

Carbon Tubular Shootout



The Carbon Tubular - When high-end just isn't good enough

It has been said that most top pros ride tubular wheels and tires. The only ones that ride clinchers are the ones who are getting paid by sponsors to ride clinchers. However most consumers on the other hand ride clinchers. When you buy a bike, no matter the cost, it will come with clincher wheels and tires. Why such a gap? What benefits do tubulars offer the enthusiast? What are the downsides? This article will attempt to demystify the tubular, more specifically, the carbon tubular.

What is the big deal ?

Well carbon tubulars are better than clinchers. Tubulars (wheels and tires combined) are lighter, handle better, are more comfortable. And with the advent of deep profile carbon wheels, tubulars are more aerodynamic and thus faster. They also pinch-flat less often. So if they're so good, then how come no production bike comes with tubulars? Well like most things in life, tubulars come with very significant downsides. Carbon tubulars are very expensive, often costing as much as a decent bike. Also, tubular tires can be difficult to mount and changing flat tires on the road is inconvenient.

So what about you ?

In a recent poll I roadbikereview, we found:

Do you use tubular tires ?

No, not interested at all. 44 %
No, but I'd like to learn more and try them. 29 %
Yes, but only in races. 14 %
Yes, all the time. 13 %

A very small percentage, 13% use tubulars everyday. A slightly bigger group uses them on race day only where the money investment is preserved for special events and there is either flat tire support or it spells a DNF in the race anyway.

Interesting that 29% want to learn more about it. Roadbikereview will attempt to demystify the carbon tubular and help you determine if it has a place in your cycling stable.

What is a tubular ?

There are two types of tires/wheels used in bicycles today - tubular and clincher. Sew-up is another term for tubular and refers to the process of repairing a flat tire where the rider needs to cut the tire to get to the tube and sew the tire back up. If you don't know what type of tire you have on your bike, it is a clincher tire. Virtually 100% of all production bikes are shipped with clincher tires and wheels. Tubular tires are only compatible with tubular wheels and clincher tires with clincher wheels.



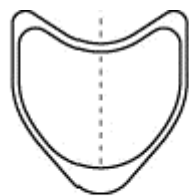
Tubular Tire



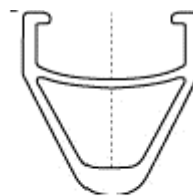
Clincher Tire

Tubular tires look just like a regular clincher tire from afar, but the differences are dramatic in the internal construction. A clincher tire looks much like a car tire off of its rim, in that it is made up of two beads that are formed around a wire hoop or a kevlar strand. These two beads are the foundation for the casing of the tire upon which a tread has been bonded (usually black tread on a brown casing). The two beads rest inside a deep groove at the center of a wheel's rim. The edges of today's grooves have a special seating or "hook" to aid in holding the bead of the tire in place at high pressure. The hook is a recent addition to the straight walls of rims of years past. Clincher tires thus use a separate tube to hold air and rim tape to protect the tube from the rim spoke holes. Clincher tires when inflated exert a lot of force outwards on the rims and thus need very strong sidewalls to hold the tire in.

A tubular tire includes a tube inside the tire and holds air by itself, even while not attached to the wheel. A tubular tire or tire has an inner tube inside of a casing that has a tread bonded to it also. Instead of having two beads that hook into a rim, the tubular tire has both edges of the casing sewn together to form a continuous donut like shape that houses the inner tube. The thread that has been sewn to hold together the casing edges are about as thick as dental floss and are stitched into the casing about every eighth inch. Covering the threads is a glued down base tape to prevent foreign matter from getting into the casing and puncturing the inner tube.



Tubular Rim



Clincher Rim

The rim for a tubular tire has a groove in it but this groove is only about one eighth of an inch deep. How does the tire stay seated on the rim? It is glued on with special contact cement. The rim hooks are shown above on the clincher rim on the right.

A little history

In the beginning, there were solid rubber tires. John Dunlop developed the first pneumatic tire and Edouard Michelin developed the first tire attached to the rim by clamps. This led to the clincher tire design. Shortly after that, tubular wheels were invented and dominated the scene since they handled better and could take higher pressures.

Things remained relatively unchanged until the 1980s when Michelin made significant advances to clincher technology. Rims were developed that were lighter and could

take higher pressures. The performance gap between clinchers and tubulars was closed and clinchers dominated the production world because of ease of mounting and ease of fixing flat tires. Then kevlar beaded clincher tires were introduced. This made clincher tires lighter and closed the weight gap with tubulars.

Enter carbon fiber. The magic material of cycling has revolutionized the world of tubular wheels. Carbon fiber turns out to be perfect for tubular rims. They are incredibly light and strong. They ride comfortably and there are many options in rim depth for aerodynamic performance. The lack of a rim bead is ideal for carbon fiber and makes ultralight rims possible. The advances in carbon fiber technology have again fueled the interest in tubular wheels. Plus there seem to be more developments to come in the near future.

Tubular Advantages:	Tubular Disadvantages:
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- Lighter. Up to 1 lb. lighter than a clincher wheelset.
- Handle better or corner than clinchers
- Carbon Aero wheels are faster
- More comfortable ride
- less prone to pinch flats
- Can handle higher pressures. Up to 220 psi.

- Higher cost both in initial investment and incremental cost of flat tires.
- Fixing Flat tires on the road is inconvenient.
- Mounting tubulars is more difficult
- carbon tubulars don't brake as well as clinchers
- carbon tubulars are not good for wet weather riding

Advantages :

Lighter

Carbon tubulars are lighter than clinchers. An ultralight clincher wheelset will weigh about 1700 grams (1300 gram American Classic wheels, 300 gram Continental Supersonic tires and 100 grams for light tubes and rim tape). An ultralight carbon tubular wheelset will weigh about 1300 grams (1000 grams for the American Carbon tubulars and 300 grams for Tufo Jet Elite tires). Tubular tires have no penalty in weight from beads made of wire or kevlar since they are one continuous tube in a hoop. The rims used for tubular tires are also lighter by virtue of design. The cross section of a tubular tire rim is a box shape with walls that can be made very thin as opposed to the clincher rim cross section that needs to be made much thicker to be strong enough for the loads imposed by the clincher tire. A tubular set of wheels will accelerate and climb hills with less effort than a set of clincher wheels.

Handle Better

Tubular tires have a rounder profile than clincher tires. This leads to a more consistent, more predictable cornering behavior. Tubular tires also seem to deliver a better feel for the road surface. This translates to better handling as well.

Carbon Aero Wheels are faster

Aerodynamic wheels are wheels with a deep rim. The rim can be 40mm wide, 60mm or even take up the entire body of the wheel. Carbon tubulars happen to be the perfect material for aero wheels. The wheels are much lighter and the ride more comfortable than aluminum aero wheels. Aero wheels are faster on almost every situation compared to non-aero wheels. The downside of aero wheels is they are a bit heavier and can be difficult to handle in high wind conditions.

More comfortable ride

Tubular tires have a wide surface glued on to the rim. Stress and shock are more evenly spread on it's structure than on a clincher tire. This is the primary reason why tubulars offer a more comfortable ride than clinchers.. Also, the materials used to make tubular tires the ride are very smooth and resilient. Most tubular tires use a very thin tube. Often latex is used to save weight. The thin tube is then combined with a rubberized casing made of high quality cotton or even better than that, silk.

Also, carbon tubular wheels absorb more shock than aluminum clincher wheels. The shock absorbing qualities of carbon fiber take effect as well on carbon rims as it absorbs vibrations and some road shock. The smooth ride of carbon rims is more pronounced on shallow profile rims.

Less Pinch Flats

Pinch Flats are caused by the road or a rock pinching the tube against the two high spots of the rim that hook onto a clincher tire. Tubular rims don't have very pronounced high spots like clinchers thus they are less prone to pinch flats. Carbon rims also avoid pinch flats as the carbon fiber absorbs some of the shock of pinched tires.

Can handle higher pressures

Tubulars can handle up to 220lbs compared to clinchers at 160 lbs. Tubulars can handle higher pressures since tire can be constructed to handle the pressure by itself. Clinchers have to exert outward pressure onto a rim to achieve high pressure. The high pressure of tubulars can be useful on extremely smooth road courses and track (velodrome) applications.

Disadvantages :

Higher cost

Carbon tubulars are expensive. All the wheels tested in this shootout cost \$1000/pair or more just for the wheels. In addition, the tires cost about \$70-\$130 each and it is normal to throw them away after one flat.

Fixing Flat tires on the road is inconvenient

The most significant downside is maintenance aka flat tires. When you get a tubular flat tire on the open road it is not possible to change or patch the tube. Thus, you have to carry a tubular tire and replace the entire tire. This process doesn't take very long once mastered but gluing is not an option while on the road and you usually have to ride conservatively back home. Note: there is a new option called Tufo gluing tape that now makes it possible to glue tires on the road.

Mounting tires is more difficult

Installing a clincher tire can be learned and performed in minutes. Installing a tubular tire takes hours to perform and even longer to master. Tubular tires have to be glued properly and tubular tires have to be centered by hand since they sit freely on the rim. This process normally takes hours to complete and it takes a bit of experience to mount a tire firmly and well-centered. And most important, an improperly glued tubular tire can roll off the rim during heavy cornering. This can result in a serious crash .

Carbon tubulars don't brake as well

Aluminum rims sometimes sport a machined or grooved surface that is ideal for braking. There are many different brake pad compounds too available for different situations. Braking with a carbon tubular is not as good since the surface is often not optimized for braking. The brake pad for carbon tubulars is mostly cork. It works well but not better than normal pads. Also, the lightest carbon tubulars don't have the stiffest braking sidewalls. This can result in a braking action that seems to pulsate as the pads hit the stiff and the soft parts of the braking surface.

Carbon tubulars are not ideal for the rain

Another downside of carbon tubulars is they don't do very well in the rain. All the water and grit kicked into the braking surface can be very damaging to carbon fiber rims. Braking suffers significantly as well.

Summary :

With the advantages and disadvantages, it is easy to understand why top pros use carbon tubulars and consumers use clinchers. Carbon tubulars are lighter and faster and give the competitive advantage. The major disadvantage of cost is covered by the team and sponsors. The mounting is taken care of by the team and finally, flat tires are handled by the team car following the rider. For the consumer on the other hand, anyone of these issues can be a deal-breaker. However, some of these objections are overcome on a 'race-day' set of wheels. Many consumers are now opting for carbon tubulars to squeeze out the last bit of performance for racing use only.