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Development of Simulation Controlling Redundant Motor System

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Since recent years, global needs of Mobility as a Service (Maas) is increased, longer vehicle driving time will be expected with the conventional comparison. Therefore, the safety and durability against redundancy is requested to automotive parts. As one such example, Fig.1 indicate: with the shift structure change from the existing machinery type to electric, Shift By Wire – Actuator (SiBW-ACT) that allow shift change operate automatically while self-parking and driving, can be definitely required. For that situation, the system securing high safety and durability have developed and accomplished on simulation environment with designing SiBW-ACT Motor control to the redundancy architecture. This paper examines the outline.

It is essential that this SiBW-ACT shown in Fig.1 operates on safety from fail safe policy, because SiBW-ACT would significantly reduce evacuation driving performance if case of operation suspension while malfunctioning. Additionally, number of parts reduction is needed to be considered. Against this two policy, integral independent redundant architecture Electric/Electronic (E/E) system as electromechanical ACT in Fig.2 is implemented, then SiBW-ACT that improve evacuation driving performance has resulted in development.

From creating Model In the Loop Simulation (MILS) environment by embedding the above redundant motor control system into the control simulation, the comparison with existing was verified. As a one of result, Fig.3 indicate motor N-T-I characteristics, Fig.4 indicate Rotation Speed waveform of shift position change. Therefore, the system performance can be predicted high accurately from MILS, and the redundant motor system validation could be available even without a real actuator.

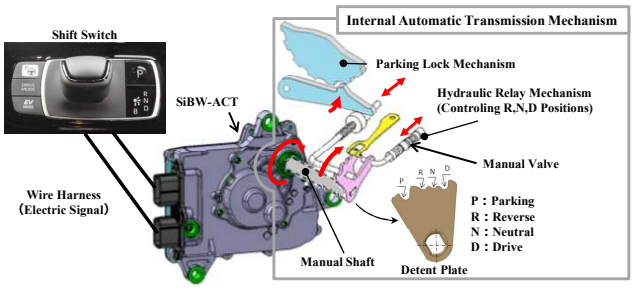

Fig.1 Motorized Shift Change

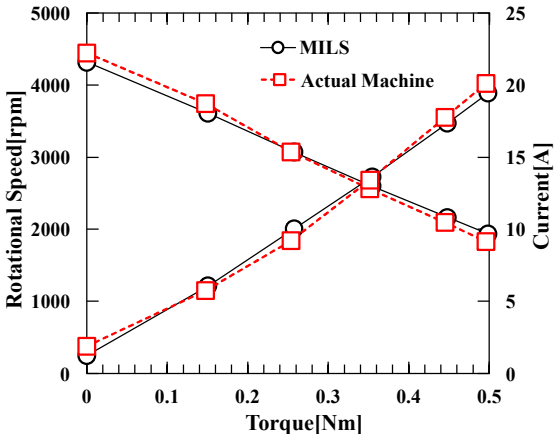

Fig.3 Comparison of N-T-I characteristics

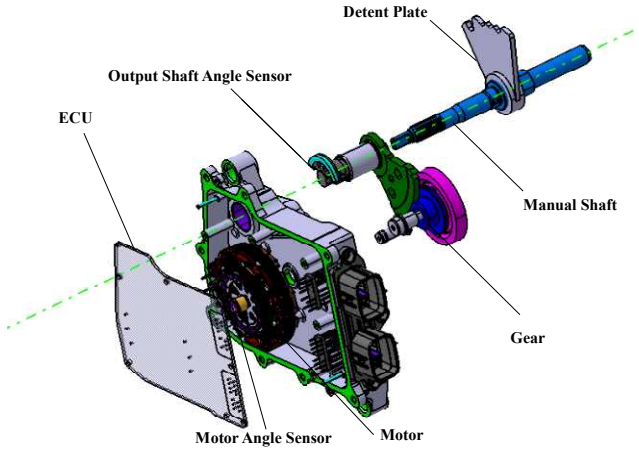

Fig.2 Electromechanical SiBW-ACT

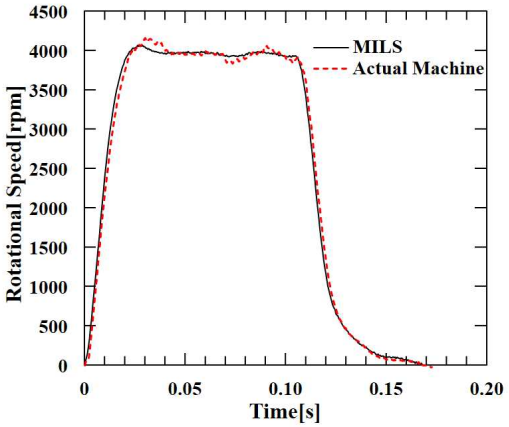

Fig.4 Comparison of Rotational Speed