

Development of an Open-Source Standardized Fastening Platform for In-Vehicle Accessory Ecosystems

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1. INTRODUCTION

As vehicles rapidly evolve into 'Purpose Built Vehicles (PBVs)' and mobile living spaces, the demand for personalized in-vehicle activities is surging. However, conventional aftermarket accessory attachment methods heavily rely on adhesives, suction cups, or auxiliary hardware. These not only cause interior damage and aesthetic degradation but also pose severe safety risks during collisions. Focus Group Discussions (FGD) revealed a strong unmet need for stable, safe, and intuitive fixation methods for daily tasks. To resolve this, we developed a standardized, automotive-grade fastening platform. By disclosing the 3D interface data to the public as an open-source standard, we aim to lower entry barriers for third-party developers and foster a user-centric DIY culture within a scalable accessory ecosystem.

2. SYSTEM DESIGN & MECHANISM

2.1 Rotational Type (Standard)

The core mechanism employs a spring-less structure utilizing the elasticity of resin materials. It consists of a Hook (Male) and a Back Plate (Female). Rotating the hook 90 degrees engages it with the plate's elastic ramp, providing clear audible feedback and secure locking. Material Selection: POM was selected for the Back Plate to ensure elasticity and fatigue resistance, while PA6+GF was chosen for the Hook to provide high structural strength and wear resistance (See. Fig.1).

2.2 Vertical Type (Heavy Load)

For heavier devices like tablets, a Vertical Type was developed. It features a spring-loaded cover for auto-return and hole concealment. The housing incorporates an elastic latching geometry to ensure high load capacity and structural stability (See. Fig.2).

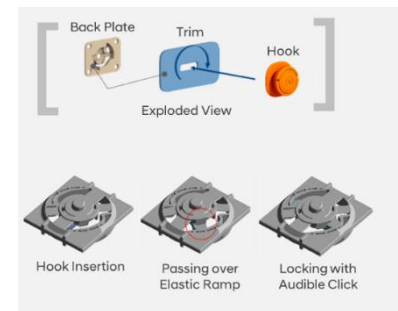


Fig. 1. Operating principle of the rotational type

3. VERIFICATION & COMMERCIALIZATION

3.1 Reliability Verification

New component-level standards (ES) were established, covering 11 items including strength and BSR. Vehicle-level validation, including crashworthiness tests, confirmed that the accessories do not detach during collisions, ensuring passenger safety.

3.2 Mass Production

The platform has been applied to major Hyundai and Kia models. To expand the ecosystem, a dedicated accessory brand, 'AddGear,' was launched, offering 18 core accessories (e.g., cup holders, tablet mounts) based on the open-source interface.

4. CONCLUSION

- 1) **Standardization:** Developed a tool-free, spring-less fastening platform that meets strict automotive reliability and crash safety standards.
- 2) **Competitiveness:** Secured 18 global patents and achieved mass production, entering the 400 trillion KRW aftermarket.
- 3) **Ecosystem:** Established a win-win ecosystem by disclosing technical data, lowering entry barriers for third-party developers.
- 4) **Sustainability:** Enabled accessory reuse across different vehicle models, promoting resource circulation (ESG).

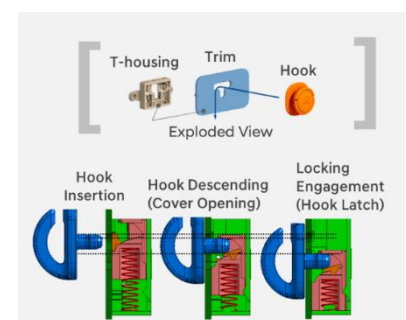


Fig. 2. Operating principle of the vertical type