



## **Why Recumbents Need Fat Tires**

**by Zach Kaplan**

**[zakaplan@earthlink.net](mailto:zakaplan@earthlink.net)**

It is really foolish to use road bike width tires on a recumbent unless you are extremely light and riding on perfectly smooth roads free of grit and potholes. Skinny tires are used on UCI time trial bikes for one reason, aerodynamics. The large diameter front wheel is the farthest forward part of the bike and reducing the width of the tire cuts down the overall frontal area a significant amount. When fairings are illegal, cutting down on frontal area is the main way to go faster. The type of time trial bikes which set records are doing it on smooth velodromes so there is no reason to use a wider tire for handling or safety reasons. Some track tubulars are so thin they are only used for a few rides. Operating costs are no object for an hour record attempt time trial bike.

Over the road time trials tend to use somewhat wider tires for added comfort, protection, and control, though still relatively narrow as aerodynamics is still highly important, generally far more significant than rolling resistance which wider tires are known to reduce.

When I first got into recumbents I rode narrow 28mm cross section tires (actually considered wide by road bike standards). I used these because they were the narrowest 20" wired on tires I could find at the time. The reason for going narrow was primarily to save weight but also because of a general thought of "If its right for a road bike it must be right for a recumbent." I also figured being a light weight rider myself I didn't need the fat tire seen on the typical pot bellied recumbent rider of the time.

After extensive recumbent riding on tires from 19mm to 54mm width I have come to a fairly clear conclusion. For the average rider on average roads a recumbent needs wider tires than an upright road bike. The primary reason is because the recumbent rider can't deweight the bike for going over bumps and other road hazards. The recumbent rider also can't use upper body "English" nearly so much as an upright rider. In other words when a recumbent rider hits a big patch of gravel or sand on the road or accidentally rides onto the dirt edge of the road the probability of almost instantly going down is fairly great (if using road bike width tires). The road bike rider on the other hand has both more reaction time due to higher center of gravity and can move upper body side to side and for and aft in relation to the bike to a much greater degree and stands a much greater chance of averting this type of accident even though the tires may be only 20mm wide. Another reason wider tires are more important on a recumbent than an upright is generally the recumbent rider has less of a view of the road directly in front of the bike, thus it is more difficult to avoid running over road hazards. This is even more so on faired recumbents both due to forward vision obstruction of the fairing and the generally higher speeds faired recumbents operate at. Recumbents tend to have smaller diameter front wheels which go deeper into potholes, another reason to put wider tires on them, particularly if they are heavily loaded front wheels on SWBs which experience far higher impact loading than the full size front wheel of a road bike.

The primary disadvantage of wider tires, aerodynamic drag, is less of a factor on recumbents. This is because the front recumbent wheel is generally significantly smaller in diameter than the front wheel on a road bike. Additionally SWB recumbents have the front wheel set back from the front of the bike in an already turbulent zone behind the rotating pedals. With a reasonably low seat much of the rear wheel of a recumbent is drafting the rider. On a fully faired recumbent 50% or more of both wheels are fully enclosed and contribute little to the overall frontal area.

The secondary disadvantage of wider tires is greater weight. On bikes used for solo riding (the way most transportation cyclists use their bikes) the importance of light weight is greatly over rated. Even on a hilly course adding a kilogram to the weight of the wheels is not going to slow the rider down by much. Weight, particularly rotating weight, comes into play more in pack riding such as criterium or road racing when the riders are trying to follow each other very closely for aerodynamic reasons and thus need to make frequent adjustments to their speeds to maintain the correct following distance.

My findings on real roads (rough and hilly) have been I am overall faster with wider tires than narrower tires. I am able to descend significantly faster on an appropriately inflated wide tire because of the greater flotation it offers on rough sections and when going over the inevitable road debris. The wider tire can be operated at a lower pressure without risking pinch punctures or rim damage. Doing so while slightly increasing the rolling resistance actually increases overall average speed on typical roads because high frequency vibrations are filtered out reducing fatigue on the rider. A less fatigued rider is a more efficient rider. In addition the lower pressures reduce the amount the bike is accelerated vertically going over bumps which saves energy. While the tire sidewalls have some hysteresis they are overall fairly efficient and absorb relatively little energy. The need to operate tires at maximum pressure for maximum efficiency is another myth (on

anything other than smooth velodromes).

As one continues to look at the true meaning of average speed additional time savings of wider tires become evident through a reduction in time spent by the side of the road repairing punctures and reduced time spent in hospital emergency rooms. There are considerable financial advantages to ranging from less frequent tire replacements (both from normal wear and road hazard damage), reduced rim replacements from roadside hazards, and reduced ambulance and hospital costs.