Latest Safety Research on Speed Pedelecs

European Cyclists’ Federation
Name  c.woolsgrove@ecf.com
4/27/2016
Speed pedelecs and Road Safety:

There is hardly any information on speed pedelecs and how safe they are. There are no data, no in depth research of accident types, injury types, demography, etc. There have been two research papers specifically looking at s-pedelecs and how they relate to road safety that we have found. Although we present these papers as a guide to some of the road safety issues and as a matter of completeness they are limited in scope and methods and should not be seen in any way as conclusive. The only conclusive thing we can say is that there to be more research.

German Insurers Accident Research (UDV) and Chemnitz University of Technology carried out a large-scale naturalistic cycling study to investigate the vehicle usage, speed and road safety of users of electric bicycles in Germany. There were a total number of 90 participants, 10 of whom were s-pedelec users, 49 pedelec users and the remainder cyclists. Three groups were compared, results include;

- The s-pedelec riders often used the cycling infrastructure illegally
- S-pedelec users used their bike more often for work-related journeys than the other two groups 53.6% as opposed to 30.0% for all participants
- Pedelec and s-pedelec users most often stated that the car was the alternative means of transport, whereas conventional cyclists stated most often that public transport was the alternative
- Contrary to current legislation, s-pedelec users also used the cycling infrastructure, (13.7% of their km ridden), particularly off-road shared-use paths (9.8% of their km driven).
- All three groups used footpaths on which cyclists were not permitted (7.4% of km ridden), with ordinary cyclists doing this most often (9.7%).
- There was not a great deal of difference in average speed between pedelec and bicycle users but there was a large difference in average speed between s-pedelec and pedelec users
  - S-pedelec average speed 23.2 km/h
  - Pedelec average speed 17.4 km/h
  - Cyclist average speed 15.3 km/h
- There were no statistically significant differences between conventional cyclists, pedelec and s-pedelec users or between the three different age groups in terms of the number of critical incidents in which they were involved. Where conflicts did occur, most s-pedelec incidents were with cars occurring when drivers violated the participant’s right of way, pulled out of parking spaces, turned off or did a u-turn

UDV were also commissioned by DEKRA¹ to carry out research specifically on s-pedelec safety, they looked specifically at the vehicle and at crash tests, here are their conclusions;

¹ http://udv.de/download/file/fid/1546
• Tampering was fairly easy with the possibility of increasing speeds up to 20%
• Tampering was easier amongst the cheaper lower end brands, indeed all safety standards were lower for vehicles in the lower price categories including the drive train, the electronic battery monitoring system and, in particular, the cable routing
• All brakes performed adequately on a dry road surface. On a wet road surface, however, there were great differences in braking performance. Hydraulic brakes showed much better performance. However, there is a tendency of over braking at the front wheel when the brake is operated suddenly and forcefully
• The hub motor on the front wheel was found to be a less favourable combination. On wet surfaces and/or in bends, in particular, critical situations can occur as a result of the sudden activation of pedal assistance or skidding of the front wheel.
• With some drive concepts, motor assistance continued for a short time when the brakes were applied or on a downhill stretch, resulting in critical situations
• Higher average and maximum speed as well as higher mileage gives the possibility of an additional risk on the roads
• More frequent overtaking with higher speeds also give rise to more critical situations
• Car drives will not be able to guess the speed of the bike, elderly people will be travelling at 30-40 km/
• In crash tests the forces exerted on crash partners and on the s-pedelec dummies themselves were very high and neck bending and chest compression speed being exceeded
• the average speed was 18.8 km/h compared to 14.9 km/h for a normal bicycle without motor assistance in urban riding environments

Results from these two research seem to suggest that there are and will be some road safety issues. Handling of s-pedelecs does seem to resemble that of a moped from time to time, however there were no life threatening incidents, incidents like this are too rare and the studies too small for any conclusive opinion. There has been some work carried out on lower powered pedelecs with regards to their handling\(^2\), which does seem to suggest that there are moped similarities even with lower power bikes.

SWOV the road safety organisation in the Netherlands claim that in the Netherlands about one third of bicycle accidents in which no motorized vehicle was involved (single bike accidents) happened on a pedelec. SWOV have looked at lower powered pedelec road safety and found 5 studies\(^3\). The main factors for lower powered safety issues include;

- a major issue is handling amongst elderly people
- Width of the bicycle lanes made a difference especially on bi-directional paths


\(^3\) http://repository.tudelft.nl/view/ir/uuid%3A2b140a5e-af59-4313-bd4c-c00bda879420/
• There were longer trips, more time and more trips taken on a pedelec than a conventional bicycle increasing the levels of exposure
• Handling was affected by
  o Higher weight
  o Higher acceleration
  o Higher centre of gravity
  o The silent running
  o Braking from a higher speed
• Younger riders are more likely to engage in risky behaviours at intersections
• Most of the single bike accidents were as a result of
  o falling while (dis)mounting
  o falling while braking
  o falling while turning at intersection
  o More crashes on curved sections of infrastructure

But remember this SWOV study is only for the lower powered bikes.