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STRUCTURAL ANALYSIS OF THE Y25 BOGIE CHASSIS FOR IBERIAN RAILWAY GAUGE

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Summary: The EU Green Deal aims to increase rail freight transport by 50% by 2030 and 100% by 2050, while overall freight demand is expected to grow by 50% by 2050. However, freight wagons have seen little innovation in recent decades, making them less competitive than road transport. Developing new railway bogies is essential for enhancing efficiency and sustainability. This study focuses on the structural analysis of the Y25 bogie chassis for Iberian gauge, emphasizing a lightweight design to improve performance. The Y25 bogie for Iberian gauge, compatible with interchangeable wheelsets, offers a key advantage in cross-border European rail operations. Optimizing its chassis frame design can significantly reduce manufacturing, maintenance, and energy costs. To achieve this, various frame configurations are evaluated using Finite Element Analysis (FEA) to identify stress concentrations and enhance structural integrity. The study focuses solely on the bogie frame, excluding suspension elements. Compliance with EN 13749 and EN 16235 standards requires careful management of these properties to ensure mechanical performance, dynamic stability, and resonance control. FEA is employed to analyze the effects of thinner HSS sheets on stiffness, deformation, and stress distribution, addressing these challenges. In conclusion, this research aims to enhance the Y25 bogie's efficiency, adaptability, and cost-effectiveness, contributing to lighter, more sustainable, and high-performance rail freight solutions that align with European transport development goals.

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