

ROAD BIKE COMPONENTS OVERVIEW

Road Cycling Technology

Road cycling has its traditions and purists like any other sport. There could be a contest between Major League Baseball and the cycling world to see which sport has the most purists per thousand fans and athletes. In road cycling, index shifting, and now electronic shifting, disc brakes and carbon fiber frames and wheels have had detractors over the last twenty-five years. Now it seems that technology is accelerating within road cycling. SRAM has introduced a 1x front chainring; that replaces the double chainring with a single chainring. Garmin has added the Varia Bike Lights and Rearview radar. Garmin also upgraded its Edge 520 bike computer to include Functional Threshold Power (FTP) and VO₂ maximum calculations and Shimano DI2 integration.

SRAM's 1x ('One By') is a single front chainring with 48 or 50 teeth and 11-32 or 11-36 rear cassettes. This gives the 1x11 gear setup a similar range of gear inches to a 2x11 gear setup, but the gear ratios are fewer. This means that the mechanical advantage is nearly the same, but there is a limit on the top speed of the bike. This also gives the rider a wider step between gears, making it harder to maintain cadence with gear shifting. SRAM alternates the chainring teeth between narrow and wide to help keep the chain from derailing. And the rear derailleur provides extra tension on the chain to prevent derailing also. The 11-speed rear cassette pushed the triple chainring to the fringe, will the simplicity of the 1x create an equal standing with the double chainring?

My wife is concerned about my bike riding. Whenever there is a bike accident printed in the local newspaper, I get to hear about it. Invariably, the cyclist is riding at night in a high traffic area without lights, or a helmet, typically. Garmin has introduced a system that addresses night riding. Varia Smart Bike Lights include a headlight, taillight and a combination of both

headlight and taillight. The lights are tied to the Garmin Edge 1000 and 520 bike computers to supply speed data to the lights. Based on the cyclist's speed, the headlight will shine brighter and therefore further down the road. The headlights and taillights will get brighter as the darkness grows based on the input from the Edge 1000 which has light sensing capability. This system is a far cry from the lights from my high school days with the generator that ran off of my rear tire and slowed my bicycle down. Garmin Varia Headlight is \$199.99, the taillight is \$69.99, and the combination of both is \$299.99.

Garmin also introduced the Varia Rearview Radar system. The radar detects approaching vehicles from behind up to 153 yards (140 meters) away. As the vehicle gets closer, the tail light gets brighter and flashes. The rear unit has the radar and light system included. The separate head unit or the Garmin Edge 1000, 520 and 25 will display how many vehicles are being tracked behind you and how far they are. It also will detect cyclists behind you as well. Garmin quotes a study by the League of American Bicyclists about how getting hit from behind is the leading cause of cycling fatalities in the United States. However, I have seen other statistics stating that 3.9% of bike - car collisions are from behind. This light will do nothing for the 'right cross' or 'left cross.'

Garmin upgraded the Edge 520 bike computer with features found in the top of the line Edge 1000. For \$300, the Edge 520 will compute your VO2 Max by using your power output and heart rate and riding at 70% of your maximum heart rate for 20 minutes. The Edge 520 will compute your FTP as well for you. To have these bits of data without visiting a cycling lab is a significant benefit to cyclist's training. If you have Garmin Vector pedals, the 520 will analyze your pedal stroke.

It took years to perfect the front and rear derailleurs. Steel was the main bike frame material for decades. Friction shifters were the only way to shift gears for years before that a cyclist had to remove and switch the rear wheels around to shift gears early in the last century. Now frame and component materials change within years, the amount of data available is steadily increasing, and the selection of road bike types is expanding faster than the flavors of Coca-Cola. In the not too distant future, cyclists may be able to have instant analysis on the road.

Mechanical Doping: Pro Cycling in the News Again

It has been 11 years since Lance Armstrong stood on the podium in the Tour de France. In 2016, the news is filled with new accusations of cheating in pro cycling. This time the International Cycling Union (UCI), the governing body of pro cycling, accused Belgian cyclo-cross rider Femke Van den Driessche of technological fraud at the 2016 UCI Cyclo-cross World Championships in Heusden-Zolder, Belgium.

The UCI used an application installed on a tablet to scan the bicycle.

Previously, the UCI had to ask the team mechanics to disassemble the bikes to help them inspect them. The technological fraud is a confirmed case of mechanical doping that has been rumored for years on the pro circuit. Mechanical doping is adding a small electric motor powered by a battery to the bike that will help the cyclist by providing power to the crankshaft.

Currently, one Austrian company, vivax drive GmbH & Co KG, is selling the vivax Assist, an E-Bike System. It has an electric motor installed in the seat post of a bicycle that connects to the crankshaft with gears in the bottom bracket of the bike. The battery is hidden in a saddle bag or water bottle and will last up to 60, or 90 minutes, depending on which battery you buy. This device supplies 200 watts to the crankshaft. The pedals will keep turning, yet the cyclist does not have actually to pedal to sustain 17 to 20 miles per hour on a flat road. Or provide enough power to motor up an incline of 4 to 6% easily. The company claims that the device will help cyclists keep up on group rides where the other cyclists are stronger, thus keeping group rides together.



This line of marketing does not explain the hidden motor, battery or the small button to start and stop the motor installed on the end of the handlebar. And selling this device at \$3,000 makes it tough for a weekend cyclist to buy one just to stay with the Saturday group ride.

At this point, the UCI rules call for a minimum 6-month suspension and a fine of 20,000 to 200,000 Swiss francs (or \$19,700 to \$197,000). Cycling great Eddy Merckx said in a press conference on February 2 that cyclists caught using motorized bicycles should be banned for life.

Through fifteen years of various cheating schemes in pro cycling, it is time for the UCI, sponsors and cycling TV networks get serious about penalizing cyclists and teams that cheat. The conversation around pro cycling has revolved around cheating and not on top cyclists or pro teams for too long. The number of fans that watch races on TV cannot expand if the cheating is at the center of the sport.

A Different Road Bicycle for Everyday

Five years ago when I bought my Trek Madone 6.5 via the Project One program, I could choose between the Madone road bike and the Speed Concept Triathlon/Time Trial bike models for road bikes. Today, most major bicycle manufacturer has four major types of road bicycles to choose from; Race, Aerodynamic, Endurance and Triathlon/Time Trial. A cyclist buying a new bike is faced with a range of bikes, features, and capabilities that they have to sift through to make a decision. The specialized roles that

each of these bicycles fill has an effect on the pro tour. Alberto Contador of Tinkoff-Saxo Bank changed bikes during the Giro d'Italia and the Tour de France, switching to a lighter race bike for climbing. Will it become normal to see many pro cyclists swapping bikes during Grand Tour stages depending on road conditions or the upcoming route elevation? Below is a chart of what bike industry marketing professionals have given us.

Manufacturer	Road Bike Types, 2015			
	Race	Aero	Endurance	Triathlon/TT
Giant	TCR Advanced	Propel Advanced	Defy Advanced	Trinity Advanced
Specialized	Tarmac, Allez	Venge	Roubaix, Diverge	Shiv
Cannondale	Supersix EVO, CAAD12	Supersix EVO Hi- MOD	Synapse Carbon, Synapse	Slice
Trek	Emonda	Madone	Domane	Speed Concept
Felt	AR Series	F Series	Z Series	IA, DA, B, S Series

With any industry or sport, the success of any competitor is quickly copied by every other competitor. The marketing staffs have unleashed the engineering staffs at many of the bicycle manufacturers to design and produce bicycles with specific roles and price points.

Race bicycles are typically lightweight carbon fiber, or aluminum, bicycles that are at, or just below, the Union Cycliste Internationale (UCI), the weight limit of 6.8kg (14.99lb). The UCI is the governing body for cycling sports. Trek introduced the Emonda that can be configured to weigh 4.5 kg (10 lbs). Trek says that the Emonda is the lightest production bike today. Manufacturers develop the lightest frames that are safe to ride to reduce weight, whether carbon fiber, or aluminum, and carbon fiber components throughout the bike, like handlebars, saddles, and wheels.

Aerodynamic bicycles have teardrop shaped tubes to allow them to pass through the air more efficiently. Traditional cylindrical tubes do not move through the air as well as teardrop shaped tubes. Since their introduction a few years ago, these bicycles are slightly heavier than race bikes and can have harsher rides, due to the shapes used. The shaped tubes are not as

compliant as cylindrical tubes, so these formed tubes will transmit road buzz more. Manufacturers are trying to design more comfort into these types of bikes.

Endurance bicycles, or comfort bikes, are designed for longer rides with more compliance built into the frame. They provide softer rides to the cyclists. Bike shops will bring this option up if the shopping cyclist is 1) not competing in criteriums, or crits and 2) express discomfort with the harsh rides of the aero bicycles. Some of the bicycles have the latest technology for road bicycles, disc brakes. Disc brakes have better stopping power in the rain and give the cyclist a better feel while braking. Everyone who has used disc brakes in my LBS gush over the second advantage, all of them saying the touch that you have is great.

Triathlon or Time Trial bicycles are the only road bike type that has largely remained the same over the last few years. They are still at the top end of prices, and because of the cyclist positioning and the fact that steering these bikes through a technical course, their numbers are limited. Except on the Pacific Coast Highway between Los Angeles and Camarillo, which can be as many as 30% of riders on the weekend, from my observation. This is due to the sea breeze that runs west to east, primarily a steady headwind for cyclists heading away from LA.

For the average shopper cyclist, facing a wall of road bicycle choices puts a burden on the customer. You have to know what type of riding and the expected routes that you will be possibly using over the next few months, or years. Buying road bikes over the Internet could be impossible with these many choices. The experienced staff at an LBS would help any prospective buyer to make the right choice. After choosing the bike frame, then you have to pick your components. One day very soon, the experience of shopping for a road bicycle may rival the experience we endure at the local car dealership.

Road Bike Pedals

When I was younger, the only bike pedals available were the flat or platform pedals. Riding a bike was simple, get on and start pedaling. You come to a stop, you step off the pedal and stand on the ground. I did this for decades. Until my first ride on clipless pedals. I came to a stop, I tried to slide my right foot off of the pedal like always. But my foot wouldn't move. In that motionless moment, I thought to myself that this is going to hurt. Luckily I plopped over in the grass next to the road. Falling over with your feet stuck in your new clipless pedals happens to everyone within the first few rides. It's a rite of passage.

Clipless pedals

Clipless pedals are a big upgrade for a cyclist over platform pedals. They allow you to pull up on the pedal as well as push down. These pedals

effectively double your efficiency. You can engage your hamstrings, glutes, hip flexors and lower back muscles as well as your quadriceps. I found myself going 2 miles per hour faster the week I first put on my Speedplay pedals. Also, I can pedal with just my hamstrings which will give my quads a short rest.

The term “clipless” pedals is confusing since you have to clip into and out of these types of pedals. Before the mid-1980’s cyclists used toe clips or toe cages as an early attempt at increasing pedal efficiency. You secure your shoes into the toe clips with leather straps, and you may not be able to get them out in the event of a crash, making them more dangerous than clipless.

In 1984, the first successful clipless pedals by Look appeared based on the downhill ski binding concept. The cyclist clips in toe-first then steps on the pedal to complete the clip in. To release your foot, you simply turn the heel of your foot and at a preset angle the pedal will release. Or in the event of a crash or some other situation, your shoe can break free. I’ve been able to rip my shoe off of my pedal when I had to suddenly stop, without turning my foot to properly clip out. The dominant clipless pedal manufacturer, Shimano introduced its first clipless pedal in 1988, based on the Look design. Time, a French pedal manufacturer, introduced the



first clipless pedal with float the same year. Float allows your foot to move side to side slightly so that your leg is not locked in one position potentially hurting your knees. Pedal technology has largely remained the same with improvements with weight and durability over the years. Speedplay has produced an innovative design uses a double sided pedal that allows the rider to clip in on either side of the pedal. I have been riding with Speedplay pedals for over 10 years, and I love the fact that I can clip in on either side of the pedal, so I barely have to look at my pedal as I get going again.



Advantages of Clipless Pedals

With platform pedals, you can actually only engage your quadricep muscles pushing down on the pedals from the one o'clock position to six o'clock. By connecting your feet to the pedals, you can push and pull on the

pedals throughout the turn of the pedal. I think of it as turning circles with my feet rather than just pushing down on the pedals. You will use other muscles, including your hamstrings, gluteus maximus, hip flexors and lower back muscles. By using other large muscle groups, my quads are not as tired after long rides, even century rides.



Using clipless pedals, you can push the pedal over the top of the circle using your quads, by extending your legs in a kicking motion. On the downstroke, you push the pedal, again using your quads. Then near the bottom, at 5 o'clock you can pull back on the pedal, using a motion like scraping mud off of the bottom of your shoe. Then from 7 o'clock to about 11 o'clock you use a combination of your hamstrings, hip flexors, and abs to pull up on the pedal. Since your other leg is doing the opposite, the efforts support each other, making turning the cranks easier.

3 Things to Look for While Shopping for Clipless Pedals

When go look for a pair of clipless pedals, there are 3 things to consider,



float, compatibility and maintenance of the pedals. Float is the amount of freedom that your foot has while connected to the pedal. You can pivot your heel at a set amount of degrees before you clip out of the pedal. The float prevents your foot and leg being locked in only one position which could be bad for your knees. Each manufacturer has a different set angle of float, and many pedals can have the float adjusted. Compatibility with your bike shoes can be an issue. Shimano and it Shimano Pedaling Dynamics, or the SPD system, introduced in 1990, dominates pedal systems. Therefore most bike shoes are designed to be “SPD compatible” with three bolt holes in the sole to accommodate the SPD cleat. Other pedal systems may or may not need adapters to attach the cleat to the shoe. For example, Speedplay has a three-hole adapter plate to attach to the shoe and the cleat attaches to the adapter plate with 4 more pedals. Most people want to perform as little

maintenance as possible. Speedplay pedals require more maintenance than other pedals. The spindles need to be lubricated every 200 miles or so. (You don't need the special tool to lube Speedplay pedals, by the way, a baby medicine syringe will do just fine). Other pedals require annual maintenance.

Top 5 Road Bike Pedals

Pedal System	Cost	Float, degrees	Weight, g
Speedplay Zero	\$199	15	70 / 118 each with 3 hole adapter
Shimano Ultegra PD-6800 SPD-SL	\$129	3	280
Shimano Dura-Ace PD-9000 SPD-SL	\$189	1	250
Time Xpresso 8 Pro Pedal	\$249	5	100 each
Speedplay X5 Road	\$115	Free Float	212

Road clipless pedal cleats, unlike mountain bike cleats, are not recessed into the soles of the shoe. When walking around, you will clomp around like a shod horse. The cleats along with the smooth soles of your road shoes can be slippery, especially on hard wet surfaces. And walking around will wear down the cleats and sand, and dirt can clog up the cleats.

Road Bicycle Tires

Beyond your cycling skills and attention to various hazards on the road, your tires are an important part of your safety. Your tires resist punctures and blowouts, provide a part of your ride comfort and grip the road especially in turns. For some cyclists, tires are an afterthought, something bought on sale. Other cyclists study the tire thread counts and whether the tire has a single compound or double compound, or whether the tire color matches their bicycle.

Road bicycle tires come in three general groups, the clincher, tubular and tubeless. Clincher wheel rims have flanges on both sides of the wheel rim that hold the beads of the tire in place, with a separate enclosed inner tube between the tire and rim. Tubular tires are tires that completely enclose the inner tube, which sewn up inside the tire. Both are glued onto the wheel rim. Tubeless tires mount directly to the rim without an inner tube, much like car tires. Tubeless tires use tire sealant to keep the air in the tire.

All three types of tires have the same basic construction. They have two main elements; a nylon fabric coated with rubber. The fabric is where the thread count, or threads per inch ("TPI") comes from. The material is

layered within the rubber and gives the basic shape of the tire. The higher the TPI, the more flexible the tire is. The rubber coating provides the traction and protects the fabric. Manufacturers add different chemicals and compounds to the rubber to increase durability and traction, such as the Continental Grand Prix Black Chili tire. Dual compound tires have a hard rubber center strip for durability and softer strips along each side of the tire to help the traction of the tire in turns.

The vast majority of cyclists use clincher tires. In addition to the fabric and the rubber, clinchers have beads or hoops of Kevlar cords or steel cables that run along the edge of the tire. The beads fit into the flanges of the clincher wheels to set the tire in place. The beads are also the parts of the tire that cyclists wrestle with when trying to change a flat with tire levers. Clincher tires typically weigh more than tubular and tubeless tires. Clincher tires are vulnerable to pinch flats, where an underinflated tire hits a sharp edge, and the inner tube is pinched against the wheel rim. There are plenty of clincher tire choices at every bike shop and discount store. Some clinchers have a kevlar belt included with the tire fabric providing a level of puncture resistance. And there are colored tires available to allow the cyclist to match their bicycles if they wish.

Pro cyclists ride on tubular tires or 'tubs' in the United Kingdom. They are still the regular tires of the pro cycling tour and were the standard tire for all cyclists years ago. Because tubular tires have no beads, tubular tires are lighter than clincher tires. The tubular rim has no corresponding flange, so the wheel rim is lighter also. The tubular tire has an inner tube sewn inside the tire, and both are glued to the rim. One way to change a tubular flat is to replace the entire wheel, which is quickly done within the pro cycling tour with the team support car and mechanics. For the ordinary cyclist, this could mean either using a spare complete tubular tire placed on the rim replacing the flat or walking home. I met one cyclist with a tubular tire flat who did have to walk home. Pulling the flat tubular and replacing it with another tubular tire means that you have to go slow on the corners. The glue takes hours to set fully, and the tire could easily roll off of the rim in a corner before the glue sets. However, tubular tires are not vulnerable to one frequent cause of clincher tire flats, the pinch flat. Without an inner tube, the pinch flat is not possible.

Tubeless tires also eliminate the pinch flats since tubeless tires have no inner tubes and the sealant helps with small punctures. Therefore, tubeless tires will help cyclists who experience lots of punctures, either due to the adverse local road conditions or plant life (like the tribulus terrestris, or Goat Head, which produces spiked hard seeds that easily puncture bicycle tires). If the tubeless tire suffers a puncture, the cyclist can insert an inner tube, pump it up and head home and patch the tubeless tire there.

The major tire manufacturers, with their top tires, are:

- Continental, Grand Prix 4000S II
- Schwalbe, Durano S Raceguard
- Zipp, Tangente Course
- Specialized, S-Works Turbo
- Vittoria, Rubino Pro
- Michelin, Pro4
- Mavic, Yksion Grip Link
- Specialized, Roubaix Pro
- Bontrager, R3

Be sure to match the width of the tire with the width of the wheel. Years ago, 23 mm was the standard tire width with few alternatives. Today, in 2015, some pros, and many other cyclists, are riding 25 and 28 mm tires. These bigger tires offer a little more comfort on the road and reduced tire punctures and with aerodynamic wheels being introduced, the larger tires offer some aerodynamic savings. Also, make sure that your bicycle can accommodate the tire width increase.

Just like car tires, bike tires do not last forever. Be sure to check the inflation pressure of your tires at least once a week, if not before every ride. Tires do not hold air pressure. Air molecules, especially carbon dioxide from minipumps, can pass through the rubber compound of the tire. Check the tread of your tires often, based on how much riding you do in a week, or a month. Look for gashes, missing tread and worn out tread, especially the rear tire. The rear tire supports up to 60 percent of a cyclist's weight and force of pedaling goes through the rear wheel to the road. As the tires wear out, the tires will allow more foreign objects to pass through and puncture the tire. Tires endure more abuse from the road than any other bicycle component, and tires are a big factor of a cyclist's safety.

Colnago C60 Review

I test rode the Colnago C60 in Santa Monica. This demo ride was a part of my continuing search for a replacement of my Project One Trek Madone 6.5. I had read all of the glowing reviews of this bicycle and was eager to see if the reviews were a rewrite of Colnago marketing or real. After riding up and down Broadway and Santa Monica Boulevard, I can see that the C60 is an impressive ride. The C60 was quick, responsive and felt solid.



The carbon fiber Colnago C60 was introduced in 2014 and replaces the C59 model. The C60 is the Colnago race model ridden by Thomas Voeckler of Team Europcar in the 2015 Tour de France. The rest of the team rode the aerodynamic Colnago VR-1 in this year's Tour.

I took the C60 down Broadway for a few blocks and then back along Santa Monica Boulevard and then back up Broadway. I was able to sprint a

few times as well as accelerate the bicycle sitting on the Fizik saddle. The bike also came equipped with Shimano Di2 groupset, with Mavic aluminum wheels and a Bontrager Flare R taillight. The solid feel of the bike was evident from the start of the ride. Many bicycle manufacturers are designing race bikes to be lighter and lighter with little regard for ride stability or durability. The C60 did not feel heavier than my Trek, or the Trek Madone 9.9 that I test rode recently. It did feel a little more stable.

I purposely held back on some stop lights to get a chance to do a standing sprint with the C60 to see if the frame would groan or bend under strain. I must say that the C60 accelerated without a hitch. There was no groan from the bottom bracket, and it felt like whatever I put into the bicycle was producing speed. There was very little wasted effort. The C60 quickly and quietly gathered speed. I also steered toward some rough patches of asphalt to determine the ride stability of the C60. The C60 handled the bumps without skittering to either side, a definite plus.

At first glance, the C60 may look like the older C59 since Colnago used similar geometry for both. And both use lugged construction instead of monocoque construction. Monocoque construction makes the carbon fiber bicycle frame look like one piece. However, Colnago has introduced some improvements over the C59. The first improvement is the fluted tubes. The tubes are fluted for extra rigidity. The additional rigidity allowed the engineers to reduce the thickness of the carbon fiber used for the tubes, which reduced weight. The top tube and the downtube continue the flutes into the lugs. The lugs are no longer round but star shaped. The downtube has a bigger radius, increasing its stiffness and the bottom bracket lugs are much larger and stiffer than ever before. The bottom bracket also has threaded removable sleeves that line the bottom bracket and it compatible with Campagnolo, Shimano, SRAM, FSA and Rotor cranksets. As the sleeves wear, they can be replaced. This will eliminate the bottom bracket creaking in other pressfit carbon fiber bottom brackets, such as in the Trek bicycle models. The C60 frame parts are manufactured in China, but the frame is assembled and painted in Cambiago, near Milan in Northern Italy. Other Colnago bicycles are made and assembled entirely in China. The C60 can also be ordered with disc brakes. Every that I know who has ridden road bikes with disc brakes love the stopping power and the feel of disc brakes.



Colnago is a top Italian bicycle manufacturer. Ernesto Colnago, 82, was the head mechanic for the Molteni team of pro cycling legend Eddy Merckx. Colnago collaborates with Ferrari to produce bicycles. Currently,

the VR-1 model is the latest Ferrari - Colnago collaboration.

If you are looking for a solid top-end bicycle that is also robust and durable, then the Colnago C60 should fit the bill. Currently, major bicycle manufacturers are chasing lighter and more aerodynamic bicycles. Extremely light carbon fiber frames may not be that durable over the course of years and aero bikes are not known for their comfort over the course of hours. The Colnago C60 is a durable bike that will last for years and has the capability to go fast when pushed. I did not feel any hesitation from the C60 frame on the demo ride at all. The current US MSRP is \$6,199 but can be negotiated. I think it is worth a look if you want a carbon fiber bicycle that can take a few bumps on the road.

I am grateful to the folks at [Helen's Cycles](#) in Santa Monica for allowing a demo ride of the C60.