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NEW OPTIONS IN SOFT TRIM SURFACES

The mid-1999 decision by GM to seek alternatives to PVC in auto interiors continues to stimulate a wave of material substitution research by resin and roll goods suppliers. The major driving forces for the substitution directive were improved low temperature performance (for invisible airbag deployment), improved UV resistance, easier recyclability (if mono-materials sandwich constructions could be achieved) and the potential for reduced fogging. The harmonization of the materials selection palette between European and North American production is also a driving force.

Instrument panel skins- Thus far, the major interior substitutions have been in instrument panel skins where slush molded TPU, spray polyurethane (from Recticel) and thermoformed TPO have gained share at the expense of thermoformed PVC and slush molded PVC. Thermoformed skins generally have lost market share to such non-thermoformed alternatives as sprayed PU and slush molded TPU.

While there have been some substitutions in the thermoformed IP skin portion of the fleet, thermoformed TPO skins have thus far not gained the strong position expected in IPs. This is due to their higher cost (vs PVC) and the difficulty of retaining grain definition during thermoforming over sharply curved surfaces when positive forming processes are used. This disadvantage for thermoformed TPO appears to be resolved through the use of negative thermoforming (introduced by Visteon and others in the North American and European fleets).

Coated fabrics- PVC coated fabrics are used as the surfacing for seat backs and sides as well as some minor applications such as security shades. Most roll goods suppliers in the US and Europe are actively seeking substitutes for the plasticized-PVC used in coated fabrics. The PVC substitution candidates that have emerged thus far are polyurethane coated fabrics (from Kyowa Leather and others) and TPO. The polyurethane coated fabrics are considerably more expensive than PVC coatings and are targeted at the rapid growth leather trim market.

TPO coated fabrics at first encountered difficulties because they were:

- Too stiff (poor drape properties)
- Not weldable by RF techniques (important in reducing costs associated with cut and sew operations)
- Too expensive compared to PVC.

The stiffness/drape problem is being addressed via the use of components in the surface coating that have lower stiffness than the PP/ rubber combinations used in the original TPO formulations. Dow's (Index), ethylene styrene interpolymers and plastomers from Dow, Exxon and other suppliers appear to have the necessary drape, sewability and low temperature properties to be technically competitive in automotive soft trim coated fabric applications. Weldability using RF techniques still remains a key performance barrier but appears to have

been resolved recently using formulations and additives adopted from the medical sheet sector which faces an even more pressing need to join sheet without sewing.

Enhanced recyclability (without adding cost) remains a driving force for all auto interior modules and is particularly important for coated fabrics used in soft trim due to the multi-layer, multi-material sandwich construction of the fabric which reduces recyclability:

- Surface (usually PVC)
- Textile support (polyester or nylon)
- Foam backing (usually skived PU foam).

As in other constructions, the ability to select from a single materials family, enhances recyclability. Polyolefin suppliers hope to make this an all-polyolefin coated fabric construction using:

- TPO surface coatings
- Polyolefin nonwoven support
- Sheet polyolefin foam backing.

Recent technologies for producing polyolefin sheet foam show promise for substituting for skived PU foam but the recyclability of the all polyolefin construction remains to be demonstrated.

Molded-in decoration and floor modules- The deep pile carpets, found as the surface for most acoustic/floor modules, are not suited to the rough treatment associated with an active outdoors lifestyle. TPO sheet is the current leading non-carpet alternative. It offers an alternative to the black rubber or colored PVC mats used as protective covers over carpeting.

An all-polyolefin construction is possible:

- TPO surface skin
- Low density polyolefin foam acoustic layer (competes with PU acoustic foams pioneered by Huntsman and Collins and Aikman)
- High density polyolefin acoustic damping layer(competes with highly filled EVA damping layers).

In addition to the utility function, the substitution with a soft plastic sheet for carpeting offers the option for molded-in-decoration (MID). Not only are colors possible (not feasible with rubber mats) but by layering the surface sheet, it is possible to incorporate decorative patterns which match or complement the patterns used for the seat, door trim or headliner fabric. Basell and several European and North American interior skins and acoustic/flooring producers are offering such alternatives. The initial penetration is in European light commercial vehicles and will likely be found in North American SUVs

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