

Technology Trends in the North American Market

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1. Conditions in the NAFTA automobile market

The North American Free Trade Agreement (NAFTA) area is a huge and important market for automakers. By way of example, sales of new passenger cars and light-duty trucks in 2003 totaled about 16,680,000 units in the United States (US), 1,590,000 units in Canada, and 1,540,000 units in Mexico. Mitsubishi Motors Corporation (MMC) is among the automakers for which the NAFTA market is important; MMC sold 270,000 new vehicles in this market in 2003.

In the US, light-duty trucks, which include Sports Utility Vehicles (SUVs) and pickups, remain extremely popular; they accounted for 53.2 % of new-vehicle sales in 2003. If data on new-vehicle sales are analyzed, the preferences of US automobile users become apparent. Examination of data on numbers of cylinders and drivetrain configurations of new vehicles sold in the first six months of 2004 (Fig. 1) reveals that four- and six-cylinder engines and front-wheel drive (FWD) were predominant among passenger cars. Greater proportions of models with all-wheel drive (AWD) were sold among light-duty trucks. With large, six- and eight-cylinder models, however, the proportions of vehicles selected with FWD and rear-wheel drive (RWD) were significant. Notably, AWD models accounted for 43.5 % (under half) of six-cylinder light-duty trucks. The importance of offering two-wheel-drive (2WD) models, even among SUVs and pickups, which are traditionally associated with AWD, can be clearly seen.

With Mitsubishi GALANT-class midsize passenger cars, engine configurations selected by customers differ according to the market positioning of individual models (Fig. 2). Strong-selling sedans such as the Honda ACCORD and Toyota CAMRY are marketed with an emphasis on V6 engine performance, but it can be seen from Fig. 2 that most of such sedans are actually sold with less expensive inline four-cylinder engines. In the market for midsize sedans, therefore, automakers are sensible to maximize profitability with models that have inline four-cylinder engines even though they highlight the high performance of V6 models in their promotional activities.

With Mitsubishi ENDEAVOR-class midsize SUVs, nearly half of customers select 2WD models despite the widely perceived association of SUVs with AWD (Fig. 3). With the Mitsubishi ENDEAVOR, 45.2 % of sales in the first six months of 2004 were made in four relatively warm states: Florida, California, Texas, and Illinois.

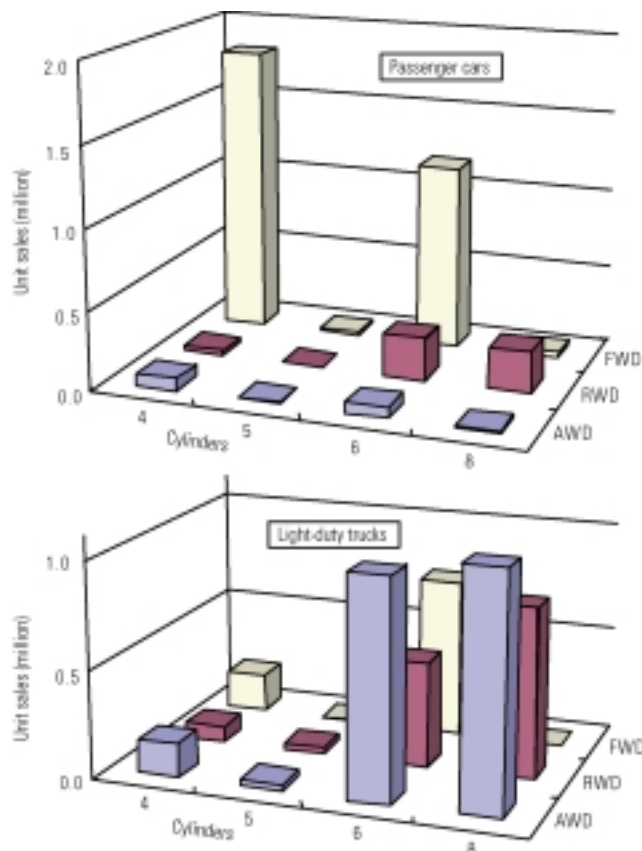


Fig. 1 US new-vehicle unit sales in first half of 2004 by number of cylinders and drivetrain configuration

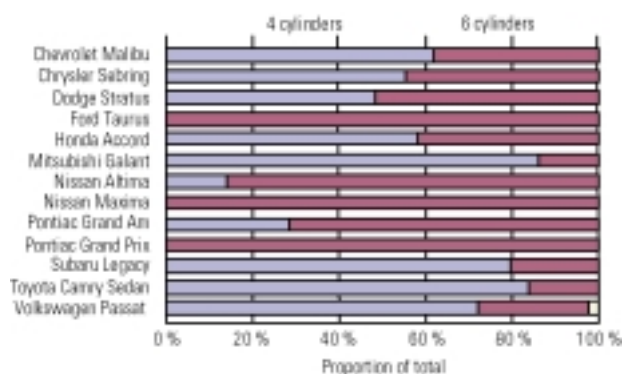


Fig. 2 US unit sales of new midsize passenger cars in first half of 2004 by number of cylinders

AWD is not absolutely necessary in winter in these

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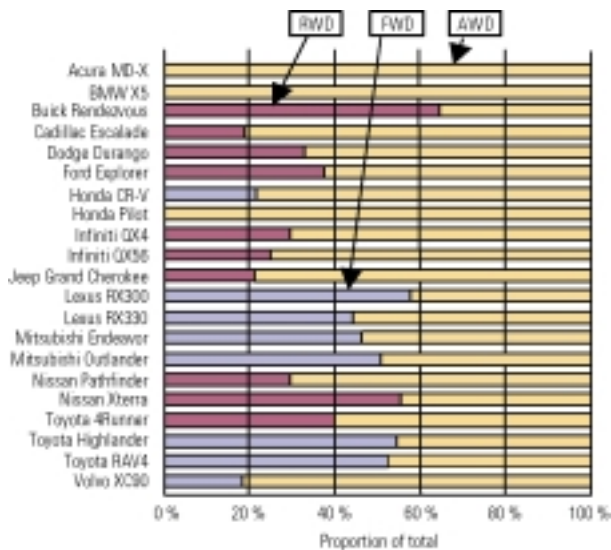


Fig. 3 US unit sales of new midsize SUVs in first half of 2004 by drivetrain configuration

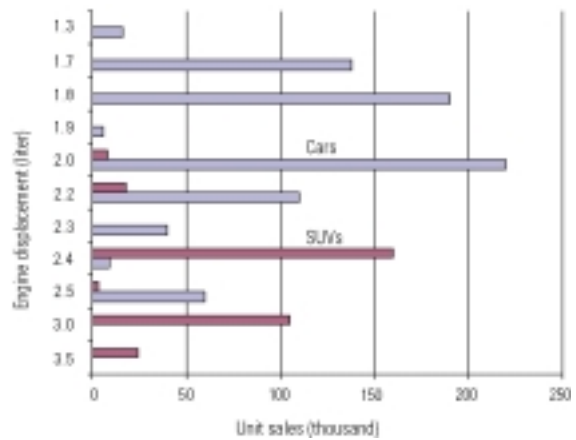


Fig. 4 US unit sales of new compact vehicles in first half of 2004 by engine displacement

states, so the importance of offering 2WD models is particularly great there.

With Mitsubishi LANCER-class compact passenger cars, the most popular engine displacements are 1.8-liter and 2.0-liter (Fig. 4). With compact SUVs, the most popular engine displacement is 2.4-liter. However, models with engine displacements of 3.0-liter and larger are also sold in large numbers.

In the US, the traditional perception that bigger is better remains predominant. However, there are signs of growing awareness of the attraction of vehicles that are small and smart. Following the success of Toyota's Scion brand, other B-segment models such as the Honda Fit, Suzuki IGNIS, Nissan Cube, and BMW 2-Series have been introduced. Although these models are small, they have high levels of equipment (DVD navigation systems and so on) and are thus helping to destroy the traditional perception that small equals cheap.

With passenger cars, a return to a focus on high performance can be expected; customers are likely to be strongly attracted to RWD and AWD. The catalyst is the adoption of RWD in the Chrysler 300 and Dodge Magnum, which are large sedans. General Motors will join this movement by launching, from the 2006 model year, RWD sports cars based on its newly developed Kappa architecture. A likely result is that customers will come to perceive an association between high performance and RWD. Japanese and European automakers will, at the same time, introduce AWD in their high-performance models to achieve differentiation.

2. Relationships between state statute, regulations, and standards

Each of the 50 states that constitute the US has its own constitution and laws. The federal government's role is limited to affairs that extend beyond any individ-

ual state's jurisdiction, so it is necessary for automakers to simultaneously satisfy the road-transportation laws and other regulations of each individual state. In addition, the auto industry has many self-imposed regulations and standards. When developing vehicles, therefore, automakers have to take into account huge amounts of regulatory information.

The challenges facing automakers are clearly exemplified by issues related to driver distraction. Driver distraction results from a driver's use of a cellphone or navigation system while driving, and it causes the driver to pay insufficient attention to the task of driving the vehicle. Unfortunately, state laws, guidelines, and standards are inter-related in complex ways.

At the federal level, there is no legislation prohibiting the use of cellphones at the wheel. However, certain states (for example, New York State and Washington, DC), certain counties (for example, Miami Dade County, Florida), and certain cities (for example, Brooklyn, Ohio) have their own laws prohibiting this activity. In other words, different segments along the same highway may be subject to different regulations; the situation is extremely difficult for drivers to grasp.

Federal Motor Vehicle Safety Standards and other federal regulations take precedence over state laws, so the federal government could, in theory, resolve the confusion resulting from regional legal differences by issuing regulations. However, the federal government has not been able to do so in practice because of the problem of needing to clearly delineate actions that are permissible for drivers. The auto industry has responded by creating its own guidelines and by making an effort to take harmonized measures. At the same time, experts in ergonomics work on the creation of International Organization for Standardization (ISO) and Society of Automotive Engineers (SAE) standards. Guidelines and standards of the kind mentioned here are not directly enforceable, but automakers accept them as expertly prepared reflections of their overall position and are, in practice, obligated to comply with them. The consequence is that, although there is much

Table 1 Alliance of Automobile Manufacturers distraction guidelines

Version	Issue Date	Completed Sections
1.0	2000/12	Principles only
2.0	2002/4	1.1, 1.2, 1.3, 2.2, 2.4, 3.1, 3.2, 3.5, 4.1, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6
2.1	2003/11	Version 2.0 + 1.5, 2.3, 3.6, 4.2, 4.3
3.0	2004/12	Version 2.1 + 1.4, 2.1, 3.3, 3.4

information for automakers' reference, the industry has no single, consistent, absolutely accepted set of rules.

Guidelines and standards of the kind mentioned above are in some cases not issued until they have been studied and discussed by working groups over a period of years. Often, not even an overview of proposed guidelines and standards is available while deliberations are in progress. MRDA's Technical Information Group and Regulatory & Certification Affairs Group participate in many working groups. Up-to-date information on these activities can be seen on the NAFTA Technical Report page on the MRDA intranet (<http://10.79.3.7>).

3. Overview of guidelines on driver distraction

The Alliance of Automobile Manufacturers (AAM) has been compiling voluntary industry guidelines related to driver distraction since 2000, and it has already issued a number of sections (**Table 1**). Version 1.0, which the AAM issued in December 2000, consists of principles only, but version 2.0 and subsequent versions include evaluation criteria and evaluation methods. By way of example, section 3.5 of version 2.0 specifies that the system reaction time shall be a maximum of 250 ms and that if more than two seconds are taken the system shall indicate that it is responding. And section 3.6 of version 2.1 requires that, while a vehicle is being driven, any dynamically indicated data that do not contribute to safety shall be indicated dimly or have their monitor turned off or be switched to some other window. Version 3, which was completed at the end of 2004, includes requirements related to the basics of the interface. For example, it requires that the display be located within a downward viewing angle of 30° and states that a permitted operation is one for which a single visual recognition period is no longer than two seconds and for which the overall recognition time through completion of the operation is no longer than 20 seconds.

Defining operations that may be performed at the wheel is extremely difficult because it requires not only quantification of increases in the driver's operating burden caused by the operations but also establishment of clear numerical standards. SAE standard J2364 states that an operation that may be performed at the wheel is one for which the total task time is no longer than 15 seconds or one that, when performed by a person wear-

Table 2 EDR-related documents issued by SAE VEDI Committee

Number	Content
J1698	EDR Concept
J1698-1 Dec 2003	EDR Output Data Format for Frontal Impact Event
J1698-1 Version 2	EDR Output Data Format for Impact and Rotational Events
J1698-2 May 2004	Identification Method for EDR Data Extraction Protocol

ing special goggles with a liquid-crystal shutter, can be completed with a total shutter-open time no longer than 20 seconds. The test technique with which special goggles are used is called occlusion. In the ISO/TC22/SC13/WG8 committee, a related, proposed standard (ISO16673) is under consideration. Another approach is based on the view that an operating task for a telematics device should be permitted at the wheel provided the distraction it causes is no worse than that caused by normal operation of the radio. The aforementioned WG8 committee is also considering a method for deciding whether operations at the wheel are permissible or not by employing the results of simulated lane-change tasks. There is no single tool that can be applied to all cases, so it is necessary to effectively combine existing tools to establish evaluation techniques.

4. Overview of standardization for data recorders

Onboard electronic data recorders (EDRs), which record operating data including data on accident impacts, can be used to clarify the causes of accidents, so they have the potential to enhance safety in transportation.

The US Department of Transportation (DOT) issued in June 2004 a Notice for Proposed Rulemaking in connection with EDRs. The DOT's proposals included a harmonized output format for data stored in EDRs. By a deadline in mid-August 2004, the DOT had received more than 100 comments on its proposals. The large number of comments reflected the fact that many people are concerned about this issue.

At about the same time, the SAE was working on creation of standards for a harmonized output format for EDR data. The SAE's Vehicle Event Data Interface (VEDI) Committee has issued four standards (**Table 2**). The J1698 standard issued by the VEDI Committee is based on the concept that an EDR is a function, not a box, and it defines the items to be standardized as only EDR data that are, by some means, downloaded outside of the vehicle; it leaves the method for obtaining the data via the vehicle bus, the method for storing the data, and the method for downloading the data for individual automakers to choose. This standard defines the data name, sampling frequency, data resolution, hexadecimal structure, and other attributes of 65 data elements; the data definitions can be applied with nearly all EDR applications.

5. Summary

With regard to the NAFTA market, the MRDA Technical Information Group conducts wide-ranging research into market trends, technology trends, trends in equipment adoption, and trends among MMC's competitors, and it participates widely in the creation of guidelines and standards by industry bodies. It makes the resulting information available via the MRDA intranet, and keeps the information up-to-date. The MRDA Technical Information Group will continue to work in diverse, flexible ways to support MMC's activi-

ties in North America. We look forward to hearing from anyone who requires information.




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