



Designing Trust: SDV 시대의 법, 인증 그리고 신뢰



화물자동차 규모별 세부 분류기준 적용에 관한 연구

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A Study on the Application of Detailed Classification Criteria Based on Cargo Truck Size

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Key Words : Cargo Truck(화물자동차), Limit of Dimension(크기), Classification of Vehicle(차량분류), Safety Standard(안전기준), Regulation on the Performance and Standards of Motor Vehicles and Motor Vehicle Parts(자동차 및 자동차부품의 성능과 기준에 관한 규칙)

ABSTRACT

Article 4 of the current Regulation on the Performance and Standards of Motor Vehicles and Motor Vehicle Parts restricts the length, width, and height of vehicles according to road facility standards defined by the Road Act. In addition, Annex 1 of the Enforcement Rule of the Motor Vehicle Management Act further classifies vehicle types by category and size, setting detailed criteria. Under these rules, vehicles are categorized into mini, small, medium, and large according to their size. However, unlike passenger cars or vans, cargo trucks—excluding mini trucks—are classified only by maximum payload and gross vehicle weight (GVW), without size-based standards for length, width, or height.

Therefore, even small cargo trucks can be legally manufactured up to 13 m in length and 4 m in height if they meet the general standards outlined in Article 4. There is no regulatory basis to restrict such production. As a result, manufacturers may produce similar vehicle types in response to market demand without sufficient validation of driving stability, which can lead to serious safety concerns.

For example, small cargo trucks with excessively tall cargo beds relative to their body structure are vulnerable to crosswinds at high speeds, reducing driving stability. These designs also facilitate overloading, shifting the center of gravity upward and increasing the risk of rollover accidents. Additionally, when such vehicles operate in narrow urban areas or alleys, they may obstruct the visibility of pedestrians and other drivers, increasing the risk of accidents and related social costs.

This study presents actual examples of these issues and examines classification and dimensional standards in major countries, including those in Europe. Based on Korea's cargo truck operation practices, it proposes applying detailed length and height standards by size, in addition to current payload and GVW criteria.

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가변축 시스템 성능평가 및 현가장치 구조에 따른 특성 연구

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Evaluation of lift Axle Systems and Characteristics According to Suspension Structure

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Key Words : Left axle(가변축), Lift axle test(가변축시험), Suspension(현가장치), Korean Motor Vehicle safety Standards(자동차 안전기준)

ABSTRACT

This study was conducted to evaluate the performance of left axle systems applicable to commercial and special-purpose vehicles and to verify their compliance with Article 13 (7) and (8) of the Korean Motor Vehicle safety Standards(KMVSS). Tests were performed on general cargo vehicles to assess major performance parameters such as load distribution ratio and automatic lowering function through lift axle operation and manual control tests. In particular, this study compared the sensing characteristics of left axle systems according to the structural differences of fixed-axle suspensions. For spring-type suspensions, a deformation-based mechanical load-sensing method using angle sensors was applied to directly measure changes in axle load. For air suspension systems, an electronic sensing method was employed to detect airbag pressure variations. Both sensing methods reliably detected load variations for axle control. however, the air suspension type demonstrated superior responsiveness and higher precision in controlling small load fluctuations, as each airbag could independently sense pressure changes. The results indicate that the tested left axle systems maintain stable load distribution and control performance regardless of suspension structure. Moreover, the application of air-suspension-based sensing systems is expected to enhance the accuracy of load control and improve road load management efficiency for heavy commercial vehicles in future implementations.

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서비스디자인 기반 대량맞춤형 프레임워크를 활용한 픽업트럭 사용자 경험(UX) 향상에 대한 연구

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A Study on the Improvement of Pickup Truck User Experience (UX) Using a Mass Customized Framework Based on Service Design

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Key Words : Pickup Truck(픽업트럭), User Experience(사용자 경험), Service Design(서비스 디자인), Mass Customization(대량 맞춤), Modulization(모듈화)

ABSTRACT

Recently, the Korean pickup truck market has become increasingly diversified. The strength of pickup trucks lies in their versatility—they can be adapted to various purposes and usage styles depending on user needs. In this context, user experience (UX) plays a critical role. This study proposes a service design-centered mass customization framework aimed at improving the UX of pickup truck users from the perspective of a special-purpose vehicle manufacturer. The research adopted the Double Diamond model, which is widely applied in service design. In the Discover stage, different types of pickup truck users were categorized according to their usage characteristics and the specialized features they required. In the Define stage, the core needs of each user cluster were identified and clearly articulated. During the Develop stage, the pickup truck's specialized features were structured into modular components, divided into internal and external factors. These modules were developed to reflect the essential needs of each user cluster. In the Deliver stage, real users participated in experience-based evaluations of the developed modules. Through this framework, special-purpose vehicle manufacturers gained advantages in production and inventory efficiency, as they could flexibly respond to new user demands by recombining existing modules. User feedback indicated that the proposed modular features offered consistent quality, ease of use, and expandability to other modules. However, they also revealed limitations in meeting highly individualized aesthetic preferences and diverse functional requirements. Future research should explore platform-based modular design strategies that expand the performance and functional aspects of modular products, while simultaneously enhancing personalization. This approach is expected to further improve both manufacturer efficiency and user satisfaction, creating a more adaptive and user-responsive pickup truck ecosystem in Korea.

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삼륜형·사륜형 이륜자동차 안전기준 개선에 관한 연구

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A Study on Improving Safety Regulations for Three- and Four-Wheeled Motorcycles

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Key Words : Motor vehicle management act(자동차관리법), Three-wheeled motorcycles(삼륜형 이륜자동차), Four-wheeled motorcycles(사륜형 이륜자동차), Vehicle regulations(자동차 제작기준)

ABSTRACT

Under the Motor Vehicle Management Act, motor vehicles are classified into passenger cars, buses, trucks, special-purpose vehicles, and motorcycles. These motorcycles are further divided into two-wheeled, three-wheeled, and four-wheeled types according to the number of wheels. Consequently, issues have been raised regarding the boundary between four-wheeled motorcycles and ultra-compact vehicles, as well as fairness concerns between three-wheeled and four-wheeled motorcycles. In particular, with the approval of a cargo compartment for four-wheeled motorcycles, deficiencies have emerged in the classification of steering systems and other regulations for vehicles in the light or sub-compact categories. This study reviews regulations such as steering systems, seat arrangements, windshields, and passenger compartments of these motorcycles, with the aim of minimizing confusion in the industry and proposing rational improvements to manufacturing regulations.

자동차관리법에서 규정하는 자동차의 차종은 승용, 승합, 화물, 특수, 이륜 자동차로 구분된다. 이 중 이륜자동차는 다시 바퀴의 개수에 따라 이륜형, 삼륜형, 사륜형으로 분류할 수 있다. 따라서 사륜형 이륜자동차와 초소형자동차와의 경계, 삼륜형 이륜자동차와 사륜형 이륜자동차와의 형평성 문제 등이 제기되고 있다. 특히 사륜형 이륜자동차의 물품적재장치가 허용됨에 따라 조향장치 등 경형 이하의 자동차 구분에 미비점이 발생되고 있다. 본 연구에서는 이륜자동차의 조향방식, 좌석배치, 방풍장치, 차실 등의 기준을 검토하여 산업계의 혼란을 최소화하고 합리적인 제작 기준 개선안을 제시하고자 한다.

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첨단특장차 전문인력양성 교육사업의 효과분석

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Effectiveness Analysis of the Advanced Special-Purpose Vehicle Workforce Training Program

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Key Words : Educational effectiveness(교육효과분석), Cost-benefit analysis(비용편익분석), Workforce development(전문인력양성), Special-purpose vehicle(특장차), Electric vehicle(전기차), Artificial intelligence(인공지능), Regional economic impact(지역경제효과)

ABSTRACT

This study aims to empirically analyze the economic feasibility and educational effectiveness of the Advanced Special-Purpose Vehicle Workforce Training Program implemented in 2025, in order to verify the necessity of vocational education during the ongoing industrial transition. The program, initiated and supported by the government, was designed to respond to the eco-friendly and digital transformation of the mobility industry by promoting the professionalization of the vehicle certification system, strengthening the safety competence for high-voltage electric vehicle components, and enhancing artificial intelligence (AI) and software utilization skills.

The curriculum comprised four major areas: (1) Certified Safety Inspection Training for manufacturers, (2) Certification Process Manager Training, (3) Electric Vehicle High-Voltage Safety Training, and (4) AI and Software Utilization Training. The program targeted approximately 4,600 manufacturers nationwide, requesting at least one participant per company. As a result, a total of 399 individuals participated, achieving a participation rate of 8.67%. The survey results showed an average satisfaction rate of 96.8%, and between 93% and 100% of respondents indicated that “institutionalization of the education program is necessary.” A regression-based summary revealed that perceived institutional necessity ($\beta_1 > 0$), professional competence ($\beta_2 > 0$), and adequacy of training time ($\beta_3 > 0$) had significant positive effects on overall satisfaction, while external economic conditions ($\beta_4 < 0$) had a negative effect ($R^2 \approx 0.75$). These findings suggest that the intrinsic quality factors of the training are key determinants of participants’ perception and satisfaction.

From an economic perspective, the total investment of 215 million KRW generated a cumulative economic ripple effect of 1.799 billion KRW. The benefit-cost ratio (B/C) was calculated as 3.7 for the single year and 4.5 cumulatively over three years, indicating that each 1 KRW of local government funding created approximately 4.5 KRW in economic value. This confirms the high economic feasibility and efficiency of the public educational investment.

Overall, this study empirically demonstrates that the training program effectively enhanced practical capabilities in the industrial field and contributed to regional industrial revitalization. It also emphasizes the necessity of establishing a legalized and standardized certification-based education system. These findings provide a substantive foundation for developing sustainable growth strategies and regional workforce development policies within the advanced mobility industry.

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