# Living with a Rohloff Speedhub

New literature for "Living with Rohloff" By Andy Blance (Thorn's designer and test pilot).

It is a decade since Rohloff first introduced their revolutionary 14 speed geared hub.
I was interested in the hub at the time, but (like many others, I expect) I didn't want to buy something which I felt may not work properly and which I knew I would never be able to mend.
I could see the attraction of being able to change through all 14 gears using just one shifter; being able to do this without even needing to pedal was more attractive still!
I could see that maintenance could be much simpler; the wheel could be much stronger.
We were persuaded by some strong-willed customers into building a few custom bikes equipped with Speedhubs, and hearing much positive feedback from the happy owners, I decided to contact Rohloff myself -
I reasoned that with the passing of the years, Rohloff would have identified and cured any problems during this time.
"What problems have you had and what is the service life?"
I asked, getting straight to the point, after introducing myself.
"No joke, Andy, but we have never had a hub fail, so we can't tell you the service life, but some of our customers have covered 70,000km of world travel" was the reply from the product manager, Carsten Geck.
(This is now 80,000km AB June 2004.)

There followed more emails and my design for a frame was approved.
This is equipped with an eccentric bottom bracket to adjust chain tension, whilst using socketed vertical drop outs, which we know produce the most reliable rear ends for touring bikes.
Whenever I get the opportunity, I like to travel on dirt roads, over high mountains, with medium-weight camping and cooking kit and up to 1 week's supply of food... I built two "Adventure Touring" bikes with Speedhubs and Fiona and I set out in Feb 2003 to ride as many mountain gravel roads as we could find in Tasmania... there were plenty!
The bikes were better than good... they were sublime. I liked the Rohloff hub so much that this bike has been joined by a lightweight, sporty bike with a Speedhub.
The strength and durability of the Tasmania bikes has been built into the Thorn Raven Tour and the lighter weight bikes have gone on to become the Thorn Raven Sport Tour.

## Further developments.

In September 2003 I rode the Newnham 90Km Enduro on our first prototype Rohloff mountain bike; this was a "hard tail" design, built from our medium weight, conical, Reynolds 853 tubeset.
I designed the frame specifically for hard use, low maintenance and long life.
The results were very encouraging, a few tweaks were made and now the geometry is spot on... a sublime blend of stability down hill and agility on single track! The "Enduro" is perfect for long distance, high performance cross-country riding, winter mtb training (or, in the case of the "Catalyst" version, also towing a Bob Yak trailer around the world!)
With the help of a short travel suspension post, I can ride this bike all day. (I have recently completed a 90 mile mtb ride over challenging terrain.
Compared to the usual alloy framed, derailleur geared bike, the overall impression is actually one of silence! This is not the usual first impression of a Rohloff hub (!) and is primarily because the chain can't slap on the stays but even seventh gear does not sound too noisy off road.
It is the bike's performance in mud which is its most outstanding feature... not only do all the gears continue to operate faultlessly, the 'muddy' transmission is much more efficient and much lighter in weight than muddy derailleurs... the bike is so easy to clean afterwards!
I have certainly not tried to save every ounce with the frame... long-term durability and the ability to survive some hard knocks is much more important to me... I would like my frame to outlast the hub... now there's a challenge!
I had the opportunity to load the tourer up and head south again, with my tent last winter. South Western Australia's sandy trails and graveled forest tracks were no problem for the

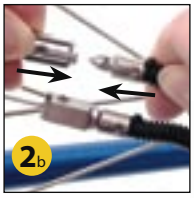
Rohloff. The bike performed faultlessly and traveling with it was indeed "No worries".
My touring bike's hub has now had its second oil change and it is running more sweetly than ever, it gets quieter all the time, I can still hear seventh gear whirring away, and perhaps I do spend less time in it than I would if it was silent, but I am convinced that it is only noise, not increased friction.
The hubs have now been fitted to a pair of Thorn eXXp bikes (massive, carthorse-like, touring "mountainbikes") and the wicked gravel road of the Chilean Andes beckon!
I now have my ideal touring bikes, a perfect every day bike and a fantastic mountain bike each with a Rohloff hub. I have become so used to using it, that changing gear without pedaling, has become an unconscious and integral part of my cycling technique... I really have no wish to use (or maintain!) derailleur gears again!
We have also fitted the hub into several tandems... the feedback has been so positive that we are having a range of Rohloff tandems built... they will be available in spring 2005.
Getting rid of the front mech is a phenomenal benefit on a tandem, so is being able to change gear without pedaling!

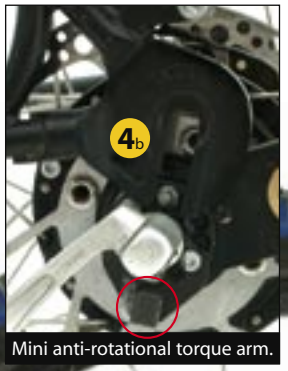
## Known problems with Rohloff hubs.

As mentioned earlier in this article, there has never been a case of a Rohloff hub's internals failing.
Some of the early hubs did leak a little oil, in most of these instances, after examination, Rohloff discovered that the hubs still contained far in excess of the recommended 25ml of oil... well-meaning owners had thought that " if 25ml of oil is good, then 50ml of oil must be better" Actually the hubs do not need more than 12 to 15ml... but they must have 12ml!
Rohloff have modified the seals and, when the correct quantity of oil is used, leaks should only occur when the sprocket on one side or the axle ring assembly on the other are removed and the hub is also laid down on that side.
Reports of slipping gears can almost always be traced to using the chain tensioner; everything that I have reported about the hub has been based on me using the OEM version in a frame with vertical drop-outs and an eccentric bottom bracket. There are other ways of doing it but there really is no sense in using the chain tensioner.
Very occasionally, a new hub rapidly becomes difficult to change between 3 and 4 and/or 10 and 11... even more rarely; this can be accompanied by slipping in these gears. Sometimes a small particle, produced during the running in process, is the culprit, it can be flushed out and the hub's oil replaced, but usually the wheel has to go back to Rohloff; who return the wheel inside one week, after they have re-shim it. The problem has never been reported arise a second time.
As this malfunction has never been reported on anything other than very low mileage hubs, it shows that there must have been an error (in deciding which shims are required, when the hub is assembled) which can't be detected until the hub is built into a wheel and comes under operational load. We have now supplied many machines with the Rohloff hub and we have had to return fewer than 1% of them! We advise you to purchase your hub a couple of months before a grand adventure, just in case you are that 1 in 100!

**Please note that the internal gear wire will snap eventually...** when it snaps, changing gear with the twist grip becomes impossible. The bike can still be pedaled and in practice what usually happens is that the rider's instinct is to twist the shifter when the cable snaps, so depending upon which cable snapped, the hub is(usually) in first gear or fourteenth. Removing the axle ring assembly (good quality Torx Tx20 driver and 8mm spanner) will allow the hub to be put into whatever gear is required and **the cycle can still be ridden.**
The replacement of the internal gear wire in a Rohloff hub is not particularly tricky, once the very clear instructions have been read and understood. Having said that, I would much rather change the cable at home (when I am under no pressure, in the dry, under good lighting conditions, with my reading glasses, cable cutters and cup of tea available) than change it halfway up a mountain in a storm during the night!
**But prevention is much better than cure, so why not consider maintaining the cable in the same way that you would the cam belt in your car? That is, change it at regular intervals, these intervals being shorter than the service life of the component.**
I would suggest that because

# Easy rear wheel removal!

Mini anti-rotational torque arm.



No tools required & takes seconds!




Mini anti-rotational torque arm.

## Removal:

**1a.** Quick-release the V brake pipe

**2a.** Quick-release the two Rohloff cables simply by twisting them through 90° degrees

**3a.** Quick-release the skewer

## Replacement:

To replace the wheel reverse the process

**5b.** Locate the chain on the sprocket

**4b.** Ensure the mini anti-rotational torque arm fits into the deep slot on the left hand dropout

**3b.** Tighten the Quick release skewer

**2b.** Clip together the two Rohloff cables

****Important Safety****
****Notice****

**1b.** Clip back the V brake pipe

No tools required & takes seconds!

## EX Hub (Cable Box) Wheel Removal:

**1a.** Unscrew Cable Box thumbscrew and remove

**2a.** Quick-release the skewer

## Replacement:

To replace the wheel reverse the process

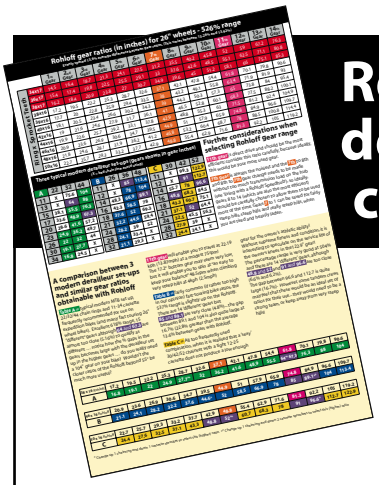
**5b.** Locate the chain on the sprocket

**4b.** Ensure the mini anti-rotational torque arm fits into the deep slot on the left hand dropout

**3b.** Tighten the Quick release skewer

**2b.** Replace Cable Box and screw in the thumbscrew

**Simple!**



# Rohloff Gear inch & derailleur gear ratio comparision charts.

## The 3 red highlighted possibilities are to be used at the owner's own risk.

Rohloff will not give a warranty on the hubs when a gear with an input ratio smaller than 40 x 17 (2.353:1) is used. This (38 x 16) ratio is permissible for use by world class athletes (permissible even for 2 athletes, on tandem)

The diameter of the wheel and the gear ratio produced are not relevant... it is the input ratio which is critical... Rohloff state 150 kg pedal force (!!!) with 170mm cranks as maximum input. If exceeded, this could damage the hub as easily in 14th as it could in 1st.

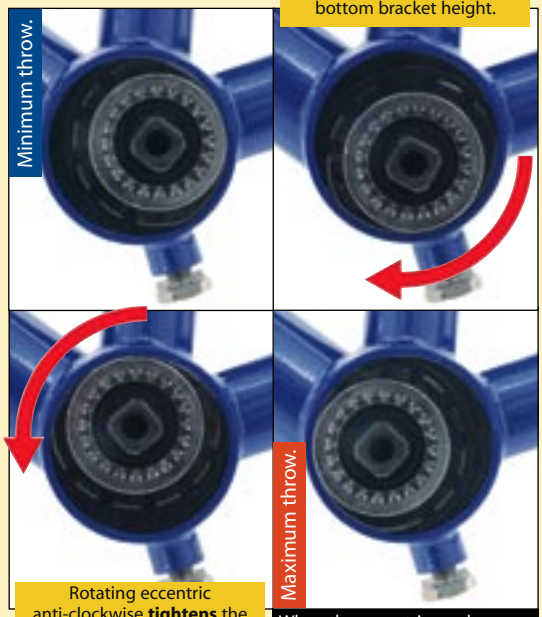
**In our opinion 38 x 16 is an ideal general touring gear, some may say it is too low, but if you are fit enough, or can get fit enough to spin 14th gear at a knee-saving 100rpm for 1 hour you would travel 43.377 km (27.11 miles) on 26" wheels!**

You may feel, especially if you are older and/or used to spinning low gears, that you are unlikely to develop the pedal force of a world-class athlete, so you may wish to take personal responsibility for the hub and use these 'forbidden' ratios... it is your choice!

There are no limits imposed by Rohloff on how high a gear you can use; there is a double-sided 15 tooth sprocket available. Rohloff also make a 13 tooth sprocket but this is only single sided and is positioned slightly further outboard of the hub.

## Simple Eccentric chain adjustment and perfect chainline!

Rotating clockwise **tightens** the chain and **lowers** the bottom bracket height.




Rotating eccentric anti-clockwise **tightens** the chain and **raises** the bottom bracket height.

**NOTE:** When adjusting the chain do not over tighten it... **remember to allow for the tight spot**.

When the eccentric reaches this point and the chain needs adjusting, a link of chain needs to be removed. The eccentric must then be rotated back to the 'minimum throw' position to allow re-adjustment of the chain tension.

# Rohloff gear ratios (in inches) for 26" wheels - 526% range

**Evenly spaced 13.6% average difference between gear ratios. (This varies between 13.26% and 13.92%)**

| Ring x Sprocket Teeth | 1st Gear | 2nd Gear | 3rd Gear | 4th Gear | 5th Gear | 6th Gear | 7th Gear | 8th Gear | 9th Gear | 10th Gear | 11th Gear | 12th Gear | 13th Gear | 14th Gear |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34x17 | 14.5 | 16.4 | 18.7 | 21.3 | 24.1 | 27.5 | 31.2 | 35.5 | 40.2 | 45.8 | 52 | 59 | 67.2 | 76.3 |
| 36x17 | 15.4 | 17.4 | 19.8 | 22.5 | 25.5 | 29.1 | 33 | 37.6 | 42.6 | 48.5 | 55.1 | 62.5 | 71.1 | 80.8 |
| 38x17 | 16.2 | 18.4 | 20.9 | 23.8 | 27 | 30.7 | 34.9 | 39.6 | 45 | 51.2 | 58.1 | 66 | 75.1 | 85.3 |
| 40x17 | 17.1 | 19.3 | 22.0 | 25.0 | 28.4 | 32.3 | 36.7 | 41.7 | 47.4 | 53.9 | 61.2 | 69.4 | 79.0 | 89.8 |
| 38x16 | 17.2 | 19.5 | 22.2 | 25.3 | 28.7 | 32.6 | 37.1 | 42.1 | 47.8 | 54.4 | 61.8 | 70.1 | 79.8 | 90.6 |
| 39x16 | 17.7 | 20 | 22.8 | 25.9 | 29.4 | 33.5 | 38 | 43.2 | 49.1 | 55.8 | 63.4 | 71.9 | 81.9 | 93 |
| 40x16 | 18.1 | 20.5 | 23.4 | 26.6 | 30.2 | 34.3 | 39 | 44.3 | 50.3 | 57.3 | 65 | 73.8 | 84 | 95.4 |
| 42x16 | 19 | 21.6 | 24.6 | 27.9 | 31.7 | 36.1 | 41 | 46.5 | 52.8 | 60.1 | 68.3 | 77.5 | 88.2 | 100.1 |
| 44x16 | 19.9 | 22.6 | 25.7 | 29.2 | 33.1 | 37.8 | 42.9 | 48.8 | 55.3 | 63 | 71.5 | 81.2 | 92.4 | 104.9 |
| 46x16 | 20.9 | 23.6 | 26.9 | 30.6 | 34.7 | 39.5 | 44.9 | 51 | 57.9 | 65.9 | 74.8 | 84.9 | 96.6 | 109.7 |
| 48x16 | 21.8 | 24.6 | 28.1 | 31.9 | 36.2 | 41.2 | 46.8 | 53.2 | 60.4 | 68.7 | 78 | 88.5 | 100.8 | 114.4 |
| 50x16 | 22.7 | 25.7 | 29.3 | 33.2 | 37.7 | 42.9 | 48.8 | 55.4 | 62.9 | 71.6 | 81.3 | 92.2 | 105 | 119.2 |

## Three typical modern derailleur set-ups (gears shown in gear inches)

**(X = bad chain line, avoid using)**

| A | 22 | 32 | 44 |
|---|---|---|---|
| 11 | X | 75.6 | 104 |
| 13 | X | 64 | 88 |
| 15 | 38.1 | 55.5 | 76.3 |
| 17 | 33.6 | 48.9 | 67.3 |
| 20 | 28.6 | 41.6 | 57.2 |
| 23 | 24.9 | 36.2 | 49.7 |
| 26 | 22 | 32 | 44 |
| 30 | 19.1 | 27.7 | X |
| 34 | 16.8 | 24.5 | X |

| B | 26 | 36 | 48 |
|---|---|---|---|
| 11 | X | 85 | 113.4 |
| 12 | X | 78 | 104 |
| 14 | 48.3 | 66.9 | 89.1 |
| 16 | 42.3 | 58.5 | 78 |
| 18 | 37.6 | 52 | 69.3 |
| 21 | 32.2 | 44.6 | 59.4 |
| 24 | 28.2 | 39 | 52 |
| 28 | 24.1 | 33.4 | X |
| 32 | 21.1 | 29.3 | X |

| C | 30 | 42 | 52 |
|---|---|---|---|
| 11 | X | 99.3 | 122.9 |
| 12 | X | 91 | 112.7 |
| 14 | 55.7 | 78 | 96.6 |
| 16 | 48.8 | 68.3 | 84.5 |
| 18 | 43.3 | 60.7 | 75.1 |
| 21 | 37.1 | 52 | 64.4 |
| 24 | 32.5 | 45.5 | 56.3 |
| 28 | 27.9 | 39 | X |
| 32 | 24.4 | 34.1 | X |

## Further considerations when selecting Rohloff gear range

**11th gear** is direct drive and should be the most efficient; consider this ratio carefully, because ideally, this would be your most used gear.

**7th gear** is always the noisiest and the **7th** to 8th and 8th to **7th** gear change needs to be made without too much transmission load on the hub (see 'living with a Rohloff Speedhub'), so ideally, gears 8 to 14 (which are also the most efficient) should be carefully chosen to allow them to be used most of the time. Gears **7** to 1 can be saved for fairly steep hills, steep hills and really steep hills, when you are tired and heavily laden.

## A comparison between 3 modern derailleur set-ups and similar gear ratios obtainable with Rohloff

**Table A =** typical modern MTB set up, 22/32/44 chain rings and 11-34 cassette frequently recommended for use on expedition bikes (and many fast touring 26" wheel bikes). Excellent 618% range, 15 "different" gears although **64** and **67.3** are almost too close (5.16%) to qualify as different … notice how the % gaps in the gears becomes large with the derailleur set up in the higher gears… do you really need a 104" gear on your bike? Wouldn't the closer ratios of the Rohloff, beyond 55" be much more useful?

**11th gear** will enable you to travel at 22.19 kph (13.87mph) at a modest 75rpm!
The 17.2" bottom gear may seem very low, but it will enable you to spin at "an easy to keep your balance" 48.5rpm when climbing very steep hills at 4kph (2.5mph)

**Table B =** fairly common (if rather too high in our opinion) fast-touring bike ratios, the 537% range is slightly up on the Rohloff. There are 14 'different' gears but **85** and **89.1** are very close (4.8%)... the gap between 89.1 and 104 is also quite large at 16.7% (22.8% greater than the average 13.6% between gears with Rohloff.

**Table C =** All too frequently used combination, when it is realised that a 'sexy' 30/42/52 chainset with a tight 12-25 cassette does not produce a low enough gear for the owner's athletic ability!
Without supreme fitness and condition, it is interesting to speculate on the service life of the owner's knees in the122.9" gear!
Once this has been established an 11 - 32 cassette is necessitated.
The percentage range is very good at 504% and there are 14 'different' gears, although **48.8** and **52** and **91** and **96.6** are too close (6.6% and 6.2%).
The gap between 96.6 and 112.7 is quite large (16.7%). However, some tandem crews may feel that these would be an ideal set of ratios for their use... they would need to be a strong team, or keep away from very steep hills!

| 38 x 16 Rohloff | 17.2 | 19.5 | 22.2 | 25.3 | 28.7 | 32.6 | 37.1 | 42.1 | 47.8 | 54.4 | 61.8 | 70.1 | 79.8 | 90.6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 16.8 | 19.1 | 22 | 24.9 | 27.7** | 32 | 36.2 | 41.6 | 48.9 | 55.5 | 64** 67.3 | 76.3 | 88 | 104 |

| 46 x 16 Rohloff | 20.9 | 23.6 | 26.9 | 30.6 | 34.7 | 39.5 | 44.9 | 51 | 57.9 | 65.9 | 74.8 | 84.9 | 96.6 | 109.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | 21.1 | 24.1 | 28.2 | 32.2 | 37.6 | 44.6* | 52 | 58.5 | 66.9 | 78 | 85 | 89.1** | 104 | 113.4 |

| 50 x 16 Rohloff | 22.7 | 25.7 | 29.3 | 33.2 | 37.7 | 42.9 | 48.8 | 55.4 | 62.9 | 71.6 | 81.3 | 92.2 | 105 | 119.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 24.4 | 27.6 | 32.5 | 37.1 | 43.3 | 48.8 | 52** | 60.7 | 68.3 | 78 | 91 | 96.6* | 112.7 | 122.9 |

* Change up 1 chainring and down 1 cassette sprocket to select this (higher) ratio. ** Change up 1 chainring and down 2 cassette sprockets to select this (higher) ratio

our cycles have such a perfect line of entry of the cable into the hub, the cable should fail at the upper end of Rohloff's 10,000-30,000Km projected cable service life... so 20,000Km service intervals should see very few, if any, of our customers with broken cables.
To those poor, unfortunate individuals who always seem to have bad luck with mechanical things, I would say that, even if you changed it at 10,000km (i.e. every other oil change) it would require but a fraction of your time spent in maintenance compared to a derailleur system.
For the global tourist, the extremely cautious and the phenomenally unlucky, there are two alternative strategies to consider;
[1] Carry a complete axle ring assembly (the name of the whole component which houses the cables and pulley) and a good quality Tx20 Torx driver; this allows the replacement of the cables in less time than it would take to repair a puncture and pump up a tyre!
You then have 10,000Km minimum to find a suitable time and place to perfect the technique to replace the 0.9mm cable in your old axle ring assembly before you could possibly need it again.
The axle ring assembly costs £40 from SJS Cycles (SJSC part No. 10358) it weighs 64g and comes complete with cables installed and cut to precisely the correct length, rubber gaiters fitted and QR fittings attached.
[2] You could opt for the (more expensive and slightly heavier) version with the QR external cable box... this uses conventional 1.1mm gear cable and conventional (brake) outer casing all the way through and in the (unlikely) event of one of these breaking, disconnect the external box and a simple turn of an 8mm spanner will engage whichever gear you wish, enabling you to continue on to a suitable repair facility.
However, to function perfectly, this option really requires specific cable routing and is only available on our Raven Enduro, the new Raven Twin tandems and our "made in Somerset", Rohloff eXp and eXXp.
**I have been unable to discover any other problems with the Speedhub, every part is available as a spare part and Rohloff have a philosophy that means that each improvement to the hub is retrofitable to earlier hubs.**

## What I like about the Speedhub

I like the solid build of the Speedhub; it was originally built as an all-season MTB hub, for use in Northern Europe's extreme conditions... **it is well sealed, all the internals run in an oil bath.**
I like the fact that the **'indexing of the gears' takes place inside the hub,** this means that the twist grip, although beautifully made to enable easy replacement of the cables, is a low tech item - there is little to go wrong with it (unlike current derailleur shifters).
The twin-cable system means that there are **no return springs to fail,** either in the shifter or the hub.
I like the way **that the next gear (up or down) is only a simple twist of the shifter away...** none of that "changing up a chainring and down two sprockets."
I love being able to **change gear without pedaling,** it is difficult to express how really useful this is.
It is great not to have a derailleur hanging low down waiting to be knocked.
The smaller chainring and sprocket (and lack of rear derailleur) means that the chain is less likely to cover your leg in black muck.
I like the way Rohloff have engineered the sprocket to be double sided... wear it out and then turn it round and wear it out again, it is refreshing that, in today's throw away society, Rohloff have considered this to be a priority!
I like the way the gears never 'jump' or slip... you feel really confident pedaling, or changing gear, when out of the saddle!
**I like the absolute silence of pedaling it, in gears 8 to 14, once it is run in.**

## Things I dislike about the Rohloff Speedhub

**It would be too much to hope that there would be no dislikes, but they are few.**
It is a shame that the hub is only available in 32 holes, but I have been persuaded that 32 spokes, bedded in widely spaced flanges with no wheel dish, are stronger than 48 spokes on a dished wheel with the narrow flanges necessitated by 9 speed cassettes.
It is a pity, for some potential users, that there is not a brake lever type shifter suitable for drop bars (I can't imagine what it would need to be like)... we

have solutions to using Rohloff with drop bars but they mean that you have to move your hand to reach the shifter. I have come to prefer "straight" bars myself (swept back riser bars)... so it is not an issue for me.
I don't enjoy the noise in gears 7 to 1, especially the noise in gear 7... but I can easily live with it, because it is the noise of precision parts rotating and meshing at speed, the hub does get quieter with the miles and because I have carefully considered my gearing, I am in gears 8 to 14 most of the time!
I don't like the fact that you have to back off your pedaling power, particularly when changing between 7 & 8 and 8 & 7. If you do not back off between these gears, the hub will change into, and stay in, gear 14... until you do back off! This is a nuisance, but it is **only a nuisance** and not a danger and much easier to accommodate than the nuances of changing chain rings with a derailleur!
**Over time I have become so used to using the hub, that I never experience any problems whatsoever, when changing gear...whatever the circumstances!**
I am not obsessed with weight but, like most cyclists, I like to keep things as light as possible; the hub doesn't weigh more than the items it replaces, but the frame needs some extra provision for the hub. The fact that all the weight is at the rear of the bike makes it feel heavier than it actually is, when you pick the bike up. **This concentration of the weight is not noticeable, in any way, when riding the bike.** To be fair to Rohloff, when you see a cut-away drawing and you see all those ball races, labyrinth seals, and needle bearings... when you see the quality of the machining you realise they have done remarkably well to make it as light as it is!
I am not going to cite the high cost as a negative feature because, looking at the quality of this product it is actually an engineering bargain, beyond belief! Goodness only knows how many £££'s worth of shifters, cassettes, derailleur, chains, chain rings and rear hubs you would have needed to buy during the service life of the Rohloff Speedhub... however long that turns out to be! Or how many jammed chains, slipped gears and messy hands you will avoid!
**In short the Rohloff Speed-hub is German engineering at its absolute finest... it is so overbuilt that nobody yet knows its real-world service life... and it continues to get better as it gets older!**

## Why we recommend getting a complete bike rather than adding a hub to an existing bike

One of the great joys of the Rohloff, apart from all the considerable benefits in operation, service and reliability, is that the considerable investment in one is repaid, over the years, by being able to squeeze every last bit of service life out of the transmission.
**Please note that fitting the hub to a frame not designed specifically for it** (except in the case of a frame with very long horizontal dropouts) **means that a chain tensioner will have to be used,** the tensioner allows the chain to skip when things are only partly worn, or if you try adding a new chain to a part worn sprocket... just as a derailleur system does.

If you fit an aftermarket hub kit, you must also use a torque arm to resist the considerable force trying to rotate the hub in the frame. We have had our own stainless steel vertical dropouts made, which accept the bicycle manufacturers' version of the hub (OEM 1) which have a "mini torque arm" built into them.

The Rohloff cables run in continuous outer casing to the LHS of the hub, frames not carefully considered for Rohloff will need to cable tie these cables to the frame... this is neither as efficient nor as elegant as our totally thought out, Rohloff specific frames.

## Oh, and we do allow you a 100 day, money back if not delighted, trial period, with our bikes!

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