



Ensuring the Safety of Italy's Tolloed Motorways

By Maurizio Rotondo

Safety has always played a central role in the activities and analyses of AISCAT, the Italian national association of toll motorways. As part of this effort, AISCAT, together with other European associations, companies, and institutions as diverse as the Institute of Traffic Psychology and Medicine in Spain, Slovak Railways, the Swedish Taxi Association, and others, is a signatory of the European Road Safety Charter. The charter, a European Commission initiative, commits its signatories to work closely with European authorities in promoting road safety and to share practices and ideas with other members.

As a charter signatory, and as a concerned member of the European transportation community, AISCAT has publicized its positions and data on road safety in Italy and the progress its members have made in protecting motorway users. These efforts demonstrate the association's consistent commitment to road safety, and to the welfare of society in general.

Traffic Casualties: A Local Story

Contrary to common belief, it isn't traffic on the main roads and motorways that determines the greatest number of casualties; rather, an analysis of available data in Italy shows that the number of deaths in urban areas and on local roads is more than 5 times greater than that on the motorway network and 2.6 times greater than that on main roads.

The disparity involving injuries is even larger, with the number of injuries caused by road accidents more than 11 times greater in urban areas than on the motorway network and more than 7.4 times greater than on main roads. Worryingly, this trend seems to be progressively increasing.

In any discussion of road safety in Italy, and in Europe in general, then, two clear and extremely significant points emerge. First is the fact, now recognized across the entire European Union network, that, quantitatively speaking, motorways represent an almost residual factor in terms of road accident risk. Second is the generally recognized need to fine-tune the tools used to analyze road accidents, in terms of both harmonizing the available data, especially on an international level, and choosing the correct standard of safety indicators.

assessing motorway safety. Such data are usually unavailable, however, because of the expense involved in recording such information along a broad network. As a consequence, many European countries neglect to track the information. Nonetheless, some countries do, and, in general, these data are available for tolled motorways.

The Human Factor

In its white paper “European Transport Policy for 2010: Time to Decide,” the European Commission describes how every day the number of deaths on European roads is practically equivalent to the number of passengers carried by an average-size airplane. The European Union thus requires that its member states pursue the ambitious target of reducing road fatalities by 50 percent by the year 2010--a target that was later endorsed at the national level.

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For example, it is commonly understood that to measure road safety reliably, one must use parameters that relate the number of accidents in terms of vehicle kilometers traveled on the stretch of road being examined. This approach has been used for decades in

The EC white paper also highlights the fact that among all means of transport, road transport is the most dangerous, with the largest number of fatal casualties by far. (By comparison, the next-most dangerous mode of travel in the EU in 2005 was air, which

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produced 146 fatalities versus 45,296 for roads.) AISCAT believes that this greater risk is a direct consequence of the fact that the safety of road transport depends on the existence of a very high number of decision-makers not encountered in other forms of transportation. This is particularly true if one looks at every driver as a decision-maker (often not a professional one) whose thought process, as well as driving attentiveness and care, determines the overall safety of the road.

Studies by the Organization for Economic Co-operation and Development (OECD) show that 95 percent of road accidents worldwide on all roads are attributable to human behavior¹. AISCAT's own industry studies of Italy confirm this conclusion, thus underscoring how recent improvements in vehicles and infrastructure haven't been matched by greater responsibility and caution among road users.

Unfortunately, despite the availability of some international safety

data from the OECD and the United Nations, statistical analyses of road accidents are generally still limited to the national level. The only data that currently appear to have some degree of reliability in terms of international comparability are mortality rates. Corrective factors have been identified in this area to ensure data compatibility and to enable European countries to use common parameters.

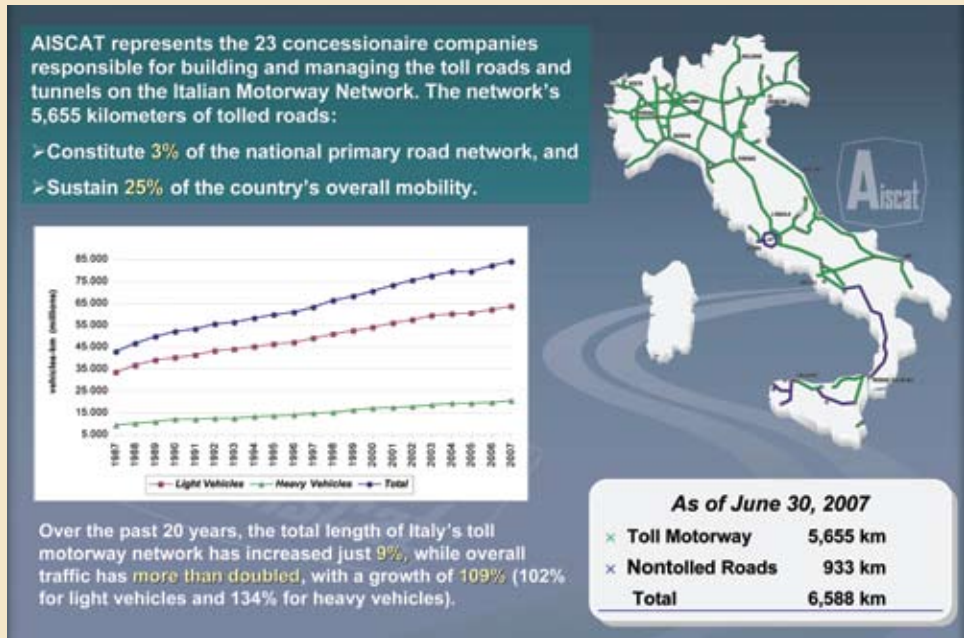
Specifically, most EU countries keep track of road fatalities using the parameter of deaths within 30 days of the accident, though some countries use the parameter of 7 or 14 days. For cases using the latter numbers, and for historical records, multiplication factors are used to harmonize the data at 30 days, using equivalency tables and factors available from the EC's Web site.

Closing the Infrastructure Gap

The Italian Motorway Network, spanning more than 5,600 kilometers, offers Italy an enormous mobility

1 "Research on Road Transport and Intermodal Road Safety Strategies," OECD, 1999. See also Recommendations of the Group of Experts on Safety in Road Tunnels, United Nations Economic and Social Council, December 10, 2001.

Figure 1: The Italian Motorway Network



service. The network accounts for almost 75 percent of the country's goods transport and more than 10 percent of its passenger transport, despite the fact that the network represents only 3 percent of Italy's primary roads.

Over the past 20 years, although the tolled portion of the network has increased just 9 percent, the system's overall traffic has grown an astounding 109 percent (see Figure 1). Not surprisingly, such a dramatic increase in traffic compared with such a marginal adjustment in infrastructure has produced a very high increase in traffic

density. This has in turn led to difficulties for the motorway's operators in terms of management, safety, and traffic flow, though all of these areas have been addressed through substantial investments in security and the optimization of management processes. High-end pavement, new safety barriers, and enhanced monitoring and patrolling are some of the most notable security investments, together with closer cooperation with the police who patrol the infrastructure and, in general, with the relevant government agencies at the national and regional levels.

Italy's toll road operators recognize the undeniable complexity of safety concerns but have always seen their main task and priority as addressing the road's infrastructure. All other activities, such as traffic control, which is the responsibility of the state police, and driver training, the responsibility of the Ministry of Infrastructure and Transport, though just as important as infrastructure in terms of safety, are left to state territory and transport bodies, with road operators able to influence these areas only marginally.

The country's tolled-motorway operators are committed to conducting annual analyses of accident rates and the state of infrastructure maintenance. In their studies, the companies use parameters that are most significant in terms of safety, such as road-surface grip (which provides an indication of tire-to-surface contact and thus the effectiveness of braking and road-holding capability); evenness of road surface (which affects vehicle stability); and surface porosity (which helps distinguish roads that drain efficiently from those that don't).

All of these important activities and studies do, however, run the risk of producing incomplete results. This may be due to the significant imbalance that has taken place over the past three decades between the demand for mobility and the supply of infrastructure. In order to close the infrastructure

gap, the Italian government has on several occasions highlighted the need to turn to private capital, well aware of the fact that Italy's motorway operators currently are its largest private investors.

Accident and Fatality Declines

Italy's tolled network has generally experienced a decline in accident and mortality rates this decade. The causes of this continuous, and hopefully continued, decrease reflect the coherency of the network operators' safety policy. This policy has been carried out industriously with continuous and significant investments as well as the systematic use of qualified human resources.

Given such a framework, it is useful to reiterate the importance of using an accident-rate indicator that allows for the accurate presentation of safety trends. Widespread application of the accident rate in its multiple forms is possible in Italy only on tolled motorways. This is because two important aspects of this parameter are precisely measurable only on tolled roads:

- The number of accidents observed and controlled by the road police and managed by bodies that are usually certified ISO 9001/9002 for quality control; and
- The amount of traffic along the stretches on which these accidents

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occur as recorded by toll transactions.

On other urban and suburban roads in Italy, systematic traffic measurements are no longer carried out, possibly for cost reasons. Such expenses, however, would more than be repaid by the benefits of providing more accurate safety analyses and better timing or scheduling of maintenance work.

Nonetheless, the recent improvements that Italy's motorway operators have made to the network, discussed in more detail below, have led to a reduction in the absolute value of fatality rates since 2001, despite the

surge in user demand. In 2001, fatalities on the tolled portion of the network totaled 598, a rate of 0.82 per 100 million vehicle kilometers traveled. By 2007, those figures had declined to 417 and 0.50, respectively (see Figures 2 and 3).

Safety Measures

Over the years, Italy's motorway operators have undertaken various technical and economic measures to improve the network's safety, some of which are described above. These include the installation of draining



Figure 2: Fatalities on the Tolled Portion of the Italian Motorway Network, 2001–2007

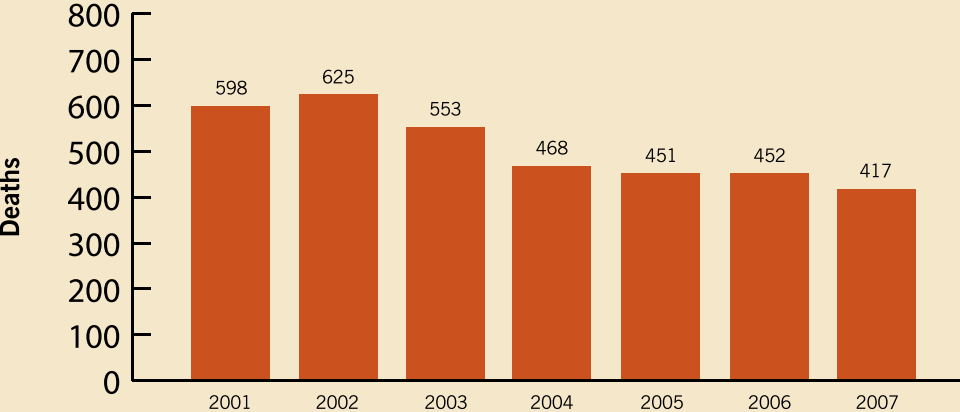
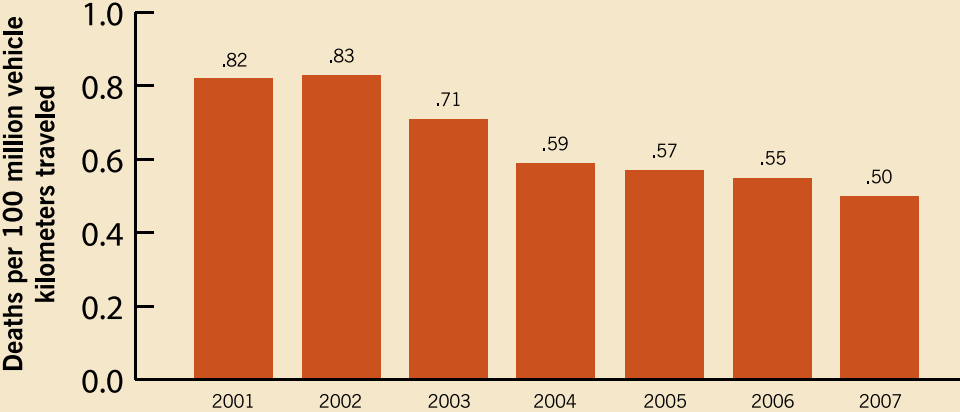


Figure 3: Fatality Rate on the Tolled Portion of the Italian Motorway Network, 2001–2007 (per 100 million vehicle kilometers traveled)



pavement, which has noticeably helped reduce the fatality rate on Italy's tolled motorways. In 1999, when nearly 30 percent of pavements were of the draining variety, the fatality rate per 100 million vehicle kilometers traveled was 0.99. By 2005, when 57 percent of pavements drained, the fatality rate had been reduced to 0.57 (see Figure 4).

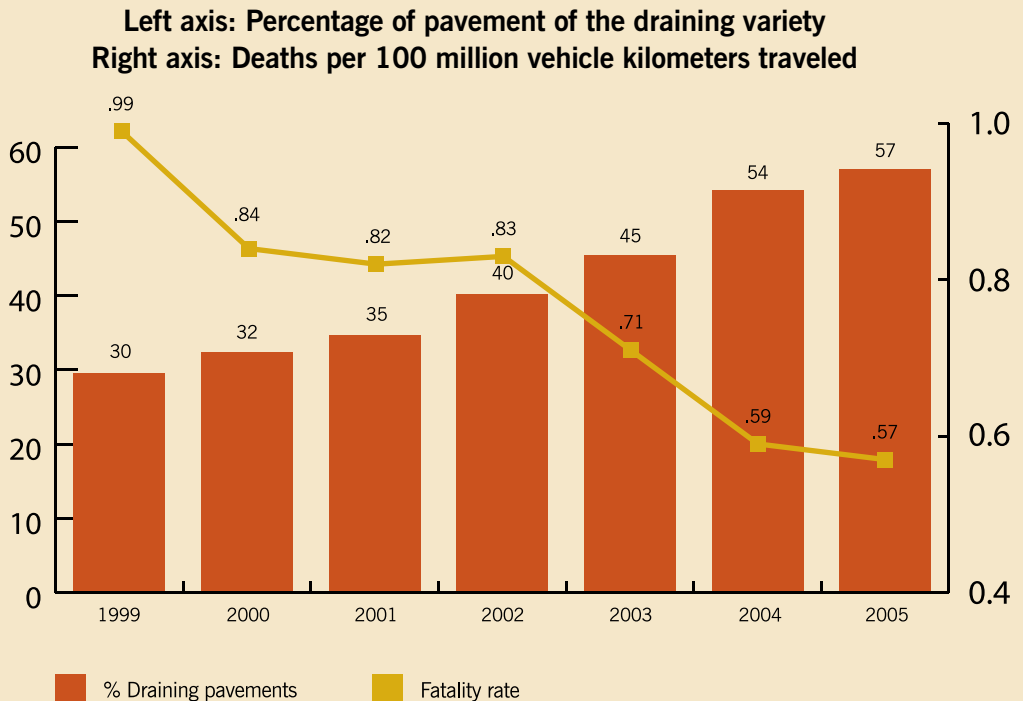
Regular preventive maintenance is, along with accurate safety assessments, the other powerful instrument that ensures a road's intrinsic safety. With regular maintenance, road infrastructure never stops functioning adequately because it never reaches its breaking point.

It must be emphasized that the results summarized above are not the outcome of last-minute initiatives, but rather are strictly correlated to the daily work of proven and reliable motorway operators as well as their continuous and significant investments, which average €100,000 (approximately US\$157,650) per kilometer per year.

Organization and Management

Several factors contribute to the success of Italy's motorway network, including its operational centers, control systems and operating resources, emergency plans, traffic personnel, and police service.

Figure 4: Road Fatalities in Relation to Draining Pavement Use on Tolled Italian Motorway, 1999–2005



Operational centers for traffic management. The need to ensure safe traffic flow is a constant task for Italy's motorway operators, which have adopted several management and organizational measures to help carry out this work. These measures are designed to enable the operators to:

1. Monitor potential traffic difficulties as they develop on both carriageways of the motorway and at all service stations/tollgates connected to interchange junctions with other motorways;
2. Promptly activate the necessary systems in cases of major accidents, such as emergency rescue, road cleaning and repair services, and hazmat teams, to minimize the disruption to traffic flow along the motorway and at service stations;
3. Discourage and promptly reprimand all irregular or dangerous behavior among travelers that could cause risky situations or accidents; and
4. Maintain auxiliary communications systems for motorists that encourage proper decision-making and safe behavior by warning of traffic problems on the road.

The nucleus of these daily activities for each operator is its operational center. The center is equipped with a control-system terminal and maintains all the necessary channels for internal (among the concessionaire's personnel)

and external (with fire and police personnel, for example) communication. The center also contains a computer or interactive synoptic table that keeps track of the section of road in its jurisdiction.

The centers are staffed 24 hours a day by operators who have been trained to act as the first interface with the concessionaire's on-road units, which can intervene in a road incident on their own or cooperate with the appropriate external bodies, such as hazmat teams, ambulances, and fire and police personnel.

The operational centers are in constant contact with all road units, which are responsible for monitoring the roadway and informing the center of any situations that require assistance. Each operational center maintains contact with the road squads from its radio information center, which houses radio systems covering the entire motorway that the operator installs and manages via radio-link networks.

Certain operational centers, based on the number of police personnel available, also benefit from direct contact with the road police service units that operate on the motorway. This interaction takes place through road police operational centers located close to the motorway operator's own operational center. This arrangement permits the road police and operators to be in constant communication.

Control systems and operating resources. The concessionaires' operational centers possess a vast array of resources that permit continuous monitoring of the motorway stretches in question. These resources, some of which are highly specialized, optimize each operator's ability to prevent traffic disruptions and re-establish normal conditions after an incident has occurred.

The centers are equipped with automated monitoring systems essentially consisting of a network of road cameras, weather-surveying points, and traffic-surveying points. Sensors that can measure visibility conditions and warn of the possibility of fog are located along stretches of the motorway network that generally have poor visibility.

The motorway concessionaires use a number of different traffic-surveying

systems along the network, the distribution of which is generally skewed toward traffic intensity.

Among these are systems based on the technology developed for electronic toll collection, which are located at regular intervals along the motorway and can track a significant sample of vehicles, measuring both transit time and speed.

Recently, these systems have also been successfully employed by the road police as a tool for monitoring adherence to the speed limit, thus also contributing to the motorway's safety. (For further details on these systems, see "Safe Keeping: One Concessionaire's Success in Protecting Italy's Motorway Users," page 53.)

Emergency plans. Italy's motorway operators agree with the contention expressed in the aforementioned EC white paper that, "The dispersion of



responsibility and resources among numerous bodies charged with road safety, both on a national and regional level, limits broad action-taking and discourages the introduction of coordinated policies.” The concessionaires believe that coordination between the various entities responsible for road security should be pursued at all levels: regulatory, planning, and operational. Indeed, coordinated planning between operators has assumed a fundamental role in the Italian Motorway Network’s operation while defining the methods used for resolving and managing risk. This coordination is reflected in several emergency and traffic-management plans the operators share at an institutional level that provide for the involvement of all parties in the management of unusual situations.

New traffic personnel. In the past decade, Italy’s motorway operators have introduced new traffic personnel to maximize the companies’ internal human resources as well as the resources of the road police. The new staff are dedicated to specific tasks to help free up the police, an arrangement that appears to have contributed significantly to safety improvement. The employees may, for example, be tasked with handling only those accidents in which no injuries are sustained, only property damage (which accounts for 70 percent of cases on the network). Alternately, these staff may be assigned



to address signaling offenses related to new road rules. In this way, the police are left to more effectively handle other, more important traffic safety issues.

Road police service. Under an agreement with the Ministry of the Interior, the road police are responsible for traffic regulation and control and have divisions dedicated to patrolling the motorway 24 hours a day. Each road patrol is assigned a 30- to 40-kilometer section of motorway, alternating between service stations, service areas, and parking areas to carry out their surveillance.

The road police operational centers are staffed 24 hours a day, with two operators, and are in constant radio contact with all police units, leading and coordinating the activities of those units operating on motorway stretches in their area. The units perform their work using control and monitoring systems provided by the motorway operator.

Road Communications

The effective distribution of information is one of the keys to fostering positive interaction between Italy's motorway users and operators while maximizing traffic safety and flow. As part of this effort, the operators have developed a system of communication channels, consisting of radio, mobile telephony, and Web-based information services, so

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as to best compel users to drive safely while simultaneously offering them a variety of means to access traffic information. Additionally, each operator's radio information center collects and distributes information on road, weather, and traffic conditions both for drivers who are already in transit as well as those who have not yet begun their journey, keeping in mind the different needs of each group.

Travelers already under way may rely on two chief sources of motorway information: traffic news on radio stations and variable-message signs. Traffic news is broadcast on national radio stations as part of the stations' normal programming or through agree-

ments with private radio stations for the transmission of regular traffic bulletins throughout the day's programming.

Motorists already on the road are also kept abreast of road information via a network of variable-message signs. The vehicles of the new traffic personnel teams are also equipped with road signs. When needed, these signs are positioned just ahead of an accident or danger point, well in view of approaching traffic. Moreover, motorway operators use dedicated phone numbers that their clients may call to contact a radio information center or dedicated call center directly for information about motorway services and traffic updates.

Those motorway users who have not yet begun their trip also enjoy a special information service. Before embarking on their journey, these customers can visit the Web site of their main motorway operator, where, among other information, they can view traffic forecasts for peak periods. This not only helps users plan their trips but also discourages them from traveling at peak times, thus aiding traffic conditions and reducing the number of minor accidents that characterize congested traffic. Alternatively, customers can surf the Internet, specifically the dedicated national teletext pages, to find news about the motorway network.

A number of motorway operators even produce their own news footage.

These segments are regularly broadcast as part of the daily programming of private television stations. Operators that don't produce their own footage can instead collaborate with stations that can.

AISCAT and its members also publish several publications and pamphlets, some in collaboration with the road police, that aim to improve user knowledge of the motorway system as well as encourage proper driving behavior.

Experience Counts

Based on AISCAT's analysis, in addition to the many ad hoc analyses that have been carried out, we can state with certainty that, both in Italy and elsewhere, motorway operators are the players with the most experience in terms of road safety. In addition to the industry analyses that support this assertion, concessionaires have proven their safety skills as operators by adopting effective management procedures and structures, identifying innovative technologies, and obtaining a growing body of knowledge through constant research on traffic safety. However, the progress made so far in the sector shouldn't be considered a

finishing point in Italy but rather a useful starting point for addressing the country's increasing need for mobility.

It is precisely toward this end that Italian motorway operators' investments over the coming years should be directed. Speed control, coordinated traffic management planning (especially cross-border), improved winter operations, flexible use of capacity through ITS (intelligent transportation systems), and enhanced and personalized information systems are among the main guidelines for the coming years.

Of course, both the past and current work of motorway operators should not remain isolated, but rather should enjoy contributions from institutional efforts aimed at supporting the country's infrastructure while encouraging users to fully respect traffic regulations. For example, the Italian Motorway Network needs the extension and widening that its concessionaires have been strongly advocating in the past three decades in addition to state-of-the-art technology, such as is available in various speed-control systems. Such efforts can help secure the continued safety of Italy's tolled motorways for future users.

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