

Cellophane: The Silent Salesman

While dining at a restaurant in France in the early 1900s, Jacques Edwin Brandenberger watched as a patron at a nearby table accidentally spilled a bottle of red wine on the linen tablecloth. The waiter had to remove the stained cloth, wipe up the mess, and replace it before dinner could proceed. Brandenberger, a Swiss chemist working for the French textile manufacturer Blanchisserie et Teinturerie de Thaon, began thinking about ways of treating cloth to make it spill-proof. Though he ultimately failed to invent a better tablecloth, his research led to the invention of cellophane. This shiny, transparent wrapping became a cultural rage in the 1920s, and continues to be a popular packaging material today.

Brandenberger quickly settled on viscose as his spill-proofing agent, and spent about five years applying various viscose formulations to cloth samples. Viscose is a viscous yellow liquid that is made by treating cellulose with aqueous caustic soda followed by carbon disulfide. Further treatment with acid converts viscose into a solid. Despite all his efforts, Brandenberger found that viscose made cloth stiff and brittle, and it tended to peel off in a transparent film. He soon realized that this thin, clear film could be a product in itself. He named it "cellophane," borrowing from the root word for cellulose and "diaphane," the French word for "transparent."

By 1912 Brandenberger had developed an elaborate process for making cellophane. The key was the first step: forming a uniformly thin film by extruding liquid viscose through the lips of a hopper into a bath of dilute sulfuric acid and sodium sulfate, where the film became solid. The lips of the hopper had to be machined to a fine tolerance to achieve film uniformity. The remaining steps included 16 more baths for cleaning, desulfurizing, bleaching, and adding glycerine, which eliminated brittleness. In 1913 Brandenberger established his own company called La Cellophane, SA.

His initial attempts to market cellophane as a substitute for flammable cellulose nitrate for the motion picture film industry failed because it warped under the heat of the projection bulb. He succeeded in selling his clear film as a luxury packaging material to Coty, the exclusive perfume manufacturer in Paris, and to a toothpaste manufacturer. But the expense of the product and the intervention of World War I prevented it from reaching a mass market.

It took the intervention of Du Pont, which was interested in expanding its image from that of an explosive powder company, to realize the sales potential of cellophane. In the early 1920s, Du Pont began investigating cellophane as a possible companion product to its existing rayon line, which was also made using viscose. In 1923, La Cellophane and Du Pont reached an agreement and formed the Du Pont Cellophane Company. They built a manufacturing facility at the Du Pont rayon works in Buffalo, New York, so it could be easily converted to a rayon factory if the new product failed. The plant was opened for operation on April 1, 1924, with Brandenberger present.

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The December 1923 edition of *Du Pont Magazine* touted the selling points of the new product: "Thin as tissue, but hard to tear; like paper but not paper; transparent as glass but not glass—a non-fragile waterproof product with a singularly wide range of uses—that's cellophane."

But while cellophane could hold liquid water without leaking, it proved to be porous to water vapor, much to the chagrin of Du Pont officials. The main thrust of their sales effort was in packaging consumable products for freshness, but it soon became apparent that cakes, crackers, and cigars wrapped in cellophane dried out. Without a moisture-proof product Du Pont's investment was tenuous; the chemical director at the time estimated that it would take years to reformulate cellophane.

That was before they hired William Hale Charch to attack the problem. Charch, a 27-year-old chemist who had been laid off from General Motors, took less than a year to rescue the product. Starting in 1925, he first tried the obvious moisture-proofing agents—waxes, rubber, latex, gums—without success. Then, following up on some French research, he began experimenting with nitrocellulose coatings. Mixtures of nitrocellulose and wax looked promising, but they were stiff. Some 2,000 failed attempts later, Charch had devel-

oped a four-part moisture-proof coating system for cellophane. It consisted of nitrocellulose, wax, a plasticizer, and a blending agent, and increased the weight of the film by just 10 percent. Following another year and a half of development work to incorporate these new ingredients into the production process, Du Pont finally had its moisture-proof cellophane in 1927.

The new product soon revolutionized the purchasing practices of consumers. It became known as "the silent salesman." As Stephen Fenichell noted in his book *Plastic: The Making of a Synthetic Century*, the shiny transparent film had "eye appeal." "A national grocery store chain reported a 2,100 percent increase in doughnut sales in two weeks after wrapping its doughnuts in cellophane," Fenichell wrote.

Cellophane became a cultural rage, making its way into Cole Porter's lyric's (his song "You're the Top" included the line "You're cellophane!"), and into a 1931 *New Yorker* cartoon which showed a gentleman seeing his newborn son for the first time and exclaiming "My word!—No Cellophane." A ball gown was made of layered and bunched cellophane, indulging the whim while maintaining modesty.

But besides the consumer and cultural angles, cellophane found other uses. Letters typed on cellophane in contact with carbon paper were sandwiched between glass plates and projected during presentations using an arc lamp. In a medical application, a porous form of cellophane tubing began to be used in dialysis machines to remove toxins from blood in 1947.

Brandenberger was awarded the Cresson Medal from the Franklin Institute in 1937 for developing the process of manufacturing cellophane; he died in 1954 in Zurich. Charch had a long career with Du Pont, helping to develop such products as Teflon, Orlon, Dacron, and Lycra before his death in 1958.

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FOR FURTHER READING: Stephen Fenichell, *Plastic: The Making of a Synthetic Century* (HarperCollins Publishers, Inc., New York, 1996); David A. Hounshell and John Kenly Smit, Jr., *Science and Corporate Strategy: Du Pont R&D, 1902–1980* (Cambridge University Press, Cambridge, UK, 1988); and J. Harry Dubois, *Plastics History U.S.A* (Cahners Books, Boston, Massachusetts, 1972).