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

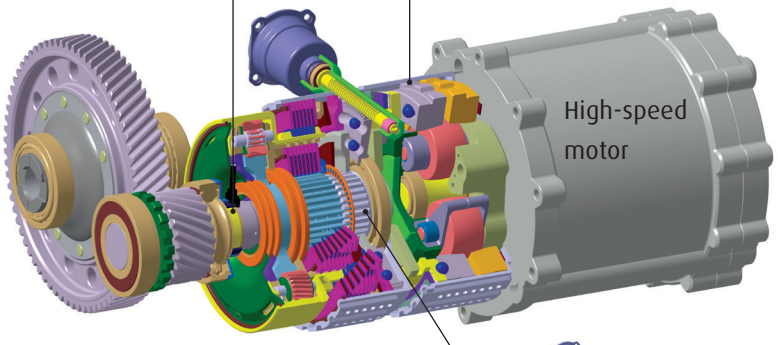
General Description and Features of the Product (Structure and Operating Principles)

NSK products with Seamless 2-speed e-Axle

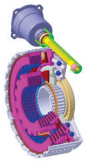
Combine large driving torque at low speed and High top speed
Expand high efficiency area → Improve electric consumption

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



Power Flow Switching Device
Electric shift actuator



Specifications

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

Magnetostrictive Torque Sensor

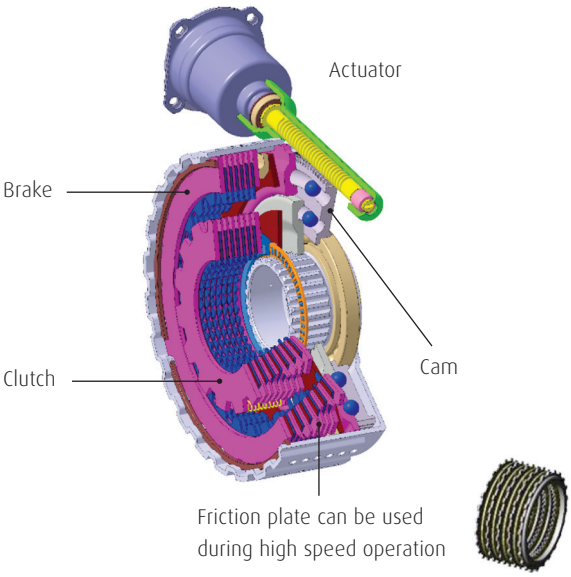
Detect shear stress by inverse magnetostrictive effect and convert to torque

Features

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

Power Flow Switching Devise

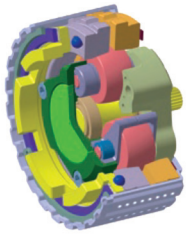
Electric shift actuator
Control Brake and Clutch by 1 actuator



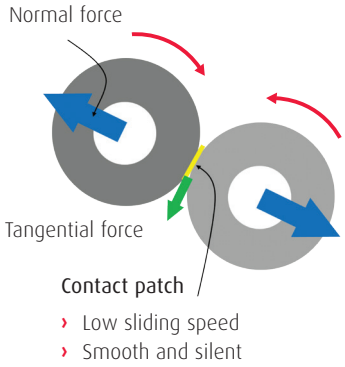
Traction Drive Speed Reducer

Features

1.High speed capability
2.High quietness

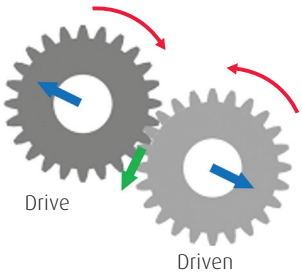


Traction Drive



- Low sliding speed
- Smooth and silent

Gear



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