Responsibility beyond the vehicle: the BMW Motorrad principle "Safety 360°".

Contents.

1. Overview.

"Safety 360°" – an integrated approach to motorcycling safety.
Motorcycling and safety - these two words are inseparably linked as far as BMW Motorrad is concerned. For decades now, BMW Motorrad has established a pioneering role for itself when it comes to issues of safety in connection with motorcycling. Thanks to its powerful innovative strength, which continues unabated to this day, an integrated approach to safety has been developed which is firmly anchored within corporate strategy and covers all areas of motorcycling. The "Safety 360°" principle adopts a universal perspective, breaking down the topic into three facets:

- Safety technology in the vehicle itself
- Safety derived from rider equipment
- Safety derived from rider training.

BMW Motorrad ABS available as standard in all models from now on.
Increasing importance is attached to the issue of safety in public and political debate. As a leading motorcycle manufacturer, BMW Motorrad has always been aware of its social responsibility in this connection. In 1988 the company presented the world's first serial production motorcycles with the antilock brake system ABS - the most effective technical safety bonus to this day.

The next logical step follows now: from model year 2013,
BMW Motorrad will be offering ABS as a standard feature in all models. The company is being proactive here, significantly pre-empting the requirement for ABS likely to be introduced in 2016 for all newly registered motorcycles in Europe. The first new models in which this measure is to be applied are the 2-cylinder models BMW F 700 GS and BMW F 800 GS.

"Safety 360°" principle, facet 1:
Safety based on innovative vehicle technology.
Research into safety aspects extends far back into the almost 90-year history of BMW Motorrad, starting in the area of suspension technology. It was as long ago as 1937 that BMW Motorrad introduced the telescopic fork as an

outstanding technical innovation. Further milestones followed in the 1980s and 1990s with the rear suspension system BMW Motorrad Paralever and the front suspension system BMW Motorrad Telelever. And in 2004, BMW introduced a type of front wheel suspension which enabled a previously unheard of degree of sensitivity in suspension and damping response while ensuring maximum ride stability: the BMW Motorrad Duolever.

With the Electronic Suspension Adjustment ESA, likewise introduced in 2004, electronic systems became a part of serial production motorcycle chassis design for the first time. The latter allowed adjustment of suspension and damping at the press of a button. It was followed in 2010 by the Enduro ESA in the R 1200 GS and Adventure. ESA II is the latest refinement of this system, also allowing adjustment of the spring rate.

A further milestone was presented by BMW Motorrad in 2009: Dynamic Traction Control DTC, an extension of BMW Motorrad Automatic Stability Control ASC (from 2006). For the first time in serial production motorcycle construction, the DTC system used the banking angle of the vehicle as an additional parameter.

Seeing and being seen are crucial for safe motorcycling. In the field of electrical engineering/electronics, innovative lighting systems are continuously being developed, most recently for example the world's first Adaptive Headlight in motorcycle manufacture (K 1600 GT, K 1600 GTL, from 2011) or the first highly effective daytime running light (C 600 Sport, C 650 GT, from 2012).

Comfort and freedom from distraction are likewise essential so as to eliminate fatigue for safe motorcycling. For this reason, the aspects of ergonomics and usability are incorporated in all BMW Motorrad development work at an early stage. Specifications include a cleverly devised, relaxed seating position as well as maximum functionality and simplicity of vehicle control.

In order to minimise vehicle damage if the worst comes to the worst, BMW Motorrad also offers an extensive program of protective special accessories (e.g. crash bars and folding brake/clutch levers).

BMW Motorrad intends to further improve motorcycling safety in future. For example, refinement of the electronic suspension adjustment system ESA II is planned so as to create a semiactive suspension technology (Dynamic Damping Control DDC) and the use of intelligent rider assistance systems (under the generic concept "Project ConnectedRide").

"Safety 360°" principle, facet 2:
innovative rider equipment as a safety bonus.

The use of rider equipment to ensure maximum comfort for the rider and minimise the potential consequences of accidents is also a factor which has enjoyed high-priority status with BMW Motorrad for decades. BMW Motorrad developed the first helmet based on modern safety considerations as long ago as 1976. In 1978 BMW Motorrad was the first motorcycle manufacturer to present an entire rider equipment collection. In addition to the NP protectors for motorcycle suits subsequently developed by BMW Motorrad and the safety-optimised boots and gloves, the Neck Brace System introduced in 2007 is another innovation contributing to rider safety.

"Safety 360°" principle, facet 3:
individually tailored rider training courses to meet all needs.

The third facet of the "Safety 360°" principle is concerned with initial and further training of motorcyclists - after all, riders with a higher skill level ride more safely. BMW Motorrad therefore offers rider training courses in the areas off-road, safety and race track under the guidance of certified instructors. The programs allow both for skill level - from beginners through to highly experienced motorcyclists - and all types of motorcycling, whether off-road enduro riding, motorcycling on public roads or performance-oriented riding on the race track.

2. Vehicle.

Suspension technology.

Innovative suspension technology - a longstanding characteristic feature of BMW motorcycles.
The design of all chassis components has a major impact on traction, ride stability, agility and comfort. The ability to accelerate, steer or brake the motorcycle or scooter in all situations is imperative from the safety perspective - as well as being a crucial factor in terms of riding dynamics and riding fun, too.

Innovative chassis developments run through the almost 90-year history of BMW Motorcycle like a golden thread. The first hydraulically damped telescopic fork in a serial production motorcycle (1937), long swing arms (1950s and 1960s), long-stroke comfort telescopic forks (1970s), Paralever (1987) and Telelever (1993) remain milestones in motorcycle technology to this day, invented or refined and used in serial production for the first time by BMW Motorrad. Particularly notable innovations of the recent past are the electronically adjustable suspension systems.

Front suspension as a fundamental component of a motorcycle in terms of ride precision and ride comfort.
In the R 1100 RS presented in 1993, the power unit was designed as a load-bearing element for the first time in a BMW motorcycle, so there was no longer any frame in the conventional sense. Front wheel suspension uses the BMW Motorrad Telelever, a combination of triangular swinging arm and telescopic fork supported by the engine block. The benefits of this system are extremely sensitive response, torsional stiffness and braking stability.

Up until 2004, the Telelever was the only type of front-wheel suspension able to establish itself alongside the dominant telescopic fork: it offers superior properties in terms of function and comfort and was the optimum solution for motorcycles in the boxer twin series at the time.

The subsequent advancement came with the K 1200 S in 2004 and is still in use in BMW motorcycles today: the Duolever is an effective alternative to the Telelever in the BMW Motorrad 4-cylinder series. This type of front suspension also provides riders with sporty ambitions a sense of safe control in all situations in that it separates the functions of wheel control on the one hand and suspension/damping on the other. The benefits here are a high degree of stability and only slight suspension dive when the brakes are applied.

The BMW Motorrad Paralever as an innovative optimisation of rear wheel suspension in conjunction with cardan shaft drive.

In 1987 BMW Motorrad put the R 100 GS on the market - not just the highest capacity enduro but also one which featured an outstanding technical innovation in the area of rear wheel suspension: the double-pivot rear swinging arm BMW Motorrad Paralever. The Paralever uses torque bracing to eliminate unwanted drive torque generated by the cardan shaft drive such as righting moment and suspension hardening during acceleration. The effect clearly felt by the rider is a calmer, more stable and ultimately safer ride response.

Electronic Suspension Adjustment ESA.

The launch of the BMW K 1200 S in 2004 saw the first use of electronics in a serial production motorcycle chassis. Electronic Suspension Adjustment or ESA for short (an ex works option) allows the suspension to be adapted as preferred at the press of a button – for maximum convenience and even during travel. It was the first system in the world to comprise electronic suspension adjustment in motorcycles. The components adjusted are the spring mount and the rebound and compression stage of the damping.
On the front wheel only the rebound damping is varied.

Operation was designed to be as simple and comprehensible as possible. The rider simply chooses the load state ("solo", "solo with luggage" and "with passenger and luggage") and the damping level according to the intended riding style ("Comfort", "Normal", "Sport"). Spring mount adjustment is carried out by an electric motor with a hydraulic system. The damping rate is altered by means of small, light stepper motors at the damper.

As a result, the drive response of the K 1200 S is largely independent of the various load states and can be adapted by riders to their own personal needs - a significant increase in ride safety and comfort.

Enduro ESA for off-road use.

Designed for the specific requirements of a travel enduro bike, a new version of the ESA system presented in 2009 in the new R 1200 GS and R 1200 GS Adventure models likewise allows adjustment of the suspension: the Enduro ESA not differentiates between various load states and riding styles but also between on-road and off-road use - if necessary, ground clearance can be increased over two levels, for example.

ESA II – spring rate adjustable now too, alongside suspension/damping.

As an optional extra ex works, the rider of the successor model of the K 1200 S - the K 1300 S - can conveniently press a button to adapt not only the damping properties of the front and rear spring struts and the spring mount ("spring preload") of the rear spring strut but also as the latter's spring rate and therefore the "hardness" of the suspension. This second generation Electronic Suspension Adjustment - or ESA II for short - allows a previously unheard of level of suspension adjustment to rider and load with the very highest level of operational convenience. The result is a new dimension of ride stability and outstanding responsiveness in all riding and load states, thereby providing an additional safety bonus especially when braking.

BMW Motorrad Dynamic Damping Control DDC – semiactive suspension technology for the future.

BMW Motorrad is permanently involved in refining suspension technology so as to be able to offer even more effective suspension/damping systems in the future for further enhanced riding dynamics and riding safety. One example of this is Dynamic Damping Control, or DDC for short. BMW Motorrad will be incorporating this system in the serial production of its vehicles in the near future.

Dynamic Damping Control DDC goes one step further than the current ESA II system. The semiactive suspension system reacts automatically to manoeuvres such as braking, accelerating, and cornering on various road surfaces and analyses the situational parameters provided by sensors to set the correct level of damping at electrically actuated proportional EDC valves. Greater safety is the welcome outcome - especially on poor road surfaces.

Selected at the press of a button, three characteristic maps for the basic configurations “Comfort”, “Normal”, and “Sport” allow riders to realise their own preference on this system too. Like ESA II, DDC also allows the spring rate to be varied.

DDC is networked with the other BMW Motorrad control systems – ABS and DTC – via the CAN bus; the system detects any control activity in these other systems and adapts damping within milliseconds as needed.

Electronic control systems.

BMW Motorrad ABS – more than two decades of innovation.

From model year 2013, BMW Motorrad will be offering all its new vehicles with ABS fitted as standard. This is a proactive step, clearly pre-empting the requirement for ABS which is likely to be introduced in 2016 for all newly registered motorcycles in Europe.

Generously dimensioned brake systems with high-quality components have long been a part of the BMW Motorrad development philosophy. In order to further shorten brake distances, BMW Motorrad was the first motorcycle manufacturer in the world to fit its machines with the anti-locking system ABS over 20 years ago, setting a milestone in active motorcycling safety at the time. Initially introduced in the BMW Motorrad models of the K series such as the K 100 and K1 as an ex works option, it soon blazed a trail of success in the opposed twin "boxer" series and later in the F and G models. On August 31st 2009, a BMW K 1300 R was the one-millionth BMW to leave the production plant in Berlin-Spandau fitted with the innovative BMW Motorrad Integral ABS.

ABS for the R and K series: constantly smaller, lighter and higher performance.

In spring 1988, motorcycle experts spoke of a "technical revolution" and the "most important advancement in the field of active safety": BMW was the first motorcycle manufacturer in the world to put an electronic-hydraulic antilock braking system (ABS) on the market in the model K 100. It weighed 11.1 kilograms and saw instant success.

It was not long before the next generation of the system went on the market in 1993, ABS II. This new system was just under half the weight (5.96 kg) and much more compact than the first ABS. The structure of the electronics using modern digital technology further enhanced reliability and control quality. The third generation of ABS went on the market in spring 2001 - BMW Motorrad Integral ABS. This system offered an integral brake function linking the brake cycles for the front and rear wheel for the first time, as well as providing a brake servo function. At a weight of 4.35 kilograms it was around 20 per cent lighter than ABS II.

In 2006, BMW Motorrad Integral ABS moved into the next generation, this time making a veritable leap in its evolution - from being confined to brake control to becoming a fully networked system. With the new Integral ABS, BMW Motorrad created a platform for additional riding dynamics control systems based on reduced engineering. This opens the way for the option of additional rider assistance functions as desired by the customer, such as Automatic Stability Control ASC.

The technology was developed separately from the predecessor system and the system layout fundamentally recast. Maximum stopping power and thus very short braking distances are now possible, even without electrical brake-servo assistance. The Integral ABS weighs 2.3 kilograms and is in highly successful use in this version to this day in the models of the R and K series.

ABS for the entry level and medium category.

An ABS was likewise introduced in the entry-level model F 650 GS (single-cylinder) in the year 2000. This is a solution specific to the segment: a compact, light (2.1 kg) dual channel valve system without integral function.

A refined system on this basis was used from 2006 in the medium category models of the F series and in the sports boxer machine R 1200 S. The new generation of BMW Motorrad ABS is characterised not just by a compact structure and low weight (1.5 kg) but also by much improved control quality as compared to the predecessor generation.

In 2008 the system was slightly modified, with braking distances shortened even further by means of an improved lift detection function for the rear wheel and extended diagnostics.

In 2009 the system was then further optimised with the addition of a new pressure sensor for the launch of the BMW F 800 R - to match the sporting purpose for which the roadster was designed.

Based on the BMW Motorrad principle "Safety 360°", the latest generation of the BMW Motorrad dual channel ABS will be installed for the first time in serial production from model year 2013 in the two new models BMW F 700 GS and F 800 GS. The new system is not only much lighter, weighing just 700 grams,

but is also more compact in size that the previous generation. What is more, it now has inlet valves which can be infinitely adjusted for an even better response. New wheel sensors automatically monitor the distance between sensor and sensor wheel. As usual, the new standard ABS can be deactivated at the press of the button if the rider so wishes - for example for active riding over rough terrain.

Race ABS for the race track.

The current high point of technological development is BMW Motorrad Race ABS developed for the launch of the BMW S 1000 RR in 2009 to meet the needs of supersports riders. This is a completely newly developed system which is significantly lighter than previous part integral systems. With a control unit weighing just 1.5 kilograms and a total weight of just 2.5 kilograms, it is ideally suited for use in supersports motorcycles.

The rider can press a button to select engine characteristics including the relevant Race ABS characteristics for a range of conditions such as a wet surface ("Rain"), road ("Sport"), race track with supersports tyres ("Race") and race track with slicks ("Slick"). These are combined with the various modes and are mutually harmonised for maximum safety.
Even though the new system - like every other ABS - cannot redefine the limits of motorcycle physics, the new Race ABS does provide the rider with valuable support and an enormous safety bonus.

BMW Motorrad ASC and DTC – increased safety when accelerating.

In the course of ABS development and with a view to increasing ride safety even further, BMW has also created traction slip control systems such as ASC (Automatic Stability Control) or most recently Dynamic Traction Control DTC for the new BMW S 1000 RR.

The rider assistance system ASC introduced in 2006 has been one of the most popular ex works options for years. This is because the BMW Motorrad traction control system limits drive torque in relation to the nature of the road surface. By comparing the rotational speeds of the front and rear wheel obtained via the ABS sensors, the electronic system detects spin in the rear wheel and cuts back engine power accordingly by reducing

the ignition angle as well as adapting injection via the engine control system. The result: no more rear wheel spin, more efficient power transmission while maintaining lateral forces and thus significantly increased active riding safety.

In the BMW Motorrad GS models, the ASC also features a special terrain function which is adapted to the traction conditions on loose surfaces such as sand and gravel. The change between the road and the terrain setting is conveniently made by means of a switch on the handlebar instrument panel. Since 2011, this innovative traction control system has been available for retrofit in all BMW motorcycles with Integral ABS (since 2007).

An outstanding refinement of the traction control system and a genuine innovation in the field of electronic control systems in general is Dynamic Traction Control DTC, introduced in 2009 in the BMW S 1000 RR. This was the first traction control system to be offered in the supersports segment with banking detection. In addition to comparing the rotational speeds of the front and rear wheels via the ABS sensors, there is now a sensor box which determines the motorcycle's banking angle. Like the new BMW Motorrad Race ABS, DTC (Dynamic Traction Control) is also individually combined with the engine control modes available.

With its four different settings, DTC helps the rider control the S 1000 RR much more effectively and safely when close to the physical limits than would otherwise be possible without it.

Lighting.

Adaptive Headlight - significantly improved road illumination on bends.

Seeing and being seen are crucial to safe motorcycling. In the area of electrical engineering, BMW Motorrad constantly works to develop innovative lighting systems.

Since the launch of the 6-cylinder models K 1600 GT and K 1600 GTL in 2011, BMW Motorrad is the first motorcycle manufacturer in the world to offer an Adaptive Headlight in conjunction with standard xenon headlamps. Here, compensation of the banking angle and the pitch provide

much improved illumination of the road on bends, thereby significantly increasing ride safety.

Daytime running light and LED technology - much improved visibility.
BMW Motorrad first presented its LED daytime running light feature in the new scooters C 600 Sport and C 650 GT in 2011. This safety feature, hitherto a rarity, provides considerably enhanced visibility in road traffic, thereby contributing significantly to the motorcyclist's passive safety. Much more widespread use of LED technologies in scooters and motorcycles is being prepared for the future.

Ergonomics and usability.

The ergonomics triangle as the defining factor for ride posture.
Ergonomics has always been a key issue in the development of BMW motorcycles - after all, lasting safety and fatigue elimination is only possible if the rider adopts the right seating position.
Here, particular importance is attached to the so-called ergonomics triangle, consisting of the positions of the handlebars, seat and footrests. Depending on the model, BMW Motorrad offers various adjustment options and alternatives such as seats for higher or lower seating heights.

BMW Motorrad addresses special ergonomic needs - such as those of especially short or tall riders - by providing an extensive range of options and special accessories (windshields, lowering kits etc.) for customisation purposes.

Optimum usability based on maximum functionality.
Simple handling and excellent reachability of switch units, hand levers and pedals for brake, clutch and gears are absolutely essential for safe motorcycling. This is why BMW Motorrad has always attached great importance to functionality. Here the multi-controller as part of an integrated operating concept is an innovation in the motorcycle field, as found in the K 1600 GT and K 1600 GTL, for example.

The readability of instruments and information has a very important role to play in this connection, too. Dial faces with optimised design, high-resolution TFT screens, anti-reflective instrument panels and intuitive menu guidance - every aspect is subjected to ongoing examination and improved where necessary.

Special accessories.

BMW Motorrad offers an even broader range of possibilities for optimising motorcycle safety when it comes to special uses and requirement profiles.

For example, additional crash pads and crash bars can prevent major damage to the motorcycle in a worst-case scenario. Additional hand protectors safeguard against flying stones and an underguard prevents more extensive damage to the underside of the engine when riding off-road.

A look into the future: BMW Motorrad ConnectedRide - intelligent rider assistance systems.

"Vehicle to vehicle" (V2V) or "Vehicle to infrastructure" (V2I) communication as rider assistance technologies for increased motorcycling safety.

BMW Motorrad is involved in collaborative research with an international network of experts with the aim of enhancing motorcycling safety. There are already signs of far-reaching developments to come which have emerged from BMW Motorrad ConnectedRide, a research project run by BMW Motorrad and BMW Research and Technology.
From a long term perspective, assistance systems such as those based on V2x communication can offer considerable improvements in safety.

In future, an **intersecting traffic assistant** could be used to analyse the road users approaching a junction, including the priority situation and the probability of a collision occurring. In the event of an acute risk of collision, the perceptibility of the motorcycle would be increased by means of lights and sounding the horn.

A traffic light cycle assistant could involve communication between the traffic light system and the vehicle. If the lights had already turned red and the speed of the motorcycle has not changed as it reaches the junction, this information would be passed onto the rider early on via the instrument panel to allow the brakes to be applied gently.

BMW Motorrad eCall with automatic fall detection ACN - a life-saving system.

This valuable safety system is already available in serial production BMW automobiles and research is currently being carried out into a solution designed specifically for motorcycles. Such a feature might be ready for serial motorcycle production in the medium term.

If the rider of a motorcycle fitted with BMW Motorrad eCall were to be involved in an accident, this would be registered via a system of sensors (Automatic Collision Notification [ACN]) and an automatic emergency call would be activated. As in the case of manual operation, the necessary information would then be relayed to the BMW call centre and rescue operations would be coordinated geared towards the nature of the accident.

BMW Motorrad camera-based rider information and assistance system.

The BMW Motorrad rider information and assistance system could actively contribute to preventing dangerous situations from occurring in the first place. This technology could possibly be ready for serial production in the medium term. The system combines **sign detection, object detection** and **collision warning** to provide a comprehensive early warning system. For the first time in a motorcycle, the system actively detects a hazardous situation and is capable of triggering appropriate secondary measures such as increasing perceptibility or preparing the brake system.

3. Rider equipment.

Safety as a matter of principle - perfect protection from hazards, wind and weather.

BMW Motorrad is the only motorcycle manufacturer to develop an entire range of rider equipment and has done so since the 1970s - from motorcycle helmets to rider suits, boots and gloves. From the very outset, engineers and designers have set high standards when it comes to safety. The aim to this day is to provide maximum protection combined with a high level of wear comfort and excellent performance.

The BMW Motorrad System helmets with folding chin section set the benchmark in the motorcycling world from the very beginning. The last few decades have seen ongoing development towards today's fully-fledged range of clothing and riding equipment at the high level of quality and performance that is characteristic of BMW Motorrad.

Helmets.

Motorcycling is all in the head - BMW Motorrad helmets for optimum protection and functionality.

Today, BMW Motorrad helmets not only meet the regular ECE norm 22-05, they surpass it significantly in many aspects. All BMW Motorrad helmets have an EPS inner shell made of foamed polystyrene with varying material densities. The result is optimum impact absorption in the areas of the chin, forehead, crown, back of the head and cheeks. BMW Motorrad helmets can be adapted to individual ergonomic needs by means of various cheek and neck pads. The System 6 helmet is available in sizes 48/49 to 64/65.

BMW Motorrad helmets have an effective system of negative pressure ventilation. The so-called "AirFlow" system was used for the first time in the BMW Motorrad helmet of the same name - the first of its kind in the world. The current AirFlow2 helmet has two additional large ventilation zones so as to direct maximum airstream volume into the helmet. This ensures the rider always keeps a cool head.

In the helmet area, BMW Motorrad provides various solutions to match differing purposes. Comfort-oriented motorcyclists will find an integrated sun visor to reduce dazzle in the folding System 6 helmet, for example.

In order to provide the best possible protection, all BMW Motorrad helmets have an additional neck strap which keeps the helmet securely in place even in the case of a collision. Depending on their purpose, helmets are fitted with an easy-to-use ratchet fastener or else the double D fastener popular with sports riders.

The weight of a helmet has a major impact in terms of the physical strain experienced by the rider, especially in the area of the neck muscles, so every gram of weight reduction increases riding pleasure. In spite of its sophisticated chin section mechanism, GRP helmet shell, integrated sun visor and dual visor as standard, the BMW System 6 helmet weighs no more than approx 1,570 grams (size 58/59), the Sport helmet weighs just 1,380 grams and the Enduro Carbon helmet, one of the lightest of its kind in the world, boasts a weight of little more than 1,100 grams. The main reason for this is the use of light, highly rigid carbon fibre laminate for the helmet shell.

The helmet's aerodynamic qualities are another comfort feature which enhance rider concentration. BMW Motorrad has its own wind tunnel, enabling helmets to be tested under reproducible conditions during development, thereby achieving optimum aerodynamic and aeroacoustic performance. This is why BMW Motorrad helmets are among the quietest in their class, offering extra ride comfort and therefore improved concentration and safety while motorcycling.

Helmet safety also means ensuring optimum visibility for the rider in all conditions. For this reason, BMW Motorrad helmets without dual visor have an anti-scratch and anti-fog coating. The anti-scratch coating makes the visor surface resilient to scratches which can impair visibility - especially when riding at night or in the rain. The anti-fog coating stops the visor from fogging over in damp climatic conditions. Outstanding helmets in this area are the BMW Motorrad System 6 helmet, the Sport helmet and the DoubleR helmet, which are even fitted as standard with a dual visor. The latter offer the best anti-fog properties currently technologically feasible.

Suits.

Safely dressed in all weathers - innovative textile rider clothing by BMW Motorrad.

There is no such thing as bad weather when it comes to motorcycling - only the wrong clothing to suit the purpose. This philosophy, common among motorcyclists, has been part of the BMW Motorrad program for decades in the development of rider suits, jackets and trousers. It is embodied in the company's very own seal of quality - C.A.R.E. by BMW Motorrad. C.A.R.E. stands for "Concept of Advanced Rider Equipment" and reflects BMW Motorrad's constant endeavour in research, development and the testing of materials and products to find the appropriate solution for the wide-ranging demands made of motorcycle clothing.

BMW Motorrad all-weather suits such as the TourShell are not just designed to be wind and waterproof with the use of high-tech materials, they also provide additional active breathing due to the C.A.R.E. climate membrane. The outer material is a highly abrasion-resistant material made of polyamide and spandex consisting of a triple-layer laminate. This laminate design prevents the upper material from absorbing too much water and increasing the weight of the suit. At the same time, the spandex element keeps the tissue elastic so that the suit can adapt to the rider's movements. This is also supported by stretch inserts at the shoulders (men) and hips (women). As a result, the rider benefits from excellent wear comfort and can focus entirely on motorcycling - in all weathers and riding conditions.

Flexible, removable NP protectors with excellent damping properties developed by BMW Motorrad are applied at points which are at particular risk in the event of a fall, such as the back, shoulders, elbows, hip and knees. These fit snugly around the respective body parts so as to provide the best possible wear comfort, too. In the knee area, the protectors can also be adjusted to three different levels so that every motorcyclist can find the perfect fit. The cuff bands, collar and waistband are also adjustable to meet individual needs. Here, an elasticised Velcro fastener with a large adjustment range provides much improved comfort as compared to the conventional Velcro fasteners used previously.

A removable, quilted thermal inner jacket fulfils the particular demands of an all-weather motorcycle suit. With its efficient thermal insulation and integrated cuff sheaths, if offers excellent protection from the cold: by ensuring the rider's well-being, this supports concentration on the road. If it is still too hot in the summer in spite of having removed the inner jacket, it is possible to make use of the effective zip vents at the side of the chest area.

Only the very highest quality materials are developed and used in the manufacture of BMW Motorrad rider equipment products. The upper materials - in particular terms of abrasion resilience - are a key factor since they are so important for safety. A computer-supported test facility is used for development purposes to simulate realistic conditions which indicate precisely what happens to the clothing on contact with the road.

This development process has led to the creation of such fabrics as the extreme protective textile Schoeller Keproshield especially for motorcycle suits - the result of collaboration with textile specialist Schoeller. Keproshield is made of Kevlar (aramid), cotton and polyamide, thereby constituting the upper material. The three layers are merged with the so-called c_change membrane and a light knitted yarn. The use of this material results in an improvement in tear resistance, tear propagation strength and frictional heat resilience of approximately 20 per cent. What is more, the reduced weight makes for a significant enhancement in terms of wear comfort.

The above-mentioned c_change membrane adapts its pore size to the outside temperature, regulating the level of active breathing required of the clothing. Nature itself is the role model here. c_change membrane "breathes"

in high temperatures and insulates in the cold, rather like the principle of a fir cone whose scales open in warm weather and close in cold weather. What is more, this "intelligent" membrane is designed to be permanently wind and weatherproof. It is flexible, providing an excellent basis for an entirely elastic upper material so as to ensure even greater wear comfort.

The so-called coldblack® feature in dark suits achieves effective heat management. coldblack® reflects both the visible and the invisible component of solar radiation - this means that not only light is reflected but the heat, too. In this way the textiles stay cool for longer, increasing wear comfort and thereby tangibly enhancing the rider's concentration and safety.

Athletic and safe – BMW Motorrad leather motorcycle clothing.
To this day, leather clothing is regarded as cult among motorcyclists and BMW Motorrad addresses this desire on the part of the fan community by offering a broad and highly innovative range of one-piece and two-piece items.

Close-fitting leather suits in highly abrasion-resistant kangaroo leather, up to approx. 1 millimetre thick, and in cowhide nappa leather, approx. 1.2 thick, offer maximum safety in the area of sports and supersports.

Safety is reflected here not just in the choice of material, however, but also in the manufacturing process. It takes as many as 130 production stages and 120 individual parts made of leather, stretch fabric and reflective material as well as zips and snap fasteners to make a single leather suit. This includes stretch inserts in leather, Kevlarstretch or Aramidstretch for a high level of wear comfort and pre-shaped sleeves and knee sections for a perfect fit on the motorcycle.

The BMW Motorrad leather suits DoubleR and Sport also feature the TFL Cool System. Dark leather with this system reflects the rays of the sun just as a light-coloured material would. A special water-repellent treatment prepares the material for motorcycling in the rain. So-called hydrophobisation only creates a protective layer around the fibres of the leather, while the leather pores remain open. This retains maximum active breathing.

NP protectors - removable at the back and hip, permanently sewn in at the shoulders, elbows and knees, and retrofittable at the tailbone - are developed in collaboration with biomechanics, specialised doctors and accident researchers to provide protection in customary BMW Motorrad quality. Safety optimisation is founded off with INOX stainless steel sliders injected in plastic. In addition to NP protectors, the supersports leather suits also have a back hump with a zip to integrate the so-called BMW Motorrad Neck Brace System.

Neck Brace System.

Protection for the front and rear neck area -
the BMW Motorrad Neck Brace System.
As the world's leading motorcycle manufacturer for innovative safety systems, BMW Motorrad presented the Neck Brace System in 2006.
At this time, helmet and body protectors had already become firmly established in motorcycling. However, the sensitive neck area was still vulnerable.

In collaboration with KTM and team of specialists made up of accident researchers, biomechanics, accident surgeons and not least the inventor of the system, South African medical consultant Dr. Chris Leatt, BMW Motorrad was actively involved in advancing the development of neck protection. The aim was to reduce the risk of injury to the neck, cervical spine and collarbone in the case of a severe fall.

The Neck Brace System is a light construction made of carbon, Kevlar and glass fibre reinforced plastic which is partly coated with a soft, impact-absorbing and skin-friendly foam layer. The system is placed around the neck like a collar. Two quick-release fasteners at the sides enable simple handling. The Neck Brace System does not create a static connection between the helmet and shoulders but sits on the torso so as to preserve freedom of movement.

Boots and gloves.

Not just made for walking - BMW Motorrad boots.

The innovations and functional detail solutions to be found in all BMW Motorrad products are developed by an experienced team of specialists - people who know from experience what motorcyclists expect of their clothing. Motorcyclists' extremities are especially at risk of injury. This is why BMW Motorrad addresses these risks with innovative solutions it its boots and gloves, too.

In the area of wind and waterproof motorcycle boots, various individually tailored solutions have been developed which are designed to suit the various types of use and rider preferences. For example, a BMW Motorrad boot fitted with the so-called Torsion Control System TCS comprises two heel shells and a dual-section frame which interact perfectly. TCS significantly reduces the risk of ankle injury.

The Metatarsal Control System MCS is likewise applied so as to avoid injury caused by extreme flexion of the metatarsal. The system is based on a fixed polyamide foundation with a rotational point at the height of the flexion, controlling the upward and downward movement of the foot and preventing excessive strain to the metatarsal.

A safe pair of hands - BMW Motorrad gloves.

The development of gloves also focuses chiefly on fitting accuracy, comfort and safety. From slight curvature of the fingers for ergonomic optimisation through to GORE-TEX®-X-TRAFIT membranes for wind and waterproof properties as well as maximum breathability and highly abrasion-resistant leather, e.g. Keratan® sheathing with Superfabric®, rayskin leather or keprotec® at especially sensitive points as well as the use of Kevlar-carbon hard shells or visco-elastic impact-absorbing foams at the knuckles - every BMW Motorrad glove contains within it a wealth of expert knowledge.

Increased visibility.

Reflectors and luminous colours - to be seen by others.

When riding at night, in the rain or in the fog, a matter of a few metres can make all the difference. The sooner the motorcyclist is seen by other road users, the better. For this reason, BMW includes light-reflecting elements in its rider equipment so as to significantly enhance visibility in poor conditions, thereby minimising risks. For optimum visibility, BMW Motorrad offers the Boulder 2 and AirShell jackets in the colour neon and the BMW System 6 helmet in luminous fluorescent yellow.

4. Rider training courses.

Safety based on vehicle control - individually tailored BMW Motorrad rider training courses for off-road, safety and race track.

The aims of BMW Motorrad rider training courses are to enable one hundred per cent discovery of the passion for motorcycling and to gain sound riding experience - thereby increasing safety. After all, motorcycling does not offer fun and pleasure to perfection until the rider has confident mastery of the machine - whether over rough terrain, on the road or on the race track. In each of these areas, BMW Motorrad offers specialised rider training courses for beginners, advanced riders and even children. These courses are supplemented by the national programs provided by BMW Motorrad partners in a wide range of countries.

BMW Motorrad instructor qualification ensures excellent quality.
The BMW Motorrad International Instructor Academy guarantees a very high standard of instructor qualification for off-road and safety training courses. As far as race track training courses are concerned, not only qualified instructors deliver the programs: BMW Motorrad also draws on the services of well-known racing motorcyclists.

Off-road.

BMW Motorrad off-road rider training - acquire and develop secure vehicle control away from asphalted road surfaces.

BMW Motorrad recognised the need for rider training courses and specialised training options early on. As long ago as 1994, a fascinating training facility was provided for BMW Motorrad riders when the Enduro Park Hechlingen was opened. This 26-hectare space is regarded as a veritable paradise for off-road motorcyclists. Spectacular water crossings and steep slopes alternate with potholes, gravel, sand and mud, offering the very finest enduro experience.

Highly qualified instructors teach beginners the basics of enduro riding and even experienced off-roaders can learn from the experts. Participants are challenged - but not overstretched. Training participants start by learning the basics of enduro riding such as the correct line of sight, the ideal seating position and effective braking on loose surfaces so as to prepare efficiently for future off-road rides.

There is also a special trial course which enables participants to try their hand at riding light, agile trial motorbikes. Trial training courses are also offered for younger participants aged between 10 and 18.

Safety.

BMW Motorrad rider training - increased safety in road traffic.
The more practice you have, the more safely you ride. This especially applies to motorcycling beginners and restarters. The compact motorcycle training course delivered at the BMW Rider Training Centre in Munich teaches participants to respond correctly to critical situations in city traffic. Here, participants learn how to shift their weight correctly, as well as acquiring mastery of the right steering movements and impulses so as to control the motorcycle more effectively in dangerous situations. Practical exercises featuring braking and steering techniques form part of the compact training course as do tips and tricks provided by the instructors for greater safety. The advanced motorcycle training course is ideal for those who wish to extend their riding skills even further. Cornering techniques, skilled avoidance, slalom and line of sight are practiced intensely here.

Race track training courses.

BMW Motorrad Race Academy and Track Days – performance-oriented riding on the race track.

For many riders with sporty ambitions, riding on a race track is the ultimate form of motorcycling, as they dream of the "knee on the ground" position, late braking into bends and skilfully following the ideal line at speed. Although these courses are geared towards riding at speed on the race track, they actually feature a wealth of content which is of direct relevance to the day-to-day handling of a motorcycle on public roads, too. After all, if you are able to control your motorcycle on the race track at threshold level, you have a much higher skill level to be able to respond appropriately in critical situations that might occur in road traffic.

For this reason, BMW Motorrad has organised the BMW Motorrad Race Academy since 2010 - race track training courses aimed at experienced motorcyclists and those with sporting ambitions which provide a specialised program for performance-oriented race track riding. What is more, the so-called Track Days have been held since 2012, offering BMW Motorrad fans the opportunity to ride the S 1000 RR on the race track - partially under the professional guidance of none other than two-times World Superbike Championship winner Troy Corser.