

DIRK ZEDLER

E-MTBS SHOULD BE AS TOUGH IN THE CITY AS THEY ARE ON THE TRAIL

Electric mountain bikes continue to be one of the healthiest segments in the industry. But how well do e-MTBs compensate for their extra weight — not just of their drive systems, but of the frames, components, chains, sprockets, etc., needed to support them — and for the inexperience of many e-MTB riders?

One reason e-MTBs are tremendously successful is that they attract two types of consumers. One consists of experienced mountain bikers who have discovered that a motor means more fun. They can now ride uphill through steep or more technical passages that on a conventional mountain bike would have required them to get off and push.

An electric drive lets them climb a mountain three times in a day instead of just once, for three times the fun. Gravity riders no longer have to rely on a shuttle or a chairlift to return to the top. They can simply ride back up.

E-MTBs as SUVs. But there's a second, large group of e-MTB customers who rarely take their bikes on mountainous trails. Instead, you see them riding e-MTBs on roads and cycle paths, even at night. They prefer e-MTBs over electric city or trekking bikes, and they want to stay as far away as possible from the kind of e-bikes associated with pensioners.

These cyclists use their e-MTBs more like SUVs, and stick mostly to roads, bike paths, and easy trails in forests and fields. We can almost give these customers' e-MTBs the "all-clear" signal. Over its 30-year history, the mountain bike has become so durable and technically advanced that most e-MTBs can easily cope with the higher mileages associated with city use.

The problem, however, is that no bike designer or product manager knows who will buy a particular bike, or how they will use it. For example, a hardtail might be used by an ambitious athlete who is training for a marathon and intends to push the bike hard.

For these reasons, it's important to take a more detailed look at how riders actually use their e-MTBs, and how the loads that act on e-MTB components differ from those that act on conventional MTBs.

E-MTBs vs. MTBs. Based on market observations and the Zedler Institute's extensive tests, we can identify several fundamental differences of e-MTB use compared with classic mountain bikes:

- Cyclists don't pedal as hard because they let the motor do more of the work.
- Cyclists remain seated for longer periods and spend less time out of the saddle.
- E-MTBs attract heavier riders, and the bikes themselves are 6 to 12kg (13 to 26 pounds) heavier than conventional mountain bikes.
- E-MTBs are increasingly used for towing kids in bike trailers.
- When e-MTBs are ridden for sport, they are subjected to more downhill use. Cyclists are more likely to ride out of the saddle over rough

terrain and jumps, significantly increasing the loads on the bike and its components.

- Unskilled riders tend to ride the brakes continually when going downhill, putting them under severe stress.
- Unskilled riders stress their e-MTBs more than experienced riders, even on unchallenging terrain, because they don't have the skills to navigate even small obstacles and cannot minimize the loads through active riding.

As a result, there are clearly higher loads acting on some components and thus an increased potential for failure — but not under all conditions. Compromises have to be made.

Bike developers, and testing institutes, should consider all of these potential issues. But trying to address them all would lead to a longer and more expensive development process, and an e-MTB that is heavier than many users really need.

However, we can identify certain areas that are well worth the expense:

E-MTB developers are well-advised to invest in beefier brake discs and should never use minimal, lightweight discs. Heavier discs reduce the problem of brake fade and improve the brakes' heat stability, helping protect unskilled or heavier riders from accidents. Better brakes also make customers happier because they don't have to make so many trips to the bike shop to replace worn-out pads and discs.

An investment in testing seatposts, forks and frames beyond the vertical loads outlined in the standard is also money well-spent. Trying to save money here can cost brands dearly down the road.

Before an e-MTB is certified for towing trailers, manufacturers should perform weight-adjusted tests of the frame, fork and handlebar. The extra weight of a child trailer has a particularly harmful effect on a bike's braking performance — and increases loads on the frame and front fork.

Toward a new category. Some market surveillance authorities have fined bike brands and banned the sale of some models because they violate standards.

E-MTBs sold in the EU are supposed to be equipped with a bell and a full lighting system, because these bikes are also expected to be used on public roads. Manufacturers often choose the cheapest lights they can find, which is not the right answer.

Instead, they should learn from the auto industry, where lighting plays a major role in the design of a new vehicle. It's an opportunity for smart



Because e-MTB riders tend to sit more and pedal less, the Zedler Institute strongly recommends that manufacturers perform additional tests on an e-MTB's seat tube as shown here. (Identifying features have been blurred) (Photo: Zedler.de)

manufacturers to include lights in the overall design of an e-MTB, especially as they have a power source on board.

Combine that, for example, with an e-MTB that specifically designed and marketed for towing a child trailer, and the industry could create an important

new bike segment — call it the e-SUV market. (For a look at the newest "e-SUVs," see our story on page 28.)

While these bikes would be less suited for riding on rough terrain, they would satisfy the needs of many customers. ■ **Dirk Zedler**

DIRK ZEDLER

Since 1993, Dirk Zedler has been an analyst and expert witness on bicycle accidents and product failures for courts, bike and insurance companies, and private individuals.



He got his start in the industry by working for a large bike shop in 1986, and now holds the respected advanced engineering degree known as a "Diplom-Ingenieur."

Courts have recognized Zedler as an officially appointed and sworn expert on bicycles since 1994, and on electric bicycles since 2014. His staff prepares some 800 expert's reports every year.

Zedler – Institut für Fahrradtechnik und -Sicherheit GmbH (the Zedler Institute for Bicycle Technology and Safety) has used this wealth of knowledge, derived

from its work in thousands of court proceedings and expert's reports, to enhance research and development in the bicycle industry.

The Institute sets the standards for the bicycle industry. It develops and builds testing equipment that is used by manufacturers to improve the riding quality and safety of their bikes, and by leading European bicycle magazines to test them. The Institute's work provides a basis for European and American manufacturers to communicate with their Asian suppliers. Manufacturers can buy test equipment from the Institute or use its state-of-the-art testing labs.

The Zedler Institute also prepares user manuals for bicycles and pedelecs. These manuals, now available in more than 40 languages, help consumers use their bikes properly — and in many cases have protected manufacturers from liability.

■ **For more information, visit www.zedler.de.**