MULTI-PIECE VEHICLE INTERIOR TRIM PANEL

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ABSTRACT

The present invention provides a method for making a multi-piece vehicle interior trim panel. In at least one embodiment, the method comprises providing a major panel having a major substrate, a sprayed urethane major skin layer disposed over at least a portion of the major substrate, and a foam layer between the major substrate and the major skin layer. The method further includes forming a minor panel by spraying polyurethane material proximate a relatively small mold surface to form a sprayed urethane minor skin layer, spraying expandable polyurethane material onto the minor skin layer to form a first resilient layer, placing a mounting substrate onto the first resilient layer, and spraying expandable polyurethane material onto the first resilient layer and the mounting substrate to form a second resilient layer. The method further comprises removing the minor panel from the mold and securing the minor panel to the major panel portion.
Figure 2
MULTI-PIECE VEHICLE INTERIOR TRIM PANEL

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention relates to multi-piece vehicle interior trim panels.

[0003] 2. Background Art

[0004] The use of interior trim panels in automotive applications is relatively well known. One relatively typical vehicle interior trim panel comprises a relatively rigid substrate having a flexible thin plastic skin disposed over at least an interior facing portion of a surface of the substrate. Spraying material, such as a polyurethane composition, onto a mold provides a skin having several advantages. When a softer touch for the panel is desired, foam has been provided between the substrate and the skin. The distance, or space, between the skin and the substrate is known as the package space (X).

[0005] A common method of providing the foam is to employ the use of a foam in place process. Various areas of a trim panel of a vehicle, such as the border area below and/or around the center stack of an instrument panel, may have a relatively short height (H) and/or a relatively small package space (X). For portions of trim panels having a height (H) of less than 12 mm and/or a package space (X) of less than 5 mm, the typical foam in place process may have difficulty being employed. This is because foam flow through these areas having a relatively small height (H) and/or package space (X) can be hindered and unreliable.

[0006] As such, it can be difficult to provide a soft touch sprayed skin panel due to the unreliability and difficulties with the foam in place process for panels having portions with a relatively small height (H) and/or a package space (X). A relatively common result is that, due to the poor foam coverage in these areas, the panel can have uneven softness zones. As part of overall craftsmanship, it is desirable to provide a soft touch sprayed skin panel having relatively even softness zones with consistent skin material to ensure consistent color, gloss and grain match.

SUMMARY OF THE INVENTION

[0007] The present invention provides a method for making a multi-piece vehicle interior trim panel.

[0008] In at least one embodiment, the method comprises providing a major panel having a major substrate: a sprayed urethane major skin layer disposed over at least a portion of the major substrate, and a layer of foam between the major substrate and the major skin layer. The major panel portion may have at least one mounting opening. In this embodiment, the method further includes providing a spray mold having a mold surface smaller than the outer surface of the major skin layer and spraying polyurethane material proximate the mold surface to form a sprayed urethane minor skin layer. In this embodiment, the method further includes spraying a first portion of expandable polyurethane material onto the minor skin layer to form a first resilient layer, placing a mounting substrate onto the first resilient layer, and spraying a second portion of expandable polyurethane material onto the first resilient layer and the mounting substrate to form a second resilient layer. In this embodiment, the method further comprises removing the minor panel portion from the mold and securing the minor panel portion to the major panel portion.

[0009] In at least another embodiment, the method comprises providing a major panel having a major substrate, a sprayed urethane major skin layer disposed over at least a portion of the major substrate, and a layer of foam between the major substrate and the major skin layer. In this embodiment, the major panel has a mounting portion having at least one mounting opening. In this embodiment, the method further includes forming a minor panel by providing a spray mold having a mold surface smaller than the outer surface of the major skin layer and spraying polyurethane material proximate the mold surface to form a sprayed urethane minor skin layer having a height (H), an exterior surface in this embodiment, the method further comprises an interior surface, spraying a first portion of expandable polyurethane material onto the minor skin layer to form a first resilient layer, and spraying a second portion of expandable polyurethane material onto the first resilient layer and the mounting substrate to form a second resilient layer. In this embodiment, the method further comprises removing the minor panel from the mold and securing the minor panel to the mounting portion of the major panel. In this embodiment, the minor panel has a package space (X) disposed between the interior surface of the minor skin layer and the mounting portion of the major substrate, with at least one of (i) the height (H) of the minor skin being less than 12 mm and (ii) the package space (X) being less than 5 mm.

[0010] In at least yet another embodiment, the method comprises providing a major panel having a major substrate and major skin layer disposed over at least a portion of the major substrate, with the major substrate having a mounting portion. In this embodiment, the method further comprises forming a minor panel by spraying polyurethane material proximate a mold surface to form a sprayed urethane minor skin layer having a height (H), placing a mounting substrate proximate the minor skin layer, and spraying expandable polyurethane material over the mounting substrate to form a resilient layer to secure the mounting substrate to the minor skin layer. In this embodiment, the method further comprises securing the minor panel to the mounting portion of the major panel, wherein a package space (X) is present between the minor skin layer and the mounting portion. In this embodiment, at least one of (i) the height (H) is less than 12 mm or (ii) the package space (X) is less than 5 mm.

[0011] While exemplary embodiments in accordance with the invention are illustrated and disclosed, such disclosure should not be construed to limit the claims. It is anticipated that various modifications and alternative designs may be made without departing from the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is perspective view of an instrument panel according to an embodiment of the invention for use in motor vehicle;

[0013] FIG. 2 is a cross sectional view of the panel taken along the line 2-2 of FIG.

[0014] FIG. 3 is a view similar to FIG. 2 showing components of the panel is an unassembled state;

[0015] FIG. 4 is a schematic view of a spray mold and a spray assembly for use in forming a panel component of the
panel of FIG. 1, wherein the spray assembly is shown applying material on the tool to form a skin layer;

[0016] FIG. 5 is a schematic view of the tool showing application of expandable material onto the skin layer to form a portion of a resilient layer;

[0017] FIG. 6 is a schematic view of the tool showing application of a mounting substrate onto the portion of resilient layer shown in FIG. 5;

[0018] FIG. 7 is a schematic view of the tool showing application of expandable material onto the first resilient layer to form another portion of the resilient layer; and

[0019] FIG. 8 is a perspective view of a component illustrated in FIG. 6.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0020] As required, detailed embodiments of the present invention are disclosed herein. However, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various alternative forms. The figures are not necessarily to scale, some features may be exaggerated or minimized to show details of particular components. Therefore specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for the claims and/or a representative basis for teaching one skilled in the art to variously employ the present invention. Moreover, except where otherwise expressly indicated, all numerical quantities in this description and in the claims indicating amounts of materials or conditions of reactions or use are to be understood as modified by the word “about” in describing the broader scope of this invention. Practice within the numerical limits stated is generally preferred. Also, unless expressly stated to the contrary, percent “parts of,” and ratio values are by weight and the description of a group or class of materials as suitable preferred for a given purpose in connection with the invention implies that mixtures of any two or more members of the group or class may be equally suitable or preferred.

[0021] FIGS. 1 and 2 show a multi-piece interior vehicle trim component, such as an instrument panel 10, according to the invention for use with a motor vehicle 12. In at least one embodiment, the instrument panel 10 has a major panel 14 and a minor panel 16 connected to the major panel.

[0022] In at least one embodiment, the minor panel 16 has a size constraint that makes employing a foam in place process to form a foam layer in the minor panel unreliable. Examples of such a constraint can be the minor panel 16 having at least one of a height (H) of less than 12 mm or a package space (X) having at least a portion of less than 5 mm. In at least one embodiment, the minor panel 16 has a height (H) of 1-10 mm, and in yet another embodiment of 5-7 mm. In at least one embodiment, the minor panel 16 has at least a portion having a package space (X) of 0.5-4 mm, and in yet other embodiments of 1-3 mm.

[0023] The minor panel 16 is shown in the Figures to have a rectangular shape. However, it should be understood that the minor panel 16 can have any suitable shape, such as a U-shape, a thin walled block-shape, an S-shape, a V-shape, etc. Furthermore, while the vehicle trim component is being illustrated as an instrument panel 10, it should be understood that the vehicle trim component could be other types of panels, such as doors, consoles and other vehicle interior trim panels.

[0024] Referring to FIG. 2, in at least one embodiment, the major panel 14 includes a rigid major substrate 20 having a first portion 22 and at least one connector portion 24 extending from the first portion. The connector portion 24 includes a mounting opening 26.

[0025] As best shown in the embodiment illustrated in FIG. 3, the major panel 24 has two connector or mounting portions, illustrated as tabs, extending from the rigid substrate 20. It should be understood that any number of connector portions 24 could be employed and that the connector portions can take any suitable shape, such as a rectangular plate having one or more mounting holes therein. Furthermore, the connector tabs 24, (i.e., connector portion) could extend elsewhere than from the major substrate, so long as the connector portion can secure the minor panel 16 relative to the major panel 14.

[0026] Referring again to FIG. 2, the major panel 14 further includes, in at least one embodiment, a foam layer 28 secured to the major substrate 20 and a major skin layer 32 secured to the foam layer 28 to cover the foam layer 28 and provides an exterior apparent surface. As can be seen in FIG. 2, the major skin layer 32 can be provided with an end portion that contacts the first portion 22 of the major substrate 20 to act as a “foam shut-off.”

[0027] The major substrate 20 is a structural member that provides support for the remainder of the major panel 14, and may comprise any suitable material. For example, the major substrate 20 may be made of plastic or reinforced plastic such as fiberglass reinforced polyurethane. Additional examples of suitable plastics, besides polyurethane, include polypropylene, polyethylene, acrylonitrile butadiene styrene (ABS), polycarbonate (PC), and ABS/PC blends. In at least one embodiment, the major substrate 14 may have a general thickness of between 0.5 to 5 mm, in another embodiment 1.0 to 3.5 mm, and in yet another embodiment 2.0 to 3.0 mm.

[0028] In the illustrated embodiment, the foam layer 28 is adhered between the major substrate 20 and the major skin layer 32. The foam layer 28 generally contours to the major substrate 20. The foam layer 28 helps to provide a soft feel to the major panel 14 of the instrument panel 10. The foam layer 28 may comprise any suitable foam material. For example, the foam layer 28 may comprise a foam in place polyurethane foam. In at least one embodiment, the density of the foam layer 28 is in the range of 0.05 to 0.20 grams per cubic centimeter (g/cm³). In at least one embodiment the foam layer 28 has a thickness of 3.0 to 25 mm, and in at least another embodiment 5 to 15 mm, and in yet another embodiment 6 to 10 mm. The foam layer 28 may have varying thicknesses.

[0029] The major skin layer 32 is adhered to the foam layer 28. Moreover, the major skin layer 32 is configured to provide a covering over, and is generally contoured to, the foam layer 28 and may comprise any sufficiently dense material. For example, the major skin layer 32 may be a solid layer that comprises an aromatic or aliphatic compound. As a more specific example, the major skin layer 32
may be made of an elastomer such as polyurethane. As an even more specific example, the major skin layer 32 may be sprayed urethane. Furthermore, the major skin layer 32 may have any suitable thickness and density. For example, the major skin layer 32 may have a general thickness in the range of 0.4 to 3 mm and a density in the range of 0.85 to 1.2 g/cm³. In at least one embodiment, the major skin layer 32 may have a shore A hardness of 50 to 80. In at least one embodiment, the major skin layer 32 has a general thickness in the range of 0.5 to 1.2 mm, and a density in the range of 0.95 to 1.1 g/cm³.

[0030] An optional coating (not shown) may be disposed over the major skin layer to protect the major skin layer 32 and/or to provide a decorative surface for the instrument panel 10. For example, the optional coating (not shown) may be used to inhibit sunlight and/or other ultraviolet light from reaching the major skin layer 32. As another example, the optional coating may be used as a paint to provide a desired color and/or texture to the major panel 14. While the optional coating may comprise any suitable material, in at least one embodiment of the invention, the optional coating is made of an aliphatic polyurethane composition. Furthermore, the optional coating may have any suitable thickness, such as a thickness of approximately 0.5 to 1.5 mil.

[0031] The major panel 14 may be made in any suitable manner. In at least one suitable manner, the major skin layer 32 is formed by spraying suitable material onto a spray mold. The major skin layer 32 is then secured to the major substrate 20 via the foam layer 28. In at least one embodiment, the foam layer 28 is disposed between the major skin layer 32 and the major substrate 20 via a foam in place process.

[0032] Referring to FIG. 2, in at least one embodiment, the minor panel 16 includes a minor skin layer 42, a resilient layer 44 disposed between the minor skin layer 42 and the connector portion 24 of the major substrate 20, and a mounting plate 46 adhered to the resilient layer 44 and connected to the connector portion 24. As is shown in FIG. 2, space may be present, at least in certain locations, between the resilient layer 44 and the connector portion 24.

[0033] The minor skin layer 42 is configured to provide a coating over, and is generally contoured to, the resilient layer 44. The minor skin layer 42 can be made of the same or similar material as the major skin layer 32 and may comprise any sufficiently dense sprayed urethane material. For example, the minor skin layer 42 may be a solid layer that comprises an aromatic or aliphatic compound. As a more specific example, the minor skin layer 42 may be made of an elastomer such as polyurethane. As an even more specific example, the minor skin layer 42 may be sprayed urethane. Furthermore, the minor skin layer 42 may have any suitable density. For example, the minor skin layer 42 may have a density in the range of 0.85 to 1.2 g/cm³. In at least one embodiment, the minor skin layer 42 has a density in the range of 0.95 to 1.1 g/cm³. In at least one embodiment, the minor skin layer has a shore A hardness of 50 to 80. An optional coating (not shown) similarly with the major skin layer 32, could be applied over the minor skin layer 42.

[0034] In at least the illustrated embodiment, the minor skin layer 42 is thicker than the major skin layer 32. This may help to provide a more rigid part for dimensional stability. While the minor skin layer 42 may have any suitable thickness, in at least one embodiment, the minor skin layer has an average thickness in the range of 0.3 to 8 mm, and in another embodiment 0.4 to 3 mm, and in yet another embodiment of 0.5 to 1.25 mm.

[0035] The mounting plate 46, in at least the illustrated embodiment as shown in FIG. 2, includes a plate portion 60 and at least one mounting projection 62 depending from the plate 60. While two mounting projections 62 are shown in FIGS. 3 and 8, it should be understood that more or less projections could be used, as desired. The mounting projection 62 can be secured to the connector portion 24 via any suitable connection means, such as by heat staking, as is shown in FIG. 2.

[0036] In at least one embodiment, the mounting plate 46 includes a plurality of, such as four, equidistant ribs 66 depending from plate portion 60 and disposed about the projection to help securably mount and locate the projection to the opening 26 and the connector portion 24. It should be understood that ribs 66 could be located on the connector portion 24 either in addition to, or instead of, the ribs 66 on the plate portion 60.

[0037] As best shown in FIG. 2, the plate portion 60 has a plurality of openings 68 therein. As will be explained further below, the openings 68 can assist in securing the plate 60 to the resilient layer 44. The mounting plate 46 may be made of any suitable material such as plastic or metal. In at least one embodiment, the plate portion 60 has a thickness of 0.2-3 mm, and in another embodiment 0.75-1.25 mm. In at least one embodiment, the mounting plate 46 is made of the same or a similar material as that of the major substrate 22.

[0038] The projections 62 on the mounting plate 46 can be secured to the connector portion 24 of the substrate 20 via any suitable means, such as heat staking as is shown in FIG. 2. The distance between the mounting portion 24 and the minor skin layer 42 is known as the package space (X). As can be understood, a substantial portion or even all of the package space (X) could be less than 5 mm, and in at least another embodiment between 0.5 and 4 mm, and in yet at least another embodiment between 1 to 3 mm.

[0039] In the illustrated embodiment, the resilient layer 44 is adhered to the mounting substrate 46 and the minor skin layer 42. The resilient layer 44 may help to provide a soft feel to the minor panel 16. The resilient layer 44 may comprise any suitable sprayed expanded polyurethane material. For example, the resilient layer 44 may comprise an expanded aromatic polyurethane elastomer. In at least one embodiment, the density of the resilient layer 44 can be in the range of 0.1 to 0.75 g/cm³, in another embodiment between 0.15 to 0.5 g/cm³, and in yet another embodiment 0.2 to 0.3 g/cm³.

[0040] In at least one embodiment, the resilient layer 44 primarily may comprise a low permeable, relatively closed cell material. In at least one embodiment, the resilient layer 44 may comprise 35 to 75 percent closed cell structures, in at least another embodiment 40 to 65 percent closed cell structures, and in yet at least another embodiment 45 to 55 percent closed cell structures, based upon the entire resilient layer 44. In at least one embodiment, the average cell structure size can vary between 0.05 mm to 3.0 mm, and in yet other embodiments between 0.5 mm to 1.0 mm.
In at least the illustrated embodiment, the resilient layer 44 generally comprises a first portion 52 adjacent the major skin layer 42 and a second portion 54 generally behind the first portion 42 and adjacent the connector portion 24. In at least one embodiment, the first portion 52 of the resilient layer 44 may have an average thickness generally between 0.3 to 4.5 mm, in other embodiments between 1 to 4 mm and in yet other embodiments 2 to 3 mm. In at least one embodiment, the second portion 54 of the resilient layer 44 may have an average thickness generally between 0.3 to 3 mm, in other embodiments between 0.5 to 2 mm and in yet other embodiments 0.75 to 1.25 mm. It should be understood that the thicknesses of the portions 52 and 54 can vary from each other, as desired. Furthermore it should be understood that the thickness of each portion 52 and 54, and especially for 54, can vary throughout their portion as desired, such as is dictated by part configuration.

Referring to FIGS. 4-6, a method of manufacturing the instrument panel 10 will now be described. As set forth above, the major panel 14 is made via any suitable process. The major panel 14 is made separately from the minor panel 16.

The minor panel 16 may be made by the following method. The method of making the minor panel 16 may begin by spraying an optional mold release agent and then an optional coating (not shown) on a spraying mold tool 70 using any suitable device, such as robotic low pressure (such as 10 to 40 psi) spray assembly 72 having one or more moveable spray nozzles.

The tool 70 has a spray receiving surface 76 generally corresponding to the exterior surface of the minor panel 14. The spray surface 76 has, in at least one embodiment, a height (H) of less than 12 mm, and in at least another embodiment between 1 and 10 mm, and in yet at least another embodiment between 4 to 8 mm. The tool 70 may be heated to any suitable temperature if desired.

Next, the method involves spraying skin layer forming material onto the spray receiving surface 76 (or the optional coating or the optional mold release agent) to form minor skin layer 42. A source of skin layer forming material (not shown) is in fluid communication with the spray assembly 72. The skin layer forming material may be any suitable sprayable substance and may be applied using any suitable device. For example, the material may include polyol and isocyanate, and the material may be sprayed with a robotic high pressure (such as 400 to 2,000 psi) spray assembly 72 having one or more moveable spray nozzles. As a result, the skin layer 42 may be formed of polyurethane. When the optional coating (not shown) is omitted from the minor panel 14, the minor skin layer 44 is preferably a colored aliphatic polyurethane.

Referring to FIG. 5, in at least one embodiment the method then involves introducing expandable material onto the minor skin layer 42 to form resilient layer 44, which bonds to the minor skin layer 42. The expandable material may comprise any suitable expandable material. In at least one embodiment, the expandable material comprises any suitable expandable polyurethane material and may be applied in any suitable manner. For example, the expandable polyurethane material may comprise polyol, isocyanate and a blowing agent such as water and/or a readily volatile organic substance, such as a delayed-action amine catalyst.

Furthermore, the expandable material may be sprayed with a robotic spray assembly 82 which receive the expandable material from a source of expandable material (not shown) in fluid communication with the spray assembly 82. The robotic spray assembly 82 may include one or more spray nozzles and the material may be allowed to free rise to achieve a desired density. The robotic spray assembly 82 may be the same type of spray assembly 72 as is used in FIG. 4. Alternatively, the same spray assembly 72 as used in FIG. 4 could be used to spray the expandable material.

The resilient layer 44 adheres the mounting substrate 46 to the minor skin layer 42. In at least one embodiment, the expandable material is sprayed in two steps to form the first portion 52 of the resilient layer 44 and the second portion 54 of the resilient layers. In this embodiment, a first portion of expandable material is sprayed onto the minor skin layer 42 to form a first portion 52 (FIG. 5) of the resilient layer 44. Before the first portion of expandable material fully cures, the mounting plate 46 is placed on the first portion 52 of sprayed expandable material. Next, a second portion of sprayed expandable material is sprayed over the mounting plate 60 of the mounting bracket 46 and the first layer of sprayed expandable material. At this point, the first layer of sprayed expandable material may have already cured or at least partially cured into the first portion 52 of the resilient layer 44. The second portion of the expandable material is sprayed to a sufficient thickness to form a second portion 54 of resilient layer 44. The spraying of the second portion of the resilient layer is illustrated in FIG. 6. After the second portion of resilient layer 44 has cured, the minor panel 16 is formed as illustrated in FIG. 7. As can be seen in the Figures, the second portion 54 of resilient layer 44 may also fill the openings 68 in the plate 60.

In at least one embodiment, the first portion 52 of the resilient layer 44 may have an average thickness generally between 0.3 to 4.5 mm, in other embodiments between 1 to 4 mm and in yet other embodiments 2 to 3 mm. In at least one embodiment, the second portion 54 of the resilient layer 44 may have an average thickness generally between 0.3 to 3 mm, in other embodiments between 0.5 to 2 mm and in yet other embodiments 0.75 to 1.25 mm. The minor panel 16 is then secured to the connector portion 24 of the major substrate 22 in any suitable manner, such as by heat staking the projection(s) 62 through the mounting opening(s) 26.

Referring to FIG. 8, a perspective view of one embodiment of mounting plate 46 is shown. Referring to FIG. 8, the mounting plate 46 includes openings 68 in the plate 60 to allow expandable material to be sprayed there-through to help secure the mounting plate 46 and the second portion 54 of resilient layer 44 to the first portion 52 of the resilient layer 44.

In at least one embodiment, the present invention provides a soft touch sprayed skin panel having relatively even softness zones with consistent skin material to ensure consistent color, gloss and grain match.

Examples of other vehicle parts that may be manufactured by the above method includes door panels, package shelves, pillar trim panels, trim products, door covers, console covers, shelves, and trim covers, among others.

Although separate spray assemblies 72 and 82 are shown in the figures, the spray assemblies may be provided
as a single spray assembly. Furthermore if the material to be sprayed includes multiple substances, the substance may be mixed at a suitable time. For example, the substances may be mixed up stream of, within, or down stream of the associated spray nozzles.

[0054] While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A method for making a multi-piece vehicle interior trim panel, said method comprising:
   - providing a major panel having a major substrate, a sprayed urethane major skin layer disposed over at least a portion of the major substrate, and a layer of foam between the major substrate and the major skin layer, the major panel having a mounting portion having at least one mounting opening;
   - forming a minor panel, said minor panel being formed by:
     - providing a spray mold having a mold surface smaller than the outer surface of the major skin layer;
     - spraying polyurethane material proximate the mold surface to form a sprayed urethane minor skin layer having a height (H), an exterior surface, and an interior surface;
     - spraying a first portion of expandable polyurethane material onto the minor skin layer to form a first resilient layer;
     - placing a mounting substrate onto the first resilient layer; and
     - spraying a second portion of expandable polyurethane material onto the first resilient layer and the mounting substrate to form a second resilient layer;
   - removing the minor panel from the mold; and
   - securing the minor panel to the mounting portion of the major panel, wherein a package space (X) is disposed between the interior surface of the minor skin layer and the mounting portion of the major substrate, with at least one of (i) the height (H) of the minor skin being less than 12 mm and (ii) the package space (X) being less than 5 mm.

2. The method of claim 1 wherein the mounting substrate is placed onto the first resilient layer before the first resilient layer has substantially cured.

3. The method of claim 1 wherein the mounting substrate has at least one projection and wherein securing the minor panel to the major panel comprises inserting the projection through the mounting opening of the major panel and securing the projection to the major panel.

4. The method of claim 3 wherein the mounting substrate comprises a plate, the projection extending from the plate, the plate having at least one plate opening therein.

5. The method of claim 4 wherein spraying a second portion of expandable polyurethane material onto the first resilient layer and the mounting substrate comprises spraying the second portion onto the plate and through the plate opening.

6. The method of the claim 3 wherein the projection is heat-staked to the major panel portion.

7. The method of claim 4 wherein the resilient layers each have a density of 0.1 to 0.75 g/cm³.

8. The method of claim 7 wherein the skin layer each have a density of 0.85 to 1.2 g/cm³.

9. The method of claim 7 wherein the first resilient layer has an average thickness of 0.3 to 4.5 mm.

10. The method of claim 9 wherein the second resilient layer has an average thickness of 0.3 to 3 mm.

11. The method of claim 10 wherein the minor skin layer has an average thickness of 0.3 to 8 mm.

12. The method of claim 11 wherein the plate has a thickness of 0.2 to 3 mm.

13. An automobile interior panel made by the method of claim 1.


15. A method for making a multi-piece vehicle interior trim panel, said method comprising:
   - providing a major panel having a major substrate and major skin layer disposed over at least a portion of the major substrate, the major substrate having a mounting portion;
   - forming a minor panel, said minor panel being formed by:
     - spraying polyurethane material proximate a mold surface to form a sprayed urethane minor skin layer having a height (H);
     - placing a mounting substrate proximate the minor skin layer; and
     - spraying expandable polyurethane material over the mounting substrate to form a resilient layer to secure the mounting substrate to the minor skin layer; and
   - securing the minor panel to the mounting portion of the major panel, wherein a package space (X) is present between the minor skin layer and the mounting portion, with at least one of the height (H) being less than 12 mm or the package space (X) being less than 5 mm.

16. The method of claim 15 wherein the mounting substrate has at least one projection and wherein securing the minor panel to the major panel comprises securing the projection to mounting portion of the major panel.

17. The method of claim 15 wherein the minor skin layer has an average thickness of 0.3 to 8 mm.

18. The method of claim 15 wherein the resilient layers each have a density of 0.1 to 0.75 g/cm³.

19. The method of claim 18 wherein the skin layer each have a density of 0.85 to 1.2 g/cm³.

20. A method for making a multi-piece vehicle interior trim panel, said method comprising:
   - providing a major panel having a major substrate and sprayed urethane major skin layer disposed over at least a portion of the major substrate, the major panel having at least one mounting opening;
   - forming a minor panel, said minor panel being formed by:
providing a spray mold having a mold surface smaller than the outer surface of the major skin layer;
spraying polyurethane material proximate the mold surface to form a polyurethane skin layer;
spraying a first portion of expandable polyurethane material onto the skin layer to form a first resilient layer;
placing a mounting substrate proximate the first resilient layer; and
spraying a second portion of expandable polyurethane material onto the first resilient layer and the mounting substrate to form a second resilient layer; and
securing the minor panel to the major panel.

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