We need a solution to the PBS tyre problem

The best technical rules have both a 'performance-based' path and a 'prescriptive / deemed-to-comply' path. This principle facilitates innovation (via the 'performance-based' path) whilst allowing the 'usual' solution to be used with minimal cost (via the 'prescriptive path').

The Performance Based Standards (PBS) scheme was developed by the then National Road Transport Commission (NRTC) during the early 2000s. The motivation was to facilitate innovation in vehicle shapes, weights and configurations by defining acceptable safety and infrastructure technical performance. Mainly, it specifies 'performance-based paths' for its four infrastructure standards and 15 safety standards (see https://www.nhvr.gov.au/files/resources/0020-pbsstdsvehassrules.pdf). There are however, 'deemed-to-comply' paths for braking, overtaking and some infrastructure standards.

Australia is the world leader in developing and applying PBS. A significant amount of work was required to develop the technical standards, define acceptable modelling practices, accredited PBS assessors and certifiers, classify roads and develop road-access principles that governments could accept. The Australian PBS technical standards have been adopted, or have been influential in Scandinavia, South Africa and New Zealand.

Australia is now getting substantial productivity and safety benefits from the PBS scheme.

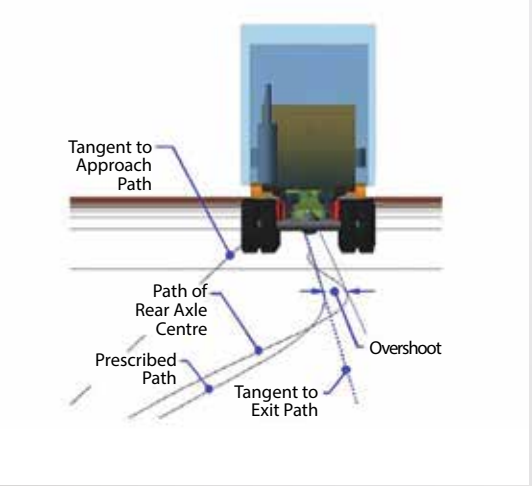
Australian Road Transport Suppliers Association (ARTSA) recently assisted the National Heavy Vehicle Regulator's office to analyse the PBS fleet. ARTSA was able to help because we have access to a redacted version of the national heavy-vehicle VIN database (called NEVDIS). ARTSA is intensely proud that it can work collaboratively with government and add value to the official vehicle data records.

A copy of the joint NHVR and ARTSA PBS report is at:
https://www.nhvr.gov.au/files/201805-0795-nhvr-artsa-pbs-report-may-2018.pdf

Some significant information contained in the report is:

- 55 per cent of all approved combinations are truck and dog combinations.
- 11 per cent of 3- and 4-axle prime movers built in 2017 are PBS approved.
- PBS vehicles made up 17 per cent of the heavy-duty (GVM or ATM > 12t) market segment.
- The median age of the PBS fleet is 3.6 years whereas the median age of the total heavy vehicle fleet is 12.2 years. Median age is an indicator of likely safety features!

So the PBS scheme is now of significant importance to our industry. It provides a path for innovation. Of fundamental importance is that it has provided governments with a reference framework for assessing the safety of novel vehicles. Without this governments would fear the community backlash for allowing longer and heavier vehicles onto roads without adequate consideration and community benefit. It is fundamentally important that the PBS technical standards are adequate to provide government with that level of confidence.



A significant technical problem exists with tyre performance classification. This problem mainly concerns combination vehicles that have at least one drawbar coupling. PBS requires simulation or test of high-speed transient off-tracking (lane change manoeuvre) and yaw damping. The illustration shows definitions for the PBS lane change manoeuvre test / simulation. If the vehicle contains a drawbar trailer then the cornering stiffness of the tyres is a key determinant of this performance.

PBS has trouble with tyres. The standards were developed based on vehicle simulations assuming a best-in-class tyre. The Australian Road Research Board has developed a world-class test trailer that can be used to test the cornering stiffness and other truck / trailer tyre performance measures. Tests of many tyres in the Australian marketplace have shown that the cornering stiffness (which is measured as kN/degree of steering angle) differ over a range of 2:1. That is, the cornering stiffness of a best-in-class tyre is about double that of a worst-in-class tyre. Consequently tyre choice is likely to determine compliance by vehicle types that can have a transient off tracking problem. Such vehicle types are very likely to include a drawbar trailer.

There are several aspects to the PBS tyre problem: There is no international technical standard that can be adopted for PBS. UN ECE Regulation 54 does apply to commercial-vehicle tyres; however, it is mainly concerned with dimensions and load ratings. It is silent about cornering stiffness.

Australian requirements are above the international requirements!

PBS Assessors tend to use proprietary information when a particular tyre is modelled. The information may come from a test or it may be declared by the tyre supplier. Either way there is no 'certification' of performance. Furthermore, the tyre pressure underpinning the claimed performance may be unknown or undeclared. The operator is left in limbo because the PBS approval can be dependent on a specific tyre being fitted. What happens when the tyre needs to be changed in Woop-Woop north? Tyres wear and they get retreaded. Maybe this changes the tyre cornering stiffness. Is a worn or retreaded tyre acceptable?

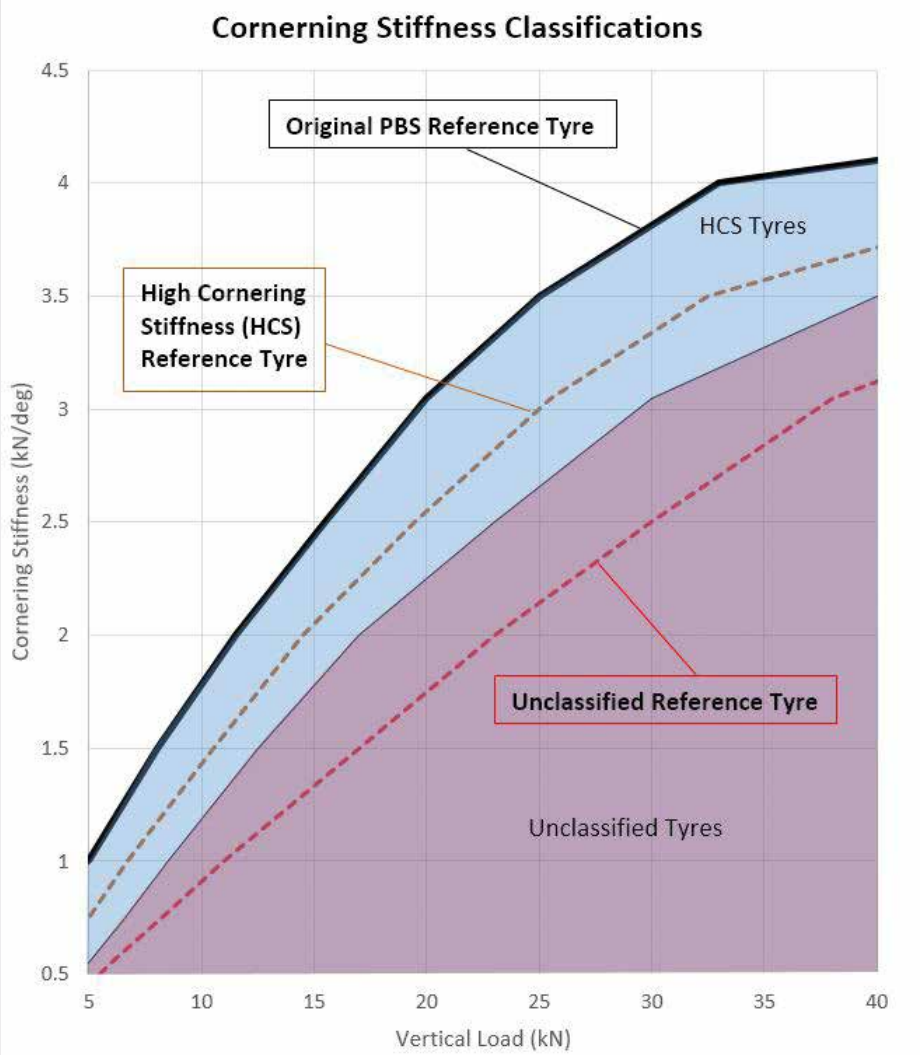
The need to legally use a specific tyre is causing much angst for operators and equipment suppliers. In many instances the requirement is ignored.

Here are the four options for resolving the PBS tyre problem:

1. Do nothing new. Have PBS approvals list the tyre(s) that must be fitted for the approval to be valid.
2. Introduce a tyre classification scheme. Tyres would be categorised as: Generic or High Cornering Stiffness (HCS). The classification shown on the graph could be used.
3. Exclude tyres from PBS considerations. PBS Assessors could be directed to use specified tyre cornering parameters when simulating vehicles. The parameters would be set to model say an 'average' tyre performance. The PBS transient off-tracking and yaw damping standards would need to be rewritten.
4. Exclude tyres from PBS specification if all the trailers have a working Central Tyre Inflation (CTI) system.

The justification for requiring tyres to be classified and modelled (Options 1 & 2) is that the PBS transient off-tracking and yaw-damping performance are fundamentally important for road-safety. The safety risk is mainly with vehicles that contain a drawbar trailer.

The justification for Option 3 is that there will still be some dimensional limitations



that will be needed to achieve the modified high speed transient off-tracking and yaw damping PBS standards, so there will still be some safety benefit. In my view Option 3 is only acceptable for vehicles that do not contain a drawbar trailer. If tyres are excused for drawbar-trailer vehicles then the safety performance of these PBS combinations will be lessened. The risk is a loss of confidence by government and the public about the value of the PBS scheme.

The justification for Option 4 is that a CTI can deliver improved safety performance. It is well known that a tyre that is appropriately inflated according to the load it carries will achieve better braking adhesion and sidewall stiffness than an underinflated tyre. This option will provide a safety benefit via a 'deemed-to-comply' path.

I favour allowing all four options, but in pairs! Options 1 and 2 provide the 'performance-based' path. That is, the tyre must have been tested. If a classified tyre is specified then the Assessor must use the specified tyre class parameters. If a classified tyre is not good enough then a specific tyre can be specified using its particular cornering parameters. Option 1 ties the permit to a specific tyre whereas Option 2 allows any appropriately classified tyre to be used.

Option 3 should be acceptable for combinations that do not contain a drawbar trailer. Otherwise Option 4 should be acceptable.

Revision of the PBS scheme to fix the tyre problem is urgently needed. I urge regulators to provide both a 'performance-based' path (Options 1 + 2) and a deemed-to-comply path (Options 3 + 4) to fix it.

Dr Peter Hart
Chairman, ARTSA