

Continuously variable transmission

Project Seminar



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Outline

- Introduction
- what is continuously variable transmission (cvt)
- CVT Theory & Design
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what is continuously variable transmission (cvt)?

- A continuously variable transmission (CVT), (also known as single-speed transmission, gearless transmission, one-speed automatic, variable pulley transmission, or in case of motorcycles, a twist-and-go) is a transmission that can change seamlessly through an infinite number of effective gear ratios between maximum and minimum values.

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Introduction

cvt



Introduction

- ❖ Rather than selecting one of four or five gears, a CVT constantly changes its gear ratio to optimize engine efficiency with a perfectly smooth torque-speed curve. This improves both gas .
- ❖ • One potential solution to this fuel economy dilemma is the continuously variable transmission (CVT), an old idea that has only recently become a bastion of hope to automakers.
- ❖ • CVTs could potentially allow IC vehicles to meet the first wave of new fuel regulations while development of hybrid electric and fuel cell vehicles continues.

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CVT THEORY & DESIGN



Cvt theory

- Today's automobiles almost exclusively use either a conventional manual or automatic transmission with “multiple planetary gear sets that use integral clutches and bands to achieve discrete gear ratios” .
- A typical automatic uses four or five such Years, while a manual normally employs five or six.
- The continuously variable transmission replaces discrete gear ratios with infinitely adjustable gearing through one of several basic CVT designs.



Design

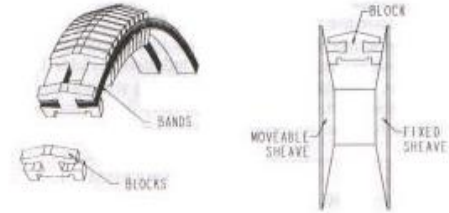


Figure (1) – Metal Push Belt CVT
From [3]

=>This most common type of CVT uses segmented steel blocks stacked on a steel ribbon, as shown in Figure (1). This belt transmits power between two conical pulleys, or sheaves, one fixed and one movable . With a belt drive

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Toroidal Traction-Drive

Toroidal Traction-Drive

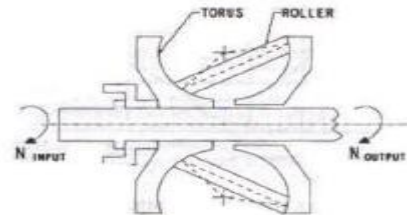


Figure (2) – Toroidal CVT
From [3]

These transmissions use the high shear strength of viscous fluids to transmit torque between an input torus and an output torus. As the movable torus slides linearly, the angle of a roller changes relative to shaft position, as seen in Figure (2). This results in a change in gear ratio .

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Variable Diameter Elastomer Belt

Variable Diameter Elastomer Belt

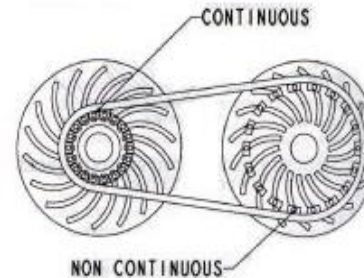


Figure (3) – Variable Diameter Belt CVT
From [3]

***This type of CVT, as represented in Figure (2), uses a flat, flexible belt mounted on movable supports. These supports can change radius and thus gear ratio.**

***However, the supports separate at high gear ratios to form a discontinuous gear path, as seen in Figure (3). This can lead to the problems with creep and slip that have plagued CVTs for years.**

RESEARCH

- While IC development has slowed in recent years as automobile manufacturers devote more resources to hybrid electric vehicles (HEVs) and fuel cell vehicles (FEVs), CVT research and development is expanding quickly.

OTHER APPLICATION

- **Tractors**
- **Golf Carts**
- **Ride on Lawn Mowers**
- **Motorized Wheelchairs**
- **Bicycles**
- **Power tools**
- **Industrial Equipment**
- **Minimachines**

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Advantage&Disad- -vantage

- There is improved acceleration due to the lower power loss experienced.
- Stepless transmission.
- It has the ability to allow the engine to rev almost immediately which delivers maximum torque.
- Provides a smoother ride than automatic transmission.
- Adapts to varying road conditions and power demands to allow for a better ride.

- **Higher cost.**
- **Belt-driven CVTs (VDP system) have a limited amount of torque; however the technology is constantly being improved.**
- **Transmitting motion by friction causes greater wear.**
- **Require special oil and other materials**

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Future Scope of Work

CONCLUSION

conclusion

- Today, only a handful of cars worldwide make use of CVTs, but the applications and benefits of continuously variable transmissions can only increase based on today's research and development.
- As automakers continue to develop CVTs, more and more vehicle lines will begin to use them. As development continues, fuel efficiency and performance benefits will inevitably increase; this will lead to increased sales of CVT-equipped vehicles.
- Increased sales will prompt further development and implementation, and the cycle will repeat ad infinitum.

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References

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Any queries?

THANK YOU