FREEWHEELER NEWS

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Recumbents and Road Streamliners

By John Tetz

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Although the recumbent position in itself emerged quite quickly as the preferred rider position under the IHPVA success, this did not mean that the artifact of the recumbent bicycle stabilized into one typical configuration, as did the Safety Bicycle.

Recumbent bicycles can be of many different configurations including three- and four wheelers, short or long, high or low, small wheels or large wheels depending on which purpose they are to serve. As a designer/builder I was thrilled by the wide open field that recumbents provided. This changed my life.

Above seat steering

Under seat steering

Both are long wheel base bikes

Large wheel high racer

Small wheel Low racer

Both are short wheel based bikes

TRIKES

Two wheels up front (steering), one wheel in the back (power), called **Tadpole** (taken from a top view with a fat front, tapering to a tail – a tad pole shape).

One wheel up front (steering), two wheels in the rear (power), called a **Delta (**lots of cargo space between the two rear wheels).

ROAD STREAMLINERS

A streamliner is a vehicle with two wheels with an aerodynamic shell.
Here is a commercial road streamliner.

This is called a Lightning F-. The bike inside is a P-38 and can be ridden separately. The F-40 is adding a fiberglass nose cone, an aluminum frame tail assembly, and stretching Spandex from the edge of the nose to the tail. A fast bike that has room for panniers and can be used for transportation and touring.

The F-40 is the Race Across America team record holder. A 4-rider team taking turns on a F-40, pedaled 2910 miles (LA to New York – longer distance then present runs) in 5 days and 1 hour (24 mph average). This bike is not for timid or casual riders. It's for riders with the skills and a strong desire to fly.

Similarly the Tour Easy which has a nose cone and spandex stretched to a tail post. With an open bottom it's easier to get the feet down (better for urban conditions). The F-40 has a full bottom with slots for the feet but is more aerodynamic – (better for suburban conditions).

Streamline shells provide performance advantages - as a comparison if you're doing **14 mph** on a conventional bike, the streamliner is doing **19 to 20 mph - same effort.**

I ran a F-40 for several years for local shopping and running errands, plus a few long distance (1,000 mile) self supported touring - and some racing including a west coast race during one of the tours (did well).

These bikes are fast but the spandex does not provided adequate crash protection. I lost some skin on an arm. There are other materials (Coro-Plast) but most of these materials will not allow fine control over aerodynamic shape.

I met two German lads on one of my trips to Europe who were exploring the use of light weight foam for streamlined shells. One look and I knew this was an ideal material. I eventually found a suitable material (Zote Foam) heat formable into smooth compound curves, can be ordered in any thickness, variety of densities and colors, and is sound deadening.

I built the **Orange Foam Shell.**

The shell weighs 6 pounds – composite shells often weigh 15 to 25 pounds, are noisy, requires expensive materials (carbon), lots of throw away construction materials, and uses toxic resins, plus are labor intensive to build.

I used this vehicle mainly for alternate transportation in my town and neighboring towns including through the winter equaling about 4,000 miles per year.

The patches on its sides are covering scars from years of use and going down (black ice at night, and a high speed crash). At no time did I get hurt, (no road rash etc) as the shell took the brunt of the fall. I used this vehicle for 10 years.

Then I built the **Vacuum Foam Shell - VFS.**

The shell was vacuum formed inside two female molds.
Http://www.recumbents.com/mars/pages/proj/tetz/VFS/projtetzVFS00intro.html

The shell is more aero and an all carbon bike inside makes a light streamliner, total vehicle weight 33 pounds (most composite streamliners weigh in at 50 pounds).

This vehicle flys !!! Quit pedaling in the 20 mph range and it coasts and coasts – a gleeful feeling (it's like you're getting something for nothing). It gives 45% increase in speed in comparison to a conventional up-right bike. **Coasting down a 2% grade gives 30 mph, and the potential of 75 mph down 6% grade - I brake at 65.**

I have had many riders ask are you hot in there (its one of the most often asked questions). I raise an arm straight up and show there is little or no sweat - meanwhile they glisten with sweat.

There is some cockpit air flowing thru various vents in the vehicle. Where it does get hot is on a long climb (the canopy can be flipped open for more air), but stopping for a traffic light can be brutal. Overall it's not a problem. First, you're in the shade. Just standing in the sun can be hot. Second, if you're moving along, say in the low 20s, you're not working very hard at all in comparison to an unfaired bike. Third, on even slight down grades you're coasting where the others are pedaling.

Speeds are higher up slight grades because the aero drag is lower - the power saved by the lower aero drag can be applied to climbing. Speeds up steep hills are of course slower due to the additional weight. But most often I get to the hill much earlier and a lot fresher. And even if I get passed, there is always that fast down hill on the other side or the flats where lots of time can be made up. Not much can keep up with this vehicle.

Heavy crosswinds can push the vehicle around a bit. Luckily here in the East truly high winds are rare. Overly correcting to minimize the wander often increases the wander. Micro handlebar adjustments will reduce wander.

Rollers disappear – the down grade speeds are so high that the momentum takes you way up the next roller with maybe only a couple of down shifts, crest the top and with light pedaling, pick up lots of speed on the down for the next up. **Thrilling !**

I have to admit I use this vehicle for thrills, not for hauling cargo (although it does have a luggage rack in the tail for two panniers). My heart rate climbs into the 80s just sitting in it - **Anticipation**! I relate this experience to flying a plane.

But all this performance talk is about competition. It shows the vehicles ability but little of this is important for transportation vehicles. A conventional bicycle is an extremely efficient vehicle but is weather and is seasonally limited. A shell gives both weather protection and extends the riding season thru most of the year. But there are consequences to using a streamliner. It takes more effort to design and build (can't buy one). It's a bit heavier and hard to get in / out. Getting the feet down at stops is a bit tense, and holding it up at a stop in a crosswind can be difficult.

Because road streamliners are more complex, they didn't catch on in a big way by the average HPV crowd. However I thoroughly enjoyed exploring them for possible efficient alternate transportation. They sure are good to have during the winter (and if you do go down). And the fun quotient is outstanding.