

Magna @ Renault 2023

Drivetrain Systems

Dedicated Hybrid Drive DHD Eco

The DHD Eco is part of the 230 family using a smart modular scalability approach for Low Torque HV applications. The DHD Eco is reduced to four gears (acting as a dedicated hybrid drive) with eLaunch, eReverse and two gears in electric driving.

for B-C Segment



Smarter



Cleaner



Lighter



Competitive advantage/differentiators

- -74 % fuel consumption vs. DCT (WLTC)*
- Adjustable drivability by clutch modulation & SW functions to support individual OEM branding
- Strong 120 kW e-motor peak power to support any all-day driving conditions with pure electric drive

Applications/benefits

- Low risk by reuse of matured technologies & building blocks, ASIL C
- Short y-length of 350 mm
- Suitable interchangeable flexibility to cope with market dynamics

* 1.0l 120kW 3-Cyl. Gasoline; Capacity 12kWh (useable)

Ideation

Discovery

Concept

Development

Serial Preparation

in Production

eDecoupling

Magna's electromagnetic eDecoupling acts as a stand alone or integrated power flow decoupler for EV applications. With quick activation times, superior NVH behaviour via integrated powertrain controls and compact packaging, the Magna eDecoupling increases EV range by reducing drag torque of e-motor and gearbox in primary and secondary eDrive systems.



Cleaner



Electrification



Driving Dynamics

Competitive advantage/differentiators

- eDecoupling integrates into differential or EV link shaft as a complete module
- Compact design minimizes added package space and weight in axial or radial direction
- In-house coil design assures quick activation times to maximize performance and efficiency
- Seamless integration via powertrain controls to ensure best NVH

Applications/benefits

- Decouple rotating power of e-motor and gearbox in primary (HEV) or secondary eDrive systems
- Improve electric vehicle travel range by reducing e-motor and gearbox drag-torque loss
- Modular design can be scaled for use in electric vehicles from B segment up to SUV and LCV

SOP

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eBeam™ – Electric Axle Drive System

Heavy Duty electric drive for frame-based vehicle usage. Structure-oriented design to support high payload and towing capability with matching power for continuous duty usage, high peak torque and robustness.



Cleaner



Electrification



Autonomy



Driving Dynamics



Design



Co-Development
Opportunity

Competitive advantage/differentiators

- **Safety**
Robust design for safe towing and hauling
- **Dynamics**
Scalable power to 150 kW_{cont} / 200 kW_{peak} and 7,000 Nm peak axle torque
- **Vehicle Integration**
Adaptable to current suspension, achieves required clearances during full suspension movement

Applications

- Battery electric vehicle / FuelCell
- PUP / SUV / LCV
- Primary and complementary propulsion
- Coaxial e-motor for GAWR up to 3,250 kg

SOP

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eDS – electric Drive System Mid+

This eDrive with next-gen technologies provides up to 205 kW for 10 seconds and up to 4,000 Nm at the wheels. It can be applied to both hybrid and battery electric vehicles as primary and secondary drive. Next-gen technology options in the e-motor, inverter, gearbox and intelligent software strategy contribute to best-in-class efficiency, drivability and safety. Up to -24% less weight, +7% more power and -22% less volume in packaging compared to other available products in the market.



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Electrification



Driving Dynamics

Competitive advantage/differentiators

- Optimized and scalable to best-in-class efficiency (aiming > 95% peak efficiency)
- Best-in-class drivability, performance, and safety with TV option
- Optimized and flexible package
- Affordable cost

Applications/benefits

- C, D, E Segment BEVs / PHEVs
- Advanced direct stator cooling concept enabling increased continuous power performance
- Safety integrity level ASiL “D”
- Optional park lock or disconnect, and small packaged twin-clutch torque vectoring

SOP

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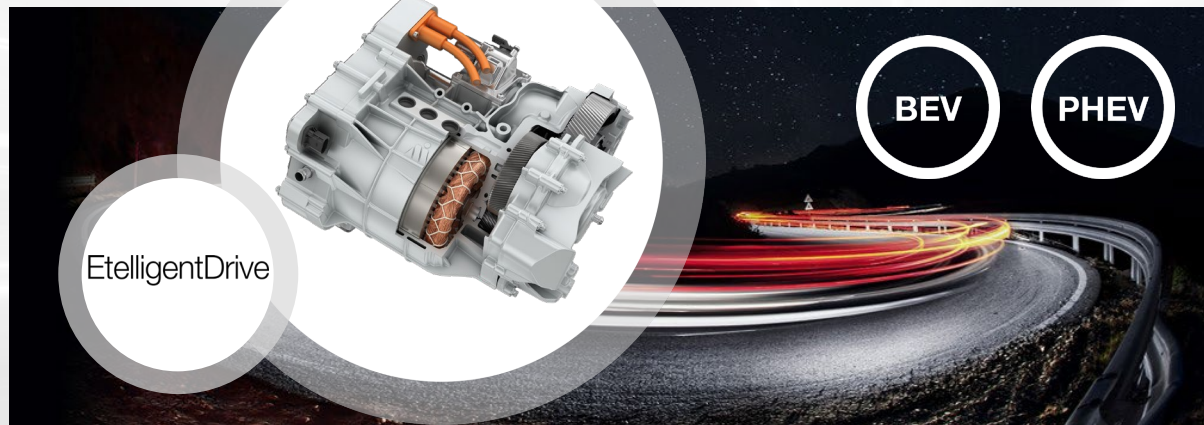
Development

Serial Preparation

in Production

eDS – electric Drive System Mid+ w/ Decoupling+

The eDrive system is equipped with Decoupling+ a combination of an integrated decoupling unit and a predictive controls strategy. Together with next-gen technology options in the e-motor, inverter, gearbox and intelligent software strategy it contributes to best-in-class efficiency, safety, convenience and dynamics.



Cleaner



Smarter



Electrification



Driving Dynamics

Competitive advantage/differentiators

- **Efficiency**
35 W drag loss at 50 kph or
94 % max. efficiency
91.6 % avg. efficiency WLTC
- **Safety**
< 200 ms fast reconnect time
- **Convenience**
1 ms control loop of native speed interface
- **Dynamics**
+ 8 % torque boost (7 sec.)
+ 22 % power boost (7 sec.)

Applications/benefits

- C, D, E, VAN Segment BEVs / PHEVs

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E-motor Stator & Rotor Lamination Core Stacks

Magna offers e-motor cores for electrified powertrains – featuring an advanced dot bonding process, which not only improves power density and weight reduction through higher stacking factor, but also requires lower activation temperature reducing process CO2 footprint.



Electrification



Cleaner



Driving Dynamics

Competitive advantage/differentiators

- High speed stamping process (patent pending) and advanced manufacturing process resulting in lower overall cost
- Dot bonding process utilizes an adhesive designed for fast curing while providing high tensile strength
- Complex dot bonding adhesive patterns possible
- State of the art joining technologies (mech. interlock, laser weld, etc.)

Applications/benefits

- All cars, SUVs and LCVs using
- Primary & secondary eDrive systems
- Traction e-motors for BEV, HEV & PHEV
- Global manufacturing capability in all main regions (NA, EU & AP)
- Efficiency & performance improvements
- Improved rotor burst strength
- NVH improvements

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Automotive Applications & Cloud Services

Our software applications extend the user experience by connecting the driver with vehicle and environment. They advance the user-vehicle-relationship by incorporating smartphone and web platforms. The customer satisfaction is increased by revealing relevant vehicle KPIs and mobility behavior is improved by gamification.



Features and Specifications

Collection and analysis of data, visualization of relevant measures, comprehensive customization of vehicle settings

- **Metrix**
Translate raw data from CAN bus to relevant vehicle KPIs during evolutionary phase and presentation of vehicle features
- **Easet**
Make complex vehicle settings intuitively transparent to the driver and translate them into values familiar to the end-consumer like efficiency, dynamics, convenience
- **Journey**
Live data view and tracking of trips incl. visualization of enhanced statistics both within the app and in a web-portal

Core Technologies

- Cross-platform mobile apps with Flutter
- Android and iOS native apps
- Web services and web apps
- Highly scalable serverless cloud architecture
- Secure IoT environment
- Highest security level with certificate-based authentication and data protection

Additional Takeaways

- Multiple target groups (OEM, vehicle driver, fleet operator) 
- Reduce complexity of vehicle customization through the driver 
- Seamless user experience in ONE environment (mobile and web) 
- Real-time and posterior online data insights 

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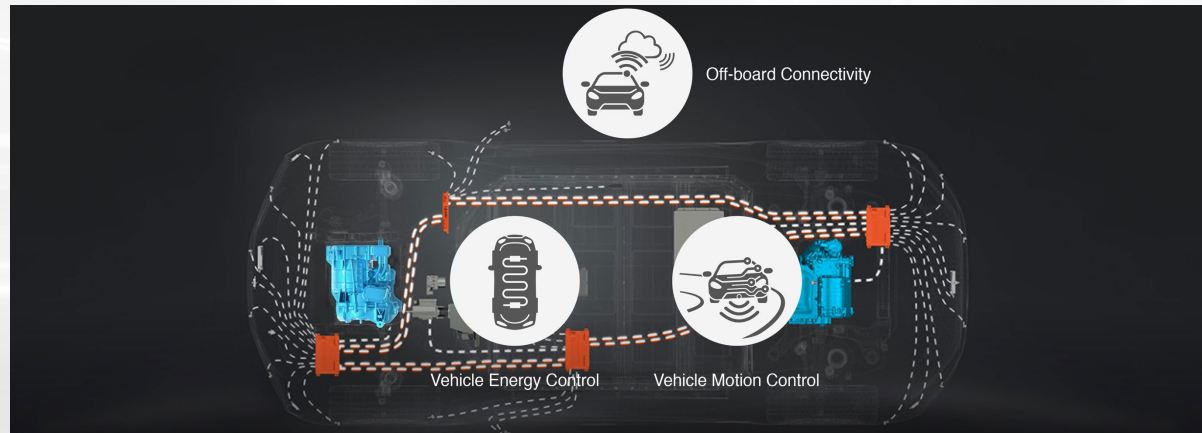
Development

Series Preparation

in Production

Energy & Motion Control

Functional modular software platform for BEV and (P)HEV. Magna delivers an operating strategy including advanced and predictive vehicle functions for energy & motion control independent of the powertrain layout and E/E architecture. Our Software will offer new platform opportunities and partnership collaborations.



Features and Specifications

- Vehicle physics model incl. active sideslip angle calculation
- Longitudinal torque vectoring
- Lateral torque vectoring by EMs, clutches and brakes (incl. integrated eDrive and brake controls)
- Disconnect strategy
- Traction Predictor incl. Road State Observer
- Energy management by using route information
- Powertrain and battery conditioning
- Charging Control
- Specific calibration of platform functionalities ensures differentiation and supports individual brands image

Core Technologies

- Service oriented architecture
- Distributed Data Services (DDS)
- Containerization based on e.g., WebAssembly
- Fully functional safety ISO 26262 compliant
- Cyber security ISO 21434
- Over-the-air updates / continuous deployment to support Always New Vehicle (ANV)

Additional Takeaways

- Connectivity to off-board information enables predictive features e.g., friction data, route information (online digital twins)
- Full-scale energy management supports max range – for hybrids and BEVs
- Highly adaptable to various vehicle characteristics/driver modes
- In production for torque vectoring and disconnect strategy
- Multiple software licensing models

Ideation

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Series Preparation

in Production

eDS – electric Drive System High HE

Magna's next gen 800V eDrive is based on a KPI driven generation approach. It delivers up to 20% on loss reduction (efficiency), power, torque, and sustainability compared to our prior generation*. Designed as drop-in solution for front and rear axle packages.

*See storyboard eDS Mid+ HE



Cleaner



Electrification



Autonomy



Driving Dynamics

Competitive advantage/differentiators

- **Efficiency**
93% efficiency at real world cycle
- **Sustainability**
< 0.5 % HRE (heavy rare earth); minimum usage of materials
- **Convenience**
Drop-in solution; 90° tilt around drive axis
- **Dynamics**
Boost capable up to 325 kW @ 900 V

Applications/benefits

- Battery electric vehicles
- C,D, E segment vehicles
- Highly efficient primary propulsion
- Complementary propulsion with optional eDecoupling unit
- Support of end-user functions

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Forward. For all.