

Acturonix Mid-Drive Motor for e-Bikes

- having innovative single axis technology -

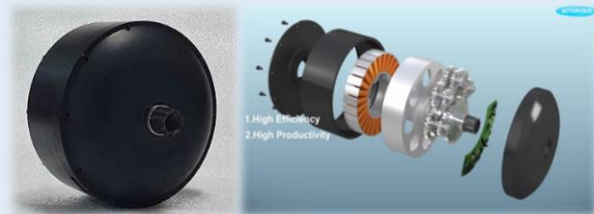
Content

- Acturonix Company
- Acturonix Mid-Drive Motor
- Proposition for Business Collaboration

Aug. 2021 / Acturonix Co.

Acturonix Company

- **Foundation** June 2012
- **Location** 10-1, Muinro 13th St., Sujigu, Yonginsi, Gyeonggido, SOUTH KOREA
- **Business** Design and Development for Precision Electric Motors
- **Technology** ASAS™ (Advanced Single Axis System), a Proprietary Mid-Drive Motor Tech. for e-Bike
DHA™ (Digital Haptic Actuator), a Next Generation Haptic/ Vibration Motor



Mid-Drive Motor with ASAS™ Technology



DHA

- **Inventor & CEO: Bryan Shin**

- Education: Master of Science, Electrics & Electronics Engineering
Korea Advanced Institute of Science and Technology (KAIST), 1987

- Work: 2008 ~ 2012 Samsung Electronics Co., Ltd.
2005 ~ 2008 Samsung Advanced Institute of Technology
1987 ~ 2005 Samsung Electro-Mechanics Co., Ltd.

- Area: BLDC* Motor, DC Motor, Step Motor, Vibration Motor, MEMS*, EAP*

- Duty: R&D, Design & Engineering, Manufacturing, Technology Marketing

Acturonix Mid-Drive Motor

- Adopted ASAS™ (Advanced Single Axis System) technology
- All-in-one: motor + gear set + driver board
- Driving crankshaft directly
- Smaller than crank sprocket (Φ 152 mm, H 80 mm)
- Less wiring for e-bike production efficiency
- Output power: 250~350 Watt or more
- Customer design available
- Commercial proved as an e-bike conversion kit from 2016, DiPAG™ (See page 8)

** The shape and color of the motor case would be changeable according to e-bike design.*



ASAS™ Technology (Advanced Single Axis System)

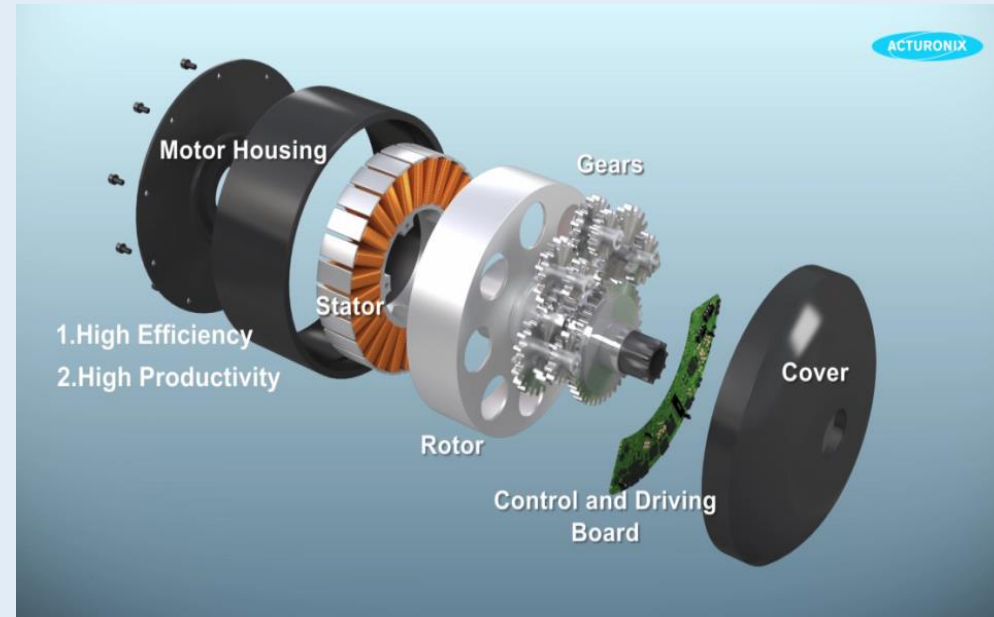
- **Single axis for motor and crank shaft**
 - Torque power transferred from motor to crank directly

- **Unified a motor, gear sets and a drive board in one body**
 - Motor: three phase BLDC motor
 - Gear sets: no internal gear
 - Simple drive board

- **Light weight without inner gears**

- **Easy replacement of crank and sprocket**

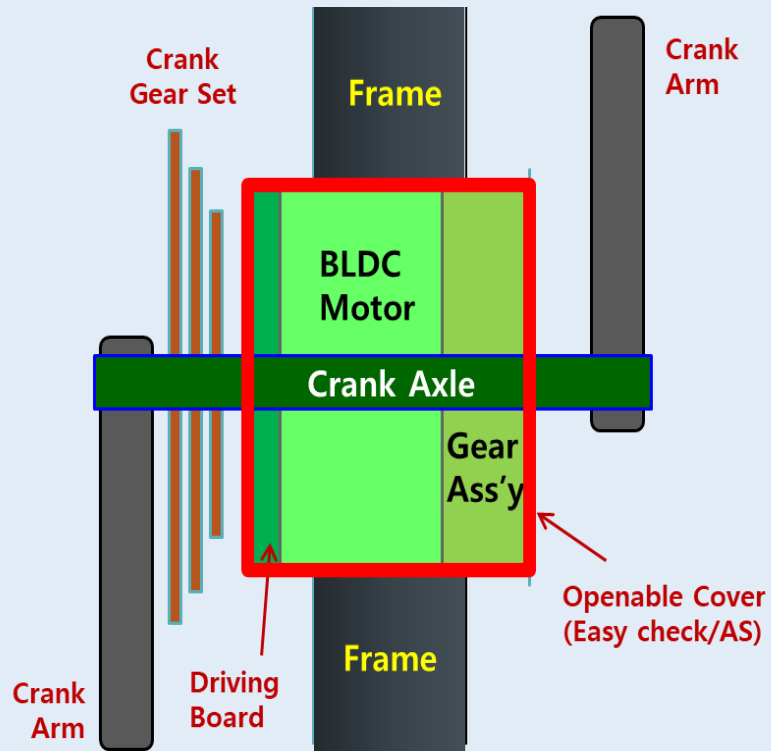
- **Easy check and maintenance through openable cover**
 - Gear sets and drive board placed at a same space



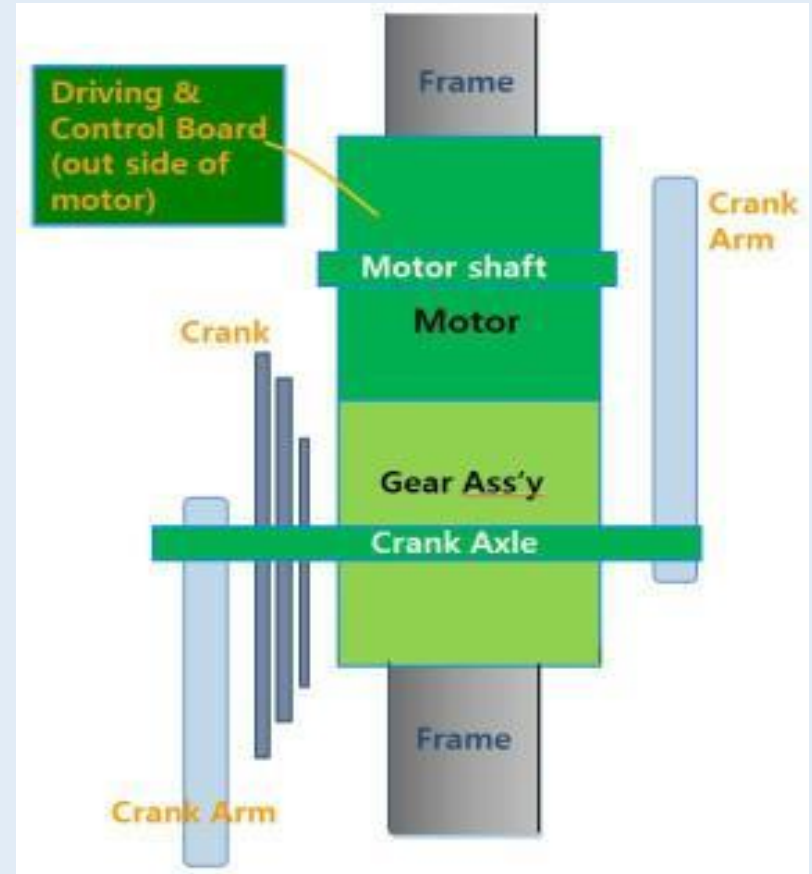
Please watch a short video clip!! → <https://youtu.be/NUL5Jun62T0>

Acturonix vs. Others Mid-Drive Motor

Acturonix



Others



Comparison

Acturonix

Others

Left Side View



Right Side View



Merits of New Ebike with the Acturonix Motor

1) Having a Mid Drive Motor

- Installed with bottom bracket
- Small size with minimum exposure
- Simple structure: light weight, easy maintenance
- A pedal speed sensor embedded inside the motor
- The brake works automatically when pedaling stopped.

2) Riding the e-Bike as a Regular Bike

- The front crank and the rear gears are available.
- The front crank gear can be replaced.
- The motor works only in forward direction.

3) Pedal Assist System (PAS)

- The motor works only when pedaling.
- No load in a motor-off or a battery-out situation

4) Possible for High Gear Ratio & High Efficiency Motor

- Minimizing battery energy consumption

5) Design Flexibility

- With small size motor, flexible and aesthetic e-bike design possible



Acturonix Motor Design Concept

◆ BLDC Motor

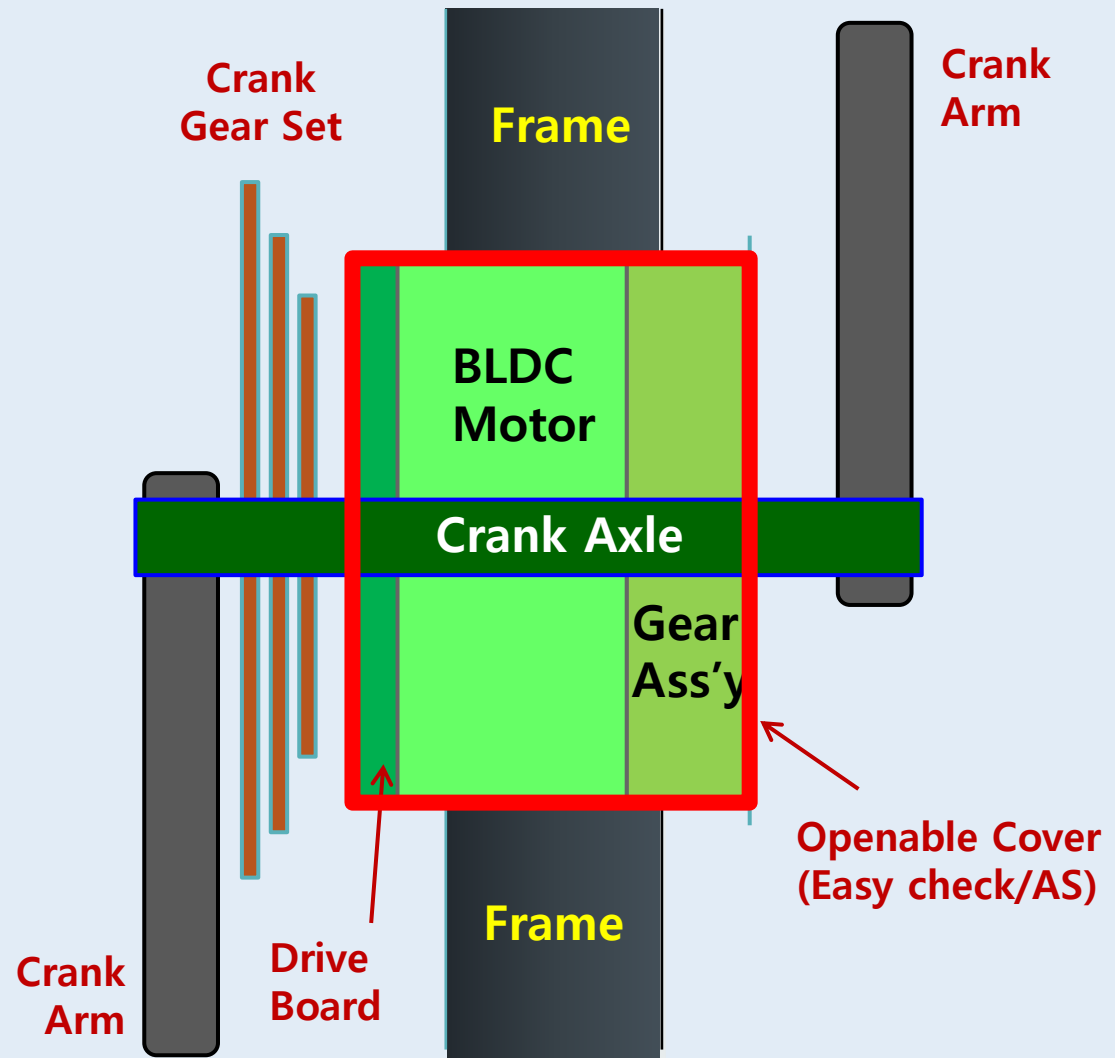
- 3-Phase
- a Speed Sensor Embedded
- Crankshaft Direct Drive
- $\Phi 130\sim\Phi 150\text{mm}$

◆ Gears

- Optimal Gear Ratio
 - To maximize battery efficiency
- Outer Gears

◆ Driving/ Control Board

- Programmable Control
- User Friendly Programming



Commercial Reference

➤ Commercialized as an Ebike Conversion Kit

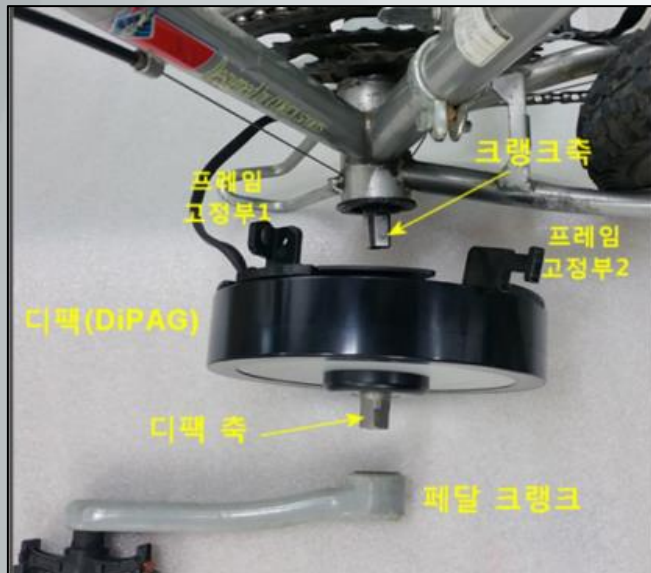
- Brand name: DiPAG™ (Direct Pedal Assist Gear)
- A mid-drive motor kit for e-bike conversion
- DIY (do-it-yourself) kit to add on crankshaft easily
- Product package: motor, controller, user manual
- Sales record from year 2016 (online shopping in Korea)

- Adopted ASAS™ technology
- Driving crankshaft directly
- BLDC (brushless DC) motor
- PAS (pedal assist system)



Commercial Reference

➤ Examples of e-Bikes Installed DiPAG™



Proposition for Business Collaboration

1. Technology Buy-out

- Technology transfer from Acturonix
- Taking-over all rights for its e-bike motor technology/product
- Design, drawing, document, know-how, intellectual property, etc.

2. Technology Licensing

- Getting the rights to use the Acturonix technology
- Design, drawing, document, know-how, intellectual property, etc.
- Initial payment and running roylaty

3. e-Bike Business Collaboration

- Design collaboration between Acturonix and an ebike maker, especially on e-bike frame and motor case
 - * Role of Acturonix: Motor production and supply
 - * Role of the e-bike maker: Ebike production and sales

4. Joint Venture for Motor Business

5. Other type of business collaboration is also possible.

Thank you !

Contact: Andy Kang
Email: andy.kang@acturonix.com