

## NuVinci Transmission a Work of Art

Leonardo DaVinci is credited with the idea first, as is the case with many engineering innovations; although, somewhere in China there may be a continuously variable transmission etched into an ancient cave dwelling.

The Power Play staff has dispatched its excavation team to the region to conduct an extensive search for any precursor, but they have yet to come up with any artifacts to challenge the Italian inventor's credit.

The CVT has come a long way since 1490, and DaVinci would be proud to see the innovative applications his concept is applied to today. As the technology has been refined and developed since the first European patent filing in the late 19th century, the CVT has popped up in automobiles, and lately, in bicycles, light electric vehicles, outdoor power equipment and wind turbines.

Fallbrook Technologies Inc., a technology development company focused on improving mechanical transmission-based products, features the renaissance-based model as its core technology in the NuVinci continuously variable planetary (CVP). The NuVinci uses a set of rotating and tilting balls between the input and output components of a transmission. The tilting balls alter their contact diameters and vary the speed ratio. In comparison, to other current CVTs, the NuVinci is less complex and costs less to produce, according to Fallbrook.

Interestingly enough, the advanced NuVinci design was not the result of mad scientists hunched over lab tables, pontificating over complex equations, formulas or theories. "In the late 1990's, Don Miller, a cycling enthusiast, became interested in building the world's fastest bicycle," says Emile Barrios, marketing director at Fallbrook. "At the time, Miller was involved in real estate/mortgage banking and worked on inventions in his spare time. In analyzing the challenges

involved, he quickly found that the transmission was a limiting factor. While looking around for new ideas, Miller came across the concept of a CVT. Although he had no formal engineering background or training, Miller's subsequent experiments led him to develop an entirely new concept for CVT-based bicycle transmissions."

Although developed with bikes in mind, for Fallbrook, the applications seem endless. "In addition to the Hydro-Gear lawn and garden application, Viryid Technologies Inc. has licensed NuVinci technology for use in small wind turbines and plans to have its system available for sale in 2010," Barrios says. "Fallbrook itself is pursuing the use of NuVinci technology in continuously variable accessory drives (CVADs). These applications include superchargers, alternators and A/C compressors in motor vehicles. In addition, NuVinci technology can significantly improve the performance and economics of light electric vehicles."

For NuVinci's inventor, Miller, the technology development was trying, yet ultimately rewarding. "The technology took over 10 years to develop. There were long periods of incremental improvement with occasional major breakthroughs," Miller says.

Miller believes his design will continue to evolve over time, as will the innovative applications DaVinci may not have dreamed of. "The NuVinci CVP is a truly universal transmission that can more efficiently control speed and torque of a drivetrain by allowing the prime mover (motor or human) to operate at its optimum efficiency. Its simplicity should pave the way for hundreds of new applications in the next 50 years. It could be an enabling technology for future applications such as walking robots and deep drilling rigs."

On second thought, DaVinci probably did envision walking robots amidst his other seemingly-wild ideas that were passed off as science fiction at the time.

For more information, including a full list of applications, visit [www.fallbrooktech.com/Nuvinci](http://www.fallbrooktech.com/Nuvinci).

