Muc-Off Files Part 1

Recently I was able to have a call with the head of Muc-Off test lab, and the global PR & comms manager.

Muc-Off have (to me) been a bit of an enigma wrapped in a mystery, for a long time. When I first started ZFC, I had fully expected that their Nano chain lube would be one of the top products ZFC would stock and recommend. However the test results were oh so bad. As were the Team Sky Hydrodynamic Lube.

Then M-O released the NTC brochure claiming that a key competitor (Ceramic Speed UFO) increased in friction losses by 10w in just four hours of cycling - which honestly just does not line up with any basic logic. Ceramic Speed released an open letter response to this test result showing how they were able to replicate such a shocking result by testing in a manner proven from jason smiths Friction Facts days to produce runaway efficiency loss results.

https://www.ceramicspeed.com/en/cycling/journal/an-open-communication-on-muc-off-s-claims-on-testing

Some big questions arose from this situation. Firstly, as Jason Smith assisted M-O re testing, how could they possibly not be aware of the issue, and secondly IF we give them the benefit of the doubt, how could they twig that something was majorly wrong with the result and investigate. An implication – which I hope M-O will prove any such concerns to be unfounded, is that M-O deliberately tested in a manner known to produce an incorrect and really bad result for a key competitor.

That is a pretty big concern. But, I think if you do read the open letter response, as well as an old but still contains key bits document in ZFC instructions tab – Manufacturer testing – you will understand there is without doubt enough to substantiate such a concern.

For years I have been looking for M-O to provide detail and allay this concern. This has not happened.

When I finally managed to have a call with the head of R&D, I was hoping that this would be time for clarity. It was not quite that, but, at least communication has started, and I hope it isn't shut soon after it has begun – there is so much to understand here.

I was not able to delve into specifics on the call as I had hoped. I obtained a little information, but really it still lead to probably more questions than answers, and so below is the wrap of this call and the questions I have sent to M-O to answer / provide detail.

Also on the call M-O raised that they did not really believe the ZFC wear correlation has a direct link to lubricant efficiency or performance, and that their latest go fast lubricant makes chains continually faster by conditioning the chains surface condition – and so I have stepped out to them my thoughts and questions re the ins and outs of this, which I think if you read you will find very interesting, they have some groovy questions to clarify for me.

Then there was a point I didn't get a chance to chat to them about re making sure one covers outside of chain in a wet lubricant with their UV lights, which I contend is a pretty horrendous idea.

So – below is literally what I have sent to Muc-Off post our call for clarification, I will be covering this in a youtube vid as well, and then when (hopefully not if) I attain M-O's super detailed leave no follow up questions needed, I will update with a Muc-Off files part 2. Complete exoneration of all concerns and M-O path is the path forwards for the industry? Or will I receive no responses of a corporate response that's all fluff and no specifics. Get your popcorn.

Concern / Query 1 – M-O testing showing UFO drip increasing by 10w in just 4hr period for Nano launch.

ZFC summary of this discussion;

- MO advise that the testing has been an evolution, and that those test results are part of that evolution.

- NTC launch numbers with UFO at 10w+ loss after just 4hrs, with efficiency loss starting to notably increase after just 18 mins, was before a lot of concern was raised about this "Slackening thing" - re running long intervals just on a "Full Tension Test" machine

- The Full tension test machine allows MO to obtain extremely reliable and repeatable results.

ZFC outstanding concerns on this topic;

- My understanding is that at the time MO was developing the test machines, that there was heavy consultation with Jason Smith of Friction Facts, who had pioneered the need for both Full Tension test machines and Full load test machines, after discovering runaway efficiency loss results for longer runs on Full tension test machine, due to lubricant not able to re-align and re-set on chain surfaces without the slackening period through bottom of drivetrain. Not all lubricants are affected, but many can be heavily affected by the lack of slackening time.

- It still seems improbably to me that MO was not aware of the need to test using both FTT & FLT machines as per process developed by Friction facts of long intervals on FLT machine, moving chain back to FTT machine for the accurate efficiency loss numbers.

- The NANO launch brochure (I have this saved so can send if need) shows pictures of BOTH an FTT machine and FLT machine - yet only FTT machine used.

- The results obtained for UFO by M-O are just so clearly improbably re being an accurate result – I want to understand the decision for M-O to run with such results and drive marketing campaign showing how terrible main competitor is. This situation really started the confusion re mfg efficiency testing claims for all in cycling.

- When CS replicated the – in my opinion – very erroneous result of a 10w loss increase in just 4hrs in their open letter response, raising many concerns I wont re type here – there was no response to this from MO.

- Logic – HOW, HOW, HOW could a lubricant increase by 10w in just 4 hours in a clean conditions test. How did this not raise red flags?

- When the many red flags were raised for M-O from the CS open letter response – why were these red flags, and the brochure data – not addressed and if deemed red flags correct – the data in the marketing and claims addressed.

- During our call - It was re-iterated numerous times re MO placing much stock in the test results from the FTT machine as it delivers reliably repeatable results. But, if the test itself is flawed as we are seeing incorrect runaway results from no slackening time, I put it to MO that reliably repeating incorrect test results is not of value. What is MO response to this?

- I do not understand how a 10w loss increase in 4hrs in a clean test did not trigger a review of the test protocol. No one in this field can look me in the eye and state they believe, hand on heart, that yes, this lubricant will increase in efficiency losses by 10w, in just 4 hours, in a perfect conditions road ride. No lubricant is going to do that. A cutting fluid would be hard pressed to do that. A ride in the mud will be lucky to deliver that.

- In light of just basic logic of how a lubricants performance may change, and by how much, in a good dry conditions road ride in a 4 hour period - What is the path for this to make it from the test lab – with clearly highly qualified staff, to sign off as a true and accurate test of that lubricants

performance actual performance – that a lubricant increased in efficiency losses by 10w, in just 4 hours. And then all the checks and balances from there for this to be the central point of a very powerful marketing launch showing a key competitor with a result that cutting fluid in mud would be likely to realistically deliver.

- It may seem I am beleaguering this one point a lot but bear in mind, such a (in my opinion. And many others opinion), massively incorrect test result to be used in the manner M-O used it raises deep concerns. Concerns not just re testing accuracy but integrity. I want to M-O to categorically rule out integrity concerns.

- It obviously can be viewed, due to such an incredibly improbably test result, and with the input from JS that;

    - MO was at the time fully aware of the need for using both FTT & FLT machines for such test durations.
    - MO was aware that testing just on FTT machine only for 4hr duration would produce a very bad result for a key competitor, and that this would look great for marketing
    - As such MO did not address CS replication of this result and open letter response.
    - The implications of the above are extremely concerning re M-O integrity & marketing if this is what occurred
    - If the above is not what occurred – I need more information that what I was able to attain on our call, where the "understanding of this slackening thing" at the time was a bit vague, as well as understanding how the frankly illogical test result did not trigger red flags and review of the testing.
- The point is being covered to death here because I really have never been able to attain any clarification or understanding of how such a result went to print as a central marketing piece in NTC launch, and either possible answer;
    - Believed the result to be accurate – how?
    - Aware the result was not accurate

Either option is of importance re understanding what M-O data and marketing MO has released since (still same Test process?), and what may come out in future

- Unfortunately in our discussion we were unable to really hash this out. I would have preferred to have spent 30 minutes of the call going through the above vs jumping to showing impressive looking tribology machines.

- Martin advises that "In future" they may look again at waxes. I gather the inference is that waxes typically test poorly in MO testing (which would be due to running long intervals on FTT machine?). Ie – MO has squirt at 8.5w loss in that test, yet other test facilities like CS have Squirt closer to 4w. Pretty major difference between two extremely high precision efficiency test labs. But we have one using both FTT AND FLT machine, as per what was ascertained as necessary from Friction Facts testing, and we have MO staying with just FTT only, which deliver very poor results for many wax base lubricants. Is it that MO will look at wax base lubricants / immersive wax when finally change test methodology?

- My concern is that MO deliberately uses a base not affected by slackening so that it performs well in long runs on FTT testing, and that this knocks out many wax base lubricants until such time as MO changes test methodology.

- Bearing in mind that often what makes a top lubricant is one that STAYS low friction, by absorbing less contamination – a trait often demonstrated by the top wax lubricants over wet lubricants. With MO needing to stick to a base not affected by long runs on FTT machine, thereby seemingly limiting MO to a high contamination absorbing base (as per ZFC testing) – this appears to in part explain the performance gap in MO testing vs ZFC testing.

- I feel that MO overall just wants to move from this whole FTT / FLT the 10w loss increase thing. But I hope the above provides sufficient context that from ZFC perspective – understanding conflicting testing from various manufacturers – especially when the results are so far apart and

confuse all cyclists reading one mfg claims vs another – we need to understand it.

And to understand it, we simply need full open and honest information re exactly what occurred, and why, and what was understood, and decisions made – at the time they occurred. If MO has full integrity around this entire situation, then there should not be anything they do not wish to share with ZFC, and by extension, cyclists the world over. We need to get efficiency testing to a globally agreed protocol / standard. Without that, we need to understand each mfg testing protocol in full, including;

- Exact test protocol – in full – from start to finish.
- Understanding of the results obtained from their test protocol
- What updates to test protocol have occurred since commenced, why were the changes made, and what impact may this have on legacy test results.
- Exact test protocol as it stands today re efficiency testing – from start to finish.

Again this what I wished to discuss on the call. All the above pages could have possibly (hopefully) been put to bed with a thorough open and honest deep dive chat. MO may choose to not answer any of the above, in which case deep concerns will simply remain deeply concerning, as will future data from MO lab on efficiency testing.

High wear doesn't necessarily mean high friction. M-O disagree's with ZFC wear correlation link.

- MO presented that they have solid test data – from both lab testing, and getting chains back from World tour athletes post harsh events, that chains are getting FASTER as they wear.

- Some excellent tribology info / pics were presented showing the clearly improved surface condition of the key load and wear surfaces of chain – demonstrating that when running Ludicrous AF – the chains continue to get faster even though it will show up as measurable wear on the chain.

- Hence my higher wear rates for MO lubricants do not show a link to them being high friction lubricants. The lubricant is conditioning the chain, showing as wear, but as such making the chain faster and faster over time.

- From ZFC perspective;
  - I agree chains can get faster after a break in and surface conditioning.

  - **I disagree – STRONGLY - that chains are at their fastest, or getting faster WHILST the condition is occurring.**

  - It literally takes friction to condition metal. Removing peaks & troughs – which is removing metal – takes friction to do so. If one was set about conditional a metal surface with a frictionless cloth, nothing would happen.

  - Hence, wearing metal is NOT as low friction as NOT wearing away metal. It MUST take some additional friction to abrade away (condition) metal.

  - I cannot think of anyone / anything else in cycling or any other industry – where what is used to do the conditioning, is also used as the fastest end option. There is a reason why most will do an initial break in with the factory grease, which will contain micro particles of metal from manufacture, and then move to something extremely low friction after the initial conditioning is done and the much higher friction factory grease + metal particles is removed.

  - The end product is to provide lowest friction possible, and any further conditioning is by having nano particles fill peaks and

troughs, not to remove peaks, which as that requires removing metal -obviously would take some additional friction to do so.

- Ie one very clear example - Silca use a diamond polish to do the break in. They are not going to then use the diamond polish as the race day lubricant.

- Another quick analogy in my rush here – Think restoring a metal component. What one uses as the final polishing for gleaming smooth surface finish is not the same as what is used to begin the process which needs to be more aggressive.

- I do not see that it is remotely feasible to be able to use the same product for the initial conditioning of the metal AND as the race day lubricant. Please explain how I am incorrect.

- IMPORTANTLY – Following on this line of thinking, during the conditioning, as per the brilliant tribology images I was shown where there was a notable improvement in the surface of the metal;
  - METAL HAS BEEN REMOVED FOR THIS CONDITIONING TO OCCUR. WHERE DOES THIS METAL GO?
  - It would obviously now be part of the lubricant that is running on the chain no?
  - I do not think anyone would typically add a lot of micro / nano particles of metal to their lubricant, and expect a decrease in that lubricants friction, and an accompanying increase in speed?

- So exactly WHEN does the Ludicrous AF chain become faster? Most cyclists will as per instructions, clean chain, apply LAF, and race. But during that time;
  - LAF is conditioning the metal, causing wear, which takes friction
  - From the wear (conditioning) - metal particles will become part of the lubricant which would add further friction and wearing – how is this making the chain / lubricant faster?

- What I understood from the call was that Athletes would run LAF, chain would return, it would be ultrasonically cleaned, surface conditioning improvement would be noticed, LAF re applied, and now the chain is faster than when it was initially cleaned and LAF applied, and that rinse & repeat - this situation continues for quite some time, with chains continuing to get faster and faster as they continue to wear.
- But we need to see the losses journey. Ie – I can understand if it starts at say 4w with LAF, and then after a long hard race, it is cleaned and re -treated and now it is 3.8w. But what was it after race when it has the metal particles in it from conditioning the metal ? (as well as the contamination that sticks on contact to the wet lube?)
- What is it when the racer is actually racing on it?

- In summary – it is difficult to understand how a product that actively conditions chain metal can also be the same ultra low friction product for race day. I cannot think how the two can co-exist. I cannot think of another such example in any application in any industry where initial conditioning is desirable, and as such am looking for detailed guidance on this from MO to understand what is happening and how in this process, and negating the concerns outlined above.

Back to the ZFC wear correlation testing & MO results.

For this example, let's assume then base on MO input, that the wear rate obtained for L.A.F in clean block 1, at 8.9% of the 0.5% wear allowance, does not cross correlate as higher losses due to friction vs say Silca Synergetic at 0% wear – because LAF has some, well – magic, and it is faster.

(and for the record on this – M-O Nano recorded a wear rate for this clean block of 37.7%! That is a lot of metal removed, which again – MUST take friction to do so, AND – This metal is becoming part of the lubricant – can MO pls explain how they contend Nano was a very fast lubricant in the face of such extreme wear rates?)

But – then we move to adding contamination. In dry contamination block 2, Silca Synergetic (wet lube) recorded a wear rate of 18.6%. M-O ludicrous AF recorded a result of 78%. That is 4.2x the amount chain wear. That is 4.2x the

amount of metal abraded through, and that has now become part of the lubricant that running in the chain.

- **IF NO CONTAMINATION was added in block 2, we would expect to see a similar wear rate to block 1. Chain is just running again similar to if one was riding an ergo indoors.**

- The increase in a lubricants wear rate in block 2 assesses a lubricants ability to REMAIN low friction when exposed to dry dust contamination. The more that is absorbed by the lubricant, the more abrasive it becomes, the higher wear rates are recorded – and also very importantly, the increase in the wear rate vs it's clean block 1 result.

- As LAF had a very large increase in wear rate vs its clean block 1 result, the increase in wear rate can be directly attributed to the abrasive contamination absorbed by LAF.

- Such a large increase, due to absorbing abrasive contamination, cannot be low friction. Compared to other lubricants that greatly resist absorbing contamination, and have very low increase in wear vs clean block 1, comparatively, I find it extremely difficult to draw any conclusion other than that LAF has increased in friction losses by a notable amount to cause such rapid chain wear.

- How can such an increase in wear, clearly attributable to the lubricant absorbing abrasive contamination – not be a concern re increase in friction losses.

- As such ZFC contends that the ZFC test protocol, which alternates clean and contamination blocks – is able to effectively assess a lubricants performance across differing conditions, and that wear rate correlation to efficiency performance is – well, laws of physics.

- ZFC agrees that for outright efficiency testing, the wear rate correlation cannot directly ascertain which lubricant may be outright faster if results are similar. Ie – lubricant A records a 5%

wear in block 1, and lubricant B records 8%. Difference in properties from high pressure friction performance, viscous friction, stiction – ZFC test cannot ascertain that the 5% lubricant is outright faster than the 8%. Similarly in block 2, if one lubricant is 45% wear and another is 50% wear.

- However, when wear rates show a very large gap, as high pressure abrasive friction component, responsible for elongation wear of the chain, is by far the dominant friction loss vs stiction / viscous friction – then lubricants demonstration clearly higher wear rates vs others – it becomes improbable that they would in fact be lower friction whilst merrily eating through notably more hardened steel.

- This is especially so when we can see, directly, that the increase in wear is due to the lubricant absorbing much more abrasive contamination vs other lubricants. When a lubricant becomes much more abrasive, it becomes higher friction loss. I do not see how such a wear correlation can be contested – please outline how this is contested.

- Again, this also loops back to the strength of top waxes / wax based lubricants – if the contamination just bounces off vs being absorbed, and they show a very small increase in wear rate over baseline in clean block 1, does MO believe this very low wear rate has no bearing / correlation on the lubricant remaining very low friction in such conditions?

- I contend it is a very hard sell that, if over a 1000km test block, one lubricant uses up nearly all of the chains effective lifespan to the recommended 0.5% replacement, vs other lubricants that have shown EXTREMELY low wear rates and used only a small fraction of the chains wear rate lifespan – that the very high wear lubricant (in this case LAF), is a) lower friction vs others, b) faster than the other lubricants, c) the worlds fastest as claimed.

- If on LAF I wore out circa 3 to 5 chains in the same time as I would wear out 1 chain on top competitor lubricants, is MO advocating that the lubricant abrading through chains at a circa 3 or 5 : 1 faster ratio is in fact lower friction and faster?

- Obviously from ZFC perspective at the moment (and again, I am far from alone on my own island here), this seem improbable at best. It is not just the Ceramic Speed and Silca agreeing here, but many mfg's who book testing with ZFC, after reviewing test protocol, test brief and correlations – many extremely smart and qualified staff with enormous expertise in lubricant development, chemistry, tribology testing etc – sign off on and book in with ZFC for testing to benchmark their lubricants performance. Basic physics does seem to click and align quickly with other parties.

- Again pls explain how the wear rate correlation concerns – from condition of metal at the time also delivering a fast lubricant WHILST conditioning is occurring, as well as how absorbing a comparatively very high amount of abrasive contamination and very high wear – is in fact lower friction, or even how there is no correlation to friction loss increase.

- ZFC would like to see MO's efficiency loss data of chains on LAF POST harsh conditions events **BEFORE** they have been cleaned and re lubed (as well as of course the test protocol in full for this test).

- ZFC would like to see such data vs key competitors lubes in same event used with other MO athletes as part of field test R&D. I would like to see the before loss number, the after loss number, and the net wear rate of the chain. To uphold MO's claim that the wear rate and friction losses are not linked, we would need to see the chain has notably worn, and yet the friction losses have decreased from pre race to post race– **with the lubricant and chain as is** , not cleaned and fresh lube on the now "conditioned" chain that is then run in a clean lab efficiency test.

- Summary – ZFC contends that

    - conditioning metal flat out takes some friction, which will be higher than lubricants that are just lubricating, not conditioning. Conditioning – in any industry for any part, is typically done at the start with a more abrasive compound, moving to lowest friction option available after conditioning has been completed. The same product cannot be used for both functions.
    - Increasing metal particles in your lubricant from conditioning will increase abrasiveness of the lubricant, increase wear, and increase the friction losses of the lubricant. Pls explain how this is incorrect.
    - Absorbing contamination readily and greatly increasing wear rate is higher friction vs lubricants that resist absorbing contamination and continue to deliver impressively low wear rates. Please advise how this wear rate correlation is incorrect.

Tribology testing relatability to real world performance

Again whilst it was great to see the truly impressive tribology testing at M-O lab, and the direction Martin is looking to take Tribology testing for bicycle chain lubricants - firstly – as per email before call – it was much more important (my point of view only of course) to have been able to discuss the above two sections in depth and have covered all points above, and obtained MO official input to the above.

However in lieu of the call not quite going that way, and with tribology testing being a key feature of the call – I should clarify why, to date, I tend not to place too much weight on tribology testing, as yet. This may change in future, however at the moment;

- Time and time again lubricants go to market with impressive / amazing tribology or ASTM industry standard testing – and yet demonstrate that

they quickly become abrasive and high wear when being used in its actual use case – as a lubricant on a bicycle chain fully exposed to contamination.

- To date Tribology and ASTM tests do not seem to relate to the lubricants performance on a bicycle chain. Many tests just are not valid in that they may tell a very small picture for one lubricant type, however be a completely not applicable test for other lubricant types. Ie brugger test typically goes very badly for waxes – a grinding wheel is going to quickly abrade the wax off the surface of the test bearing. But this is not what happens inside the chain where all surfaces are coated and sliding on each other. If it did happen, it would show in rapid wear. The fact the top waxes / wax lubricants typically deliver such extremely low wear rates shows the wax coating is staying in place, and the chain metal is well protected from metal on metal contact and wear. All parts are just sliding on solid coating of slippery wax. Same is often observed for pin on disc tests and a slew of other ASTM or tribology tests.

- THEY MAY show an impressive comparison between one wet lubricant and another, but – they do not show extremely important aspects such as which lubricant absorbs contamination at a much greater or slower rate – and for a bicycle chain lubricant, this is often at the top of the most critical factors for ongoing low friction performance – especially for the majority of cyclists who do not ultrasonically clean their chain after every ride.

- Hence why at this time, I have not generally given much credence, yet – to tribology testing – it has a poor track record overall for predicting real world performance vs my wear rate correlation testing that uses a bicycle drivetrain. It sometimes gives a hint re potential performance in very clean conditions or its ability to still perform with some level of contamination thrown at it. But again, I have seen a number of great brugger tests, with contamination, for lubricants that then demonstrate high wear rates in ZFC testing, and biased I may be, but ZFC testing – the chain and lubricant is operating as the chain and lubricant will operate in its actual use case, delivering a much more indicative result.

- That said – it is impressive to see the direction MO is looking to take tribology testing, maybe it will overcome a number of the shortcomings of existing tribology and ASTM testing – but over time I would like to see a link between this testing and my wear rate testing – to at least a decent degree, they should correlate.

- This would mean the MO tribology testing would need some type of contamination protocol as well as clean lube testing.

Wet lube covering chain

Another key point I wished to discuss but did not get the chance links back to concern re MO & marketing.

- A number of MO wet lubricants, MO includes a UV light (and lubricant has UV infused particles) so that users can ensure that all of the OUTSIDE of the chain is covered in a wet lubricant.

- ZFC contends that doing such a thing is a rather horrendous idea. The biggest enemy to wet lubricants is that contamination sticks on contact, vs waxes / chain coating type lubricants that demonstrate extremely high contamination resistance.

- The wet lubricants that have tested best in contamination conditions – such as silca synergetic, work by having AS LITTLE wet lubricant needed as possible whilst still proving great lubrication INSIDE the chain.

- Information and advice for wet lubricants has ALWAYS been to ensure as much excess wet lubricant as possible is wiped from outside of chain, as that will just attract much more contamination, and much more quickly.

- Firstly – does M-O R&D lab agree with the marketing approach that one should ensure all of the OUTSIDE of chain is covered in a WET lubricant? Or does MO R&D agree this is a very bad idea.

- Second, if it agree's it is a very bad idea – why is this approach heavily pushed on the market? (noting especially that many such MO customers will be mtb / gravel riders).

- Third – if MO disagree's that it is a very bad idea, pls explain how it is a great idea to have all of the outside of chain coated such that contamination gathering is at its maximum ability.

For the record, if you haven't seen already on posts – I have put out many times that I have severe concerns re MO here, as whilst the average cyclist may think ah yeah cool great idea - that highly qualified staff working in the R&D lab who are developing lubricants for use on a bicycle chain, which is completely exposed to contamination – surely they would absolutely know that ensuring all of the OUTSIDE of chain is covered in a WET lubricant would VERY OBVIOUSLY be the completely incorrect approach to ensuring that lubricant remains low friction over time / use.

As such if the R&D staff know, how does this become a key marketing strategy with UV particles needing to be infused in the lubricant and little UV lights being made to go out with lubricants – there are a lot of levels of very conscious decision making here to drive an approach, that ZFC & many others contend is a frankly horrendous approach to lubricating one's bicycle chain.

Can Marting / R&D lab pls advise what is behind this approach by M-O.

Motion labs

At this time I have not had time to go into further detail on motion labs – it has been big big days and I am still well behind – I really wanted to get the above across to you when I had time to type it out for input at your earliest – and I know from a first blush of motion labs that this does not answer the above pages.

I have re looked though the LAF launch you wished me to backlink reference however the new motion labs testing again it is just data, no information on the actual testing.

If I have missed relevance of motion labs to my main concerns above pls highlight such in reply.

The MO test results are a central part of this, as is understanding the huge difference between MO claims and the test results seen in ZFC test protocol.

As per the LAF launch, M-O has a call out re moving the industry towards a global test standard, and asking for input. A part of moving forwards on a test standard is understanding what all parties are doing at the moment, and understanding the data those tests produce. I have full detail and understanding of the Friction facts and Ceramic Speed test protocol. To data I have not been able to obtain the full test protocol (really very scant detail) for M-O efficiency testing. M-O being fully transparent on test protocol will obviously help move forwards.

I would also like M-O input on what issue they see with the FTT + FLT methodology pioneered by Friction Facts for efficiency testing, at this time I am not able to see a flaw in this method, nor understand why M-O did not follow the same method, aside from possible concerning reasons which again I would like M-O to dispel those concerns by providing sound reasoning behind why FTT only testing was done, and what concerns there are re adopting the FTT + FLT method outside of perception of following CS testing method. Perceived optics should be a distant concern vs achieving a viable global standard for chain & lubricant efficiency testing.

I will be covering the above in a you tube vid as well as this document, as it is central to many things that ZFC is at the core of. As you know, and as covered

on a previous YT Vid, mfg efficiency testing claim landscape / conflicting claims – results – it's a basket case, and it needs to be moved forwards.

So a part 1 video outlining above concerns and points of view will be out soon, and then will be doing a part 2 covering the response and input from M-O to clarify as much as possible from the above. I believe if M-O wish, they can clarify all points of concern from the above.

Apologies for putting up some hard questions – but a number of them are obviously of M-O's making, and the questions are simply the questions – there is no other way to understanding what has happened / is happening / is going to happen in future without understanding the points of concern raised in this document.

I hope it is received in the manner it is sent – and that is purely and simply understanding the above concerns. I hope there is no pride getting in the way, or corporate politics, or if higher powers have driven some interesting decisions – I hope it is clear that responses need detail that will hold up to technical scrutiny – we are trying to get to a better place re testing. Part 2 it would be great to cover the M-O response being very pleased with the specific detail and understanding provided. If it is a corporate response reading like it needed to be signed off by legal, marketing and the CEO – that will pretty clearly come across, and that will be unlikely to openly and honestly answer the specific concerns raised / provide the specific detail needed.

It is time to move past the surface. We must directly address specific detail and concerns to understand.