

Sofrider V2 – A Bike Transformed by Systems Thinking

A Technical Summary by Doug Burton



“Systems Thinking” in product development is all too rare, and it is a hallmark of true break-through products. It is a process that assures all design modifications are directed to improve the performance of an entire product as a whole, to satisfy the customer on all levels, rather than upgrading one or two subsystems, increasing performance in one area at the expense of another.

The bikes offered by Cruzbike, Inc. are unique products developed in a unique way. A foundation of John Tolhurst’s development approach has been to involve the customer in the product development process as deeply as possible. One tool that has made this possible is the offering of the Cruzbike Kit. Kit customers built Cruzbikes using many different donor-bike “platforms”, and it’s apparent that John has listened very carefully to his kit builders to learn what worked and what didn’t. In effect, he built a 30+ member “virtual R&D” department, probably one of the largest bike development teams in existence!

Applying John’s design talent and Systems Thinking approach to the wealth of information provided by customers, Cruzbike’s latest offering is the Sofrider V2, an upgraded version of the first commercially-available all-up Cruzbike. While anyone

could be forgiven for thinking that this is just the original Sofrider with an additional chainring and derailleur, the truth is that there is almost no component that hasn't been tweaked, moved, replaced or upgraded.

V2 Drivetrain

Perhaps the most obvious change to the Sofrider is the adoption of a front derailleur and double chainring crankset, replacing the original 8-Speed cruiser gearing found on the initial version. But there's more to it...



The V2 replaces the original Shimano Alivio and Revoshift parts with a set of carefully-chosen components aimed at honing the bike for its new “sports-touring” role. The “lower” derailleur is SRAM X7, shifted by SRAM X5 1:1 shifters, on a very nicely-made SunRace wide-ratio M60 11/32 tooth cassette. Where the V1 used a “granny gear” cogset, the gearing on the V2 is evenly-spaced across the range, and the right ratio always seems to be available. The “upper” derailleur is a Microshift FD42, a rigid and precise mech chosen by several respected recumbent manufacturers for its predictable performance and compatibility with 1:1 cable pull ratios. The single-ring 44t/152mm crankset has been replaced by a Truvative 53/39t road double crankset, with 170mm crank arms, turning a square-taper bottom bracket. The resulting gain-ratio range is 2.3 to 9.0, with a typical road crankset drop on the chainring downshift.



Gear chart using Gain Ratios

For 26 X 1.5 / 38-559 / MTB tire with 170 mm cranks

	53	35.9 %	39
11	9.0		6.6
18.2 %			
13	7.6		5.6
15.4 %			
15	6.6		4.8
20.0 %			
18	5.5		4.0
16.7 %			
21	4.7		3.5
14.3 %			
24	4.1		3.0
16.7 %			
28	3.5		2.6
14.3 %			
32	3.1		2.3

Gear Chart generated by “Sheldon Brown’s Gear Calculator”, <http://sheldonbrown.com/gears/>

The drivetrain now connects to the road through upgraded hubs laced to Weinmann rims, carrying 100psi 559 x 1.5 Kenda Kwest tires, providing a noticeable improvement in rolling resistance at a very small cost in “plushness” over the previously-used 65psi tires. The tire firmness is what an experienced recumbent rider would expect, while the full suspension soaks up larger, low-frequency inputs.

The result is a sure-footed drivetrain/tire combination that’s at home eating up long distance pavement, while not being afraid of less-than-optimal chipseal or a commuter shortcut through the grass or across the cobblestones.

V2 Frame Refinements

At first glance, the V2 frame looks like the original Sofrider “Y-Frame”-based MTB part. Closer inspection reveals the only part that wasn’t changed was the head tube.



The most significant changes are found in the design of the rear swing arm. The V2 part adds 2 inches to the wheelbase, and provides 100mm hub spacing, eliminating the previously-required 135mm axle and spacers. Quick release axles are provided front and rear.



The main frame has had its top tube lowered one inch, and the down tube has acquired a gentle forward curve. Since the top tube length has not been changed, the effect of these frame changes has been to place the rider slightly farther forward and closer to the ground. This makes handling the bike at a stop more comfortable, and adds to rider confidence getting underway on an uphill start. Also, the additional effective top tube length makes adjusting the seat back to a shallower angle easier. The longer wheelbase combats the tendency of FWD bikes toward wheelspin on very loose or slick surfaces, achieving parity with rear-drive bikes in all but the very worst conditions.

V2 Other Changes

A key to an efficient Moving Bottom Bracket (“MBB”) recumbent design is a rigid front fork/steering assembly. In reality, the whole bike is the front end, while everything else just keeps the rider off the ground.



The V2 benefits from improved rigidity through the adoption of a chromoly steering tube and a strong, fixed-angle stem, replacing the extended aluminum fork steerer tube and adjustable stem used for the original Sofrider. The additional rigidity translates into a noticeable improvement in arm input to the pedals under climbing or sprinting loads.



The original resin and aluminum brake levers have been replaced with very nice Tektro units, and changes in cable routing have made braking a “right now” experience. Hand feel and response time are improved.

V2 Riding

Moving from a V1 to a V2, the change in ride feel is surprising. The lower seat makes the bike very comfortable at a stop, and starting off in a straight line is effortless and natural. The longer crank arms give the drivetrain an “open” feel, with the added leverage from the crank arm length matching the arm input through the wide bars very well. The bike feels “all of a piece” and corners “on rails” due to the slightly lower center of gravity. The high-pressure tires and upgraded hubs result in a swift roll-down performance, while the 1.5 inch tire width gives a sure-footed and stable feel on all surfaces, even pea gravel and soft sod. The drivetrain improvements make any terrain accessible. To watch the V2 in action, take this link:

<http://www.youtube.com/watch?v=drewBVVowUQ>

All in all, the Sofrider V2 is a triumph of listening to the customer, holistic “systems” development, and enlightened tweaking. At US \$1175.00, it’s an effective challenger to bikes costing hundreds more, and offers MBB front-wheel-drive not available anywhere else.