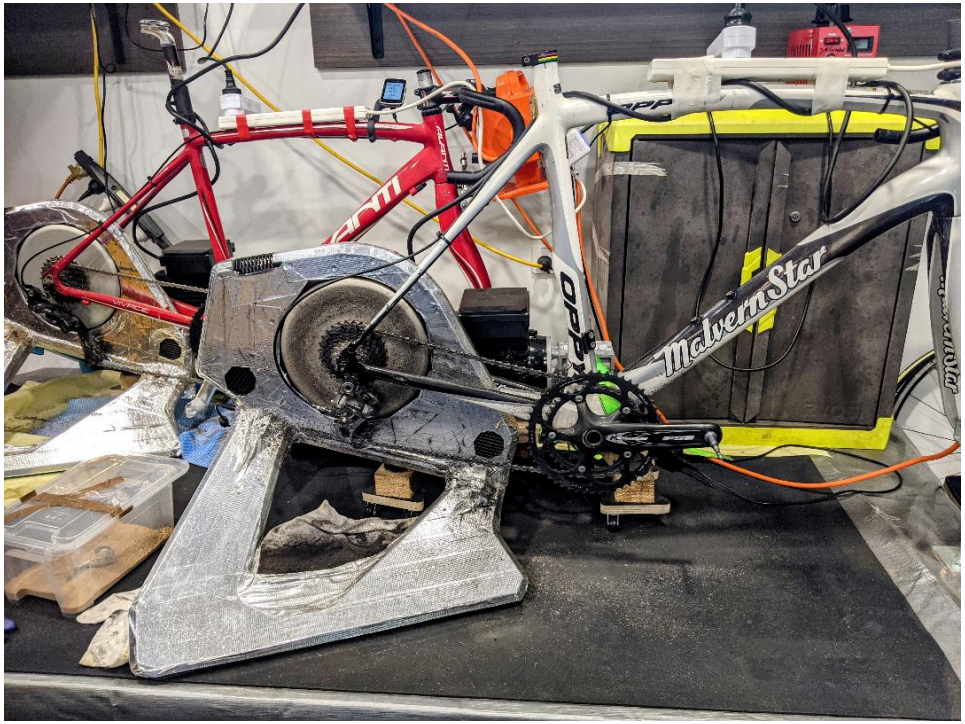
Zero Friction Cycling



Lubricant On Test : absoluteBlack Graphene Lube

Cost: $240 Aud from Zero Friction Cycling & others

Size – 140ml

Photo :

Not A DETAIL REVIEW!!

Although if this is the first review of mine you have read it may seem like one 😊 For me this is a very small review!

Why is the worlds most expensive lubricant not getting a detail review from the worlds leading independent lube test body?

It should be, but a combination of legalities and time have made it impossible at this time, but the mini review should still help a lot.

ZFC was contracted by absoluteBlack to test product during development. I conducted a lot of testing, taking up pretty much a solid 6 month block of 2020's testing time. It is usual if a private test goes extremely well that the non disclosure agreement covering the test results is torn up and manufacturer wishes for a detail review to be released. If a test doesn't go as well as hoped, then the NDA stays in place and I say nil nix nada re testing, the data isn't used in any comparisons etc etc.

Overall the graphene lube did test extremely well, however discussions with AB with regards to other testing being undertaken at time which they used also as part of their product release not only to bolster claims for graphene lube, but these tests also just happened to prove that every other key competitor product was in fact rubbish – these discussions became quite strained, and claims made using other data such as that obtained with an outright efficiency test company , pin on disc test etc, I felt quite strongly were concerning. When I raised these concerns, again to say discussions were strained – they reached a point where further discussion was feasible – nothing positive was going to come from continued dialogue. In my opinion it became clear that this was not a discussion of getting to the merits of one test vs another or why X data varies so much – if a particular test data showed graphene lube to be the best and competitors products to be terrible – then that test was exactly what they were looking for.

Obviously a number of these test results are completely at odds with what Zero Friction Cycling testing has assessed for a number of top recommended products.

I will not go into FLT vs FTT testing here, I have a full document in instructions tab (Manufacturer Testing) which covers this, however the short version is that Friction Facts pioneered FLT + FTT test methodology for outright efficiency testing, and this method is generally accepted by everyone else I know high up in the tech world as the gold standard re outright efficiency test.

This is a lab based test, conducted (currently by most who have the resources to build such a machine and conduct testing) over typically a 12 to 14 hour period.

The general data trend you will see from such a test report is one of Lube X starts at Y friction loss, over the first few hours the friction loss may drop a bit and then stabilise as the lubricant and chain really bed into optimal zone, then at some point the friction losses will start to increase as the lubricant treatment lifespan starts to struggle.

What you do not see is wild fluctuations in the efficiency losses. What on earth can be happening in a lubricant in a clean lab test for it to vary by multiple watts in such a period. It would not vary by anywhere near that much in 12 hours of normal dry conditions road riding. In one case in the data provided and used by AB a lubricants efficiency went up by multiple watts, then down by multiple watts, then up again.

This simply cannot happen in a clean lab test as best as anyone I know of can think of, and I know some pretty darn clever people these days in this space. What could possible happen for a clean lab test of such duration to see efficiency loss fluctuations – up and down totally circa 8w in a period of only around 3 to 4 hours.

If you read the Manufacturer testing document you will see what can happen with some lubricants if they are kept on an FTT machine only for long periods, the efficiency loss can continue to increase at a certain point as tension is kept on both top and bottom span of chain s what happens in real riding where the chain goes through a “slackening” period through the bottom of drivetrain which enables lubricants molecules to realign and reset. Hence the need for FLT and FTT machines to be used.

This is where ZFC test protocol helps support or not some test results put forwards. For the testing period used in the graphene lube launch by AB, for that period ZFC has tested the main competitor lubricants over that time span at 250w load, and see 0.00 wear.

If a wax or chain coating type lubricant shows 0.00 wear for such a period, and we already know that such lubricants are extremely fast as being solid have extremely low stiction and zero viscous friction, then how is it possible for them to have a 4 to 5w loss INCREASW over such a period. Where on earth can 5w of extra efficiency loss be coming from if it is not abrasive wear of chain metal which would clearly show up in ZFC test.

The above are a couple of examples of where things reached an impasse and discussions became unworkable. AB went to market with the data as it was, and for me this is dismaying because I work so hard to help bring clarity to performance claims with robust test data, that when we have manufacturers going to market with fancy test data completely at odds with each other and making no sense at all to readers / consumers – then the waters become all that much more muddy instead of testing adding clarity to claims.

In summary – the above is my way of explaining that ZFC agrees in very large part with the claims made by AB with regards to the performance of Graphene lube, however disagree's emphatically with much of the other data presented shooting down key competitor products if I have tested those products and they have proven to be extremely high performing in ZFC test protocol.

It is also worth mentioning that the ZFC test protocol is completely open, peer reviewed and supported, endorsed and used by a number of the top brains and top manufacturers in the industry. The 3rd party testing used for outright efficiency data in the AB launch the test process and equipment is secret, and I was unable to obtain any answers to my questions with regards to the data. At one stage the proprieter advised by email he would answer all my questions, and then, he didn't answer any.

Personally I believe there is a lot to be said about being completely open with regards to your testing process, how it works, how the performance measures and metrics are obtained. Again in my personal opinion, not doing so is bright red flag.

What I would have liked to do is conduct yet another test on my own volition so it is a public test not wrapped up under NDA, however after spending so much time testing graphene lube, I was already very far behind getting to other booked tests, and now even with 3 machines up and running, ZFC is fully booked for 2021. With graphene lube test this takes a long time due to need for overnight set after each application, so it ties up a machine for two months at least. And I've already tested and re-tested for AB over a period of nearly 6 months, so my motivation to test it yet again when I am completely booked, under the pump and running behind – at this stage it simply isn't a priority. It would be far easier if AB simply removed NDA like other manufacturers do when their lubricant tests extremely well.

So – my personal advice and personal opinion is to pls disregard the attempts to shoot down other known top products, but that graphene lube demonstrated;

- Excellent dry contamination resistance
- Excellent wet weather performance
- It is absolutely unrivalled re single application longevity making it a top choice for very long or long & harsh conditions events.
- It is genuinely very low outright friction, this has been backed up by a lab I do have 100% trust in re outright efficiency testing.

So – the perfect lube right? Excels in all areas so it's a slam dunk?

Not quite for all, below will hopefully help cover whom this lubricant may be best suited to, and some very important aspects to consider and be aware of before taking the plunge on that very expensive bottle.

PRO's & Cons of Graphene Lube

Alrighty – so to get the above magnificent performance step one is (of course – needs to be done for all lubricants – don't let other media steer you astray) remove the factory grease.

Then you MUST apply the lubricant via immersive application. I'm going to give some deserved props here to AB for going to market stressing this point and providing instructions and a method of how to do. There are some other very good lubricants that also have very significant initial penetration issues (Smoove / squirt, and I would almost put Tru Tension Tungsten all weather in that bracket as well).

Advising customers first application should be immersive is not something they are keen to do. Again in my opinion (sorry I have to keep saying this so I don't get sued for stating something as fact that may be contested) this may put a lot of customers off. If you are looking at a bottle of lubricant online or on the shelf at an LBS and one says hey you need to strip factory grease and initially apply via immersive bath, and another says just throw on top of whatever and things will be amazing – many will take the easy option, even though in 99.999999% of cases the easy option is flat out incorrect and will deliver a very poor result for the rider.

So AB was taking a risk re uptake, however they knew that it absolutely does have initial penetration issues, and so they did the right thing on this front, something I was very relieved about and something I do believe deserves credit as to date all other lubricants with known significant penetration issues have been scared off going down this path, to the detriment of their customers friction and wear rates for their otherwise excellent products – especially at the price per bottle cost for lubes like Smoove / squirt.

I do believe however they could do a bit better re how to best conduct this immersive application. Again just my opinion, but application via the bag is a bit faffy, and you have to buy your own little funnel to get it back from bag into the bottle or you carry a high risk of spillage of a super expensive lubricant (they do not provide include a little funnel to get lube from bag back into bottle). Also a lot of product is left behind in the bag. At the high expense of this product, this is not to dismissed, you could easily be leaving around $20 behind in that bag.

The first thing I did was purchase a 500ml screw top container from supermarket that is basically exactly the same as what silca use for SS drip tubs.

It is VASTLY better to put chain and lube into this screw top tub, soak a for a min or two completely submerged, shake the bejeezus out of it in every axis you can muster, remove chain, let excess drip back into container, Put lid on to reduce air exposure to lube, THOROUGHLY wipe excess lube off chain with microfibre cloth (this way you will have a very clean running graphene lube chain, some haven't wiped excess and had a very messy chain / drivetrain), hang to set overnight. After hanging to set, remove container lid and pour lube back into original bottle using a little funnel, and then re tighten both lids and seal both containers back in bag provided by AB to be super super safe that you have highest chance of lube in container still being wet ready for next immersive re-lube post a maintenance clean, vs what was unable to be poured back into bottle being dry and wasted.

This method is again in my opinion vasty superior to using the bag, and much easier / less risk of spillage re pouring back into bottle, the solid container and a little funnel make pouring back in a doddle, vs the soft bag – its just flat out more tricky / easy to have a mini spill and even a mini spill is very expensive. I have suggested to AB that they replace the bag with container, however due to shipping size increase I doubt this will occur.

From here, if you only ride in dry road conditions, you can just re-lube as soon as chain starts to sound / feel a bit dry, and enjoy exceptional low friction, very long intervals between re-lubes, very low component wear rate, and as long as you work lube in thoroughly and wipe excess thoroughly (I personally would follow the advance Smoove application guide on my website for all lubes like this) – you will have a great time with this lubricant.

For some riders who like a really long lasting lubricant as just don't get around to re-lubing much, dedicated ergo bike etc – this lube could really be what you have been waiting for all your life as for some they may be able to go months between re-lubes depending on weekly mileage.

What if it rains? Or I ride in harsh conditions (very dusty etc)

Whilst its performance in the wet is extremely high, unfortunately your chain will want to be properly cleaned and re-lubed post any wet ride if you wish to keep a truly low friction low wear chain. This is not specific to Graphene lube, this is ZFC's clear recommendation for **ANY lubricant.**

Your chain is not water proof, so whilst a lube may set to a coating, or paste, or a solid wax – water will run right through chain, bringing contamination deep inside chain with it, and this contamination will be pressed into set coating. From there it is basically land locked – it isn't going anywhere unless you remove it, so as with all lubes, your next rides in the sun will be similar friction and wear as if you are still riding in the wet.

If you just cop a light spray – I wouldn't stress, but if you ride in proper wet where the front wheel is hosing the chain with dirty road water – then, unfortunately it is true for all lubricants – you really really really should take care of that chain afterwards.

What is involved in taking care of a chain post wet ride varies massively depending on the lubricant. A wet lubricant = lots of solvent flush cleans. A wax like MSpeedwax of Silca hot melt you can either just re-wax it, or for bonus points boil up the kettle and melt bulk of

contaminated wax off (super handy post muddy cx / mtb rides), dry with hairdryer and re-wax – 10 mins job even post a full mudder and boom chain is back in wax bath and it's all yeehaa again next ride.

For lubes like graphene lube / Smoove / squirt – things are a bit tougher. IF you are going to clean the chain, and you will need to if you want to keep chain properly in low friction low wear zone post proper wet rides, then you have a bit more involved in the clean as boiling water alone won't do it.

Especially in the case of graphene lube, remember post proper clean you are going to need to re-apply via immersive application. So before you put chain back into a bath of $200 ish worth of lubricant, you don't want the chain to be half arsed clean and contaminate your entire bottle of lube. You really want that chain to be proper clean.

Ceramic Speeds Ufo Clean is brilliant here. It is one of the few solvents designed to work specifically on waxes (most solvents don't do diddly to waxes) and the only one that is environmentally friendly that I know of.

Here's what I do;

Boil up the kettle and boiling water flush cleans swishing in an open container x 3.

Blow dry with heat gun.

Soak in UFO clean for 5 mins in a bidon (keep bidon for this purpose), shake the bejeezus out of it, remove from UFO clean and flush with boiling water until water goes from white to clear.

Blow dry.

Re apply via immersive application.

If you have an ultrasonic you can do the above in ultrasonic vs container (this is actually what I do cos I have lots of super groovy ultrasonics, but don't stress if you don't have, you don't need at all, you can do a brilliant job via container method).

****note for boiling water swish in open container, Never shake a closed container of boiling water as this releases a lot of steam pressure, container will blow lid off and you will scald hands / face – not cool. Literally.****

The above is by no means the end of the world if you only get caught in the wet occasionally, but honestly if you ride a lot in the wet then doing the above will quickly become a real PITA – especially if it is just for day in day out training vs the supreme ease of either just a boiling water rinse dry and re-wax / re-lube like you can get away with for all but race chains for Mspeedwax / Hot melt / Silca Ss drip / UFO drip new formula. Yes doing the full monty above will be better for those as well, but you can get away on training chain with very good contamination reset results by just simply popping chain off and re-waxing or boiling water rinse, dry & re-wax or re lube and it takes all of 10 mins tops and things are back to a great place. And you haven't had to use any solvents like you need to do with wet lubes to flush clean.

**** note also doing the above method with UFO clean you will get at least about 30 chain cleans from a litre of UFO clean using bidon method before you need to worry about changing to fresh bottle of ufo clean, so it really is great product for the latest wax based super lubes especially if you are maintaining a dedicated race chain in mint condition or post wet ride care. Note whilst CS instructions show spraying on chain on bike, I am still a big proponent of removing chain and soaking vs spraying on bike. Removing and immersing + soaking then shaking is simply a 100% foolproof method to obtain a perfect flush clean, spraying on bike - results may vary….**

It is also great to remove chain anyway post wet rides so you can check that bottom bracket bearings are ok by spinning crank with finger – you will feel instantly if things are not going well because water / contamination penetrated into bearings. Same with back wheel, spin back wheel and put finger on axle- silky smooth – awesome – rough & notchy – time to get sorted asap. Without chain on and freehub engaged you can actually feel what is going on with rear wheel bearings that you cannot with the freehub noise / vibration in the when you have chain on bike. You can also quickly check jockey wheels and ensure spinning light and smooth vs rough or hard to turn.

So it is a win win re removing chain to look after properly post wet rides. I have lost count how many customers I have had in workshop where I remove existing chain to switch them over to a new waxed chain, and bottom bracket feels like it was made by Fred Flinstone, rear wheel bearings feeling rough as, and sometimes even a jockey wheel you can barely turn with your finger for good measure, and I will be like how many races have you done with bike running like this?!

Popping chain off in 30 seconds you know if all is silky smooth and good everywhere on bike, or if one or more area's need attention to get back to silky smooth.

So if not already, think about getting into the habit of periodically removing chain for quick bearing check, especially post wet rides. Some bikes (cx bikes) cop a hammering, I literally cannot remember one CX bike through the workshop where customer is using a drip lube and had never removed chain that didn't have a nightmare going on with bearings and jockey wheels. Those that wax / remove chain to look after post harsh conditions rides and check bearings – they get to ensure all is running sweet all the time as get onto as soon as bearings are not feeling perfectly smooth. Often bearings can be saved from needing to be replaced if attended to asap, whereas if you run them for a good period with contamination in them and running rough – its usually game over and $$ for new bearings.

It really is not hard to ensure your bike is always riding like smooth silk lightning – just a small amount of knowledge and attention as per above and you will quickly be in this club. It's a fun club.

Are you sure I have to clean chain post any decent wet ride? I thought re-lubing and wiping is fine…..

Yes that is a common and big misconception I am working hard to change. It is especially common in mtb world where the way its always been has been drip more lube on and wipe chain and then at X point I just replace the entire drivetrain , I have no idea how many km's that is, I guess its normal.

There is a better kind of normal.

Even for road riders, your total chain / drivetrain lifespan can be highly variable by even a couple of wet rides if you do not take care of things afterwards. Introduce a lot of contamination early into a chains life that you do not remove, this can easily cut down that chains lifespan by circa 50% vs had the chain had a long run of nice dry riding before being hit with a solid wet ride.

As explained above, a solid wet ride will bring a lot of contamination into chain, and whilst I may talk about X lube performing very well in harsh wet conditions, that is relative to other lubricants in harsh / wet conditions. The wear rates are still vastly higher than dry road riding.

For instance;

The average wear rate for all lubricants tested to date for clean block 1 is 13.2%. It is 2.2% for the top 5 lubricants.

The average wear rate in wet contamination block 4 is 59.1%. The average for the top 5 lubricants is 24.3%.

In Clean block 5 that follows wet contamination block 4, the average is 29.8%, so this is over double the wear rate of clean block 1. Even for the top 5 lubricants tested it is 16.1% - so nearly 8 times greater vs clean block 1.

We can see the average for all lubes is around double vs block 1, as opposed to 8 times for the top 5 lubricants tested – that is simply due to the fact that the top 5 lubricants recorded such an extremely low average wear in block 1 that any increase is a much greater multiplication. 16.1% average for the top 5 tested is still obviously much much better vs 29.8% for all lubricant average – this result also does not include a result for a lot of the worst lubricants tested as they did not make it to block 5 in the test, had I continued and obtained a measured result for them, the all lube average for block 5 would have been much higher – but in many cases continuing the test was not physically possible as the

worst lubricants were exhibiting such horrendous chain such by this stage that in one case it snapped a derailleur hanger – which was an annoying machine fix and could have been worse, or it blows the 3amp fuse in voltage controller which is there precisely to prevent major damage to test rigs if something like a hanger breaks vs standard 10amp fuse.

So, you can if you wish NOT clean chain post wet rides and have anywhere around double to 8 times the friction and wear vs if you DO clean chain post wet rides – your call.

Just again remember what is going on, with the top lubricants that tend to set to chain coating, or paste, or plastic type state, the contamination is pressed in and land locked and is not going anywhere unless your remove it.

Yes adding more lube helps, but you are simply improving the ratio of lubricant to contamination, you are not getting rid of the abrasive contamination in the chain. And most re-lubes if you do the math, you are only adding circa 0.05 to 0.1ml per link of lubricant, there is only so much flush cleaning or ratio improvement that can do, and as you can see from the testing, we have measured exactly what on average this does in fact do – the wear rates post wet contamination blocks are simply a heck of lot higher vs if one only rides in clean dry conditions.

So in summary, there is just no way to avoid a clear & robustly tested truth, a truth tested across every type of lubricant – **post decent wet rides if you want your chain to go back to a low friction, low wear chain, you need to step in and properly clean your chain.** Remember it just does SO much work and has a lot of moving parts, this is why even a little abrasive contamination in the mix quickly adds up to a measurable increase in friction and wear as there are just tens of thousands of link articulations a minute, each link has 8 separate pieces of sliding surface friction per articulation, so there are hundreds of thousands of individual pieces of sliding surface friction per minute as you pedal along. Mechanically your chain is working like a bat out of hell – hence tiny differences in contamination levels in lubricant mean friction and wear multiply out very quickly in a component where literally hundreds of thousands of pieces of metal are sliding against each other per minute.

It is also hence the focus these days on chains and chain lubes by many top manufacturers. It can still be common for many initially to scoff at claims of X lube will save 3 to 6w vs an average lubed chain – however, with so much action happening - lowering the friction a little bit per piece we can see – multiplied by 200,000 or 300,000 = notable watts saved. So it is time to move past the scoffing (if you are reading this you probably are not a scoffer, but you probably have cycling friends who are) and time to see why chain lube & maintenance is genuinely such a big deal re either saving or adding a handful of watts of friction losses or gains. Not only has it been tested and proven (like, a lot) – it is also simply logical why your chain & its lubricant is such an easy low hanging fruit re the watts savings or big watts losses (which = big wear rates), and that is why there has been so much continued growth re focus and new generation lubricant releases over the last few years.

This all wraps up of course to the clear and as strongly as I can convey advice being that since your chain and drivetrain is the heart of your magnificent bicycle, and may have some pretty expensive bits on it, completely exposed to elements and working so hard – don't let it run with abrasive stuff mixed in the lube, look after your chain, and your drivetrain will look after you, and your wallet.

Ok – hopefully having really hammered home why you need to clean your chain and reset contamination post decent wet rides, (I know, sorry I do tend to try to hammer things home like no other, and I have taken the liberty with this review being shorter on detail of the actual lube due to NDA to focus the attention on the above instead, and it is very pertinent with regards to this super expensive lubricant anyhoo) that all of the above will hopefully help drive home what lubricant choice is right for you. One that is easily reset, or one that is quite a lot of work and a lot of money for an immersive re-lube post reset (I estimate the immersive re-lube with graphene wax to be cost at minimum circa $20 aud, likely around $30 aud factoring in product loss left in container, so it is not a cheap re-lube).

Depending on what conditions you tend to ride in and how you like to maintain your chain, it is very important to make an informed decision here. A lot of people have jumped in and bought a super expensive bottle of graphene lube, ridden in some solid wet conditions, and then just added more super expensive lube over the top of a chain that will still have a whole bunch of abrasive contamination in it. Again whilst its wet weather performance is great, there is still no getting around the need to reset contamination post wet rides – so will its friction be better than a lubricant that is easily reset post such rides and assuming the rider does so? No, in most cases it will not. It is a waste of an extremely expensive lubricant to just add it over the top of a chain ridden in the wet. On the flip side, if you were never going to clean your chain anyway

no matter what you run, then hey – Graphene lube has an excellent chance of outperforming other drip lubes overall in such conditions. So again it very much depends on you – planning to reset post wet rides every time and ride a lot in the wet, this will be tough lube for you to live with. Planning to never clean chain post wet rides and can afford $240 a bottle of lube – then this may be the best drip lube for you.

If one only rides in the dry, Is it then really worth all that money per application vs an easier to maintain much cheaper lubricant that will also deliver exceptionally low wear rates, all you have to do is simply re-lube more frequently – again that is for you to decide after digesting the above.

So if you ride in the wet often, based on the above scenario's - strongly consider whether AB graphene should be your daily lube, or if you should keep as your dedicated race chain lube and a much easier to clean / no penetration issues lube like silca ss drip or ufo drip will be easier to live with day to day, or of course ZFC's numero uno recommendation of immersive waxing with MSw or hot melt. Honestly – it is so easy and your chain comes out looking brand new every re-wax and all parts are re-coated in a solid super slippery wax – its just very hard to beat – as you are putting chain in a bath of 400ml plus of wax, and for training chains if you like you don't even need to do any cleaning and you are still miles ahead. In testing with no cleaning intervention at all, both Mspeedwax and Silca hot melt test chains immediately reverted back to 0.0% wear in clean block 5 post wet contamination block – This result has not been remotely demonstrated by ANY drip lube, and I cannot see that this result will ever be delivered by a drip lube, yet the top known immersive waxes such as Mspeedwax and Silca Hot melt, simply re-wax post wet ride and your chain is back to ultra low friction. Hence why I have for a long time been firmly in the immersive wax camp.

Also worth considering and popular these days for those whom are not sure if ready for immersive waxing every time is to use wax compatible lube like silca ss drip or Ceramic Speed ufo for say 5 re lubes then re-wax, and then also just simply re-wax post any wet ride to reset contamination. Very very easy to maintain a super clean, super low friction and wear chain / drivetrain. With the product choices available now there really is no excuse for a dirty high friction high wear drivetrain. An always low friction drivetrain day in day out is easily obtainable even if you often ride in harsh conditions.

Is AB wax compatible.

Yes, but with a but. AB have confirmed that you can re-wax with msw or hot melt straight over the top of AB graphene lube with no cleaning, which is most excellent – that really is handy - but due to the penetration issues if going the other way, I would start applying the graphene lube to a waxed chain WELL before waxed chain starts to sound and feel dry. So for road I would be applying over msw or hot melt at about 150km mark to ensure plenty of wax left to protect against wear whilst ab graphene takes quite some time to work down into pin if you are not doing an immersive ab application with your previously waxed chain.

By the same vein I personally would class AB graphene as cross compatible with UFO drip, although Ceramic Speed would say no don't do that, stay with UFO drip that is the only way we can guarantee you the promised ultra low friction. But if I was me i would not be concerned adding UFO drip over graphene lube, or vice versa again just if going the other way apply early same as per instructions re adding over mspeedwax / hot melt.

I would of course ***fully clean before ever doing an immersive ab application*** – your chain should never go into your super expensive bottle of graphene lube without being perfectly clean.

So what about dust for dry gravel / mtb riders?

Ok so the good news is that unlike wet riding where unfortunately water really ruins the party by being the transport medium to bring contamination deep inside chain, AB graphene has extremely high dry dust contamination resistance. If always ride in dry dusty conditions I would still do a periodic full flush clean and re-set, but these intervals can be pretty long, ie every circa 2000km of dry gravel / mtb riding would be my recommendation.

What you do want to do is ensure that you do not import dust when you re-apply lubricant. Again this is the same as if you are using Silca ss drip or UFO drip or Smoove / squirt etc.

Some dust will stick to outside of chain even on a solid waxed chain due to static electricity, the same way dust sticks to your frame and you do not lubricate your frame. Well, I don't. I imagine you don't either.

A little hint / trick for offroad chains before re-lubing with a chain coating type lubricant / re-waxing is to spray or pour a little bit of methylated spirits onto a microfibre cloth and wipe chain, this will lift off surface dust. Wipe dry with other part of microfibre cloth, and re-lube / or remove and re-wax. This minimises dust going into wax pot / minimises risk that drip lube will import dust deep into chain as lubricant penetrates.

For wet lubes chain should be wiped as externally clean as possible post every ride anyway, and so the same goes pre re-lube. Wet lubes lube will always end up on surface and dust will stick on contact becoming part of lubricant, and you simply always want to remove that contaminated lubricant from outside of chain / chain rings / cassette – its not doing anything positive aside from acting as a mild grinding paste, and again new lube passing through a lesser amount of contaminated lube on its way through to inside chain is always a good thing. Again using something like methylated spirits on microfibre cloth can help lift off contaminated lube vs pressing it into chain as you wipe – or for some wet lubes sometimes wiping with an actual solvent like mineral turps can be even better.

ZFC Overall Performance Ratings

I’m not going to go through and rate for each category for this lubricant as it is quite unique re its cost and application process, which makes it difficult to assign a rating in some categories because if you only ride in the dry it is one thing, if you get caught out in the wet and need to re-set it is another thing entirely due to the time and cost of doing a proper re-set and immersive re-lube, and I am not going take the risk of breaching NDA by getting too specific in performance ratings.

So i will simply summarise and confirm that graphene lube is a genuinely very low friction and wear lubricant, it has unrivalled single application longevity, it has exceptional dry contamination resistance and also extremely high wet / harsh conditions performance – however it also has significant initial penetration issues hence their clear instructions for initial immersive application - so first application / application post any proper chain clean is quite involved and very expensive.

Hence personally, vs the ease of other very low friction low wear lubricants that do not have any penetration issues such as either immersive waxing with msw or silca hot melt, or lubricants like silca ss drip / ufo drip – they are personally my lubricants of choice for training and racing in events where treatment lifespan for such events is not of concern as they are just so easy to maintain a super low friction and super clean drivetrain.

If I had a very long harsh conditions event and I was unable / unwilling to re-lube part way or swap chains part way – then graphene lube would be my go to number one choice (ie a 24hr mtb event flag to flag, and there are a host of very long

harsh conditions gravel / mtb events around the world where a properly prepped graphene lube chain should be of consideration as a top choice).

The extreme single application longevity will also suit some riders for training but mostly for those who only ride in dry conditions, also it suits some for dedicated ergo bikes again due to the fact that for many it is once every 2 or 3 months re-lube depending on mileage. And also, if you can afford it and you were never going to re-wax or clean and re-lube chain post wet rides anyway, then you do have as good a lubricant as any, and much much better than many - if you are just going to put more lube on a contaminated chain because that's just how your roll with chain maintenance.

Overall AB have created something special with graphene lube, in my opinion it is a truly exceptional lubricant and it is great to have such a high performing lubricant that can genuinely last such an extreme distance per application – this will be just what some riders need for some events or suit their personal riding. However as mentioned, I was also personally dismayed by the data and marketing approach used in the launch, as this was - in my personal opinion, detrimental to consumer clarity around product claims and testing, which works against what I work so hard on every day with regards to improving consumer clarity and improving consumer faith in independent test results, so as to be able to make the right decision that will deliver a low friction low wear drivetrain with a maintenance level that suits them and their riding / racing.

GRAPHENE WAX pre alert.

If you have kept abreast of ZFC latest news posts you will have read that I have tested Graphene wax, and that detail review I am hoping to get to this week (after hot melt detail review and synergetic detail review which are next in line to be done) – and that alas this product has not tested well at all. As in really, really not well.

As such at this time ZFC does not recommend Graphene wax, nor mixing and matching graphene lube & graphene wax due to the very high wear rates recorded with graphene wax.

I have also had many cyclists around the world write to me since my posts advising that their experience with graphene wax has not been as they were hoping – the main complaint has been very short treatment lifespan, and whilst they have not tracked wear rates – my testing does, and I can confirm that wear rates in ZFC control test were very high from gun – even clean block 1.

So the initial outlook for graphene wax performance is nothing like graphene lube which is exceptionally good.

I also note that the graphene wax launch contained no test data to back claims like graphene lube did. Where is the pin on disc test for this one? (it is contended that the pin on disc test is not valid for solid waxes as the pin will quickly abrade wax off surface and then show high friction and wear. This is not what occurs inside a chain where the wax is pressed onto and held in place on the internal sliding surfaces that are all coated in the wax. It is contended that pin on

disc tests are only valid for liquid lubricants, as the disc is spinning submerged in the lubricant, as such there are concerns as to why this test was used to demonstrate graphene lube vs products such as UFO wax etc.

If it is a valid test, I would like to see the same pin on disc test results for graphene wax. The absence of all the test data for graphene wax vs what was released for graphene lube, as well as my test results and anecdotal rider feedback – it is currently not adding up to a picture of recommending graphene wax at this time – in fact the test results from ZFC test were such that unfortunately i would actively recommend against graphene wax same as I actively recommend against wend wax which has tested very poorly (refer to detail review for wend wax – lots of fun stuff going on with that product).

So just in case I do not get to detail review for graphene wax this project week – pls take note of the above in the interim. I have had an initial email from and to lead scientist at AB re graphene wax, am awaiting next reply.

**** Interestingly on the graphene wax web page on AB website it is currently sitting on a rating of 4.75 out of 5 stars from 1039 votes at time of writing this review, this is a bit of a disconnect from anecdotal reports I have received and my testing, so it will be interesting indeed to see where this all ends up re discussions with AB and customer satisfaction in general. Considering Wend wax also tends to rate very highly from customer reviews…….. again I can only stress that the results from the worlds most exhaustive and peer reviewed test process here at ZFC is in my opinion your most accurate guide (biased of course, I created the test after all – but again I stress the test is highly peer reviewed and has proven its repeatability and accuracy - I suggest always if in doubt read the test protocol and decide for yourself the merits of the test – it is no short lab based test but run over thousands of km's and with dedicated clean**

and contamination blocks – all aspects of a lubricants performance are able to be very accurately assessed vs going by "feel" – where often riders feel exactly what the marketing tells them they will feel. Refer to marginal gains podcast on placebo effect– one of the best podcasts ever).

Race Day Lubricant Road – /10

Not rating unless NDA is removed.

Race Day Lubricant MTB / CX / Gravel – /10

Not rating unless NDA is removed.

Everyday Lubricant – /10 dry riding – /10 for wet / humid countries.

Not rating unless NDA is removed.

Harsh Conditions Lubricant – /10

Not rating unless NDA is removed.

Single Application for Long event – 10/10

I will rate this section due to its exception single application longevity.

Cost to lubricate (based on blocks 1-5)

Extrapolated drive train running costs table per 10,000km based on blocks 1-5.

Unable to rate with NDA in place.

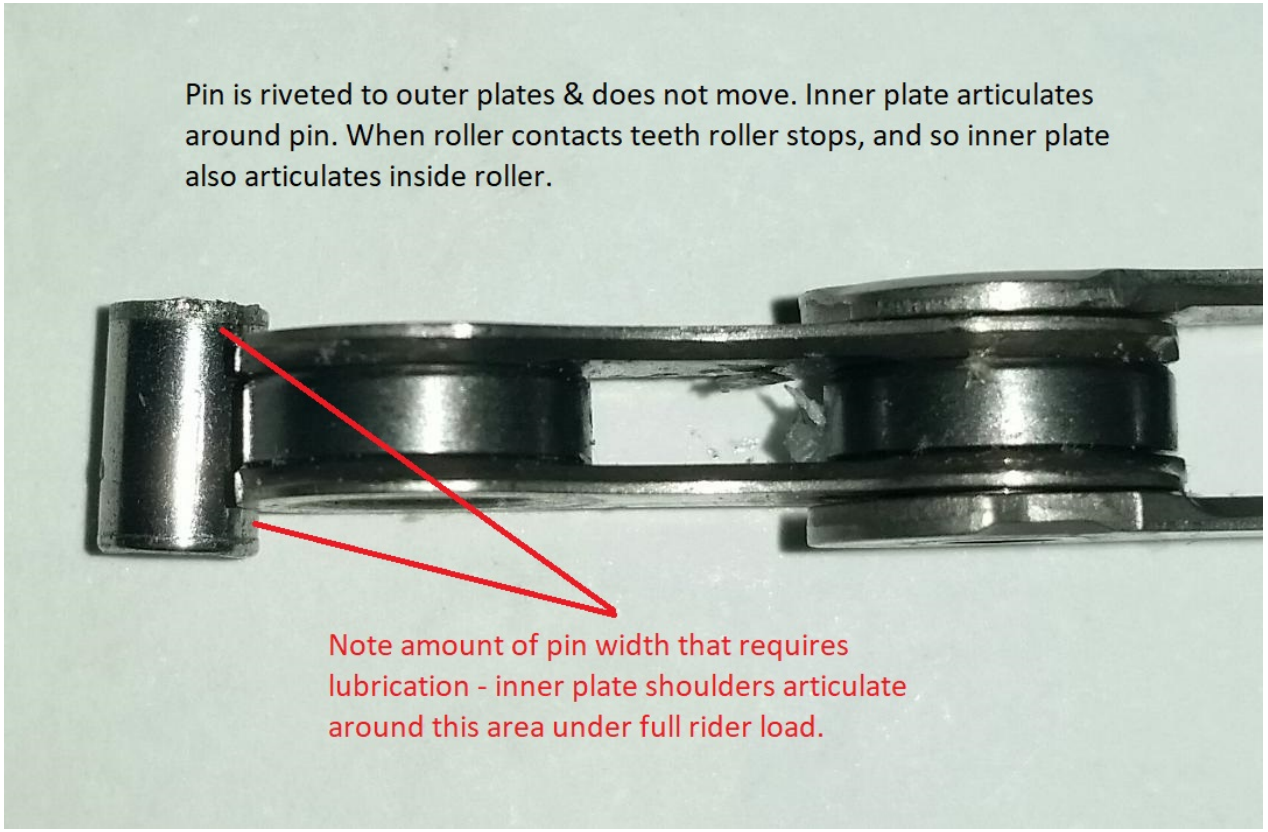
Best online magazine review of lube found:

N/A .

Why do some lubricants have initial penetration issues? Is it really a thing?

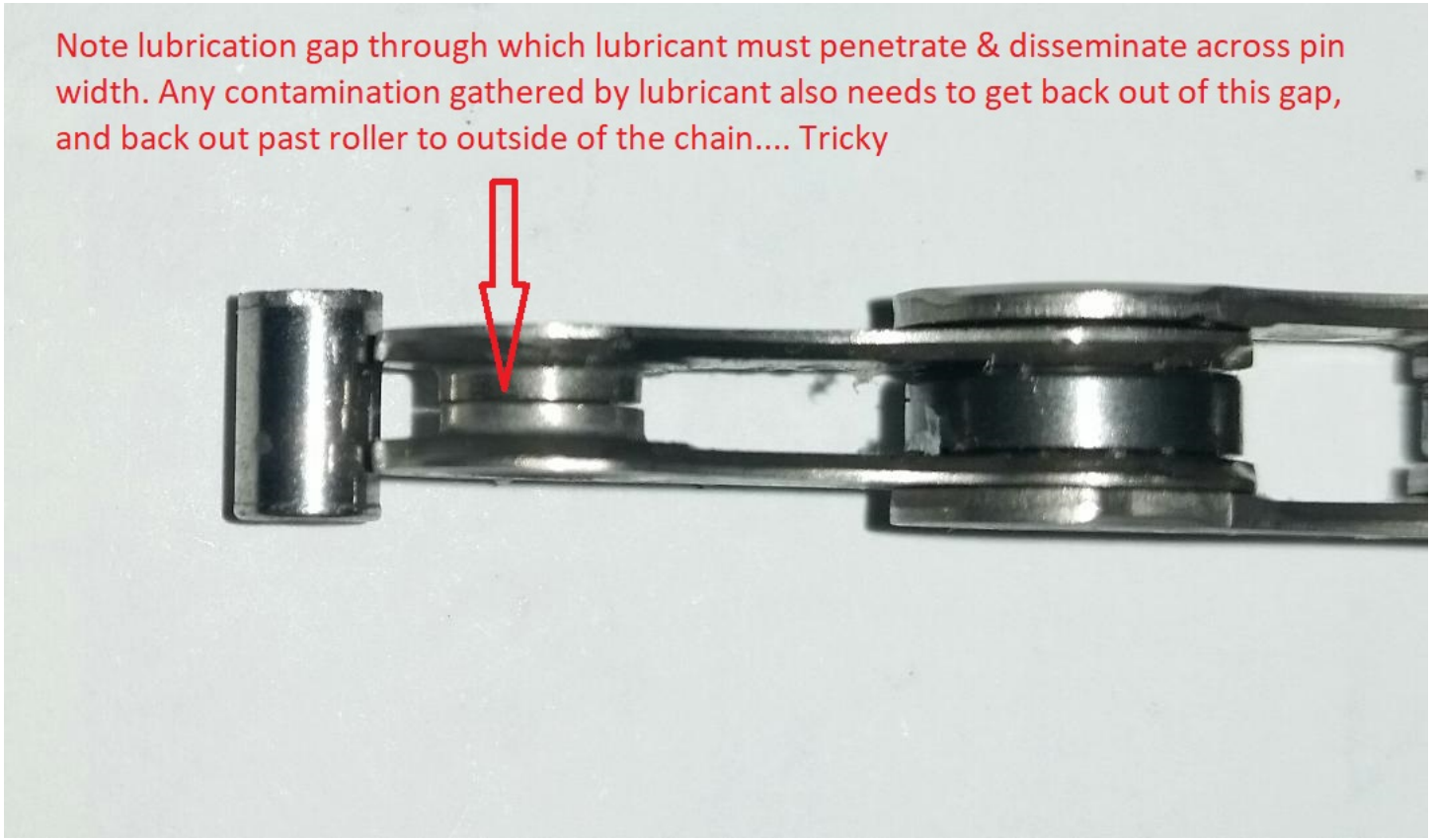
***Yes -some lubricants have used up around 20% of their wear rate allowance in clean block 1, with wear rate then dropping in block 2 despite contamination now being added, which for lubricants without penetration issues always sees and increase in wear in this block. It drops because the lubricant has now finally penetrated to pin, and its performance now is better even with contamination added vs what it**

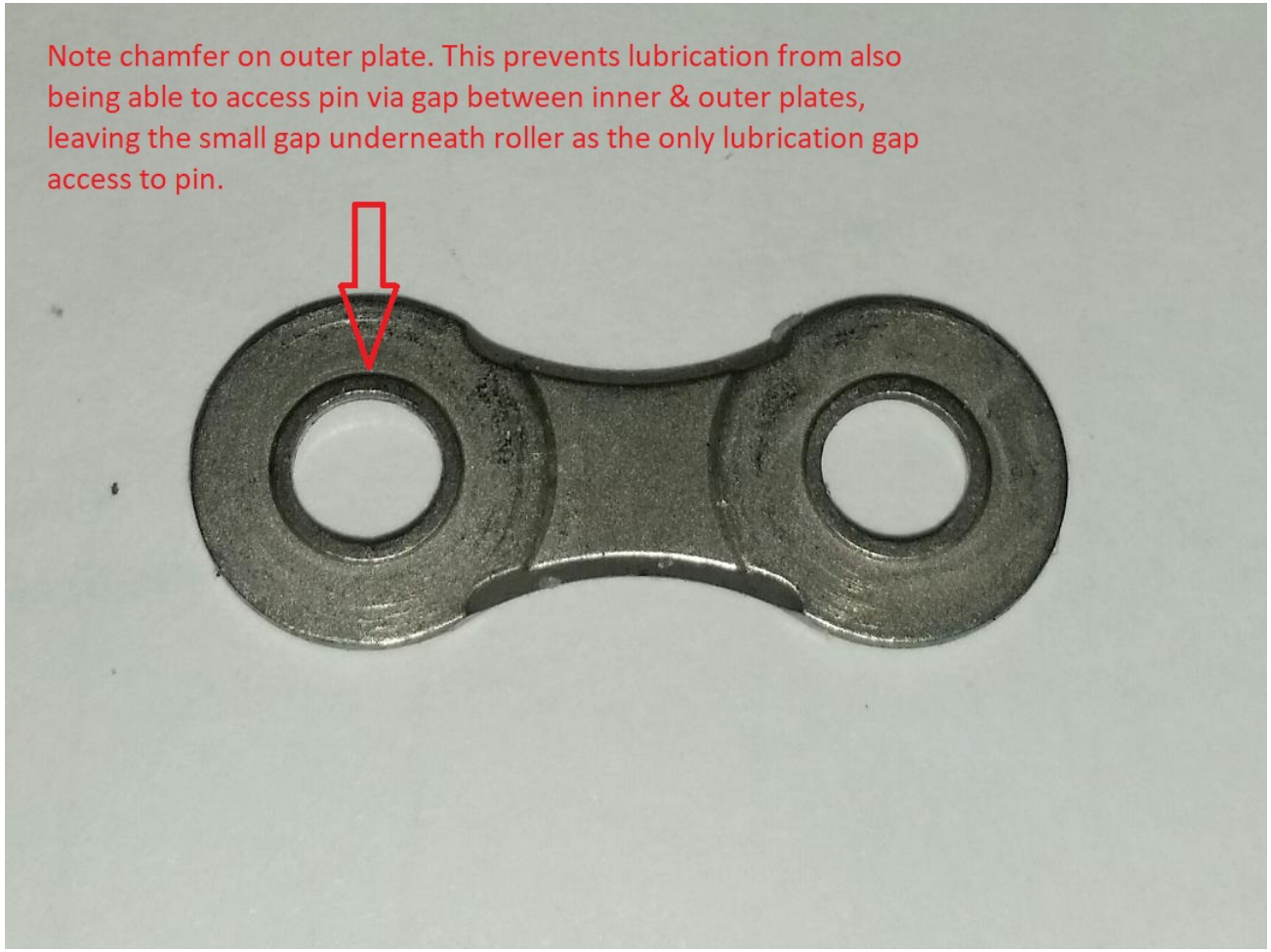
was without lubricant penetrating to pin in block 1. Typically a lubricant should have its best result re very low wear in clean block 1, then increase as contamination is added. If 20% of test wear allowance is used in clean block 1, that is clearly a very high wear result of hardened steel parts, which flat out takes a lot of friction. Such lubricants should absolutely be applied via immersive application where possible.



Now with Roller removed

(Note width of inner plate shoulders – inside bore articulates around pin, outside of plate shoulders articulates inside roller.





Thanks for reading – stay tuned, Tru-Tension Tungsten Race lube is on test now, and Silca Super Secret lube is high on the list to be done as well as the just launched absoluteblackGraphene