

Zero Friction Cycling

*Worlds most exhaustive independent bicycle chain lubricant and chain testing –
over 300,000km of controlled testing to date.*



Lubricant On Test : absoluteBlack GRAPHENwax

Cost: \$55.95 Aud from various online stores

Size – 340 grams



Photo :

Manufacturers Description on package;

N/a – alas due to time delay doing this review I no longer have packaging

Directions on package

N/a – alas due to time delay doing this review I no longer have packaging

Extra information from Manufacturer website

Unlike other Hot Melt waxes, GRAPHENwax ® not only exhibits lowest friction, but also lasts longer and is much easier to use. Usually after dipping the chain in melted wax you need to wait until chain cools down and then painstakingly break every chain link so the chain can be flexible again, leaving crumbled mess behind and particles on the frame and crank. With GRAPHENwax ® we have reinvented this process. After the chain cools down, you only need to run it between your fingers along its entire length, and the chain is broken-in leaving no pieces of wax behind. Our wax simply doesn't crumble during the chain movement, meaning you have more wax that protects the drivetrain for longer. It can also withstand those hot days where other wax lubricants simply melt off your chain. GRAPHENwax ® will not stain your fingers when handling the chain and it's the quietest wax coating you will use. **It's your "dream come true" wax lubricant.**

GRAPHENwax ® and our World Tour winning GRAPHENlube go very well together. If you plan longer rides you can "top it up" with GRAPHENlube ®. Chain will not require re-cleaning.

Why we don't use Tungsten Disulfide (WS₂) nor Molybdenum Disulfide (MoS₂) additives.

While these substances can exhibit super low friction, they do it only in vacuum or inert gas. In normal humid air they not only have high friction but also very short life because of the rapid oxidation process. Using these additives in chain lubricant, where water is often present, is simply pointless.

We also don't use any oils or paraffin oils in the mixture because it adversely impacts the friction.

Because of the complex manufacturing process the graphene wax is only produced in limited quantities at a time and will be sold on a first come, first served basis.

WHY PLIABLE GRAPHEN WAX IS BETTER THAN ANY OTHER HOT MELT FORMULA:

- *You don't have to painstakingly manipulate the chain links anymore to get the chain flexibility. Just run your fingers once along the chain length and job done.
- *It's the most quiet hot melt wax you will ever use.
- *It doesn't flake off like other waxes, which means no more mess once you put the chain on the bike.
- * You don't have to loosen the chain off like you do with other waxes. From get go you can even easily back pedal.
- *It's quiet for a long time because it sticks better to the side of link plates enhancing the shifting performance
- *It melts faster in the crockpot - saving you time
- *Lasts longer thanks to wax flexibility and Graphene additive

- *Delivers an incredibly low friction for much longer than any other wax.
- *Doesn't melt off your chain on a hot day.

HOW LONG THE BOX OF GRAPHEN WAX LASTS:

Each chain treatment uses only 3-4g (0.14oz) of wax if you let it drip back into the crockpot while it dries. We actually weighed it. If you clean your chain with boiling water (see video below), let it dry and then wax, you could get around 62 treatments and still have 100g (3.5oz) left in the pot to guarantee full immersion of the chain. It's only a matter of how much you contaminate the wax or how good you clean the chain with boiling water prior to every waxing. Wax will still last the same number of applications regardless of cleaning, but if you contaminate the wax too much, it will no longer be as effective.

It's like walking in the house with shoes on. The floor is clean as long as you clean your shoes every time you enter the house.

THE PRODUCT

In simple terms it's a wax with specially modified crystalline structure and a mix of additives with high purity graphene which makes it very pliable. Wax based lubricants exhibit far greater tolerance to water and dirt contamination, successfully separating moving chain parts from abrasion and filling in all the imperfections on friction surfaces. Graphene – the wonder material that is still not commonly used because of its incredibly high cost, is a great additive for a few reasons. It has extremely low friction coefficient in all the environments, is far stronger than any known material to a man and it can cling to metal protecting friction

surfaces from excessive abrasion. Moreover, it repels the water and is not permeable to air reducing therefore oxidative stress on the metal surface. Even a single atom layer is enough to reduce the friction considerably.

HOW TO LUBRICATE YOUR CHAIN WITH FLEXIBLE GRAPHENWAX ®

FIRST CHAIN PREPARATION: Take the chain off the bike or use brand new chain and clean it using a solvent (like White Spirit or mineral turps) by immersing the chain completely in the solvent for 20-60min using the poly bag that was delivered with the wax (Use gloves). Shake the bag with chain for 2min at the end. Take chain out and let it fully dry (10-12h - super important). Optionally you can rinse the chain at this point with 98% alcohol to remove any remaining residue. Once the chain is fully dry (10-12h) you can apply the lube normally like instructed below. Solvent cleaning is only needed for the first time to remove the oils.

1. After that , If the chain is dirty, you can clean it by simply pouring hot water on the chain and let it dry. Cleaning the chain this way doesn't contaminate the wax in crockpot, making it useful for longer.
2. Melt the GRAPHENwax ® in the crockpot (slow cooker) in usual manner on medium heat. Melt it completely. Our wax melts at around 70°C (160°F) but you should heat it to around 90-100°C (194-212°F)
3. Fully immerse the chain into the molten wax and wait until the wax buildup on the chain melts again (min 10-15min - IMPORTANT!). Best way to do this is to use wire metal clothes hanger by threading both ends of chain on the hanger.
4. Agitate the chain gently (up, down, left right) in the liquid wax (using the coat hanger) for about 3-5min to make sure that the wax goes into the pins. Links need bending movement in order for the wax to get in.

5. Take the chain out, hang it, then gently wipe the excess of the wax from the chain side plates and let it cool for about 15min.

5. After FULLY cooling to room temperature (min 40min), simply hold your chain in one hand and run it between two fingers of your free hand (as per our video) and job done

TROUBLESHOOT:

* Chain squeaks only after few hours of dry riding. - It means there is a wax starvation caused by improper waxing. Make sure wax temperature is correct (this is Crucial), make sure to wait minimum 10-15min after immersing the chain to the wax before agitating because chain needs to heat up to the same temperature - you cannot rush it. Inserting cold chain into hot wax dramatically decreases wax temperature. So you need to let it heat up again. Agitate the chain for 3-5min in a way to bend as many chain links as possible.

* Wax flakes off on my turbo-trainer sessions. - It means you didn't wipe the chain after hanging it to dry. Make sure the waxing temperature is right (it's crucial). After swishing, hang the chain and wipe it with paper towel/cloth on the outside plates then let it cool. Once cooled run it through your gloved hand to break the links.

Warning.

Please remember that melted wax is very hot, so you should always wear appropriate protective clothing, leather gloves and safety glasses. Never leave working crockpot unattended. After use, turn the crockpot off and make sure the still hot melted wax is not reachable by children or other unauthorized people. Use only

crockpot (slow cooker) to melt the wax. Never use oven, microwave or stove. Never exceed the temperature of 100°C (212°F). Never expose to open flame. Keep away from children. Use in well-ventilated space.

RE-WAXING INTERVALS:

GRAPHENwax ® coating will last on the chain for approximately 450 km (280 mi) in dry road conditions. The longevity of the coating will be reduced in dusty/off-road conditions. When the chain starts sounding dry, it is time to re-wax. **When riding in rain/wet conditions, the chain should be re-waxed after each ride.** This is inherent to all hot melt waxes no matter the brand, and cannot be avoided.

If your rides are often in mud/rain we recommend our amazing GRAPHENlube, which will greatly reduce the maintenance intervals.

Designed in UK. Manufactured in Poland (EU).

GRAPHENwax ® is a registered trademark of absoluteBLACK. Lubricant composition protected by several patents pending. #GRAPHENwax, #chainlube, #chainwax

Official Outright efficiency loss if tested by dependable FTT lab : Unknown.

This is extremely odd as much friction data was provided with Graphene Lubricant Launch. My favourite research lab has not tested at this time as not viewed as a priority test.

absoluteBlack Graphene Wax – Initial input re mfg claims.

Righto, this is a new section vs other detail reviews as a number of the above claims need to be covered somewhat before things get bogged down in full block by block breakdown, as there are a number of key points of contention from marketing vs testing that need to be covered as first priority for this review.

Firstly – a quick reminder that ZFC was heavily involved in testing graphene lube during its development, and found the product overall to be outstanding, and setting a new benchmark for single application longevity treatment lifespan. ZFC commenced stocking Graphene Lube as soon as available. I was expecting a lot from GRAPHENWax.

Alrighty, lets work through the GRAPHENWax claims and initial findings from testing.

Pls remember (to minimise the odds of AB taking legal action against this review) that the views expressed below are my personal opinion based on the testing results vs marketing claims, and as such are not stated as fact. Almost all of what I am about to type below is contended by AB, and AB believe they have created clearly the highest performance immersive wax in the world.

A final caveat however is that the ZFC test protocol has proven to be extremely robust over the last 4+ years and over 300,000km of testing. It is a test protocol both endorsed and heavily used by a number of the major manufacturers of the world to back their own precision efficiency testing, as there is simply no escaping the wear rate correlation of the ZFC test. It flat out takes friction to wear through the hardened metal parts of the chain at a prodigious rate. If you had at it on those parts with a frictionless cloth, obviously nothing is going happen. So when a lubricant delivers extremely low / nil wear rates for a block, that bodes extremely well for their lubricants low friction performance claims. If parts of chain wear like someone took a bastard file to them, then there will be concerns re that lubricant's performance claims, and of course all rates of wear in between those two extremes assessed accordingly.

With that fun disclaimer / prelude – lets dive into a super interesting case of mfg claims vs test results as well as other concerns raised throughout the test period.

➤ **Unlike other Hot Melt waxes, GRAPHENwax ® not only exhibits lowest friction, but also lasts longer and is much easier to use.**

I cannot find any efficiency loss claims from AB for GRAPHENwax. I find this interesting in that a fair ol cornucopia of test data was provided for graphene lube launch.

Despite ZFC agreeing with graphene lube launch performance claims, it needs to be highlighted that ZFC agreed only with the performance claims pertaining to Graphene Lube, and that the poor performance results of competitor products is contended by myself and numerous others.

Firstly the efficiency loss data from Wheel Energy showed a number of competitors to have rather poor efficiency loss results, results which do not line up with ZFC testing. I.e, if a known top lubricant over same test timespan with ZFC shows ZERO wear, where does 4+ watts of loss increase come from in the W.E testing. It cannot come from stiction / viscous friction, that level of increase must come from high pressure friction performance, which if performing poorly, results in wear. Also, on that graph, there was at least one lubricant that exhibited an initial increase in losses of multiple watts, only to then decrease by even more watts. There is no explanation how this is credible, and such up then down swings by such high values in so short a time have never been seen in an other efficiency testing. In short, the efficiency test results for competitor products are, in my opinion, of great concern, and not accepted.

Secondly, other more tribological testing completed such as pin on disc test, it is contended that this is not a valid test for many bicycle chain lubricants. This test does not, in mine and others opinion, replicate with any accuracy what is occurring inside chain links, where all parts of the chain are coated in solid lubricant, or even what may be occurring with a liquid lubricant. Typically in such a test, a solid wax is simply going to be quickly scraped off the surface of the disc by the pin, and high wear occurs to pin and the disc. If this replicated accurately what was occurring within a bicycle chain, obviously those running an immersive wax like mspeedwax / Silca Hot melt / Ceramic Speed UFO – would quickly show very high wear rates in cycling use. In reality, they deliver the longest chain and drivetrain lifespans we have ever seen, often by quite some margin.

AB advised they believe it is / was a completely valid comparison test. If that is so, where is the pin on disc test for GRAPHENwax ?

I do not believe we will ever see one.

➤ **Re lasts the longest claim**

Whilst graphene lube has exceptional treatment longevity, for GRAPHENWax both control testing, field testing, and cyclist feedback to me raises concerns re the above claim.

In ZFC test wear rates were extremely high right from the start. Where products like mspeedwax and Silca hot melt and Silca synergetic recorded 0.0% wear for clean block 1, and other top performing lubricants have recorded under 5% wear, GRAPENwax recorded 22% wear placing it as one other highest wear products tested thus far.

In field testing I found GRAPHENWax to feel and sound very dry VERY quickly, with both mspeedwax and Silca Hot melt lasting circa 3 times the distance before you notice the easily identified dry sound and feel that occurs when a wax chain treatment is reaching its treatment lifespan. And again, during such interval lengths mspeedwax and Hot Melt delivered zero wear, graphene wax delivered a very fast wear rate.

Throughout the months after GRAPHENwax launch, I had many cyclists from around the world email me to advise they found exactly the same result re treatment longevity after I put out an initial summary in one of social media post updates. They had tried GRAPHENwax based on a) the great performance advised for Graphene lube, and b) – again AB NAILED the packaging, it just calls out to one to buy it. But all that wrote in were very disappointed and switched back to either mspeedwax or hot melt that they were using before. I have not had a single cyclist write me an email advising they experience a result at odds to my testing – something that has happened with other lubricant reviews where a user's particular experience may differ for better or worse vs my findings.

On discussion with absoluteBlack, they advise that in all the sales of GRAPHENwax – which has been very strong, they have only had around 5 customers write back with performance concerns, and all were found / deemed to be incorrect prep by the customer, and the issue resolved when customer prepped correctly.

This is of course at odds with ZFC control testing, my personal field testing, and every single email I have received from cyclists testing GRAPHENwax vs their previous experience on either mspeedwax or hot melt. Readers of this review are going to have a fun choice to make re whom to put their belief in....

This contention therefore covers other main claims such as quietest wax as it quickly became notably dry and noisy.

➤ It doesn't flake off like other waxes, which means no more mess once you put the chain on the bike.

Again ZFC contends this claim, as well as the claim re it being the cleanest wax. I personally found it to flake off at a very similar amount to mspeedwax / hot melt without specifically measuring amount of wax flakes at X time.

Much worse however is that I found GRAPHENwax to be quite dirty to handle. Removing chain for waxing would have my fingers with black marks on them, I would not have wanted to wipe my fingers on my clothes after handling. If you get a rear flat with GRAPHENwax, I believe you will get dirty fingers. Whereas with mspeedwax / hot melt you can merrily remove your chain and throw it on a white shagpile rug with no fears.

- That friction modifiers such as moly or tungsten disulphide are only fast in a vacuum, and assertions they are very high friction in conditions competitors are using them in their lubricants.

Ok – This one really gets me. Both moly and tungsten disulphide are used extensively in innumerable industry and mechanical high performance applications in a gazillion different lubrication forms, hardly any of which are operating in a vacuum. You can do your own research here if you wish to delve further. If I address this point any further I am going to overstep my preferred diplomatic approach to differences of opinion re mfg claims. Like every human being I too have my tolerance limits. If we are going to accept this claim we may as well also accept that burning **97,103,871 barrels of oil per day** (*figures from 2016 study*) has no impact on climate change, that female professional cyclists are paid vastly more than their male counterparts, and that the world is flat and surrounded by an ice wall guarded by NASA.

Claims that may hold some basis in fact

- **Melts faster in pot** – maybe, but remember you get 340g in a pack vs 500g for msw & hot melt, there isn't much in it, and what there is may largely be down to a lower volume of wax to melt. Personally, melt time of wax is a non issue, I have plenty of fun things to do whilst my wax is melting, I don't stand there watching it melt.
- **It is easier to break in chain** – yes it is – msw / hot melt – especially if chain has set in cold area – can be a bit of work for your fingers. The more pliable GRAPHENwax is definitely much easier to break. Again however, I just pull my Msw / hot melt chains around a circular handle, job done in 15 seconds vs breaking bond link by link with my thumbs.
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A bit of wrap at the start of the review vs the end....

Typically in my detail reviews I cover the block by block performance, then cover overall result in a wrap vs main competitors & vs marketing claims, however in this case I'm going to do a bit of wrap before the block by block performance results whilst the mfg claims and contentions are fresh in our minds from the above pages.

I was very curious as to whether or not AB had delivered something truly exceptional with GRAPHENwax. If their marketing claims bore out true, then their pliable wax, being easier to break in and install, still clean, longer lasting per treatment (remembering graphene lube is extremely long lasting per treatment), lesser excess wax flaking due being pliable, lesser dry feel / smoother feel vs more solid chain coating lubricants – their pliable wax with graphene held much promise indeed.

I did find it odd that the launch was missing the cornucopia of testing data that we saw with Graphene lube launch – even if I personally found much of the Graphene lube launch data questionable at best, not a viable test at worst, and my opinion is that AB went to market with a strategy of looking to tear down their competitors as much as possible vs simply standing tall on the merits of their own products performance – an approach I personally disagreed with strongly as it released much data that just conflicts with other testing which causes confusion. And its just a poor form approach (in my opinion) that was completely unnecessary, Graphene Lube performs to such a high level it is well capable of standing tall on its own – it does not need to try to peg down other known top performing products in the market place. AB & I disagree strongly re the above.

So where is the supporting data for GRAPHENwax?

- There is no efficiency testing with W.E.
- Of great interest to myself and others there is no silly (in my opinion...) pin on disc test
- There are none of the other fancy tribology tests accompanying Graphene lube launch.

It is all claims, no data. Had Graphene lube launched similarly, and then I tested and found it to be an amazing product – which it is, I would not have such concerns re the absence of the data for GRAPHENwax launch.

However both the absence of any supporting data and matching tribology testing for GRAPHENwax, COMBINED with the very poor test results, observations vs claims, and same experiences being reported by many cyclists around the world who have tried GRAPHENwax – the absence of supporting test data I feel may have some depth to it. Maybe they didn't want to spend the money after the huge costs for Graphene Lube. Maybe they genuinely believe based on their own in house & field testing that all claims are genuinely met. Maybe based on their own in house and field testing they knew that the tests performed for Graphene Lube would not go very well for GRAPHENWax. Only AB knows, and they will certainly not advise it is the latter.

Based on the result obtained in my testing , again – purely my personal opinion – the data is not there because it would take some even more creative tribology testing to have GRAPHENwax deliver great looking test results vs competitors, and obtaining such creative test results working with 3rd party test labs is extremely resource & \$\$ intensive.

So, to date the only controlled independent testing we have for GRAPHENwax that I am currently aware of at the time of typing this review is my ZFC test. If you want to know all about the test the full protocol is accessible on the lubricant test page on ZFC website (so – not secret like W.E testing). And again, there is a reason why ZFC testing is used to back precision lab testing – the ZFC test is a fairly blunt instrument, but this makes it extremely robust. THERE IS NO AVOIDING THE WEAR RATE CORRELATION – and this has been proven, upheld and peer reviewed – hence the use of ZFC test to help substantiate lab efficiency testing / other tribology testing results.

Unfortunately, surprisingly and disappointingly as we will see from the block by block results below, GRAPHENwax demonstrated a very high chain wear rate from the gun. I believe it is fairly safe to say that I am pretty well versed in prepping chains perfectly as per manufacturer instructions, being the only other company in the world officially allowed to sell chains pre prepped with Mspeedwax outside of Mspeedwax themselves, same with Silca Hot melt, and same with absoluteBlack Graphene lube – based on the fact they have 100% confidence in my ability to ultrasonically clean and prep chains perfectly every time (will be interesting if my graphene lube prep permission is soon revoked...). Obviously a poorly prepped chain would deliver a poor customer result, probably leading them to think that product is poor – so a huge amount of trust is placed in me / zfc by mspeedwax / silca / absoluteBlack in granting this permission. Being in the independent testing space, obviously all companies contracting ZFC to test their products need to have 100% confidence the test chain/s are prepped perfectly as per their instructions – and as such it is so done.

I take extreme care and attention so as not to potentially waste 2 months of testing time to possibly then need to re-test if an error was made on the initial prep.

I am obviously biased here and so AB are free to claim I must have prepped incorrectly to have obtained the results I obtained. For what its worth, I am 100% confident that I prepped the test chains perfectly, the results are accurate, reflective of field testing, and reflective of cyclist's feedback from around the world – I do not believe a re-test to confirm is warranted. If I held any concerns at all re the validity of the test, and I mean any teeny tiny amount of concern, I would have re tested immediately. I take the role of trusted independent test facility as seriously as it is possible to be taken, and I would never go to print with a test result where I held ANY level of concern regarding the accuracy of the test results.

So you can believe AB if you wish that the test results must be incorrect, I must have made an error in prep etc – that is perfectly fine, no one is above question – and if anyone has any specific questions please zing them through, I am always happy to answer any questions with regards to any test. I just wish to convey before such assertions (which I am expecting) are made by AB, and knowing also how quick AB are to pull the trigger on legal action (or other not very desirable actions such as discrediting), that I stock & recommend AB graphene lube based on its exceptional performance, ZFC is here to support manufacturers bringing genuinely great products to market, hence what are the odds that I would not have taken extreme care with the prep and testing on this test (as with all tests). Also ponder whether I would have greatly preferred for GRAPHENwax to be an outstanding product ZFC could stock alongside Graphene Lube (bundle packs etc).

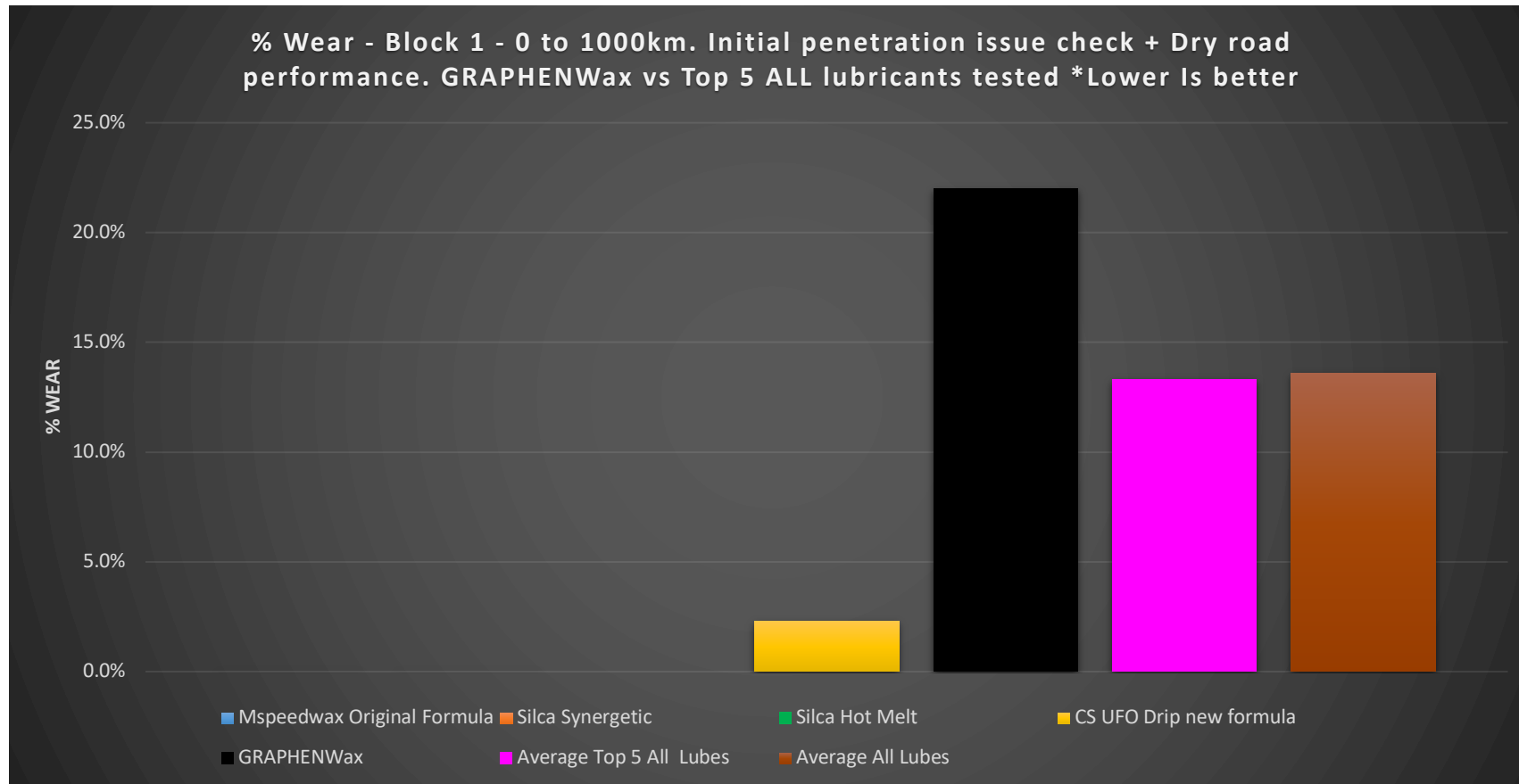
For what it is worth, I had every reason & wish for GRAPHENwax to deliver outstanding test results, and zero wish / desire for GRAPHENwax to deliver concerning test results. In fact the concerning test results are a right pain in the arse – if there a not time consuming consequences / reputational attacks for this review I will be surprised.

But the results are what they are, the ZFC test protocol is extremely robust and dependable, and again not to be unhumble (new word?) few have as much experience prepping chains as I do, especially for immersive waxing. You can weigh up all of the above, and decide which party you believe, the mfg, or the independent test facility that places the absolute highest level of integrity possible regarding delivering to readers / cyclists accurate independent test assessment results. K – that should cover it!! Apologies for all that – previous dealings with AB, I just really, really need to cover some bases and keep my awesome lawyer on speed dial.

absoluteBlack GRAPHENWax Test results

BLOCK 1 – No Contamination – Performance assessment for dry road riding from new prepped chain.

Test stops when net chain wear reaches 0.5mm+



Here we go.

As touched on in the above prelude, the wear rate for GRAPHENWax was very high right from the start. This was not only unexpected based on the performance of Graphene Lube, but it is also extremely surprising for an immersive wax.

Typically wax emulsion lubricants with significant initial penetration issues have delivered circa 20% wear rate in clean block 1, a wear rate that typically drops to under 4% when the same lubricant is applied via immersive application (Squirt, Smoove, Tru Tension, Grax).

The top immersive waxes known and recommended at the moment (Mspeedwax & Silca Hot melt) are both at 0%, and I would expect that the vast majority of DIY waxers using terrible things like candles or cheap hardware paraffin – both options of which contain a lot of undesirable impurities such as high mineral oil content, soy, palm oil etc making them both slow and quickly very gunky giving immersive waxing a bad rap at LBS's all over the world – would likely still come in well under the wear rate delivered by GRAPHENWax.

The only lubricants to record a result worse than GRAPHENWax in block 1 are the worst performing lubricants ZFC (and in some cases both ZFC and Friction Facts) have ever tested – so it is keeping company with the likes of White lightning epic ride which recorded a 9w efficiency loss figure with Friction Facts, Wend Wax which is frankly – terrible (in my opinion 😊), and the infamous Muc-Off Hydrodynamic and Muc-Off Nano which tested more akin to cutting fluids re the rate they ate through test chains.

PLIABLE WAX FAIL?

How is such a result possible for an immersive wax? My leading theory – which also would cover the very short treatment lifespan demonstrated in field testing (and common feedback from around the world) is that the pliable wax approach is a fundamentally flawed.

When Friction Facts discovered that very high quality & refined paraffin was such an exceptional bicycle chain lubricant, investigation into why it was such revealed the fact that quite quickly excess wax is pressed out from the huge internal pressures under rider load, and the remaining coating over the next 20 to 40 minutes self polishes to a very high polish coating, which is super slippery and has extraordinarily low stiction and zero viscous friction. This is why such waxes continue to improve as the wax treatment is broken in, typically reaching this optimal state around 30 mins of riding. Lubricants that have focussed on “conditioning” the chain itself have typically struggled (to put it kindly)– to polish steel takes friction for anything to happen, so the lubricant itself needs to be an abrasive paste. Other lubricants that try to fill in the troughs and peaks with their friction modifier additives again tend to struggle with contamination coming in and ruining the party, continually scuffing and messing up the surface. Some recent lubricants are succeeding here (like silca ss drip, synergetic, UFO drip) – but if you pick up a bottle claim ceramic particles are doing wonders re forming X coating and filling troughs & conditioning chain metal – good luck re your wear rates, you will need it.

The extremely high quality paraffin used as the based in the top known immersive wax as wax based lubricants is soft enough to self polish and self heal quickly, but the layer is strong enough prevent metal on metal contact until the layer is worn too thin. Stay within treatment lifespans, and as proven 6 ways from Sunday, the chain and drivetrain component lifespans attained on Mspeedwax / Silca Hot melt often simply have to be experienced

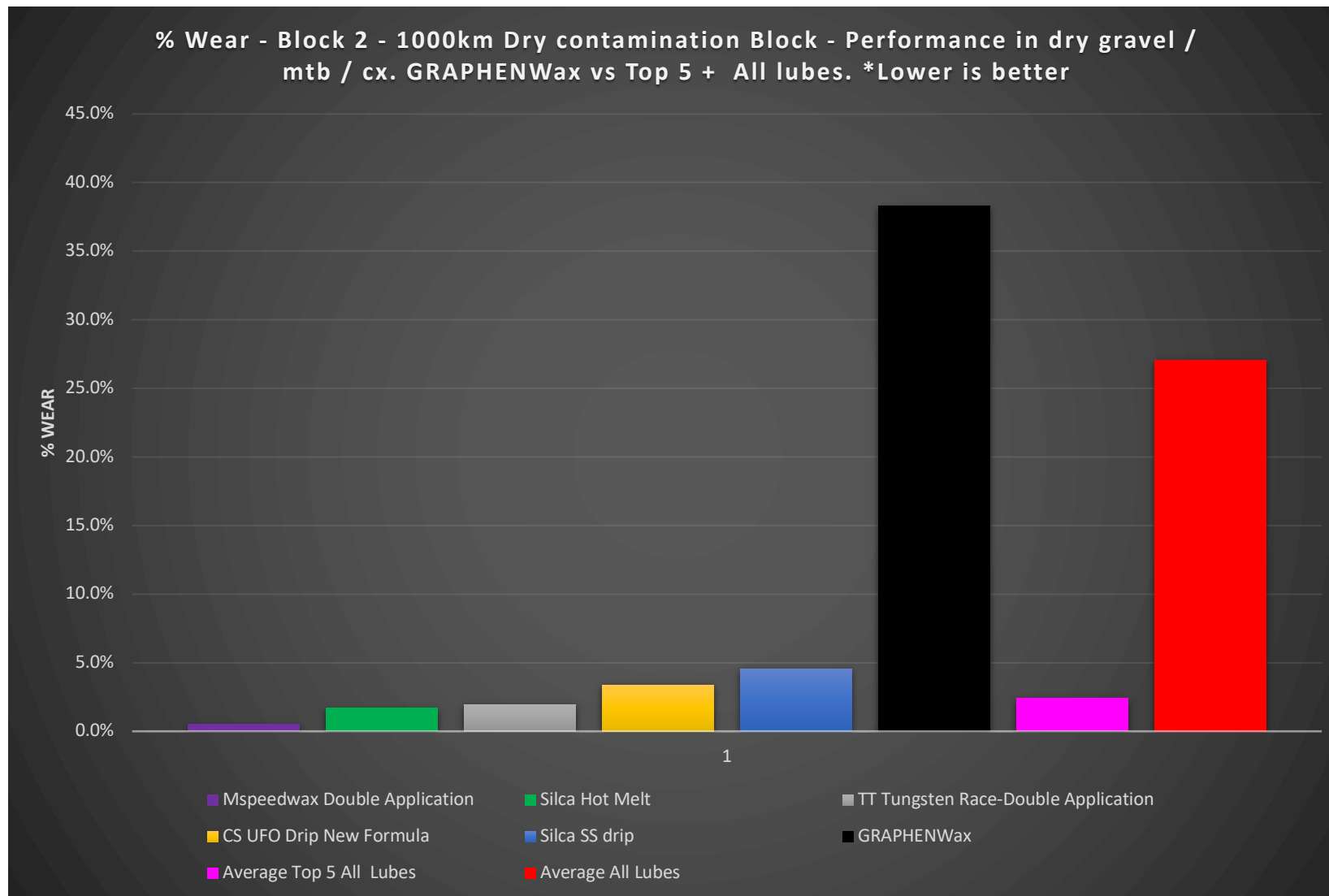
to be believed. The extreme longevity of your chain and components is your back up proof you are running very low friction lubricant day in day out. Again – wearing through metal at a prodigious rate flat out takes friction.

This is purely theory, but my belief at this time is that AB's approach of a pliable wax simply has not worked, the wax is too soft to prevent metal wearing on metal. Pressures inside your chain from rider load due to the very small nature of the parts involved can reach into thousands of psi.

Also, the softer wax, as you will see from the contamination test blocks, appears to absorb much more contamination whereas the majority of it just bounces off waxes like Mspeedwax / Silca hot melt.

I am also 100% certain that AB will refute this in the strongest terms, as well as my testing, but it sure will be interesting if an updated formula comes out one day that is less pliable.... Place your bets. If I was me at it was my drivetrain on the line, I know where I'm placing my bets.

BLOCK 2 – Dry Contamination – Performance assessment for dry gravel / Mtb / Cx riding.



So here we can see that things go from bad to worse, which is again a surprise for an immersive wax. One of the key advantages for immersive waxing / solid coating lubricants is the extremely high contamination resistance.

Again lubricants such as Mspeedwax / Silca hot melt have proven a) to have highest level of contamination resistance to begin with being a true solid lubricant – it is always better to have as little contamination as possible penetrate to begin with vs having to have a way of dealing with a whole bunch of contamination that has become part of the lubricant, and b) to be highly “self healing”, in that should abrasive contamination penetrate, typically this physically abrades the paraffin wax off, typically taking the contamination out with it, and then the coating self polishes and heals very quickly. Such coatings tend to remain very low friction in harsh conditions until suddenly they are not. The trade off of course (there is always a trade off...) is shortened treatment lifespan. As whatever abrasive contamination that does penetrate is physically abrading off your lubrication layer, the harsher the conditions, the treatment lifespans will be notably shorter – so depending on event your lubricant choice may need to change. There is a point with such treatments where the friction will increase suddenly as there is insufficient wax layer left, and you are mostly now running contamination & metal.

On the plus side though for most race / event lengths, you get a very low friction coating that will remain very low friction from flag to flag, after which you can re-wax and tada, all is magnificent again.

It appears that the softer GRAPHENwax simply absorbed more contamination vs the majority just bouncing off as is the case with mspeedwax / hot melt / ss drip / ufo drip / tru-tension tungsten all weather or race / Smoove etc – and that GRAPHENWax lacks the shedding and self healing properties of the top solid chain coating lubricants.

At 38.3% of the 0.5% chain wear allowance for the dry contamination test block, GRAPHENWax is unfortunately keeping company with the worst performing lubricants tested by ZFC. This is a VERY high wear rate making GRAPHENWax highly unsuitable (in my opinion...) for gravel / Dry mtb riding, which is highly unusual of course for this lubricant type, with products like mspeedwax / silca hot melt being the absolute best lubricant choices you can make for such riding. Even wend wax recorded a higher performing result at 33.6%. Being beaten by Wend is not a benchmark area one wants to be residing in.

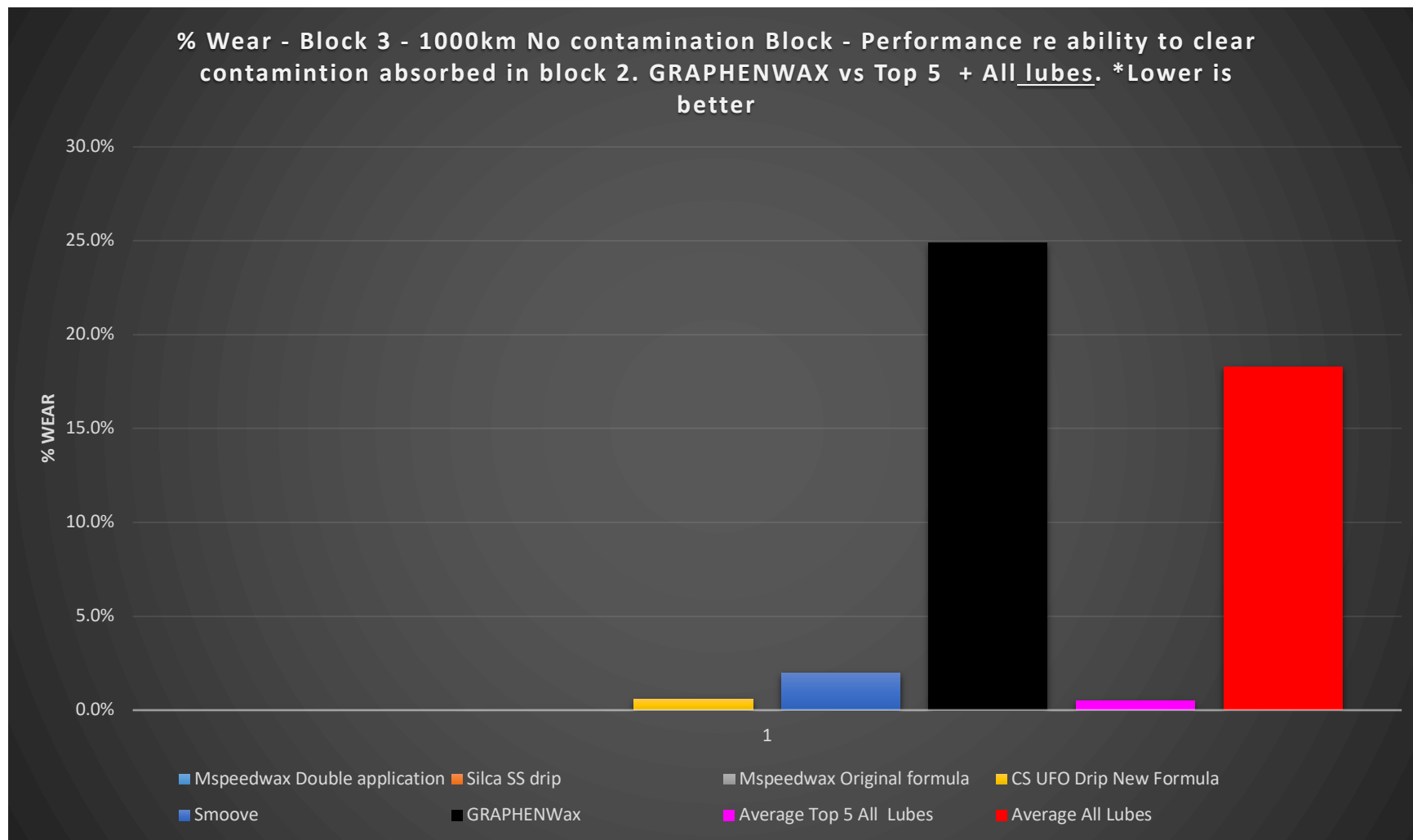
Quick recap on **Wend wax** for those who missed the review;

- Wend Wax launched as the worlds first rub on wax stick. Their website and marketing claimed “Just rub wax on chain and have a race ready chain in seconds”. Unsurprisingly, wend were unable to break the laws of physics with their product, and it turns out if your rub a solid lubricant on the outside of your chain, you have a solid lubricant on the outside of your chain, and no lubrication inside your chain.
- The first test chain wore to the 0.5% allowance mark in 800km in block one, same as a chain stripped of all lubricant. It sounded and performed exactly the same as a chain with zero lubrication. Which is to say it was a horrendously loud and horrible test to run, one with very scary chain suck for the latter half, and not a test I ever want to do again.
- Upon contacting wend re this result, they advised that oh, not all chains are the same, you must need the “advanced application technique” – whereby I needed to dissolve the wax into the chain with their specific “wax off” solvent.
- This worked to get some lubricant into chain, but overall it performed very poorly.
- And – remember now you are mixing your own wax drip lube in a multi step process, when there are already pre-mixed wax lubricant options on the market that perform vastly better, and at one half or one third the price of wend.
- To combat this, Wend released the wax in a range of colours, and to my eternal disappointment, the market went wild.

- To enjoy a coloured wend wax chain, that actually sort of kinda works with some level of lubrication, you need to rub on the coloured wax, dissolve in – this will of course also dissolve off your coloured wax, wipe chain and allow solvent to dry, rub on your coloured wax again so you have a coloured chain. This will last for about 2 to 3 minutes of riding before the colour is just a mess of excess gunked up wax as you have now way over applied how much wax you need or want on your chain. To get a couple minutes of colour.
- Can someone explain to me how so many people fell for this marketing?
- The wax sets like concrete. It is an EXTREMELY difficult clean.
- Efficiency testing for wend wax and wend race chains by CS Denmark lab has it at over 14w loss. You can claim this test result to be biased as it is tested by CS. I do not, I have been working with this test lab since friction facts handover. If it was a contender, as some great products are like graphene lube, silca ss etc – CS just keep working extremely hard just to have a lubricant that is a small amount faster. If wend was fast, it would be reported as fast – even if CS reported it not quite as fast as UFO. But at over 14w, it was barely even able to be tested as it was basically off the scale of the machine.
- As I work very hard in this space to improve cyclist information and education re trying to ensure make a great lubricant choice decision and save your drivetrain from a lot of friction and wear – it dismays me greatly to this day that all Wend had to do to sell a horrific product (in my opinion 😊) like hotcakes was to release it in some gimmicky colours.
- C'mon everyone, we are smarter than this. I know some marketing is hard to see through the hyperbole to the facts – but this is a case where it really was not difficult. I get that inevitably some are going to fall for it, but the market & lbs take up of wend due to the wax being in colours – lets make sure our logic circuits are at least on level one. It has been sad to see a lot of drivetrains ruined in short order thanks to simply a terrible product (in my opinion...) simply being released in some colours. Deep breaths. Deep breaths.
- Do not feed the sharks in our industry, support manufacturers investing a lot and working very hard to bring genuinely great products to market that genuinely increase your drivetrain lifespans by, in many cases for the top known lubricants – typically 2 to 3 times vs an medium choice lubricant, 5 to 10 times a poor choice lubricant.

So – obviously not the kind of company performance wise one wants their lubricant to be hanging out with. It pains me that GRAPHENWax is hanging out with what ZFC rates as one of the shonkiest product release of the last decade.

BLOCK 3 – No Contamination – Performance assessment re clearing any contamination absorbed in dry contamination block 2.

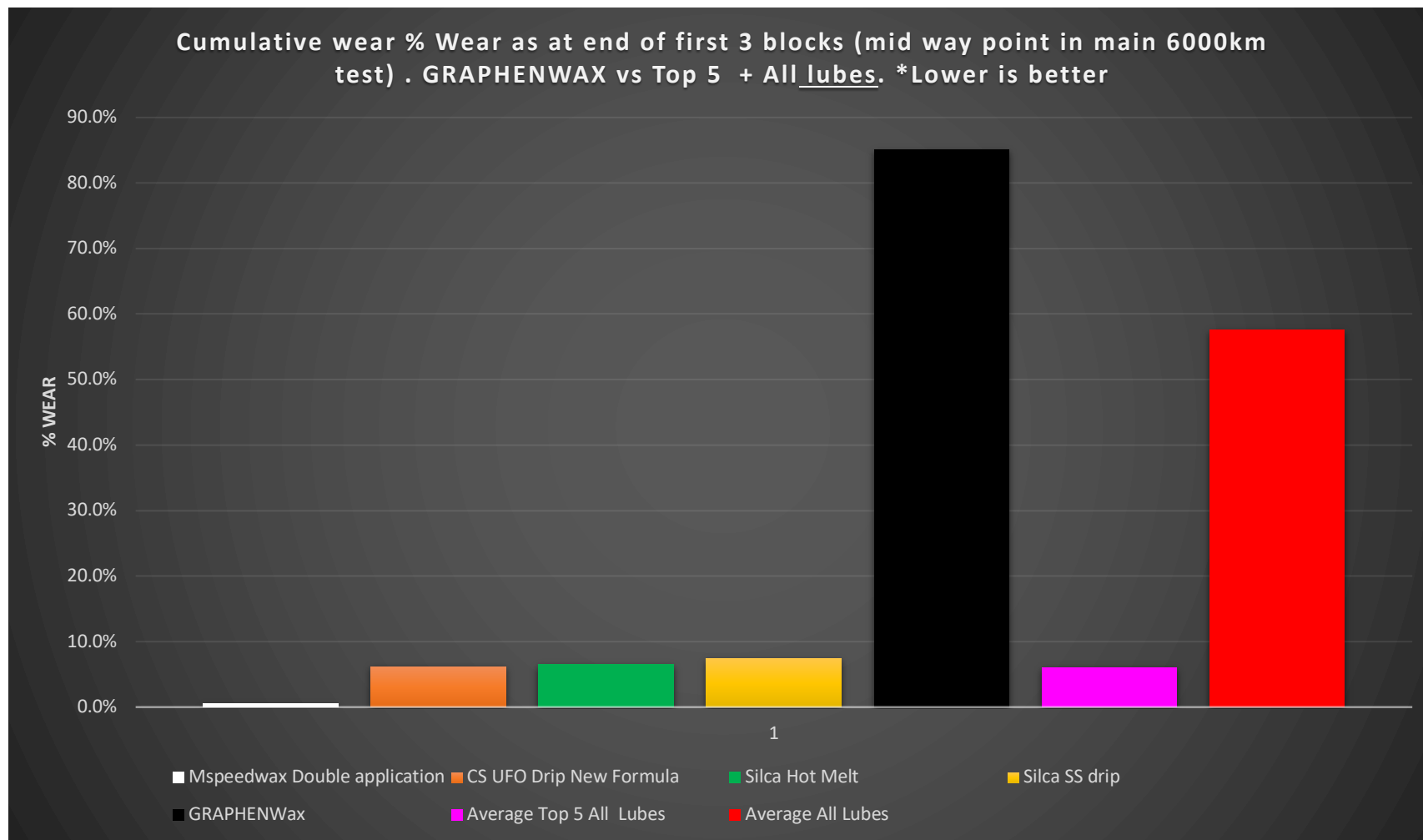


So if we look at GRAPHENwax vs average all lubricants tested, it doesn't look too bad.... But a reminder that in all lubes that average is made up of some horrendously performing lubricants tested.

Versus the competition GRAPHENWax is claiming to be beating on all fronts, it is way of the mark – with the top tested lubricants resetting back to either 0% wear after being re-waxed, or even near zero wear for the top lubricants that simply didn't really let any contamination in during block 2.

Whilst the wear rate for GRAPHENWax did drop from 38.3% to 24.9% - this does show that the re-waxing did in fact clear and reset MOST of the contamination that was absorbed during block 2, as the 24.9% is close to the clean block 1 wear rate of 22%. So it is almost back to its clean performance baseline, it is just that the wear performance baseline is really, really high (bad).

Where are we at with Cumulative Wear at halfway mark of 6000km main test?



At the halfway mark of test we have had 2 x No Contamination (clean) blocks sandwiching 1 x dry contamination block. The test gets proper tough after this halfway point as we hit wet contamination block in block 4 which puts many lubricants to the sword.

Mid point (well, mid point of main test should a lubricant make it all the way to the end of block 6 – 6000km, which is looking rather unlikely this test), GRAPHENWax has used up over 85% of its 0.5% wear rate allowance, vs its main competitors in this space the top 5 of which have use up only 6.1%.

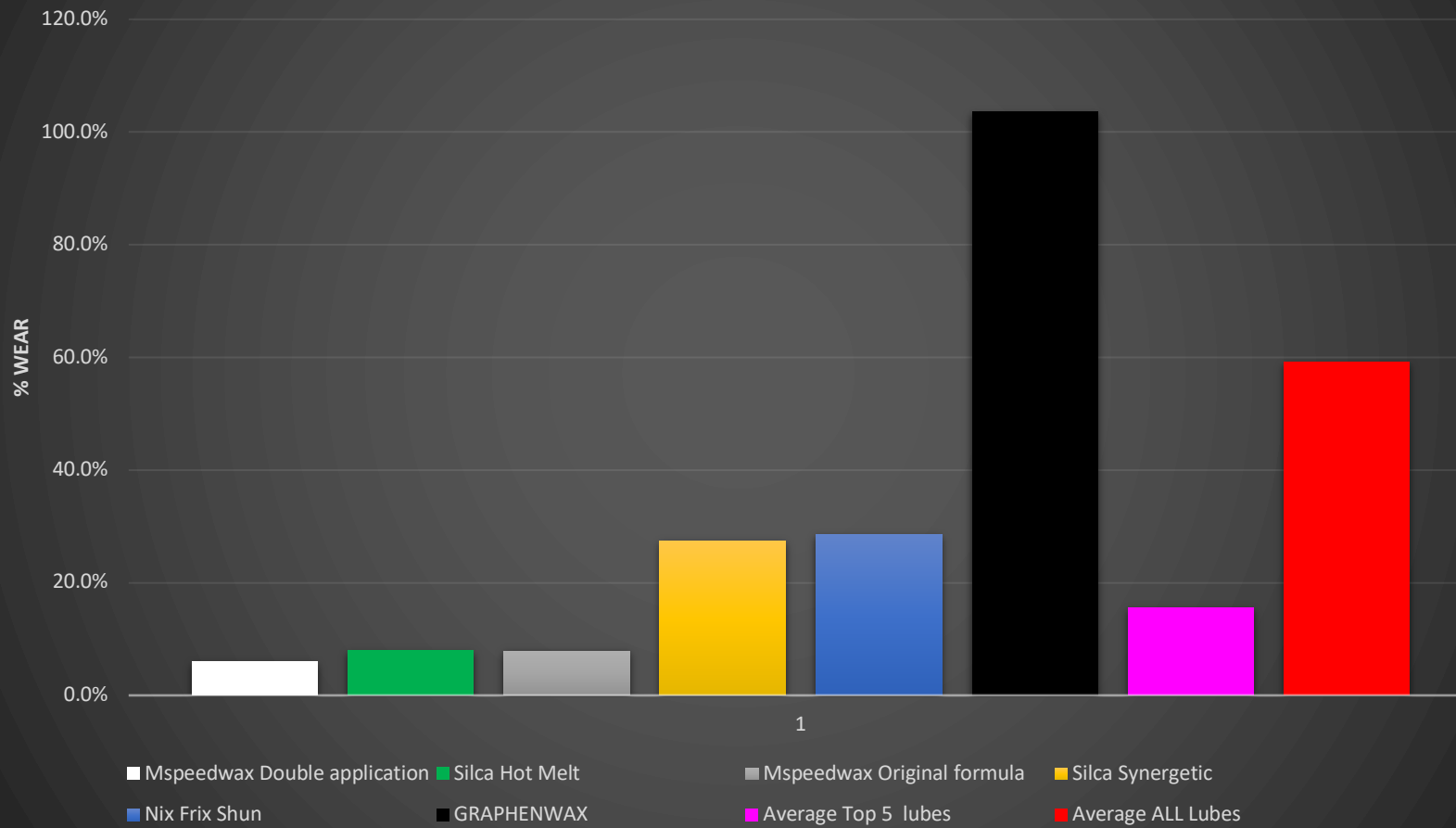
That is not a gap, that is a veritable Chasm.

Have I mentioned there is no escaping the wear rate correlation?

A manufacturer can release all the fancy tribology testing in the world (which as already mentioned, is strangely absent for GRAPHENWax), but the most accurate test of all is testing the lubricant in a precisely controlled manner IN ITS ACTUAL USE CASE, which is on a bicycle chain on a bicycle drivetrain. A very high wear rate = metal parts wearing quickly, which as physics dictate, simply flat out takes friction. Extremely low wear rates demonstrate an extremely high likelihood manufacturer claims are holding true.

BLOCK 4 – Wet Contamination Block– Performance assessment riding in harsh wet conditions.

% Wear - Block 4 - 1000km Wet contamination Block - Performance in Harsh wet conditions GRAPHENWax vs Top 5 plus all lubes. *Lower is better



Quite simply GRAPHENWax fell off the cliff it was already teetering on in wet contamination block 4. Recording over 100% of its 0.5% wear allowance just in this test block alone, it was not only 6.7 times greater wear rate vs its key competition, but it was also much higher than the average of all lubricants tested thus far.

This makes GRAPHENWax really not suited to harsh conditions riding. Unless you are able to pack your slow cooker and re-wax mid ride. And your rides are really short. And even then you will be well behind re wear rates vs the top known lubricant choices. It is massively behind its key competition here.

Again I believe simply that the pliable wax both a) absorbs too much contamination, b) is too soft to prevent contamination from abrading against chain metal, c) The pliable wax is unable to shed contamination and self clean / heal. D) This brings a lot more contamination into your wax pot when re-wax post wet rides, making the wax in the pot much more abrasive much more quickly than top immersive waxes such as Mspeedwax / Silca hot melt, and e) the short treatment lifespan (in my opinion from controlled and field testing) had the wet contamination intervals exceed GRAPHENWax treatment lifespan leading to very high wear for the latter part of each interval.

Combine all 5 concerns, in my opinion this explains pretty intuitively the extremely high wear rate recorded for GRAPHENWax in wet contamination block 4.

I am scared for any drivetrains running GRAPHENWax in harsh conditions.

I am a bit scared for any drivetrains running GRAPHENWax period.

BLOCK 5 – No Contamination – Performance assessment re clearing any contamination absorbed in Wet contamination block 4.

GRAPHENWax not tested as had well exceeded wear rate limit for main test at end of block 4.

BLOCK 6 – Extreme Contamination Block– Performance assessment riding in extreme conditions – very wet and harsh contamination ie events containing lots of mud..

GRAPHENWax not tested as had well exceeded wear rate limit for main test at end of block 4.

Total Cumulative wear end of test at 6000km with 3 x 1000km harsh to extreme contamination blocks;

Unable to provide a viable result for GRAPHENWax for the full 6000km main test as it was far too past wear rate allowance by end of block 5 to accurately extrapolate a result for blocks 5 & 6.

Single application longevity results.

One the most common questions I receive these days is will X lubricant last me for X event. The initial single application longevity test was not sufficient, it was relatively quick test tacked onto the end of the main test as I put all my focus onto ensuring main test protocol properly assessed all the key performance area's needed.

Over time it became clear the initial single application longevity test was not sufficiently well thought out, and also that this area is a key piece of data for many racers or riders participating in a groovy event, I have introduced a new, vastly better Single application protocol.

Alas – this takes a lot longer and multiple chains per test to cover road, dry offroad and extreme conditions, and so I am as I type working my way through re-testing all lubricants worthy of testing, or new tests currently completed (such as Graphene wax).

****Note so AB do not sue me re Graphene Lube test, this test was not part of private contracted testing, and was recently conducted on a commercially purchased bottle of graphene lube****

At the time of writing I can pop in the below data, however again for full information on the test and the results head to the lubricant test page to download the full test results document.

Okey dokey – Dry road conditions;

Lubricant	Real World Km's to Wear allowance
AB Graphene Lube	1085
Silca Synergetic	778
Silca Hot Melt	531
UFO Drip V2	394
AB Graphene Wax	140

Dry offroad conditions;

Lubricant	Real World Km's to Wear allowance
AB Graphene Lube	440
Silca Hot Melt	343
Silca Synergetic	230
Ufo Drip v2	360
AB Graphene Wax	140

Extreme conditions;

Lubricant	Real World Km's to Wear allowance
AB Graphene Lube	270
Silca Synergetic	230
Silca Hot Melt	212
UFO Drip V2	119
AB Graphene Wax	115

*(**Missing from the above at the moment is Mspeedwax as original test was under old longevity test protocol, I am testing their new formula as I type under the new test protocol, keep checking lubricant test page for data updates, data is updated well before detail reviews are able to be completed – I expect it will be similar ballpark to Silca Hot Melt, main test blocks have been testing extremely well)*

Overall to date – whilst I have a lot more S.A.L testing to re do under the new much improved new protocol, we can see that mostly GRAPHENWax is way down vs competition, which is at odds with marketing claims of it being longest lasting immersive wax.

Again, this was also backed up in field testing, with GRAPHENWax feeling and sounding VERY dry VERY quickly vs Mspeedwax or Silca Hot Melt both of which stay in a lovely silky smooth zone for a good stretch, even in dusty offroad conditions. I have extensively used Mspeedwax in many races and events over the last 5+ years, and also recently tested out hot melt, using recently in an XC marathon event where I raced hard for 213km of dry mtb riding. The chain was still in

silky smooth zone, had not even begun to make the zzzz, zzzz, zzzz sound & feel that one gets with solid coating lubricants when they are starting to reach their treatment limit. GRAPHENWax would be reaching this stage by around 100km of dry road riding. My wear rate for my race chain pre and post race with Hot melt was 0.00. After a 213km xc marathon race. I have had extremely low wear results (under 0.05) on same race in previous years with the original formula of mspeedwax, new formula is looking to beat the original formula. Based on my field testing, GRAPHENWax would not have lasted this event, not even close, and the start to finish wear rate I firmly believe would have been very high indeed.

For the extreme conditions S.A.L test block we can see that it was pretty close to UFO drip v2 which did struggle in the wet, as did silca ss drip which apologies I still need to update the table (time, I just struggling for time, im trying to punch out this review as fast as possible so I can devote a day to data updates – will be done asap – retail is soon to be taken over by a new awesome retail manager so I can concentrate on testing and documents).

In short, in extreme conditions I would not run GRAPHENWax or ufo drip v2 or Silca ss drip (remember chain coating type lubricants are typically have around half of their volume being carrier, half being actual lubricant, so vs 100% lubricant lubes – they can suffer short lifespans in very harsh conditions vs the immersive wax version of same lube, such as Silca hot melt or a UFO wax chain vs UFO drip etc. Mspeedwax do not have a drip option so its always 100% lube with the immersive wax).

However, in all other conditions I would not run GRAPHENWax either.

A reminder at his time that one should ALWAYS ensure they reset contamination in chain post ANY decent wet ride (Road or offroad), how this is done varies by lubricant type, check out maintenance level 1 you tube vid by ZFC – more detailed videos will be coming 😊

<https://www.youtube.com/watch?v=5O6dEvb4SKQ&t=28s>

Total Cost to run over 10,000km.

This is an extremely important metric, and so I have recently spend much of previous project week greatly expanding the cost to run modelling to cover ultegra groupset – road conditions, Dura ace groupset – road conditions, GRX 800 groupset dry offroad, and GRX 800 extreme conditions.

The cheaper the groupset (ie 105, dry road riding) the lesser impact on your wallet for running a meh lube and meh maintenance as cost if you wear out parts fairly quickly is not so bad.

The higher tier groupset with very expensive parts, then the performance of the lubricant is critical, and so far all of the proven top lubricants – it does not matter at all what it costs per bottle if the wear rates delivered are extremely low, as the cost of components far outweigh lubricant cost.

So this modelling is pretty detailed factoring in cost of lubricant, amount of lubricant used, component wear rate, and cost of those components, all adding up to total cost to run per 10,000km for that specific groupset in those riding conditions.

Now your cost to run may obviously differ as your power may be higher or lower, your contamination may be worse or not as bad etc etc – no controlled test can perfectly model real world testing – neither can real world testing as rider Y will vary greatly vs rider X. However the value in very controlled testing over thousands of km's with specific clean and contamination blocks enables a clear cost to run comparison for using lube X vs Y lube and what you can expect for your type of riding.

The modelling is too detailed to pop in here, you really need to read the full modelling notes and see the full tables – which you can do so by going to lubricant test page on zfc website, and downloading the full data document (the test page has some main wear graphs on it, but full data including cost to run is obtained by downloading that document via the link).

In summary however for GRAPHENWax, total cost to run drivetrain with this product is EXTREMELY high, both due to the quite high cost of the product itself, combined with very high drivetrain component wear rate results. GRAPENWax on

dura ace drivetrain calculates out to nearly 5 times the running cost vs its main competitors of Mspeedwax and Silca Hot Melt.

Final Test observations and review

So a pretty bruising / brutal overall performance review for GRAPHENWax, and again this is extremely surprising given the absolutely outstanding performance results for Graphene Lube.

As already stated, my belief at this time is that the pliable wax approach is simply fundamentally flawed, and this is what sits behind the very poor wear rates, contamination absorption and treatment lifespan. It is a great marketing angle though, so there is that to consider in amongst all of the above, how that angle may or may not have factored into this product coming into being in this form factor.

Some cyclists are all onboard re the understanding of why immersive waxing has some unassailable advantages over drip lubes, in that every single re-wax the chain comes out basically looking brand new, any contamination that has managed to penetrate the solid lubricant layer (which for a part operating externally and completely exposed to contamination has some unassailable advantages) is simply flushed out on re-wax, and all parts of chain are re-coated with a solid super slippery coating.

However, the deal breaker for some cyclists has been the less damped feel of a solid lubricant vs liquid lubricants (mind, if one hasn't tried mspeedwax / hot melt – you will be pleasantly surprised just how silky smooth they are for a darn good stretch before feeling and sounding dry), the need to remove chain each time to re-lube (re wax), and the relatively short lifespan vs some of the longer lasting drip lubes on the market.

Also the excess wax flaking off, breaking wax bond etc is a PITA for some that is not too their liking (again though, even a small modicum of experience and one gets extremely proficient in taking care of both of those aspects of waxed life).

I do not believe it is a coincidence that GRAPHENWax launched to market promising to have addressed all the main barriers for some re moving to immersive waxing. The promise of their pliable graphene infused wax offering superior treatment lifespan so longer time between re waxes, much less wax flaking, easy break of wax bond, and lower friction – all that a potential but not quite there yet immersive waxer needed to hear to get over the line.

The reality throughout the ZFC control and field testing was that its lifespan was vastly shorter, there was basically just as much excess wax flaking, the chain was quite dirty to handle vs the extremely clean handling with Mspeedwax / Silca Hot Melt, and wear rates were frankly terrible which does not bode well re low friction claims.

It did deliver on being easier to break the wax link bond, but – again if you have something round to pull your mspeedwax / hot melt chain around (tool box handle, bike stand, wheelie bin handle, piece of dowell) – this is a 15 second job, and one that is very easy – you do not have to break the wax bond link by link if you put just a tiny bit of effort to get a system going to make this aspect a non issue.

As mentioned a couple times previously as well but I need to include in the wrap, the lack of test data from AB for GRAPHENWax like we saw with Graphene Lube, is also curious, to put it mildly (even if much of the tribology test results for Graphene Lube are contended, such as using a pin on disc test to compare a liquid lube vs solid wax – the absence of this test for GRAPHENWax in my view adds more validity to the concerns re its inclusion in Graphene Lube launch).

I have discussed the above with the super smart and super qualified scientist / chemist at AB that developed this product, and the short version of the email chain is that all of the above is absolutely and totally refuted and disagreed with by AB, they have done extensive testing for which this product excelled in all, and their feedback from customers is outstanding, except for about 5 which had short treatment lifespan issues, all attributed to incorrect initial prep, and the customer happy after re trying with correct prep.

I don't want to boast again but, yep – I am going to rate myself at pretty darn good at prepping chains exactly as per manufacturer instructions, as well as pre prepping chains for immersive waxing. I do not believe I incorrectly prepped the chains tested for main test, field testing and the 2 chains prepped for single application longevity testing, and multiple batches of GRAPHENWax were used, purchased 2 months apart, (one for main test, one for field test and the controlled Single application Longevity testing).

Also, again whilst the ZFC test is a relatively blunt tool in that it cannot provide an efficiency loss number, as stated before there is simply no getting around the wear rate correlation, and the quite simple nature of the test equipment and protocol overall ensures that the +/- 5% variance per test is extremely robust – with over 300,000km of controlled testing

now completed within this variance tolerance (ie many many tests have been repeated to ensure within this variance, and also the chain longevity test project had 30x ultegra chain halves and the blind test half wear within this variance). And the ZFC testing is closely matching many other manufacturers in private testing re their own expected results per block, single application longevity – from their own combination of tribology and athlete field testing.

The full test protocol is available on website lubricant test page.

So, you can choose to dismiss my testing as erroneous and believe AB – no problems. Again, ZFC / me, are not above question, no one is. Just know that I have absolutely zero to gain for putting out a negative review, much to gain if the product performed outstandingly and as per marketing claims, and I take my position as a trusted independent test facility as seriously as it is possible to be taken for every single test and every single review.

You can assess yourself by using a dependable chain wear check tool such as the shimano TL-CN-42, and see how many km's attained to 0.5% wear. If it attains over 10,000km (road riding) – let me know. If it is coming in short of that, then the competition (mspeedwax / Silca hot melt) will deliver you better results as almost always average 10,000 to 15,000km for the vast majority of road cyclists, some even over 20,000km to a genuine 0.5%, and that is GRAPHENWax's direct competition.

The test results have been extraordinarily surprising, and very disappointing. It is no doubt going to cause me much lost time and grief with AB, they are not shy to take actions which are painful to deal with. So I am not looking forward to the possible repercussions once this review is live and AB find out about it, but – it tested how it tested, I am 100% confident in the test results or I would not release this detail review until I was. And so whilst I support and applaud AB for bringing a great product to market with Graphene Lube, it is with heavy fingers and trepidation I have typed up the detail review for GRAPHENWax.

ZFC Overall Performance Ratings

Normally I would go through and rate the lubricants suitability in each of the below use case categories, however in this case it is simply not worth attempting to do so. The wear rates were very high from the start, and extremely high in contamination blocks, the cost of the product is high, the drivetrain wear rate is very high, the efficiency losses are therefore likely to be very high, it has short treatment longevity, and it is comparatively dirty (for an immersive wax).

There are no applications for which ZFC would recommend this product, as there are so many other products that will vastly outperform GRAPHENWax (Legal cover off – this in my / ZFC opinion, based on the testing results covered above, and not stating as empirical fact, it is recognised that absoluteBlack either have, or likely will, disagree with basically every aspect of the above testing, findings and review, and may possibly have their own testing and data which they believe empirically prove that all of their marketing claims are upheld and factual).

Race Day Lubricant Road – /10

Race Day Lubricant - MTB / CX –/10 XCO / 10 for XCM

Everyday Lubricant – /10 to /10

Harsh Conditions Lubricant – /10 to /10

Single Application for Long event – /10

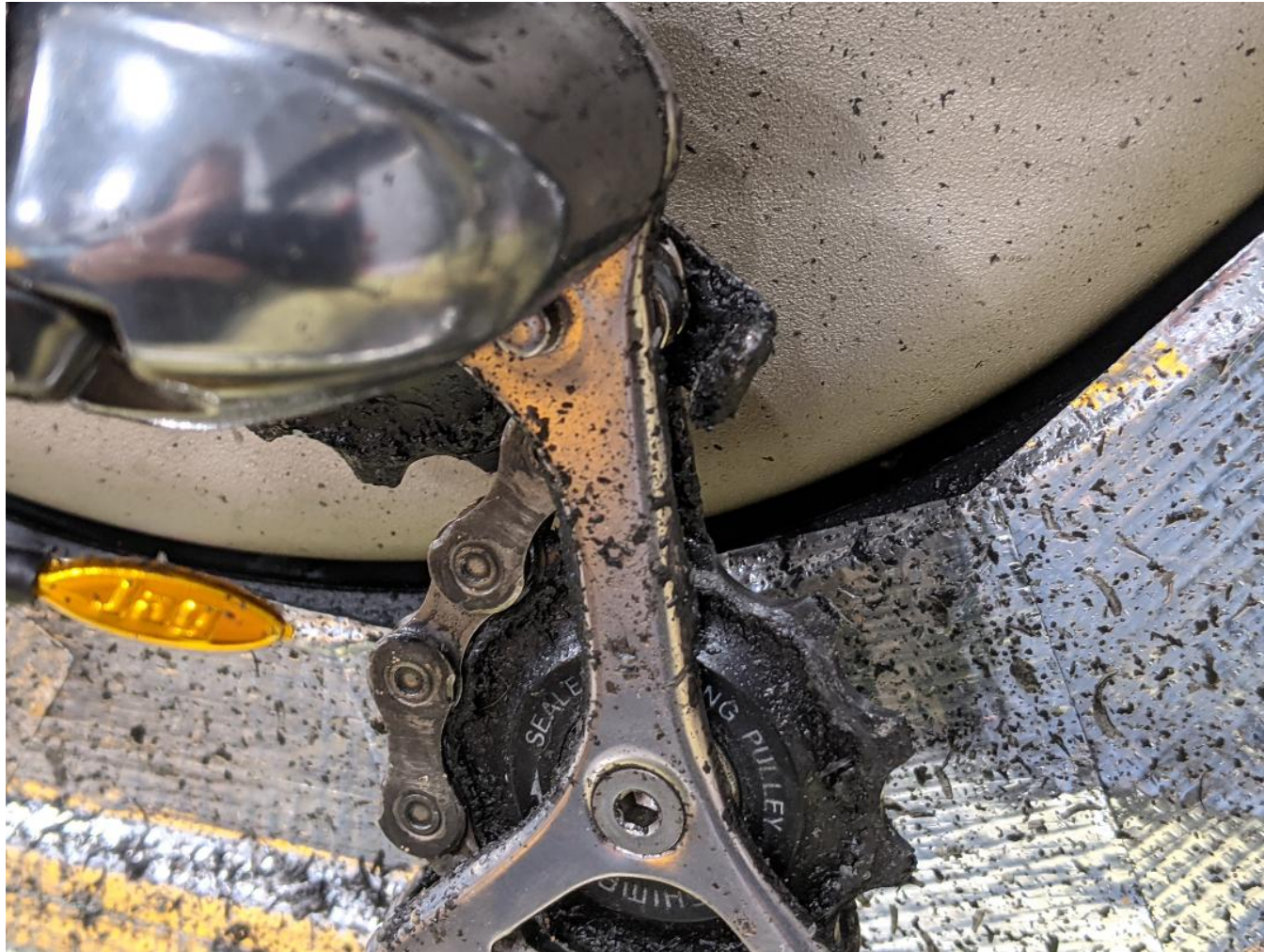
Pictures From test



Mid point of main test – 3000km. Not as clean at all as Mspeedwax / hot melt



Mid point of main test – 3000km. Not as clean at all as Mspeedwax / hot melt



Mid point of main test – 3000km. Not as clean at all as Mspeedwax / hot melt

I didn't take a 3000km point photo's for recent hot melt test, so here is a pic of my mtb post the 213km xc marathon event, and also at this time that cassette has completed over 4000 km field test msw, hot melt, silca ss drip and ufo drip, and has never, ever been cleaned aside from water rinse post wet & muddy rides.

