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# Going Off-Road



As seen in  
**Design Solutions**  
April, 2014

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**Today's Medical Developments**  
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 **Stieber**  
Clutch

An Altra Industrial Motion Company

# Going Off-Road

**Stieber Clutch helps All Terrain wheelchair manufacturer along the road to success...**



Stieber Clutch helps Mountain Trike, an off-road wheelchair manufacturer, improve reliability.



Mountain Trike's designer, Tim Morgan, chose to specify an overrunning clutch to transmit the kinetic energy from the levers to the wheels.

While standard wheelchairs are an essential tool for many people with disabilities, they are still extremely limited in terms of the terrain that they can handle. This is why Tim Morgan has invented the Mountain Trike, a wheelchair designed specifically for use off-road and in difficult conditions. Operating in such harsh conditions can put a strain on the components and at times sourcing parts that could withstand this tough environment proved a challenge. Fortunately Stieber Clutch was able to offer a solution which has so far proven to be 100% reliable.

There is great desire amongst many wheelchair users to go out and enjoy the countryside. However, activities as simple as family trips in the park or ambling along country paths can be difficult or even impossible in a regular wheelchair due to the uneven ground, steep terrain and mud. While some traditional wheelchair designs are available with chunky, 'off-road' tires, they still require the user to push the wheels to move the chair forward, which results in muddy slippery hands and poor transmission of drive.

The Mountain Trike is the only manual wheelchair on the market that has been designed specifically for all terrain use, combined with everyday practicality. It uses a unique lever drive system that allows the user to power, steer and brake the Trike using two levers which are positioned in front of them. The levers are connected to the wheels using similar technology that can be found on a mountain bike and power each wheel independently. A third wheel at the back stabilizes the chair and can be steered using a joystick mechanism attached to one of the levers.

Rather than a standard bike free wheel, the Mountain Trike's designer, Tim Morgan, chose to specify an overrunning clutch to transmit the kinetic energy from the levers to the wheels.

Tim explains his reasoning behind the specification: "When the wheels are spinning freely on a mountain bike, without drive from the pedals, the freewheel clicks during the rotation. The Mountain Trike is intended for use during family walks and other lifestyle activities so I wanted to make sure it would run silently. I also found that bike freewheels have a small amount of free travel before it engages. Because the levers are quite long, this translated to several inches of free travel with each push, which was quite jarring for the user and resulted in less efficiency overall. Using an overrunning clutch eliminates both of these issues."



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While the initial overrunning clutches, specified on early test models, performed as desired short term, it became apparent that over long term use their durability was not up to the standard required for the Trike. Poor seals meant that mud and contaminants could creep inside, which caused seizing, while the poorly machined internal components led to slipping and, eventually, total failure due to the regular shock loading caused by disengaging and engaging the drive train with every push.

Aware that he needed to source an alternative component that could survive in the most extreme terrain, Tim approached Stieber Clutch: “I was already aware that Stieber Clutch is well known for its quality and reliability in tough industrial applications, so when we began to have problems with the original bought in components I approached the company to see if Stieber was able to offer a solution. I was supplied with the CSK PP overrunning clutch for testing and the superiority of the component was immediately apparent. The seals were clearly far better protected and the movement was much smoother.”

Stieber/Formsprag overrunning clutches offer a number of unique design features which ensure that they are longer lasting and more reliable than other components on the market. The sprags are manufactured using the company’s patented ‘Formchrome’ process which diffuses chromium carbide into the working surface of the sprag, increasing its surface hardness substantially to deliver excellent wear protection. They are also precision machined to ensure that each sprag is almost identical to the next to prevent uneven rolling movement.

The sprag retainer assembly also features a free action design that permits each sprag to have free and independent action. This independence allows each sprag to adapt to variations in annular space (eccentricities) so that when the clutch is engaged, the load is proportionally shared among all sprags, eliminating the possibility of clutch damage resulting from the entire load being absorbed by just a few sprags. In operation, springs energise the sprags into position for instantaneous engagement with no backlash.

Tim continues: “During the testing process it was clear that the Stieber clutch offered far more in terms of reliable performance and they are now specified as standard on all Mountain Trikes. Since they have been installed we have had no reported failures, even from some of our more adventurous customers.”



The Stieber overrunning clutch offers far more in terms of reliable performance and is now specified as standard on all Mountain Trikes.



Stieber/Formsprag overrunning clutches offer a number of unique design features which ensure that they are longer lasting and more reliable than other components on the market.

## About Altra Industrial Motion

Altra Industrial Motion (NASDAQ:AIMC) is a leading multi-national designer, producer and marketer of a wide range of electromechanical power transmission products. The company brings together strong brands covering over 40 product lines with production facilities in nine countries.

Altra's leading brands include Boston Gear, Warner Electric, TB Wood's, Formsprag Clutch, Wichita Clutch, Industrial Clutch, Ameridrives Couplings, Kilian Manufacturing, Marland Clutch, Nuttall Gear, Bauer Gear Motor, Svendborg Brakes, Stieber Clutch, Twiflex Limited, Bibby Turboflex, Matrix International, Inertia Dynamics, Huco Dynatork, Lamiflex Couplings, Ameridrives Power Transmission, Guardian Couplings, Delroyd Worm Gear and Warner Linear. For information on any of these technology leaders, visit [www.AltraMotion.com](http://www.AltraMotion.com) or call 815-389-3771.



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