

Hybrid Economy, NASCAR Performance

VMT TECHNOLOGIES DESIGNS POSITIVELY ENGAGED, INFINITELY VARIABLE TRANSMISSION

Matthew Jaster, Associate Editor



Gary Lee invented the Universal Transmission design.

To better understand the concept behind VMT Technologies Universal Transmission, you have to start in the snow—the light, champagne-powdery kind typically found in Utah.

Gary Lee, inventor of the Universal Transmission design, was having trouble getting his snowmobile through it.

“We were pushing snow instead of getting on top of it,” Lee says. “The heat generated would cause the rubber belt in the transmission to fall apart. I was burning a belt every time I went out on a snowmobile trip. I figured there had to be a better way where the friction is positively displaced.”

Lee began tinkering with the transmission on his snowmobile and realized there were things that could be done to improve the design. This thought process eventually led to the creation of the company, VMT

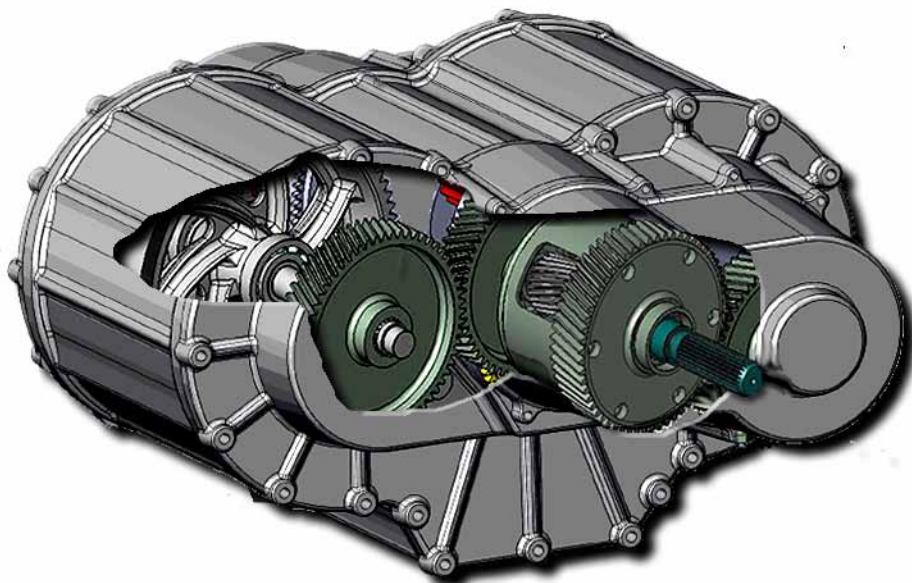
(Vernier Moon Torque) Technologies and a design concept for a positively engaged, infinitely variable transmission.

Today, VMT claims the transmission prototype can improve vehicle gas mileage up to 30 percent or more and can also improve the way electric/hybrid vehicles operate. With the assistance of CEO Richard Wilson, Mark Stoddard, chief marketing and busi-

ness development officer and Steve Sutherland, chief operating officer, Lee began discussing the new transmission concept with OEMs. Discussions involved an alternative to standard transmission design.

“It’s an infinitely variable transmission, requiring no clutch or torque converter, and it’s constantly engaged. It doesn’t use friction to change gears.

continued



VMT Technologies has designed a concept for a positively engaged, infinitely variable transmission (courtesy of VMT).



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It can replace the expensive motor controller and turn low-torque hybrids to high-torque hybrids," Lee says. "Friction is not a friend to efficiency or performance."

The Universal Transmission uses an engaged drive chain instead of a friction belt. This allows a friction-free chain-to-sheave relationship as the torque flows through the gear/chain engagement. There are other distinct properties that make the design unique to the transmission market including:

- Metal gears always remain engaged, giving drivers maxi-

mum performance;

- It never disconnects the engine from the load like standard or automatic transmissions currently do;
- The fuel savings alone is enough to dramatically reduce pollutants, reduce effects from fossil fuels and encourage energy independence;
- The transmission not only makes electric and hybrid cars a reality in passenger vehicles, but large trucks as well.

"The efficiency of the transmission



Lee explains the transmission technology during a recent presentation (courtesy Stuart Johnson, Deseret News).



Lee discusses the advantages of the Universal Transmission to senior engineers at a major transmission manufacturer in Korea (courtesy of VMT).

can also allow you to reduce the size of the engine, which improves gas mileage," says Mike Agrelius, sales director at VMT. "In electric and hybrid vehicles, the Universal Transmission could replace the expensive controller, making electric hybrids more competitive in the automotive market."

"Electric cars are still in their infancy," adds Sutherland. "Having an infinitely variable transmission that performs right out of neutral can significantly cut costs. The price tag of an electric car can double due to the battery pack and controller alone."

VMT sees a market much broader than that of continuously variable transmissions (CVTs), since their transmission can work in trucks and heavy equipment as well as small vehicles. VMT believes with the Universal Transmission there is room to improve on this design.

"CVTs are friction-based and have limited torque application. It's appealing because there are more gear increments and better gas mileage. We know that at the very minimum, the Universal Transmission will match anything they've been able to do with the CVTs," Sutherland says.

In order to meet the many challenges of the Universal Transmission design, VMT worked with Brigham Young University for three years. Mechanical engineering students as well as teachers were instrumental in helping to research and understand the problems that had to be overcome to develop what has become this transmission concept.

"The work done at BYU allowed Gary to use it as a springboard, and we've been on the fast track ever since," Sutherland says.

More than 15 mechanical engineers, including four distinguished professors of mechanical engineering, consider the Universal Transmission breakthrough technology. While transmission companies have spent billions on new technology efforts, Lee's knowledge of gears and his determination as an inventor were pivotal in providing the right foundation for the

Universal Transmission concept.

VMT is aggressively seeking various opinions and feedback from the likes of Allison Transmission, Borg Warner, Honda, Subaru, Hyundai and Kia on the concept. One company, in particular, considers the Universal Transmission "leap frog technology."

"We've been especially pleased with all the interest and intrigue we've seen since November," Sutherland says. "It's an exciting opportunity for us to be able to incorporate Gary's

vision and provide engineering consulting in the future."

"Hybrid economy with NASCAR performance," Lee says. "This is probably the best description we can give for the work we're putting together."

While the country continues to explore fuel efficiency in the automotive market, there's no denying the fact that many Americans still enjoy larger vehicles.

"Americans love big, powerful
continued



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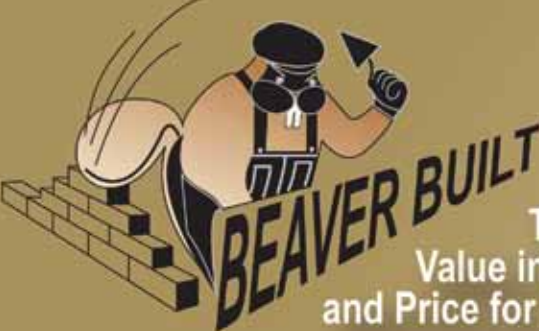



Lee and Will Decker, senior engineer, discuss the Universal Transmission at the white board (courtesy of VMT).






automobiles. We're excited about the possibility that an infinitely variable transmission could make an electric Ford F-150 a reality and offer a significant energy savings to the electric, hybrid or conventional versions," Sutherland says.


At the company's website (www.moongears.com), the Universal Transmission development process is detailed along with a series of questions and answers that describe the benefits versus a standard gearbox, automatic transmission or CVT.

The company also goes into great detail on the advantages of the Universal Transmission in the semi-truck market. About 50 percent of all oil for vehicles is consumed by trucks. If the Universal Transmission is utilized in a semi truck, fuel usage could rise from 5 mpg to perhaps a high of 6.5 mpg just from keeping the engine running in its "sweet spot" and never having to shift. Every time you shift, you disconnect the engine from the load, and you lose momentum or inertia. Going uphill requires dramatic uses of fuel just to recapture that momentum at every gear. Fuel will be saved because there is no clutch and the transmission is constantly engaged. Save fuel in trucks and you make a far stronger impact than saving fuel in cars. With an improvement of 5 mpg to 6.5 mpg in the big rigs, and more in smaller trucks, some of which could have electric or hybrid motors, there could be a 15 to 25 percent reduction of the fuel consumed in U.S. vehi-





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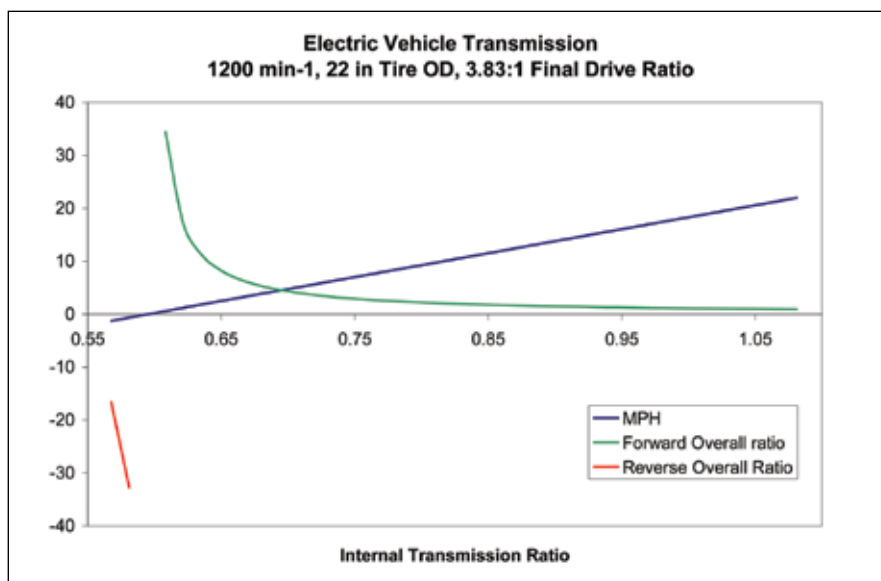
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cles—just in trucks.

Currently, the licensing company is continuing to get the message out via press conferences, press releases, technical papers, peer review groups and professional journals. VMT has a fully working 3-D CAD prototype of the design and is looking for strategic partners to create a functional, in-vehicle prototype. The transmission design can be applied to heavy trucks, agricultural and heavy duty equipment, maritime, automobiles (including electric, hybrid and light trucks) and military vehicles.

It's been a whirlwind of activity for the Provo, Utah-based organization as it continues to spread the word on the transmission technology. The VMT staff includes many employees from a variety of career fields that simply felt Lee was onto something as he tinkered with snowmobile transmissions in the Utah snow.

"We all came into this from different backgrounds," Agrelius says. "We're just a matter of months from securing a



This table shows the output of the transmission as it steps through its range of discrete ratios (courtesy of VMT).

strategic partner. People in the industry see the value and the possibilities of this technology, and they want to get a head start on their competition.” ⚙

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