AUSTRALIAN EXPERIENCE WITH VEHICLE STANDARDS

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ABSTRACT

This paper reviews the development of vehicle standards for safety and environmental protection in Australia, considers the role of research in these standards and considers ways of making research more implementable. It is concluded that a three-level system of vehicle standards is desirable: design rules, in-service rules (both mandatory) and codes of practice (advisory). Research has been successfully implemented initially in advisory standards which have been subsequently incorporated in mandatory requirements. Research tends to be more implementable when it is customer-driven, carried out co-operatively with customers and involves active combination of traditional academic disciplines. It is most successfully implemented in the environment in which it was initiated and carried out

INTRODUCTION

Like many countries, Australia has a system for determining and implementing vehicle standards to assure at least minimum levels of safety, emissions control and security. Australia perhaps differs from other countries in that

(i) as an enterprising island continent we developed some unique standards

(ii) as a small economy we import vehicles or components from all over the world

(iii) as a vast country we developed some unique types of truck

(iv) as a federation we traditionally vested vehicle legislative authority with individual States and

(v) as a bureaucracy we developed a multitude of regulations affecting vehicle manufacturers, owners and operators.

In this paper, I would like to draw out some of the more interesting aspects, both good and bad, of our experience with truck standards and to look at the role research may have played. In doing so, I shall note some changing environments in Australia with respect to the national economy, federal-state division of responsibilities, the transport industry and the research community. I shall finally consider ways of making research implementable.

VEHICLE STANDARDS

For over 20 years, Australia has operated design standards for new vehicles (Australian Design Rules - ADR's) and in-service standards for existing vehicles (Consolidated Draft Regulations - CDR's). In recent times, the ADR's and CDR's were combined where possible and were "harmonised" with overseas standards, particularly the UN Economic Commission for Europe (ECE) Regulations. We have also seen major changes in the administration of the rules and, perhaps most interesting of all, a significantly increased emphasis in the heavy vehicles areas.

TRUCK ADR'S

The most significant ADR's relating to heavy trucks and trailers, and their dates of implementation, are as follows:

ADR28A	Motor Vehicle Noise	1980
ADR30	Diesel Engine Smoke Emissions	1976
ADR35A	Braking Systems - Commercial Vehicles	1980
ADR38	Heavy Trailer Braking Systems	1985

In 1986, Third Edition ADR's (Federal Department of Transport 1986) were introduced, adding the following ADR's which, in part, affect heavy trucks and trailers.

ADR42 General Safety Requirements

(includes semi-trailer rear bumpers and wheelguards)

ADR43 Vehicle Configuration and Marking

(includes compliance plates, vehicle dimensions, suspensions)

ADR44 Specific Purpose Vehicle Requirements

(includes coupling requirements and road train dimensions and mechanical requirements).

(Prior to 1988, a number of these "new" rules rested in the CDR's).

These rules are still in a state of transition, both technically and administratively. On the technical side, the braking ADR's (35A and 38) have always suffered from incompatibility between tractor and trailer brakes and efforts have been made to align with the European standard. These efforts are now coming to fruition. A major effort has also been made in the road train and B-double areas, and a package of new ADR's covering

- mechanical connections
- trailers for road trains
- tractors for road trains and B-doubles
- marking and plating (gross capacity)

is about to be implemented.

Other rulemaking activities have been in the pipeline for some time. Requirements for truck seat belts have been strengthened and rationalised to encourage wearing of the belts and will be introduced in 1991. Requirements for truck tyre performance and selection are being included in the existing ADR24 and will accept tyres meeting current Australian, US, ECE or Japanese standards. Slow progress is being made with cab rollover strength and rear under-run protection.

There is an increasing recognition that effective vehicle standards must go back to the manufacturing stage, and that this places less demands on administering authorities in the long run. However, such rules require long lead times for their introduction (up to two years) and there is a need to cover vehicles already in service. For these reasons, Australia is introducing Australian In-Service Rules (AIR's) which will cover existing vehicles and, inter alia, matters relating to vehicles in combination, such as offtracking. It is also intended to have a third level of rules to cover more specific areas such as drawbars and dollies. This third level will be called Codes of Practice.

The development of standards at each of the above three levels requires co-operation between governments, industry, road user groups and researchers. The ADR system originated in a more crusading era when governments were supportive of the safety issues raised by road user groups and researchers, and were prepared to impose new rules on industry. Today, governments place the economy first and are reluctant to impose new standards. Nevertheless, Australian vehicle standards continue to be overseen by the

national Vehicle Standards Advisory Committee, which includes representation from federal and state governments, industry, road user groups, professional groups, researchers and academia. The onus is firmly on the vehicle manufacturer and this in turn gives the manufacturer groups great power to over-ride initiatives on the grounds of impracticality or cost.

The administration of vehicle rules has rested with the states, and it has been by no means automatic for all states to place a particular ADR in legislation (Pearson 1987). This has created problems of non-uniformity. A major change is now taking place in that Federal legislation on Vehicle Standards has been passed by the House of Representatives and is expected to pass the Senate within days of the time of writing. This will mean that ADR's will be enforced nationally for the first time. Partly because of the administrative burden of the ADR's, there was only token resistance by the states to this transferral of powers to the federal government. AIR's will, however, remain with the states.

RESEARCH ROLE

Research in Australia tends to be a public sector activity. While manufacturers have limited research capabilities in Australia, plus access to parent-company facilities overseas, most heavy vehicle research is done by government agencies (e.g. Federal Office of Road Safety), public sector corporations (e.g. National Association of Australian State Road Authorities), research organisations (e.g. ARRB), consultants or universities.

This has affected the area of influence that research has had in Australia. It has tended to affect vehicles in use rather than at the design stage, because that has been the environment in which research has been carried out.

There is also the question of the level of research: is it of a fundamental knowledge-producing type, to fill a particular need, or review? Within changing attitudes to research funding, there is less and less opportunity for fundamental research and research now has to be more fully driven by customer needs.

How did research contribute to the ADR's?

The braking ADR's, 35A and 38, were driven by a widely-perceived need to improve truck braking and broke new ground in that they departed from both ECE and US Federal Motor Vehicle Safety Standards (FMVSS). Limited research was carried out, both to settle some technical issues and to try and draft requirements. However, the rules have been widely criticised and have eventually, with the aid of further research, moved closer to the Europeans. The performance requirements have always been, and continue to be, inferior to the European requirements. This is, of course, a very difficult area complicated by the mix of European and US-sourced vehicle designs used in Australia, and the fundamentally different braking philosophies in evidence in Europe and the US.

The more mundane ADR's affecting combination vehicle dimensions, configurations, suspensions, couplings and conspicuity have been more successful. These have achieved improvements in performance, have been widely implemented, and have been fairly well accepted by industry. These rules have tended to start out as design-restrictive formulations in some cases and then to move towards performance-based requirements as research results have become available. This research has been specifically directed at needs which have been identified in industry-government forums. For example, ARRB's coupling research was initiated by the NAASRA Road Train Working Party, and suspension research was initiated by the NAASRA Economics of Road Vehicle Limits (ERVL) Study. In some cases, the research findings were first implemented through Standards Australia's non-mandatory technical standards which are developed on a professional basis and may subsequently be called up in legislation. These Australian Standards are somewhat analogous to SAE and ASTM standards in the US, or ISO standards. Good examples also occur in Germany with its DIN standards and, at a more comprehensive and complex level, TUV procedures.

MAKING RESEARCH IMPLEMENTABLE

We can also look at the research role from the opposite direction. What research do we have which is not implemented in standards? In Australia, and I suspect in other countries, there is a great deal. From my own experience, ARRB's work on heavy vehicle stability is only

now beginning the process of entering an Australian Standard.

Similarly, ARRB's research on suspensions is only partly implemented, despite persistent efforts from the researchers' end. There must be some good reasons for this situation:

. Technical complexity - this deters government agencies and industry alike and increases when researchers work in isolation

. Lack of deadlines - one well-known Australian source multiplies researchers' time estimates by a factor of 2.5

. Cost to industry - this has become an over-riding factor

. Lack of planned implementation path - "someone in the government" will not do this for the researcher

. Interface issues - the interfaces between traditional academic disciplines provide interesting - and necessary - areas for research but lead to additional problems in the above areas of complexity and implementation; expertise tends to reside in traditional disciplines and tends to be maintained through research within those disciplines.

Based on the Australian experience, research into heavy truck performance and size-and-weight limits can be better implemented under the following conditions:

(i) Research is driven by customer needs

(ii) Research needs are identified by industry/government forums

(iii) Researchers do not work in isolation from their customers

(iv) Traditional academic disciplines are actively combined and implementation paths planned

(v) Deadlines are met

(vi) Results are implemented initially in non-mandatory technical standards

DISCUSSION

There is no doubt that the design rule process is a difficult and time consuming exercise. However, there is a need for mandatory requirements at the design stage where issues of safety and environmental protection are involved, and there is no economic incentive for the required design measures. To support these design rules, additional mandatory in-service rules are needed to cover the long lead times of design rules and matters relating to vehicles in combination.

Codes of practice, which are not mandatory, are also needed to cover more specialised areas and could also provide a useful breeding ground for design rules. As it would appear that research needs are best identified, and that research is best implemented, in a professionally-based industry-government forum, the use of advisory technical standards should be developed much more as an avenue to effective vehicle standards. The work of the Technischer Uberwachungs Verein (TUV) in Germany is of particular interest. This commercially-based technical quality assurance organisation develops performance tests for a wide range of heavy vehicle characteristics, among other areas of activity.

While research clearly has an important role in the development of design rules, more effort in the development of non-mandatory technical standards or codes of practice appears to be the most effective use of scarce research resources.

CONCLUSIONS

After many years of evolution, and with an increasing emphasis in the heavy vehicle area, Australia has arrived at a three-level system of vehicle standards: design rules, in-service rules (both mandatory) and codes of practice (advisory).

Research has been most successfully implemented initially in advisory standards and subsequently incorporated in mandatory requirements. There are some interesting overseas

models for further developing non-mandatory technical standards (e.g. the German TUV).

Research tends to be more implementable when it is customer-driven, carried out co-operatively with customers and involves active combination of traditional academic disciplines. It is most successfully implemented in the environment in which it was initiated and carried out.

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