

# The BMW GINA Light Visionary Model. Innovative approach and optical expression of creative freedom.



The key to affecting the development of tomorrow's mobility lies in our readiness to challenge what is established and in the ability to present new options. In order to meet these objectives, BMW Group Design taps into the potential of the GINA principle (Geometry and Functions In "N" Adaptions) which promotes innovative thinking by allowing maximum freedom of creativity. GINA produces dramatically different solutions that affect the design and functionality of future cars. The GINA Light Visionary Model is an optical expression of selective, future-oriented concepts which provide an example of the manner and extent of this transformation.

BMW Group Design is not just interested in answering the question of how the car of the future will look but primarily wishes to explore the creative freedom it has to offer. Both of these aspects are affected by the requirements that future cars are expected to meet. All ideas that the GINA Light Visionary Model presents are therefore derived from the needs and demands of customers concerning the aesthetic and functional characteristics of their car and their desire to express individuality and lifestyle. The GINA Light Visionary Model has an almost seamless outer skin, a flexible textile cover that stretches across a moveable substructure. Individual functions are only revealed if and when they are needed. With this model, BMW Group Design initiates a fundamental discourse about the characteristics that will affect the development of cars in future. It is therefore fundamentally different from concept cars, which reflect what is expected of them by implementing as many elements as possible in a future production model. In contrast, the GINA Light Visionary Model is a vision of future cars and serves as an object of research.

## **The seamless car body of the GINA Light Visionary Model.**

Putting its visions of tomorrow's car into practice, BMW Group Design has developed a two-seater roadster with the unique dynamic proportions that are typical of its brand. The GINA Light Visionary Model takes the sculptural design that has already been established by a number of production cars to a new, unparalleled conclusion. The car's front and sides, including the doors, create one single uninterrupted, seamless whole that converges to form an optical as well as a structural unit.

In order to create this appearance, it was necessary to move beyond all previous conceptions of car body configuration, design and materials. Therefore, the GINA Light Visionary Model has dispensed with the usual body elements found

on production vehicles such as front apron, bonnet, side panels, doors, wheel arches, roof, trunk lid and rear deck. Instead, a new structure with a minimum amount of components has taken their place. A special, highly durable and extremely expansion-resistant fabric material stretches across a metal structure. This new material offers designers a significantly higher level of freedom of design and functionality.

The body consists of only four elements. The largest component extends from the front of the vehicle to the edge of the windscreen and down the sides to the rear edge of the doors. The large side panels start at the front where the rocker panels emerge and run across the rear wheel arches into the rear. The fourth component is the central rear deck element.

### **An innovation breaks new ground: car with a flexible outer skin.**

The innovation of a flexible outer skin breaks new ground in automotive engineering. This revolutionary solution opens up new design, production and functionality potential. It has a major impact on the interaction between driver and car and enhances it by offering a variety of entirely new options. Some elements of the substructure are moveable. The driver can move them by means of electro and electro-hydraulic controls. This will also change the shape of the outer skin, which can thus be adapted to suit the current situation, the driver's requirements and can also enhance the car's functional range. The most striking example of this is the headlight design. In normal position, when the headlights are not active, i.e. when there is no necessity to illuminate the road, they are hidden under the special fabric cover. As soon as the driver turns on the lights, the contour of the front end changes. Activated by the metal structure that lies beneath it, the previously closed fabric cover opens to the right and left of the BMW kidney grille and reveals the BMW double headlights. The rear and the rocker panels of the GINA Visionary Model can also adapt both the shape and function to the driving situation in hand. Both can change the shape of their outer skin to meet the driver's requirement for particularly dynamic motoring. This concept also takes into account a potential interaction with aerodynamic requirements. The design of the rear element allows for automatic lifting of the rear spoiler when a certain speed is reached, thus creating extra downforce on the rear axle at higher speeds. Due to the fact that the entire rear end, including the spoiler, is covered by a single sheet of material that reaches as far as the rear compartment of the interior, the homogeneous shape of the car's rear will not be affected by changes to the spoiler position. The mechanical system that moves the elements remains concealed.

The turn indicators and the taillights function without changes to the shape of the outer skin. Their position, however, is only revealed upon activation. The emitted light shines through the translucent fabric cover, which is permeable to light but not transparent.

The rocker panels demonstrate the formal versatility of the GINA Light Visionary Model with an equally impressive performance. The air duct can be optimised if required. A corresponding movement of the metal structure results in an adjustment of the rocker panel contour to allow for better airflow. At the same time, an additional protruding rocker panel line emerges. The aerodynamic optimization and the length of the line can be infinitely adapted to the driving situation at hand.

**Special fabric cover ensures accurate reproduction of material folds.**

The fact that the body surface is designed by means of a flexible fabric cover that stretches across a metal substructure means that the materials used must meet exacting requirements. Industrially produced hybrid fabric made from a stabilizing mesh netting support and an outer layer that is both water-repellent and resistant to high and low temperatures is suitable for this application. Another essential material property is a maximum level of dimensional stability. It must remain dimensionally stable irrespective of the temperature and air humidity it is exposed to even after severe and constant expansion. The dimensional stability helps retain the cover's surface tension for a long period of time. The movement of individual body elements creates accurately reproducible folds in the material. In its choice of material BMW Group Design was inspired by exterior and interior architecture. The expertise of seat pattern designers working for BMW Group Interior Design was successfully applied in order to cut the fabric webbing to size with maximum precision, determine the strategic position of attachment points and stretch the material. As a result, the surfaces are remarkably well balanced and due to the steady tension that is retained between any two clearly defined points, the lines are extremely accurate.

The special fabric is supported by a metal wire structure. At specific points, the high-strength metal is enhanced by carbon struts with a higher flexibility. They are used predominantly for round, moving contours with a particularly narrow radius.

The use of large fabric areas and the possibility of changing the surface contours by moving individual parts of the metal mesh that lies beneath it create a new relationship between form and function. If additional cooling air is required, the BMW kidney grille at the front of the vehicle can be opened. Because the overall surface of the special fabric covering remains unchanged, the contraction at the front of the vehicle, which is necessary for functional reasons, has to be

compensated for by extra tension in other areas. The result is an optically attractive interaction between various body parts that introduces a new dimension to sculptural design. The widening of the kidney grille openings is activated by a movement of the metal mesh in the front area of the side panels. This creates more tension, which becomes visible by the emergence of an additional character line. The development of this new contour tenses the front of the vehicle: the kidney grille opens up.

### **Innovative body structure introduces new functional dimensions.**

The high-precision fit of the material to the metal mesh also allows surface changes without slackening the tension. In this case, opening of the surface by moving the respective steel mesh struts creates precisely defined folds in the material. The GINA Light Visionary Model uses this option to display a function that corresponds to the opening of the hood in conventional vehicles. The material opens at the centre of the engine cover and can be folded to the far right and left along an opening line that is approximately 0.5 meters long, to allow the driver or mechanic access to the service points in the engine. The filler caps of the engine oil, cooling and wiper water tanks are now open for servicing. Opening and closing is similar to the mechanism on a doctor's traditional medical bag, where clip-lock fasteners are held together in the middle by a rail.

The effect of the accurate surface material draping is even more impressive when the doors are opened. They swing both outwards and upwards. The high number of attachment points for the fabric cover positioned at the front of the car as well as at rear door edges creates a clearly defined and perfectly reproducible bulk of material. The draping is confined to the area between the front door edge and the side panel. Once the doors are closed, the folds in material disappear completely, leaving a perfectly smooth, stretched material surface.

### **The interior: discourse between driver and vehicle.**

In the interior, variability, form and function are united in an inseparable connection. Whenever selected functions are accessed, the driver also changes the appearance of individual car elements. Again, the car's variability is adapted to suit the driver's needs. This creates a close interaction between driver and car in various different situations.

When the car is parked, the steering wheel and the round instruments – rev counter, speedometer and fuel gauge, which are vertically arranged on the centre console, are in idle position. This provides the driver with maximum comfort upon entering the car. Likewise, the seat only assumes its optimised functional position and shape if and when the driver sits down on it.

At that point, the headrest, previously firmly integrated into the seat's backrest, rises up automatically. At the same time, the steering wheel moves towards the driver and the instrument panel moves in the same direction. The information on the best driver-specific position of both steering column and seat is stored in the transducer. The engine is started simply by pushing the start/stop button.

The smooth transition of interior and exterior that is typical of BMW convertibles is reinterpreted by the GINA Light Visionary Model. The fabric that covers the rear deck runs into the interior and stretches across the driver and front passenger seats. The same material is also used for the surface design of the door trim and armrests. The shift lever in the centre console protrudes from tightly stretched textile bellows.

Driver and front seat passenger look out through a steeply inclined windscreen with the inside rear view mirror integrated into its frame. The side view mirrors are connected to the window frame. A narrow vertical dividing bar located at the center of the windscreen harks back to the typical windscreen division of traditional roadsters.

### **Innovative thinking put into practice: the GINA Light Visionary Model.**

With the GINA Light Visionary Model, BMW Group Design focuses on a wide variety of issues that will determine the future conception of mobility. It demonstrates the results of intense research into design, functionality, material and production. All ideas that have been put into practice in the GINA Light Visionary Model are derived from the same motivation: to challenge conventional and previously pursued solutions. The quest for alternative options has generated a wide variety of different requirements that potential solutions are expected to meet. The main focus is on providing general versatility and catering to customer requirements with sophisticated solutions. In accordance with the GINA principle, every functionality enhancement helps to create an emotional bond between the driver and their car. The new solutions also allow for the option of fast, flexible and cost-efficient production.

Every innovation demonstrated by the GINA Light Visionary Model also contributes to a clearly optimised resource management. As the quest for sustainability is one of the central issues of the GINA philosophy, new materials and manufacturing processes are expected to consume less resources and energy than previous solutions. Accordingly, the infrastructure used for manufacturing cars that are built in compliance with the GINA principle, has also changed. The manufacturing process requires fewer model-specific tools, and more highly-qualified skilled specialists. In all the areas referred to above, the GINA Light Visionary Model has provided inspiration for more intense research into ideas conceived as a result of maximum creative freedom.

### **Emotional appeal of roadster models and visionary prospect of future cars.**

The solutions conceived as part of this philosophy are not considered separately, but have been pooled in an integrating vision – a vision that is expressed in the context of an outstanding, fascinating car. The basic features of a roadster with its eight-cylinder combustion engine below a stretched front that applies motive power to the rear wheels in order to move the car along the road defines this context. The synthesis of elementary visions and sheer driving pleasure expressed by the appearance of the GINA Light Visionary Model has a particularly striking emotional impact. Only the particular appearance of a fascinating car with its authentic design that creates a natural aesthetic look can bring to light the significance of the presented innovations.

The GINA Light Visionary Model builds a bridge between vision and reality by presenting a number of features with a striking similarity with those found on production vehicles. The Roadster rests on 20" alloy wheels in a cross-spoke design with a matt silver finish. The car body is comprised of an exceptionally light aluminum space frame. Two double tailpipes for the rear exhaust system, a third brake light integrated into the height-adjustable rear spoiler, an air splitter at the front and a rear-end diffuser in a carbon design also meet the standards of a production vehicle.

Nevertheless, the GINA Light Visionary Model retains its character as an object of research. It demonstrates the innovative force of BMW Group Design and its ability to challenge what is established, to find new solutions and to interpret these in the context of the car of the future at a high aesthetic level. This car is the logical continuation of the GINA principle in action. The GINA principle has already led to a variety of innovative concepts and has production vehicles in ways that are completely new and unprecedented by any other car manufacturer.

BMW Group Design uses concept cars such as the BMW concept car CS1 of 2002 as a step on the way towards putting a particular vision into practice. The CS1 was the first to present features such as the basic principle of the innovative control system – the BMW iDrive. Independently from all other innovative features shown by this concept car, the iDrive has become a series production feature. Similarly, the GINA principle gave rise to an innovative manufacturing method that allows the manufacturers to decorate outer skin components that have been preformed by conventional methods with individually configured, high-precision contour lines prior to their reintegration into the manufacturing process. The Rapid Manufacturing method utilized for this process was first used during the production of hoods for the BMW Z4 M Roadster and the BMW Z4 M Coupé. In these models, the finished

hood has received two distinctive contour lines prior to painting. These are not produced by a pressing tool but embossed into the metal with pin-point precision by a robot-guided steel pin.

Both examples illustrate the challenging route from a vision to a concept and to final series production that is not always straight and direct. With the GINA Light Visionary Model, BMW Group Design shows where this route begins. Not all innovations shown by the GINA Light Visionary Model will proceed to the next stages. In its entirety, however, the visionary look into the future shows the extent to which the BMW Group employs creative potential in its endeavor to respond to the challenges of tomorrow's mobility.