



THE USE OF TEXTILE FIBRES IN PADDING CAR DASHBOARDS – STUDY CASE –

TEODOR-STANCIU Silviu¹

¹ George Enescu” National University of Arts, Iași, Faculty of Visual Arts and Design, Design Department,
189 Sărărie Street, 700451 Iași, Romania, E-Mail: fapdd@arteiasi.ro

Corresponding author: Teodor-Stanciu, Silviu, E-mail: silviuteodorstanciu@gmail.com

Abstract: *The paper presents the advantages and disadvantages of using textile fibres for the dashboard padding of cars. The car dashboard had throughout time a constant evolution in relation to the use of new technologies and materials, offering users not only a good visibility on the tool panel and a good ergonomics on the commands, but also a good protection in case of impact by integrating the airbags and by using soft, deformable materials, for an eventual contact with the passengers. The metal structure has gradually been replaced with reinforced fibre glass, with plastic such as ABS and PVC, the outer layer of the dashboard being able to be covered in polyurethane foam with a finishing made of PVC foil or leather in case of the luxury vehicles and PVC in case of the medium level ones. The Romanian car producer Dacia brings for the first time textile fibres for the padding of the central panel of the dashboards of the models Logan and Sandero, which will represent the topic of a study case.*

Key words: *textile fibres, car dashboard, textile insertion, technology.*

1. INTRODUCTION

The car became a common presence in big urban centres since the half of the 20th century, this knowing a constant technical and aesthetic evolution in relation to the new materials and technologies used in the industry. The growths of the reliability, of the manoeuvrability, of the interior comfort are only a few of the preoccupations of designers and engineers in the auto industry, the safety of passengers becoming a priority in the contemporary period, when the number of cars has grown significantly. Besides the active protection systems, sensors, traction control, braking assistance, steadiness control, passive protection systems also have a really important role, such as seatbelts, headrests, airbags and, last but not least, the parts designed to absorb the force of the impact, protecting the integrity of the cabin. Using plastic has generated notable results in impact tests, features such as elasticity, resistance to a mechanic stress and high temperatures determining designers to extend the use of plastic and padding the car cabin [1]. The gradual replacement of the metal elements from the car dashboard has led to a significant decrease of its weight, to the decrease of the production cost, to the possibility of experimenting new shapes, which have raised the ergonomic character and implicitly, the protection in case of a frontal impact [2]. The metal structure was gradually replaced with reinforced fibre glass, with plastic such as ABS and PVC, the outer layer of the dashboard being able to be covered in polyurethane foam with a finishing made of PVC



foil or leather in case of the luxury vehicles and PVC in case of the medium level ones. Although the PVC is a material easy to mould and process, with a high variety of textures and colours, it is rigid in case of a physical contact of passengers with the dashboard during a car crash. The technology of covering the dashboard with a layer of polyurethane foam finished with PVC foil has proven to have a low resistance to heat, the constant exposure to temperatures over 100 degrees causing cracks in the fabric (Fig. 1a). The luxury cars dashboards are finished with synthetic or even natural leather, fabrics which resist to high temperatures and significantly ease the frontal impact of passengers due to the elasticity. Taking into account the high implementation costs of this solution, which influences the final cost of the product, most of the car producers, globally, choose the PVC finishing. In this context, the Romanian car producer, Dacia, has presented for the first time in 2020 the third generation of the models Logan and Sandero with textile fabric on the dashboard (Fig. 1b). The unconventional solution will be analysed during a study case, both advantages and disadvantages being presented, functionally and aesthetically.

2. GENERAL INFORMATION

The third generation of the models Logan and Sandero includes a new series of active and passive protection systems for the Romanian car producer Dacia, one of these being the longitudinal insertion of textile fabric on the dashboard (Fig. 1c). Fabrics have been used in the auto industry since its founding, in order to upholster seats and chairs, roofs, door interiors and even the floor. Throughout history, the fabrics used in car interiors have diversified accordingly to discovering new technologies. Thus, the cloth has been replaced since the 1960s with synthetic fibres, cheaper to produce and with a high degree of wear throughout time, but with a low degree of comfort for the passengers, being afterwards replaced with mixed fabrics, from natural and synthetic fibres. Using textiles in a car interior offers passengers the feeling of comfort, of safety. The interaction areas of the passengers with the components from inside the vehicle have gradually been padded in fabric, besides the seats one seeing the armrests, headrests, interior sides of the doors, sun blinds, roof padding. Applying the fabric insertion on the dashboard represents a first in the auto industry, with multiple implications, both functionally, as well as aesthetically.

2.1. The problem

In case of the cars with a medium selling price, category in which Dacia fits, the leather or fabric padding of the passenger interaction areas is limited to the basics. Leather, a luxury material, used by some premium brands for the entire padding of the dashboard, the interior of doors, is used optionally by Dacia only for padding the steering wheel. The dashboard or the door interiors are made of PVC, in order to reduce the production costs. PVC is a mouldable material, which can be processed in a large variety of finishes and colours, so that from an aesthetic point of view the components made of PVC would be similar to those made of leather or even fabrics [3]. Nonetheless, from a tactile perspective, the rough, stiff material does not offer comfort to passengers, the frontal impact and the risk of its splintering in case of an accident can hurt the passengers sitting in the front. The longitudinal strip of fabric (Fig. 2a) placed by Dacia on the dashboard of Logan and Sandero offers a plus of protection in case of an accident, the fabric preventing the interaction of passengers with possible PVC splinters. Also, the layer of sponge which doubles the insertion of fabric contributes to the absorption of the impact and the attenuation of the contact of passengers from the front seats with the dashboard (Fig. 2b) [4].



Fig. 1: a) Dacia 1310 dashboard made of polyurethane and PVC foil - damage caused by the overheating of the material during summertime; b) Comparison between a conventional ABS and PVC dashboard (Dacia Logan 1) and an ABS and PVC dashboard with a fabric insertion (Dacia Sandero Stepway 3); c) Fabric insertion - detail (Dacia Sandero Stepway 3)

2.2. The solution

The insertion of fabric, polyester textile, with a width of 100mm, is placed longitudinally on the entire length of the dashboard, in its central area. From an aesthetic point of view, the fabric strip becomes an accent area, which also plays a functional role by visually delimiting the basic dashboard tools (speedometer, revmeter, board computer screen, multimedia touch screen) from the ones used on a sideline (climate control system, car doors security, air recirculation) [5]. The aspect of the fabric, made of a geometric rhythm of white-black, makes the transition between the two functional plans of the dashboard, blending with the aesthetics of the interior design of the entire cabin. The use of the fabric on the dashboard from in front of all car passengers offers them an increased sense of comfort and security, the fabric diminishing, from a perception point of view, the cold nature of plastic [6].

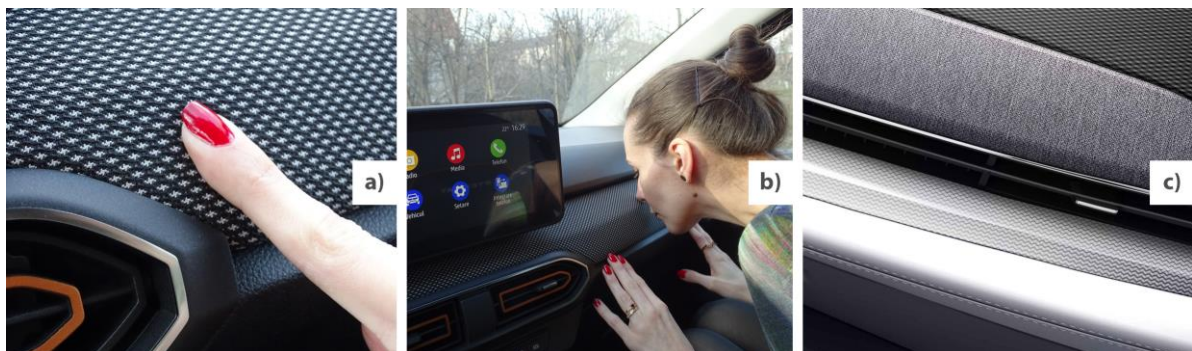


Fig. 2: a) Padded textile insertion (Dacia Sandero Stepway 3); b) Simulation frontal accident -the padded area ensures frontal protection to passengers; c) Padded textile insertion applied on the dashboard of Ford Mustang Mach – E 2021 vehicles

2.3. Benefits

The polyester textile offers numerous advantages, both functionally and aesthetically, the synthetic material having a high degree of resistance to wear and stretch, being able to take the shape of the dashboard without wrinkling, the synthetic fibres offering a high degree of resistance to high



temperatures as well. Nevertheless, using a textile material in a highly used area of the car, which means the interaction of passengers with the controls on the dashboard, leads to its dirtying. Using cleaning technologies based on water and steam may damage the dashboard electronic tools. Also, the fabric is permanently exposed to sunlight, the discoloration and even yellowing process as a constant exposure to high temperatures being irreversible. The specific features of synthetic fibres, such as elasticity and water resistance, ensure a good resistance of the fabric during cold weather and temperature differences, favouring conditions for condensation. Taking into account the normal life duration of an 8-10 years old car, it is estimated that the fabric insertion will physically last, but aesthetically with irredeemable signs of wear, the first 4-5 years of use, if we take into account the evolution of fabrics found in other previous Dacia models [7].

The case study was made on a Dacia Sandero Stepway vehicle, personal propriety, acquired in 2021. Thus, interaction with the dashboard was researched and quantified, including with the fabric padded area, the behaviour of the fabric during summertime, by exposure to constant sunlight and high temperatures and, to an equal extent, during wintertime, to low temperatures and moisture.

3. CONCLUSIONS

The premises of using synthetic textile materials for padding the dashboard of vehicles are positive from the perspective of the relation functionality/ implementation costs. The mechanical proprieties of textile padding offer a good adaptability of the product to operation areas with high temperature differences. Using padding insertions also offers a good protection to passengers in case of impact with the dashboard. The analysed technical solution presents numerous functional and aesthetic advantages unlike the PVC dashboards, conventional for cars with a medium cost of acquisition, answering to the usability and security requirements similar to premium materials used in case of luxury cars. It is estimated that this technical solution will be gradually adopted by many auto producers, aspect supported by new models of Ford companies (Mustang Mach – E 2021) and even the Mercedes-Benz group (Smart Fortwo 2021) (Fig. 2c).

REFERENCES

- [1] Pralea, Jeni, *Designul în contextul proiectării produsului industrial*, Editura ARTES, Iași, 2009.
- [2] Manolescu, Aurel, Lefter, Viorel, Deaconu, Alecsandrina, Marinaș, Cristian, Marin, Irinel, Nica, Elvira, Puia, Ramona, *Ergonomie*, Editura Economică, București, 2010.
- [3] Pralea, Jeni, *Plastic, lemn, design – proiectarea produselor de mase plastice*, Editura Artes, Iași, 2009.
- [4] Kroemer, Karl H. E., Kroemer, Hiltrud J., Kroemer-Elbert, Katrin E., *Engineering Physiology*, Editura Springer, New York, 1997.
- [5] Meilgaard, Morten C., CARR, B., Thomas, Cville, Gail, Vance, *Sensory Evaluation Techniques*, Editura CRC Press, 2006.
- [6] Malnar, Joy, Monice, Vodvarka, Frank, *Sensory Design*, Editura University Of Minnesota Press, 2004.
- [7] Masek, V., *Designul și calitatea vieții*, Editura Științifică și Enciclopedică, București.