

One-Motor Electric Transmission Control. Innovations by KSK.

KEIHIN SEIMITSU KOGYO CO. LTD. (KSK)



ONE-MOTOR ELECTRIC TRANSMISSION CONTROL

Improved energy efficiency is being called for in automobiles in order to alleviate global warming. There is an increased need not only to improve the fuel mileage of engines and to reduce vehicle weight, but also for the widespread use of hybrid vehicles and electric vehicles.

Responding to the need for ever lighter and more compact solutions, KSK developed a transmission actuator for shift-by-wire systems that enables both shifting and selection with a single motor. It is designed for use in lightweight and compact transmissions in order to cater to the need for electronic control over hybrid and electric vehicles. It is also well-suited for automating Manual Transmissions (MT) in cars with small engines and transmissions.

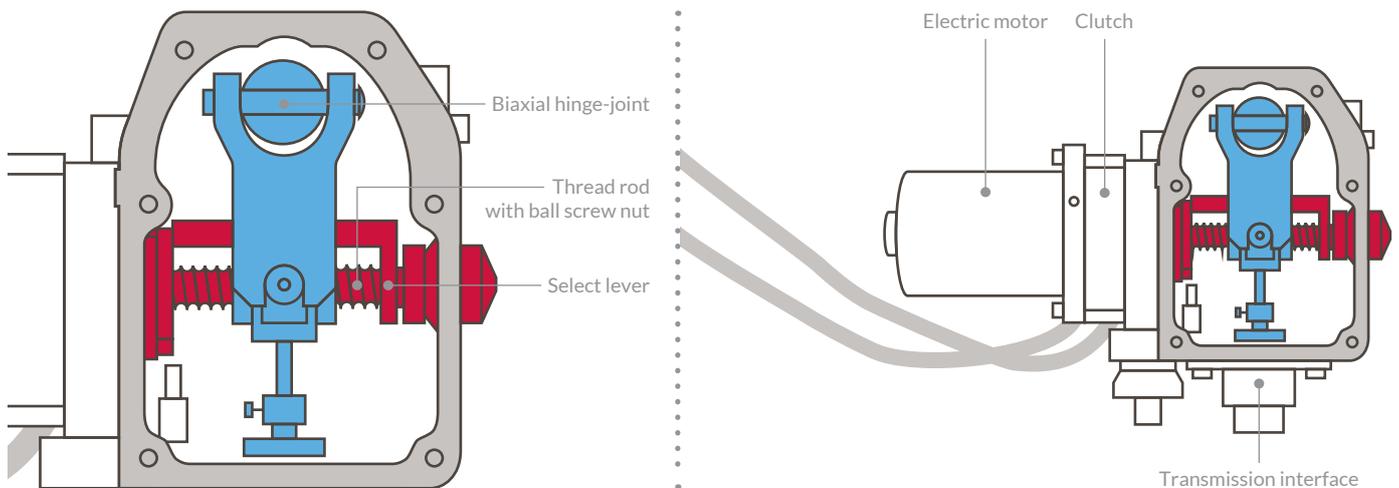


OUT-OF-THE-BOX THINKING ...

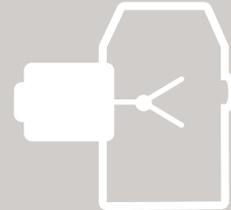
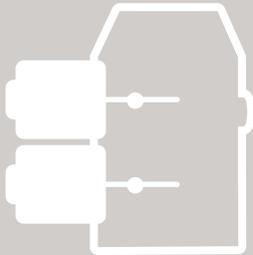
An Automated Manual Transmission (AMT) is, put simply, a Manual Transmission with a 'robot' performing the gear shifts. The 'robot' of an AMT is the electric transmission control system that performs the SHIFT and SELECT operations. It is mounted outside the transmission and transmits the signals it receives from the shift lever to the gears inside the transmission. Conventional electric transmission control systems perform their operations with the use of either two motors for shifting and selecting or three solenoids. KSK reduced that to one motor and one clutch - without compromising the speed of shifting and selection operations compared to conventional control systems or Automatic Transmissions (AT).

< 0.1 sec.
SHIFT and SELECT reaction time (achieved)

< 0.05 sec.
SELECT reaction time (development goal)



A ball screw nut performs SHIFT, a select lever performs SELECT operations, both moved by the same motor. KSK's One-Motor One-Clutch Electric Transmission Control is actually an innovative simplification of current transmission control systems' construction design.



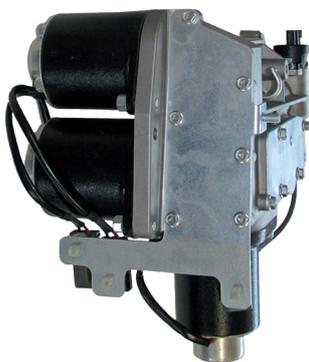
Conventional wisdom maintained the use of either two motors or three solenoids for shifting and selecting. KSK's innovative approach requires only one motor for operating a transmission.

... REDUCES WEIGHT AND SPACE AND COSTS

KSK's innovative approach drastically reduces the space required and the weight of the transmission control system. It also offers significant savings in power consumption. While the AMT is not widespread today, emerging markets offer much potential for the technology: Automated Transmissions were too costly for the average car owner in these markets. For those the AMT offers driving comfort at affordable prices. In countries where traffic jams are frequent and average engine torque is relatively low, the AMT could be the ideal solution. The product depicted here is a prototype. Development currently centers on the electronic control as well as improving endurance and reliability of the device. Start of serial production is forecast for 2018.

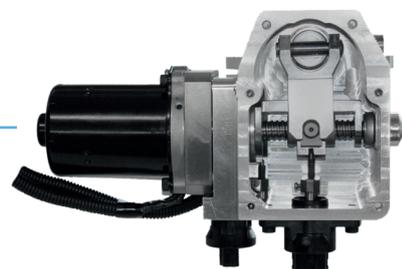
60%
Weight reduction

60%
Space reduction



17.5 kg

Two-Motor Electric Transmission Control
Previous product design



6.8 kg

One-Motor Electric Transmission Control
Prototype developed by KSK



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