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Performance-based standards for South African car-carriers

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Abstract

Until recently, car-carriers in South Africa operated under abnormal load permits allowing a finite relaxation of legal height and length limits. This practice is being phased out, and exemption will only be granted if a car-carrier complies with the Australian Performance-Based Standards (PBS) scheme. A low-speed turning model was developed in Matlab®, and used to benchmark the tail swing performance of the existing South African car-carrier fleet. About 80 per cent of the fleet were shown to not comply with the 0.30 m tail swing limit, due to South Africa's inadequate rear overhang legislation which permits tail swing of up to 1.25 m. TruckSim® was used to conduct detailed PBS assessments of two car-carrier designs. Critical performance areas were identified; most notably yaw damping and tail swing for the truck and tag-trailer combination, and maximum of difference and difference of maxima for the tractor and semitrailer combination. These were remedied through appropriate design modifications. The Matlab® model was shown to be versatile, accurate and efficient, with potential for future application. The TruckSim® assessments highlighted complexities unique to car-carriers in a PBS context and showed how these may be addressed. This research has shown the benefit of PBS for heavy vehicles, and has guided car-carrier design to improve safety.