

Sticking Point

History, Manufacturing Techniques, and Preservation of Decals



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Abstract Decals, also known as decalcomania or transfer prints, were invented in England and flourished between the 1850s and 1970s, although they are still used today. Applied to a wide variety of materials, they were used primarily for decoration, trademarking, and advertisement on many surfaces. The use of decals greatly speeded manufacture of many consumer goods and made them more affordable. Because decalcomania have not been widely studied in the context of collections management, this paper will discuss the invention and use of decals, categorize types of decals by printing and application methods to aid in identification, and describe preservation strategies for decals found in cultural heritage collections.

Designing and printing directly onto a manufacturer's product is a simple task today, thanks to advancements in printing, graphic design, transfer, and computing that have enabled individuals to employ professional-level methods previously unavailable. Transferring a visual identity to another medium or form had been inconsistent, as handpainting was costly and lacked uniform results. As an improvement, transfers were developed in England and spread through much of Europe by the 1850s and to the United States by the 1860s.

Decalcomania transfers enabled the placement of a printed image on almost any surface or object (Pfouts 2002: 6). The advent of these transfers brought an inexpensive, mass-produced approach to trademarking goods, completing "a job that was comparable to many hours of work of a highly paid artist" (Kosloff 1950: 38). The term "decalcomania," often shortened to "decals," has French origins. An early contributor to the invention of decals was a Frenchman living in England who coined the term *decalquer*, meaning "to transfer a tracing" (Pfouts 2002: 7). As an advertising brochure for a leading decal manufacturer states, "a decal is nothing more or less than a paint film attached temporarily to a paper backing" (Palm Brothers Decalcomania Company 1946b: 1) that is coated with a water-soluble release layer to allow for easy removal during the transfer process (Decals, 1937: 6).

Decalcomania were used for three main purposes: decorating, advertising, and labeling (Burdick 1953b: 59). Decals could be produced in varied styles, designs, and colors, and for different surfaces—even complex, curved ones (Kosloff 1950: 38). One of the early uses of decals was to decorate china and other household goods, making decorated plates and dishes affordable for common folk for the first time. The concept of “point of purchase” advertising on store windows was a prime factor in the success of other types of decals. Decals were “rolling billboards” on windows and sides of vehicles, uniformly displaying company logos and product advertisements (Socony-Vacuum Oil Company 1937: 10). They were also found as name plates, instruction panels, and signs on trucks, buses, and street cars. Decals were crucial to the war effort in the 1930s and 40s, applied to arsenal, ammunition boxes, containers, airplanes, and flares (Hoffman 1988: 5). One decalcomania company boasted that over 2,700 decals were found on a single World War II Boeing B29 Superfortress plane, used as diagrams, instructions, cautionary labels, and even a “No Smoking” sign (Palm Brothers Decalcomania Company 1946a: 1). Decals could be designed to mimic wood, leather, and stone, and could be applied to many surfaces, including enamel, ceramic, and glass (Kosloff 1950: 38). In fact, one decal manufacturer stated that “there is only one form of inscription this process can not produce, and that is the incised lettering on tombstones” (Sherman 1906: 854).

In production settings, decals were preferred over metal signs, stencils, and hand-painting because they attached quickly—without the need to drill holes or attach rivets or screws to a product or to spend hours painting by hand (Palm Brothers Decalcomania Company 1946a: 2). The process for application of decals was often clearly printed on the back on the release paper layer, adding to their usefulness. The permanence of decals, even in outdoor applications, was another selling point touted by designers and manufacturers (Palm Brothers Decalcomania Company 1946b: 2).

Decalcomania are collected by many cultural heritage institutions, and are also found adhered to objects of historic value. This paper will focus on the history and manufacture of decalcomania and will address preservation strategies for such items. Excluded from this discussion are static-cling plastic decals and bumper stickers, as is extensive description of the application and use of kiln-fired ceramic decals.¹ While the next section focuses on the history of decals that began in Europe, all of the visual examination of decals conducted for this research took place in the United States. As such, while the discussion of paper, printing, and types of decals may be generalized for all decals, the author’s frame of reference focuses on decals manufactured in the United States.

History

While artists have used the transfer process for centuries—drawing or printing a design on paper, then moistening it and applying to a surface (“Max Palm” 1937: 1)—the history of decal transfers is somewhat difficult to pinpoint with certainty.

In general, decalomania flourished in Europe and the United States from approximately the mid-1800s to the mid-1900s.

A number of individuals may be credited with the development of decalomania. Many recognize Simon François Ravenet, a mid-18th-century engraver from France working in England, as the inventor of the process, specifically for decorated china. Ravenet is also credited with coining the term “decalquer,” or, “to copy by tracing” (Simmons 2011). Decal manufacture flourished after the 1796 invention of lithography by Alois Senefelder (Kosloff 1950: 38). In 1826, an Austrian named Röthmüller took out the first patent on producing lithographic transfers that were appropriate for application to surfaces such as wood and tin (Weiss 1935: 5). Modern lithographic transfers came into use about 1850 in France, Germany, and England (Kosloff 1982: 78), first to decorate iron sewing machines with “beautiful effects like mother-of-pearl, marquetry and floral designs” (Decalomania 1903: 258) (Figure 1). In 1856, C. G. Gottgetreu of London patented a process of coating paper with starch that allowed the transfer of multicolor prints onto another surface (Adamek 2000: 68). Various improvements by 1890 lowered the cost and increased the popularity of decals (Weiss 1935: 6).

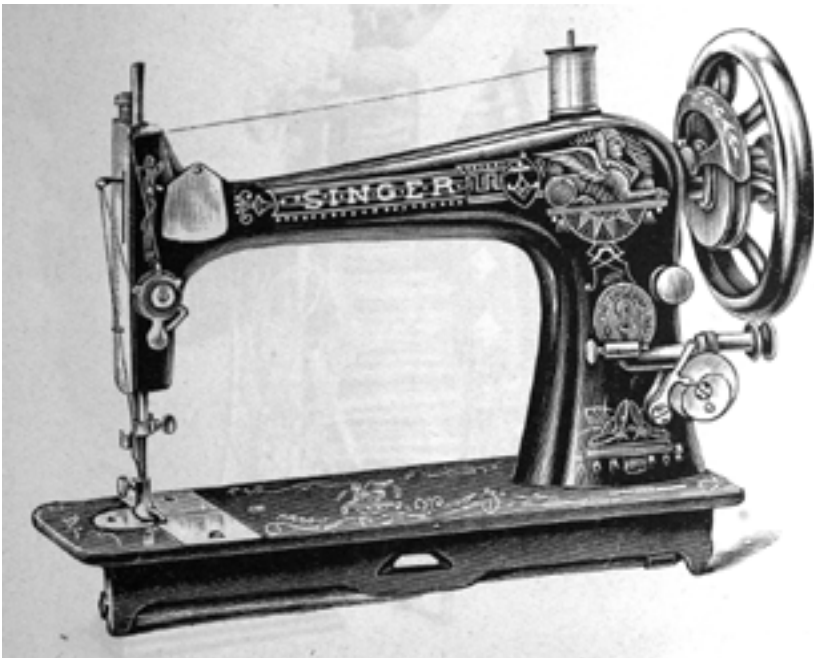


Figure 1. Cast iron sewing machine with applied decalomania. Singer Vibratory Shuttle No. 2 in Catalogue of Singer Sewing Machines for Family Use. Columbian Exposition Edition, May 1893, RH B2205, Kenneth Spencer Research Library, University of Kansas. Photograph by the author.

In 1868 the first firm to manufacture decals in the United States was established: the Palm Brothers Decalcomania Company located in Cincinnati (Kosloff 1982: 78). Palm Brothers began manufacture after first importing German scroll designs, stripes, and numbers to “accommodate wagon transfer business of brewers [sic], meat, ice, and delivery companies on the Ohio River” (Hoffman 1988: 1). So important were decals in American decoration and manufacture that the Palm Brothers Decalcomania Company entered their “patent transfer letters and signs” into the Chicago World’s Fair competition in 1892, for which it received a gold medal and highest award (Palm Brothers & Company 1920: 2). By the 1950s, three decal companies dominated in the United States: Meyercord (Chicago), Impko (Hackensack, NJ), and Duro (Chicago) (Pfouts 2002: 7).

Paper Types

Specialized papers were required for decal printing. The paper had to be “quite compact and at the same time sufficiently porous to absorb water rapidly during the transfer process” (Decalcomania 1903: 258). The paper was coated with various layers of “stickative,” as it was called in the decal trade, which became part of the design itself and allowed the decal to stick to a surface during transfer later (Socony-Vacuum Oil Company 1937: 5–6). The creation of transfer paper started with an application of starch to the paper, which was polished between hot rollers when dry. Next came a combination of glycerin, albumen, and gum arabic to keep the paper pliable and provide an adhesive (Adamek 2000: 71). In the early days, printers might make the decal paper themselves, although later it became more efficient to purchase it from a specialty manufacturer (Sherman 1906: 854).

Transfer papers were extremely sensitive to ambient humidity, resulting in curled papers and color misalignment if not manufactured in a consistent environment (Adamek 2000: 70). In 1928, Palm Brothers built one of the earliest air-conditioned buildings in the state of Ohio for its decal printing operations (Palm Bros. Honors 1948: 85). According to one decal printer of the 1950s, relative humidity in the print room was rigidly controlled between 60–65% (Burdick 1953a: 59). Those without air conditioning developed low-tech solutions to the humidity dilemma, such as hanging the stock in the printing room for at least 24 hours to condition the paper before commencing printing (O’Neil 1954: 22), storing printing paper in boxes containing water so extra moisture would prevent the paper from curling, or sprinkling the floor of the processing room to raise the relative humidity (Biegeleisen and Busenbark 1941: 151). After the decal paper acclimated, but before printing, each sheet was “accustomed to the press” in order to confirm printing registration (Socony-Vacuum Oil Company 1937: 7–8).

There are two main types of decal paper: simplex (or single) and duplex (or double). Simplex stock is a heavy, water-permeable paper sheet coated on one side

with water-soluble adhesive or “stickative” (Kosloff 1982: 78). Duplex paper, developed around the turn of the 20th century by the Britains Paper Company in England (Simmons 2011), has a heavy backing sheet to which is adhered a removable tissue coated with albumen or water-soluble gums (Hiatt and Middleton 1967, 143). With two stabilizing layers, duplex papers were used to apply transfers to non-even surfaces, as the tissue paper helped the decal conform to rounded objects (Palm Brothers [1930–1940]: 21).

Printing

While decals were undoubtedly printed by various methods, the two most common during the years that decals flourished were chromolithography and silk screen printing. Lithography was the primary printing method until the end of World War II, when silk screen printing became dominant (Hoffman 1988: 4). While not discussed in detail here, rotary offset printing and photolithography were also used by the 1890s (Blaszczyk 2000: 86).

Lithography

The earliest manufactured decals were printed by lithography, a method of printing in which images are drawn on a type of limestone with oil-based media. When a business client ordered a decal design, s/he would meet with the decal company to determine wording, design, size, and colors. An in-house artist would craft sketches for the client’s approval (Palm Brothers [1930–1940]: 45). Once sketches were authorized, drawings were made by hand on the stones. A separate design was made on a series of stones for “each different color and each different shade of color . . . for instance, there may be as many as two blues, or three greens, or grays in a design” (Palm Brothers [1930–1940]: 34). Color was inked in and preserved with a thin layer of gum arabic (Adamek 2000: 70). To achieve the final result, in addition to the colors shown in the various designs on the sheet, it was necessary to use a large number of white prints, “in order to build up a body, which makes the transfer self-sustaining during the transferring operation” (Palm Brothers [1930–1940]: 34). Lithographic decals were printed with oil pigments with slow drying times. Each layer of the print had to dry naturally, without the use of forced drying that might embrittle and crack the pigments (Palm Brothers [1930–1940]: 34). Under magnification, lithographically printed decals may appear as a series of stippled dots, and exhibit signs of shading and color gradation from colors printed on top of one another (Guild of Fine Art Care 1995: 49).

Some decal manufacturers added printed contours outlining the shape of the decal on the back of the paper to aid the user in accurately placing face-down trans-

fers on a receiving surface. Small transfers were printed with many designs on a sheet to make decal printing economical; in the 1930s, decal sheets were printed in multiples of 500 (Palm Brothers [1930–1940]: 34). Conversely, large window decals might be quite large, up to about 2 square feet each (Palm Brothers 1934: 2).

Screenprinting

At the end of the World War II, silk screen printing took over as the printing method of choice, in part because the lithographic stones were cumbersome and the printing process slow (Hoffman 1988: 4–5). Silkscreen printing uses stencils attached to screen, through which ink is forced onto a substrate below. For each color in the decal a separate stencil was used to block different areas of the design. Screen printing was faster and allowed short runs to be printed more economically. In addition, the heavy ink deposit of screen printing lent itself well to large, bold designs (Kosloff 1950: 38). Under magnification, screenprinted images may appear serrated around the edges of blocks of color. Areas of color overlap in screenprinting are usually easily distinguished by ridges created by the different inks (Guild of Fine Art Care 1995: 55).

Decals were silkscreened with decal lacquers, synthetic decal enamels, or a combination of both (Kosloff 1982: 80). As with chromolithography, typically each layer of a silkscreened decal was allowed to dry completely before the next one was printed, although some screenprinting inks allowed for forced drying to speed up the process (Kosloff 1982: 81). Screenprinting decals began with printing a coat of clear lacquer on paper (Burdick 1953c: 23) to form an invisible film base to serve as the transfer medium, keeping the decal design intact until it could be safely transferred to its final surface (Biegeleisen 1963: 140). Next came background and detail colors, followed by a clear coat. For face-down decals the procedure was reversed—first the clear coat, then the detail colors followed by the background color, and finally another clear coat.

Decal Types

There are many types of decals, and their identification and classification is surprisingly complicated. Because it may be helpful to collections professionals to know more about the differences to aid in classifying and describing decals, they will be discussed by the means used to activate or to serve as an adhesive (either varnish or water). See Table 1 for a summary of the typical features of the most prominent types of decals.

Varnish-Applied

As the name implies, varnish-applied decals were applied to a surface using a special varnish or cement (Palm Brothers [1930–1940]: 3). The weatherability of varnish allowed for a wealth of outdoor applications: on trucks, as small name plates on metal objects, and even on industrial equipment (Biegeleisen and Busenbark 1941:

Table 1. Typical Features of the Most Prominent Types of Decals

Name	Applied with Water or Varnish	How Commonly Printed	Paper Typically Used	Features
“Regular”	Varnish	Face down (layers printed in reverse order)	Simplex	Could support open lettering or use of metal leaf.
Varnish-applied; “duplex”	Varnish	Face down (layers printed in reverse order)	Duplex	Could support open lettering or use of metal leaf.
Mineral transfer	Varnish	Face down (layers printed in reverse order)	Duplex	Heated as part of “setting” process; used special pigments. Water-applied slide-offs later developed for china.
Slide-offs	Water	Face up, with adhesive on back of paint film layer	Simplex	For application to opaque surfaces.
Direct transfer	Water	Face down or in reverse when applied to opaque surface; face up when applied to inside of transparent one (such as a window)	Simplex	Used when last printed coat would come in contact with receiving surface. May have outlines of the design printed on back of the decal paper.
Window signs (type of direct transfer)	Water	Face up, with adhesive on face of paint film	Simplex	Often printed in large sections to cover big store windows.
Double-purpose; Double-duty	Water	Face up, but with adhesive coating over image AND on back of film	Simplex	Could be used as either slide-off decal or direct transfer.

153). In addition, because varnish-applied decals are kept on their backing papers until applied to a surface, open lettering, irregular outlines, and designs without a background could be used. Typical examples of open lettering can be found on pianos, typewriters, sewing machines, and phonographs from the mid-nineteenth through early-twentieth centuries (see Figure 1). Large, complex decals tended to be varnish-applied (Palm Brothers [1930–1940]: 3).

In addition, varnish-applied decals could support the use of 22-karat gold, aluminum, and bronze leaf that mimicked hand lettering on vehicles, shop signs, and metal machinery (Palm Brothers Decalcomania Company 1947: 8–9). Gold and silver gave a lustrous appearance and good outdoor durability on trucks and wagons (Palm Brothers [1930–1940]: 5). Aluminum leaf was another option; it is much less expensive than gold, not brittle, and non-oxidizing (Wright 2008: 39). For less costly applications, bronze transfers could be used, made with gold sizing with

bronze powder laid on top. Bronze tended to oxidize over time, so it was restricted for indoor applications (Palm Brothers [1930–1940]: 41).

Early decals were printed in pure oil pigments (Palm Brothers [1930–1940]: 7). While most varnish-applied decals were printed on duplex paper, varnish-applied “regular” or simplex decals were made up of layers printed face-down on the paper in reverse order. Decal companies sold special transfer cement for their application (Palm Brothers & Company 1887: 23). To apply simplex decals, a thin layer of varnish or cement was applied to the printed side of the decal and allowed to become tacky. Next the transfer was placed into position on a surface and adhered with even pressure using a roller. Once in place, the backing paper was saturated before being slid or lifted off. The transfer was checked for blisters and surplus varnish removed “with soft sponge, chamois, or rag saturated with benzine or turpentine” (H.A. Meyercord Decalomania Company n.d.: 40). After the decal was set (circa 1–3 hours), a final layer coat of varnish could be applied (H.A. Meyercord Decalomania Company n.d.: 40).

Duplex decals were printed on top of the tissue layer of the double paper (Kosloff 1950: 121) and printed in reverse. They were much more common than simplex varnish-applied decals. When duplex-paper decals were applied, “a coat of varnish was applied to the face of the decal, allowed to become tacky, in the usual method, but after the decal was placed on the article, the heavy backing sheet was stripped off the tissue layer before water was applied” (Palm Brothers [1930–1940]: 4). It was important that the receiving surface be cleaned of dirt and grease before application (Biegeleisen 1963: 140).

Another category of varnish-transfer decals was the mineral transfers for decoration on china, glass, and ceramics. These decals were typically printed on duplex paper with mineral colors that required firing to set (Socony-Vacuum Oil Company 1937: 10). First, a special varnish was spread on the china where the decal would be applied. A few minutes after application, the backing paper was wetted with a damp sponge and carefully peeled away. The decal was washed with a wet sponge to remove residue and allowed to “stand twenty-four hours to dry before firing” (Palm Brothers & Company 1910: 29). When heated, the varnish layer disintegrated, leaving the decorative image sunk under the glaze to permanently protect the design. When decorations were applied as decals rather than as hand-painted images the cost of application was reduced fifty times, making decorated china “transferware” affordable for the masses (Decalomania 1903: 258).

Water-Applied

At the end of the 19th century, water-applied decals became more prominent, although varnish application continued (Pfouts 2002: 7). The first U. S.-manufactured water-applied decals not intended for use on china were developed around 1890 by

Thomas Burke of Philadelphia (Pfouts 2002: 7). Although decals have been largely replaced by computer-generated methods of labeling and trademarking, their use continues to the present day. (A common example is the temporary children's tattoo.)

Slide-off decals, printed face-up on a paper backing, were a general-purpose decal for indoor use (Palm Brothers [1930–1940]: 20). They were generally smaller decals printed on the adhesive side of the simplex decal paper in any number of desired colors (Kosloff 1982: 79). This decal was simple to apply, so could even the “most un-educated kind of help” could quickly learn to apply it (Palm Brothers [1930–1940]: 21). In industrial settings, the decals could be applied to objects in an assembly-line fashion (Palm Brothers [1930–1940]: 9).

The structure of a slide-off decal normally consisted of “printed colored pigments and a binder or vehicle to hold colors in place” (Kosloff 1982: 79). When applied to opaque surfaces, the background color was printed first and the rest of the colors printed over it in right-facing order (Kosloff 1950: 121).

Slide-off decals were applied by soaking the decal in water and allowing the backing paper to release within a few seconds. These decals were generally less than one square foot in size, because larger decals were awkward to apply in this manner (Palm Brothers Decalcomania Company 1947: 8). Once the paper stopped curling in the water (Palm Brothers [1930–1940]: 23), the backing paper was slid off and the printed color film was applied to the desired surface, design side up (Palm Brothers Decalcomania Company 1947: 8). Slide-off decals dried on the surface as the water-soluble stickative under the paint film lost water to evaporation and became adhered (Palm Brothers [1930–1940]: 21). Once the backing paper was removed, the decal became essentially a group of self-sustaining paint layers. Because the paper backing was detached before application, slide-off decals could not be used when various elements of a design were not linked together (Socony-Vacuum Oil Company 1937: 10).

Direct-transfers were decals in which the last printed coat was intended to be placed in direct contact with the receiving surface. As such, they were printed with an adhesive coating over the design as the top layer (Kosloff 1982: 79–80). Direct transfers could be printed face down or in reverse when they were intended to be applied to opaque surface or on the outside of windows, or be printed face-up for the inside of a transparent surface, such as a store or automobile window (Biegeleisen and Busenbank 1941: 153). When applied to an opaque surface, the face-down transfer was dipped in water for a few seconds, placed on the receiving surface, smoothed out with a squeegee or roller, and the backing paper slid from the top of the transfer. When the backing paper was removed, the finished decal would be face-up on the receiving surface. Because the backing paper was nearest the user when the decal was applied, some manufacturers printed an outline of the design on the back of the transfer paper in a light color to guide in placing the transfer when it could not be seen (Biegeleisen and Busenbank 1941: 153).

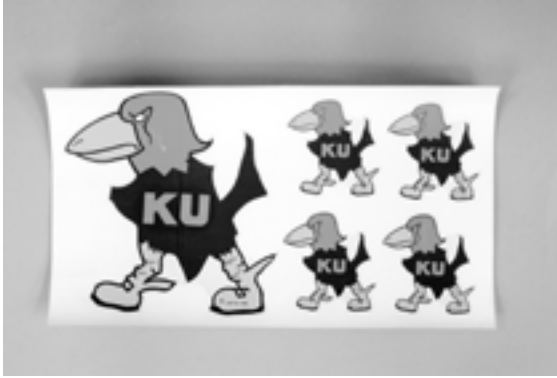


Figure 2. Double-duty, water-applied, screen-printed window transfer with “stickative” on image surface and on decal side of paper backing. Note how the paper-backed decal is curling. Jayhawk Decals, 0/25, Kenneth Spencer Research Library, University of Kansas. Photograph by the author.

Window signs, a common type of direct-transfer decal, were made for a particular purpose: to be used in advertising on store windows, as the name implies. They were slide-off decals applied to the inside of the window to be seen from the outside reading the right way and so were printed face-up with adhesive on the face of color film (Biegeleisen 1963: 139). These decals were often printed large, or in sections, to cover big store windows (Palm Brothers [1930–1940]: 16). According to a manufacturer’s claims, a decal window sign could last for many months with “better weathering than with varnish-applied transparencies” (Palm Brothers [1930–1940]: 33).

Another type of water-applied decal was the double-duty or double-purpose transfer. These decals were printed with adhesive on both the face and back of the decal to be applied either to a transparent or opaque surface (Palm Brothers Decalcomania Company 1947: 8). In other words, they could be used as either slide-off or direct transfer decals (Burdick 1953: 21) (Figure 2).

When double-duty decals were used in applications exposing them to the elements, they could be varnished over the design surface (Kosloff 1982: 79). Occasionally double-duty decals were double-printed to form a transfer that could be viewed simultaneously from inside and outside of a transparent surface without light shining through (Palm Brothers Decalcomania Company 1947: 8). In such a scenario, the decal was printed with the adhesive on one side of the simplex paper, followed by layers of opaque ink on top of the decal image, then a second image printed on top of the opaque layers. This type of decal printing could easily require over forty printings of different colors (Socony-Vacuum Oil Company 1937: 9).

Preservation of Decals

Decals fall into the category of ephemera—material made for a specific, short-term purpose, not necessarily meant to survive long-term. Traditionally, ephemera may

Table 2. Preservation and Storage Recommendations

Condition	Recommendation
Individual decals still on paper substrate	Store in alkaline folders or envelopes.
Overly humid environment (above 65% relative humidity)	Reduce relative humidity; consider adding silicone release paper slip sheets between decals to prevent sticking.
Cracked, delaminated, or abraded decals on paper backing	Handle delicately; store horizontally. Contact a conservator if damage is severe.
Cracked, delaminated, or abraded decals applied to a surface	Consider photographing current condition to watch for changes. Contact a conservator if damage is severe.
Decals stuck together	Avoid attempting to pull them apart, as they are unlikely to separate cleanly. Contact a conservator to see if separation is possible.
Oversize decals	Store flat in an alkaline folder. Do not bend or crease.

have received less attention from collections professionals, although the value of ephemera is increasingly appreciated. Unused decals, as well as decals adhered to various types of objects, are found in many museums, libraries, and archives. Learning more about how decals were made—from their adhesive and paper to printing techniques and manufacturing styles—may be useful to museum, library, and archives professionals hoping to better understand, describe, handle, and care for these items. While they are generally quite stable, a few considerations may improve their longevity.

This section provides general care, handling, and preservation guidelines for decals of all types, which should be preserved intact on their backing papers when possible in order to maintain product manufacturing history and provide stability for the fragile paint layers that make up the decal structure. Preservation of decals may be greatly improved by following archive and museum standards for relative humidity, temperature, and light exposure in storage and exhibition spaces; providing proper housing; and implementing an integrated pest management program. See Table 2 for a summary of preservation and storage recommendations for decals.

Environment and Storage

One factor to consider in decalomania preservation is their sensitivity to changes in ambient relative humidity. Decal advertisements tout their permanency, stating that decals might last many years if “placed in a cool dry place” (Palm Brothers [1930–1940]: 2). In general, as the decal pigments become brittle, heat and moisture speed deterioration (Weiss 1935: 8). Unused decals still on their paper backings might curl or dry out in the printing shop, so were not often kept on hand for long

Figure 3. Decal stuck to a paper document, damage that is difficult or impossible to reverse. Forrest Allen Papers, 66/11, Kenneth Spencer Research Library, University of Kansas. Photograph by author.



periods of time (Weiss 1935: 9). In overly wet conditions, on the other hand, unapplied decals could stick together. Often decals were separated by slip sheets to prevent this (Biegeleisen and Busenbark 1941: 154). In general, decals will not stick if the relative humidity and temperature are maintained at accepted museum storage levels (circa 70 degrees Fahrenheit and 50 percent relative humidity). However, if a decal should stick to a nearby item, such as a paper document as seen in Figure 3, it will be difficult or impossible to remove without destroying the decal image and possibly also the substrate.

To avoid this scenario and for added caution in storage, decals can be separated in folders by silicone-release paper purchased from an archival supplier. Decals that have already stuck to one another should not be pulled apart, as they will not release cleanly from one another. If their separation is important, contact a conservator to see if anything can be done.

The paper on which decals were printed was not meant to be attached to the image long-term. In collections in which the unused decals are preserved on paper backings, the collections professional should be aware of the likely brittle and acidic nature of the backing papers. Decals may be torn or pigment lost if the paper has been folded over time or if items are improperly stored or handled. When possible, consider placing decals in individual alkaline folders or envelopes, inside a folded piece of silicone release paper.

Decals adhered to objects of various types (wood, metal, paper) are usually quite stable if the object is stored in a stable environment. However, if a decal looks unusual—if it is cracking, delaminating, or otherwise detaching, or if small bits of pigment appear in the bottom of an object's container—consider photographing it in its current condition and isolating the object from other collection materials. If changes are noted during periodic collection inspections, an objects or paper conservator could advise on treatment options.

Because both the decal paper and stickative include components attractive to many pests, a regular integrated pest management program is essential. In addition, although oil-based pigments used in most decals are generally quite light stable, it is a good collection management practice to limit light exposure when possible.

Handling and Care

Cracking, delaminating, and abrasion—all more common as a decal ages—were observed early on by manufacturers; these types of deterioration are the most common noted by the author in her inspection of historic decals. As a 1950s decal manufacturer noted, the choice of correct paint materials helped determine decal quality. If different coating layers had different rates of expansion and contraction, the decal would crack as temperature and relative humidity fluctuated (Burdick 1953c: 23). Furthermore, when a varnish-applied decal peeled or cracked, it could be the result of: 1) an overly heavy coat of varnish, 2) not allowing the varnish to become sufficiently tacky before applying the decal to the surface, or 3) not washing off all superfluous cement after the decal was applied (Palm Brothers Decalomania Company n.d., 1). A possible contributing factor to the brittle nature of screenprinted decals is the type of lacquer used in their manufacture. Nitrocellulose-based lacquer, used in decals from the 1930s, caused them to crack or chip (Pfouts 2002: 6). In the author's review of historic decals, some colors appear to be particularly prone to abrasion and cracking, in particular early metallic effects using bronze and silver. Deteriorated decals should be handled delicately and stored horizontally to limit further separation. Badly deteriorated decals should be separated from other decals and access should be restricted. Consider substituting a color photocopy or digital scan for use in exhibits or for research when a surrogate will suffice.

Conclusion

Decals were mainly printed by lithography and screenprinting from the mid-1800s to the mid-1900s. They were printed with an internal adhesive to allow for separation of a paint film from a paper backing sheet. Early on, decalomania were applied through the use of varnish or varnish cement; water application became more common later. Although the use of decals was eventually superseded by less cumbersome approaches, their invention opened up a host of decorating, advertising, and trademarking possibilities.

Decalomania have not received much attention in the museum, archive, and conservation literature, and few substantive research collections of decalomania exist in North America.² To increase awareness and better understanding of decals, this paper categorizes types of decals, examines their vulnerabilities, and specifies best practices for preservation of these collection materials. Storing decals in a stable environment; separating them from one another; inspecting for signs of delamination, cracking, or abrasion; and consulting a conservator if they stick together or separate from a substrate will help ensure their preservation. More research into the chemical and physical qualities of the component materials of decals is needed in order to better understand their weaknesses and to develop more refined preven-

tive and remedial preservation solutions, especially regarding long-term interactions between decals and various surfaces to which they have been adhered. As more collections professionals record and share information about decals, we will gain a wider understanding of these important yet often overlooked bits of material culture.

Acknowledgments

This investigation was supported by the University of Kansas General Research Fund allocation #2301689. Many thanks to staff at the Cincinnati Room of the Public Library of Cincinnati and Hamilton County and the Cincinnati Museum Center for use of their extensive decalomania resources

Notes

1. For a discussion of bumper stickers, see “Soapbox for the Automobile: Bumper Sticker History, Identification, and Preservation,” by the author, found in Volume 7, Number 1 of this journal. More detail about printing and applying ceramic decals may be found in Albert Kosloff’s *Ceramic Screen Printing*. (Cincinnati: Signs of the Times Publishing, 1977). Regina Lee Blaszczyk, in her book *Imagining Consumers: Design and Innovation from Wedgwood to Corning* (Johns Hopkins Press, 2000), discusses the social impact of the rise of ceramic decals.
2. The author is aware of only three substantive collections of decalomania and associated business files in North America. The Palm Brothers Decalomania Company Records are housed at the Cincinnati Museum Center in Cincinnati, Ohio, USA. The Commercial Decal, Inc. Collection resides at the National Museum of American History Archives Center, Washington, D.C., USA. In Canada, the Industrial Transfers Collection may be found at the Canada Science and Technology Museum in Ottawa, Ontario.

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