CHRIS KONIDITSIOTIS

Safely delivering untapped heavy vehicle mass productivity

When I began my transport portfolio career as a graduate engineer, I was promptly informed that a heavy vehicle's mass is a key consideration in the design and maintenance of our transport infrastructure networks. Indeed, there was a co-dependency between the pavement, bridge, and culvert structure and the length, axle group spacing, and mass of both the axle groups and the heavy vehicle as a whole.

The general policy was (and in many aspects continues to be) that we structurally build infrastructure to accommodate a suite of heavy vehicle types with maximum mass limits. We expect industry operators to, among other things, load a heavy vehicle within the set mass limits.

As a young engineer with responsibility in the traffic loading and the development of national design guides and standards; the integrity, accuracy, and frequency of available mass information were at best an estimate. Routine or day-to-day collection of heavy vehicle mass data was limited to on-road weigh-in-motion systems used in research initiatives and key projects. These initiatives and projects were limited in number due to the fiscal capacity to weigh heavy vehicles. Furthermore, such investment in heavy vehicle mass data was dependent on individual champions in road transport agencies and associated research and academic institutes. To put it simply, we had limited information and hence visibility to quantify the actual traffic loading.

Given the context and environment, we adopted a more conservative approach to considering heavy vehicle traffic loading in developing the design and maintenance guides and standards.

In the case of bridge design, load safety factors of 2 were adopted and for pavements, average traffic load distributions were embraced — one for rural and one for urban networks. The design guides and standards could be applied for specific traffic loading; however, the issue was such data was simply not routinely available.

So, 35 years ago we dreamt of the day when we would routinely have access to heavy vehicle mass information with integrity and associated accuracy, and a frequency that provided insight, allowing us to address directly the contribution of mass to the design and maintenance of our transport infrastructure.

Thus, today I pose myself the question — have we arrived and achieved our goal of more readily available heavy vehicle mass data? Has the journey that we have travelled over the past three decades reached its destination?

My answer is — yes, we have arrived, however, do we really understand that we have arrived?

A range of on-road weigh-in-motion systems and acquisition models are now commercially available in Australia. We have both national and regional specifications. We have widespread networks of high-speed weigh-in-motion systems used for a myriad of different purposes. We have progressed from not only using high-speed weigh-in-motion as a pre-screen for compliance and enforcement but now to be able to deliver direct enforcement.

We also have in-vehicle technologies, commercially available and readily used by the heavy vehicle industry. Also available are national specifications with recognised accuracy and integrity that are routinely used by transport operators, regulators, and road managers to achieve their private and public policy needs.

The integrity and accuracy in the collection of mass information are now readily and commercially available for routine traffic load and individual heavy vehicles. Routinely, transport operators are adopting in-vehicle technologies to accurately measure axle group and gross vehicle mass, furthermore, the weigh-in-motion networks are now greater in number and use across the road network.

However, this advance in technology and associated public and private investment is not fully utilised. Rather, it is predominately driven by responses to ensure compliance to mass loading obligations. That is, these advances are used to continue to fulfill the industry operators' obligations to load a heavy vehicle within the set mass limits.

It is not that I am questioning this foundational use; however, I want to go back to the start, to when I started in the transport portfolio, due to the lack of availability, our mass limits were by necessity, conservative. Today we need to rethink and re-evaluate our approach and consider the fact that we have readily available mass information and acknowledge its immensely improved accuracy and integrity. We are so much better informed!

What we dreamt of 30 years ago is now available. Are we today, taking full advantage of this capability or are we still using conservative approaches as if we are stuck in the past? My thesis is that we need to, as a minimum, be aware of the now available capability as this provides us with a whole new set of opportunities. This technical capability can permit us to improve our design and maintenance, and now, in addition, how we operate our networks to improve both safety and productivity.

So, what does this entail? What are the next steps?

The development of traffic loading inputs to the design and maintenance of infrastructure has traditionally been based on scare data. Hence a conservative approach has been built into the guides and standards, arguably for legitimate reasons. The readily available traffic data now provides an opportunity, and, I would argue an obligation, to revisit our guides and standards. To effectively revisit the traffic loading inputs and do what we dreamt of 30 years ago. Traffic loading assumptions and associated safety margins can be re-assessed in light of the more accurate and readily available data.

Secondly, the use of in-vehicle on-board mass systems for the first time permits the specialised operation of a heavy vehicle on the road network. Rather than a one-size-fits-all approach, based on conservative loading distributions, or in the case of bridges, high order load safety factors, because the transport operator is making available the actual mass of their vehicle, access arrangements can be customised.

It is recognised that heavy vehicle mass monitoring is opening doors to improve access to parts of the network or provide increased mas on existing routes. For example, bridge guides and standards have been changed to provide load safety factors of 1.8 (rather than 2), subject to the capacity of the structure and the use of on-board mass with regulatory telematics. However, for the most part this still remains very specialised.

The challenge is for road managers and regulators to consider this practice the norm rather than the exception.

On-board mass systems provide the opportunity to significantly increase network and commercial productivity and, just as importantly, not compromise safety. This being achieved by the transport operator providing vehicle- specific mass information.

Australia has a world leading position concerning road transport heavy vehicle types, mass monitoring technologies and telematics. The challenge for road managers, regulators and operators is to work together to safely deliver the untapped mass productivity gains.

Chris Koniditsiotis
ARTSA, Life Member
President, International Society for Weigh in Motion

McColl's showcases a new Tieman built 26-metre tanker for its farm milk division.