

# TECHNICAL INSIGHT

A PUBLICATION OF NSK EUROPE

## Seamless 2-speed e-Axle

### Development Objectives

- › Seamless shifting is achieved with feedback control for clutch and motor by using Torque Sensor  
→ 2-speed transmission improves the driving performance and the electric consumption
- › System downsizing by combining High-speed Traction Motor and Traction Drive Speed Reducer  
Achieves significantly silent operation with Traction Drive

### General Description and Features of the Product (Structure and Operating Principles)

#### NSK products with Seamless 2-speed e-Axle

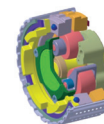
Combine large driving torque at low speed and High top speed  
Expand high efficiency area → Improve electric consumption



#### Magnetostrictive Torque Sensor

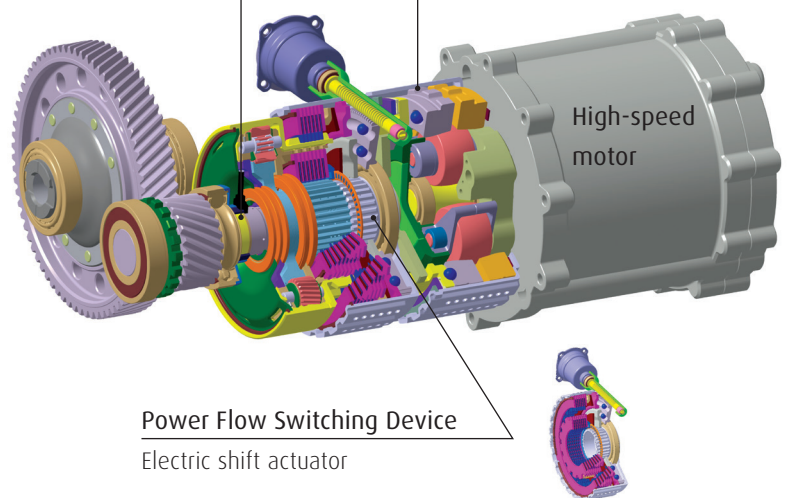
Feedback control of clutch and motor by using Torque Sensor, reducing:

- › Shifting shock
- › Shifting time
- › Clutch absorption energy



#### Traction Drive Speed reducer

System downsizing



### Specifications

› Max. Power	150kW
› Max. Drive torque	4,000Nm
› Max. Vehicle speed	250km/h
› Max. Motor torque	130Nm
› Max. Motor speed	30,000min <sup>-1</sup>
› Traction drive speed reducer ratio	5.0
› Planetary gear reduction ratio	Low: 2.5 High: 1

### Magnetostrictive Torque Sensor

Detect shear stress by inverse magnetostrictive effect and convert to torque

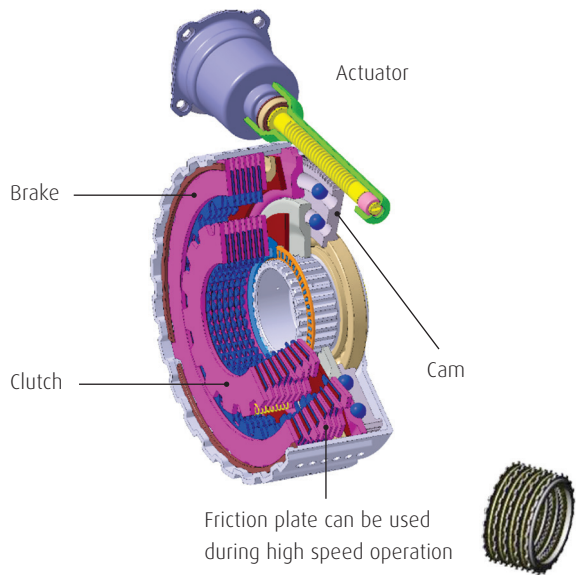
#### Features

- 1. Non-contact type sensing
- 2. Compact and Light weight
- 3. Quick response



### Power Flow Switching Device

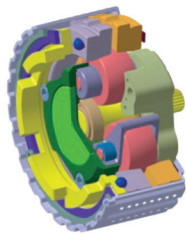
Electric shift actuator  
Control Brake and Clutch by 1 actuator



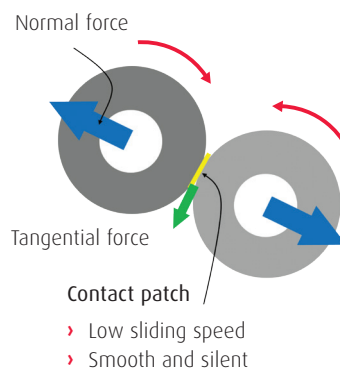
### Traction Drive Speed Reducer

#### Features

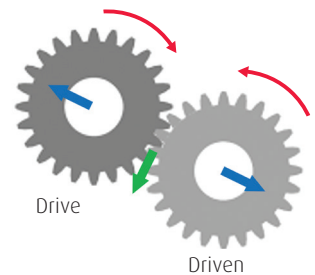
- 1. High speed capability
- 2. High quietness



#### Traction Drive



#### Gear



### High-speed Traction Motor & Traction Drive Speed Reducer (TDSR)

