

DIRK ZEDLER: THE BIG WOBBLE IS BACK

THE POOR RIDING CHARACTERISTICS OF E-BIKES CAN BE SOLVED

Just a low step-through frame, a front or rear motor and a pannier rack battery – and the e-bike was ready. The other side of the coin was disastrous riding behaviour. Many of these early e-bikes were basically unrideable with luggage, characterised by poor directional stability when changing direction, oscillation on faster descents, and even handlebar wobble when the rider did not have a firm grip on the handlebars with both hands. Falls resulting in serious injuries led to court cases, compensation payments, articles in the special-interest press and, as a result, to a rethink on the part of the manufacturers and finally to significantly more stable e-bikes.

A decade later, it seems that manufacturers are putting the users at risk again. Today's frame designs with integrated batteries, combined with rapidly changing user behaviour, are causing problems. In a sense, the story is starting again from the beginning.

As if the industry had not learnt from its mistakes, the design is being changed just like that in an almost negligent manner and, what is more, the fact that luggage is carried much more frequently is being ignored. In addition, sporty road racers or mountain bikers used to be alone in the mountains. Today, thanks to powerful drive units in combination with large batteries and charging possibilities at nearly every mountain inn, e-bikers climb far uphill. Only a few days ago, the author saw a group of older people with low step-through e-bikes at Bielerhöhe, the highest point of the Silvretta-Hochalpenstrasse (Silvretta High Alpine Road, one of the most popular panoramic roads in the

Austrian Alps), all of them with full pannier bags.

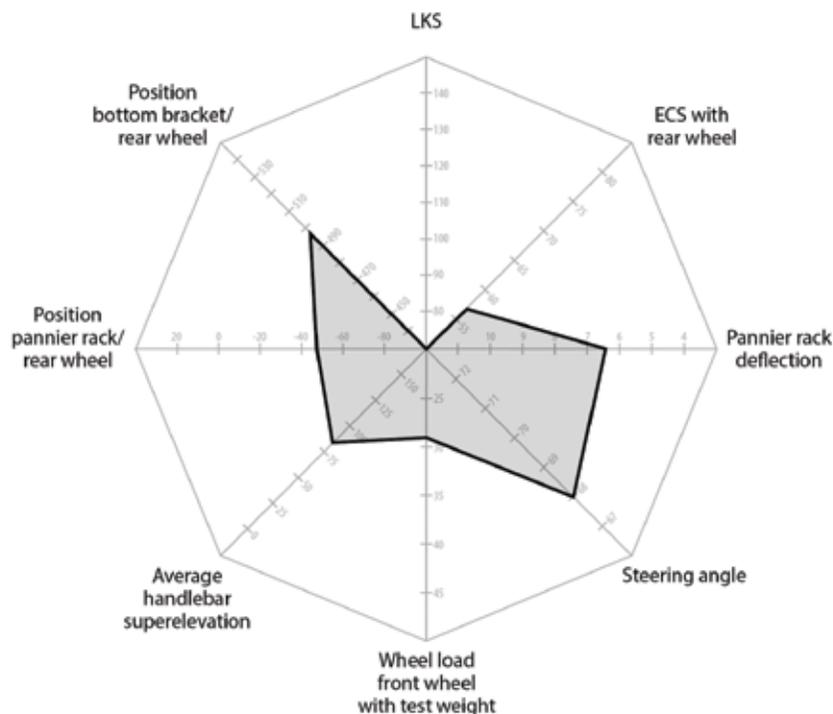
It's not only our industry that wants a higher share of cycling in traffic and travelling. For this reason, the use of e-bikes should no longer be related to the skills of athletes only. As an industry, the electric drive not only offers a great chance for us, but also means that we have to face the challenges.

Complex interrelationships - solved by testing. It is not a simple matter to cope with the complex oscillation behaviour of electric bicycles. Nevertheless, it can be solved. It basically makes sense to increase the frame stiffness, but this is not yet a guarantee for a good ride. The centre of gravity position, the frame geometry, the pannier rack connection, the fork and the wheel stiffness are further factors which must be optimised in terms of interaction.

The good news is that basically all e-bikes can be improved, often to a considerable extent. In particular, low step-through e-bikes can be optimised to such an extent that the adverse riding phenomena are only evident at very high speeds that are reached only rarely by most riders. The risk as defined by the Product Safety Act valid throughout Europe as probability of occurrence times severity of the potential damage is minimized to such an extent that the risk assessment can turn out to be positive with good conscience.

In figures, this means that even a low step-through e-bike with down-tube battery that already shows severe wobble at 10 km/h with luggage, can on the basis of the test results be optimised to such an extent

Low step-through bicycle Model C
Frame size 47 cm | With test weight on pannier rack



Poor riding stability. Highly prone to wobble and oscillation even at low speeds. Unsafe riding behaviour with one hand on the handlebar as of 10 km/h.

that the same phenomenon does not occur before the e-bike has reached a speed of 35 km/h. With both hands on the handlebars such an e-bike remains

safe and steady on its track even at a fast speed while carrying luggage.

■ 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 all over the world. 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

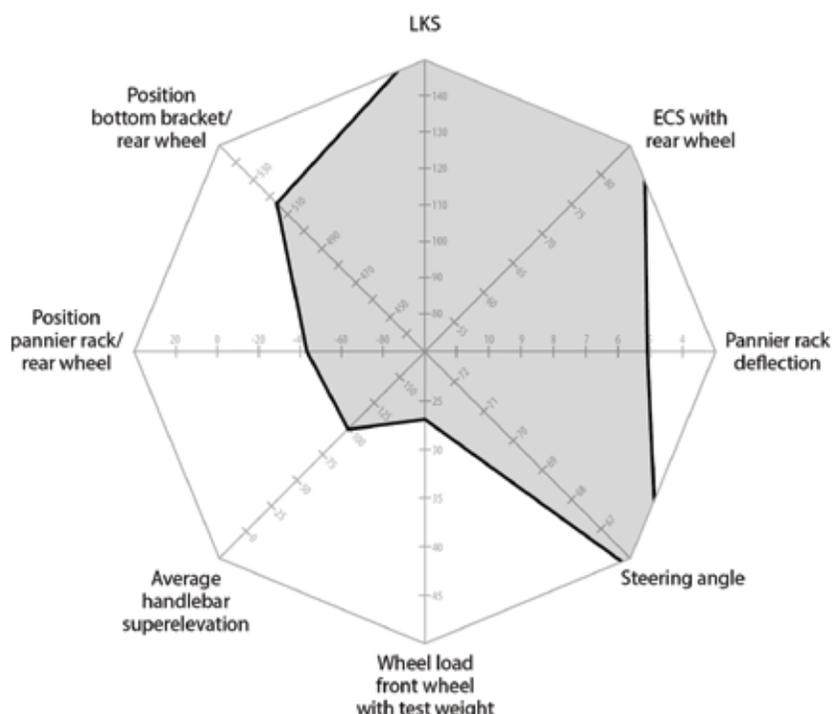
in the bicycle industry.

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 risk analyses, recall papers and 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.

Low step-through bicycle Model A
Frame size 45 cm | With test weight on pannier rack



High riding stability. Safe riding behaviour even with only one hand on the handlebar at 35 km/h and faster.