Column Type Electric Power Steering Equipped with Small Integrated Motor and ECU

This report introduces a column type electric power steering (C-EPS®) equipped with a small and inexpensive motor integrated ECU (MCU: Motor Control Unit) developed by JTEKT to provide small vehicles (C-segment, below 1 800 cc) with a redundant design capable of continuing assistance even in trouble. This steering also has a modified column structure which achieved further weight reduction, and was put into volume production.

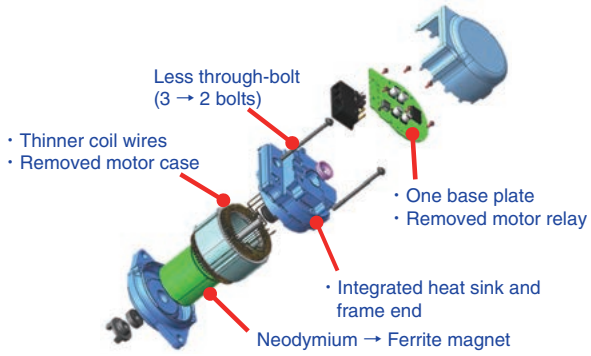
Purpose

- To suit to small vehicles, downsized the motor corresponding with lower output, and adopted inexpensive magnetic materials.
- To reduce the number and the weight of components, adopted a tube collapsible structure that would be the standard for columns going forward.

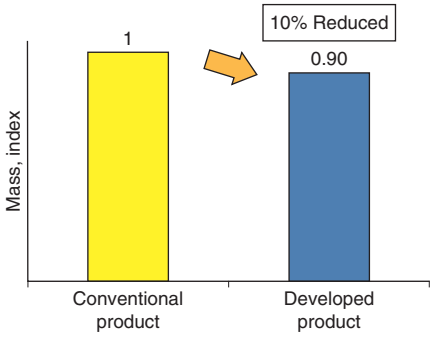
Features

①Functional safety supporting MCU and torque sensor
Adoption of redundant hardware that continues assistance using the circuit normally working even in trouble.
Redundant hardware: Motor-driven circuit, torque sensor, rotation angle sensor (newly adopted)

②Downsized, inexpensive MCU
Structural simplification reduced the mass 10%.
Also, the adoption of ferrite magnet instead of neodymium contributed to reducing the supply risk of rare earth.



Downsized MCU configuration



MCU mass comparison

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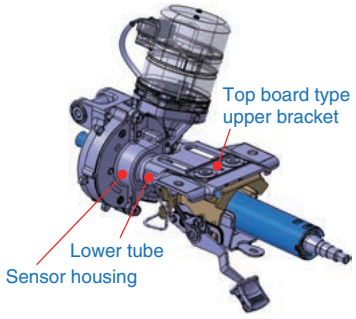
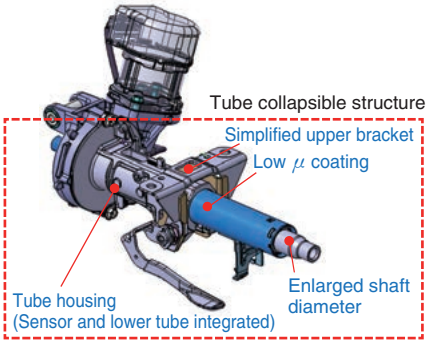
③Tube collapsible structure column

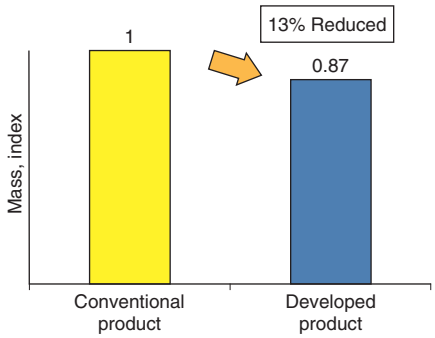
Modification from the conventional structure to the tube collapsible structure reduced the number of components from 45 to 35, and lowered the mass 13%.



Conventional product



Developed product



Column mass comparison

④Achieved 8% weight reduction of C-EPS® in comparison with our conventional type through the weight reduction of MCU and column.

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