

Overview: E-bike hub motors

Proven, affordable hub motors remain the workhorses of the e-bike category

While mid-drive motors are all the rage in electric bicycles, hub motors remain the powerful, proven and affordable workhorses of the e-bike industry.



Copenhagen Wheel

New hub motor brands are coming on to the market, while a growing number of bike brands are using them on new models — showing that hub motors still have much to offer the industry.

Eurobike newcomer **Superpedestrian A6-304**, the company behind the much-anticipated Copenhagen Wheel, is giving visitors the chance to test its all-in-one e-bike wheel at Demo Day.

With all e-bike components packed into a single hub and controlled by a smartphone app, the Copenhagen Wheel demonstrates the kind of technology that, if successful, could make hub motors sexy again.

It's been several years in development, but the company's Andrew Schmidt says the Copenhagen Wheel will be shipping to consumers by Eurobike.

The name stems from a 2009 grant given by the city of Copenhagen to the SENSEable City Labs at the Massachusetts Institute of Technology to develop an all-in-one wheel. Under co-inventor Assaf Biderman, associate director of the labs, the wheel became a commercial project.

The Copenhagen Wheel is a gearless hub motor that can be fitted in minutes on a standard bicycle. It uses regenerative braking and is controlled by multiple sensors. The wheel offers electric assist



Tout Terrain eXpress bike

of between three and 10 times the rider's pedal power. It's available for 26-inch and 700c wheels.

Germany's **Tout Terrain A2-109** is launching its first e-bike line at Eurobike and chose a new range of hub motors to power it. Known for its sturdy, low-maintenance touring and urban bikes, Tout Terrain turned to **Go SwissDrive A4-701** for its gearless electric drive system. The system also uses a Pinion bottom bracket.

Tout Terrain is launching five eXpress models: the Chiyoda, City II,



Polaris e-bikes

Metropolitan, Metropolitan Shopper and Via Veneto, all based on existing non-electric designs. The company will offer the Go SwissDrive's lighter Cruise and the heavier but more powerful Standard motors as options.

"We believe we have adopted the best overall electric bike drive system on the market," said Oliver Römer of Tout Terrain. He said that placing the Pinion system "upstream" of the cranks should reduce wear and tear on the drivetrain, which can be a problem with mid-drive systems.

The U.S brand **Polaris ZH-303**, known for its snowmobiles, ATVs and other recreational vehicles, has already found its bearings in Europe with a line of hub-powered e-bikes.

For 2016, Polaris introduces what it calls Gear Speed Technology. The system automatically changes the motor's output based on the selected bicycle gear, using a pre-programmed speed and power curve (See related story, page 22).

Several Asian brands are relying on hub motors as they establish a presence in Europe.

Kymco subsidiary **Klever, FG-0/307** which launched its e-bike line in 2013, is expanding its range with two new models. Klever's distinctive e-bikes are aimed at urban riders who want practical transportation wrapped in a unique style.

The new models feature a higher torque version of Klever's own Biactron rear hub gearless motor, for better hill climbing.



Klever Q

Klever's Q model is unusual because it is compact, with folding handlebars for "flatpacking," yet manages to be fully suspended. Its controller links via Bluetooth to smartphones.

The B25 Power model adds extra hill-climbing and cargo-carrying ability to Klever's existing B25 model, leading the company to urge customers to "Tow, climb, carry, explore."

Darfon A4-608, which like Klever is based in Taiwan, is showing its hub-powered range of futuristic Besv bikes. The company points to its background as a multi-million-dollar enterprise that makes electronic components, including keyboards for Apple computers.

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The cool Klever compact

Q doesn't look or ride like any other compact e-bike, in fact Q is one of the only compact e-bikes with full suspension. It has a low center of gravity and features the silent high-torque BIACTRON rear motor, making it more comfortable, powerful and fun to ride. With high torque in every gear, Q is also multi-utility, so tow, climb, carry, explore! The compact Q "flat packs" down to a low narrow profile, so pass through tight spaces, take it on board, or stow it away. The Q control panel features bluetooth and rings on incoming calls.

There are 2 Q models, the 10-speed for climbing, where gears come in useful, and a simpler single-speed for purists. Rear racks are available for both.



See Q at selected dealers in November, available to the public from December 2015.

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YouMo bike

Chinese giant **Suzhou Bafang ZH-205** now known in Europe simply as Bafang, is the world's biggest maker of hub motors. It now has a European service center for aftersales support and OEM training. Bafang's massive range includes everything from gearless motors to high-torque geared systems suitable for fat bikes.

The proprietary frame design used by Swiss company **YouMo FG-0/213** is built around the battery rather than the motor.

YouMo's cruiser-style bikes demonstrate another advantage of hub motors: The frame isn't compromised by the need to accommodate a mid-drive motor.

YouMo chose to house the battery lower and more centrally in the frame for better handling. Its bikes are equipped with Go SwissDrive rear hub motors.

"We chose a hub motor because the driving experience is great. The power from the motor is transmitted directly to the road, giving higher acceleration. Wear of the transmission parts is also much lower than with mid-drives, and recuperation of battery power is also possible," said Joel Kurz of YouMo.

"Last but not least, a hub motor fit better with our cruiser-style geometry," he added.

For 2016, the company is launching a single-speed model for rental fleets and B2B customers.

YouMo bikes also add the Go Swiss Evo display that is Bluetooth-enabled and compatible with smartphones.



Wheeler E-Eagle with BionX D-Series motor and semi-integrated battery.

BionX AG-407, another well-established manufacturer of gearless hub motors, has made some refinements to its popular system, including a new battery design that is more heavily integrated into the frame. The BionX system also has a new ring-style button that offers fingertip control and can be used independently of the display, which

has also been updated.

BionX's large and distinctive D-Series hub motor, introduced at last year's Eurobike, now has a proven track record. A D-series-equipped **Wheeler B3-200** mountain bike won the World E-bike Championship in the Italian Dolomites in June. Wheeler, a long-term OEM partner of BionX, continues to use BionX systems across its range.

Geared hub motors are one of the most traditional types of electric drive motors, but they are still finding applications in today's market.

Japanese firm **SR Suntour A4-102** is launching a 500W, 45 kph (28 mph) geared hub motor that weighs 3.9kg (8.6 lbs.). Based on SR Suntour's HESC ATS system launched in 2014, the new rear hub motor system features a frame-mounted battery and an optional 4.5-inch



Suntour TFT display

TFT color display. According to the company, Hercules and Bulls will use the 500W motor for the German market. The company says the system's acceleration is particularly impressive in test rides.

Heinzmann FG-0/311, which has one of the longest track records of any hub motor company, is partnering with Speedliner Mobility on a new range of electric assist transport and cargo bikes for industrial and business use. The new range features battery capacity up to 20Ah. Heinzmann said some models are capable of hauling loads of up to 300kg.

Radkutsche FG-0/404, another German firm exhibiting at Eurobike, produces everything from "rapid" cargo bikes to large capacity delivery vehicles. Its bikes have even been used by mobile pancake vendors.

"We find a front hub motor in a 20-inch wheel to be a great hill climber, even with very heavy loads," Stefan Rickmeyer of Radkutsche said.

One footnote: **Höganäs**, which promoted its Eclino hub drive system at last year's Eurobike, has withdrawn from the electric drive market and instead will supply components to other manufacturers.

Höganäs aside, it's clear that hub motors won't be going away any time soon. ■ **RICHARD PEACE**

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Radkutsche with eZee hub motor

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