draft, 12)

Berol also manufactures Verithin colored pencils which are harder, less creamy, and slightly more erasable than Prismacolor pencils.

Berol Prismacolor 鉛筆：由甲基纖維素黏著劑、高嶺土和皂土（為增進覆蓋力所添加）、20–30%的蠟、和有高量的無機和有機色料組成；高濃度的色料使其有極好的覆蓋力。(Norris, 1993 draft, 12)。Berol 也生產製造 Verithin 彩色鉛筆，較硬、較不濃厚、且比 Prismacolor 系列較易擦除。

Derwent Studio pencils, manufactured by Rexel Cumberland in Great Britain: Composed of natural clay filler, hydroxypropyl-cellulose binder, and organic and inorganic pigments. Hardness is controlled by the addition of wax (about 15%). Manufacturer will provide lightfastness chart that includes rating system based upon the British Standard Blue Wool Scale (BS 1006) Method of measuring colorfastness to light. (Norris, 1993 draft, 12)

Derwent Studio 鉛筆，由英國的 Rexel Cumberland 製造生產：由天然白土填料、羥丙基甲基纖維素黏著劑、無機和有機色料組成，硬度由額外添加的蠟（約 15%）所決定。製造者提供耐光度表，其中包括以英國標準藍色毛織物等級（BS1006）的標準方法測量對光照的褪色程度。

- **Colored Water-soluble Pencils and Crayons**: Some colored pencils and crayons are made with water-soluble binders and dyes. These tend to be more commonly used for toning inserts than for inpainting directly on artifacts. If used for inpainting, water sensitivity of pencil or crayon could preclude subsequent water treatments due to possible bleeding.

  彩色水溶性鉛筆和蠟筆：某些彩色鉛筆和蠟筆是由水溶性黏著劑或和染料製成，比起直接用於文物上的全色，其更常用於調整嵌補紙的色調；假如於全色使用，必須注意溶於水的鉛筆或蠟筆可能會在濕處理的時候造成暈染。

  Working characteristics: Water-soluble pencils and crayons are similar to other colored pencils. In addition, they may be applied dry and then gone over with a wet brush, or dipped into water and applied damp.

  使用上的特性：水溶性鉛筆和蠟筆和其他彩色鉛筆非常類似，另外也可以乾上後再用濕筆帶過、或沾水後濕上。

  Reversibility: If applied dry, these pencils and crayons can be reduced partially with eraser, but are more irreversible if applied wet.

  可逆性：假如乾上，這種鉛筆和蠟筆可以用橡皮擦擦去一部分，但濕上後就比較難以移除。

  Derwent Watercolor pencils, manufactured by Rexel Cumberland in Great Britain: Made with water-soluble dyes. Fuchsia, bluish red, and purple colors are especially fugitive. (National Artists Equity, 1993, 1)

  Derwent 水性色鉛筆，由英國的 Rexel Cumberland 生產製造：由水溶性染料製成，紫紅、藍紅和紫色尤其特別的容易跑色。

Derwent Water-soluble Sketching Pencils: Similar in appearance to graphite with unaided eye; however, under the microscope, seem to contain both graphite and black pigment or dye.

Derwent 水溶性速寫鉛筆：在肉眼下看起來和石墨很相像；然而在顯微鏡下看起來像石墨和黑色色料或染料。

Caran d'Ache Neocolor II water-soluble crayons and soft pencils: Made in Switzerland.

Caran d'Ache Neocolor II 水溶性蠟筆和軟鉛筆：瑞士製造。

Holbein water-soluble soft pastels.

Holbein 水溶性軟粉彩

- **Other Pencils**: Conté black sketching pencils (Pierre Noire pencils, Carbon pencils, Special Carbon): Made of waxes, clay, and finely ground pigments (carbon black and lamp black). Powdered ingredients are mixed with water and several plasticizing agents, and then dried. Carbon pencils are more dense and shiny than Pierre Noire pencils. (product literature)

  其他鉛筆： Conté 黑色速寫鉛筆（Pierre Noire 鉛筆、碳鉛筆、特殊碳）：由蠟、白土、和細磨的色料（碳黑和燈黑）組成，粉末材料與水和數種塑化劑混合後乾燥。碳鉛筆比 Pierre Noire 鉛筆要更細緻和發亮（產品資料）。

  Working characteristics: These sketching pencils are somewhat blendable and water-soluble. See **Colored Water-Soluble Pencils and Crayons** under Compressed Stick and Pencil Colors.

  使用上的特性：這些速寫鉛筆在某程度上具可混合性和水溶性，參見顏料棒和色鉛筆之下的**彩色水溶性鉛筆和蠟筆**。

- **Crayons**: Crayons are described as drawing materials containing oily, waxy or greasy components or combinations of water-soluble and fatty binders. They are used infrequently for inpainting directly on objects due to limited reversibility.

  蠟筆：蠟筆被描述為具有油性、蠟性的成分，或由水溶性或脂類黏著劑組成；因其可逆性有限，很少直接用於文物的全色。

  Lithographic crayons: May contain lamp black, wax, tallow, spermaceti, soap, and shellac. (Watrous, 1957, 120; and Mayer) Available in range of softness.

  石版蠟筆：可能含有燈黑、蠟、動物性油脂、鯨蠟、皂類和蟲膠(Watrous, 1957, 120; and Mayer)，有不同軟硬度可供選擇。

  Oil pastels and sticks: May contain oils (linseed or vegetable), waxes, and pigments.

  油蠟筆和油蠟棒：可能含有油脂（亞麻仁油或植物油）、蠟和色料。

  Wax crayons

  蠟筆

2.4 Wet Media 濕式媒材

Pan or Tube Watercolors and Gouaches 盤式或管狀水彩和不透明水彩

Watercolors contain pigments dispersed in water and gum arabic, vegetable gums, or dextrin; and may include plasticizer (such as hydromel or sugar water), glycerine to keep paint moist, wetting agent, and preservative. (Mayer, 1981, 426) Gouaches contain the same ingredients as tube watercolors, except they include more pigment and an inert, such as blanc fixe, to produce a matte surface and opacity. Lithopone, composed of zinc sulfide with barium sulfate and titanium dioxide, is found in some contemporary water-based paints, such as poster colors and cheap watercolors. (Gettens and Stout, 1966, 125)

水彩顏料含有分散在水和阿拉伯膠中的色料、樹膠或糊精；或許含有增塑劑（如蜜水或糖水）、甘油可使顏料保濕、保濕劑和防腐劑。(Mayer, 1981, 426) 不透明水彩顏料含有類似成分，除了其含有更多的色料和惰性色料如白鋇土，可形成較平光的表面和不透明度。

Special note: Modern watercolor and gouache may differ from traditional paints. Check the product label carefully. For instance, some products with “gouache” in the title actually contain an acrylic component.

特別注意：現代水彩或不透明水彩可能和傳統水彩和不透明水彩顏料不一樣，仔細的察看標籤，例如：有些稱作「不透明水彩」的產品可能內含壓克力膠成分。

- Working characteristics: Watercolor and gouache can be diluted with water and applied directly or mixed with other binders, solvents, and media. Either a transparent or an opaque appearance is possible depending upon dilution and application, pigment type, or mixture components. Gloss can be adjusted with addition of other binders. When toning fills, increased penetration and evenness of tone can be achieved by adding glycerine as a wetting agent.

  使用上的特性：水彩或不透明水彩可用水稀釋然後直接使用，或與其他黏著劑、溶劑或媒材混合。看起來透明或不透明都和稀釋程度和使用方式、色料種類或混合成分有關；光亮的表面可以用額外的黏著劑來達成。調整補紙顏色的時候，可加入甘油作為保濕劑來增加顏色的滲透與均勻度。

- Reversibility: Watercolor and gouache may be reduced with damp swabs depending upon age and penetration of the inpainting layer into the paper, as well as the paint composition. Reversibility increases with application of an isolating layer or addition of a resoluble binder, e.g., methyl cellulose.

  可逆性：水彩和不透明水彩可能可以用濕棉花棒來去除，這又和老化和全色層對紙的滲透程度，還有顏料的組成相關；先行塗佈隔離層或具可溶性的黏著劑如甲基纖維素，能夠增加其可逆性。

- Stability: In watercolors, the pigments are not protected by excess binder as in oil or acrylic paints and therefore, are more vulnerable to light and pollutants. Also, they tend to be applied in thin films exposing pigments to increased exposure and subsequent damage. References on the stability of pigments and watercolor paints are ASTM D5067 Standard Specification for Artists' Watercolor Paints and The Wilcox Guide to the Best Watercolor Paints by Michael

Wilcox. Manufacturers may change components so conservators may need to test individual paints for lightfastness.

穩定度：在水彩顏料中，色料沒有如同在油畫顏料或壓克力顏料中被大量黏著劑保護著，因此更容易被光或汙染物影響；另外，水彩容易以薄膜的樣態塗佈，使得色料增加暴露及受損機會。關於色料和水彩顏料穩定度的參考資料參見 ASTM D5067 藝術家的水彩顏料之標準規格和 Wilcox 最佳水彩顏料指南。製造廠商可能會改變成分，因此修復師們應該要個別針對耐光性加以測試。

- Manufacturers include: Winsor & Newton, Grumbacher, Schmincke, Rowney, Lefranc & Bourgeouis, etc.

  製造廠商包括：Winsor & Newton, Grumbacher, Schmincke, Rowney, Lefranc & Bourgeouis 等。

- Winsor & Newton Brilliant Watercolors: Watercolor liquids sold in bottles; manufactured from dyes and have limited lightfastness. (product literature)

  Winsor & Newton Brilliant 水彩：瓶裝販售的水彩液態顏料，內含染料、因此耐光度有限。（產品資料）

- Photographic retouching paints (e.g., Marabu Retouch Set, Schmincke Positive Retouching Colors): These are essentially watercolor or gouache paints composed of pigments bound with gum arabic, dextrin or “sugary substance”. Colors are available in matte and glossy and appear somewhat opaque when applied. (Norris, 1993 Draft, 11/12) Some conservators suspect that dyes may be mixed with pigments for certain colors.

  相片補彩顏料（如：Marabu Retouch Set, Schmincke Positive Retouching Colors）：基本上為水彩或不透明水彩顏料，由色料與阿拉伯膠、糊精或「含糖物質」組成。顏色有平光和亮光可供選擇，塗佈後看起來不透明。(Norris, 1993 Draft, 11/12) 有些修復師猜測某些顏色內含染料和色料混合而成。

Extract from Boiled Discolored Paper: Prepared by soaking or cooking old, discolored paper scraps in water and evaporating the liquid. pH can be adjusted with calcium or magnesium compounds. The residue can be remoistened with water similar to pan watercolors. (Perkinson, 1984, 110) Extract was tested at the Smithsonian Institution in 1977/78 at request of Katherine Eirk and found to contain short-chain sugars from degradation of sizing and cellulose. Some conservators have reservations because the extract may be acidic and possibly harmful to the paper substrate over time, and because of unknown light stability and reversibility. Thus, while useful for inserts, it may not be appropriate for application onto original. Mold growth was found on distillate “cake” even after initial and repeated washing of paper scraps to remove adhesives.

由老紙煮出的萃取物：將老紙、含污漬的碎紙浸泡或加水煮後，其水蒸發後而成。可以使用鈣或錳化物調整 pH 酸鹼值。萃取物可以用水潮濕後像盤式水彩一樣使用(Perkinson, 1984, 110)。萃取物曾經在 1977/1978 年間由史密森機構，因應 Katherine Eirk 的要求而檢測；結果發現內含短鍊醣類，為上膠劑和纖維素的降解物。有些修復師因其可能含有酸性物質且可能隨時間於紙張有害，加上其耐光性和可逆性未知，而對於使用這種萃取物採取保留的態度。因此，即使用於嵌補紙非

常好用，對於使用這種萃取物在原作上可能是不恰當的。在多次清洗並移除其中黏著劑後，還是曾發現過在蒸餾「餅」上有黴菌生長的情況。

Drawing Inks: Composed of finely ground pigments or dyes dispersed in aqueous binder with a wetting agent and preservative. India and sumi inks are carbon-based; some fountain and felt-tip pen inks are dye-based. Binders of water-resistant inks contain shellac or rosin combined with borax. (Watrous, 1957, 69) Black waterproof inks usually are composed of carbon black pigment in a colloidal solution of shellac soap (or synthetic resin); chromatic waterproof inks contain pigments, chiefly organic, in the same formulation, or aqueous anionic or cationic dyes in shellac solution. (Bredereck, 1988, 115) Inks tend to be glossier than watercolors.

素描墨水：由細磨色料或染料、連同保濕劑和防腐劑，加入水性黏著劑中調製而成。印度和日本墨水主要成分為碳；一些鋼筆和馬克筆類墨水則是以染料為主。防水墨水的黏著劑含有蟲膠或松香，且和硼砂混合。(Watrous, 1957, 69) 黑色防水墨水常含有碳為主的黑色色料與膠液（如蟲膠皂或合成樹脂）混合而成；彩色防水墨水含有色料（大部分為有機）混於類似的配方、或水性陰離子或陽離子染料的蟲膠溶液。(Bredereck, 1988, 115) 這些墨水通常比水彩更發亮。

- Winsor & Newton Drawing Inks: Pigments (black, white, gold, and silver inks) or dyes (all colored inks) in shellac. (product literature)

  Winsor & Newton 素描墨水：色料(黑、白、金和銀墨水)或染料(所有的彩色墨水)溶於蟲膠。(產品資料)

- Higgins India Ink: Waterproof black ink by A.W. Faber-Castell.

  Higgins 印度墨水：由 A.W. Faber-Castell 製造的防水黑墨水

Printing Inks: Printing inks can be diluted with organic solvents and applied with a fine brush to bridge areas of design loss in printed areas.

印刷墨水：印刷墨水可以有機溶劑稀釋，然後使用小筆在有圖像缺損的印刷部位接筆。

Acrylic Resin Paints: Contain pigments in acrylic resin(s). Used frequently by paintings and objects conservators. Dilution with solvents required for translucent effects. Tend to remain soluble in organic solvents. Can be modified with acrylic resins.

壓克力樹脂顏料：含有色料的壓克力樹脂，為油畫和器物修復師經常使用。使用溶劑稀釋可以達到透明效果，可溶於於有機溶劑。可用壓克力樹脂改造調整。

- Lefranc & Bourgeois Restoration Colors (recently renamed Charbonell Restoration Colors): Pigments preselected for lightfastness. Bound in resin mixture of isobutyl methacrylate in cyclohexanone. By combining resins, working properties result in greater flexibility, increased gloss, and less yellowing. Remain soluble in benzine. (Norris, 1993 draft, 18)

  Lefranc & Bourgeois 修復顏料（最近改名為 Charbonell 修復顏料）：精選耐光色料，以溶於甲基丙烯酸异丁酯和環已酮的樹脂為黏著劑。因內含樹脂，使用特性上具有非常好的延伸性、發亮和較不易黃化。可溶於石油精。

- Magna Bocour: Manufacturer recently went out of business. Remains soluble in xylene and toluene. (Norris, 1993 draft, 18)

  Magna Bocour：製造廠商已倒閉。可溶於二甲苯和甲苯。

Acrylic Dispersion Paints: Composed of pigments in acrylic polymer or copolymer dispersion of acrylic acid, methacrylic acid or acrylonitrile. (Sometimes termed latex, acrylic latex or polymer emulsion paint.) (Norris, 1993, 16) Acrylic dispersion paints may contain additives including plasticizers, anti-foaming agents, thickeners, fungicides, wetting agents, etc. Labels often list pigment(s) present and lightfastness rating. Acrylic dispersions are most often used to tone inserts and lining papers.'

壓克力顏料／丙烯顏料：由色料溶於壓克力（共）聚合物分散體、甲基丙烯酸或丙烯腈組成。（有時稱作乳膠、壓克力乳膠或聚合乳液顏料）(Norris, 1993, 16) 壓克力分散顏料可能含有添加物包括塑化劑、消泡劑、增稠劑、除黴劑、保濕劑等，標籤上常常標示有色料和耐光度級別。壓克力分散液最常被使用於調整紙層和托紙的色調。

- Working characteristics: Acrylic dispersion paints can be thinned with water for application, but when dry are water resistant. Tend to appear opaque unless diluted. Can be "fattened" with unpigmented acrylic medium for glazing or shinier effects. Acrylic matte or gel medium may be mixed with or applied over areas of retouching to match surface gloss.

  使用上的特性：壓克力分散顏料可以用水稀釋來使用，但當它乾燥後便具防水性。除非加水稀釋，基本上看起來不透明，也可以用不含色料的壓克力媒材「扁平化」，來達到光亮的效果。壓克力平光或膠狀材料可以彼此混合或覆蓋補筆區域，以使表面亮度相稱。

- Stability and reversibility: Yellowing of the acrylic emulsion binder may occur, although this may not be a function of binder degradation. At early stages of aging, acrylic dispersions are soluble in acetone, benzine, alcohol, and toluene. Later, "stronger" organic solvents may be required to swell the paint film. (Norris, 1993, 16–17)

  穩定度和可逆性：壓克力乳膠劑可能會變黃，雖然這並不算是黏著劑用途上的劣化。早期的劣化，壓克力分散劑可溶於丙酮、石油精、乙醇和甲醛；接下來，可能會需要更「強」的有機溶劑來使顏料膜軟脹。

- Brands include: Liquitex Acrylic Artist Color, Winsor & Newton Artists' Acrylic Colour, Golden Artist Colors, etc. Liquitex and Golden paints are formulated with Rhoplex acrylic dispersion binder modified with general additives.'

  品牌包括：Liqui Liquitex and Golden tex Acrylic Artist Color, Winsor & Newton Artists' Acrylic Colour, Golden Artist Colors 等等。Liquitex 和 Golden 顏料由具一般添加物的 Rhoplex 壓克力分散黏著劑製成。

- Winsor & Newton Liquid Acrylic Color: Pigments in an alkali soluble acrylic solution (Winsor & Newton product literature). These are transparent colors with a consistency similar to ink. Are diluted with water, but are water resistant upon drying. Reversibility and light stability unknown.

Winsor & Newton 液態壓克力顏料：為存於溶於鹼液的壓克力溶液的色料（Winsor & Newton 產品資料）。這些是有這類似於墨水的黏稠度之透明顏料，可用水稀釋，但乾後具防水性。可逆性和耐光性未知。

- Turner Acryl Gouache: Contains an acrylic emulsion which makes paint more resistant to water than gouache, but paint dries to a matte surface similar to Turner's Design Gouache. (National Artists Equity, Winter 1994, 3)

  Turner 壓克力不透明顏料：含有壓克力乳膠使其比不透明水彩更具防水性，但顏料乾燥後表面呈平光和 Turner 插畫設計顏料系列相似。

Vinyl Paints: Composed of pigments in vinyl-based binder. They are slightly to readily reversible in ethanol. Very good for retouching matte screenprint surfaces such as those found in Andy Warhol prints. Brand name: Flasche by Lefranc & Bourgeois.

乙烯顏料：為文含乙烯基的黏著劑的色料，易於或些微溶於酒精；非常適於平光絹版印刷表面全色如安迪沃荷的版畫。品牌名：Flasche by Lefranc & Bourgeois.

Dyes: For description of dyes used in retouching photographs see the Photographic Materials Group page on Inpainting of Photographic Prints.

染料：用於照片全色的染料請參見在攝影照片的全色上的攝影材料群組頁面。

2.5 Other Media 其他媒材

Colored Waxes: Pigments ground in microcrystalline wax can be used as toned filling material or as inpainting media; especially good for filling losses in serigraphs and clay-coated papers. Applied warm and cleaned up with benzine; can be burnished to match sheen.

色蠟：研磨色粉調微晶蠟可用來調整填補材料的色調，或作為全色媒材，在絹網製版和塗佈白土的紙張中填補破損尤其好用。加熱後上色，以石油精清除；也可以磨光以配合光亮度。

Dry Cellulose Powder: Whatman cellulose powder available from Fisher Scientific. Microcrystalline cellulose (FLUKA) has a smaller particle size than alpha cellulose powder. Cellulose powder has been used for filling small superficial losses in paper support or along tears, and for covering dirty tear edges, abraded areas, etc. Powder, originally white, can be “toned” by heating on a hot plate, periodically stirring the powder to get even darkening of color. Range of colors from beige to brown can be obtains by adjusting heat and time (See **Use of Paper Fibers or Cellulose Powder** under Alternatives to Inpainting for notes on application).

乾燥纖維素粉：Whatman 纖維素粉可以在 Fisher Scientific 公司買到。微晶纖維素粉(FLUKA)擁有比 α- 纖維素粉較小的顆粒。纖維素粉已經常用於填補紙質基才上小而淺薄的破損、撕裂痕，和覆蓋撕裂痕邊緣上的髒汙、磨損區域等等。粉末原色為白色，可以以加熱器烘烤調整顏色，不時加以攪拌粉末以得到較深的粉末顏色。藉由控制熱度和烘烤時間，顏色的範圍可從米色到褐色。（更多使用重點，參見全色以外的方法章節之下的**紙張纖維和纖維素粉的用途**）

Cellulose powder deteriorated by heating or roasting can release discoloration when wet, can change tonal value, and can cause staining. Burned cellulose should be washed to prevent bleeding of tone, via paste or cellulose ethers, into the original.

纖維素粉因熱或烘烤而劣化，潮濕時會釋放出顏色，因而會改變色調或造成汙漬。焦化纖維素應先清洗過，以免因漿糊或纖維素醚類黏著劑造成色調暈開滲入原作。

2.6 Additional Binders or Coating Materials 外加的黏結劑或塗佈材料

Additional materials can be added to inpainting media to act as a binder for dry pigments or pastels, to adjust solubility and thus reversibility, to alter viscosity, and to adjust gloss. Coatings may be applied over inpainting to seal media or adjust gloss. See Adhesives for description of characteristics, stability, and preparation of the following materials.

外加材料可以加入全色媒材，作為乾式色料或粉彩的黏結劑，以調整可溶性和進而可逆性、或改變黏稠度、光亮度。塗佈層可以加於全色之上封住媒材或調整光亮度。更多以下材質的特性描述、穩定度和製備，請參見黏著劑章節。

- **Cellulose Ethers 纖維素醚類**
- **Gelatin 明膠類**
- **Gums**: Historically used by artists, but not generally used by conservators because of tendency to crack when heavily applied. May be used to attempt to match gloss of original gum coating.

  樹膠類：歷史上藝術家所使用，但不是修復師一般所常用，因其厚塗時常裂開。可能為了配合原作上的樹膠塗佈的光亮度而使用。
- **Acrylic Resins 壓克力樹脂**
- **Acrylic Dispersions**: Liquitex Acrylic Gloss Medium and Varnish, acrylic dispersion adhesives (Rhoplex, Plextol, Lascaux, etc.).

  壓克力分散液：Liquitex 壓克力光亮媒材和清漆、壓克力分散黏著劑（如：Rhoplex、Plextol、 Lascaux 等）。
- **Polyvinyl Acetate Resins 聚醋酸乙烯樹脂**
- **Wax or Paraffin**: Can be mixed with heptane and applied to surface, then burnished or texturized as appropriate. Reversible with heptane.

  蠟與石蠟：可以與庚烷混合塗在表面上，然後磨光或適當製造肌理；可用庚烷清除。
- **Wondersol**: “Often used by photographic ‘retouchers’ in an airbrush to ‘seal’ each layer of retouching, or added to gouache to assist in its flow. According to manufacturer, Retouch Methods, Inc., Wondersol consists of gum arabic, methanol, water, and a preservative Moldall. Everything goes into suspension and the mixture is allowed to settle for six months. Undissolved gum arabic is skimmed off the top of the solution before it is packaged in a plastic jar fitted with an eyedropper lid. This material may be considered to increase gloss on finished inpainting.” (Norris, 1993 draft, 13)

  Wondersol: 常用於相片「補筆」、以噴槍「封」住每一層補彩，或加在不透明水彩裡有助於其流動。據製造商—Retouch Methods 有限公司—的資料：Wondersol 含有阿拉伯膠、甲醇、水和 Moldall 防腐劑等加入懸浮液裡，然後靜置六個月。在包裝至塑膠瓶且帶有滴管

的蓋子之前，未溶解的阿拉伯膠會浮在表面並且被挑掉。一般認為這個材料在全色完成後有可能會越來越光亮。(Norris, 1993 draft, 13)

- **Aquapasto**: Is a soft translucent gel which contains gum arabic and silica, and when mixed with watercolor or gouache enables thicker layers of paint. Full impasto is best achieved with two or more applications, rather than one thick application. Manufactured by Winsor & Newton. (product literature)

  Aquapasto: 是一種半透明、含有阿拉伯膠和矽土的材料，可以和水彩或不透明水彩一起混合使用以得到較厚的顏料層。全面厚塗法最好以塗佈兩層或兩層以上來完成，比一次塗一層很厚要來得好。由 Winsor & Newton 生產製造。（產品資料）

2.7 Tools and Supplies 工具和用品

- **Application tools**: Cotton swabs, blotters, sponge pastel blenders, erasers (manual and motorized), wooden skewers, cotton, tortillions and stumps, polyester film (Mylar), toothpicks, absorbent dental tips (Healthco), air brush, drafting masks.

  使用工具：棉花棒、吸水紙、粉彩混色海綿、橡皮擦（手動或電動）、木籤、棉花、紙筆、聚酯片（Mylar）、牙籤、吸水的牙科紙針（Healthco，牙科材料公司名）、噴槍、面罩。

- **Brushes**: Large mop watercolor brushes for preparing inserts, fine point (00–0000) sable brushes, stipple or blender brushes. Small stipple brushes can be created by cutting off the ends of pointed watercolor brushes. Caution should be taken not to wet ferrule of brushes with mouth as some pigments may be toxic.

  筆刷：大的拖把型水彩筆刷（以用來準備嵌補紙）、小頭（00-0000 型號）貂毛筆、點畫筆和調色筆。小點畫筆可以用修剪尖頭水彩畫筆來做成。必須小心避免用嘴潤筆因有些色料具有毒性。

- **Palettes and Mixing Equipment**: Ground glass, unglazed ceramic dishes, sandpaper, aluminum pans, beakers, small pieces of glass or plexiglas, disposable paper palettes, plastic pans.

  調色盤和混合設備：玻璃板、未上釉的陶瓷盤、砂紙、鋁箔盤、燒杯、小片玻璃或壓克力板、免洗紙調色盤、塑膠盤。

- **General Tools**: Hair dryer, knife or scalpels, microscope, magnifiers. Dremel tool or other precision grinding tool can be invaluable for shaping and sharpening knives and scalpels to be more fitted for special use.

  一般工具：吹風機、刀或手術刀、顯微鏡、放大鏡；電動工具或其他精確磨砂工具以用來整形、磨刀或手術刀，使其更為適於特殊用途。

- **Burnishing Tools**: Bone folders, small Teflon spatulas, agates, curved dental tools, fingernail, cotton swabs, polyester web, Japanese tissue.

  磨光工具：骨刀、小鐵氟龍刮刀、瑪瑙刀、曲狀牙科工具、指甲、棉花棒、聚酯網、日本薄紙。

3. Treatment Variations 修復處理的不同變通方法

3.1 Technical Considerations 技術上的考量

Order of Treatment Procedures: Inpainting is one of the last procedures to be carried out during treatment of an object. Wet treatments, stain removal, etc. should be undertaken before inpainting. If flattening is the final procedure, the object should be humidified and dried so as not to disturb inpainting.

處理過程的順序：全色是文物修復處理的最後幾個步驟之一，濕處理、除漬等等應該在全色前處理完畢；假如攤平是最後步驟，此文物應該用微潤濕後乾燥的方式，才不會影響到全好的顏色，

General Working Tips: During treatment, review inpainting in several lighting situations (incandescent, natural, fluorescent; specular, raking, normal) and in both horizontal and vertical positions. Step away many times so visual considerations are fresh. Test on extra material from insert or similar paper. With translucent papers and repairs, consider what the work of art will be against (e.g., mat board); color of mat will affect color of support and insert. Also see Considerations During Inpainting.

通用工作小技巧：在修復處理中，以不同光照條件（白熾燈、自然光、日光燈、反射光、側光、正光），並且以水平及直立方式檢視全色區域。不時退後觀察，使得視覺得以重新調整。在剩餘嵌補紙的或類似的紙材上試色；對於半透明的紙張或補紙，考慮到什麼樣的材料（如卡紙）、夾裱色調會在作品之下，因其會影響到紙質基底材或嵌補紙的顏色。請參見全色時的考量。

Objects which are lined using a stretch drying technique (such as with “Dacron”, plexiglas, karibari board, etc.) may be more easily inpainted if the object remains under restraint, especially where much moisture is needed.

小托過並使用繃平法（像是繃在”條淪布”、壓克力板、日式紙牆等）平整的文物，使其保持繃平狀態並全色不失為一便利方法，尤其是需要介入很多水分的情況。

Pretreatment of Area: Pretreatment of the area to be inpainted can determine whether results are successful. Ensure that the texture, relative gloss or matte appearance, planar conformity, etc. correspond prior to applying color. Color match or approximation will not be successful if the underlying structure is not matched.

預處理區域：全色區域的預處理關乎於全色成功於否，上色前要確認質感、相關亮光或平光外表、平面一致性等，是否和原作相同。若是顏色之下的結構不相稱，全色與原作相稱或類似的狀態是無法達成的。

- Set down lifted fibers in abraded areas with moisture or adhesive (wheat starch paste, methyl cellulose, methyl cellulose/carboxy methyl cellulose mix, gelatin, etc.).

  把起毛的纖維以一點水分或黏著劑（小麥澱粉漿糊、甲基纖維素、甲基／羧甲基纖維素混合、明膠等）黏回。

- Damages (such as gouges) or irregular surfaces may need to be filled with paper fibers, cellulose powder, or other appropriate material before inpainting.

損傷（像撞擊痕）或不規則表面區域，全色前可能需要補上一些紙纖維、纖維素粉或其他適當材料。

- Edges of original at tears and losses should be thoroughly cleaned before filling.

  原作上撕裂痕和缺損的邊緣在補缺前需要好好清潔乾淨。

- Textures can be created on an insert paper using a variety of tools. Also, small pieces of glass, plexiglas, felts, etc., even wooden surfaces, can be used to “print” textures on fills (for instance wood texture in Japanese print); this is best done before the fill is cut and placed.

  嵌補紙的質感可以用多種工具製造出來；另外，小片玻璃、壓克力板、毛毯等，甚或木頭表面，等可以用來在補紙上「印」出質感（例如日本版畫上的木頭質感）；這些質感最好在補紙裁切和置放前先做好。

Color Matching 使顏色相稱

- Err on the side of slightly lighter and cooler than surrounding color.

  使顏色稍微比破損周圍原作顏色要淡且冷色調一點，是錯誤的。

- Relationship of warm-to-cool color matching is very important. Often building up a color by mixing (e.g., a cool blue with yellow to create a green) will be more successful than directly applying a single color.

  使冷暖色調的關係相稱是很重要的；通常來說，以混合顏色（如混合冷色調的藍色和黃色成為綠色）達到所需顏色，要比一次到位的單種顏色要好些。

- One can create a color that will read as “dark” but not be as harsh as black by mixing dark blues, brown or red with black.

  儘量以黑色混合深藍、褐色或紅色來調一個被看作是「深」色的顏色，而不是完全的黑色。

- To lighten a black, keep the color warm and lighten gradually by adding raw sienna or a yellow oxide as an alternative to adding a white, which tends to make the black go cool and bluish.

  要使黑色亮一點，讓顏色保持暖色系且加入生茶紅（raw sienna）或氧化黃使其變亮，是除了加入白色（會使黑色變冷色調及偏藍）的另一方法。

- Build up several layers of the same or different colors to simulate the complexity of the artifact, rather than an obviously single color application.

  堆積數層一樣或不一樣的顏色，以呼應文物上複雜的色調，要比只上一種過於顯眼的單色要好。

Also, gradually adding layers aids color approximation.

另外，漸進式的加入各層顏色有助於顏色類似。

- A blotter with a hole cut in the center can be placed over the color field to be matched to permit viewing without distraction from adjacent colors.

  吸水紙中間裁一個洞，可以用來放在上色區域，如此可以更精準的對色而沒有周邊的顏色干擾。

Use of Complementary Colors: When toning an insert paper to match the base paper tone, it is often advisable to work using the principle of complementary colors. Utilizing complementary color pairs when selecting the color to apply gives one the ability to significantly alter the resulting color using very little amounts of toning medium. Keeping toning medium to a minimum helps maintain the translucent quality which is so important in replicating a convincing paper tone. For example, if a paper is becoming orange-brown, instead of adding a darker brown to compensate, add a very thin wash of a blue (or terre verte). An extremely small amount of blue is all that is required to neutralize the orange tone and the resulting color appears more natural and less like a painted surface.

互補色的使用：當調整嵌補紙的色調使其與基本紙色相稱時，使用互補色原則對全色工作是有助益的。每當需要選擇一種顏色可以最少量的調色媒材，來顯著改變最後形成顏色時，可以利用互為補色的一對顏色；保持最少量調色媒材有助於保持色彩的透明質感，而其透明質感對於再重製紙的原色是非常重要的。舉例來說：假若要使紙張變成從橘變成褐色調，可加上非常淡薄的一層藍（或灰綠色調），而非加上深褐色來達成。所需的即是那極少量的藍，便可將橘色調中性化且較自然的顏色呈現，而較不像是畫上去的表面。

General Notes on Color Application 上色的一般注意要點

- Consider stippling in several different tones so the eye does not settle on and discriminate the inpainted area from the artifact.

  考慮用不同色調以點狀上色，如此一來眼睛不會從文物上落到和注意到全色區域。

- Do not overwork the area as colors can become muddy and less convincing.

  不要在同一區域工作過頭，因為顏色會變髒且較無說服力。

- Selectively blotting a freshly applied aqueous compensation with Kimwipe tissue will lessen an overly thick and opaque application and help to create a color field that is less flat and artificial looking.

  選擇性用 Kimwipe 薄紙按壓剛塗上水性顏色的區域，如此可以使過於厚塗和不透明的塗層較薄，且有助於使顏色不那麼死板和更自然。

- Consider adding “fox marks”, “flyspecks”, and “soiling” to an insert so that it blends better with the original support. Stains, abrasions, and other signs of wear in the artifact which have been interrupted by a loss can be simulated in the insert.

  考慮點上一些「褐斑」、「昆蟲排泄物」或「髒汙」在嵌補紙上，如此可以和原作質感更相近。在文物上因為破損而中斷的污漬、磨損和其他老舊痕跡，也可以稍微在嵌補紙上提示一下。

- To compensate losses in which the edge of the original is discolored, best results may be achieved by toning the insert to match the paper rather than the staining, and then blending the edge color slightly.

  針對在那些洞口邊緣已變色的區域補全，最好按紙張本身色調，而不是污漬的顏色來對嵌補紙染色，然後再稍微帶一點洞口的顏色即可。

- Adjust translucency of fills on an thin object using acrylics on reverse; tone front with watercolors, etc.

  對於比較薄的文物，利用壓克力顏料在背面、水彩顏料在正面，以此方法調整補紙的透明度。

- If inpainting black lines on an off-white support (e.g., in the case of an engraving), be sure to match tone of support on insert before adding lines. It is essential to get the basic match correct before detail is added.

  假如需要在米白紙材上補筆（如線雕版畫），在加線前確保先使嵌補紙的底色與基材相稱；先使基本色調相稱在加細節是很基本的原則。

3.2 Application of Isolating Layer or Size 施加隔離層或上膠

The presence of an isolating layer or size prevents absorption of wet media by paper fibers, reduces embedding of powdered pigments, and provides a distinct layer to allow easier removal of inpainting materials. Thin layers of methyl cellulose, other cellulose ethers, gelatin, etc. may be applied locally to the object in areas to be inpainted and allowed to dry before inpainting. In some cases, it may be necessary to build up the coating by applying several thin layers. Insert papers may be immersed in size solution or coated by brush. Consider stability and reversibility of isolating layer since some materials can be difficult to remove entirely. Consider also the potential darkening and planar distortions of the support when using water-based materials.

隔離層或上膠劑的存在可以避免潮濕的媒材吸收到紙纖維、減少粉狀色料嵌入，且提供可辨認的層次使全色材料在日後可以較容易的被移除。可以局部的在文物上需全色之處，薄薄上一層的甲基纖維素、其他纖維素醚、明膠等，並等待其完全乾燥再全色。某些情況下，可能需要上數次薄層來堆積塗佈層；嵌補紙也可以浸入再上膠劑或以筆刷塗佈。當使用水性材料時，須考量到基材暗化和平面變形的可能。

Japanese paper fills can be surface sized with 1–5% gelatin to receive color more evenly and absorb less.

日本紙的補紙可以用 1-5%的明膠水做表面上膠，以得到均勻上色且較少吸收到紙裡的效果。

3.3 Application of Dry Materials 乾性材料的施加方式

Dry Media in Stick Form: Pastels, charcoal, crayons, etc. can be applied directly; however, because of their chunky form and often friable nature, they tend to be applied in powdered form using brushes, etc. (See Crumbled Dry Media under Application of Dry Materials). In stick form, they are used more often for toning inserts where they are applied directly and then blended with fingertips, swabs, brushes or stumps. Application tools/sticks can be formed to a point using knives or sandpaper.

棒狀形式之乾式媒材：粉彩、碳棒、蠟筆等等可以直接上，然而因其顆粒狀且易碎的特性，可以用筆刷直接以粉末型態乾上（參見在施加乾式媒材章節之下的碎狀乾式媒材）。棒狀型態可直接用於調整嵌補紙色調，以手指、棉花棒、筆刷或紙筆捲抹開。施加工具／色料棒可以用刀或砂紙削成尖狀使用。

Drawbacks: Pastels, chalks, etc. are often too crumbly and uncontrollable in stick form for inpainting small losses. If applied heavily, they may require coating to prevent accidental smearing or transfer. One must keep in mind, however, that coating, particularly in the case of pastels, may alter the colors causing darkening and/or a shift in hue. Pastels may tend to gather at edges of losses and be subsequently difficult to remove.

缺點：棒狀的粉彩、粉筆等常常因為太易粉碎而在全色小缺損時難以控制；假如厚塗可能需要一些塗佈層來防止意外的抹開或轉印到別的地方。必須謹記一點：塗佈層（尤其是用於粉彩）可能會改變顏色造成暗化或色相改變。粉彩可能容易堆積在破損的邊緣且造成後續難以移除。

Dry Media in Pencil Form (pastel, colored, charcoal, and graphite pencils): Pencil media can be applied directly to losses and inserts. Are easy to apply, controllable, and blendable. Colored pencils are fairly containable, do not penetrate into paper, and can be burnished to a high gloss. Sensitivity to water and organic solvents is dependent on type, brand, and specific color composition of pencil.

鉛筆形式之乾式媒材（粉彩鉛筆、彩色鉛筆、炭精筆和石墨鉛筆）：鉛筆媒材可以直接使用在破損處或嵌補紙上，相當易於操作、控制且混合；彩色鉛筆相當易於操作，較不會深入紙中，且可以磨光到發亮。對水和有機溶劑的敏感度和鉛筆種類、品牌和哪一種顏色組成息息相關。

Drawbacks: A continuous layer may be difficult to achieve depending upon pencil type and texture of paper substrate; may need to combine pencils with other media (e.g., watercolors) to increase coverage and density. Smudging or transfer of these media may be problematic; if applied heavily, may require coating to prevent transfer, though coating may darken color. Pencils with hard points may scratch and damage the paper support, and will easily burnish paper texture. Color pencils may impart an undesired gloss to the paper surface.

缺點：依不同鉛筆種類和紙張的表面肌理而定，很難構成連續性的顏料層；也許需要和別種媒材（如水彩）混合使用以增加覆蓋力及密度。這些媒材的抹開和轉印可能造成很多問題；厚塗可能需要塗佈層來防止轉印到別處，然而塗佈層會暗化顏色。有硬尖頭的鉛筆有可能會劃傷紙質基底材，且易於磨平紙張肌理。彩色鉛筆則可能會在紙張表面留下不需要的亮光。

Crumbled Dry Media: **碎屑狀乾式媒材**

- Dry application: Crumbled pastel sticks, scraped colored pencils, and dry pigments can be mixed in a container or on a palette, sheet of sandpaper, or paper/blotter to form powders of the desired color. Palette made of ground glass or masking tape strip on glass provides for slight tooth without losing all color into absorbent blotter. The mixture is applied with pointed or stipple brushes, absorbent tips (Healthco), swabs, stumps, blotter tips, toothpicks, etc. Excess powder can be removed with swabs or brushes, dry or moistened, or can be picked up with kneaded erasers.

乾式施加方式：碎屑狀的粉彩棒、削下的彩色鉛筆碎屑和乾色料可以在罐子裡、調色盤、砂紙或一般紙/吸水紙上混合粉末至想要的顏色。由磨砂玻璃板或貼有紙膠帶的玻璃做成的調色盤可以提供些微的表面摩擦，而不會在吸收性很大的吸水紙上失去所有的顏色。混合好的色料可以用尖頭或點狀筆刷、具吸收性的尖頭（Healthco，牙科材料公司名）、棉花棒、紙捲筆、吸水紙尖、牙籤等施加。多餘的粉末可以用棉花棒（濕或乾皆可）或軟橡皮移除。Drawbacks: Smudging of media may be problematic depending upon application. Some papers may be too slick for dry media unless the media are rubbed into paper substrate or applied wet or with binder. Some papers may be too pulpy or soft to withstand manipulation of applicator.

缺點：依施加方式不一，媒材的抹開可能會造成問題：有些紙對於乾式媒材可能過滑，除非將媒材揉進紙張中、或濕上、或與黏結劑一同施加才可解決；有些紙張可能纖維太過鬆軟或太軟，以至於無法承受太多操作。

- Dry application: Locally “humidify” or moisten area so dry media can be held while it is being manipulated and not smudge adjacent areas. (Note that the paper is not wet.) Alternatively, apply a thin layer of methyl cellulose or gelatin to the area. Stipple on color in a series of thin coats using a pointed or stipple brush. Burnish with Japanese tissue (Uda) or Hollytex, and cover with a weight until dry. Repeat until color and density is appropriate. A final thin layer of methyl cellulose or gelatin may be applied, but generally is not necessary.

  乾式施加方法：局部「加濕」或潤濕使乾式媒材在操作時可以沾上且不會抹到周圍（注意紙張並不是濕的）；另外也可以塗佈一層薄薄的甲基纖維素或明膠，以尖頭或點畫筆刷在色料輕點形成一連串的薄塗層次，以日本薄紙（宇陀紙）或 Hollytex 輕輕磨壓且蓋上，上加重物直到乾燥。重複此步驟直到顏色和密度都達到所需，最後可以薄塗一層甲基纖維素或明膠，但一般來說並非必要。

- Wet application: Pastels, dry pigments, and powdery colored and graphite pencils can be mixed with a damp brush, water, ethanol, or binders such as methyl cellulose, gelatin, acrylic resin or dispersion, polyvinyl acetate resin, etc. Better color buildup may be achieved with wet application than when powdered media are applied dry. Variations in gloss depend on the type and amount of binder.

  濕式施加方法：粉彩、乾式色料和粉末型的彩色或石墨鉛筆可以與濕筆、水、酒精或黏著劑（如甲基纖維素、明膠、壓克力樹脂或分散液、聚醋酸乙烯樹脂等）。比較好的成色可能可以濕式施加方法達成相較於乾上粉末媒材。表面光亮的程度依不同黏著劑的種類或份量而不同。

  Powdered pastel colors can be also easily blended in wet condition to achieve a particular tone. Check dried color first before application. Useful for inpainting small blemishes on pastel paintings. Addition of small quantity of ethanol to pigment mixture will facilitate transfer of pigments onto support (especially when pigments will not adhere to the paper well). Working with ethanol as a carrier facilitates color mixing and application, and inpainting dries quickly. Be aware of danger of wicking water/ethanol into surrounding areas. Check ethanol compatibility of pigments.

粉末狀的粉彩可以輕易的在潮濕狀態混合以求特別的色調，上色前先確認一下乾燥後的顏色；對於粉彩畫上的小斑點全色非常好用。額外加入少量的酒精與色粉混和可幫助色粉上在基材上（尤其是當色粉沒有辦法好好的沾在紙上時），使用時以酒精當作載色劑幫助顏色混合及施加，且有助於全色部位快速乾燥。小心水／酒精吸入周邊，並且確認酒精和色粉的相容狀態。

Wet Application of Colored Pencils: Water-soluble colored pencils can be applied dry and then brushed over with water, or the tip dipped in water and applied damp for ease of application and to achieve intense color. Colored pencils can be applied similarly using mineral spirits, etc. instead of water.

彩色鉛筆的濕式施加方式：水溶性彩色鉛筆可以乾上然後用筆刷刷水，或以筆尖沾水塗上用以減少塗佈，和達到濃厚的顏色。彩色鉛筆也可以以石油精像水一樣使用。

3.4 Application of Wet Media 濕式媒材的施加方式

General Techniques: The following techniques can be used for toning inserts as well as for inpainting.

一般技法：下述全色技法可以也用於調整嵌補紙色調

- Watercolors, inks, and other paints may be diluted with appropriate solvents and applied directly with small brushes. Applying wet media with a fairly dry brush by touching the brush on blotting paper may prevent wicking of media by paper substrate.

  水彩、墨水和其他顏料可以適量溶劑稀釋，然後直接以小筆刷塗佈。以筆刷接觸吸水紙調整為偏乾的筆塗佈濕式媒材，如此可以避免媒材被吸到紙質中。

- To achieve continuous flat tones, first spray or brush with water the area to be treated. This will prevent the formation of hard edges. Then apply watercolor.

  為了達到連續且均勻的色調，一開始可以噴濕或刷濕待全色區域，這可以避免形成生硬顯眼的邊緣，然後在塗上水彩。

- Stipple brushes can be used to create patterns as found in spatter or crayon lithographs. Also, a stiff brush loaded with color which is flicked onto the toned fill simulates a stipple effect.

  點畫筆刷可以用來製造一些如同濺灑或蠟筆樣的石版畫紋理，另外可以在染色的補紙上輕點沾上顏色的硬筆刷來呼應點狀的效果。

- Wet inpainting media can be selectively picked up with dry or moistened blotter tip or swabs to soften or blend toning. Erasers can be used to lighten watercolor when already dry. Care should be taken not to alter the original surface when working directly on an object.

  濕式全色媒材可以選擇性的以乾或稍濕的吸水紙尖角或棉花棒移除，來緩和或漸層的調整色調，橡皮擦可以用來讓已乾的水彩提高亮度；在文物上作處理時必須小心不要改變原做表面狀態。

- Wet media, such as acrylic emulsion paints and watercolors, change color when dry.

  濕式媒材，如壓克力分散顏料和水彩，當乾的時候會改變顏色。

- Reversibility of wet media is increased by the presence of an isolating layer and/or by the addition of a large molecule resoluble gum, such as methyl cellulose or carboxymethyl cellulose.

  隔離層和／或外加的長鏈可溶性膠如甲基纖維素或羧甲基纖維素，可增加濕式媒材的可逆性。

Notes on Watercolor and Gouache 水彩和不透明水彩的注意事項

- Considerations relating to transparency of watercolor pigments: Organic pigments tend to be transparent, inorganic pigments from metals tend to be opaque. However, some transparent colors have high tinting strengths and can stain the paper and overpower underlying colors (e.g., alizarin crimson has high staining power). (Weingrod, 1991, 15) Opacity may be more easily achieved with gouaches than with repeated layering of transparent watercolors.

  關於水彩色料的透明性之考量：有機色料比較透明，由金屬製成的無機色料比較不透明。然而，有些透明顏色有相當高的著色力，以至於使紙張汙染或改變深層的色調（如：茜草深紅有非常高的染色力）(Weingrod, 1991, 15)。比較起使用重複數層的透明水彩，覆蓋度可能較容易以不透明水彩來達成。

- Watercolors can be applied in a single layer or in several layers utilizing the transparent nature of some pigments to create a third color.

  水彩可以利用一些色料本身所具有的透明感，以塗佈單層或數層來創造第三種顏色。

  A hair-dryer can be used to dry watercolor stippling as it is applied to effectively build up layers of tones and to prevent lifting of underlying paint layers. Also, this technique prevents the formation of tide lines.

  吹風機可以用來乾燥以點畫法施加的水彩顏料，使其更有效率的堆積色調的層次並且閉避免洗下層顏色，另外這個技法也可以避免形成水線。

- It may be difficult to achieve dense or dark passages by layering watercolor washes due to tendency of previous layers to be picked-up by damp brush. Acrylics can be layered more successfully.

  因為前幾層顏色會被濕潤的筆刷帶起，所以要以塗佈數層水彩達到濃厚且深沉的效果可能有點困難；壓克力顏料比較可以堆積層次。

- Some watercolor pigments “settle out” when mixed in dilute solutions. Frequent stirring helps maintain a well-blended mixture.

  當和稀釋溶劑混合的時候，有些水彩色料會被「分離」出來，經常性的攪拌有助於保持溶液的混合。

- Cellulose ethers, gelatin or gum arabic can be added to watercolors to increase viscosity, alter gloss, and improve handling. Gum arabic, if thickly applied, may crack. Gloss can be adjusted by the proportion and choice of cellulose gum (e.g., carboxymethyl cellulose tends to have less gloss than methyl cellulose).

可以在水彩裡加入纖維素醚、明膠或阿拉伯膠，以增加稠度、改變光澤，並改善處理過程。阿拉伯膠厚塗時有可能會裂開。加入不同比例或選擇的纖維素膠可以調整光澤（如羧甲基纖維素比甲基纖維素的光澤感較低）。

- Pastels or kaolin may be added to watercolors to increase matte appearance.

  可以在水彩裡加入粉彩或高嶺土來增加平光的效果。

- Alternating layers of colored pencils and watercolors have been used to build up dark or opaque passages, and to simulate some printing inks.

  交錯使用色鉛筆及水彩顏料可以營造較暗或不透明的效果，亦可模擬部分印墨的色澤。

Extract from Old Papers: Can be used like pan watercolors. May be mixed with watercolors to make a color look “old”.

老紙萃取物：可以像盤式水彩一般使用，也可以和水彩混合使顏色看起來「舊氣」一點。

Notes on Acrylic Paints 壓克力顏料的注意事項

- Acrylics (aqueous dispersion-based or solvent-resin based) may be used for inpainting oil on paper, imitating heavy-bodied screenprint or lithographic inks, and inpainting losses on water-sensitive (tempera block-print) historic wallpapers. One may also choose to use non-aqueous media, such as solvent-based resin acrylics (Lefranc & Bourgeois or Magna) for compensations that will “hold” (won't travel or bleed) on artwork to receive aqueous treatment. Adjust surface characteristics by the addition of more medium (glossy or matte), the addition of dry pigments (to absorb excess medium present in prepared paints), or by the addition of small amounts of matting or flatting agents (e.g., silica). Matting agents should be added sparingly as excessive amounts will result in a greying or chalking of the color.

  壓克力顏料（水性分散液類或溶劑樹酯類）可以用於紙上油彩、仿厚實的絲網印刷或石版印刷墨水的全色，和對水敏感（蛋彩木刻印刷）之歷史壁紙的全色；還有一種情形會選擇使用非水性媒材－如溶劑類樹酯壓克力(Lefranc & Bourgeois or Magna)－對缺失作補全，就是當這種材料可以好好的固著在文物上（而不會色移或暈染），足以承受進一步的水性修復處理。可以加入更多的媒劑來調整表面特徵（亮光或平光)、加入乾色粉（以吸收多餘的製備好顏料中多餘的媒劑）、或加入少量的消光劑（如矽土）；消光劑應該謹慎地加入，因其會造成顏色較灰且粉狀。

- Acrylics can be layered more successfully than watercolors. Apply many thin layers, allowing each layer to dry first.

  壓克力顏料可以比水彩更好堆積成層；可塗佈多層並確保讓每一層徹底乾燥再上下一層。

- Acrylics can change color when dry and tend to appear opaque unless thinned with water.

  壓克力顏料在乾燥後會改變顏色且看起來較為不透明，除非以水洗薄。

Adjusting Diluent: Behavior and handling of inpainting media can be modified by adjusting the diluent formulation. For watercolor media, acetone may be added to replace a portion of the water in the diluent (i.e., 20% to 60%) to produce paints with speedier evaporation and less tendency to travel. For

solvent-resin acrylics, slow evaporating solvents, such as xylene, may be used for long working times; speedier mixtures, incorporating benzine and acetone (or toluene, although to be avoided for its noxiousness) will produce faster evaporating inpaint. Faster evaporating mixes may be helpful for brush recreation of crisp, “high-standing” printed intaglio ink lines.

調整稀釋液：全色材料的特性和處理方式可以調整稀釋配方來修正；以水彩媒材來說，可以加入丙酮來取代稀釋液中部份的水（如：20%到 60%），而製成有著更快揮發速度且較不造成色移的顏料；以溶劑樹酯壓克力顏料來說，較慢揮發的溶劑如二甲苯，可能用以較長工作時間；較快揮發的混合溶劑，如混合石油精和丙酮（或甲苯，但因其毒性盡量避免）可以形成較快揮發的全色顏料。較快揮發的混合顏料對於以筆刷重製清晰、跳出的凹版印刷墨線很有幫助。

3.5 Notes on Toning Inserts 嵌補紙染色注意事項

- Flat tones on large inserts may be achieved before final shaping and attachment to the object by using an airbrush with diluted watercolors, acrylic paints, inks, etc. Areas not to be toned can be masked. Practice is required to control dripping and unwanted spray from airbrush. Also, splatter effect on lithographs can be simulated using airbrush.

  在大塊嵌補紙上的均勻且單一色調，在進行最後裁整並貼上前，可以藉由使用噴槍塗佈稀釋水彩、壓克力顏料、墨水等來達成效果；而不需全色的區域可以先遮蔽起來。實作上需要控制住噴槍滴流或不想要的噴灑，此外石刻版畫上的點狀滴濺效果也可以使用噴槍來模擬。

- Background color of inserts may be painted with one type of media while the design may be drawn with another. Acrylics can be used for basic tone or background color on fills or inserts; then watercolors can be used for design or to make final color adjustments without disturbing the bottom layer. Alternatively, watercolors may be used for background toning, and then acrylics (aqueous or solvent based) may be used for inpainting design on top or for adjusting touches.

  嵌補紙的背景色可以一種媒材來塗佈，而筆意（或圖樣）用另一種媒材來完成。壓克力顏料可以用來作為補紙或嵌補紙的基本色調或背景色，然後水彩可以用來強調筆意或調整最後色調而不會洗掉下面的層次；反過來水彩也可以用在背景色，然後壓克力顏料（水性或溶劑性）可以用於上以補筆意或調整質感。

- On fill paper, alternate warm (red to yellow) and cool (blue to green) tones in light washes, drying between applications, to match the color of darkened older papers. Create shades of grey and brown or tone down a color using its complementary color in light washes or mixed together.

  於補紙上，可交互使用較稀釋的暖色（紅至黃）和冷色（藍至綠），且每次塗佈之間確保完全乾燥，如此以達到較暗的老紙色調。以稀釋或混合的互補色，調出灰色和褐色的不同亮度，或以此加暗色調。

- After toning a large piece of paper from which smaller inserts are going to be formed, be sure to tone the edges of the fills before adhering them in place. Otherwise, lighter edges may be

visible. When toning insert edges be cautious because they will generally be more absorbent, and hence will become darker than the sized surface of the paper.

於大塊的紙張上染色並從其中準備好小塊的嵌補紙後，確保在補洞前在其邊緣加點顏色；否則，淺色的邊緣可能會很明顯。當在邊緣加顏色時必須非常小心，因為邊緣會比較容易吸收顏色且變得比上過膠的紙張表面還要暗沉。

- When fill is to be toned after adhering, apply paste to reverse of object, not to fill, in order to avoid getting an area on fill that resists toning. After fill is adhered in place, work in a drier manner or do not apply color to the edge of the juncture of fill and object; dot in edge last.

  當補洞後待全色時，於文物背後塗漿糊，而不是在補紙上；這麼一來可以避免補紙上的某些區域無法吃色。在補洞之後，用乾筆進行全色或先不在補紙邊或洞口加色，最後再以點筆填色。

- A barrier line at edge of fill using paste, methyl cellulose, benzine or xylene, or Acryloid B-72 can be created if original paper is soft and bleeding from fill is a problem.

  假若原作的紙張屬於較為鬆軟性質，且有顏色可能從補紙暈染出來的疑慮時，可使用漿糊、甲基纖維素、石油精或二甲苯、B-72 於補紙邊緣做線狀隔離。

- For cast paper pulp inserts, pulp can be mixed with watercolor or diluted acrylic paint in blender and cast on the suction table to achieve very subtle tints.

  對於紙漿補紙，紙漿可以和水彩或稀釋的壓克力顏料在果汁機裡混和，然後在抽氣桌澆注形成，這麼一來可達成非常隱約的淡色調。

3.6 Mechanical Alteration of Inpainted Surface 全色表面的物理性改變

Increasing Surface Gloss: An inpainted area or insert paper can be burnished with the tip of a bone folder, teflon spatula, stainless steel dental tool, or agate directly rubbed on the surface or with a barrier of polyester web, slick paper (i.e. silicone release paper, gampi tissue), polyester film, etc. to increase gloss. Buffing with cotton pad or swabs may also increase gloss. Burnishing is often accompanied by a decrease in surface texture which may or may not be desirable.

增加表面光澤：全色區域或嵌補紙可以使用骨刀、鐵氟龍刀、不鏽鋼牙科工具或瑪瑙刀的尖端來稍加磨光表面；或隔一層聚酯纖維網、滑紙（如矽膠離型紙、雁皮紙）、聚酯片等來增加光澤，也可以以棉質軟墊或棉花棒來稍作緩衝也可增加光澤；磨光通常伴隨著可能是不所期望的表面糙感之下降。

Decreasing Surface Gloss: Insert paper may be abraded with sandpaper to create mottled or matte appearance. New, very fine sandpapers on Mylar are invaluable, but one should be careful if working near original surface. A very light application of pastel pigments may achieve a similar effect. Microcrystalline wax also decreases gloss.

減低表面光澤：嵌補紙可以砂紙磨糙以製造粗糙或平光質感，在 Mylar 上新且極細的砂紙非常好用，但在靠近原作表面時進行打磨時要特別小心；以粉彩顏料輕塗可能也可以達到類似效果，使用微晶蠟也可以減低表面光澤。

See **Extenders, Fillers, and Matting/Flatting Agents** under Pigments for discussion of microballoons, silica, chalk, etc.

參見於色料之下的**稀釋劑/展色劑(Extenders)填料和消光劑**，關於微泡、矽土、白堊土等的討論。

Creation of Texture: Insert can be modified by moistening its surface, and using tools such as dental tools or dull knives to create various effects, e.g., dimples, incised lines, felt textures, platemarks or other embossments, etc.

製造質感：可以潤濕嵌補紙表面、和使用如牙科紙針或鈍器改變或製造多樣的表面質感，如：點狀分佈、雕線、絨布質感、版緣凹痕或其他壓印效果等。

3.7 Application of Coatings 塗佈處理

To increase gloss or simulate a coating, inpainting can be coated with gelatin, methyl cellulose, gum arabic, acrylic resin or emulsion, microcrystalline wax, etc. Caution should be exercised, since application of coating may disturb or lift inpainting. Coating can be burnished to increase gloss.

為了增加光澤或仿造塗佈層，全色區域可以塗佈動物膠、甲基纖維素、阿拉伯膠、壓克力樹酯或乳膠、微晶蠟等；此程序必須小心進行因為塗佈處理可能會帶起或擾動全色好的顏色。塗佈層也可以磨光以增加光澤。

Acrylic Resins: Acryloid B-72 resin or Winton varnish will give inserts a higher degree of gloss than possible with methyl cellulose. These can be applied over a variety of media depending upon solvent sensitivity.

壓克力樹酯：使用 B-72 樹酯或溫莎牛頓凡尼斯，可以比使用甲基纖維素給予嵌補紙相當高度的光澤，並可以依其溶劑敏感度於多樣的媒材之上使用。

Wax or Paraffin: Waxes can be mixed with heptane and coated onto surface. Burnish to create gloss or texturize with sandpaper, pressure and polyester web, or scalpel. Can mix with powdered pigments to create matte surface.

蠟或石蠟：蠟可以和庚烷混合後塗佈表面，磨光可製造亮度或以砂紙、聚酯網或手術刀等製造質感；也可以和色粉混和以製造平光表面。

Achieving High Gloss: If high gloss is required on insert paper, silicone release Mylar can be placed on coating while wet and the area put under weight until dry. Especially effective with Liquitex acrylic medium or acrylic dispersion adhesives (i.e., Rhoplex, Plextol). If necessary, repeat to get even gloss. This technique may be problematic if used directly on an object as coating material may seep beyond the desired area when heavily applied.

達成高光澤效果：假如嵌補紙上需要高度光澤，可以在還是濕潤時放置矽膠離型聚酯片在塗佈層上，並加重物直到完全乾燥；在 Liquitex 壓克力媒材或壓克力分散黏著劑(如：Rhoplex、Plextol)上特別有用；有必要的話，重複處理到光澤均勻。如果直接使用在文物上這個技法有可能會有些問題，因其厚塗時塗佈材料可能滲出到其他區域。

3.8 Removal of Inpainting 全色的移除

Erasers: White vinyl, gum, and kneaded rubber erasers can be used to pick up dry media and lighten dried watercolors. However, pigment particles may remain in the interstices of the paper substrate.

橡皮擦：白色塑膠橡皮擦、美術橡皮擦或軟橡皮可以用來去除乾式媒材和提亮乾水彩，然而色料顆粒可能還會存留在紙張的纖維裡。

Smearing and/or driving of pigments into fiber interstices must be avoided. Careful cleaning of eraser surface, and use of light dabbing - not rubbing - motion with first application of eraser may help to improve control. Oil transferred from hands to kneaded rubber eraser may be transferred to color surface making ultimate removal more difficult.

要避免色料的抹進和（或）吃進紙張纖維之中，小心的以橡皮擦清潔表面，並先使用輕觸(非摩擦)的動作可有助於控制程度。軟橡皮所沾染到的手指油脂可能也會轉移到顏色表面，以致於最終的移除更為困難。

Wet Removal: Swabs dampened with water or an appropriate solvent can be used to remove watercolors and other paints. Area can be wet with water or solvents, and the inpainting lifted off with filter paper, blotters, or Japanese paper. Presence of an isolating layer will improve ability to remove inpainting. Moisture may “set” inpainting materials into the paper. Very quick application of fresh blotter to moistened area can reduce moisture penetration and limit problem of setting colors into paper. Abrasion or disturbance of paper surface may occur during wet removal, so caution must be exercised.

濕性移除：以水或適當溶劑潤濕的棉花棒可以用以移除水彩和其他顏料，待移除區域可以以水或溶劑先潤濕，然後全色材料可以濾紙、吸水紙或日本紙帶起。隔離層有助於移除全色，濕氣可能反而會將全色材料吸進紙張，迅速的以乾淨的吸水紙處理潤濕區域可以減少其滲入，且減低顏色吃進紙張的問題。濕性移除除理過程可能造成紙張表面磨損，所以要特別的小心進行。

Mechanical Removal: In some cases, one may be able to gently scrape off inpainting with scalpels and pick up the particles with a kneaded eraser. This technique may cause less embedding of inpainting media into the paper than removal with moisture.

物理性移除：在某些情況，可以用手術刀輕刮的方式移除全色，並以軟橡皮撿起碎屑，此技法比起濕性移除法可能造成些微全色材料被壓進紙張。

Removal of Colored Pencils: Colored pencils can partially be reduced with eraser, scalpel, etc. Damp swabs may be used to partially lift off colored pencil, however, too much moisture may set colors or cause bleeding of media. Removal is most effective when an isolating layer or size is present. However, if heavily applied or applied wet, colored pencils can be difficult to remove. Be aware that some colored pencils are soluble in water, while some are sensitive to organic solvents, and others may be affected by both.

彩色鉛筆的移除：彩色鉛筆可以橡皮擦、手術刀等移除部分材料，可以使用潤濕的棉花棒移除部分彩色鉛筆材料，然而過多的水分很有可能將顏色帶進紙層或造成媒材的暈染。當有隔離層或上膠層時，能夠更有效的移除全色，然而假如彩色鉛筆以厚塗或濕塗方式進行，可能會很難移除。注意有些彩色鉛筆溶於水，而有些溶於有機溶劑，更有些則是對兩者都有反應。

Pastel Removal: In many cases, pastel or chalk particles can be picked up with the dampened tip of a small brush. A very controlled “particle by particle” removal is possible if a microscope is used.

粉彩的移除：在很多情況下，粉彩或粉筆顆粒可以濕潤的小筆刷帶起，非常可控的、”一顆一顆”帶起來的移除方法可以在使用顯微鏡下達成。

3.9 Alternatives to Inpainting 全色的替代方式

Use of Paper Fibers or Cellulose Powder: Paper fibers or cellulose powder may be used to disguise stains, the grey edge of tears, etc., and to fill gouges, superficial losses in paper support, gaps from sprung tears, etc. in preparation for inpainting. Note that sprung tears can frequently be rejoined by partially humidifying the surrounding paper to expand it. Resulting planar distortions, if they occur, can often be evened out by subsequent weighting.

紙張纖維或纖維素粉的使用：紙張纖維或纖維素粉可以用來掩蓋污漬、撕裂痕的灰邊等，還有全色前填補凹鑿痕、基底材上淺小的缺失、開裂痕的空隙等；值得注意的是開裂痕常常可以部分潤濕周邊紙張，使其伸漲後再併合，其也許造成的平面變形可以後續重壓組處理改善。

- Paper fibers, teased from either Western or Japanese papers and toned to match support or media, can be adhered with methyl cellulose or wheat starch paste.

  由西方紙張或日本紙張取下的紙張纖維，經過稍加染色以與基底材或媒材相符合後，可以與甲基纖維素或小麥澱粉糊沾上。

- Cellulose powder can be “toned” to match support color by heating powder on a hot plate (See **Dry Cellulose Powder** under Other Media). Pre-toned dry cellulose powder is blended on a blotter until it is dispersed and the color is matched to the artifact. It is important to blend and disperse the powder so that it is not lumpy. Either locally humidify, moisten, or apply methyl cellulose or gelatin to the area to be treated. Stipple in dry cellulose in a thin layer. Burnish into place and allow to completely dry. Repeat procedure until the color and density is appropriate.

  纖維素粉可以加熱器加熱改變顏色使其與基底材相稱（參見其他媒材之下的乾燥纖維素粉）；事先改好顏色的乾燥纖維素粉可以在吸水紙上混合，直到分散均勻且顏色與文物相稱。將粉末混和和分散均勻是很重要的步驟，其使粉末不至於看起來結塊不勻。局部加濕、潤濕或在帶處理區域塗上甲基纖維素或動物膠，薄薄的點一些乾纖維素粉，稍加按壓然後等待其完全乾燥，重複數次直到顏色和濃度適當。

  Alternatively, mix cellulose powder with methyl cellulose before application; ensures neat, even application. Excess can be shaved with a scalpel after drying.

  替代的方式還有，在處理前將纖維素粉與甲基纖維素混合，確保為乾淨齊整的、均勻的塗佈，多餘的可以在乾燥後以手術刀刮除。

  Cellulose powder can be picked up and applied with fine-tipped tweezers which may save time. Good results may be obtained by sizing the surface of cellulose powder fills with thin methyl cellulose and applying watercolor on top to enhance or improve the end result. Burnishing with flat Teflon spatula aids adhesion but does not result in polished surface.

纖維素粉可以尖頭念鑷子挑起或佈入，此方法可能更為省時；在纖維素填充表面以稀薄的甲基纖維素上膠後，再塗上水彩可以達到不錯的效果，以平鐵氟龍刀稍微壓平可以增進附著度，但不至於造成過於光亮的表面。

A mixture of dry pigments and/or watercolor and microcellulose powder can be applied with a brush and painted into gaps from tears or silverfish damages. Repeat until desired color and thickness is achieved.

乾色料和（或）水彩與微纖維素粉的混合物，可以筆刷塗佈在裂縫或衣魚造成的損害，重複數次直到達到理想的顏色或厚度。

Overlays: Inserts or overlays may be used to cover stains or reconstruct design where inpainting may not be successful or desirable. In some cases, these may be more reversible than inpainting. However, there is no guarantee that the color of the overlay will remain matched to that of the paper support after aging.

貼覆紙：嵌補紙或貼覆紙可以用以覆蓋污漬，或在全色可能效果不是很理想的區域重建圖樣；在某些狀況下，這些方式可能比起全色更具可逆性，然而定無法保證貼覆紙的顏色能夠隨時間保持一致且與紙質基底材相稱。

- Thin Japanese tissue papers and thinned Western papers can be toned and adhered to the original in some cases, thereby avoiding direct application of media. Some conservators take this approach where a stain cannot be reduced, yet is truly disfiguring, since it may be both more effective and more reversible than covering with media.

  某些情況下，很薄的日本紙和揭薄的西方紙可以經染色後貼在原作上，但應避免直接在媒材上。有些修復師在污漬無法更進一步被清除且真的很干擾畫面的情況下，使用這個方法，畢竟此法比較起直接覆蓋在媒材上，有可能效果更好且可逆性更高。

- In some cases, inserts may be made from photocopies on archival paper, or hand-copies from reproductions may be used to compensate design losses. Archival photocopies or laser prints can be used for temporary, reversible fills reintegrating an area of loss for exhibition. Photocopies can be made onto old papers, Mylar, etc; however, avoid getting plastics caught in the machines as they may present a fire hazard. Caution - poor quality electrostatic photocopies may smudge or deposit particles on original.

  在某些狀況下，嵌補紙可由照相複印在檔案級紙張上製成，或由複製品臨摹而成，以用於在圖樣缺失處。檔案級照相複印或雷射列印可以用於短期使用，在展覽中其可移除的補紙可以補全缺失處。照相複印可以由老紙、聚酯片等所製成，然而應該避免塑膠卡在機器中因為可能有造成火災的疑慮。注意：品質低下的靜電複印可能會造成其顆粒在原作上汙染或堆積。

- Custom-mixed paper pulp discs can be made and then used for inserts or overlays. See Filling of Losses.

  為文物訂製的圓狀紙漿可以製好後使用於嵌補紙或貼覆紙，參見填補缺失。

Toned Supports: Mat board beneath loss can be toned with watercolors, or toned inserts can be adhered to the mat to visually compensate for losses. The combination of toned and white mat board (or paper inserts) can visually integrate discolored and unaffected areas of a fairly translucent paper, thereby delaying or avoiding treatment (i.e., stain removal, washing, or inpainting).

帶色的基底材：置於缺失之下的裱板可以用水彩補點顏色，或帶色的嵌補紙可以黏貼在裱板上，以用來視覺上補缺。同時使用帶色裱板和白色裱板（或嵌補紙）可以視覺上統整稍微透明的紙質文物之變色和非變色區域，因此省略修復處理（如：污漬移除、清洗或全色）。

3.10 Tips for Reproducing Certain Colors or Media 重建某些顏色或媒材的小技巧

Serigraph Ink: Pigments ground in microcrystalline wax are very good for filling chip losses in serigraphs and clay-coated papers; areas can be burnished to match sheen. Acrylic or polyvinyl acetate paints have been used to replicate screen inks.

絹網製版墨水：將色料磨入微晶蠟，用於填補絹版和白土塗佈紙張的小缺角非常好用；也可以稍加磨光使此區域的光澤與原作一致。壓克力顏料或聚醋酸乙烯樹脂顏料則已常用於替代製版墨水。

Mezzotint Prints: Dry black pigment mixed with methyl cellulose can be used to simulate very thick printing ink in mezzotints.

美柔汀版畫：乾燥黑色色料和甲基纖維素混合可以用來仿造濃厚的版畫墨水如美柔汀版畫。

Photogravures: Charcoal mixed with methyl cellulose is good for touching up photogravures.

照相凹版印刷：炭筆粉和甲基纖維素混合可以用來為照相凹版印刷版畫作補筆。

Gouache: Pastel pigments may be applied with a wet brush to replicate matte gouache in small areas. Superficial scratches in gouache can be gone over lightly with a damp brush to restore original surface characteristics instead of inpainting.

不透明水彩：可以濕筆塗上粉彩色料，以小區域仿造平光的不透明水彩；不透明水彩上淺淺的刮痕可以濕筆輕塗一下取代全色，以此復原本來的表面特性即可。

3.11 Tips for Reducing or Covering Stains 減低或覆蓋污漬的技巧

The amount of anticipated reduction of the visual strength of a stain should be considered as should its dimension. The degree of subtle application of inpainting media is important. Some stains may be successfully diminished, but in other cases inpainting may be more distracting than the appearance of the original stain or damage.

預期減低污漬的程度應該和污漬的尺寸一起考量，以全色材料應做多少微處理是很重要的，有些污漬可能可以很成功的掩蓋，但有些情況全色材料可能比原本污漬更干擾外表。

- Several layers of stippled watercolor tones may be applied to form an opaque base covering the stain. Pastel on top of watercolor integrates and provides convincing paper texture.

可以多層次的點狀水彩顏色形成不透明基色，以覆蓋污漬；加點粉彩在水彩之上可以統整色調且作出很像的紙張肌理。

- When applied wet, pastels can be very effective in disguising stains; use pastels lighter than stain and tone to match surrounding color with glaze of watercolor.

  當濕塗時，粉彩可以比較有效的掩蓋污漬；使用較污漬淺一點的顏色，並以一點水彩塗佈其上調整到與周邊顏色相稱。

- Disguising with paper fibers or temporary inserts may be options. See Removal of Inpainting and Alternatives to Inpainting.

  用紙纖維或暫時性嵌補紙覆貼，也可以是一個選項，參見移除全色和全色的替代方式。

4. Stability (Lightfastness) Rating of Some Commonly Used Pigments

一些常用色料的穩定度（耐光度）評比

ASTM (American Society for Testing and Materials) classifies the following pigments as having excellent lightfastness (category 1): burnt sienna, burnt umber, raw sienna, raw umber, Prussian blue, cerulean blue, cobalt blue, ultramarine blue, ivory black, lamp black, terre verte, viridian, yellow ochre, most cadmium pigments, red oxide, Chinese white.

ASTM（美國材料與試驗協會）將以下的色料分級為：耐光度優（第一類別）的有焦茶紅（譯者註：或稱焦席耶納土）、焦赭、生茶紅、生赭、普魯士藍、天藍、鈷藍、群青、象牙黑、燈黑、綠土、青綠、赭黃、大部分的含鉻色料、氧化紅、中國白（譯者註：鋅白）。

Manufacturers' Classifications: For example, Winsor & Newton classifies all its paints in terms of permanence judging them on durability and lightfastness in under glass, are exposed to ordinary daylight, damp, and atmospheric pollutants for a number of years. (See product literature.) Classification designations (AA extremely permanent through C fugitive) are marked on the paint tube. Some of the pigments classified as category 1 by ASTM are marked only as class A by Winsor & Newton: cadmium reds and yellows, ultramarine blue, and Prussian blue.

製造廠商的分級制度：舉例來說，溫莎牛頓公司將所有出品之顏料分級；其中將這些顏料在玻璃罩下、暴露在一般日光、潮濕和大氣中汙染源中數年後，評斷各顏料的耐用及耐光表現（參見產品資料）。分級名稱（從非常持久的 AA 到易變化的 C）註記在各顏料管上；有些色料被 ASTM 分級為第一類別但被溫莎牛頓只列為 A 級，如鉻紅黃、群青和普魯士藍。

Published Guides: The Wilcox Guide to the Best Watercolor Paints gives descriptions of pigments, paints, and particular manufacturers' products. Wilcox rates each tube of paint based upon reliability, suitability, and quality. ASTM lightfastness classifications also given. Since Wilcox's definitions are not clearly explained, take care when interpreting ratings of paints.

已出版的指南：Wilcox 最佳水彩顏料指南（The Wilcox Guide to the Best Watercolor Paints）提供色料、顏料和特殊製造廠商產品的描述，Wilcox 根據可靠性、適應性和品質，評比每一管顏料；也列出了 ASTM 耐光度分級。由於 Wilcox 的定義不是非常清楚，所以要斟酌參考其顏料等級。

Testing Lightfastness: One can test lightfastness by applying materials to paper, covering one side with black paper or board, then exposing samples to light. British Blue Wool Standard can be incorporated into test in order to estimate amount of light exposure and fading. (Weingrod, 1992, 19)

試驗耐光度：可以將材料塗佈在紙上，並用黑紙或紙板覆蓋半邊後曝曬於光線之下，以試驗耐光度；英國藍色毛織標準（British Blue Wool Standard）可以用來和試驗一起參考，以預估光照和褪色的量。(Weingrod, 1992, 19)

5. Historical Techniques and Materials 歷史上使用過的技法和材料

（暫無內容）

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7. History of This Page 關於此頁面之起源

BPG Wiki 書籍紙張群組維基

In 2009, the Foundation for Advancement in Conservation (FAIC) launched the AIC Wiki with funding assistance from the National Center for Preservation Technology and Training (NCPTT), a division of the National Parks Service. Along with catalogs from other specialty groups, the published Paper Conservation Catalog and the unpublished Book Conservation Catalog were transcribed into a Wiki environment. In 2018, Jennifer Evers reformatted this page by removing the legacy numbered outline format and improving internal links.

2009 年，文物修護發展基金會（the Foundation for Advancement in Conservation，簡稱 FAIC）在附屬於國家科技保存與訓練中心（National Center for Preservation Technology and Training，簡稱 NCPTT）下之國家公園服務部門的資金協助下，架設了 AIC 維基百科。已出版的紙張文物修復目錄（Paper Conservation Catalog）和未出版的書籍修復目錄（Book Conservation Catalog），連同其他群組整理的目錄都一起編入此維基介面。2018 年，Jennifer Evers 女士移除了編號大綱的格式，且增加了內部的連結檢索功能，全面重整此網頁的格式。

Paper Conservation Catalog (print edition 1984-1994) 紙張文物修復目錄（引刷版本 1984-1994）

Prior to the creation of the AIC Conservation Wiki, this chapter was created in 1994 as Chapter 30: Inpainting of the 9th edition of the Paper Conservation Catalog, (print edition 1984-1994) by the following:

在 AIC 維基百科創建頁面之前，本章節原為 1994 第九版的紙張文物修復目錄第三十章：全色，由以下人員編寫：

Compiler 編撰者: Kimberly Schenck

Contributors 供稿者: Robert Aitchison, James Bernstein, Craigen Bowen, Irene Brückle, Roderick Gilman Carpenter, Betty Fiske, Christopher Foster, Christa Gaehde, Claire Hoevel, Nancy Huegh, Debora D. Mayer, Holly Maxson, T.K. McClintock, Debbie Hess Norris, Leslie Hill Paisley, Yoonjoo Strumfels, Paula Volent, Judy Walsh.

Editorial Board 編輯委員: Sylvia Rogers Albro, Sarah Bertalan, Antoinette Dwan, Holly H. Krueger, Elizabeth Coombs Leslie, Catherine I. Maynor, Catherine Nicholson, Kimberly Schenck, Ann Seibert, Dianne van der Reyden, Terry Boone Wallis.