

A RESTORER'S GUIDE FOR IDENTIFICATION, RESEARCH AND REPLICATION OF AUTOMOBILE TOP MATERIALS

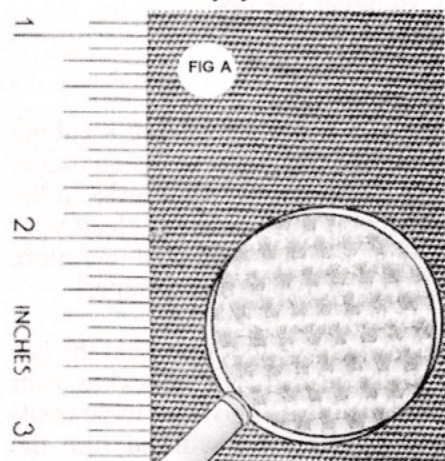
Part II

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TOP FABRIC DETAILS OF COMPONENTS

CLOTH WEAVE CONSTRUCTION

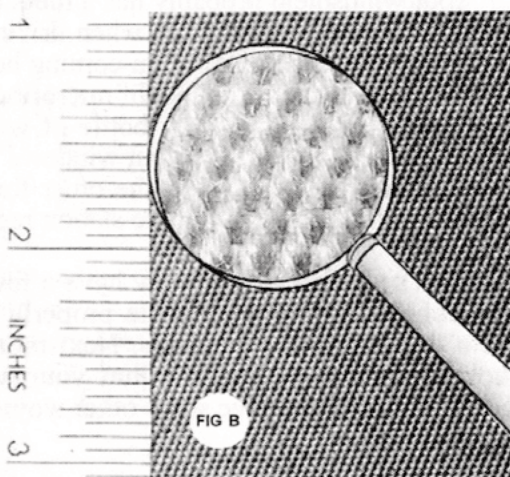
Because the various top materials use different kinds of cloth, a few of the more common weave types are worth defining. Duck, or Square Weave, dominated as exterior fabric on cloth top materials for many years. The weave is a simple



alternation of yarns going over one intersecting yarn and under the next (Figure A). T w i l l Weave, a favorite as an exterior fabric since the 1980s,

has a weave that gives a strong diagonal pattern (Figure B). The diagonal lines normally run 'up'

toward the right edge of the cloth. The twill weave limits top material stretch, which is advantageous for dimensional stability



at high driving speed. Drill Weave cloth, usually

used for the interior side of top material, has a diagonal pattern that is usually finer than a twill weave, the diagonals usually running 'up' toward the left edge of the fabric. For many decades the premier grades of European cloth topping used a Dobby Weave interior cloth (Figure C), this being the criss-cross pattern well known on the lining of Mercedes-Benz top material.



CLOTH FIBER COMPOSITION

Throughout the first century of automobile production, most top material cloth consisted of cotton fibers on both the exterior and interior sides. Prior to 1917, the auto industry used substantial quantities of mohair exterior fabric on the cloth toppings. Unlike the pile-surface mohair upholstery fabrics popular in the 1920s and 1930s, the mohair cloth used for top material was a square weave, flat woven textile, usually with cotton yarns in the roll length and mohair (woven from Angora goat hair fiber) across the roll width. Weavers could do this in a way to maximize the surface presence of the mohair yarns. Despite a premium price, the mohair was readily cleanable and kept its lustrous appearance longer than did other fibers. Wool, generally blended with cotton, saw at least a fair amount of use prior to the mid-teens, sometimes being passed off by less scrupulous sellers as premium-grade mohair. From the mid-teens through the late 1930s, few automobile top materials utilized anything other than cotton fabrics. A little mohair was used for specialized premium materials in North America. The United Kingdom's auto industry apparently used mohair more extensively, into the 1950s. Rayon and other synthetic fibers became accepted for interior automotive trim, but could not withstand the much harsher exterior applications until the fiber recipes were improved in the very late 1930s.

In the late 1940s, coated fabric producers began to offer top materials incorporating synthetic-fiber cloth, either as a blend with cotton or totally of synthetic fiber. As applied to production top materials, blends of Rayon and Cotton achieved fairly wide use for exterior surfaces of three-ply cloth toppings from the late forties through the mid-fifties. Car stylists liked the Rayon because its solu-

tion-dyed fibers had colorfastness superior to that of dyed cotton fiber. However, the Rayon was susceptible to heat shrinkage and degradation from acid rain, particularly in industrialized regions. Orlon®, a DuPont acrylic fiber, was used for cloth topping face fabric from the early 1950s through 1957 and had better weatherability. In the more recent generations of top materials, acrylic has gained dominance for exterior fabrics. Interior fabrics of top materials have been cottons, polyester and cotton blends and even all-polyester in limited instances. Despite a persistent public misconception, nylon has never been used in any production automobile top material, at least in North America.

CLOTH COLORATION

Textile coloration varied in step with style trends and technology. The performance demands of automotive textiles, at times, forced advances in the production and dyeing of cloth. With the harsh exposure to ultraviolet light and to general weathering, the demands for colorfastness usually challenged the textile makers. Black, tans and earth tone colors traditionally offered the best color stability for dyed natural fibers. Brightness of the colors improved over time. By today's standards, exterior fabric colors from before 1940 look dull and drab, but were very acceptable in their day. Keep in mind, too, that automotive soft trim colors tend to be muted and are meant to harmonize with many other colors, with exceptions happening only in certain times when style trends dictated vibrant colors, such as in the late 1920s and in the 1950s.

Usually a uniform, monochromatic cloth was dyed after weaving, or 'piece-dyed' according to industry terminology. Color variations could be imparted in a cloth by weaving together different colored yarns, these being referred to as 'yarn-dyed fabrics.' Commonly these involved two or three different yarn colors, but a few exotic offerings in the twenties and thirties consisted of four different colors. Blending of fiber colors in yarn production was (and still is) another technique for achieving a multi-colored effect. Of course this kind of cloth would be referred to as a fiber-blend.

When synthetic fibers came into strong use around 1950, colorfastness was improved by the use of so-called 'solution dyed' fibers. These were

produced from a plastic melt stock in which the color was integral, yielding a fiber with color throughout. Dyed fibers receive the color pigmentation only at or near their surfaces. Solution dyed fiber is standard in the exterior acrylic cloth on all modern cloth top material.

COATING COMPOUNDS

Coating substances also evolved greatly over the first century of automobile production, but more so for surface coated materials than for the three-ply cloth type. Makers of that three-ply cloth material used a middle layer of natural or synthetic rubber. Synthetic rubber became prevalent right after the 1940s. For the surface-coated top materials, early in the twentieth century buyers could choose between natural rubber and pyroxylin. The latter was a cellulose nitrate material used for many kinds of coated fabrics, including some top materials, upholstery and trim fabrics. Pyroxylin was typically used as a surface coating, particularly where a color other than black was wanted. Higher-end, black surface-coated materials contained an outer surface coating of rubber with a clear top coating for weatherability and gloss. In the 1950s synthetic rubber (DuPont Hypalon®) and vinyl replaced the earlier choices. As a surface coating, vinyl achieved particular favor because it provided great functionality, a wide variety of color choices and relatively low cost compared with other compounds. Another crucial factor in favor of vinyl coatings in the 1950s was the ability to electronically weld seams in tops. This was not feasible with Hypalon. Once OEM and aftermarket top makers got the hang of this technique, it brought a big improvement in the consistency of seam integrity.

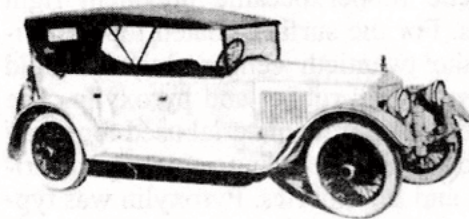
GENERAL TOP MATERIAL TRENDS IN AUTOMOTIVE HISTORY

PRIOR TO 1905 auto tops were made from many kinds of materials: leather; uncoated canvas; three-ply cloth and rubber surface-coated materials. Just as car body designs began to evolve from horse-drawn carriage designs, so too were tops evolving toward more extendible mechanisms. Canvas top material exteriors used cotton and some wool cloth(s).

1905 TO 1915 saw extensive use of pyroxylin surface-coated material for lower priced tops. These

were often referred to as 'automobile leather' and 'imitation leather.' Pantasote gained wide acceptance as a premium surface-coated topping. It was a four-ply variety with modified pyroxylin for the surface coating or facing. Mohair, introduced by 1907, became widely accepted as a premium version of three-ply cloth top material because of its superior cleanability.

1916 TO 1925 was a period dominated by the use of surface-coated materials, both in two and four ply constructions, for lower priced and premium tops, respectively. Technology advances in rubber coating and a textile dyestuff shortage during World



War I drove this change in usage away from cloth toppings. Many producers began to

compete with Pantasote in the production of four ply surface-coated materials. In this period, black tops (especially the surface-coated ones) were more ubiquitous than Model T Fords!

1926 TO 1942 brought a re-emergence of three-ply cloth top materials. In addition to these rubber-combined varieties, uncoated Burbank canvas from England was used for top material on many higher priced, open and convertible cars until the mid 1930s. Advances in textile dyes enabled the use of more varied colors. Yarn-dyed cloth was popular through the mid-thirties, then giving way to solid colors. Car body styling governed the kinds of top material used. Surface-coated fabrics were used for lower priced soft tops and for covering the center deck of closed body tops. The latter application vanished with the advent of all-steel tops in the mid-1930s. For traditional black top-decking, a rubber-faced four-ply fabric was specified by many car makers. If the top deck was to be painted (matching the car body), pyroxylin was used. Ford, and perhaps a few other makers, offered deck material featuring a print pattern on pyroxylin.

1946 TO 1955 convertible bodied cars generally used three-ply cloth top materials. The premium exterior fabrics now contained synthetic fibers completely, or were blended with cotton. Popular

choices were cotton/rayon blends and Orlon® (a DuPont acrylic). Vinyl tops became available through the replacement top market about 1951, with Original Equipment usage growing by the mid-fifties. Some hardtop cars of the early fifties received an Original Equipment roof cover for styling enhancement. Such materials were variants of convertible top materials.

1956 TO 1976 North American factory convertible production used vinyl surface-coated materials exclusively. Replacement tops were offered in two- and four-ply vinyls. Colors of both the vinyl facing and cotton lining fabric varied through the years, but the vinyl was usually embossed in the 'Standard' (a.k.a. 'diamond' or 'pinpoint') grain. As with North American practice, European car makers apparently switched from cloth to vinyl convertible topping in the fifties (the author welcomes more information about this). Much of the European vinyl topping seems to have been embossed with the so-called 'Colonial', 'Crush' or 'Monaco' grains. From the mid-1960s into the mid-1980s, vinyl landau tops were popular on many North American hardtop cars. The materials used were surface coated materials on woven fabrics initially, later on nonwoven 'synthetic felt' to impart a padded effect. Such roof covering materials used different embossing grains than did convertible top materials.

SINCE 1977 convertibles enjoyed a resurgence inspired first by the Mercedes convertibles, then later by Mazda's Miata in the roadster category. Vinyl top materials, favored by North American and Japanese makers, gave partial way to the new generation of three-ply cloth top materials having a solution-dyed acrylic outer fabric. As convertible models proliferated in the 1990s, the range of cloth top materials increased, too. Newest versions offer physical and acoustical performance far superior to older materials. Despite the popularity of retractable hard top convertibles in the first decade of the twenty-first century, car makers recognize the very solid technical benefits of traditional soft top technology and intend to keep them in their product lines.

S.K.