

Chub Wheel Goods, by The Hive:

The Chub brand represents a rapidly expanding line of fully serviceable hubs and wheels. The defining feature of Chub brand products are hubs with oversized carbon shells bonded to giant flanges. This document will serve to highlight the features and technical advantages of Chub hubs.

Chub brand wheel goods are brought to you by The Hive.

The Chub Origin:

The Chub Hub concept originated with the Chub Fixed, a rear track hub originally developed by Joe Graney. Joe came up with the Chub concept by using basic engineering principles to answer the question “how can you build a stronger wheel by varying the geometry and composition of the hub?” The answer is by increasing flange diameter, and dramatically increasing the torsional stiffness of the hub shell. This document will elaborate on and explain this answer.

The Original, the Chub Fixed:

The Chub Fixed is made up of two oversized aluminum flanges bonded to a massive carbon shell. It rolls on sealed cartridge bearings and employs an alloy 15mm thru axle, bolted to the frame by custom Ti or Stainless M10 bolts. As compared to a typical high flange fixed-gear hub using the same spoke count, rim and build method, The Chub Fixed decreases peak spoke stress under pedaling loads by a staggering 70%! Reducing peak spoke stress means your wheels wind up less, accelerate faster, and generally won't blow up.

Reducing spoke stress allows you to build stronger, lighter, more durable wheels, no matter what your end goal may be. Use fewer, lighter spokes to build a durable yet lightweight wheel. Use thirty-two heavier spokes to build the ultimate bombproof wheel. The Chub advantage or Chubvantage™ gives you that flexibility.

Technical Details – How does the Chub build stronger wheels?

Reason No. 1: (Shell) Size Matters

Our testing shows that shell size is a critical factor in designing a high performance rear hub. Shell size determines how efficiently pedaling forces are transmitted from the drive side to the non-drive side, and efficient transfer of power between the flanges allows the non-drive side to benefit from the advantages of using a larger flange.

Conversely, on Chub hubs designed for disc brakes, braking loads are efficiently shared between the spokes on both flanges. Instantaneous brake loads can reach several times the magnitude of pedaling loads when the brakes are first applied, so distributing these extreme impulses between both hub flanges mean that all of the spokes in the wheel are applying this force to the rim, not just the disc side spokes.

Getting back to pedaling loads, on a wheel with a standard (i.e., small) shell diameter, the non-drive side flange and spokes are pretty much just along for the ride. Normal hub shell

diameters result in 95% of the drive torque being transmitted to the drive side spokes. That's why it's ok to lace a rear wheel radially on the non-drive side when using a small diameter hub shell: the spokes aren't pulling, so they might as well be short and look cool.

While no one suggests lacing disc front hub radially on the non-disc side, the same logic applies – most of the braking force is going through the disc side spokes.

Uneven distribution of force between the flanges and throughout the wheel can lead to inefficient acceleration or deceleration and premature wheel failure. For pedaling loads, the drive side flange must bear almost all of the drive torque, with the associated spokes carrying almost all of the spoke stress. As a result, most wheels are overbuilt on the drive side (or prone to failure), because the drive side does all the work.

Some have attempted to solve this problem by using larger flanges on the non-drive side. Our careful analysis revealed that with a typical shell diameter, increasing the size of the non-drive flange does nothing to increase torque transfer between the flanges because each twists relative to the other under load.

Others have attempted to solve the problem by using different lacing patterns, such as radial lacing on the drive side and two-cross on the non-drive side. This approach makes no sense to us, since (among other reasons) a wheel built this way will still have nearly all of the torque coming from the drive side, yet the drive spokes are laced in a way that makes them less capable of handling drive forces. (If this were a thesis instead of a white paper, we would talk about spoke tension variation and how terrible it is with radial lacing....)

Chub hubs provide an elegant solution to the problems described – they are designed to more evenly distribute driving and braking loads between the spokes on both flanges of the hub. In the case of the Chub Fixed, driving torque is distributed 55% drive side/ 45% non drive side, as compared to 95/5 for a tradition high flange track hub!

Through our meticulous analysis and testing, we discovered that a hub's torsional stiffness is the key to distributing torque to the non-drive side. Increasing shell size while reducing wall thickness and using superior shell material is the best way to increase torsional stiffness without adding weight. The result is a hub that more efficiently transfers pedal force from the drive side to the non-drive side, increasing wheel strength by reducing spoke stress.

Reason No. 2: Big Flanges = Decreased Spoke Force and Less Hub Windup

Larger hub flanges give the spokes, when laced tangentially, a larger lever arm to apply force to the rim. Since $\text{Torque} = \text{Force} \times \text{Lever Arm}$, *for a given amount of torque*, as the lever arm increases the amount of force decreases. For our purposes, hub torque depends on the amount of force applied by the chain or brakes, and force is applied from the hub to the rim via the spokes. Less force on the spokes results in less hub wind-up - the amount the hub twists relative to the rest of the wheel when torque is applied. Wind-up causes hesitation and puts additional stress on the spokes. All else being equal, a wheel built around a Chub will have less

wind-up than a wheel built with a typical hub, meaning less hesitation and less spoke stress. Less hesitation means you accelerate faster, and less spoke stress means you get a stronger wheel for a given number and gauge of spokes.

Reason No. 3: Big Flanges = Better Spoke Triangulation

In addition to decreasing wind up, big flanges have the benefit of increasing triangulation of spokes across the wheel (also known as dish). That is to say there is a bigger angle between the rim and the spoke when viewed in cross section. For a given number and gauge of spokes in a wheel build, better triangulation builds a laterally stiffer wheel. Laterally stiff wheels track straighter and wander less under cornering loads. Wheels built with Chub hubs add precision to the handling of your bike.

Reason No. 4: Big Axle = Increased Stiffness and Durability

The Chub Fixed and SS hubs use oversized 15mm aluminum axles securely attached to your frame with 10mm hex bolts. As compared to hubs with standard axles, the Chub will minimize frame flex from big pedaling efforts and braking loads, increasing acceleration and frame life. In addition, the oversized axle requires larger diameter bearing cartridges, which will last longer since the rider's weight is spread over a larger area.

Chub hubs all roll on super-precision Japanese cartridge bearings. Although they're more expensive than your run of the mill bearing, these bearings are consistent and smooth. We are actively testing bearings for all of our hub applications, to verify that our bearings meet our exacting standards.

Spreading the Love:

Starting with the Chub Fixed, we at The Hive are taking the Chub concept and systematically applying it to a full range of hubs. We've already started with singlespeed mountain hubs (the Chub SS) and a variety of front hubs with geared mountain hubs on the way. We are sticking to a simple formula for the design of each and every hub: bond alloy flanges to a carbon center tube, use oversize flanges where it adds a technical benefit, and don't skimp on quality components, manufacturing processes or finishing. This ensures that every Chub product will provide years of trouble free riding pleasure.