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FASTENING/JOINING

With products in industries ranging from automotive to appliance moving towards a streamlined and sophisticated look, fastening systems, whether mechanical or adhesive, are being integrated into an assembly earlier in the development process.

Beveled-edge tape makes auto painting neater

The popular two-tone designs on trucks and automobiles and thick paint coatings on aircraft typically use a paint masking tape that's applied to create the break line between sprayed colors. The paint and coatings industry has made great strides in modifying the composition of their products to be more environmentally friendly. This effort has occurred simultaneously with industry's focus on improving the durability of their products.

Compositional changes in paint and coatings require that a thicker final coating now needs to be applied for increased levels of durability. The method by which thicker coatings are achieved highlights some deficiencies in existing conventional thin-film paint masking products, when a two-tone color break line on automobiles is specified.

In automotive assembly, the vehicle will undergo at least four coats of paint. The paint is then subjected to a series of low

bakes in an oven that averages 170°F with the final cure up to 350°F.

In aerospace production, as many as 20 to 30 individual coats of paint are sprayed onto the metal body frames. The rigors and demands for military aircraft means that the Stealth coatings range from 0.040 to 0.050 in. thick. It can take as much as 8 to 12 hr to complete the film build with 15 to 30 min between coats. This thicker coat presents a challenge to conventional paint mask methods.

Conventional masking products typically consist of an adhesive-coated thin-paper or film (polypropylene or polyethylene) tape to which masking drape material is attached. The slit edge of the tape creates the final paint break line. The problem is that thin masking tapes become buried within the multiple paint coatings; the final paint thickness becomes greater than the thickness of the thin masking tapes. When the masking is removed, the paint coating is torn or stretched as the tape is peeled away, leaving an unacceptable rough, ragged edge which must later be reworked at great expense. Even if a thicker masking tape facestock is used the buildup of paint at the break line will ramp up and cover the tape leaving a ridge that cannot be pin stripped over.

Jay Cantwell, aerospace engineer, recognized this impending problem and devised a solution: Shadow Mask Beveled Edge Masking. The product is marketed by Waterjet Tech Inc., St. Louis, that specializes in the water-cutting technology. Cantwell explains, "Shadow Mask is a dimensional and conformable tape that is designed for use as a thick, wet-film masking material which allows a smooth demarcation or break line of a spray-applied coating without going through additional handwork."



Avery Dennison FT 8306 is a double-coated film, with a permanent/removable differential adhesive tape that bonds dissimilar substrates. It forms a permanent bond on one side but a removable bond on the other.

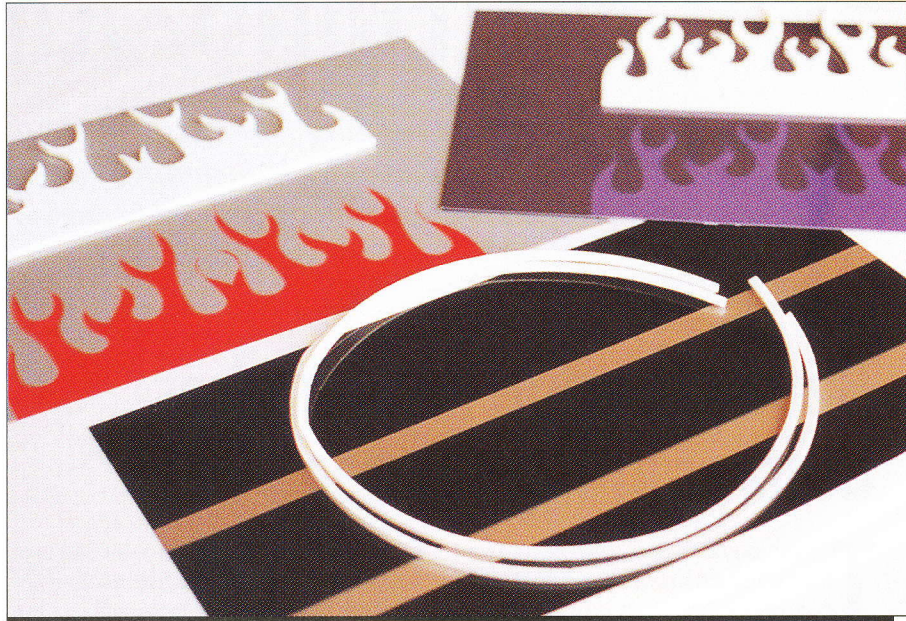
and conformable tape that is designed for use as a thick, wet-film masking material which allows a smooth demarcation or break line of a spray-applied coating without going through additional handwork.”

Shadow Mask is a self-adhesive, beveled-edge foam masking tape that features a virgin polyethylene foam body which is slit at specific angles on one edge. The foam is supplied with a unique adhesive bonding system on one side. The adhesive side is repositionable and removable from painted surfaces; it is protected by a 60# super tough kraft release liner. The repositionable adhesive allows for the precise location of the painting mask. Should a positioning error occur, the tape can be peeled off without leaving adhesive residue behind and later affixed in the correct position.

To find the right adhesive tape to incorporate into his product, Cantwell tapped the resources of Avery Dennison Specialty Tape Div. in Painesville, Ohio. The Specialty Tape Div. offered a differential adhesive tape system which bonds securely to the foam carrier, yet is cleanly removable from the painted surfaces, even after exposure to oven bakes as high as 350°F.

After a series of tests, FT 8306 a double-coated film emerged as the tape that provides the necessary permanent bond to the foam and clean removal upon completion of the desired coatings.

With the right fastening system determined, the question became how to enhance this masking system further. The answer lay in tailoring the masking tape facestock thickness and edge angle to optimize application. The angled edge of the masking product creates an overhang toward the de-



A beveled edge on a paint masking-tape helps create a smooth and neat break line between sprayed colors.

sired break line creating a shadow area under the masking product. The multiple paint finishes build and taper off under the bevel creating a precise edge break thinner than the final paint coating. A precise combination of foam thickness and angle overhang in relationship to the final paint coating eliminates the possibility of the masking product becoming embedded within the paint or coating. At the time of demask, the tape product is peeled away leaving a perfect break line that does not require rework.

The proprietary method of defining the height and angle of the masking product to achieve dimensional coating location and a smooth break line is patent pending and key

to the product. The precise angling comes from waterjet cutting technology. Water in streams as fine as human hair is forced through 0.003-in.-diameter nozzles at three times the speed of sound.

The product is manufactured from highly conformable and noncontaminating materials and allows the generation of super-smooth and slick break lines on most complex three-dimensional surfaces. Use of the Shadow Mask system eliminates the need for costly manual rework saving \$100,000 to \$350,000 by the automotive industry. The product is available in different thicknesses, widths, lengths, and with a single or double-angled edge.