

Mobile Vehicle Transmissions

CVT Transmissions

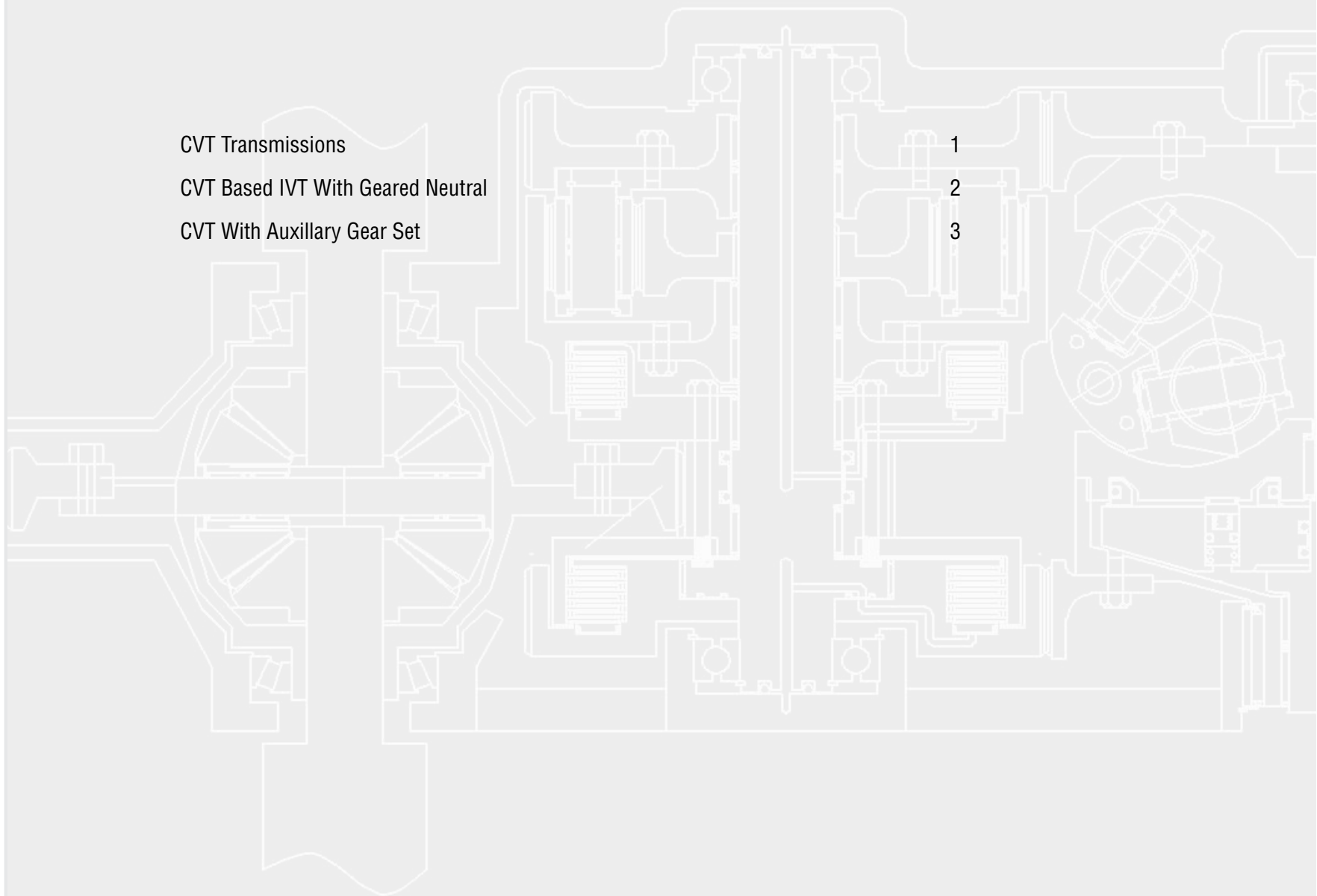
CVT Based IVT With Geared Neutral

CVT With Auxillary Gear Set

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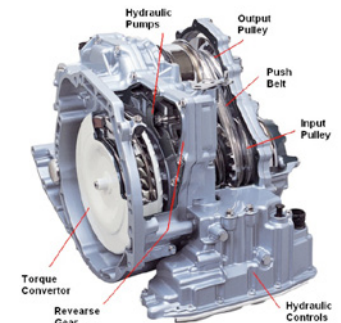
CVT Transmissions

The CVT is taking a larger and larger share of the automotive transmission market. It is predicted to gain a market share of between 10% and 25% before 2020.

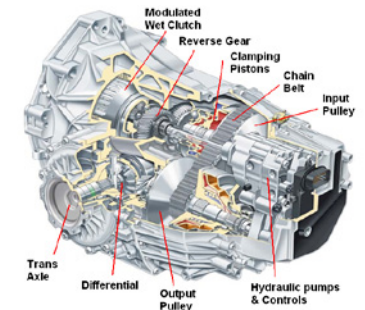
Its particular market niche appears to be

- South East Asia market
- Emerging markets
- Mild Hybrids using CVT connection
- Small to medium sized cars with front wheel drive

The bulk of the mainstream CVT market will be supplied by Push Belt or Pull Chain type CVT's unless something better than them like Ultimate Transmission's DFTV gets a foothold. Transmissions promoted by companies like Torotrak, NSK or NuVinci are unlikely to overtake the belt or chain CVT's because of fundamental efficiency and size issues.



Typical front wheel drive CVT by Jatco



Typical all wheel drive CVT by Audi

CVT Transmissions

The toroidal variator in the form of a **SFTV** or **SHTV** has so far failed to compete with these CVT's on the following grounds

1. Wrong proportions for front wheel drive
2. Too big and heavy
3. Slightly less efficient
4. Somewhat restrictive ratio spread
5. Some instability in control dynamics.
6. Too expensive
7. Requires very specific traction fluids and so requires critical maintenance care

The only toroidal based CVT that has had significant application to the automotive industry has been the Nissan Extroid.

The top of the range Nissan automobile was the Cedric. It was fitted with an Extroid or Powertoros **SHTV - CVT** from 2000 to 2006. This Transmission is referred to by NSK as the **PowerToros**.

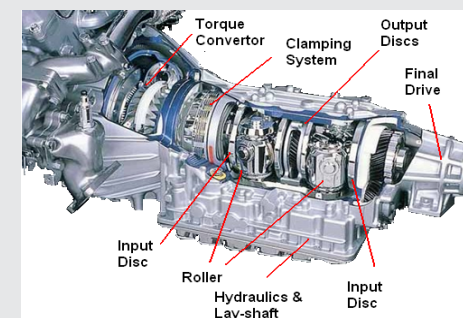
Current models are fitted with a push belt CVT that has been especially developed for high torque front wheel drive cars.

The improved Extroid (Powertoros) with three rollers per cavity. Ultimate transmissions are unaware of this being incorporated in any working transmissions.

The reasons for this are unclear but may be because NSK was unable to overcome the ratio overruns associated with the delicate control system used by NSK.



The extroid transmission in the 2006 Nissan Cedric - 2 cavity
2 rollers per cavit.



Assembled power rollers in one cavity

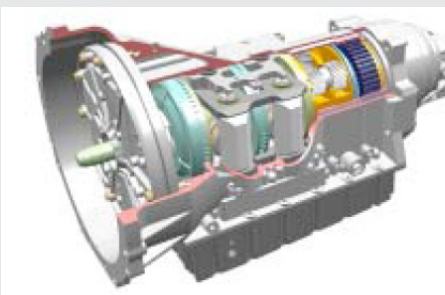
CVT Based IVT with Geared Neutral

CVT Based IVT with Geared Neutral

The CVT based IVT has not yet made any impact on the passenger vehicle market and if it does it will be focused on the off road vehicle market, or the high power luxury vehicle market. All of the major CVT technology suppliers and manufacturers are working on getting IVT to function properly for a passenger vehicle.



Lexus LS430
SHTV – IVT fitted to a Lexus by NSK

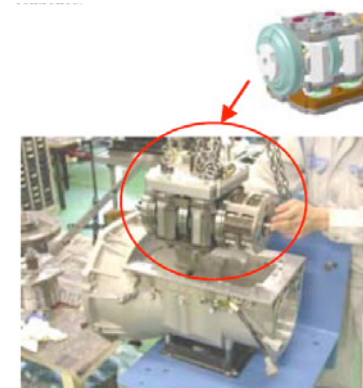


Next-Generation half-toroidal CVT
NSK SHTV – IVT for rear wheel drive

Despite only marginal success in the passenger vehicle market Torotrak has recently signed a technology transfer deal with Allison Transmissions that promises to deliver a serious output of IVT transmissions for the heavy truck and bus market.



Prototype C-IVT - Under test at Torotrak



Modularized variator - Under test at
NSK: Nissan

CVT with Auxillary Gear Set

CVT with Auxillary Gear Set

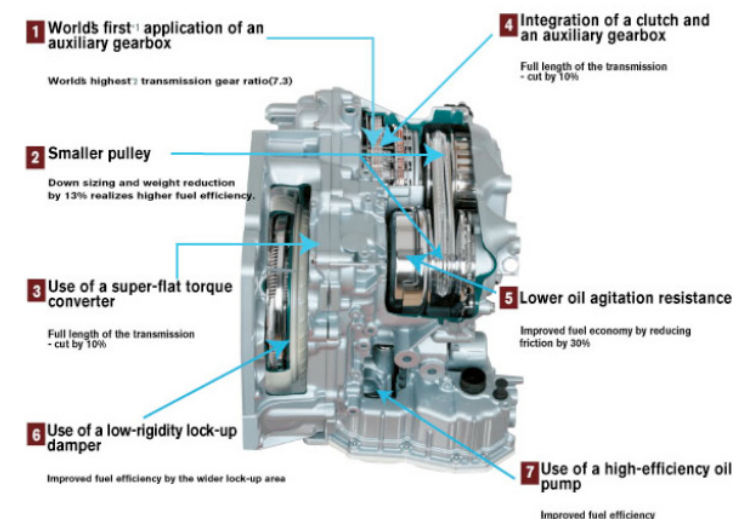
To expand the ratio spread of a CVT a secondary gear set can be introduced after the CVT in a transmission.

The secondary gear set works a little like the planetary gears in an IVT but without geared neutral. Because of the power splitting ability of such a secondary gear set it is possible to reduce the peak torque input (low gear) to the variator and so lower the size of the variator and reduce the efficiency losses.

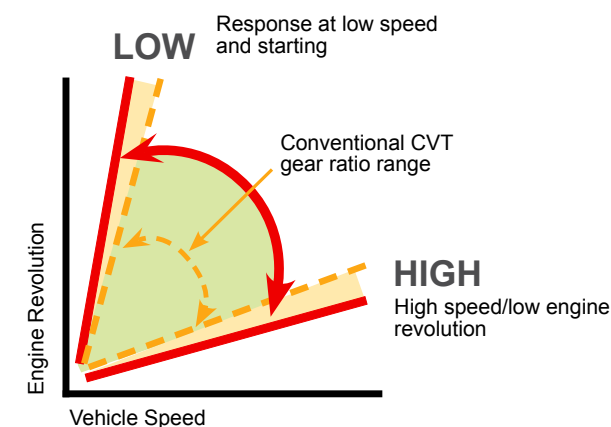
Jatco's latest Push-belt CVT's incorporate this gear set and claim big advantages.

A similar approach could be made using a **DFTV** although it would appear that the **DFTV- IVT** with geared neutral will always be more versatile.

The adoption of this device by Jatco in preference to a full IVT indicates that there are still unsolved problems with geared neutral when using a belt type CVT.



The world's highest transmission gear ration for enhanced quietness, and responsiveness on starting and acceleration.



For links to youtube
showing the CVT concept go to:

Describing consumer perception of CVT's
<http://www.youtube.com/watch?v=AV6E6J0g2C8&feature=related>

