

Contributing to Fuel Efficiency and Energy Saving with Thin Film Development Enabling Designs with High Design Properties

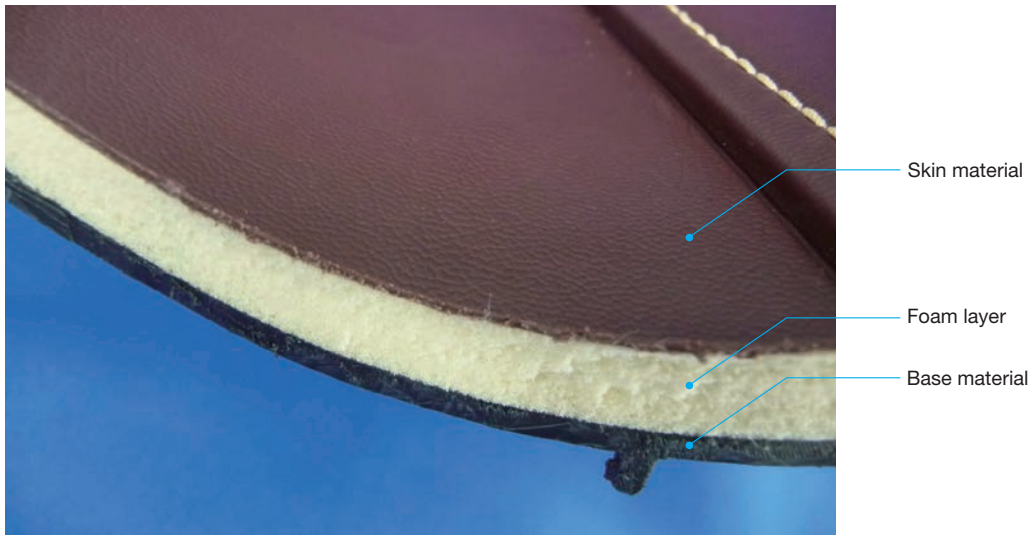
Urethane bead skin material for automobile interiors 'THERPUS LF'



Instrument panel of an automobile (Photograph provided by Nikkei Automotive Technology)

It is safe to say that the part of the automobile interior that draws the eye the most is the instrument panel, where instruments such as the speedometer are aligned. Instrument panels are roughly classified into hard instrument panels that feel hard to the touch, which are made by injection molding of hard resins such as polypropylene (PP), and soft instrument

panels that have three-layer structures consisting of the base material made of PP, etc., the foam layer with cushioning properties, and the skin layer to provide the comfortable feeling to the touch. The subject of this article is the material used as the skin material for automobile interiors, which is often used on soft instrument panels, etc.



Cross section of a soft instrument panel

Slush molding

The typical manufacturing methods for skin materials of soft instrument panels are vacuum forming and slush molding methods. The slush molding method is superior in both design properties and design freedom. The slush molding method is a molding method in which particle-shaped resin is poured into a heated die and melted to form a skin with a uniform thickness, as shown in the figure on Page 3. Conventionally, polyvinyl chloride (PVC), which has favorable scratch resistance, had been the mainstream material for slush molding. However, movements to stop using PVC increased for environmental considerations, and an examination to adopt thermoplastic polyolefins was undertaken. However, it did not gain popularity due to some issues involving formability and physical properties. Our 'THERPUS' Series, which comprises urethane beads for slush molding, was then released upon solving these issues with a combination of the urethane technologies Sanyo Chemical has accumulated for many years. The features of 'THERPUS' include [1] excellent formability, even in instrument panel dies with



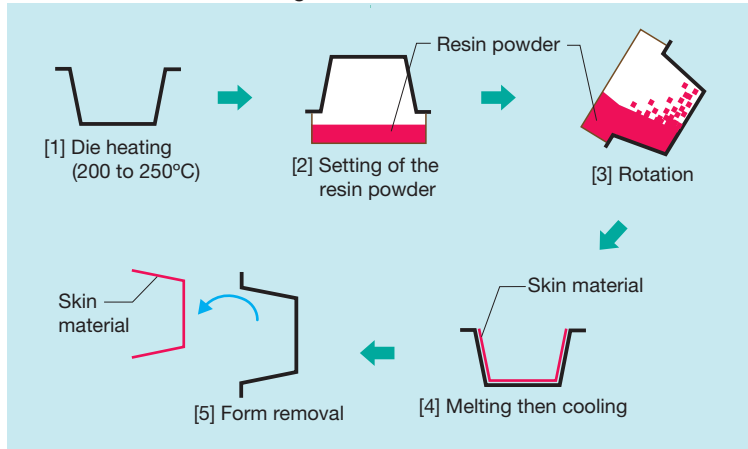
'THERPUS LF'

complex shapes, with its favorable powder fluidity and meltability; [2] soft feeling to the touch with high elasticity, and [3] low daily variations with excellent heat resistance and light resistance compared to PVC. The number of vehicle models adopting this series increased rapidly after it was incorporated into the instrument panel, door trim, etc., of "Celsior" by Toyota Motor in 2000. However, some manufacturers began to return to PVC for cost reasons after the worsening of the global economy triggered by the failure of Lehman Brothers in 2008. We developed and released 'THERPUS LF,' as a new product equipped with innovative features and cost effectiveness.

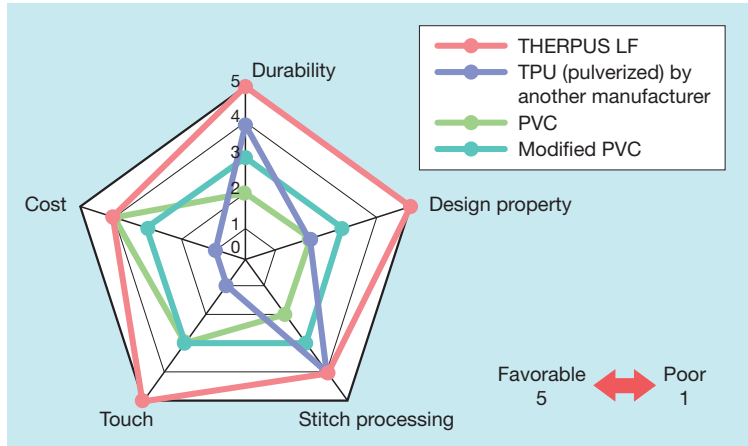
‘THERPUS LF’

‘THERPUS LF’ is equipped with the features of the conventional ‘THERPUS’ Series. In addition, its greatest feature is the dramatically improved resin strength to twice that of the conventional product by creative adjustment of the molecular structure. Since this cuts the skin thickness in half and the amount of material used, it is lower in cost than the conventional product. It also achieves weight reduction in overall skin materials on the instrument panel, door trim, console box, etc., which contributes to fuel efficiency, as well as reduction in molding cost. The molding cost is lower because ‘THERPUS LF’ can be formed at around 200°C, while PVC is formed at 230 to 250°C. The skin material is cooled to a temperature where it can be peeled off by hand after molding, and the processes of reheating, molding, and cooling are repeated. More energy can be saved as the temperature difference is smaller and the cycle time is shorter in this cycle. Furthermore, the lifetime of the die can be extended as the thermal history is shorter. It therefore results in lower molding cost. At present, invisible processing, in which the tear line to allow the air bag to deploy on the passenger side is formed only on the back side of the skin material, has become mainstream for instrument panels. Since the part with the tear line is connected only by the thin skin in invisible processing, high durability, as well as strength not to tear at the tear line even after a long period of use, are required. Meanwhile, the material often hardens or forms warping or cracks on PVC instrument panels, as they use

■ Processes of slush molding method



■ Balance in characteristics of ‘THERPUS LF’



a large amount of plasticizer to create the soft feeling, and the plasticizer evaporates or seeps into the cushion layer over time. In terms of design, false stitch processing that looks like real leather stitching, as well as actual stitch processing, can be formed with beautiful finish. The superiority of ‘THERPUS’ with its high strength and soft feeling is clear. In the future, Sanyo Chemical will continue to devote our efforts to developing products that meet the needs of the users.