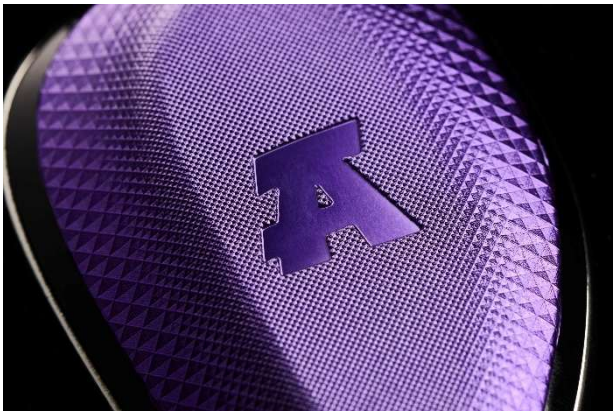
Performance Car Key with Protective Layer Finish (PLF)

Design, protection, and efficiency reimagined

Using a Smart Key as an example, KURZ, together with machine manufacturer ARBURG, demonstrates the potential of the new Protective Layer Finish (PLF) technology. Through an innovative protection concept, this solution expands the application possibilities of In-Mold Decoration (IMD). The surface and decorative layers are protected by a thin PET carrier located on the component surface. The result is high-quality, durable components that can be manufactured economically and are suitable for universal material concepts.

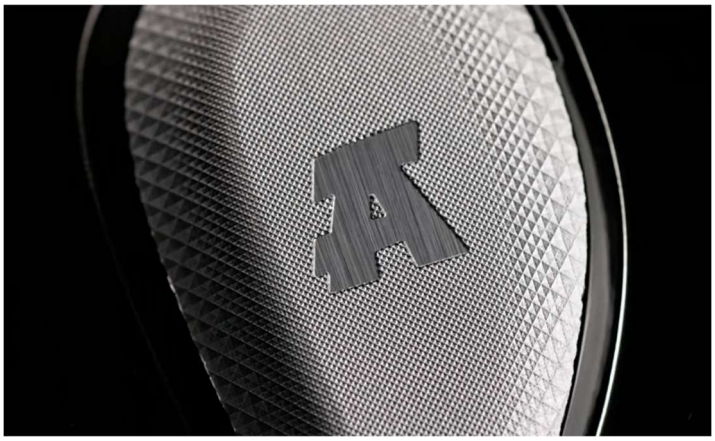
Challenge

Smart Keys are among the most frequently used control elements associated with vehicles. They are carried every day, dropped on the ground, and come into contact with keys, coins, or other objects. Scratches, abrasion, and impacts can affect their appearance and functionality. To achieve the required robustness, conventional decoration processes often use additional protective coatings or multilayer material structures. This increases material consumption, extends process chains, and raises production costs. At the same time, manufacturers expect a high degree of design freedom, more sustainable solution approaches, and efficient manufacturing processes.



Goal

The goal was to create a key cover that meets high requirements for design and surface robustness. The solution developed for this purpose was intended to combine decoration and protection in one system, use the existing IMD process concept, and be feasible with a wide variety of material concepts. In addition, it was intended to enable high-quality surfaces with different visual and haptic properties - with a high degree of design freedom and without additional coating steps.



Solutions

The PLF system was used for the first time for the Performance Car Key. This technology does not use conventional transfer systems, but rather a thin PET carrier that remains permanently on the component. The decoration is protected behind this layer, which serves both a protective and carrier function. This eliminates the need for additional protective coatings, reducing material use and process effort. At the same time, the PET layer provides high resistance to abrasion, impacts, and daily wear and thus contributes to a longer product life.

For processing the PLF system, KURZ uses the proven IMD VARIOFORM® process, which was developed specifically for decorating sophisticated 3D components. It combines decorating, forming, back injection molding, and punching in an integrated process. Structured tool inserts enable impressive visual and haptic surfaces that can be precisely synchronized with the decoration. The potential of PLF is particularly evident on the Performance Car Key itself: The exclusive laser structure from the Reichle Technology Center creates a precisely structured surface and gives the exhibit a distinctive character.

The design possibilities with PLF extend far beyond this example: Decorations can be implemented in a wide variety of desired colors and effects. In combination with customer-specific tool structures and engravings, different surface effects can be achieved with a single decoration variant.

Resource efficiency and circularity were also taken into account in the material concept of the Performance Car Key. A PIR (Post-Industrial Recyclate) PC/ABS is used as the base material. PLF is compatible with materials established in injection molding production. The extremely thin decorative layer does not affect the recyclability of the component.

Why KURZ is the right technology partner

- Exclusive PLF technology as a further development of established IMD decoration processes
- Integration of protective function, design, and cost-effectiveness in a single production process
- OEM-validated surface robustness for complex applications
- Compatibility with existing injection molding materials and established manufacturing processes
- Flexible design possibilities through freely combinable decorations, tool structures, and engravings
- Responsible technology approach through the use of recyclates, the elimination of additional protective coatings, and the avoidance of electroplating metallization processes

Conclusion

The Performance Car Key with Protective Layer Finish shows how high-quality and durable surfaces can be implemented efficiently. The technology reduces material use while maintaining high cost-effectiveness - without compromising design or robustness. In addition, it opens up new perspectives for resource-efficient material concepts and sophisticated series applications. PLF thus creates an economically attractive solution for manufacturers that place equal emphasis on design quality, durability, and efficiency.

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