



BETTER PERFORMANCE. MORE ECONOMY.



NuVinci Power Steering Pump Drives Enable:

- Reduced fuel consumption during highway cruising for heavy-duty commercial vehicles compared to conventional fixed-ratio steering pump drives
- Pump speed is now independent from engine speed
- Smooth, easier "dry park" operation when high pump output is needed
- Quiet, smooth, transparent operation
- Flexible packaging enables use of existing belt lines or engine PTO
- Stable, predictable shifting simplifies implementation of simple, yet innovative control



Traditional Steering Power, Untraditional Performance.

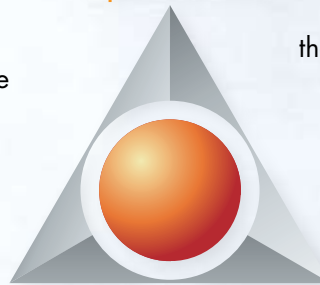
Heavy-Duty commercial vehicles share a common power steering problem – namely that engine driven power steering pumps tend to produce more flow and pressure at cruise speeds than is needed. Demands on the pump are highest when the driver wants to turn the vehicle at launch on dry pavement. Sizing the pump for this condition leads to a lot of wasted hydraulic energy above idle speeds.

A NuVinci Delta Series power steering (PS) accessory drive improves power steering pump performance by decoupling the engine speed from pump speed, enabling the pump to operate in its optimal range based on demand regardless of engine speed. As a result, the NuVinci accessory drive delivers the ideal pump speed all the time... optimizing accessory operation and performance, thereby enhancing engine performance, increasing system efficiency and improving fuel economy.

NuVinci CVP Technology

At the heart of every NuVinci accessory drive is Fallbrook's award-winning NuVinci continuously variable planetary (CVP) transmission technology. The NuVinci CVP is a new class of CVT transmission technology that acts as a power management system to control the speed and optimize the performance of the accessory drive. Unlike conventional CVTs, the NuVinci CVP uses a set of rotating and tilting balls positioned between the input and output components of the transmission that tilt to vary the speed of the transmission. Tilting the balls changes their contact diameters and varies the speed ratio. As a result, the NuVinci CVP offers a seamless and continuous transition to any ratio within its range.

Optimization



Economy

Performance





POWER STEERING PUMP ACCESSORY DRIVE

Better Feel. Better Performance. A Better Solution.

A NuVinci power steering accessory drive boosts power steering pump performance at low engine speeds, with minimal complexity, easy installation and low cost. Figure 1 illustrates a thru-drive power path configuration. Power comes in from the PTO or belt (belt interface not shown), is transferred to one traction ring, through the planet balls and out of the other traction ring. Tilting the balls provides a smooth ratio transition from overdrive to underdrive. In overdrive, the NuVinci accessory drive provides high pump speeds at engine idle, on demand. In underdrive, the NuVinci system keeps the pump speed at a minimum during high engine speeds, improving fuel economy and reducing PS system heat.

NuVinci power steering accessory drives also enable control of output speed (see redline in Figure 2), independent of engine speed (the white line). At engine idle, output speeds may be increased on demand providing more performance from the pump. At higher engine speeds (such as accelerating from a stop or cruising), accessory speeds may be reduced, saving energy and improving fuel economy. The NuVinci CVP also shifts quickly, to help smooth out transients.

The Result

The graph in Figure 3 illustrates the improvements in both low engine speed pump boosting and pump speed reduction at high engine speed that result from a NuVinci Power Steering Accessory Drive.

Thus, a NuVinci Power Steering Accessory Drive Offers:

- Increased fuel economy and reduced PS system temperature at cruise conditions
- Increased performance at idle
- Flexible packaging
- Opportunity to "rightsize" the pump
- Seamless, transparent, silent operation
- Ability to reduce engine startup torque by reducing pump speed at startup

Figure 1. Power Path to Power Steering Pump

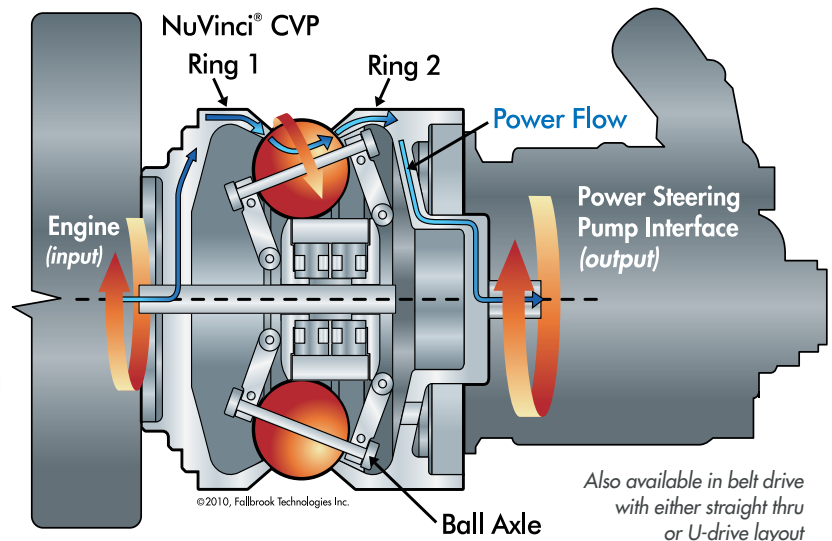


Figure 2. Speed Comparison

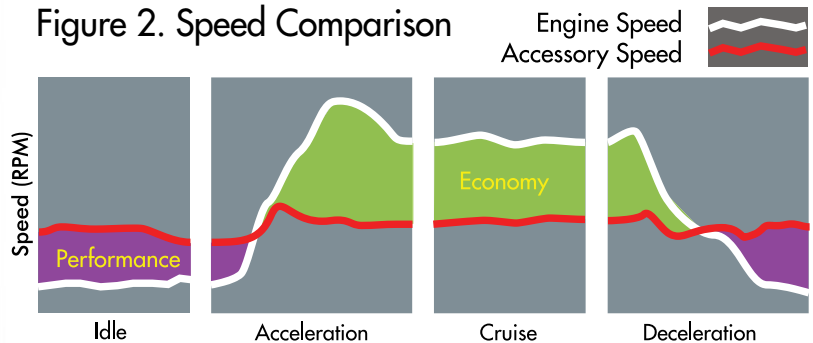
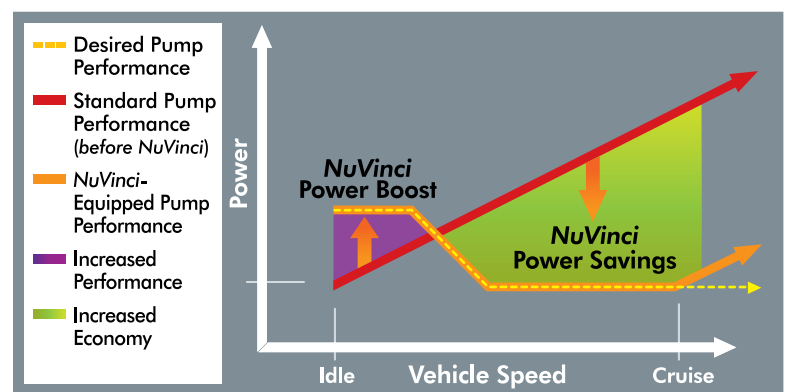


Figure 3. Power Steering Pump Power Demand



Become a NuVinci Development Partner

Fallbrook Technologies is currently selecting NuVinci CVP accessory drive development partners in several cleantech/heavy duty market areas. Becoming a development partner gives you first-strike capability in reaching your market with innovative new products, as well as access to the comprehensive and unmatched NuVinci technology portfolio of over 350 patents and patent applications worldwide.

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