

The logo for 'Zero Friction Cycling' is displayed on a black rectangular background. The word 'Zero' is written in a stylized, orange, sans-serif font, with a mechanical linkage icon integrated into the letter 'Z'. The words 'Friction' and 'Cycling' are written in a larger, orange, cursive-style font below 'Zero'.

Zero Friction Cycling

Ultimate Race Chain prep guide

- Initial Break in with factory grease – approx. 15 mins (Indoor – Ergo – power average 150w to 250w is fine)
- Ultrasonic clean until perfectly clean (container method if no ultrasonic)
- Clean bikes drivetrain, re install chain, re lube with decent oil lubricant (I use Revolubes – but even 3 in 1 oil is fine).
- 2nd break in to properly break in chain (ok to just do normal training sessions re power – INDOOR ergo).
 - Shimano 11s – 30mins +
 - Shimano 12s – 2hr +
 - YBN / Campy / KMC – 11s – 1hr +
 - YBN / Campy / KMC - 12s – 1hr +
 - Sram 11s – 2hr+
 - Sram 12s – 3hr +
 - Wippermann – 11/ 12s – 2hr+
- Ultrasonic cleaning rounds until perfectly clean (container method if no ultrasonic). MUST finish with alcohol rounds if using solvent.
- Ensure dried before wax with Mspeedwax / Silca Hot melt / Rex BD or your chosen wax.
 - If you are not waxing – then simply proven top drip lubricant – ie UFO drip, Silca SS drip, Tru Tension Tungsten All weather / Silca Synergetic / Rex Black Diamond / Smoove / Revolubes Etc etc.

- If waxing and going for ultimate prep (this guides aim!) – again clean bike drivetrain, and re install chain for wax break in run
- 30 mins ergo – power 150 to 250w
- Race powder application. Refer to Mspeedwax website for instructions – or go to the video version of this guide here:

https://www.youtube.com/watch?v=wWEzBgYBh_s

Points of Note – Ultrasonic Cleaning – Traditional Solvents

- Traditional solvents / or degreasers (mineral turpentine / white spirits) have poor ultrasonic cavitation (cleaning power). You will want to do long runs (20 to 30 mins per round) – and you will want to do outside due to potential flammable vapours and unshielded electronics.
- You will typically need to do multiple rounds.
- If using traditional solvents, YOU MUST finish with at least one round being alcohol (denatured / methylated spirits / Isopropyl) to ensure no film left from solvent cleaning that may hurt wax / chosen lubricants ability to bond to clean clear chain metal.

Points of Note – Ultrasonic Cleaning – Fancy Chain prep cleaners (Ie UFO Drivetrain Clean / Silca Chain stripper / Specific Ultrasonic Cleaning solution)

- All of the above have strong cavitation (ultrasonic cleaning power). After a 10 minute De-gas run – pop chain in, and go – a 10 minute run after degas with UFO or Stripper will be all that is needed
- Depending on ultrasonic solution – a second bath may be desired.
- For UFO DT and Stripper – rinse with thoroughly with Hot water post US cleaning and then dry
- For Ultrasonic Cleaner solution post cleaning run/s – dry, then alcohol bath, dry.

Points of Note – Race Chain Waxing

- For the ultimate race chain – ideally of course you will have a dedicated pot / wax for your dedicated race chain vs wax it in your training wax pot which over training chain re waxes becomes less amazing vs fresh wax.
- You will generally be giving your race chain some attention post race/s before re wax, so your dedicated race wax will remain close to perfect.
- When it becomes time to move training wax on – race wax pot becomes new training wax, new wax for race chain pot.

Re treating / Re Optimising your race chain

By looking after your dedicated race chain you can usually get many / many races from your race chain, and then when it is time – it moves over to be your next training chain – make your next Fully Optimised Race Chain.

Ultimate Level

- Boiling water flush rinses to melt off bulk of wax remaining on chain.
- Dry
- Ultrasonic clean with UFO DT clean (works on wax and oils) or Specific ultrasonic cleaning solution that will work on wax. (Container soak – 10 mins, shake 2 mins if no US).
- Rinse with Hot water
- Dry
- (if used US solution – alcohol bath and dry).
- Re wax with dedicated race wax.
- 30 mins Wax break in run, race powder application.

Medium Level

- Boiling water rinses to melt off bulk of wax from chain
- Dry
- Alcohol bath (container or US)
- Dry
- Re wax
- (Wax break in and race powder if you are doing that).

Points of Note – Race Powder

- At this time, I am only aware of Mspeedwax really making a dedicated race powder that is PTFE free (some just apply PTFE – but that is not as good).
- Wear a mask and gloves. Always handle chain with gloves after race powdering.
- Be careful with excess race powder that may vibrate off in transit on to brake discs / brake surface – place bike with chain on bottom if transporting in car with something underneath chain that is ok to get stained.
- Aside from the initial marginal gain in speed from race powder, it does also marginally improve treatment lifespan – especially in dust conditions.
- Another very very marginal gain if one can be bothered (again of a little more benefit to offroad riding) is to race powder cassette / chain ring/s. The powder is very slippery – it takes longer for abrasive dust to be able to stick to cog & ring teeth. Race powder between rollers and teeth is better than dust. Again, take care if doing cassette not to have any ultrafine powder getting onto rear brake disc or rim brake surface.

Not yet ready for Full Race Optimisation?

Do not worry if making the fastest possible chain by doing the above is not something you feel is feasible for you.

Whilst the chain is one of the genuine low hanging fruits for some easy watts savings, the good news is you will get the bulk of those savings just by properly cleaning the factory grease off your chain and running a proven top lubricant.

Factory grease is for packing. Some chain manufacturers do market that their FG is more than that, and that it really is a great lubricant – and some are pretty good – it will be a long lasting lubrication treatment for some brands;

- No factory grease is remotely as fast as the lubricants recommended in this guide. Simply the best aftermarket lubricants and waxes are just flat out faster, and sometimes – by quite a bit.
- Factory grease will become dirty and get slower and slower
- Top drip lubricants or waxes just do not get on with factory grease, so it must come off before you re lube anyway – so just make that step one every time for a new chain and move to a proven top lubricant choice – and you have already done a great step.
- ***MOST ESPECIALLY DO NOT RUN SRAM FACTORY GREASE IN A RACE.***
From testing data available – Sram FG is VERY slow.

Then – from simply doing the above:

- Have a dedicated race chain and training chain.
- If not waxing but using a top drip lubricant – just follow the chain maintenance guide for that lubricant type (Instructions tab – ZFC website) to reset any contamination that may be starting to build and follow “Advanced Application Guide” instructions for re applying after cleaning – most especially for wax drip lubricants.

Overall, just by having a dedicated race chain vs using the same one you hammer in training, getting rid of the factory grease, running a proven top lubricant, and looking after your dedicated race chain between races – yeehaa – some of the easiest watts savings available. Typically, more than if you did a full front to back ceramic bearing upgrade, and obviously a whole lot cheaper than doing that!

For those looking to go all in and have fun tinkering with making the fastest race chains they can – be prepared it is a bit of journey, you do get better at it with practice, and over time and making a few – you know you have it dialled. If it is big faff and drama to do – don't do it – relax and just do the above, again full optimisation is a marginal gain over simply properly cleaning a new chain and using a proven top lubricant.

But if you have the time and enjoy the tinkering – it is good fun. One of the little aspects of racing I personally enjoy is getting my bike ready for battle the next day – and for me that has always included the race chain as well as all the usual bearing checks, tire checks, brake checks and cleaning and polishing to have ones lovely machine ready to rock. I chuck on a favoured podcast and enjoy a nice little tinker. Many of the steps with the chain can be done whilst you are doing other things, and wax break in run can be a good pre race day ergo spin to also have the legs as mint as my bike.

Some will naturally enjoy prepping race chains, some will not. (and ha – the condition of some racers bikes!!).

If you want all possible marginal gains but Full Optimisation prep is not for you, that is why numerous companies already offer race day chains – such as myself here at ZFC, or Mspeedwax, Ceramic Speed, Silca and others. They are expensive, but you are paying for the labour time and steps involved to do the above (although I believe very few others do a 2 step break in).

When should I move my race chain over?

Would you believe – it depends!

For some the ratio of their racing kms and training km's works out well in that when training chain is nearing recommended 0.5% replacement mark, race chain has done a good amount of races, and it's a perfect time to move race chain over to be training chain – get / make new chain.

For others they train WAY more than they race or Race as a high % vs training – and so it wont always be some simple.

As long as it hasn't been killed by a harsh wet / wet offroad ride – generally you can expect your race chain to keep getting faster and faster for a while.

Then at some point (alas unable to be quantified) – that will stop and start to reverse.

As a general recommendation – I would move race chain over to be training chain by NO LATER than 0.2% wear (use digital calipers or Abbey Tools LL chain checker tool).

Following the above guide – especially if this is for road racers etc – this can often be easily 1500 to 2000km of racing – which is a lot of races.

But there you have it – the world of dedicated race chains and the ultimate race chain prep guide – hope you enjoy, have fun, and remember we are always here to help if you are unsure on any aspect.

Notes About Ultrasonic Cleaning

- Ultrasonic cleaning power varies A LOT by ultrasonic and by what is used to clean.
- Solvents typically have very low ultrasonic cavitation / cleaning power.
- You will further reduce cleaning power if put chain in X cleaning product in X container surrounded by water.
- If unsure – you can check the level of ultrasonic cleaning power by doing the “Foil Test” – demonstrated in ultrasonic like a boss video here;
 - https://www.youtube.com/watch?v=rH_AkBGzq20&t=2842s
- To clean Factory Grease – Solvents are fine – just use long runs and do outdoors as they will release flammable vapours, and the electronics are not shielded (Note – officially the US will instruct NOT to use solvents due to risk – so do at your own risk).
- You may need multiple baths / rounds.
- Always finish with Alcohol rounds or alcohol container bath if cleaning with solvent or degreaser to ensure no film left behind.
- Use of UFO DT clean or silca stripper provides MUCH GREATER ultrasonic cleaning power and is safe to use.
 - Degas run for 10 mins, then put in chain – run for 10 mins
 - Rinse with boiling water (not alcohol!), then dry.
- If using ultrasonic to clean wax chain – Stripper does NOT work on waxes – use UFO DT clean or another good option is an all-round Ultrasonic Solution such as Ambersil or you can usually find the right one from Elma-sonics.
 - If using an ultrasonic solution, rinse with water post clean
 - Will ALSO need Alcohol rinse to ensure no film left before next step.
 - If using proper Ultrasonic Solutions – you WILL WANT a heated ultrasonic as most US solutions work best at around 60 to 70 degrees Celsius

Overall Ultrasonic cleaning can just take a bit of practice, and if you have purchased a cheap ultrasonic – check its power – especially with what you are using to clean.

Claimed US power vs actual power for cheap ultrasonics can vary WILDLY.

Generally, for bicycle chain – anywhere in the 30 to 50w per litre volume is going to work very well. If it drops below that (ie Actual ultrasonic power in a large 4L tank is 60w).

If the focus is on chains, the 2 litre size ultrasonics are a pretty perfect size (they will normally take 1litre fluid volume). Getting a big cheap ultrasonic – no one wants to put 4 litres of UFO DT clean in or Ultrasonic solution for one chain – this often leads to putting chain in a container of some sort with cleaning solution, surrounded by water. Generally, this will reduce ultrasonic power by a lot. To potentially near zero, and most of what you think is ultrasonic cleaning is just the chain and fluid vibrating.

Ultrasonics MUST be filled to their tank fill level – or again, ultrasonic power is reduced as the US waves to not propagate properly.

Part MUST be lifted from the bottom of the tank – there is a) much lower cavitation power on the bottom and b) you may damage the transducers sitting part directly on bottom of tank

Ultrasonic waxing

ZFC does not recommend faffing with ultrasonic application of wax.

To date there is no evidence that this gives any benefit vs just good swishing technique, and in many cases it may do a worse waxing job.

If the friction modifiers in the wax are distributed properly through the wax – you can't "More properly" distribute them.

If you have swished waxed properly through the chain - you can't get "more wax" into the chain with a US.

The problems that arise with US waxing are:

- Typically VERY LOW ultrasonic power in wax – it has too low a viscosity for the frequency range of most ultrasonics.
- Few have dedicated ultrasonic for waxing and so use for cleaning and waxing. Pouring wax into US and back often leaves friction modifier behind so this decreases the ratio in wax each time.
- The low power of US in wax can have the friction modifiers settle towards the bottom of the wax during the US run – giving a worse friction modifier distribution than simply avoiding all the faff and just swishing chain thoroughly in wax pot.
- So it is a lot more time and faff, for ZERO proven benefit, and high risk of a worse waxing outcome than if one simply avoided all that faff and swished chain properly in pot.
- *You will also need a heated ultrasonic which adds cost