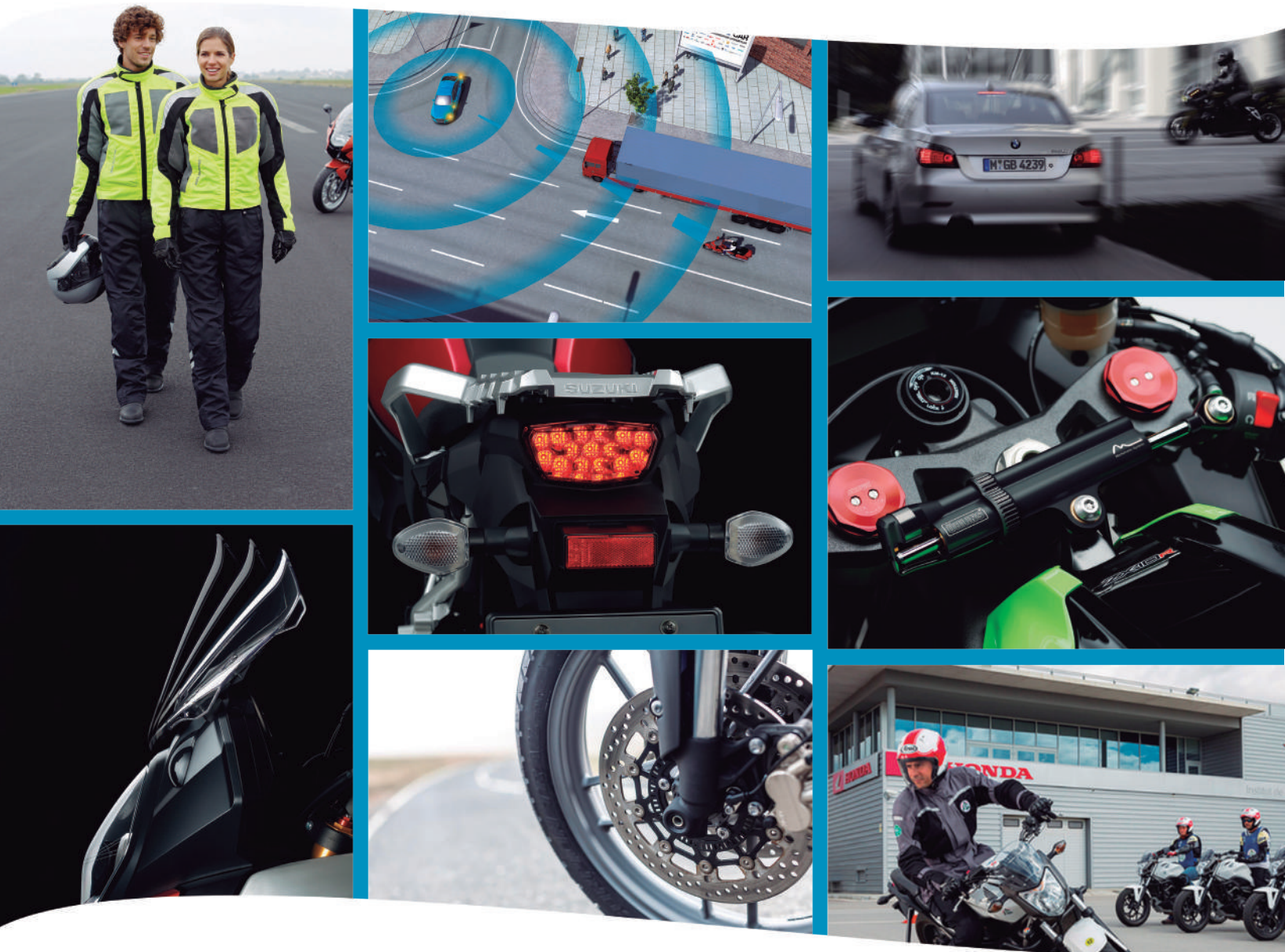


The safe ride to the future

The motorcycle industry's commitment to road safety



September 2014

A long-standing commitment to road safety

The motorcycle industry is committed to continuously improving road safety for motorcyclists and other road users. ACEM manufacturers have achieved high safety levels for their products, and continue to develop new technologies to facilitate the integration of powered two- and three-wheelers into the transport system. ACEM members have taken action to optimise vehicle safety, engaged with key policy-makers and users, and undertook research activities to develop effective safety countermeasures.

A strong commitment to safe and advanced vehicles

ACEM manufacturers work continuously to bring advanced and innovative products to the market while ensuring a high level of safety for users. Manufacturers have mainly focused on four key areas: intelligent transport systems, lighting devices, vehicle suspension, and stability and braking systems.

Recent developments in technology: intelligent transport systems

Intelligent Transport Systems (ITS) can be defined as the application of information and communication technology to different transport modes including road transport. It is a fast moving sector with research progressing constantly and new developments being continuously implemented.

For several years now ACEM manufacturers have been on the forefront of research in the area of rider assistance systems for motorcycles. They are mainly available today on high-end vehicles due to the additional complexity and consumer cost of these systems, or as optional equipment. They include equipment such as anti-lock braking systems (ABS) and traction control systems (TCS), which assist riders in maintaining vehicle control while driving on loose or slippery surfaces.

Other relevant features include tyre pressure monitoring systems (TPMS), electronic adjustable suspension, electronic cruise control, gear shift assistant, fuel economy assistant, proximity activation systems (i.e. keyless riding systems), in-vehicle navigation systems, adjustable vehicle riding modes, etc.

Furthermore, very promising developments are taking place in the field of cooperative ITS. Vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) technologies have a



KTM has fitted its newest model with Motorcycle Stability Control, a new ABS system that allows emergency braking in curves and provides additional stability to the vehicle.

high potential to minimise the risk of accidents by allowing powered two- and three-wheelers to effectively communicate with other vehicles.

ACEM manufacturers have, in close cooperation with the car industry, participated in a number of research projects that aim to develop V2V and V2I applications. Examples of these initiatives include the CAR 2 CAR Communication Consortium, the SIM-TD and the Drive C2X projects.

As a result of these efforts integration of PTWs into the transport system could be substantially increased in the future.

Lighting devices: seeing and being seen

The ability of motorcycles to be detected by other road users is a critical aspect in crash prevention. In-depth studies have repeatedly shown that failure to see the PTW by other road users are a major contributor to urban PTW injuries.

This crash factor can be partially addressed by the introduction of specific technologies that improve the conspicuity of motorcycles. This is why ACEM members committed themselves to equipping all their models including mopeds with automatic headlamp-on technology (AHO) since 2003.

Moreover, the motorcycle industry is also making use of daytime running lights (DRL) and amber position lights (APL). These systems make it easier for other road users to detect powered two- and three-wheelers.

Riding at night or in poor visibility conditions poses an important safety challenge. In view of this, some industry members are already producing vehicles fitted with adaptive lights which make night driving considerably safer. Other ACEM members have committed to incorporating adaptive lights to their newest models.

Additional relevant technologies available in the market include polyellipsoid headlamps, full LED lights (headlights, taillights and indicators), projector headlights and xenon headlights.



All of Peugeot's Metropolis are fitted with daytime running lights in order to increase their conspicuity.



BMW Motorrad adaptive headlights improve road visibility when cornering at night, significantly increasing active safety.



Suzuki stop and tail light uses LED technology for greater response and improved reliability.

Vehicle suspension and stability

Vehicle stability while riding a powered two- or three-wheelers is crucial. Highly performing suspension systems are required in order to safely adapt to different road surface conditions. Suspension systems also contribute to smooth handling and braking, and provide comfort to riders by keeping them isolated from road bumps.

Over the years ACEM manufacturers have developed a wide range of innovative vehicle suspensions adapted to different motorcycle usages. They include electronic suspension systems (standard or optional depending on the model), speed-sensitive electronic steering stabilisers (standard in various high performance models), semi-active suspension systems (which adapt the response of the suspension to road conditions, vehicle speed and driving style) and self-regulating suspensions.

All of these systems provide for maximum stability and increase users' control of the vehicle.



BRP's vehicle stability system (VSS) combines stability control, traction control, ABS and dynamic power steering to improve the safety of the rider.



Suzuki's traction control system help riders to accelerate, brake and steer properly and efficiently, making riding safer and easier.



Suzuki's adjustable wind protection reduces rider fatigue and improves concentration.

Stopping right in time: braking systems

The motorcycle industry introduced the first anti-lock braking systems (ABS) in 1988, long before this area was considered a priority by policy-makers. Since then, the industry has developed different advanced braking technologies, tailoring these devices to the specific needs of consumers. Other advanced braking systems include combined braking systems (CBS), rear wheel lift-off protection, automatic brake force distribution, amplified braking systems and brake by wire. These systems can operate individually or in combination.

Furthermore, ACEM signed in 2004 the European Road Safety Charter committing itself to offering at least 50% of their street models with advanced braking systems as an option by 2010. After this initial target was surpassed, ACEM manufacturers set a further objective: 75% of street motorcycle models offered on the market in 2015 will be available with an advanced braking system as an option or as standard fitting.

ABS systems will become mandatory for new motorcycles over 125cc from 2016. From that same date, new models up to 125cc will have to be equipped with either a combined braking system, ABS, or both. As a result of the ACEM commitment for the Road Safety Charter some manufacturers have decided to fit with ABS as a standard all of their models.



Kawasaki's 3-mode KTRC traction control provides enhanced stability in slippery conditions.



Kawasaki's Ninja ZX-10R is as standard equipped with an Electronic Steering Damper, substantially improving steering control.

Moreover, national industry associations have designed schemes that give preferential treatment to ABS-equipped models in national markets. This has allowed some EU countries to achieve a high level of ABS uptake (73% in Sweden and 90% in Germany, for example).

Engaging with riders and policy-makers

Rider education, training and continuous information campaigns, complemented by the enforcement of existing rules, are key instruments in achieving a safer road environment. ACEM members work closely with motorcycle users and other stakeholders, and lead on campaigns to improve rider safety and to encourage rider training. Moreover, the industry provides policy-makers with relevant information and formulates policy recommendations in different areas including infrastructure design.

Engaging with both policy-makers and riders is essential. Only an integrated

approach that takes into consideration all the aspects of motorcycling (i.e. vehicle, human and infrastructure factors) can improve road safety for PTW users.

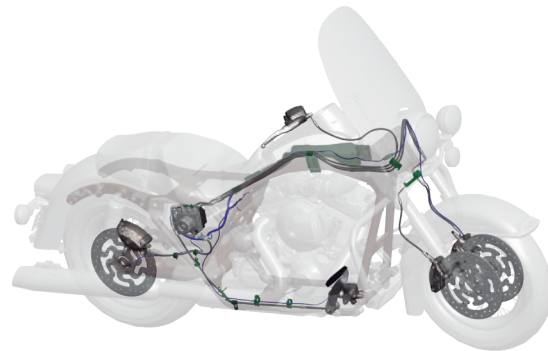
Better skills, better riding

The industry offers specialised and individually tailored rider training courses to meet all needs, from absolute beginners to highly skilled riders. These courses include training on motorcycle uses, such as motorcycling on public roads, touring, off-road enduro riding and race track riding. Furthermore, specific training schemes are developed by industry when new technologies or types of vehicles are introduced onto the market.

The main aim of these courses is to teach participants how to share the road with other road users, how to avoid potentially dangerous situations and how to better maintain control of the vehicle in extreme conditions. They take place under the guidance of certified instructors either in selected riding schools or in training centres established by ACEM members. Particular attention is paid to the training of young people looking to get a moped license or who hold a B license (a passenger car license) and want to follow a preparatory course to become riders.



Antilock brake systems, such as this one from Triumph, makes braking in any situation simpler and safer.



Harley-Davidson's linked brakes combine ABS with electronically linked brakes to dynamically optimize front and rear brake balance.



Some manufacturers have set up specialised training facilities, such as the Honda Safety Institute in Barcelona, Spain.

Moreover, ACEM members have created specific training schemes to ensure that motorcyclists who have stopped riding for a prolonged period of time can come back to motorcycling safely. These efforts are supported by national police forces in several EU countries.

Next to practical training courses, some manufacturers have also developed riding simulators for helping especially novice riders especially, to learn to see potentially dangerous traffic situations without risk. Additionally, basic control skills can be perfected (e.g. hand and foot control coordination (clutch – throttle – gear – brake)).

National industry associations play a key role in ensuring that training schemes are delivered to a high standard. In Germany, for example, more than 3,500 motorcycle trainings have been assessed in cooperation with relevant national authorities. In Italy in 2012 more than 3,200 young people attended the “Bikers academy” programme which involved a total of 619 driving schools. In the UK, the industry works closely with the Police-led ‘Bikesafe’ initiative which assesses the skills of riders via one-day courses and ride outs. More than 15,000 participants across Europe participated in a training scheme run by one of ACEM members.



The Honda Riding Trainer offers hazard perception simulation as effective and complementary safety tool in motorcycle training.

Raising awareness about protective equipment

The motorcycle industry has worked closely with protective equipment manufacturers for many years to develop and promote appropriate rider equipment. Research developed jointly by the motorcycle industry and equipment manufacturers has allowed for the development

of new protective equipment products including special clothing designed for hot climates and airbag jackets.

ACEM members and equipment producers continue to develop body protectors, back braces, clothing in reflective colours and new improved helmets. Dedicated protective equipment, including neck braces and armoured clothing has also been developed for off-road, motocross and sport motorcycling.

Some motorcycle manufacturers have also designed their own protective equipment, taking into consideration the specific needs of riders and vehicles. Indeed, it is important to stress that the safety gear required to ride safely depends on the type the specific use of each vehicle. Powered two- and three-wheelers ridden in urban areas do not require the same type of protective gear that more powerful motorbikes which can be used for example in rural environments, at higher speeds, or in off-road activities.

Furthermore, manufacturers actively encourage riders to wear appropriate safety gear. Some ACEM members have launched campaigns offering back protectors to everyone who purchased a new motorcycle and distributed tens of thousands of back protectors all over Europe. These efforts are also supported by national industry associations which work closely with clothing manufacturers, insurance companies and national administrations to promote the use of appropriate equipment and offer complete protective package at preferential rates.



In 2006, Honda launched the world's first production motorcycle air-bag system on the Honda Goldwing. The system helps to lessen the severity of injuries caused by frontal collisions.

Technology

MULTISTRADA
1200S
Dair

Ducati Dlair® Street system integration

Weight increase = 1 kg

The image is a promotional graphic for the Ducati Dlair airbag system. It features a red Ducati Multistrada 1200S motorcycle. The airbag system is integrated into the seat area, and the airbag is shown deployed and inflated. The text 'Ducati Dlair® Street system integration' is written in white on a red background. The weight increase of the system is noted as 'Weight increase = 1 kg'. The Ducati logo is in the bottom right corner.

Ducati introduced in 2014 an airbag-equipped jacket that is operated wirelessly if sensors on the vehicle detect an accident.



Harley-Davidson has created its own line of riding gear that keeps drivers both safe and comfortable on the road.



BMW has developed an entire range of rider equipment and has done so since the 1970s - from motorcycle helmets to rider suits, boots and gloves.

Working together with public authorities

Establishing a legislative framework that recognises the importance of motorcycling in transport policies is a priority for the motorcycle industry. Such an approach can have a positive impact on rider vulnerability, as well as enabling the greater utilisation by governments and society of PTWs as a mode of commuter transport in particular. National associations actively participate in different public bodies and provide industry expertise to national administrations.

ACEM members have engaged with officials to support efforts to improve national road codes, formulated recommendations to improve European licensing systems and developed, in collaboration with other stakeholders, guidelines to make transport infrastructure friendlier to PTWs. The industry has also advocated for powered two- and three-wheelers to be allowed in bus and taxi lanes in order to increase riders' safety. As a result of these efforts these vehicles have been allowed to drive in taxi / bus lanes in London and Madrid.

Ensuring that legislation is properly enforced is vital in order to protect consumers and fight counterfeiting. ACEM members cooperate with public authorities at European and national level and support market surveillance activities in order to prevent non-compliant and unsafe products from being placed on the European market. The motorcycle industry also provides valuable and up to date information to national and European decision-makers (e.g. number of units sold in national markets, size of the circulating park, etc.).

ACEM members have participated together with relevant national authorities in several road safety campaigns. These campaigns have focused on encouraging drivers to look for motorcyclists on the road. This is particularly important given that a high number of collisions are caused by car drivers noticing very late or even completely overlooking riders. Safety campaigns have also focused on the promotion of voluntary post-license training and of conspicuous and protective gear among riders.



“Occhio alla moto” was a road safety campaign launched by ANCM-Confindustria to raise awareness of motorcyclists among car drivers.

Developing safety countermeasures to improve road safety

Understanding the causes of motorcycle accidents: the MAIDS study

The industry has a long standing commitment to understanding the circumstances and causes of accidents involving PTWs. Between 1999 and 2004 ACEM, with the support of the European Commission and other partners, conducted an extensive in-depth study of motorcycle and moped accidents during the period 1999-2000 in five sampling areas located in France, Germany, Netherlands, Spain and Italy.

The methodology developed by the OECD for on-scene in-depth motorcycle accident investigations was used by all five research groups in order to maintain consistency in the data collected in each sampling area.

A total of 921 accidents were investigated in detail, resulting in approximately 2,000 variables being coded for each accident. The investigation included a full reconstruction of the accident; vehicles were inspected; witnesses to the accident were interviewed; and, subject to the applicable privacy laws, with the full cooperation and consent of both the injured person and

the local authorities, pertinent medical records for the injured riders and passengers were collected. From this data, all the human, environmental and vehicle factors which contributed to the outcome of the accident were identified.

To provide comparative information on riders and PTWs that were not involved in accidents in the same sample areas, data was collected in a further 923 cases.

MAIDS remains the most important in depth database of powered two- and three-wheelers accidents in Europe. MAIDS results are still being used by researchers and manufacturers to improve knowledge about accidents and to develop appropriate safety countermeasures.

European and in-house research projects

The motorcycle industry is currently involved in the implementation of the UDRIVE project⁷. This initiative, which runs from 2012 until 2016, is a large-scale European naturalistic study⁸ into the traffic behaviour of passenger car drivers, truck drivers and motorcyclists. A total of 240 passenger cars, 150 trucks and 40 motorcycles will be followed for the duration of one year. The road users' behaviour in traffic will be continuously registered with several sensors and cameras. This will yield a wealth of data about everyday traffic behaviour as well as about near-crashes and crashes.

In parallel to this, some ACEM members are taking part in the DRIVE C2X study⁹. DRIVE C2X is a comprehensive assessment of cooperative systems through field operational tests. It aims at creating a harmonized Europe-wide testing environment for C2X technologies, i.e. communication among vehicles (C2C) and between vehicles and the infrastructure system (C2I). Cooperative technologies are being deployed under real-world conditions in several European test sites (Finland, France, Germany, Italy, Netherlands, Spain and Sweden). The project supports efforts to standardise and commercialise ITS systems in Europe.

These ongoing initiatives build on a strong tradition of a cooperative industry efforts. ACEM members have participated in research projects focused on the usage of vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) communication systems, such as ConnectedRide¹⁰, SIM-TD¹¹ and the CAR 2 CAR Communication Consortium¹².

These projects aimed to utilise V2X technology in urban areas to lessen the risk of collisions, especially at traffic junctions in urban areas, which represent more than 50% of powered two- and three-wheelers accident scenarios¹³.

7. <http://www.udrive.eu/>

8. Naturalistic riding studies involve the installation of sophisticated cameras and instrumentation in participants' personal vehicles, providing researchers with thousands of hours of data in order to better understand actual driving behaviour and improve vehicle safety performance.

9. <http://www.drive-c2x.eu/project>

10. More information on the Connected Ride project is available at <http://goo.gl/HmtzQQ>

11. More information on the SIM-TD project is available at <http://goo.gl/GSbOUw>

12. <http://www.car-to-car.org>

13. 52% of the fatal accidents analysed in the MAIDS study happened in traffic junctions.

Between 2010 and 2012, as part of the MUSS project, the industry carried out research on the benefits of passive safety features in PTWs. Between 2009 and 2011, ACEM participated in the eSUM¹⁴ project, a collaborative initiative between the motorcycle industry, local authorities of the principal European motorcycle cities and universities, which developed a good practice guide and an action pack to promote safer urban motorcycling in urban areas.

In parallel to this, the Safespot project (2009-2011) aimed at improving road by safety using cooperative applications based on data exchange among vehicles and between vehicles and infrastructure through an ad-hoc network.

The Saferider project (2008-2010) studied the potential of ADAS¹⁵ and IVIS¹⁶ integration on motorcycles. The project aimed to develop efficient and rider-friendly interfaces for riders' comfort and safety, and to estimate the safety impact and user acceptance of the prototypes in a series of pilot applications.

The WATCH-OVER¹⁷ initiative (2006-2008) developed a cooperative system for the prevention of accidents involving vulnerable road users in urban and extra-urban areas using short range communication and vision sensors.

The SIM project¹⁸ (2006 -2009) focused on active and passive safety aspects, mainly from a PTW point-of-view. As riders are one of the most vulnerable road users, the main objectives of SIM were to identify a suitable safety strategy for them, to enhance preventive and active safety acting on electronic vehicle management and human-machine-interaction and to focus on integral passive safety devices.



eSUM was a collaborative initiative between the motorcycle industry, local authorities of the principal European motorcycle cities and universities, to promote safer urban motorcycling.



Yamaha and Piaggio were involved in the testing of ADAS in simulators and vehicles within the Saferider project.

14. European Safer Urban Motorcycling (eSUM). More information on the Project can be found at <http://www.esum.eu/>

15. ADAS. Advanced driver assistance systems.

16. VIS. In-vehicle information systems.

17. <http://www.watchover-eu.org/>

18. The final report of the Safety in Motion project (SIM) is available at <http://goo.gl/wwhxuP>