

DriveWise

What's next?

Automatic Gearboxes: How they work.

This month on DriveWise, we try and simplify the workings of four most commonly used automatic transmissions in modern cars.

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In the last couple of years, the Indian market has been inundated with new and affordable automatic cars in the market. However, different manufacturers offer different kinds of automatic gearboxes in their cars - there's CVT, torque converter, AMT and dual-clutch automatics. So, how different are these automatic gearboxes from one another in terms of working mechanism? While workings of these mechanical components are quite complex, we have tried to explain them in simple terms.

Continuously Variable Transmission



Continuously Variable Transmission or CVTs are the most common type of automatic gearbox found in small cars or automatic scooters. Its working principle is quite easy to understand - a CVT transmission uses two conical pulleys connected by a V-belt. One of the pulleys is connected directly to the engine while the second is coupled to the driveshaft or wheels. So, depending on

the engine/wheel speed the belt moves back and forth between the pulleys and offers 'continuously' changing gear ratios, thereby, providing smooth and seamless shifts. On the downside, a CVT experiences 'rubber-band effect' under hard acceleration - the engine revs high and gets noisy but there's a delay before the vehicle starts accelerating.

Torque Converter

Torque converters are the most widely used automatic gearboxes - from small hatchbacks to high-end performance cars, this type works everywhere. As for its running principle, a torque converter uses a viscous coupling that permanently connects the engine and transmission - there's no clutch and, hence, no need to engage/disengage gears at varying driving speeds. But, on the flip side, since there's no physical contact between the engine and transmission - it's only through a fluid coupling that the power is transmitted between the two - there's always a bit of a slippage to have, which



results in a power loss of around 8-10 per cent. Torque converters are, therefore, less fuel efficient than a manual gearbox or a CVT.

Automated Manual Transmission

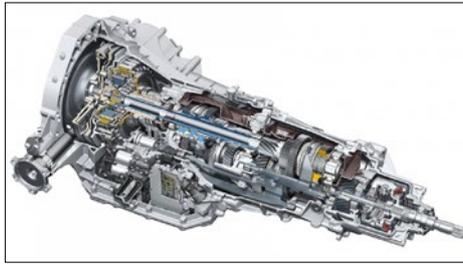


An AMT or Automated Manual Transmission is a manual transmission with automated controls. An AMT is based on a normal manual gearbox but makes use of an electronic control unit and hydraulic actuators to engage/disengage clutch from the engine and shift gears. So, basically, instead of you rowing the gears yourself, the electronic system and actuators do the job for you. And since an AMT uses a computer algorithm to swap gears, they can be even more fuel efficient than a manual gearbox. While AMTs are more affordable than CVTs or Torque Converters, they are quite jerky and slow to shift gears. It takes time to get used to these systems and sometimes you have to change your driving style. Which is why, AMTs work relatively well for city driving use, but at higher speed

on the highways it may not be ideal.

Dual-Clutch Transmission

In essence, a DCT or dual-clutch transmission is also a semi-automatic gearbox and falls under the AMT category. However, in comparison to the single-clutch automated manual transmission you've just read about in the above paragraph, a DSG uses two clutch plates. Not to mention, its working is more complicated. But then, it's also lightning quick and superior. In a DCT, each of the two clutches are connected to its individual shaft. The shaft attached



to the first clutch has odd-numbered gears while the other shaft has even-numbered gears. For example, a six-speed DSG will have gears 1-3-5 connected to the first shaft while 2-4-6 will be linked to the second shaft. Think

of it as two manual gearboxes working in a single transmission casing. So what happens during upshifts is that an electronic control unit quickly drops one clutch and engages the other clutch - which has already got the next gear pre-selected and running. Similar is the case for downshifts. The advantage of having two clutches is that it reduces gearshift times tremendously - a DSG can change cogs in between 8 milliseconds to 150 milliseconds! However, DCTs repair costs can be very expensive. Additionally, at slow speeds they are not as smooth as a CVT or torque converters. ■



1,888bhp Rimac C_Two lands in Geneva

Croatian firm Rimac has unveiled the successor of the mad Concept_One electric hypercar at the 2018 Geneva Motor Show. It's called the Concept_Two (C_Two).

First and foremost, the C_Two is an all-new car, built completely from the ground up - meaning it doesn't share any components with the Concept_One. If you talk about its aesthetics, it is a stunning piece of automotive design. What's amazing - is the powertrain that hides under its body. The C_Two packs a 120kWh lithium manganese nickel battery pack and has four electric motors for each wheel. The front wheel motors have a single-speed gearbox

each, while the rear axle has two independent two-speed gearboxes.

Here're some crucial numbers - the peak power output is 1,888bhp, and there's as much as 2,300Nm of twisting force that's instantly sent to the wheels. As a result, 0 - 100km/h takes only 1.97 seconds! And if you're brave enough to keep the throttle pinned for another 10 seconds or so, you'll get past 300km/h as well (0 - 300km/h - 11.8 seconds). Top speed is 412km/h.

Only 150 units of the Rimac C_Two will be produced, but the company hasn't put a price-tag on it as yet but it is expected to be extremely expensive. ■

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