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Development of Technology for Integrating Soft Skin Instrument Panel Parts and Improving Material Yield

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Recent years have brought demand for greater comfort in the driver's seat in conjunction with the electrification of vehicles and the adoption of autonomous driving. Therefore there is also increasing demand for high design quality and instrument panel to realize an exhilarating driver's seat. Specifically, this means a "noiseless" instrument panel without any dividing lines caused by the seams between differently shaped parts. In terms of quality feel, the interior trim quality feel was enhanced by adopting a soft epidermis (Fig. 1). The cost of materials makes up the greater part of the instrument panel unit price, and this is among the issues for sheet molding yield. There is also an urgent need to realize high design while enhancing the cost structure by making it possible to reduce costs.

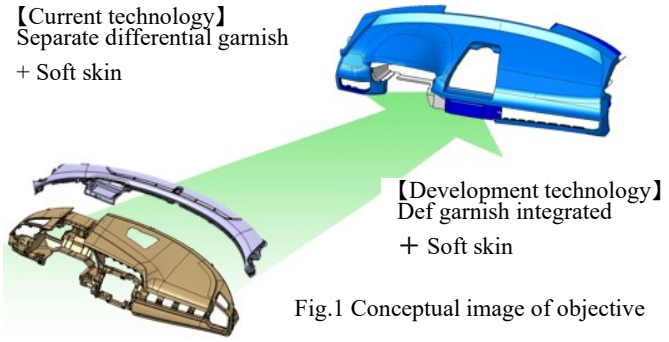

Fig.1 Conceptual image of objective

This paper reports on vacuum forming technology that has realized high design and low cost structure.

Figure 2 shows the shape with conventional forming, and Fig. 3 maps the distribution of elongation after forming. The shape of the conventionally formed navigation system visor (navivisor) part shows a large amount of elongation, which means that the sheet has been stretched thin. With the conventional technology, therefore, the practice has been to match the sheet to the area where it can be most elongated without tearing to determine the material sheet size before forming.

In conventional forming, the sheet is fixed in a sheet frame and placed in the oven to heat the sheet. When this is done, the unclamped part undergoes heat shrinkage. In order to have a sheet size large enough to cover the mold when heat shrinkage is taken into consideration, an extra-large sheet is required, and this is because of reduced material yield.

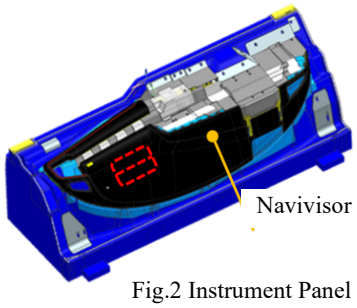

Fig.2 Instrument Panel Shape

So, it was necessary to control the amount of sheet elongation, which has been difficult to achieve with current vacuum forming, and to increase sheet material yield as much as possible.

To address the above issues, a sheet frame was developed that makes it practical to implement the below main production technologies.

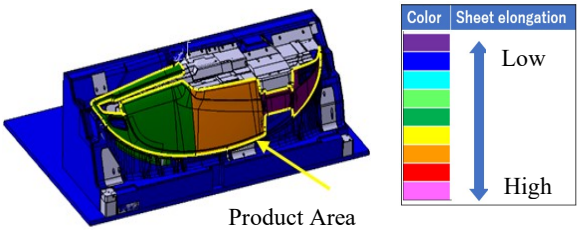

Fig. 3 Sheet elongation distribution map

・Sheet bending technology
・Overall sheet stretching technology

Employing these technologies made it possible to reduce the sheet material cost by approximately 20%. These technologies are presently being applied to the instrument panel of models from 2021 on.