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The Council for Scientific and Industrial Research (CSIR) has a track record spanning more than 60 years in research, development and innovation. The CSIR was constituted by an Act of Parliament in 1945 as a science council. The organisation's mandate is to increase the competitiveness of industry, while simultaneously improving the quality of life of the people of South Africa. This article deals with research conducted within the appropriate CSIR operating unit, namely CSIR Built Environment.

Boosting Car-Transport Productivity

Research by the Council for Scientific and Industrial Research has revealed that typical car-carrier designs stand to improve in terms of tail swing, rollover risk and gradeability, thanks to new Performance-Based Standards

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This article is based on a paper to be presented at the 32nd South African Transport Conference, 8-11 July, CSIR ICC, Pretoria. Appreciation is expressed to Oliver Naidoo of JC Auditors for the RTMS accreditation data.

The automotive import and export industries have always been strong in South Africa. Judging by the number of new vehicles being imported to and exported from our shores, this is still true. The car-carriers that transport new vehicles, particularly on the Johannesburg—Port Elizabeth and Johannesburg—Durban corridors, are vital to maintaining these industries. Although we may take it for granted, the business of car transport is an important one that is undergoing significant changes.

Car-carriers in South Africa have traditionally operated under a unique regulatory framework. Owing to the nature of the cargo, abnormal load permits have been granted for these vehicles allowing the payload to project in excess of legislated height and length limits. Generally speaking, abnormal load permits are only granted for 'indivisible loads' such as large machinery components, and so the granting of such permits for car-carriers (where the payload is divisible) was only through a special concession.

In 2006, the Abnormal Loads Technical Committee (ALTC) decided that this practice would be phased out. Reasons include concerns of rollover risk (due to the increased height), instances of non-compliance by some operators, and adherence to the indivisible load policy for abnormal load permits. A cut-off date is yet to be confirmed – probably mid-2013 – after which no new concessional permits will be granted.

Recognising the impact that these changes could have on the industry, the Committee proposed a new framework to accommodate over-dimension car-carriers. Firstly, the operator and fleet must be certified with the Road Transport Management System (RTMS), and secondly, the vehicle design must be assessed in accordance with the South African Smart Truck demonstration project (also known as performance-based standards or PBS).

For readers who missed the article 'SA Trucks Get Smart' in the April edition of *Future Trucking and Logistics*, RTMS is a self-accreditation scheme that governs the management of a vehicle fleet in terms of driver hours, vehicle maintenance, overloading etc. PBS, currently a pilot project in South Africa, is an alternative regulatory framework that replaces prescriptive mass and dimension limits with on-road performance requirements. Proposed PBS vehicle designs must undergo a 'PBS assessment' (usually using computer simulation) to prove their compliance with an extensive set of standards developed in Australia.

The Unipower Maxiporter Mk3 car-carrier undergoing field testing. This vehicle is a revised design that meets the PBS requirements.

By the end of 2012, four major car-carrier operators in South Africa had obtained RTMS certification, representing 740 vehicles on the road (including six from a smaller operator). This suggests that the industry is keen to adopt the new framework. To date, PBS assessments of three proposed car-carrier designs have been conducted by the CSIR, some in collaboration with the University of the Witwatersrand (Wits).

CARRIER CHARACTERISTICS

The PBS assessments have highlighted some interesting characteristics of typical South African car-carrier designs; it is worth touching on a few of these. A dominant feature of most existing car-carriers is a large rear overhang (the rearward projection of a truck or trailer's bodywork beyond the rearmost axle group). In a PBS context, this translates into poor performance in the 'tail swing' standard, which is a measure of how much the 'tail' of a vehicle swings out into an adjacent lane during a low-speed turn: a safety risk to other road users and pedestrians.

Research by the CSIR and Wits has shown that the leniency of South African legislation in this regard in fact means that the majority of existing car-carriers designs would fail to meet this standard, and that this would have to be addressed in new car-carrier designs.

One of the ALTC's concerns was increased rollover risk, which in a PBS context is quantified using the 'static rollover threshold' (SRT) standard. Simulations showed the three assessed car-carrier designs to have acceptable SRT performance at maximum payload capacity. Due to the variability of car-carrier payloads, a number of additional load distribution scenarios were considered to determine the least favourable conditions for rollover. In one case, this highlighted the need for upper loading platforms to be lowered when the lower platforms are empty.

It was also identified that typical car-carrier designs may fall short of the requirements for the 'startability' and 'gradeability A' standards, measures of a vehicle's ability to start and to maintain steady forward motion on roads with a steep gradient. Due to their relatively low maximum combination mass, most car-carriers make use of truck-tractors with a 6 x 2 drivetrain configuration. This is an economical option but has limited traction capabilities compared to a 6 x 4, resulting in substandard performance in the two standards. The requirements for these standards have been identified as being surprisingly stringent and are under review. A temporary concession is currently being granted to car-carriers until investigations have been completed.

Looking to the future, it seems likely that the PBS framework (or some derivation thereof) will be in place formally to address the unique characteristics of the car-transport industry. Within such a framework, possibilities exist for higher productivity vehicles to operate on major freight routes, reducing the cost of car transport in South Africa. The Smart Truck Review Panel, the ALTC and provincial authorities are working together to ensure a well-managed, safe and productive car-transport industry in South Africa.

Low-speed turn to assess tail swing and other standards

Rollover test