

REVIEW OF AUSTRALIAN NCAP SINCE ESV 1998

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ABSTRACT

The Australian New Car Assessment Program (ANCAP) last reported on progress at ESV 1998 in Canada. This is an update of results since then. In 1999 ANCAP decided to harmonise its testing and evaluation procedures with EuroNCAP (ENCAP). This was so ANCAP could use the results of ENCAP testing on European vehicles where the vehicle specifications were essentially similar to those of the Australian model, thereby reducing the number and cost of tests required to produce consumer information.

Since 1998 there has generally been an improvement in the crash test performance of new passenger vehicles sold in the Australian market. ANCAP has carried out updates of the small, medium and large car groups, and of four wheel drive (4WD) vehicles (SUVs). The new designs in the 4WD group particularly have shown a dramatic improvement in occupant safety as measured by crash tests. These include good results for the Honda CRV, Subaru Forester and Toyota Landcruiser. The four locally-built Australian large cars have also improved, but not to the top level. Small car crash test performance has been more variable, depending on the technology used in the structure and the safety equipment fitted, which is usually price driven. Future programs include commercial vehicles, a large car update and a passenger van update.

1. INTRODUCTION

1.1 What is ANCAP?

The Australian New Car Assessment Program (ANCAP) gives consumers consistent information on the occupant protection level of vehicles in serious front and side crashes. The program is supported by Australian and New Zealand automobile clubs, the State government road and transport authorities in Queensland, NSW, Western Australia and South Australia, the New Zealand Government and the Australian Federal Government. Crash testing for consumer information is also carried out in Japan, Korea, Europe and the USA.

ANCAP began crash testing vehicles in 1992, issued its first results for consumers in 1993 and last reported on progress internationally in 1998. Shortly after the last ESV conference in 1998, ANCAP decided to harmonise its test protocols and evaluation procedures with ENCAP. This was done to give vehicle manufacturers one target to aim at and to enable the respective NCAPs to exchange information on vehicle models where vehicles of essentially the same engineering design are sold in Europe and Australia.

1.2 ENCAP Tests

Each vehicle model tested in Australian NCAP is subjected to an offset crash test into a barrier, a side impact test and a pedestrian impact test.

The vehicles purchased for the test program were typical of those available to new car purchasers. The offset frontal crash test into a fixed barrier is conducted at a speed of 64 km/h. In this test, crash forces are concentrated on the driver's side of the vehicle. Forty per cent of the width of the car initially makes contact with the barrier, which has a crushable aluminium face on it. This simulates colliding with another vehicle.

The side impact test consists of running a 950kg trolley into the driver's side of the test vehicle at 50km/h. The trolley has a crushable aluminium face to simulate the front of another vehicle.

The pedestrian impact test estimates injuries to pedestrians struck by a vehicle travelling at 40km/h.

1.3 Australian Vehicle Market

The Australian vehicle market is currently split about 31% local manufacture, 69% imports (VFACTS December 2000). While the majority of the imports are sourced from Japan, there is an increasing import volume sourced from Europe, so harmonising and exchanging crash test data allows more vehicle ratings to be provided to consumers at a lower cost.

ANCAP has now tested the main groups of vehicle types several times and is therefore able to monitor

crash test outcomes over several iterations of the same vehicle model. This paper compares results obtained around the last ESV conference with more recent data and makes estimates of the improvements over that time frame.

2. VEHICLE MARKET ANALYSIS

By far the largest sales volumes in the Australian market are in the small and large car categories. Large car sales are driven by the fleet car market, as there are significant tax benefits available to employers and employees by packaging a vehicle as part of a salary agreement. Overall, about 50% of new vehicle sales in Australia are to fleets, with fleet sales of the Holden Commodore and Ford Falcon constituting about 70% of their totals.

In contrast, most sales of small cars are to private owners, leaving the medium car group with little room to move in the market. As a result, there are very few models available in the medium category and this has usually been combined with the large car group. Updates of the large/medium and small groups have been undertaken since 1998.

Light trucks comprise 28% of the passenger market but are broken up over many types and models, including four wheel drive (4WD) vehicles (SUVs) and utilities (pickups), both two and four wheel drive versions. The small and medium 4WD groups have shown significant growth and the Toyota Landcruiser is consistently a top selling model in the 4WD segment, so an update of the 4WD category was undertaken in 1998/99.

Utility sales comprise about 11% of the market, split roughly 55/45% between two and four wheel drive versions. Although this is a significant part of the market, most of the 4WD models have an H point so high that they are excluded from the ENCAP procedure. ANCAP has raised this issue with ENCAP for consideration by the technical committee, as many of these models are used as passenger vehicles in Australia. This group has not been tested for some years. Previous tests have shown generally a poor level of occupant protection.

Passenger vans similarly have not been tested for some years, as they form a small part of the Australian market. However, the recent release of some smaller, cheaper vans from Korea has resulted in increased sales and this class of vehicle needs to be tested in the near future.

3. RESULTS COMPARISONS

Comparisons have been made between the results from the groups last reviewed at ESV and the latest results available. In the small car group particularly, the data have been significantly expanded by the addition of ENCAP data on a range of models which would not otherwise have been tested in the Australian program, as their sales and/or price would have precluded them from selection under the program guidelines.

3.1. Small Cars

From the data in Table 1 it can be seen that the average HIC has reduced from 717 to 424 and the average life threatening injury risk (LTIR), developed by NHTSA and based on head and chest injury measures, has reduced from 19.4% to 12.3% from 1998 to 2000. This represents reductions of 41% and 36% respectively. When sales-weighted using 1998 and 2000 vehicle model sales figures (VFACTS December 1998, VFACTS December 2000), the reductions become 30% and 37% respectively.

It can therefore be seen that there have been significant improvements in the safety levels of small cars sold in Australia over the relatively short period of three years since the last ESV conference.

3.2. 4WD Vehicles

Table 2 summarises the data on 4WD offset crash tests from pre- and post-1998. Again we can see a significant difference between the two groups. The average HIC and LTIR of the post-1998 group are 49% and 48% lower respectively than the pre-1998 group. On a sales-weighted basis, the post-1998 results are 42% and 37% lower than the pre-1998.

These types of vehicles have been growing rapidly in sales in both the US and Australia as owners buy and use them as urban passenger cars. The passenger market share of 4WDs in Australia has risen from 8.7% in 1994 to 19% in 2000. Manufacturers have responded by installing the same level of equipment in these vehicles as is fitted to conventional vehicles, such as air conditioning, CD players, electric seats and windows etc, but have also recently upgraded the safety systems, including advanced seatbelts and airbags. These systems are obviously achieving better crash test results in the later model vehicles. Another rapid market shift has been towards the light, or "all-road", 4WD-type of vehicle, which is smaller and lighter than the full-sized group (exemplified by the Toyota Landcruiser). These smaller vehicles are

not as capable off-road as the large 4WDs, but are much better performers in urban conditions where the large majority of 4WDs are used. Some of them, for example the Subaru Forester, are based on car designs with good crash test performance, so their occupant protection systems perform similarly well.

3.3. Large/Medium Cars

Table 3 summarises the large and medium car results. While not all the data were available at the time of writing this paper, the data that is available shows that there has been an improvement in occupant protection levels in these more recent models compared to the vehicles from pre-1998.

The Australian built Holden Commodore and Toyota Avalon have side airbags available, but they are not yet standard equipment. None of the other locally built cars have side airbags available, but all now have a driver airbag as standard equipment, and a passenger airbag available as an option except in the Toyota Camry base models.

4. HARMONISATION OF NCAP

In 1999 ANCAP decided to harmonise its testing and evaluation procedures with ENCAP. This was so ANCAP could use the results of ENCAP testing on European vehicles where the vehicle specifications were essentially similar to those of the Australian model, thereby reducing the number and cost of tests required to produce consumer information.

4.1 Small Cars

In July and November 2000 ANCAP released fully harmonised test results on small cars. Six vehicles were tested locally while nine existing results from ENCAP were reproduced on vehicles which had a similar specification to the Australian model. The combined results for frontal and side impact tests for these vehicles are shown in tables 4 and 5 while the results for pedestrian impact test are shown in tables 6 and 7.

Table 4.
Frontal/Side Impact - ANCAP

Vehicle Make & Model	Occupant Rating
Daihatsu Sirion	***
Hyundai Accent	***
Mazda 323/Ford Laser	***
Nissan Pulsar	**
Daewoo Nubira	**
Daewoo Lanos	*

Table 5.
Frontal/Side Impact - ENCAP

Vehicle Make & Model	Occupant Rating
Toyota Echo (Yaris) (LHD)	****
Mercedes Benz A140 (LHD)	****
Audi A3	****
Holden (Vauxhall) Astra	****
Peugeot 206 (LHD)	****
VW Golf (LHD)	****
Toyota Corolla (LHD)	***
Peugeot 306	***
Ford KA (LHD)	***

Table 6.
Pedestrian Impact - ANCAP

Vehicle Make & Model	Pedestrian Rating
Mazda 323/Ford Laser	***
Nissan Pulsar	***
Daihatsu Sirion	**
Daewoo Lanos	**
Daewoo Nubira	**
Hyundai Accent	**

Table 7.
Pedestrian Impact - ENCAP

Vehicle Make & Model	Pedestrian Rating
VW Golf	**
Toyota Corolla	**
Peugeot 206	**
Toyota Echo	**
Audi A3	**
Ford KA	*
Holden (Vauxhall) Astra	*
Peugeot 306	*

4.2 4WD Vehicles

In Australia the four wheel drive market has several distinct groups including medium size and large. These vehicles were last tested in April 1999 but have not been retested under the ENCAP protocol due to their relatively high H point for the side impact test.

This is a rapidly growing segment of the Australian market as most four wheel drives are used on road as passenger vehicles.

4.3 Large/Medium Cars

In November 1999 ANCAP released its first set of results after introducing the ENCAP side impact test. Four vehicles were tested locally to the existing ANCAP offset frontal test and new side impact test while two applicable results from ENCAP tests were reproduced. The ENCAP pedestrian test was introduced to Australia in early 2000.

The combined results for frontal and side impact tests on these vehicles is shown in table 8.

Table 8.
Frontal/Side Impact ANCAP & ENCAP

Vehicle Make & Model	Occupant Rating
Subaru Liberty	****
Volvo S40 (ENCAP)	****
Mazda 626	***
Holden Vectra (ENCAP)	***
Daewoo Leganza	**
Hyundai Sonata	**

5. FORWARD TEST PROGRAM

As a result of harmonising with ENCAP a three year rolling forward model test program has been produced. This program aligns with ENCAP plans where possible in order to maximise opportunities to exchange relevant results. The current program plan through to the end of 2003 is summarised below:

- 2001 - Large cars (completed in May 2001)
 - Work utilities (two wheel drive)
 - Small cars (phase III)
- 2002 - People movers
 - Four wheel drives (medium size)
- 2003 - Work utilities (four wheel drive)
 - Small cars

The market segments requiring the most ANCAP resources are small cars and four wheel drives (both passenger carrying wagons and work utilities).

6. CONCLUSIONS

The occupant protection levels of new small, medium, large and 4WD vehicles in Australia have increased significantly over the three years since

ANCAP results were reported at the last ESV conference. The introduction of a new 56kmh⁻¹ offset crash test design rule in Australia (ADR 73/00) based on the UN ECE Reg 94/01 would have had some effect. However, many of the vehicles tested since as far back as 1995 have been shown to be well under the dummy criteria required by the ADR 73/00 procedure at the higher ANCAP test speed of 64 kmh⁻¹.

This shows that vehicle manufacturers are improving the occupant safety of their vehicle designs in response to consumer rating programs for vehicle safety such as ANCAP, JNCAP, US NCAP, IIHS and ENCAP.

REFERENCES

- VFACTS December 1998, compiled by GE Capital Solutions for FCAI
- VFACTS December 2000, compiled by Polk Australia P/L for FCAI

TABLES

Table 1.
Driver Dummy HIC and Risk of Life Threatening Injury Results from ANCAP and EuroNCAP Offset Tests

Vehicle	Build Year	HIC	LTIR %	Vehicle	Build Year	HIC	LTIR %
Daewoo Lanos (A)	1997	898	24	Toyota Corolla (E)	1997	487	7
Daewoo Nubira (A)	1997	763	16	Ford Ka (E)	2000	377	
Daihatsu Charade (A)	1996	490	12	Toyota Echo /Yaris (E)	2000	436	3
Daihatsu Sirion (A)	1998	937	35	Daewoo Nubira (A)	1999	210	10
Ford Laser /Mazda 323 (A)	1996	750	20	Nissan Pulsar (A)	2000	609	17
Holden (GM) Barina (A)	1995	307	13	VW Golf (E)	1998	283	12
Honda Civic (A)	1995	405	10	Mazda 323/ Ford Laser (A)	1999	471	17
Hyundai Lantra (A)	1995	1199	41	Audi A-3 (E)	1997	233	12
Kia Mentor (A)	1998	997	24	Mercedes A160 (E)	1999	451	
Mazda 121 Metro (A)	1997	455	14	Peugeot 206 (E)	2000	483	4
Mitsubishi Mirage/Lancer (A)	1996	508	11	Daihatsu Sirion (A)	2000	637	24
Nissan Pulsar (A)	1995	487	16	Holden/Vauxhall Astra (E)	1999	444	12
Suzuki Baleno (A)	1996	1044	16	Peugeot 306 (E)	1997	479	10
Toyota Starlet (A)	1996	802	19	Hyundai Accent (A)	2000	340	7
				Daewoo Nubira (A)	1999	210	10
Averages		717	19.4			424	12.3
				<i>Reduction in injury potential %</i>		41	36

Table 2.
4WD (SUV) results

Vehicle	Build Year	HIC	LTIR %	Vehicle	Build Year	HIC	LTIR %
Toyota Landcruiser*	1994	929	28	Toyota Landcruiser	1998	582	10
Mitsubishi Pajero*	1994	780	13	Subaru Forester	1998	257	9
Nissan Patrol*	1993	897	18	Honda CR-V	1999	617	23
Suzuki Vitara*	1994	646	24				
Kia Sportage	1997	1293	47				
Toyota RAV4	1997	1018	28				
Averages		927	26			485	14
				<i>Reduction in injury potential %</i>		48	47

Table 3.
Large/medium car results

Vehicle	Build Year	HIC	LTIR %	Vehicle	Build Year	HIC	LTIR %
Ford Falcon (A)	1998	598	13	Ford Falcon (A)	2000	These	data
Holden (GM) Commodore (A)	1997	510	13	Holden (GM) Commodore (A)	2000	to	
Toyota Camry (A)	1997	700	13	Toyota Camry (A)	2000	be	announced
Mitsubishi Magna (Diamante) (A)	1996	908	20	Mitsubishi Magna (Diamante) (A)	2000	at	
Subaru Liberty (A)	1994	960	26	Toyota Avalon (A)	2001		conference
Holden Vectra (E)	1996	572		Subaru Liberty (A)	1999	433	8
Honda Accord	1996	877	20	Daewoo Leganza (A)	1998	288	12
				Mazda 626	1998	455	10
Averages		732	15				
				<i>Reduction in injury potential %</i>			

Notes *offset test conducted at 60 kmh⁻¹
 (A) ANCAP test
 (E) EuroNCAP test
 LTIR - Life threatening injury risk based on HIC and chest g