

Innovative E-Bike Drive Unit

FEV SIGNATURE SOLUTIONS

Our solution provides your customers with a superior riding experience

FEV offers

- Proven e-drive concept for series development
 - Electric boost and regenerative braking
 - Consistent shifting under load, always
 - 10-speed transmission, ratio spread 500%
 - Weight: < 4.2 kg series production target
 - Robust and precise torque sensing



Why FEV

- Unique experience in the bicycle e-drive segment with own patent portfolio and prototype hardware
- Longstanding expertise in automotive e-drive hardware and software development
- Flexible cooperation models from support projects up to turn-key series development

Major milestones

CONTINUOUS DEVELOPMENT

2021



Concept premiere
on Eurobike

2022



Functional
Prototype

2023



Optimized
Design



Patents

**Drive system for a
lightweight vehicle**
HELLENBROICH GEREON
DE102021001222A1
(application)

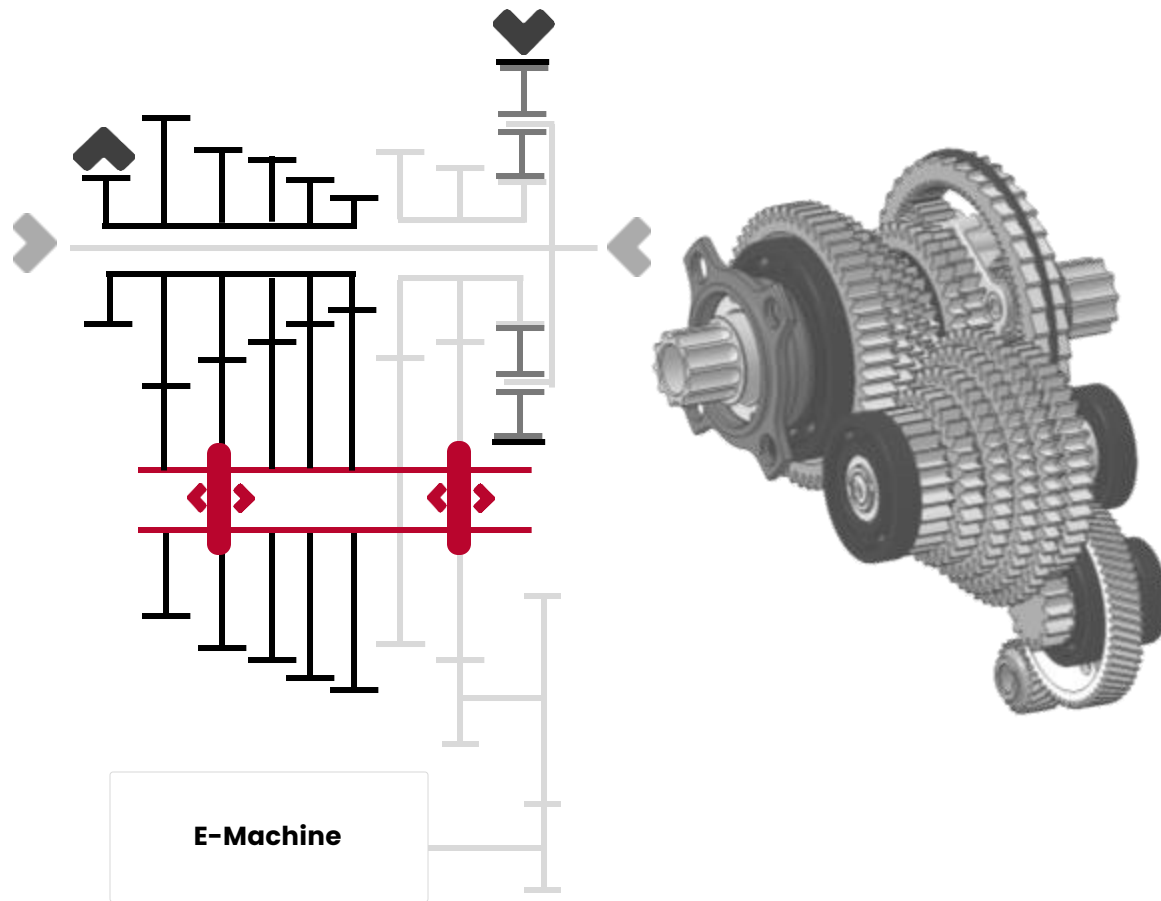
Drive system for a Vehicle
HELLENBROICH
GEREON; SHAPOVALOV VALERIY
DE102021129291A1
(application)

**Electric motor, drive unit
and light vehicle**
HELLENBROICH GEREON; MICHAEL WITTLER
DE102022114185A1
(application)

Shifting device for a gearbox
HELLENBROICH GEREON; SHAPOVALOV
VALERIY; JOHNEN MATS
DE102022131255A1
(application)

FEV's patent-pending gearset architecture and shift system enable smart torque sensing and smooth shifting

GEARSET ARCHITECTURE



Planetary gearset at the input

- Speed increase by a factor of 3
- Reduction of loads on shift system
- Higher speeds are favorable for electric machine

One-way clutch (OWC) on ring gear

- No need for one-way clutch in shift system or rear wheel hub
 - Enabler for regenerative braking
- Robust torque sensing by using force cell to measure ring gear reaction force

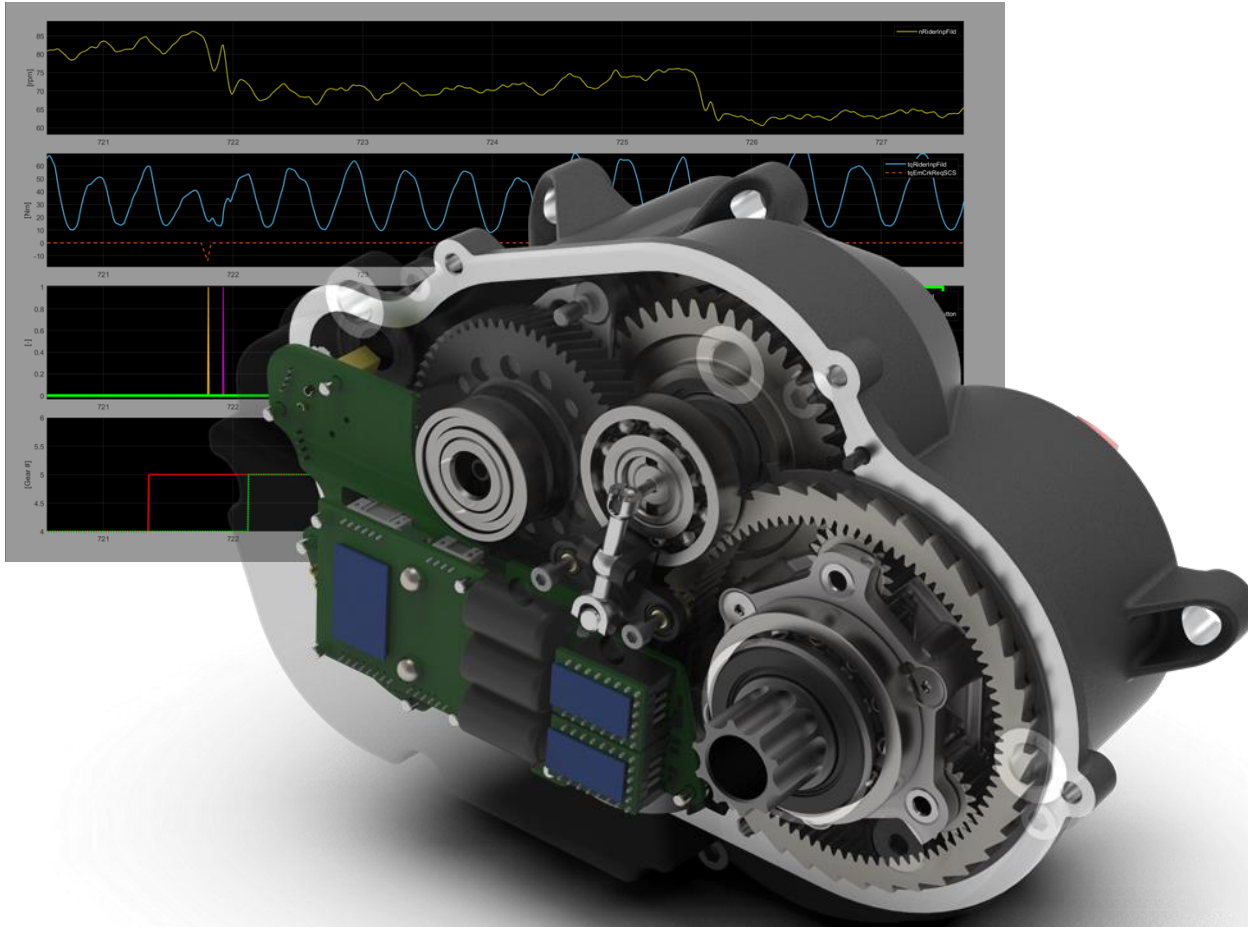
E-machine connected to input behind OWC

- Active overlay of driver torque to enable shifting under all riding conditions

2x5 = 10 speed gearset architecture

- Two main ratios (grey)
- Five range ratios (black)
- Total ratio spread: 500%

FEV offers a proven concept incl. corresponding IP as well as an experienced engineering team in all relevant fields



- Competitive specs
- Unique selling points:
 - Regenerative braking capability
 - Consistent shifting through all 10 speeds
- IP held by FEV
 - Several core patents filed
- Experience gained with Gen1 prototype
 - Shifting under load confirmed
- Gen2 prototype design available



- Recommended next step:
 - Validate updated design including latest shift system and integrated electronics
- **Interested in exploring a cooperation?**
 - Get in touch!

Get in touch with us for further information



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signature-solutions](http://www.fev.com/en/signature-solutions)