FLO Cycling - Components Series Part 1 - EZO Bearings

Posted by FLO Cycling at Monday, July 04, 2011 (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html) Labels: Component Series (http://flocycling.blogspot.com/search/label/Component%20Series) , en (http://flocycling.blogspot.com/search/label/en) , FLO Wheel Development (http://flocycling.blogspot.com/search/label/FLO%20Wheel%20Development)

Hello All,

Today we are starting a components series. High quality components are important to us and they are one of our three key design criteria. The other two are great aerodynamics and affordable prices.

We feel it is important to explain what we mean by "high quality". We are explaining our bearings by going through the specs. These are the things we worry about so you don't have to. Still it is nice to have access to this data when making a buying decision that's right for you.

You can see more of our component series in the links below.

FLO Cycling - Component Series Part 2 - FLO VORTEX Hubs (http://flocycling.blogspot.com/2011/07/flo-cycling-component-series-part-2-flo.html)
(http://flocycling.blogspot.com/2011/07/flo-cycling-component-series-part-2-flo.html)
FLO Cycling - Component Series Part 3 - Sapim Spokes (http://flocycling.blogspot.com/2011/07/flo-cycling-component-series-part-3.html)

FLO Cycling - Component Series Part 4 - FLO WIDE RIDE Rims (http://flocycling.blogspot.com/2011/08/flo-cycling-component-series-part-4-flo.html)
FLO Cycling - Component Series Part 5 - Ceramic Bearings (http://flocycling.blogspot.com/2011/08/flo-cycling-component-series-part-5.html)

(http://flocycling.blogspot.com/2011/07/flo-cycling-component-series-part-2-flo.html)

Bearings

Bearings are located inside the hub of a wheel. They allow the hub to spin freely. Bearings come in all shapes and sizes but most of them have the same basic components. There is an inner ring, an outer ring, ball bearings, and a bearing spacer. Here is a picture of a bearing where the ball bearings are visible.

(http://1.bp.blogspot.com/-NqqWfzCxSjY/ThIfBZ5Yq0I/AAAAAAAAANo/aB8SO2o727Y/s1600/igus-bearing.jpg)

Basic Bearing

The components are easily identified with the exception of the bearing spacers. In the picture above the bearing spacers are the black pieces between the ball bearings.

Here is a picture of a partly disassembled FLO VORTEX hub. You can see the bearing in the picture. Note the ball bearings are not visible since they are covered with a piece of rubber which has Japan written on it. You can see the inner and outer rings have a silver color.

(http://2.bp.blogspot.com/-do1ilnXQvj8/ThIgKvmTtqI/AAAAAAAAANs/TnPz7cTzwRM/s1600/IMG_1858.JPG)

Bearing in our Flo Vortex Hub

Japanese EZO Bearings

We have made mention several times that we use Japanese EZO Bearings. What does that mean? The company name is EZO and they manufacture their bearings in Japan. They are arguably one of the best bearing manufacturers around. Here is a quote regarding EZO bearings.

> *EZO are a Japanese company and a specialist manufacturer of high precision bearings for over 30 years and have a deserved worldwide reputation amongst customers and bearing manufacturers alike for total consistency and reliability. EZO have factories in Japan and China and their bearings are used the world over in precison instruments, automotive applications, electric motors, top-of-the-range audio equipment, robotics.. in fact anywhere where quality cannot be compromised.*

The easiest "non-scientific" way to test a bearing is to test how it feels. When we were selecting bearings for our hubs we quickly learned that some bearings just felt better and spun more freely than others. After looking into the difference, we discovered that EZO bearings were what made the difference.

We didn't just want to leave it to a feel. We wanted to ensure the bearings were capable of handling the loads required and that they would have a long life. This is where the spec sheets came in handy.

EZO 6900RU and EZO 6902RU

Our hubs use two different bearings. The front hubs use 2 EZO 6900RU bearings and our rear hubs use 4 EZO 6902RU bearings. Take a look at the pictures of the EZO 6902RU below. You can see the markings on the rubber seal.

(http://3.bp.blogspot.com/-y47bTVpE9hg/ThIjMabX4EI/AAAAAAAAANw/r72GrypcUbk/s1600/IMG_1856.JPG)

6902RU Marking

(http://2.bp.blogspot.com/-7sxJXr1pRR0/ThIjU0IDrvI/AAAAAAAAAN0/Xh7etQ8SrsA/s1600/IMG_1857.JPG)

Japan and EZO Marking

Specs

I am posting the spec data for the two bearings that I will use as the post continues.

	Front Bearing - EZO 6900RU	Rear Bearing - EZO 6902RU
Bore Diameter (mm)	10	15
Outer Diamter (mm)	22	28
Width (mm)	6	7
Cr (N)	2695	4321
Cor (N)	1273	2259
Max Speed (rpm)	34,000	26,000
Cage Type	Steel Ribbon	Steel Ribbon
Ball Bearings #	9	10
Ball Bearing Size (mm)	3.175	3.175
Seal	2RU	2RU

(http://4.bp.blogspot.com/-gF7xxg3Uk1A/ThIka-_1G1I/AAAAAAAAAN8/JXP2RRfoers/s1600/Screen+shot+2011-07-04+at+1.36.31+PM.png)

Bearing Spec

Dimensions

First let's talk about the two diameters. The bore diameter is the inside diameter and the outer diameter is obviously the outer diameter. We checked the precision of the bearings with a digital caliper and were amazed to see how tight the tolerances were.

(http://2.bp.blogspot.com/-HusVAQqIMRs/ThIletEPdBI/AAAAAAAAAOA/Frs3p98E98Y/s1600/IMG_1860.JPG)

Bore Diameter Measurement

(http://2.bp.blogspot.com/-mrwtTI_GCLI/ThIlj-8aZbI/AAAAAAAAAOE/iuxiRWAJ540/s1600/IMG_1861.JPG)

Outer Diameter Measurement

The width is the thickness of the bearing and was equally accurate. The accuracy peaked my interest so I went out to EZO's website and found the following picture, which I though was pretty cool. It shows two micro bearings on a US dime. If they can handle this type of accuracy our relatively huge bearings are no problem.

(http://1.bp.blogspot.com/-SiP8y-6Z3UI/ThImVoXZomI/AAAAAAAAAOI/otoybjxn9wo/s1600/dime_06.gif)

Two EZO Micro Bearings on a US Dime

Cr and Cor

Next up is the Cr and the Cor. These are symbols for "Basic Dynamic Load Rating" and "Basic Static Radial Load" respectively. Yeah, it didn't really clear it up for me either. Basically, the dynamic load rating is a measurement that relates to a load and 1,000,000 revolutions. The bearing is tested to determine the maximum load where the bearing will remain operable for 1,000,000 revolutions. The static load rating is a measurement of how much weight can be applied to the bearing before the bearing starts to deform.
This could be either the ball bearings loosing shape or the rings developing grooves.

So how does this relate to our wheels and what are the important things to look for? First of all 1,000,000 revolutions on a standard 700c wheel with a 23mm tire is roughly 1,300 miles. This is not very far for a set of wheels. Understand that the rating is for the maximum load and this changes as the load gets lighter. To show the maximum loads allowable I created a table that shows the maximums in units that make more sense to most of us then Newtons. I used both kilograms force (kgf) and pounds force (lbsf). This is essentially the same thing as kilograms and pounds. Don't let the "f" confuse you.

	Front Bearing - EZO 6900RU	Rear Bearing - EZO 6902RU
Cr kgf	274.81	440.62
Cr lbsf	604.59	969.36
Cor kgf	129.81	230.35
Cor lbsf	285.58	506.78

(http://4.bp.blogspot.com/-d3I13pV8KRY/ThIr0wX-81I/AAAAAAAAAOM/GYiOGEvtTx0/s1600/Screen+shot+2011-07-04+at+2.07.45+PM.png)

Cr and Cro Values in kgf and lbsf

We can see here that a single front bearing can withstand 285 lbs before it deforms and a rear bearing can withstand 506 lbs. We also see that the front and rear bearings can withstand 604 lbs and 969 lbs respectively for 1,000,000 revolutions. This basically states that even thought the load is over the static load rating it will still remain operable. It seems a bit odd, but under static load the bearings do not have time to recover from the applied load. It's this constant state of deformation that lowers the static load rating when compared to the dynamic load rating. Even though these limits exist, it is still good practice to design a system that is far away form these limits. I created a sample case with 72.72 kg or 160 lbs rider to show the actual force applied to each bearings. Remember there are two bearings in the front hub and 4 in the rear hub. This means the weight is evenly distributed over these sets of bearings. I made the assumption in my calculation that the weight distribution of the rider is 45% over the front wheel and 55% over the rear wheel. I am sure there are lots of arguments against this but it's purely for explanation purposes. Let's be honest, in the real world the load is constantly shifting anyway. The table below shows the load applied to each bearing.

	Front Bearing - EZO 6900RU	Rear Bearing - EZO 6902RU
Cr kgf/bearing	16.36	10.00
Cr lbsf/bearing	36.00	22.00
Cor kgf/bearing	16.36	10.00
Cor lbsf/bearing	36.00	22.00

(http://4.bp.blogspot.com/-EzJybM2CsuA/ThIxKjaF91I/AAAAAAAAAOQ/QBivK9vanYY/s1600/Screen+shot+2011-07-04+at+2.30.59+PM.png)

Bearing Loads with a 72.72 kg or 160 lbs Rider

We can see that our bearings can handle at least 8 times the actual load applied with the rider in the example above. This is exactly what we want to see. You want a large safety factor so you can maximize the life of your bearings and prevent damage. Unless you use our wheels for a weekend big air competition, you can rest assured the bearings can handle your weight.

Maximum Speed

The maximum speed column is an interesting one. It basically means how fast can the bearing spin and still be operable. The symbol "rpm" stand for revolutions per minute. This means how many times the bearing makes a complete turn in one minute. Again, I wanted to use a term that is more common. I converted the rpm value to miles per hour (mph). I assumed the wheel had a circumference of 2,100 mm and used the following equation.

mph = rpm * 60 * 2,100 * 0.00000062137

The 0.00000062137 is the conversion from mm to miles. Check out the values below. I had to laugh when I saw them.

	Front Bearing - EZO 6900RU	Rear Bearing - EZO 6902RU
Max mph	2661.95	2035.61

(http://4.bp.blogspot.com/-pomlcDviuJA/ThI0NnSqZFI/AAAAAAAAAOU/xyuT7BbWPbs/s1600/Screen+shot+2011-07-04+at+2.43.51+PM.png)

Max Rider Speed on mph

The speed of sound is 761.20 mph. The means you would have to break the sound barrier by a factor 3.50 for the EZO 6900RU or 2.67 for the EZO 6902RU before you would run into any problems. If you can ride your bike that fast, we are guessing something else will fail first :). Needless to say our bearings have you covered when it comes to max speed.

Cage Type

The cage type is the type of spacer used for the ball bearings. A steel ribbon looks similar to an egg carton. There are two pieces that come together to enclose the ball bearings. It's a good design coupled with the grease. It helps keep debris from coming in contact with the ball bearings and ultimately the rolling surfaces. The grease traps any potential debris if it gets past the seal. I took off the rubber seal to show you what the inside looks like.

(http://1.bp.blogspot.com/-WqUGxdF8Hwk/ThI2Axjx6_I/AAAAAAAAAOY/GwmHmfYDzPs/s1600/IMG_1862.JPG)

Steel Ribbon Cage

Ball Bearings

The ball bearing section is pretty self explanatory. When referring to the "Bearing Spec" table above, the first column is the number of ball bearings per bearing and the second column is the size of each bearing. The number and size both relate to the rest of the data. The calculations that go into the rest of the data are far beyond this post. Regardless, you can rest assured they are optimized for these bearings.

Seal

Finally we have the seal. This is the rubber piece that had the 6902RU and Japan EZO markings. For a bicycle the seal is important. It keeps out dirt and debris to help maximize bearing life. The 2RU means the seal is a non-contact seal. This means it does not make contact with the ball bearings. This is important because it reduces the amount of friction. The less friction, the less resistance, which is exactly what we want. I took a couple pictures to show what it looks like by itself.

(http://1.bp.blogspot.com/-RSS11at3Sxo/ThI4Af7EDbI/AAAAAAAAAOc/ef4y8dwMzx8/s1600/IMG_1864.JPG)

Outside Surface of 2RU Rubber Seal

(http://2.bp.blogspot.com/-oeVfyp_zDpI/ThI4EaqEJLI/AAAAAAAAAOg/dhNYX6UkXbk/s1600/IMG_1865.JPG)

Inside Surface of 2RU Rubber Seal

Conclusion

I hope that this post helps you begin to understand what FLO Cycling means by "high quality" and that it increases understanding of bearings. We feel each piece is important and have paid special attention to each one. The selection process has been very important to us so we can deliver a wheel that meets our design goals and hopefully yours too.

For more great content, please register for our free monthly newsletter at the top of the column on the right. We send links to all the articles we post during the month. As always, fire away with questions and comments.

Take care,

Jon

24 comments :

IndyRider (https://www.blogger.com/profile/15684271504313078874) said...

I appreciate your attention to detail, and your commitment to full disclosure and honesty. I can't wait to pre-order my FLO wheels!

July 4, 2011 at 4:22 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1309821770878#c2066304782300431580)

Jon (https://www.blogger.com/profile/14842923465306592969) said...

Thanks for the explanation. Keep up the good work.

July 4, 2011 at 4:26 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1309821972579#c1345436470735308934)

Flo Cycling (https://www.blogger.com/profile/12725432993113753520) said...

IndyRider,

It's our pleasure. We'd rather our customers be educated and feel comfortable when spending their hard earned dollars!

Take care,

Chris

July 4, 2011 at 4:35 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1309822553943#c8405298199179765882)

Flo Cycling (https://www.blogger.com/profile/12725432993113753520) said...

Jon,

You're welcome! Thanks for the kind words.

Chris

July 4, 2011 at 4:36 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1309822585731#c1011150660231056163)

Greg Ostrin (https://www.blogger.com/profile/01988573628996245961) said...

Hey guys great info and I look forward to future blogs. Can you expand a little more about the ball bearings and their accuracy or roundness for lack of a better term. I know that plays a factor in how well the wheel spins/rolling resistance wise.

Keep up the good work

July 4, 2011 at 7:29 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1309832991376#c7148509562862992381)

Flo Cycling (https://www.blogger.com/profile/12725432993113753520) said...

Greg,

I think what you are referring to is the ABEC rating. I don't have that value but I have already written the manufacturer requesting it. I hope to hear back from them shortly. If/When I do I will post the information in the comments.

Sorry for not having the answer right away,

Chris

July 4, 2011 at 7:55 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1309834524889#c431113770083908113)

PSteiner (https://www.blogger.com/profile/02326557175975244903) said...

That was a great read. I am glad that you have chosen such quality parts for such an important piece of the tire. Your attention to detail and directness with showing us why you chose it only makes me feel more anticipation to buy/ride these awesome wheels!

July 5, 2011 at 9:39 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1309883974727#c2473772184323369791)

Flo Cycling (https://www.blogger.com/profile/12725432993113753520) said...

PSteiner,

Thank you. We are glad you enjoyed the article.

Chris

July 5, 2011 at 9:49 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1309884564943#c3520238813145280416)

KmdrdC (https://www.blogger.com/profile/08599740957960758196) said...

Is it possible for you to quickly compare some of the specs of these bearings with some competitors wheels that are on the market?

July 5, 2011 at 11:37 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1309891032725#c1151325602825833991)

Kyle (https://www.blogger.com/profile/08899877384214653810) said...

As a mechanical engineer it's great to see a company be so open about their design process. Additionally, I think you certainly put the information in a format that even people without a technical background can understand. Keep up the good work, looking forward to these!

July 9, 2011 at 10:36 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1310232966635#c4308754429833541326)

(Flo Cycling (https://www.blogger.com/profile/12725432993113753520) said...

Kyle,

Thanks for the compliments. It's our goal to be open and honest about what we do so our customers can feel comfortable when making a purchase.

Take care,

Chris

July 9, 2011 at 10:45 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1310233505796#c4459459456622376008)

(Flo Cycling (https://www.blogger.com/profile/12725432993113753520) said...

KmdrdC,

Sorry for the delay getting back to you. I missed your message. I have looked into the details of a few other companies. Most list sizes but do not get into specifics. With out knowing all the details the comparison is difficult. Sorry I can't offer a better answer.

Take care,

Jon

July 9, 2011 at 11:26 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1310235972182#c4616845792741330780)

(Greg (https://www.blogger.com/profile/17053876023794866054) said...

I just read through your post and I think you've incorrectly described static vs. dynamic loading limits. The higher dynamic load DOES NOT suggest that the bearing will still operate if damaged. Dynamic load limits are higher because force is applied to (and removed from) the bearing over very short periods of time as the wheel spins. Static loads have a continuous application duration, causing continuous bearing deformation with no recovery period; thus the static limits will be lower.

@FloCycling: "This basically states that even thought the load is over the static load rating it will still remain operable. It seems a bit odd, but overall it is a good thing. If the bearing is damaged it will still work."

November 15, 2011 at 6:29 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1321367348472#c4719393145838664935)

FLO Cycling (https://www.blogger.com/profile/12725432993113753520) said...

Greg,

Thanks for your input. I re-read what I wrote and I did not do a very good job describing that part. You are indeed correct. Thanks for catching the error.

Take care,

Jon

November 15, 2011 at 9:02 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1321419751321#c1288572765388674354)

Mistah_Zed (https://www.blogger.com/profile/12343493706754850708) said...

Can your EZO bearing be replaced with your ceramic bearings at a later date?

March 11, 2012 at 4:11 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1331507480092#c1949399654983794739)

FLO Cycling (https://www.blogger.com/profile/12725432993113753520) said...

Mistah_Zed,

Yes you can. The ceramic bearings can be somewhat fragile so you would want to be cautious when inserting them and be sure to use the proper tools. However, as long as you have the correct size bearings, you should have no issues swapping to ceramic.

Take care,

Chris

March 12, 2012 at 10:10 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1331572230609#c7219995648237700498)

Joe Laventure (https://www.blogger.com/profile/10864348421558676486) said...

What is the difference with ceramic bearings? Is there a significant increase in performance? What about durability?

January 30, 2014 at 6:34 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1391092474850#c8736217876792655743)

FLO Cycling (https://www.blogger.com/profile/12725432993113753520) said...

Joe Laventure,

We use Japanese EZO stainless steel bearings, which are really high quality bearings. When comparing them to ceramic bearings it's hard to quantify an improvement in performance or durability. Ceramic bearings may have a 1-3% improvement, but like I said, it's hard to quantify.

We offer ceramic bearings for 2 reasons.

1. They support our Bike for a Kid program http://www.flocycling.com/bike_for_a_kid.php.

2. Some people just have to have them.

A lot of times a company may offer a lower quality stainless steel bearing. In that case, ceramics bearings are likely to show a bigger performance improvement.

I hope this helps,

Chris

January 30, 2014 at 7:29 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1391095758773#c2755287358917149150)

Pumping Cyclist (https://www.blogger.com/profile/00284524461118962456) said...

Perhaps I'm a little thick here, but I see in your blog on the bearings that you indicate that the rear hubs have four (4) bearings. However, when I watched the Flo video on replacing the bearings on the rear hub, I only saw two. What am I missing here?

August 14, 2015 at 12:58 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1439582280737#c3768337644043559147)

FLO Cycling (https://www.blogger.com/profile/12725432993113753520) said...

Pumping Cyclist,

Thanks for writing. You're not being thick at all. The other two bearings are inside of the free hub body. They can be replaced, but often times it's easier to just replace the entire free hub body when the bearings need to be replaced.

Also keep in mind that the free hub bearings are only being used when you are coasting. If you do not

do much coasting, then the free hub bearings likely have very little wear and will not need to be replaced as often as the hub shell bearings.

I hope that helps.

Take care,

Chris

August 14, 2015 at 6:04 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1439600665726#c7422908041482243859)

jimzoltan (https://www.blogger.com/profile/12582636878722447044) said...

Are you using angular contact bearings? or Deep grove bearings? I have noticed also that cycling bearing prices can range from 10.00 or so to 250.00 or so. Can you explain the differences and how they affect performance?

July 12, 2016 at 9:46 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1468342007108#c2322792209322266202)

FLO Cycling (https://www.blogger.com/profile/12725432993113753520) said...

jimzoltan,

Our bearings are neither of those two types you mentioned. They are sealed bearings with a flat inner and outer races separated by the ball bearings.

Bearings range in price for a lot of reasons. Some bearings like Ceramic Speed bearings have an VERY detailed manufacturing process that raises the price. Others are higher in price simply because of marketing and the standard distribution path they take.

Factory->Owner->Distributor->Bike Shop->Customer

That standard distribution cycle typically has the customer paying 5 times the manufacturing cost, because it changes hands so many times. People selling directly to the consumer are able to cut the cost down drastically.

All that said, the savings between the absolute best bearings and the typical bearings used by cycling companies may be a 1 watt at best. The savings are really quite small and often times not worth the investment. This is the number one reason we discontinued our TPI Ceramic line. We just couldn't validate the savings for the additional money our customers were spending. The only ceramic

bearings I would recommend at this point are Ceramic Speed bearings.

I hope that helps.

Chris

July 13, 2016 at 10:58 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1468432714276#c3707179324975876838)

(Rick Harker (https://www.blogger.com/profile/18108764902181775686) said...

Deep groove bearings are indeed what you use. It's the nature of how the bearings and bearing interface operate. The flat surfaces you mention are for location purposes either the shaft or housing.They are non adjustable to load compared to angular contact bearings.
Deep groove are (usually) press fitted and rely on accurate spacers to create the alignment and thus the service life of the bearing.
Angular contact bearings need a slightly different approach to assembly and can be minutely adjusted for play or interference, normally called load.
The grade of bearings for roundness is what defines quality and the greater the roundness the more process it takes to achieve. This will also reflect with price.
If you want the best rolling wheels with an excellent service life don't look for cheap. FLO doesn't make cheap.

October 19, 2016 at 8:33 PM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1476934429487#c1592823379545669422)

(FLO Cycling (https://www.blogger.com/profile/12725432993113753520) said...

Thanks for the information and the kind words Rick Harker.

Chris

October 20, 2016 at 5:56 AM (http://flocycling.blogspot.com/2011/07/flo-cycling-components-series-1-ezo.html?showComment=1476968202289#c8810367315798663766)

Post a Comment (https://www.blogger.com/comment.g?blogID=4829775519257341154&postID=6991951019212758750)

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Older Post (http://flocycling.blogspot.com/2011/06/flo-cycling-factory-updatessmoke-and.html)

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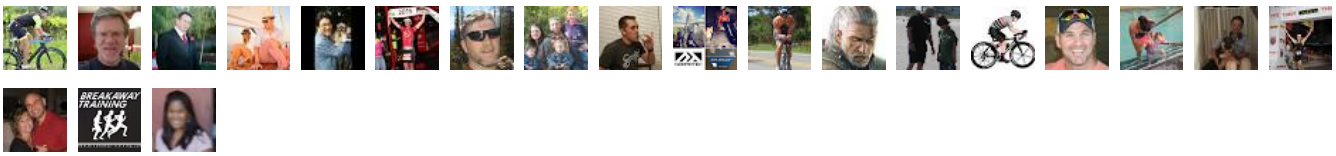

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