



The battery-motor-gear-package can be exchanged with one click.

About IMS Gear SE & Co. KGaA

IMS Gear is one of the leading companies in gear technology. It is internationally oriented, consistently innovative and acts as a partner to globally active customers. The company makes both standard components and complete gear engineering solutions of the highest level, from development to production and logistics. This helps IMS Gear to constantly set new benchmarks in countless sectors. Founded over 150 years ago, the Black Forest-based family company has experienced steady growth thanks to its customer orientation, problem solving expertise, an open culture and low hierarchies.

About Fazua GmbH

Engineering with passion. That's the motto of the Munich-based start-up. Fazua produces e-mobility solutions together with a network of experienced partners from countless technical fields. The drive unit can be integrated in the frame of a pedelec, and is currently being marketed as an attractive solution. The target market consists of internationally active manufacturers with established brands. Fazua is also developing its own bike frame, which will allow it to take its technology onto the roads under its own brand.

Gear Technology. Worldwide.

IMS:GEAR



“Standing out by fitting in”:

Pedelec hits the road with IMS Gear planetary gear

An unusual solution: Working with Munich-based start-up Fazua, IMS Gear designed the planetary gear for a fully integrated pedelec drive. Consisting of a battery, motor and gears, the package can be fully installed into the frame thanks to the experience and creative development work from the IMS Gear planetary gear modular system. A great success story for the young developers, whose solution stands out by fitting in.





Housing, gear unit and battery

The vision: Powerful, quiet and fully integrated

The idea came to Johannes Biechele when he was working on a drive unit for a mountain bike during his student placement. He thought that it must be possible to design the battery, electric motor and gearbox in a single unit, which could be integrated in the tube of the frame. Not only would this protect the technology, but it would also make the bike look better. A lot better, to be precise. Add a complete bottom bracket bearing and the vision of a lean mountain bike without the blocky features that betray it as an e-bike would become reality. Johannes discussed the idea with his colleagues and got them on board: “We’re going to build a mountain bike that looks good and packs a punch.” And it should be quiet, too. The passionate bikers wanted to avoid both the tram-like hum from the electrical components and the mechanical rattle of the transmission.

The plan: Urban mobility and a new business model

Biechele and his fellow entrepreneurs began their start-up with the university incubator. After several discussions with business angels and venture capitalists, they got the

financing they needed. 2014 saw both the founding of Fazua GmbH and a change in the business plan. Instead of a mountain bike, the focus turned to urban mobility in a bid to broaden the potential market. The entrepreneurs no longer wanted to build a complete bike. Instead, they aimed to produce a universal drive solution that bike manufacturers could integrate in their frames. The young developers quickly learned that this is the way to scale and get a foot in the door of global brands. The search began for expert partners, as the entrepreneurs had little apart from their idea and a lot of enthusiasm. After detailed research, IMS Gear made it onto the longlist for the planetary gear. They then moved to the shortlist after some discussions, before sealing the cooperation with an engineering sample.

The question: Can IMS Gear work with a start-up?

“Obviously we asked ourselves: can a big, long-standing company like IMS Gear work with a start-up? How would they come to terms with our casual style?” recalls Biechele. The answer from IMS Gear: Yes we can. In Dominik Bea, the entrepreneurs had the same dedicated contact person throughout development, “IMS Gear didn’t ask for a hundred pages of specifications to get an idea of the task. As a start-up, that would have been unaffordable for us.” Instead, IMS Gear’s planetary gear modular system played the decisive role as the start-up’s best friend: “Engineering samples, the first draft, modifications, the second sample and then finally a version close to the production model for the tests that are currently going on. Thanks to the versatility of the modular system, we were always able to implement

changes in specifications within a few weeks”, says Sales Engineer Bea of the short reaction times. “The communication between us, IMS Gear and the motor manufacturer has been brilliant”, beams Biechele. “The project shows the strength of the IMS Gear modification strategy in all its glory”, says Bea. The Fazua boss adds: “For a start-up like Fazua, this speed is extremely important.” The planetary gear modular system from IMS Gear helps avoid both complex development contracts and spiraling costs. After all, a pedelec needs more than just gears to hit the road, it needs a battery, a motor and a frame.

The technology: 72-mm toothing, radial pinning and a helical gear rim insert. Still following?

60 mm in diameter with a maximum torque of 12 Nm. With this load in mind, IMS Gear chose to use the 72-mm gear from the



Section visualisation of planetary gear with motor

planetary gear modular system. With radial pinning instead of an axial screw connection, the diameter of the first sample was below the required 60 mm. The planetary gear is integrated in a single assembly with the

drive shaft, free-wheel, bushing and the flange of the bottom bracket bearing. The B sample was optimized from a cost perspective from the modular system, with the overall length reduced by integrating a helical gear rim insert into the motor housing. The motor shaft was given special recesses and bore holes so that IMS Gear’s standard pinion could be pressed in. A spring-loaded bushing allows the battery, motor and gear assembly to be easily installed and removed. The planetary gear wheels are made completely from plastic, helping the gearbox to meet the low noise requirements.

The marketing: The pedelec for design-conscious cyclists

Marketing of the drive solution will begin in the middle of 2016, with the first bikes fitted with this technology due to be showcased at the Eurobike trade fair in late summer. With a capacity of 250 watt-hours, the rider is supported up to a speed of 15.5 miles per hour. The Fazua package, featuring the proven technology of the IMS Gear planetary gear modular system, weighs just three kilos. This makes it far lighter than currently available models. The unit can also be easily removed from the frame, making battery charging simple. The bike can also be used without the drive unit at any time. Should the requirements for the drive solution change, IMS Gear can use the pre-configuration to react quickly and implement an altered transmission, a greater torque or a modified bearing.

Fazua is also currently developing its own bike frame.

The vision of the electric mountain bike lives on: “It must be possible somehow...”