

WHY E-BIKES WASHOUT ON LOOSE TERRAIN.

Traversing a plowed field, riding on a dirt/gravel road, crossing a sandy wash, and riding through snow on single-front-wheel E-Bikes presents considerable challenges due to the vehicles' design characteristics and the unpredictable nature of terrain conditions. Among the myriad issues riders encounter, two prominent ones are front-wheel washouts and rear-wheel washouts.

Imagine rounding a curve in a dirt road on a fat-tire, single-front-wheel E-Bike only to have the front wheel suddenly skid out from beneath you. This front-wheel washout occurs when the front tire loses traction with the ground, particularly on loose dirt or gravel. You rely on the area of the tire in contact with the ground, known as the contact patch, to force the front wheel into the turn. Because the weight distribution on a conventional E-Bike favors the rear wheel (15%-85% distribution), the contact patch for the front wheel is smaller than the rear wheel. With less contact patch, there's less sideways traction making front-wheel washouts on dirt more likely than rear-wheel washouts.



Figure 1 Wipeout due to front-wheel washout

Going downhill or braking in a turn make front-wheel washouts worse. If the front-wheel contact patch encounters loose ground and loses grip, the speed with which the front wheel goes into a sideways skid increases with the force on the front wheel. And when going downhill the weight distribution shifts from the rear to the front. With more weight on the front wheel, there's more sideways force in a turn; more force leads to a faster washout and unfortunately a harder fall. Because braking puts more force on the front wheel,¹ braking while turning has a similar risk of front-wheel washout as riding a turn downhill, and with the same consequences – a bad wipeout.

Rear-wheel washouts occur for similar reasons. If the ground is loose under the contact patch of a rear tire and you apply acceleration to the rear wheel in a turn, the forces moving the tire sideways increase fast. Suddenly, the rear wheel loses traction—a rear-wheel washout. Think of driving a car on ice and what happens when you accelerate in a turn. The car spins out! But on a single-front-wheel E-Bike, there aren't two wheels in front to keep you vertical.

There are techniques to minimize the likelihood of washing out on single-front-wheel E-Bikes. If you maintain a balanced riding posture and lighten the front end you can correct steering as a front-wheel washout begins to occur (staying light on the front wheel also gives you more time to react).

¹ <https://physics.stackexchange.com/questions/441019/why-do-bikes-hardly-ever-skid-while-braking-with-the-front-wheel>

Avoiding abrupt maneuvers such as sudden acceleration, hard braking and sudden turns on loose ground can also help avoid washouts – front and rear.

All the techniques executed flawlessly cannot guarantee you'll stay up on a single-front-wheel E-Bike when rounding a corner on loose ground. There is no information about how loose the ground is in front of your E-Bike. If you're lucky, you'll catch yourself before washing out. Front-wheel sideslip alerts you to the risk of a washout so you can adjust riding technique for as long as it takes until you can get back onto asphalt.

Rungu Dualie® solved loose-ground washouts by putting two wheels in front. Rungu Dualie's Double Wheel Design, two front wheels spaced 9 inches apart, makes riding much easier and safer as it virtually eliminates the washouts and over-the-bar wipeouts with any single-front-wheel E-Bike off-road. Rungu® engineers optimized front-wheel spacing using complex mathematical modeling. Much narrower and you can't make sharp turns. Much wider and sharp turns and you'll rollover in a turn like on a Quad ATV. The Double Wheel Design provides ATV-like off-road control without the inherent danger of an ATV².

The engineers at Rungu developed and patented a modified form of Ackerman Steering, which results in smooth off-road control. The front wheel on the inside of a turn pivots sharper than the wheel on the outside, since the inner tire turns in a smaller circle than the outer one. In this way, the two front wheels grip terrain like a Quad ATV or a 4WD Jeep. Because there is a tire on the inside of the turning circle, the contact patch(es) is(are) much greater than that on a single-front-wheel E-Bike. With more grip, better control.

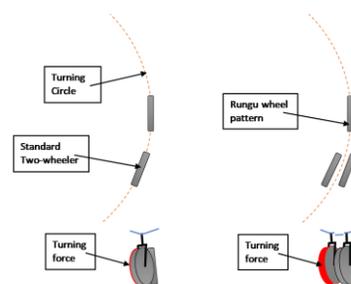


Figure 2 Physics of Rungu Dualie Double Wheel Design

Rungu Dualie's Double Wheel Design also pays dividends when a rear wheel starts to washout. As with the car driving on ice, the two front wheels give you time and added stability to keep from falling sideways. The rear-wheel may fishtail, but the front wheels keep the front end planted and keep you and your gear up off the ground.

Far more stable. Far more able.

To learn more about how Rungu Dualie outperforms single-front wheel E-Bikes on hills, in mud, on sand and in snow, visit <https://riderungu.com/e-bike-compare-2024/>. If you have more questions, email sales@riderungu.com or call (949) 877-9755. We speak English.

² In 2020, there were 135,000 ATV related injuries and over 100 fatalities due to ATV's flipping over in a turn.