CRAFTWORKS ENR

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The modern full suspension trail bikes most mountain bikers ride are incredible pieces of machinery, and it's actually a little difficult to find an outright badly performing one these days. It's also true that suspension frames mainly all look and operate largely within well-established parameters. But you only need a fleeting look at the Craftworks ENR, and specifically its idler pulley, to see it does not follow that established path. It takes the singletrack less travelled with its high-pivot idler suspension system, dubbed 'i-track'. But it begs the question, if the general design theory of most suspension frames largely works well, why change it? Or, put another way, why reinvent the wheel? The two word answer to that is: wheel path. There is a much longer answer coming below, but before then, a quick look at the Craftworks brand and the ENR frame in general…

LOCATION: Victoria Park, Christchurch (In the Port Hills). NOTES: The location of these images is the lower part of Vic Park, on and around a trail called "Pono's" and also the drop was shot on a trail called "Old Nationals."Pono's is best accessed by parking in the last available car park on Victoria Park road and following the trails down from the "Skid Site" and "Old Nationals" can be accessed from the very top of Victoria Park from the Summit Road. There is a huge variety of trails from intermediate to expert difficulty. The park is owned by the Christchurch City Council and is not just a mountain bike park but also full of walking tracks and a children's playground, with awesome views over Christchurch City. Gravity Canterbury are also responsible for helping to maintain the mountain bike trails within the park.
Victoria Park Road Carpark Location: -43.59243245,172.64425099
Summit Road Carpark Location: -43.59919629,172.64467478

CRAFTWORKS AND I-TRACK

Craftworks might not be a familiar brand to many here in New Zealand, but it has a long history in Australia. Craftworks is headed now by Kain Galliver, who also happens to be an engineer for one of the Taiwanese aluminium bike frame factories. We tested one of Craftworks' trail bikes, the FRX, back in 2010. The FRX was a pretty standard single-pivot suspension system. Since then, Craftworks have partnered with fellow Australian Hugh McLeay, who is the man behind the (patented) i-track suspension system that is featured on the ENR.

ENR FRAME

Before talking about the i-track suspension, let's get some frame basics out there. The Craftworks ENR (as in, ENduro Race) is a 160mm travel bike, which Craftworks peg as an enduro/all mountain bike. It's constructed from aluminium, uses big bearings and big tubes, and has a no-nonsense, sturdy appearance. There a tapered head tube up front, a 142/12 thru axle out back, a threaded BB shell, internal dropper post routing and room for a water bottle in the front triangle (depending on what shock you're running). The aluminium idler features narrow/wide teeth and spins on two sealed bearings. The ENR is available as a frameset and as a complete bike. Currently, the bike is available direct from Australia only.

PARTS

We rode a build very similar to the stock build available from Craftworks. The stock build features a Cane Creek DB Inline rear shock, a RockShox Pike up front (we had a Lyrik), SRAM Guide brakes (our bike had Shimano Zee brakes) Spank wheels, a RockShox Reverb dropper (our bike had a KS Lev) a SRAM GX drivetrain (we had a mix of SRAM GX and Shimano XT). Having ridden all the parts of the stock Craftworks build we were impressed at the balance of performance to cost Craftworks have gone for. With a spec like that, there's hardly any need for different spec options, which is good because Craftworks offer just the one build-kit, or a frame-only option.

THE ENR'S I-TRACK HIGH-PIVOT SUSPENSION UTILISES AN IDLER PULLEY TO MANAGE CHAIN-GROWTH OF THE VERY REARWARD WHEEL PATH.

Aside from saying that the components on our build performed without fault, we won't review the parts of ENR further in this review and instead will focus on the unique frame design and what differences that makes to the ride.

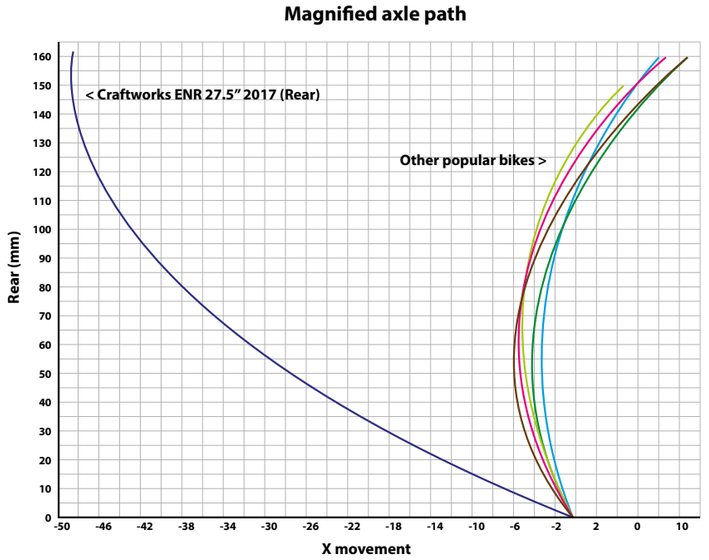
GEOMETRY

The ENR is available in only medium or large, with the only difference being the reach measurement (seat tube length and stand-over remain the same). We had the large size, which has a 445 mm reach - suitably long and reasonably standard for modern all mountain geometry. There is no extra-large size though, so tall riders who prefer a longer reach are out of luck. At a listed 66.5 degrees, the head angle is on the steeper side of modern all mountain and enduro race bikes with this much travel, and we measured ours a bit steeper than listed, at 67 degrees. At 75 degrees (effective angle and actual angle, seeing as the seat tube is straight throughout its length, rather than bent), the seat angle is also a bit steeper than many, which, when you factor in the rear sag and fork top-out of a 160mm travel bike, makes a lot of sense to ensure your weight doesn't fall off the back off the bike, when climbing steeply. Interestingly, while the 418mm length chainstays appear short, that length is when the bike is unweighted, without a rider aboard, and due to the rearward wheel path they lengthen significantly more than most bikes do once the bike sags into its travel with the rider aboard. Once sagged, the chainstays works out to be about the same as a 'normal' (i.e. non-high-pivot) bike with chainstays around 438mms, but they continue to grow all the way up to full travel, whereas most bikes' chainstays start getting shorter after the sag point.

SUSPENSION THEORY – WHEEL PATH AND MORE

Most suspension designs (Horst-links, VPPs, DWs, single pivots) have a wheel path that goes backwards a few millimetres at the start of the travel, pretty well vertical after sag for a while and then the wheel starts coming forwards again through the last half of the travel. This general wheel path is the default standard because it works well with standard chain-lines, where the chain is driven directly from the cassette to the chainring. By contrast, the ENR's wheel path is always going backwards and doesn't ever come forwards; vertical wheel travel is 160mm and rearward wheel travel is 48mm. Check out the graph to get a visual representation of that and a comparison to most other bikes' wheel paths.

With a 'normal' suspension design and chain-line, a wheel path like that of the ENR would cause the pedals to be pulled backwards over every bump, which is why the ENR employs an idler pulley - to get the chain up and closer to the ENR's (virtual) pivot point, which starts up somewhere in front of the upper link.



THE REARWARD WHEEL PATH OF THE ENR IS CLEARLY VISIBLE IN COMPARISON TO THE COMPARATIVELY VERY SIMILAR WHEELS PATHS OF FIVE OTHER POPULAR BIKES, AMONGST THEM: A DW-LINK, A HORST-LINK, ANOTHER COUPLE OF SHORT-LINK MULTI-LINKS, AND ONE BUZZ LIGHTYEAR WOULD PROBABLY RIDE IF HE WERE A MOUNTAIN BIKER. NOTE: THE GRAPHS AXES ARE NOT TO SCALE – THEY'RE FORMATTED TO EMPHASIS THE DIFFERENCE.

THE AMOUNT OF REARWARD TRAVEL, PART WAY THROUGH COMPRESSION, IS CLEARLY VISIBLE IN THESE TWO SHOTS IF YOU LOOK AT HOW FAR FURTHER BACK THE WHEEL IS IN COMPARISON TO THE CHAINRING IN THE SECOND PICTURE.

ROOTY CLIMBS IS ONE OF THE PLACES WHERE THE I-TRACK SUSPENSION OF THE ENR SHINES.

As an aside, it's worth noting that GT's I-drive and AOS suspension systems also feature a rearward axle path, though not as significant as the ENR's, and those designs manage chain-growth without an idler by having a bottom bracket that moves somewhat backwards with the rear wheel. There's more than one way to skin a cat (or so Gareth Morgan tells us.)

OK, so why would a bike designer bother with all this rearward wheel path and required idler-pulley then? I asked Hugh, the ENR's designer, to explain his thinking behind the rearward wheel path: "The reason I was motivated to use a high pivot is because rider inputs such as cornering, pumping and jumping are generally vertical in direction, but terrain forces like from hitting large rocks are more rearward in direction. If a bike has a 'conventional' axle path (which happens to be pretty close to vertical around the sag point), then it means that terrain inputs are not acting in line with the suspension movement, so the suspension feels stiffer when impacting rough terrain, and softer when the rider applies inputs. This is the opposite of ideal. In contrast, a bike with a rearward axle path feels significantly softer when impacting rough terrain, and stiffer with the rider inputs. This means that the bike can be set up with good support for rider inputs, without compromising the suspension's compliance over rough terrain." So that's the theory, according to the bike's designer. In addition to the wheel path being optimised for the trajectory of incoming bumps and rider input, there's also what you'll commonly see referred to as 'anti-squat', which refers to how much the rear wheel is affected by the chain force from the riders pedalling input and the resulting weight shift of the riders mass moving backwards as the bike accelerates forward. In short, bikes with low anti-squat will 'sit down' and compress the shock under hard acceleration and bikes with lots of anti-squat can lift up, or at least stop the wheel from moving out of the way of a bump, under high pedal loads. The ENR's i-track suspension seeks to de-couple the link between anti-squat and bump absorption, allowing for high anti-squat for efficient pedalling but still allowing the wheel to move out of the way of a bump. To be fair, most suspension designs seek to do achieve this, along with other aims, and different approaches accomplish it to varying degrees. Lastly, the ENR's suspension curve (or 'rate') is tuned expressly to be complementary to (in other words to counteract) the natural behaviour of air shocks, so that the resulting suspension feel should be easy to compress at the start, supportive in the middle of the stroke, but then not ramp up so much as to restrict access to the full travel.

Yep, that's a lot to take in. But it explains why Craftworks have gone to the bother of having that idler pulley – in the quest for the best rear suspension behaviour. It's also worth noting that the reason we've only seen idler pulleys on downhill bikes in the past is that front derailleurs preclude the use of idler pulleys. Now that the single-ring drivetrain has supplanted the front derailleur for most all mountain and enduro race bikes, a high-pivot with an idler pulley becomes an option. For that reason, we expect to see more brands using high-pivots and idlers in the future.

RIDING

OK, after all that 'this is how it works on paper' analysis, it's time to talk about how the ENR actually rides in practice. Over the six months that the ENR served as our main tester's main ride, it clocked up over 1,800 km and more than 60,000m of vertical gain/descent. As usual, we shared it around a few riders to get a few points of view, and it was noteworthy that all of our testers mentioned the same key features of how the ENR rides, so let's get to it…

UPHILL

On gentle uphills the ENR pedals like the best climbing long travel bikes – it's no slouch, and the i-track suspension's firm feel under power and the steep seat angle both assist when grinding up steep seated climbs. It was once we hit rooty and steppy technical uphills that the ENR came into its own. Comparing back and forth with a couple of popular floating pivot bikes, it was clear the ENR does an appreciably better job of sucking roots and bumps out of the way, allowing the rider to maintain speed rather than get hung up on roots and rocks. In our experience, some Horst-link bikes are also pretty good at sucking away bumps during uphills, but compared to those bikes the ENR had no squat under power when smacking into roots, so it feels comfortable but at the same time taught and efficient (and there's less chance of smacking a pedal due to a lowered, squatted down bottom bracket). The ENR really does give you the best of both worlds when technical climbing, like no other bike we've ridden – efficient feeling power delivery and excellent bump-removing ability.

The relatively steep head angle also made it easy to keep pointing in the right direction when about to negotiate the toughest rooty crux section of a tricky climb, and the longish chainstays helped keep the 160mm fork from lofting when we didn't want it to. Is it the best technical climber we've ridden? Rear suspension wise, yes. But 160mm travel forks tend to make for a tall front end, so it depends on how good you are at keeping the front end down, compared to a 100mm travel full suspension XC bike. And of course it's also a lot heavier than an XC race bike and has knobbier, slower tyres, so the ENR can't compare to a carbon hardtail with tightly spaced tyre tread when smashing up smooth dirt tracks. But if we're comparing the ENR with other bikes in the 140-160mm category, then the ENR is the best technical climber we've ridden. The only bikes that we've ridden that can match it on technical climbs, depending on the terrain, are some Plus tyred bikes.

OK, so you're not going to lose an enduro race due to the ENR's climbing ability, and indeed it is likely to give you the edge over your mates if technical climbing is involved to get to your favourite descent, but an enduro bike is more about making to the top within time, then crushing all-comers on the way back down…

DOWNHILL

Does it deliver on all those wheel-path and suspension theory promises? In short: yes. With a caveat: the best suspension isn't all that's needed to be the best enduro descender. So let's start with the yes part of that answer. At speed, the ENR smooths out rocks, roots and square-edged hits incredibly well. This was particularly noticeable when swapping back to 'regular' floating pivot suspension bikes. Compared to those bikes, there was a noticeable lack of 'hang-up' or the feeling of getting whacked through the pedals on sudden square edged impacts. That meant the back end was extremely adept at plowing through the ugliest terrain. It was also brought into sharp relief when we tore a new tubeless tyre and had to fit a tube on a very rough Porcupine Rim trail in Moab. What should have been 45psi-induced bone-rattling hell was noticeably muted by the ENR's back end. So yeah, the ENR and its rearward wheel path owns high speed rough tracks.

On less rough tracks, when pumping and otherwise working the bike, the ENR was plenty playful and happy to be worked along trail-features, making little trail-doubles, and it had as much berm-support as the best of its rivals. Riders also commented on a tendency for the back end to break traction readily; this can be interpreted as a shed-load of fun on high speed drifty tracks, or something that needs to be managed by shifting your weight back a bit.

Surprisingly, with 160mm of travel on tap, due to the bike's mid stroke support there isn't an overly soft feel to the suspension; it's more 'composed'. At lower speeds especially, this translated to a slightly 'firm' feeling over roots and rough ground - letting the rider know what was going on underneath their tyres. We'd have been interested to see whether that could be tuned out with some lighter low-speed compression damping adjustment, but we already had the CC DB Inline set to its minimum low speed and high speed compression.

The ENR frame felt very stiff – there was no discernible flex out of the sturdy aluminium tubes, nor from the large diameter bearings. It did take us a couple of days to adapt to the bike's pedal-wheeling characteristics, because it needed a touch more effort to loft the front end – we put this down to the high anti-squat and the lengthening back end; it was no biggie as we soon adapted to it and had no further issues. Similarly, on moderately steep descents we felt we needed to get our body weight further back than on similarly travelled enduro race bikes, and again we soon adapted. But, and here is the caveat: on properly steep tracks and at higher speeds, the front end of the ENR took noticeably more attention to keep online than other enduro race bikes and all mountain bikes we've ridden lately. The more aggressive the track and the more aggressive the rider, the more the words 'nervous' or 'front heavy' were mentioned. This isn't ideal for a bike a rider intends to take down the steepest, gnarliest tracks around, and to give it 100% when they're physically worn down to less than 100%. We reckon this is probably down to the back

end getting longer, rather than shorter, throughout its travel end and steeper-than-ideal head angle, both loading up the front wheel. Luckily, there is a good chance this could be fixed with a slacker head angle shifting some weight to the rear wheel, and thankfully that's easy to find out, because we're just about to fit a -2 degree Slackset from Works Components in the U.K. According to our measurement, this should take our ENR down to a 65 degree head angle, which is equivalent to most other bikes intended as enduro race bikes.

THE CANE CREEK SHOCK

The DB Inline shock performed admirably and without fault over a large number of kms, vertical metres, and hours of riding. We mention this because in our experience this isn't always the case with this shock. To reach our desired suspension action, our 80 kg (ready to ride) tester used three volume reducers. With fewer volume reducers we found we'd blow through the travel too readily. Fortunately, it's very easy to slip the volume reducers into the CC DB Inline without even removing the shock from the frame. Interestingly, with all the adjustment available, we ran the low speed and high speed compression full open – in part a testament to the pedalling efficiency and supportive nature of the ENR. Low speed rebound was set just ¼ of a turn out from fully closed and high speed rebound was set fully closed. We were surprised by the extremes of adjustment we settled on, but aside from wanting to experiment with a slightly lighter compression setting we were very happy with the performance we achieved from the DB Inline. There is a bit of a quirk to the DB Inline: it tends to have a 'lump' in the travel about 1/3 of the way into the stroke. It wasn't noticeable when riding, but it doesn't feel quite right when you're standing at the trail head pushing on the seat to check rebound settings, etc. In any case, it didn't cause any problems, but we're keen to try a RockShox Monarch plus or a Fox Float X Evol for the increased initial stroke sensitivity both these shocks offer, thanks to their larger negative chambers.

NOTES ON THE IDLER

For the first few rides we listened intently and tried to feel if the idler introduced any noise or friction losses. We couldn't discern any friction losses, and our mechanical engineer friends tell us any power losses due to friction should be beneath negligible, if any. Noise wise, we have to admit we were a little surprised to find that once the idler pulley was bedded in after a couple of rides, there was no noticeable increase in noise when riding offroad (unless the chain becomes completely stripped of lube, in which case, the idler does introduce another source of chain-grinding noise). The idler also showed no signs of untoward wear after all the vertical metres of climbing we put on it, and in fact we noted that the front chainring was noticeably less worn out – because the idler takes out the cross-chaining that usually wears down the sides of the teeth of the front ring.

NIGGLES?

Aside from wishing for a slacker head angle, the only other issue we found was the tight rear tyre clearance at the top of the seatstay bridge. We didn't ride it in terrible mud and only really noticed it when riding because a stone stuck in the tyre tread would occasionally get dragged through the bridge. To be fair, we'd take the solidly built back end with limited tyre clearance over a lower profile, flimsily built back end with improved tyre clearance any day of the week, but if your riding includes a lot of thick mud, the ENR's tight clearance won't be ideal.

No doubt, some readers will be eager to know the bike's weight. As much as we at NZMTBR believe weight to be a very over-emphasised aspect of a bike's performance, we can tell you the ENR frame is no lightweight. Though much of it appears to be in the lower portion of the seat tube, so its situated low and central, and not un-sprung mass that matters more. Our frame, with shock, idler and the required lower chain-keeper and bash-guard, was in the order of 3.8 kilos, so a full bike could be somewhere between 13 and 15 kilos, depending on what tyres and how much carbon one chose.

CONCLUSION

While Craftworks peg the ENR (ENduro Race) as an enduro race bike, we reckon it's straight up one the best trail bikes we've ridden, because it's solidly built, climbs incredibly well with the back end providing outstanding efficiency, smoothness and support. On anything other than really steep descents it's a great, confidence inspiring descender that mows through the roughest terrain. It's also really good value for money. Craftworks aren't alone in choosing a head angle that suits speeds and steepness beneath that of your average EWS race, and indeed for many everyday riders it's ideal. But, to live up to its ENR (Enduro Race) name, and also to complement the strengths of its outstanding rear suspension, we reckon a 'Slackset' headset, to knock a couple of degrees off the head angle and get some weight off the front wheel, might better suit the ENR's strengths. As mentioned, we've just fitted one and we're about to find out how it affects the ride. We'll update you in the next issue.