

DSG WHAT IS IT?

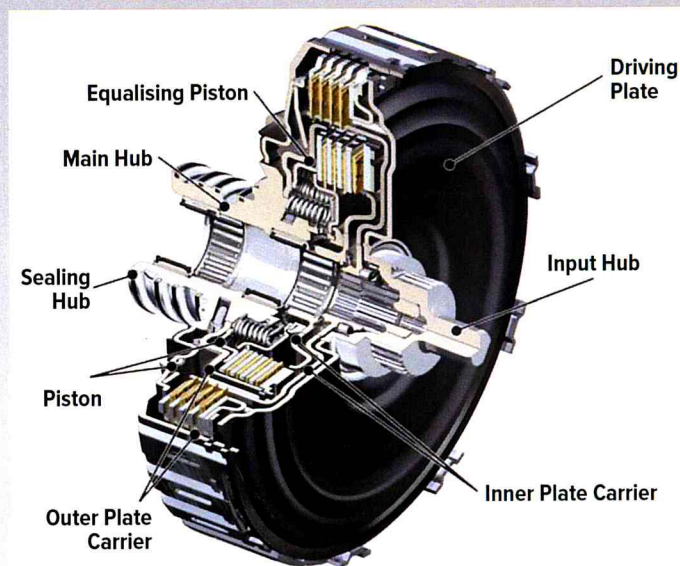
The twin-clutch transmission, also known as the Direct Shift Gearbox (DSG) or dual-clutch transmission, is an automated transmission that can change gears faster than any other geared transmission. Twin-clutch transmissions deliver more power and better control than a traditional automatic transmission and faster performance than a manual transmission.

How a manual gearbox works

A dual-clutch transmission offers the function of two manual gearboxes in one. To understand what this means, it's helpful to review how a conventional manual gearbox works. When a driver wants to change from one gear to another in a standard stick-shift car, he first presses down the clutch pedal. This operates a single clutch, which disconnects the engine from the gearbox and interrupts power flow to the transmission. Then the driver uses the stick shift to select a new gear, a process that involves moving a toothed collar from one gear wheel to another gear wheel of a different size. Devices called synchronizers match the gears before they are engaged to prevent grinding. Once the new gear is engaged, the driver releases the clutch pedal, which re-connects the engine to the gearbox and transmits power to the wheels. So, in a conventional manual transmission, there is not a continuous flow of power from the engine to the wheels. Instead, power delivery changes from on to off to on during gearshift, causing a phenomenon known as "shift shock" or "torque interrupt." For an unskilled driver, this can result in passengers being thrown forward and back again as gears are changed.

How a dual-clutch gearbox works

A dual-clutch gearbox, by contrast, uses two clutches, but has no clutch pedal. Sophisticated electronics and hydraulics control the clutches, just as they do in a standard automatic transmission. In a DCT, however, the clutches operate independently. One clutch controls the odd gears (first, third, fifth, seventh and reverse), while the other controls the even gears (second, fourth and sixth). Using this arrangement, gears can be changed without interrupting the power flow from the engine to the transmission.



Manual mode

Most twin-clutch transmissions have a manual mode which allows manual shifting via the shift lever or paddles mounted on the steering wheel. When driven in manual mode, the clutch is still operated automatically, but the driver controls which gears are selected and when. The transmission will follow the driver's commands unless the selected gear would over-rev the engine (i.e. commanding first gear while driving at 80 mph).

Advantages of DSG

The primary advantage of the twin-clutch/Direct Shift Gearbox is that it provides the same driving characteristics of a manual transmission (i.e. quicker throttle response and no drop in engine speed when the driver lifts off the accelerator) with the convenience of an automatic. However, the ability to perform near-instantaneous gearshifts gives the twin-clutch advantages over both manuals and automatic transmissions. Volkswagen's DSG takes about 8 milliseconds to upshift. Compare that to the SMT (Sequential Manual Transmission) in the Ferrari Enzo, which takes 150 ms to upshift. Instant gear shifts mean faster acceleration: According to Audi, the A3 runs 0-60 in 6.9 seconds with a 6-speed manual and 6.7 seconds with the 6-speed DSG.