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A Study on the Development of Front Radar Cover Technology for Autonomous Vehicles

Juhwan Park [1)] Wanho Son [1)] Gyeomson Seong [1)] Sunghoon Jung [2)]

1) SECO ECOPLASTIC, Technology Research Institute
31, Gongdan-ro 57-gil(Hwangseong-dong), Gyeongju-si, Gyeongsangbuk-do, 38071 Korea(E-mail: pjrk1698@myeco.co.kr)
2) INTOPS, Technology Research Institute
51, Anyangcheonseo-ro, Manan-gu, Anyang-si, Gyeonggi-do, 14088 Korea

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Recently, as autonomous driving and advanced driver assistance systems have been increasingly applied to vehicles, the importance of sensor cover technologies has also grown. Smart Cruise Control (SCC) uses radar to detect surrounding vehicles, and the SCC cover must protect the sensor while maintaining stable radar transmittance. Because the SCC cover is mounted on the vehicle exterior, it is required not only to satisfy functional performance but also to meet durability and design quality requirements. In particular, the SCC cover should be harmonized with the vehicle grille design because it is directly visible from the outside and has a strong influence on the overall exterior appearance of the vehicle. In addition, the cover may be exposed to various external environments during vehicle operation, and surface scratches can occur due to repeated contact, impact, or abrasion. If scratches are formed on the cover surface, radar transmittance may be reduced, which can lead to deterioration in radar performance and reliability.

Therefore, this study developed an SCC cover with a self-healing function. To prevent the deterioration of radar performance and reliability caused by surface scratches, a self-healing function was applied to the cover surface. In addition, a film with a three-dimensional appearance was applied to allow the SCC cover to better match the vehicle exterior design. By using this film, the conventional forming process could be eliminated, thereby simplifying the manufacturing process and reducing production time and cost. Accordingly, the developed SCC cover is expected to improve scratch resistance, maintain exterior quality, and provide enhanced applicability for automotive sensor cover systems.