



Presse-Information  
27 July 2015

## **BMW i patent powers eBike. Innovative drive unit swing arm goes into production at the Pedelec factory HNF Heisenberg.**

**Munich/Biesenthal.** BMW i stands for visionary mobility concepts, progressive design and a new understanding of premium that is strongly defined by sustainability. Furthermore, BMW i also fulfills the function within the BMW Group of an incubator for innovation that reaches far beyond the vehicles BMW i3 and BMW i8 we are already familiar with.

The patent for a drive unit swing arm, which is now entering production at the HNF eBike factory after development to series maturity in collaboration with BMW Research and Technology, originates from the first stage of BMW i market research and the early concept phase.

As there was no longer any immediate use for the patent due to the focus at BMW i on two-track electric vehicles, it has now been finally released for external usage.

Its application in reality can now be experienced on the eBike "Heisenberg XF1", on which a small logo with the wording "Concept by BMW i" indicates the prestigious origin of this innovative functional principle.

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The drive unit swing arm is a new kind of frame technology for full-suspension eBikes featuring a mid-motor. The concept allows the drive train, which was previously firmly attached to the main frame, to float freely, eliminating the need for the conventional chain tensioner. This permits for the first time the combination of a rear suspension and the durable, maintenance-free carbon belt drive on full-suspension eBikes, resulting in outstanding propulsion and handling characteristics.

**The BMW i patent for the drive unit swing arm principle facilitates for the first time the integration of mid-motor, gears and belt drive into an innovative suspension module, thereby dispensing with a belt tensioner.**

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The HNF Heisenberg development team designed the new suspension technology for the XF1 in a very specific way. The kinematics are fully integrated above the mid-motor, connecting it securely to the frame. To ensure consistent spacing of the low-maintenance carbon drive belt between the spindle and the rear hub, the mid-motor and rear hub are integrated into the drive unit swing arm. The belt runs under tension and perfectly aligned between both toothed belt discs and is able to effortlessly transfer even high peak loads from the mid-motor.

In accordance with the principle of four-joint kinematics with a virtual rotary axis around the spindle, the BMW drive unit swing arm is guided in such a precise way as to prevent the relative position of the mid-motor spindle unit from deviating in relation to the main frame. In conjunction with the shock linkage, this swing arm connectivity facilitates long spring travel of up to 150 mm on the rear wheel. One of the dynamics-related advantages of the drive unit swing arm is the fact that it functions without recoil from the pedal. Compared with other rear-mounted suspension concepts, which are specifically optimized for muscle-powered drive systems, there is no stiffening of the rear swing arm when the electric motor is providing a high degree of assistance such as during acceleration, constant travel at high speeds or on hills. The suspension can respond sensitively at any time, ensuring excellent grip and high traction. As the proportion of human driving force is relatively small, there is no unpleasant rocking movement when accelerating or breaking. Even in the event of extremely uneven terrain it is possible to pedal smoothly and efficiently.

From the summer, the HNF Heisenberg XF1 will benefit from the following advantages of the BMW i 4-joint drive unit swing arm:

- Mid-motor and even axle load distribution
- Maintenance-free belt drive with hub gear, without chain tensioner
- Highly stiff frame
- No pedal recoil



# BMW i

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- Grip and traction in all riding situations, as there is no stiffening of the rear arm swing
- Possibility of implementing a modular drive system
- Freedom in the design of the main frame

### **About BMW i**

With BMW i, the BMW Group is pursuing a holistic approach: With tailor-made vehicle concepts, a strong focus on sustainability along the entire value chain and a whole string of supplementary services, BMW i is redefining people's understanding of individual mobility.

### **About the HNF GmbH**

The company, which was established in Biesenthal near Berlin in 2014, develops next-generation eBikes with a direct service and sales concept offered under the brand name HNF Heisenberg. The founders are Michael Hecken, Karlheinz Nicolai and Benjamin Börries.

The eBike pioneers Michael Hecken and Karlheinz Nicolai had already established the Grace GmbH in 2008 and were commissioned by the Daimler Benz AG to develop the smart bike. HNF Heisenberg – their new future-oriented brand for an increasingly technophile public – will commence on xx.07.2015 with a model series ranging from the S-Pedelec city bike to the top-of-the-range full-suspension mountain bike.

([www.hnf-heisenberg.com](http://www.hnf-heisenberg.com))



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## The BMW Group

With its three brands BMW, MINI and Rolls-Royce, the BMW Group is the world's leading manufacturer of automobiles and motorcycles and also provides premium financial and mobility services. As a global company, the BMW Group operates 30 production and assembly facilities in 14 countries and has a global sales network in more than 140 countries.

In 2014, the BMW Group sold about 2.118 million cars and 123,000 motorcycles worldwide. The profit before tax for the financial year 2014 was € 8.71 billion on revenues amounting to € 80.40 billion. As of 31 December 2014, the BMW Group had a workforce of approximately 116,324 employees.

The success of the BMW Group has always been built on long-term thinking and responsible action. The company has therefore established ecological and social sustainability throughout the value chain, comprehensive product responsibility and a clear commitment to conserving resources as an integral part of its strategy.

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