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FATIGUE ASSESSMENT OF THE PORTUGUESE NEXT-GENERATION SMART WAGONS

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Summary: Rail freight wagons are generally built from welded structural steel plates, demanding robust design and thorough assessment to ensure safe, long-lasting service. In the Portuguese scenario, the next-generation smart freight wagon is examined here, using the design loads defined by the EN 12663-2 standard. The quality and classification of the welded joints follow the EN 15085-3 standard, ensuring compliance with the required weld performance for structural design. Finally, the welded structure's fatigue assessment followed the technical code DVS 1612 to evaluate endurance strength under cyclic loading. A finite element model of the wagon platform was developed to obtain the stress distribution at each welded joint. Subsequently, post-processing relied on the DVS 1612 methodology, wherein the calculated stresses were compared with permissible stress values derived from MKJ diagrams. These diagrams specify allowable stresses based on the stress ratio and the notch case associated with the welded joint configuration. The results of the verification criteria indicated that the proposed design adheres to fatigue safety requirements.

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