

HUNTING FOR SPEED

Searching for the fastest lubes on the planet

By Caley Fretz



The first rule of chain lube is simple: there are no rules.

Given the endless variables of weather, road conditions, riding styles, equipment choices, and maintenance habits spread across the cycling world, there is simply no way to stamp a foot down and shout to the world that this, right here, is the best chain lube money can buy for every rider, every day, in every part of the world. It's an impossible distinction to make.

However, determining the best lube based on the solitary, though very important, attribute of efficiency is possible. Using a collection of pricey lab equipment and a good deal of elbow grease,

it is feasible to find the fastest lube available — the best lube for your most important days, the one that most effectively slickens the hundreds of metallic contact and rotation points on a chain so that it steals as little power from your pedal stroke as possible. Efficiency is speed, after all.

Could we find the world's fastest lube? That was our challenge.

ON THE HUNT

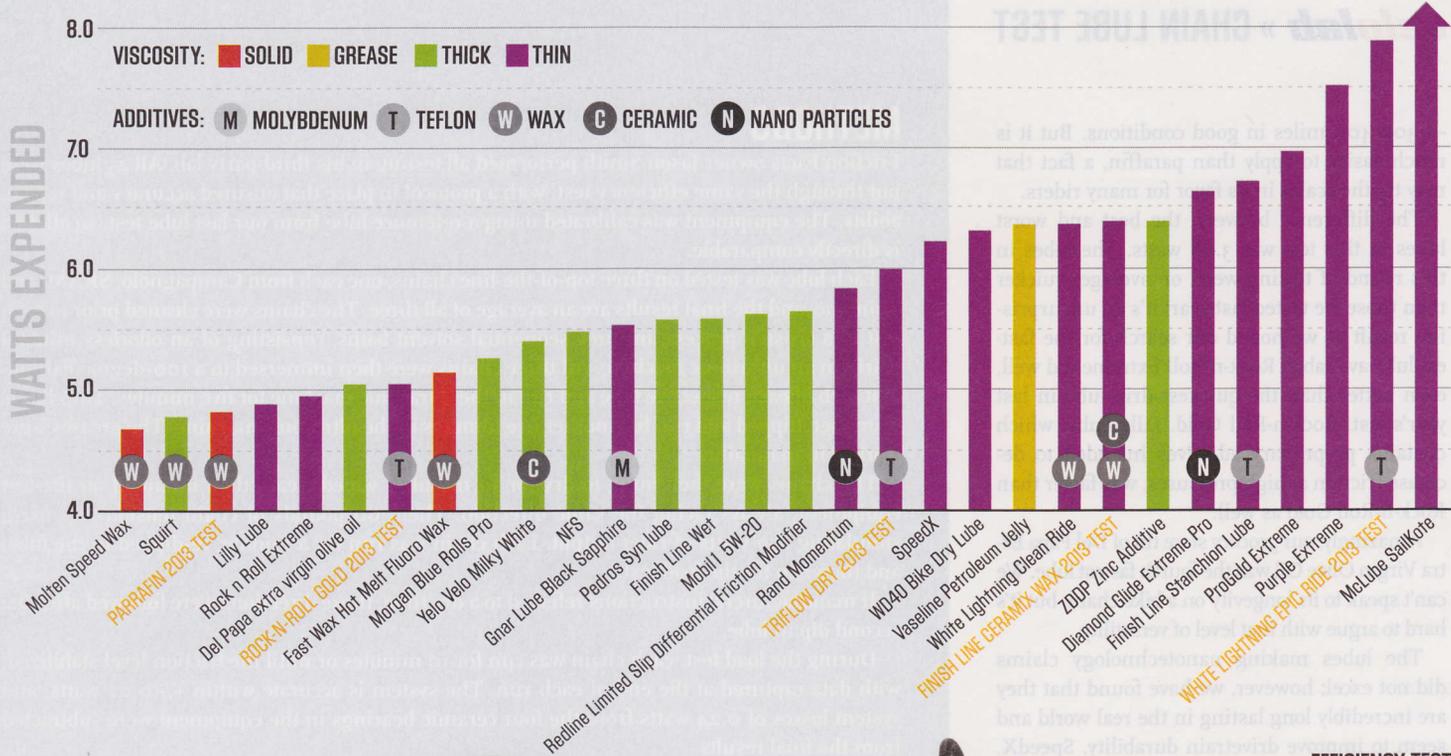
We began by returning to the Friction Facts lab owned by Jason Smith; we used the same setup in a nearly identical test last year. Utilizing his independent facility, we found out precisely how much power a chain saps as it articulates through a drivetrain with various lubes applied, measuring power loss in watts.

Because Smith calibrated the test equipment

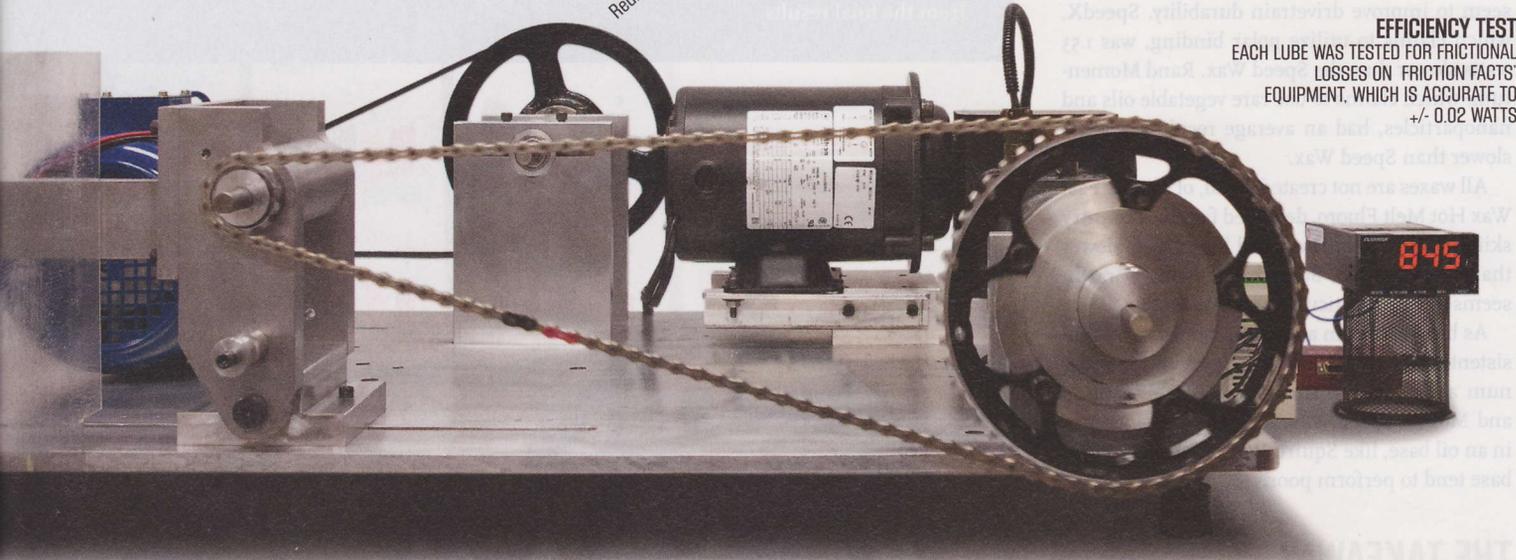
to a reference oil from the original round of lube tests, published in the March 2013 issue of *Velo*, all of the data from both tests is directly comparable. We've included key results from that original test, along with the new data, on the opposite page.

Last year was a first run; we picked 30 popular lubes and ran them through the process with no real notion of what would work well and what would not. The data from that test shaped our selection of 25 new lubes for this analysis. After last year's test, for example, we knew that Teflon-infused lubes did well, as did wax-based lubes, so we sought more. We also looked into a few lubes making impressive claims based on their use of nanotechnology. And, of course, we grabbed a few popular lubes that were left out the first time around, like Pedro's legendary Syn Lube.

No stone was left unturned. Smith, who bought all the lubes on the open market to prevent manufacturers from tampering with their usual formula, tested everything from



EFFICIENCY TEST
EACH LUBE WAS TESTED FOR FRICTIONAL LOSSES ON FRICTION FACTS' EQUIPMENT, WHICH IS ACCURATE TO +/- 0.02 WATTS



traditional drip lubes to melted paraffin wax to car oil to olive oil — yes, the sort that would normally end up on a salad, not on a chain.

Were we successful? Did we find the world's fastest lube? It's impossible to say for sure, but given the trends in the data — the main ingredients in the fastest lubes tend to be consistent and predictable — we have certainly come close. If there's something faster out there, it likely isn't commercially available. Or, it may not be a bike lube at all.

THE RESULTS

For the second year running, the fastest lube wasn't a traditional lube at all. Molten Speed Wax is, as the name suggests, a wax. It has to be melted before it can be applied to the chain.

It is based loosely on a formula developed by Friction Facts itself, which Smith has published

for public use. (We must stress that Smith has no association with Molten Speed Wax — the company is simply using part of his publicly available formula.)

Last year, hard paraffin wax, the sort that's easily sourced from any local hardware store, was the fastest lube by a good margin. Molten Speed Wax adds Teflon, or PTFE, and molybdenum to standard paraffin. Both additives are frequently used to make liquid lubes more efficient. The results were predictable: Molten Speed Wax improved upon the results of normal paraffin by 0.14 watts — not much, but in this game of tiny margins, enough to consider going with Molten over generic paraffin.

The true hero of this test, though, was Squirt Lube. It is the fastest drip lube we've ever tested, and is actually faster than simple paraffin. It was only 0.10 watt slower than the Molten Speed Wax.

Squirt is another wax-based lube; in fact, it

is based on a substance called slack wax, which is the precursor to paraffin wax. "Slack wax is close to what comes out of drill rigs," explained Smith. "It contains wax and oil in its natural state. Paraffin is slack wax refined to remove the oil. Squirt might be on to something by using the raw, unrefined slack wax, as it is a mix of wax and the natural oil."

Squirt ran even faster when it was tested without the recommended overnight dry time, an experiment we performed out of simple curiosity. This goes against the manufacturer's recommendation, so the lube's official result remains based on an overnight drying period. But it is something to keep in mind: to make Squirt even faster, apply it just before a short event.

Because Squirt is essentially wax based, it runs exceptionally clean, preventing too much gunk from building up in a drivetrain. In our testing, longevity was slightly below average

— 300-400 miles in good conditions. But it is much easier to apply than paraffin, a fact that may tip the scales in its favor for many riders.

The difference between the best and worst lubes in this test was 3.68 watts. The lubes in this round of testing were, on average, quicker than those we tested last year; it's an unsurprising result as we honed our search for the fastest lube available. Rock-n-Roll Extreme did well, even better than the quickest drip lube in last year's test, Rock-n-Roll Gold. Lilly Lube, which contains proprietary additives intended to decrease friction at high pressures, was faster than Rock-n-Roll Gold as well.

Amazingly, our grocery store tin of Del Papa Extra Virgin Olive Oil was the fourth fastest lube. We can't speak to its longevity on a bike chain, but it's hard to argue with that level of versatility.

The lubes making nanotechnology claims did not excel; however, we have found that they are incredibly long lasting in the real world and seem to improve drivetrain durability. SpeedX, which claims to utilize polar binding, was 1.53 watts slower than the Speed Wax. Rand Momentum, which claims to use rare vegetable oils and nanoparticles, had an average result, 1.15 watts slower than Speed Wax.

All waxes are not created equal, of course. Fast Wax Hot Melt Fluoro, designed for cross country skiing, did well, but was still half a watt slower than Speed Wax. Something about paraffin seems to work particularly well on chains.

As before, certain additives seemed to be consistently effective. Look for lubes with molybdenum and PTFE — Gnar Lube Black Sapphire and Molten Speed Wax, for example — or wax in an oil base, like Squirt. Wax lubes in a solvent base tend to perform poorly.

THE TAKEAWAY

We've long been proponents of the waxing method. With the right equipment, it's not particularly onerous, and it leaves one's drivetrain so wonderfully clean that any time lost in waxing is gained back ten fold in cleaning. Longevity of a wax treatment is better than most expect — we've ridden many hundreds of dry miles on a single application. That paraffin is also the fastest solution, producing the most efficient drivetrain, and is made even quicker with Molten Speed Wax's concoction, is icing on the cake.

Squirt is a phenomenal alternative, though. It, too, is very clean, though not quite as clean as paraffin. Once the water in the solution dries it picks up very little dirt. The kicker, though, is that it can be applied like any other drip lube. No more crock pots, no more potential for flammable paraffin fumes. Ease of use and incredible efficiency: Squirt really is the whole package. It's not great in wet weather, but on dry days only Speed Wax will be faster.

METHODS

Friction Facts owner Jason Smith performed all testing in his third-party lab. All 25 lubes were put through the same efficiency test, with a protocol in place that ensured accuracy and repeatability. The equipment was calibrated using a reference lube from our last lube test, so all data is directly comparable.

Each lube was tested on three top-of-the-line chains, one each from Campagnolo, SRAM, and Shimano, and the final results are an average of all three. The chains were cleaned prior to each test in a six-step process, in three sequential solvent baths, consisting of an odorless mineral spirit, in an ultrasonic machine. All three chains were then immersed in a 100-degree Fahrenheit bath of each respective lube and run in the ultrasonic machine for five minutes. The chains were then flipped and run for another five minutes in the ultrasonic machine. The greases were worked in manually.

The chains were then hung to dry for 30 minutes, wiped clean, then mounted on the test equipment, always facing the same direction. Then, 60 pounds of chain tension was used, simulating 250 watts of rider output. Each chain was run for a minute, re-dipped in the lube, and then run for the load test.

If manufacturers' instructions referred to a dry time, those directions were followed after the second dip in lube.

During the load test, each chain was run for 10 minutes or until the friction level stabilized, with data captured at the end of each run. The system is accurate within +/- 0.02 watts, and system losses of 0.24 watts from the four ceramic bearings in the equipment were subtracted from the final results.



APPLYING PARRAFIN

Paraffin wax is sold in solid chunks; therefore, it needs to be melted before application. This must be done somewhat carefully because the gas form is highly flammable (that's why candles stay lit). Boiling a pot of paraffin on the stove might blow up part of your house.

The safest method is to use a low-temperature cooker, like a crockpot, to melt the wax slowly and keep it well below boiling point. We brought our wax to 150 degrees Fahrenheit. Once the wax is melted, simply thread a wire through a thoroughly cleaned chain, dip it for a few minutes, then pull it out and re-install. The first few pedal strokes will result in wax being flung about, but the wax that stays inside the rollers is what really matters. Expect to get a few hundred dry miles out of an application.