

The Dijker, a novel concept

By Kees Jan Heijboer,
photos Dijker.eu
Published in Ligfiets&
2020-3



The Dijker. It is a completely new concept for a velomobile, nothing that we've ever seen before. It's Peter Paul van der Ven's brainchild. I visited him in his workshop at 'Arnhem's Buiten', formerly known as the 'KEMA-campus', in Arnhem, The Netherlands. Peter Paul has not only invented the concept. He has also developed the manufacturing methods and machines, and where necessary, testing equipment.



The original idea for the *Dijker* stems from the nineties, only slightly later than the *Windcheetah*, the *Leitra*, and, again slightly later, the *Alleweder*.

The main idea behind the *Dijker* is that it should be easily accessed, lightweight, easy to control and practical. It should help people get out of their car.

Extraordinary concept

Most of the current velomobiles follow the concept of the original *Alleweder*: a monocoque body using bicycle components for the drive train. They are tadpole trikes, two front wheels and one rear. Only recently have four-wheel solutions appeared, like the *Quattrovelo*, *Sunrider* and *Intercitybike 4-wheeler*.

Peter Paul van der Ven doesn't want a trike. For one they're less stable, but, more importantly, carrying things in a trike is not very easy. That's why the *Dijker* has four wheels. These are independently sprung. Peter Paul also unfortunately was forced to stay away from bicycle mechanicals, because it takes up space in places that one would rather have available for something else and because chains and sprockets are heavy. The *Dijker* that I rode weighs about 24 kg.

But hey – how does it work?

Given: a human can produce the highest force extending the legs. One makes best use of this force in a linear movement. A linear movement takes up little room.

Execution: both pedals can move back and forth independently on their own rails.

Each pedal engages onto its own belt. This belt is wrapped around the freewheel on the rear wheel axle and unwraps during the kick.

Using two independent belts, one for the left wheel, one for the right, obviates the necessity of a differential. The belts are plastic with a steel core. The steel core takes care of the tensile force. Plastic weighs little, is quiet and is partly self-lubricating.

The belt has a tooth-profile. By releasing the engagement of the pedal-sled with one's toes, the position of the pedal on the belt can be changed. This makes it possible to change gears.

When the belt is wrapped around the freewheel as much as possible, the distance to the axle, the arm, is bigger and this will give lower gearing. This is low gear. When the pedal is moved up the belt so that the belt is more unwrapped, the gearing will be heavier – high gear.



There is a small movie of the mechanism here: <http://dijker.eu/moreinfo.html>.

The belts are an own development. They have sustained extensive tensile and endurance tests on self-developed test benches. Although we seldom realize, in all its simplicity the modern bike is a combination of technical feats. In comparison, the construction of the *Dijker* is surprisingly simple!

One steers with a small steering wheel, and brakes, very clever and intuitive, by pushing the steering wheel away.

Pushing the steering wheel away to actuate the brakes is actually quite logical.

I was repeatedly reminded of a *Citroen 2CV*, a design that I admire for its elegantly simple design solutions: also the *Dijker* is unorthodox but at the same time clever in the simplicity of its design.

The chassis is no more than a flat carbon box. It is designed to withstand the forces that occur when the rider stretches his or her legs as it is then that pedals and seat are subjected to high forces. These forces were found to be significantly higher than those from the road or from a person standing on the chassis.

As the belts are partly routed through the chassis and end up directly next to the rear wheels, there is ample luggage space behind the rider. The linear movement of the legs also allows the nose cover to stay low.

Should the nose cover not suffice as protection from rain, there is a kind of poncho that one can attach to both rear and nose cover. This offers complete protection. Both nose cover and boot can be easily taken off and put back, by the way. Neither is load-bearing, so they can be kept really light weight.

The wheels all have independent suspension. The front axle has nice own design MacPherson struts and coil springs. The rear axle is a torsion axle.

Riding

I was able to do a brief test ride. A prototype without the body parts was used for this.

A second sample gave me the opportunity to experience getting into a *Dijker* with a body.

Getting in is a lot easier than, for instance, in a *Quest*. One can just step across the *Dijker* and lower oneself into the seat.

Riding itself is wonderfully uncomplicated. It's really simple: just push out one's legs out. It does not make a difference whether one pushes out one leg at a time or both legs at the same time. >



Peter Paul van der Ven in the Dijker.

> By pushing alternately one does not get the irregularity of drive that a rowbike has. Steering is nicely direct but not too, and the turning circle is quite small. Pushing the steering wheel away to actuate the brakes is actually quite logical. It works well, but when one has no experience on the *Dijker* it takes a fraction of a second to realize how one should brake. Luckily the four Sturmey-Archer drums with own development anchor plates offer very good deceleration. I appreciated the supple response of the suspension, without any tendency to wallow or roll. It is fun to see the front suspension respond.

Production

Peter Paul has developed the *Dijker* over the years as time and money permitted. He has now reached a very important milestone: the development is finished. The moment has come to start with a 6 piece 'zero-run'. He aims to have these ready by June 2021, about a year from the time this piece was written originally. He is looking for investors who'd like to invest € 10 000



or more into the project. They will become owner of a *Dijker* from the zero-run with the expectation that it will be well used to generate endurance test data. The 6 *Dijkers* will be followed by a series of 60 pieces. <



Torsie-as met riemtrommel.



Each pedal engages onto its own belt. This belt is wrapped around the free-wheel on the rear wheel axle.



If you'd like to join Peter Paul:
<http://dijker.eu>
info@dijker.eu
 Dijker CV, Van Hasseltstraat 48
 6821 AN Arnhem
 The Netherlands
 Telephone +31 (0)6 4455 6623.

Room for a lot of luggage.

