Raven Twin
And Raven Twin S&S

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Winter
2015 - 2016

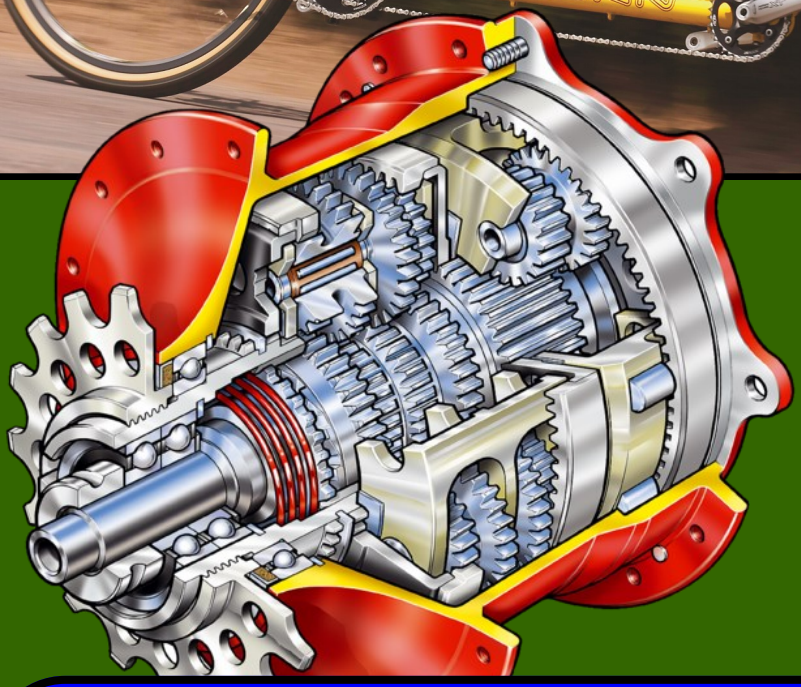
These tandems are designed specifically for use with the ***Rohloff EX hub***

Prices, in printed copies of this brochure, may no longer be correct. The current prices, given in the on line brochure, are correct and will always be honoured.

Are you disabled? - Or do you ride with, a disabled stoker?
Did you know that you don't need to pay VAT?
We can help with this, please contact us for further details.

sales@thorncycles.co.uk
01278 441505

Our designer, Andy B and partner, Fiona on their original size #8 Raven Twin.



It takes two...

...me and you!

Thorn Touring Tandem

About Thorn

The business began as St John Street Cycles, in 1984 when Robin Thorn took over an almost defunct toy and cycle shop at 36 St John Street. He chose Bridgwater quite by chance – he was having holiday in the area from his home in Norfolk, and was amazed to see the number of people on bicycles in the town. In an instant the decision was made and the shop was leased that day.

Robin borrowed a small sum from his parents and worked all hours of the day and night to build up the business. He soon became a well-known figure with his oil-stained brown overall and wild hair and beard, often working on the pavement in the sunniest weather to draw further attention to his shop.

In 1989, the first employee was taken on – Andy Blance, a friend and very experienced audax rider.

In 1992, the first tentative moves were made into national advertising, concentrating on the touring and tandem markets, which were the particular interests of Robin and Andy. The emphasis had completely changed from cheap bikes to very high quality, specialist machines, though still often sold at a bargain price made possible by Robin's buying prowess.

In 1993, Robin decided to move up the road to number 91-93. The entire building front was gutted to give a modern, light, air-conditioned shop and a very superior workshop; the rear was left as a long single-storey brick store. St John Street Cycles was rapidly becoming known as one of the major touring and tandem suppliers in the country. We were gaining an extremely good reputation for the quality of our service and the breadth of our knowledge in the field.

In late 1995 we began to consider manufacturing our own bikes. We had become increasingly frustrated by the mistakes and missing features on the bikes we could buy and wanted to design what we considered to be the ideal touring bike and the ideal tandem. Andy used his wealth of experience and study of the subject to design the bikes, and the THORN brand was launched. The first bikes were so well received that we didn't even have to advertise them – they sold as quickly as we could get them made. At this point we set up our own frame shop and Andy designed complete ranges of Thorn bikes. Thorn quickly became established as a premier brand in the tandem touring market. At the same time, our mail order business and online store had been growing apace, and our internet site recognised as an industry best.

In 2000, the limited company Thorn Cycles Ltd. Was formed, with Robin and Helen Thorn as joint owners. St John Street Cycles remains as a trading name of the company.

(1) Robin and Andy back in 1992

(2) Robin 2007

(3) Andy 2007

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Steel is real

High quality steel is the best possible material for a strong, comfortable, well equipped, long lasting frame... all our bikes are high quality **heat treated steel**... we would not wish to build our bikes with anything else and we would not wish to use anything else for our own cycling!

The final heat treatment process can double the cost of a steel cycle tube. Heat treatment significantly raises the UTS (ultimate tensile strength) which makes the tubes stronger and more resistant to cracking, it also makes the tubes more resistant to denting. It also greatly enhances steel's much talked of and easy to notice but hard to describe quality of **"resilience"**. Because heat treatment is so expensive, the steel tubes used in most cycles are not heat treated. If a frame doesn't say "heat treated", you can be certain that the tubes won't be.

All the tubes used in Thorn frames are heat treated.

Cheap (thick-walled) aluminium frames are strong enough, they could have the fittings required on a touring bike but they are heavy and very uncomfortable.

Expensive (thin walled) aluminium frames are less uncomfortable and they are quite light but they can't have the fittings required for touring and they break! Dealing with a broken lightweight aluminium frame is easy...You recycle it into bottle tops!

Carbon fibre frames can be very lightweight and very durable...as long as you don't scratch them...a gouge in a carbon frame is a catastrophic failure waiting to happen. I'd have no hesitation using one for racing...

...**If I raced I**

and (especially) if somebody else was paying for it!

It is difficult to manufacture a carbon frame with bosses...I don't know whether to laugh or cry, when I see a "cool" carbon road racing frame being used for lightweight touring...I see rattling mudguards, held on with cable ties, mega heavy alloy seat post-fitting (seat post breaking?) carriers with loads being carried, which are too high and too far back for stability...or I see no provision for luggage at all, with the rider looking like a cricket umpire, clothing tied around their waist...how cool is that...in both senses of the word?

I also frequently see the dangers and difficulties associated with toe overlap.

Titanium is two-thirds of the weight of steel...but even the top quality, cycle-specific tubes are much less stiff. To make a frame which is as stiff as a good, high quality steel frame, you have to use considerably more volume of material, which does not give that much of a weight saving! Many customers however want a weight saving with a Ti frame and they end up with a frame which is not stiff enough...this not only wastes energy...it can give a scary ride down steep hills!

You couldn't have these fittings on an alloy or titanium frame

Much of the titanium used today is not only of a very low grade but it is also "plain gauge" material, that is, it is not butted at all! If low grade steel frames can be nicknamed "gas pipe", perhaps these tubes should be called "nuclear reactor cooling pipe". Such tubes may be an improvement on "gas pipe" steel but they are far inferior to top quality steel, unless, of course, they *are* actually being used in a reactor!

They remind me of the story of "the Emperor's new clothes".

It is either impossible or extremely expensive to have the required fittings on a high quality butted Ti frame and furthermore, all such titanium frames, that we have known, have also broken! It is usually impossible to repair a cracked titanium frame. Perhaps there are some proper titanium frames, being made today, or which may be made in the future, that won't break...but we doubt it. We certainly wouldn't want to risk such a huge sum of money, when steel is almost as light, is much more durable and could be easily repaired if necessary, steel rides better, is relatively inexpensive and a steel frame can have all the fittings you require.

THORN 969 DOUBLE BUTTED SEAMLESS HEAT TREATED COLD-DRAWN CRO-MO

THORN **Steel is real!**

I sincerely hope that you enjoy reading the Raven Twin Brochure, it's been a labour of love. I also hope that you will realise that the attention to detail, in this brochure, is indicative of the attention to detail, that has been incorporated into the Raven Twin's design and development - which was also a labour of love and first hand experience!
These are not "blue sky" concept bikes, aimed, by a committee of accountants, at a poorly market-researched demographic, where 90% of design time is concerned with decals and paint colour. Neither do we allocate 50% of the cost to be spent on advertisements, which contain precious little, apart from; pictures of beautiful bronzed people, with gleaming, polar white smiles, a few clever buzz words and the "artistic" use of blank space!
If you have dreams of exploring our planet by tandem, or of simply sharing the many, varied and delightful experiences of riding tandem, the Raven Twin will enable you to fulfil your dreams - together - upon the perfect machine. No other tandem feels as secure, as well thought out, or as reliable.

Andy Blance Aug 2014

Why ride tandem?

There are many reasons why it makes sense to ride tandem. Listed below are some of them; at least 2 should apply to everybody.

[1] For partners of unequal cycling ability, going cycling together can be a cause of great frustration and concern. The more unequal their abilities - the greater the frustration and concern can be.
If it's frustrating to have to constantly wait for your partner to catch up, it's nothing compared to the frustration of constantly being waited for - only to see your partner disappear into the distance, as soon as you start cycling again! It can be soul destroying for some, yet merely irritating to others, to know that you're trying your hardest and yet you're still detracting from your partner's enjoyment.
It can also cause great concern, to both parties, to become separated, in an unfamiliar environment.
Although the above scenario is very common, it's not always the stereotype of a man waiting for a woman! Most partners of unequal ability, would find that riding tandem, is the perfect way of enjoying cycling together. Now they'll always arrive at the same time and they'll each get the degree of physical work out that they (individually) want.
This new tandem partnership should find, as have many thousands before them, that not only does their desire to go cycling together increase but also that the distances, they can cover comfortably, will also increase.
Frequently, one of them finds that their, often dreamed of adventurous cycling holiday, or cycle event, is starting to look both possible and attractive to the other - a whole new world beckons.

[2] For those with balance problems or visual impairments, stoking a tandem is possibly the only way to obtain full cardiovascular fitness - in the open air.
[3] A tandem fitted with kiddy cranks, or even better, a child back tandem (see Raven Dynamic on back page)
enables families to continue cycling together, during the early years of parenthood. It also introduces children to the pleasures of cycling in a safe, controlled environment.
Being part of a team, is much more fun! Learning the ropes, as part of a team, on a fast stable machine is much more likely to turn them into keen cyclists, than is being dragged along, by a keen parent, on an unstable child trailer.
[4] When two cycling fit parties ride tandem, the result is a shared athletic experience, of a quality beyond words - it's also very fast!
[5] It's only necessary for one of you to be able to ride a bike...that person should be at the front!
Indeed, the best stokers are often those who can't cycle on their own!
[6] Riding tandem is fun! It makes you smile - it makes others smile.

Two tandem terms explained.

Pilot - the one on the front (often called captain) but that is not really PC.
Stoker - the one on the back.

Who should be pilot, who should be stoker?

Sometimes body size makes this a really easy decision. The heaviest, or the one with the greatest upper-body strength, should go at the front, unless that would mean that the most competent cyclist was not the one in charge of the machine. It can sometimes take a fair bit of upper body strength to control a

tandem - especially at low speed. The heavier the stoker is, the more upper body strength the pilot ought to have but we've sold several replacement tandems to 55Kg women to pilot their, considerably heavier, blind partners. They're all managing fine now, thanks to our extra-stiff frames!

A good pilot will take care, to ensure that riding tandem is always a pleasure for their stoker - they understand the simple equation:-
No stoker = No tandem ride

A good stoker knows their physical limitations - they'll always pace themselves and will try and keep something in reserve - in case a few extra coals are needed on the fire.

3

THORN RAVEN TWIN

The first series of Raven Twins was acclaimed as; a ground breaking new advance in tandem design. The latest series of frames were introduced in 2011 in 5 sizes 4A, 6A, 7A, 8A and 12A . This range of tandems has redefined the future of tandeming.

We've used our unrivalled knowledge and experience to make the definitive tandem frame - whichever size you need.

To make certain that we could have exactly what we wanted, rather than have to make do with what was available, we've had our own tube set made.

This superb tube set starts life as the finest seamless Japanese Cro-Mo steel blanks, these are then cold drawn and butted, into the size and gauge that we require, finally the tubes are heat-treated to ensure the maximum strength, longevity and performance. These tubes are crafted into frames, by only the very finest of the builders, from probably the cycle trade's most respected factory. The frames have provision for every desirable feature

incorporated into them, allowing multiple choice of operation of key functions.

The new Raven Twins have 2 different frame designs and there are five sizes of frame!

All of our frame sizes could have S&S couplings fitted. Currently this means that you could have (almost) any colour you wish, with the S&S frames but it does involve a 10 week wait.

These are the finest frames we've ever had made and represent the experience we've gained from sizing customers with the previous frames. There has been so much care, experience and thought invested into these frames, as well as a massive financial investment, that we fully intend and expect them to remain both current and "cutting edge" for at least a decade! The original Raven Twins were at the cutting edge for seven years - we've only made a few minor changes to the latest (size A) frames. We almost certainly have a frame to delight and suit both of you, for your entire cycling lives!

The frames themselves are enough to get excited about and we have obviously had them built specifically to use the ultra-reliable, Rohloff Speedhub! (This is an internal hub gear, which has 14 speeds!) We've used Rohloff hubs, for many years, on touring bikes; we've used them for commuting; we've used them on mountain bikes, we've enjoyed long, heavily loaded tours in the wildest of wild places and we've used them on Tandems - they are superb - we'd never want to use derailleurs again on any bike!

(There's much more information available in our "Living with a Rohloff" brochure.)

As good as our solo bikes are, we feel that perhaps the biggest advantage of all, for a Rohloff hub, is when riding tandem! **The biggest trouble with derailleur gears, on tandems, has always been the front mech** - it's always difficult to set up the front mech, so that it changes rings when you want it to - without jamming, dropping or overshooting the chain in the process. There's no possibility of this happening with our Rohloff Tandems **- there's no front mech!**

All 14 gears are operated via one shifter; the gear mechanism runs on multiple bearings and is enclosed in the rear hub. As a bonus, you don't even need to be pedaling to change gear! How many times have you come to a halt on a derailleur tandem, only to find that you were in the wrong gear to restart? What do you do then? Do you panic about keeping your balance, whilst you stand on the pedals and strain? Do you and your stoker, get off and does your stoker then hold the rear wheel off the ground, whilst you rotate the cranks?

Can you make your derailleur gears operate perfectly in the work stand, only to find that they don't work properly when you're under load?

Have you ever wanted to change your cassette (and chain) only to find that your system is now obsolete? If you have managed to buy new stuff, have you then found all the spacers mysteriously need changing in your chainset? We've all been there and we've put up with the inadequacies of derailleurs, because we love riding tandem so much.

The Rohloff changes all that - as a tandem crew, you really can consign derailleurs to the recycling bin of cycling history. Rohloff makes everything so simple - as long as all the accommodations, necessary for its perfect installation, have been made. Be assured that we've spent the time (and the money) to make certain that our Rohloff-specific frames are Rohloff-perfect! (We've had ten different types, of cable guide, cast from stainless steel; we've had our own Rohloff-specific dropouts cast, again from stainless steel) We've always had the most enviable reputation for frame design; Cass Gilbert said of the derailleur geared Adventure, in his article about riding the Silk Road, "For our ride across Turkestan, we used Thom's Adventure tandem. Its steel frame is beautifully made with a perfect geometry for long distance riding." He then went on to say "The Adventure's excellent handling surprised us off-road and there were few trails we were not able to venture, albeit slowly".

I dislike false modesty even more than I dislike conceit. The reason all of our bikes always score so well is that I actually ride the bikes themselves, for long periods of time, in different and difficult conditions - if I feel that something could be improved - I improve it at the prototype stage - before we manufacture the bikes!

Believe me, when I say, I'm a very experienced cyclist and tandem pilot and (certainly as far as cycles are concerned) I'm only happy with perfection. I imagine that I'll own and ride every bike I design! Having learned how to make a tandem handle perfectly; I'm certainly not going to forget all that hard won experience and make a retrograde step. I've set about the task of how best to incorporate a Rohloff hub, into a perfectly designed frame. I'm convinced that, because it puts such a vastly superior machines within the financial reach of so many cyclists, the Raven Twin will be regarded as my best work so far. Whilst words can be cheap and actions certainly do speak louder; please remember, that if you don't agree, inside 100 days, that this is the best handling tandem you've ridden, with the best transmission, we'll refund you in full, when you return the bike. Don't think that there is a catch in these words - you only have to not want to keep it (without giving a reason at all) and we'll refund you. It's simply that we want you to test your ideal machine yourselves! We really don't get many back!

Are 14 gears enough for riding tandem?

If you study the gearing charts in our literature, you'll see that actually, on a 30 speed derailleur machine, you don't have 30 gears - at best you have 15. Perhaps you only have 13 different gears - you have the same (or very similar) gears several times and you often have to change chain rings and sprockets, to obtain the next gear. The Rohloff Speed hub has 14 different gears, operated by one shifter. The next gear is always just that - the **next** gear! The overall range of gears, is similar to that found on many current mountainbikes - 526%.

You've a choice of gearing on your Raven Twin, you choose how low you want your bottom gear to be - top gear is then always 526% higher than this.

(All the intermediate ratios are at constant 13.6% intervals). Rohloff insist on a lower limit of 43 x 17 on a tandem (43 teeth on the chainring and 17 on the rear sprocket, which in the lowest gear is almost identical to 22 ring x 32 sprocket with a derailleur) - there's no upper limit (Imposed by Rohloff) on your choice of gear range.

What if the Rohloff hub goes wrong? I know lots of little tricks, which may keep a derailleur running but I couldn't possibly take one of these hubs apart.

Rohloff have never had a total failure of the hub. Nobody has reported being stuck anywhere, with a hub that's lost drive. We searched the internet for problems before we contemplated making the first solo prototypes, you need have no worries about reliability - It's German engineering at its best! Would you feel that you needed to know how to strip the auto transmission on a German car before you set out on a journey? If you change the oil every 5,000Km and replace the cables, drive chains, sprocket and possibly the chain rings too, around every 20,000Km, you'll have no worries at all.

Perhaps you've heard that the hubs need running in? Rohloff say that they don't actually need running in but, in my experience, it seems to take about 1,000Km, on average, for them to become really smooth and much quieter. **In dramatic contrast to a derailleur system, the hub continues to get better as it gets older!**

Rohloff have sold more than 80,000 hubs and some owners have used them for 200,000Km of demanding cycling - nobody has yet worn one out!.

Can we honestly say that 32 spokes are enough, when we told you that you needed 48 on your derailleur tandem?

Rohloff have measured the stresses in the spokes. The forces on each spoke are lower, with a Rohloff hub, than they are on a 145mm spaced, 48 spoke tandem derailleur hub. The flanges on the Rohloff hub are much further apart than a 145mm spaced derailleur hub, these wider flanges give much more triangulation. The Rohloff hub also builds into a dishless wheel - there's still some dish in a 145mm spaced derailleur hub, which means that 24 spokes are doing most of the work; whereas all 32 spokes share the work evenly with a Rohloff hub. It's easy to replace a spoke in a Rohloff; the flanges are so large, that the sprocket does not need to be removed, in order to feed the spokes through the holes. We're convinced that you don't need more than 32 spokes.

Why do we say we won't fit a front disc to a tandem? It's not that we won't fit a front disc to a tandem - it's that we won't fit the size disc brake you'd need to a steel tandem fork. When I designed the Raven Twin, I had to choose either a comfortable fork, with provision for V brakes, or a fork which would withstand the considerable (and very different) forces created by a disc - I choose the comfortable fork! To make a fork suitable for tandem use, with a 203mm disc front brake, would've required a through -axle hub (to avoid the potential for the disc to rip the axle from the dropouts). We could've lived with through axles but the blades would also have needed to be un-tapered blades 31.8mm in diameter - I know how uncomfortable un -tapered 25.4mm blades are, from a tour in Australia, **I hope I never have to endure such discomfort again!** I certainly didn't wish to produce a bike with forks, which were even less comfortable!

I've no worries about our Raven Twin fork, when we hit a cattle grid at 50mph, on our Raven Twin! Yet, when I put an ISO disc mount on a pair of forks, with identical blades, **I managed to write them off, on an unloaded solo bike - was I behaving like an idiot? No, I was simply simulating an emergency stop, from 10mph and I was only using a 160mm front brake! Even the most careful and nervous of cyclists should expect to have to do an emergency stop from 10mph.** (I still have this fork, if you want to see it). We now offer a disc steel fork option on some of our solo bikes, it has blades which are heavier duty than our tandem blades. It's for use with a 160mm rotor. It won't fail (on a solo) but it's uncomfortable. I'm sure that you'd need a 203mm rotor, to stop a tandem as quickly as is possible with a V brake, on dry rims - and with potentially twice the weight, travelling at 10% higher speeds, **a safe tandem disc fork, if such a thing could be made, would be like riding a pneumatic drill. Riding a tandem with a steel fork, with a disc brake, Is risking either death, or nerve damage - selling one would be risking other peoples' lives and our own livelihood!**

Why do our tandems have 26" wheels?

Let's make certain we are very clear about what we are saying. We like 26" road-going-mountain bike tyres, which are at least 1.5" wide - we prefer 26 x 1.75" for most applications! So we are comparing 26 x 1.75" to 700 x 32c. If you use the much, much smaller in diameter, 26 x 1.25" tyres, you'll lose comfort and increase rolling resistance, you'd be better off with 700 x 32c! Narrow 700c tyres are better than narrow 26" tyres. Contrary to mistaken but commonly held beliefs, fatter tyres roll more quickly than narrow tyres on anything rougher than perfect tarmac. It's also true that the larger the diameter of a wheel, the faster it rolls. So a "fat" 700 x 44c tyre would actually roll more easily than an identically "fat" 26 x 1.75" tyre!

So why don't we use 700 x 44c?

As diameter increases, weight increases considerably and strength decreases dramatically. (A high quality 26 x 1.75" wheel/tyre combination is far stronger than (the difficult to obtain) 700 x 44c. 26 x 1.75" is also considerably lighter and therefore easier to pedal. In the real world, the 26 x 1.75" is very, very comfortable, it rides well and yet it still feels quick.
Most things in life are a compromise; the ideal tyre size, for any given application, is another compromise.

Years ago, my stoker and I owned several tandems, at the same time. We had a Reynolds oversize 753 700c machine custom built for us - it was probably the finest machine in the country, when it was built. We later had a less expensive 26" machine built, for mega-hilly spring and autumn long distance Audax rides. There were 5 other tandem crews in our club at the time. We had the opportunity to ride 700c and 26" tandems back to back, on club rides and Audax events. The 26" tandem was our favorite; it blew the 700c away on the hilly events and was even quicker to ride on the flat!
It was more comfortable and handled better - even though it cost half of what we'd paid for the 700c!

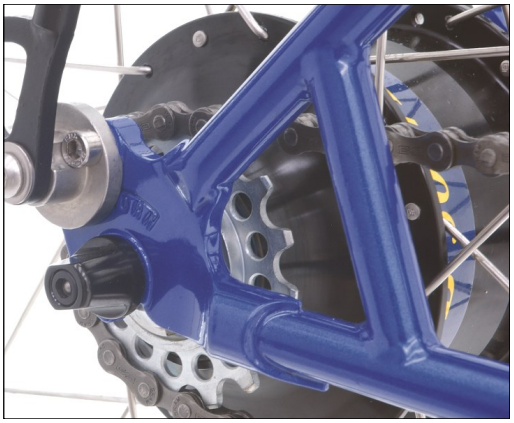
We think that, carefully weighing the pros and cons, there may be overall advantages, for some cyclists, with 26" wheels on a lightweight touring solo.
We're convinced that there are overall advantages to 26" wheels, for all cyclists, on a heavy touring solo.
We know, beyond a doubt, that there are overwhelming advantages to having 26" wheels on a tandem!
High quality 26" tyres are available everywhere in the world. The tyres grip the road better; they're far superior on loose surfaces. They are much, much more comfortable. The wheels are stronger and a wheel/tyre combination, suitable for a tandem, is also lighter, which means it can be accelerated more quickly. It is indeed foolish, to have any other size, on a new tandem.

Perhaps you are concerned with speed and want to go fast? The current mixed Land's End to John O' Groats tandem record (847 miles in 2 days 3 hours 19 minutes and 23 seconds) was set on 26" wheels (and straight bars too, for that matter!) how much faster than that do you want to go?

If you'd like to see if the Raven Twins are as good as we say, you can have a test ride, on our demo bike. You may even borrow it for a weekend, as long as you arrange it with us (01278 441505) in advance!
If you can't get here, you can still see how good the Raven Twin is, without any significant financial risk!
Buy a perfectly fitting machine, with your preferred individual specification and try it on roads you are familiar with. We'd like to remind you that we offer you a 100 day money back trial - if you don't wish to keep the machine, for any reason, return the bike and we will refund you in full.

Frame Specification

The frames are painstakingly TIG welded, using our own exclusive mega-oversized, seamless, cold drawn, butted, heat treated top quality Japanese Cro-Mo tubes - we call it "Thorn 9/6/9.
There's the option to have S+S couplings fitted to all frame sizes (please see pages14 & 15)
The Raven Twins have both chains on the same side of the bike, we do this for 3 reasons:-
Firstly, it means that we can use conventional solo chainsets, which we have in a huge variety of different lengths. This also makes the sourcing of spare parts much easier, if you damage a crank whilst on tour.
Secondly, having the chains on the same (right hand) side, means that the strain, on the rear bottom bracket, is considerably reduced - which should quadruple its service life! (The rear BB of a tandem was, historically, always a problem area).
Thirdly, having all the chains on one side, means that there's a "clean" and a "dirty" side to the tandem - this is useful when lifting or storing the machine!
We've chosen to fit the most comprehensive set of fittings, ever seen on a tandem frame, these include:-
[1] V brake bosses, on the back of the 19mm seat stays.
[2] ISO disc mount on the base of the LHS seat stay



[3] Reinforcing tubes to spread the forces, generated by disc brakes, between the seat stays and the chain stays. (Because these tubes also reinforce the carrier mounts, we've also fitted a matching tube on the RHS of the frame - this wouldn't be possible with derailleur gears)
[4] Cast stainless steel guides are used for gear and brake cables/lines, these allow for many different permutations of brake setups (please see "rear disc options"). We fit open stainless guides, for the disc brake line, to make servicing a hydraulic disc easy.
[5] We've fitted the maximum number of bottle bosses possible, this varies with the frame size and whether the frame is S+S coupled or not (please see the end columns in the matrix on page 18)
[6] We've made provision for the longest possible pump on the top of the base tube.
[7] We fit heavy duty 6mm stainless rear carrier bosses
[8] We have specified 5mm bosses under the bridges for the neat, secure and direct fitting of mudguards.
[9] We use our exclusive cast stainless steel vertical, Rohloff-specific rear dropouts.

[10] All frames have two eccentric bottom bracket shells (with stainless steel threads) The rear one provides for drive chain tension adjustment, whilst the front one allows the connecting chain tension to be adjusted.
[11] The oversized seat tubes make for a very rigid and robust frame - we provide shims to allow the fitting of 28.6mm seat posts.
[12] We use integral cast stainless seat clamps front and rear, these tighten up really securely onto the seat posts.

Fork specification

[1] We use Reynolds tandem fork blades, which have a legendary balance of comfort and strength.
[2] Our tried, tested and highly acclaimed "twin plate" crown is used... this allows the comfort of Reynolds forks to be retained, whilst making the fork laterally much more rigid, than a (heavier) single crown fork.
[3] 5mm bosses are provided under the crown, to allow the neat, secure and direct fitting of mudguards
[4] We've fitted 6mm heavy duty stainless bosses for our Lo-loader carriers - these will allow huge loads to be carried, when necessary, without any fear of shearing the fitting screws.
[5] Bosses are provided, to mount the mudguard stays in an elevated position. This means that, should an object (a stick or drinks can for example) get jammed between the wheel and the mudguard, the gap (between the tyre and the mudguard) will get larger, as the wheel's rotation causes the stays to be bent upwards. Without this provision a front mudguard is a potentially dangerous fitment, or a cause of rattles, if a "break free" fitting is used.

Finish

Our frames are treated and painted, in a modern high tech facility. The frames and forks are first given a multi-stage anti-rust treatment, followed by an etched primer and then they're powder coated. This environmentally-friendly process produces a tough finish. The decals are applied and then sealed in, with a second (this time clear) powder coat finish, the fitting of an exclusive stainless steel Thorn headbadge, is the final detail.

We offer 3 different colour choices for the uncoupled frames;
[1] Intense Yellow Gloss
[2] Cobalt blue pearl metallic
[3] Metallic British racing green

The coupled frames need to have the couplings installed off site, this means that you can choose any single colour enamel paint you wish
- but, please note -
there's now a 10 week lead time.

5

Please read the following 3 pages carefully.
Your choice of bar determines which frame size you need.

PLEASE NOTE:-
The Thorn Bars described in the following pages all have 25.4mm diameter centre swells - apart from our new eXp bars, which are 31.8mm. Currently there is a considerably greater choice of stems, with different lengths and/or angles available for 25.4mm diameter bars, than are currently available for 31.8mm diameter bars.

If you're cycling in any country and you see a loaded touring bike with drop bars, it's very likely that the rider is from the UK, or from West coast USA.

The rest of the world tends to use straight bars for loaded touring!

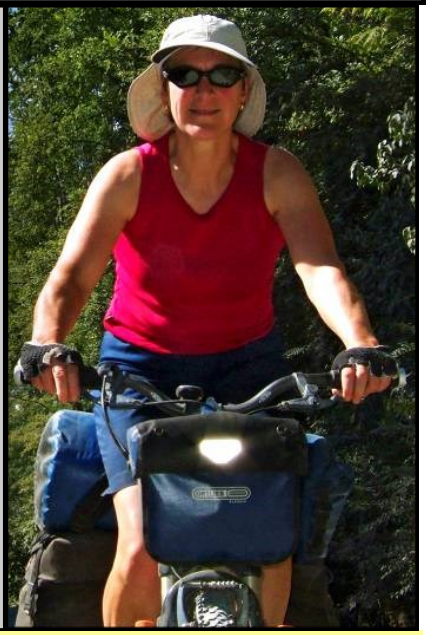
The two most useful positions (with drops) can be duplicated and even improved upon by using "straight bars" and bar ends.

If you know which bars you want on your new bike - fair enough but if you're undecided, the following may be useful.

Fiona using straight bars with bar ends (left) and the comfort bars, that she helped us develop (right). Fiona and I have used Thorn comfort bars with Ergon grips, extensively for cycle camping, mountain biking and for general cycling.

During these activities we do have different hand positions - these are cycling and not cycling!

(Activities best undertaken off the bike, include eating, making tea, resting, looking at maps, examining flora and taking pics of beautiful scenery)



DROP BARS offer 3 different positions:-

[1] The brake lever hoods, which are used about 90% of the time by most cyclists.
[2] The *tops* (a position on either side of the stem) are used about 9% of the time by most cyclists.
[3] The *hooks* (the actual dropped section) are very rarely used - even by racing cyclists. When they are used, it's usually to get more powerful braking than is possible from "the tops".

If straight bars and bar ends are so good, how come all the riders in the Tour De France use drop bars?

When you study the riders in the TDF, unless they're actually trying to win a bunch sprint, you'll rarely see them using the hooks - not even in lone breakaways, where a rider is desperately going hell for leather, in an attempt to avoid being swept up by the peloton at the finish.

Most of the TDF riders' time is spent in the perpetual jostling of a tightly packed peloton, where they frequently have to lean on each other with their elbows and shoulders, to minimise crashes caused by their bars touching. Drop bars are narrower than straight bars + bar ends and are safer in tight groups.

In a large bunch crash, where bikes and riders are sometimes piled in a heap, drop bars present less risk of impalement for riders landing on top of fallen riders' bikes.

If a TDF rider uses their brakes in the peloton, a bunch crash is almost inevitable. TDF riders rarely use their brakes much at all, so it doesn't matter to them that drop bar brakes could never be as good as brakes can be with straight bars - which is just as well with skinny tyres and short wheelbase bikes!

My question is: why have drop bars on a touring bike? Is it because you're so used to using them? Is it the look? Or is it because you've been told that they are what you need?

STRAIGHT BARS +BAR ENDS - We have several different "straight" bars.

THORN STRAIGHT BARS are 580mm wide and have a 5° bend - these suit many cyclists.

THORN NARROW BARS are **550mm** wide and have a 5° bend. The laser etched marks make it easy to cut them down to 510mm. The short centre swell allows the brake levers to be positioned sufficiently far inboard, to enable bar ends to be used - even at this width! **This produces a very aerodynamic position.** Unlike the "tops" of the drops, which use bar tape, straight bars can have very comfortable anatomical handlebar grips (such as the Ergon GP1L or GP5-L). This position also offers a great view of the road and surrounding scenery, whilst also offering instant and easy gear changing and/or very effective braking. We use this position for as much as 75% of our riding.
The Thorn Narrow bar is highly recommended for sporty use.

BAR ENDS

Bar Ends are available in many different configurations and materials. Bar ends are biomechanically efficient - particularly when climbing out of the saddle. Compared to the primary position, bar ends allow a 90° rotation of the wrists, which not only gives relief to the palms, the change also re-orients the elbows, which then in turn re-align the shoulders, which then use different muscles in the cervical spine. Simply rotating your wrists through 90°produces a completely different position, which helps greatly, especially if you ride for hour after hour without a break.

SJSC Ergo control bar ends minimalist and comfortable, thanks to thick, soft rubber.

ZOOM Ski Bends are an excellent choice for expedition touring. They'll take knocks and can be covered with Grab On foam sleeve, if required.

THORN J bend Bar Ends, complete with Blackburn Mirror and Grab-On closed cell sleeve. Thanks to their upward curve, these offer the facility of having the most effective rear view mirror yet seen on a bike with bar ends.

Ergon GP5-L grips, with the built in "L" shaped bar end are **exceptionally comfortable. These are our preferred choice for almost every application.** They offer 4 different positions and the rubber inlays give exceptional grip - even when wearing woolly gloves.

Ergon GP1L grips, these are the best choice of grip, if one of our other bar ends (or no bar ends!) have not been chosen.

THORN COMFORT BARS

are 620mm wide and are available polished or anodised black, they were developed by us with input from a senior physiotherapist. They are supremely comfortable, especially when used with Ergon grips, because they have an18° bend, which puts the wrists into perfect alignment with the forearm and thence with the elbow.

PLEASE NOTE:- only one hand position is available with comfort bars.
The bends take up a lot of the width and there is not physically enough room to fit bar ends and average sized hands, onto the relatively short straight section.

COMFORT BARS CAN NOT be CUT to REDUCE THEIR WIDTH.

In my opinion, these bars are the perfect width for one single "hands on the grips position".
Comfort bars "sweep back" around 45mm which means that they need a much longer stem, to get a specific reach, than would be used with 5° "straight bars."

Comfort bars gain around 50mm of height, which makes them an excellent choice, where a very relaxed and thus fairly high position is required.

Straight bars generally need to be used with frames with long top tubes - Comfort bars almost invariably need frames with long top tubes.

THORN Mk3 FLAT TRACK BARS

I've recently redesigned these bars, they're still essentially "**straight" bars with a 10° bend.**
The bend still starts immediately after the stem.
The centre swell length is unchanged - so we still have the longest length of 22.2mm section tube possible, for any given width of bar.
They still have a numbered scale etched every 5mm into both ends of the bar, to facilitate shortening them to individual requirements.

These bars are **now hard anodised black and 580mm wide**, which is wide enough for most applications.

UPDATE:-
Feedback has been extremely positive. I can certainly recommend 550mm - 580mm Flat Track bars for both sporty and sporty/relaxed set ups

Thorn comfort bars silver or black

Thorn Mk3 Flat track bars.
Triple butted AL7075
NOW HARD ANODISED

The scales on both ends of these bars makes it easy to cut them from 580mm to 570mm, 560mm or 550mm

The centre swell width has been kept to the minimum to give as much useful bar space as possible

FLAT TRACK BARS + GP5-L GRIPS

Fiona getting her breath back after cresting yet another long, steep climb, into a raging headwind on Ruta Cuarenta (RN 40), in Argentine Patagonia.

Fiona's FLAT TRACK bars were 640mm and were fitted with Zoom ski bends. We would now fit Thorn **eXp** bars to Expedition and/or Adventure Touring bikes.

NEW!

THORN eXp EXPEDITION HANDLEBARS.
12.5° BEND - 31.8mm CENTRE
680mm to 590mm WIDTH

I designed our NEW THORN eXp bars for seriously heavy duty use. They are 680mm wide but have scales for cutting them down, in 10mm increments to 590mm. As the bars are not designed to be used shorter than 590mm, I've been able to keep the centre swell sufficiently long, to enable bar bags, lights, cycle computers etc. to be fitted to it. Unlike all other Thorn bars, the centre of the bars is 31.8mm therefore an oversize stem is required.

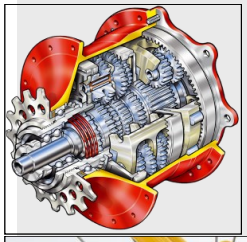
The eXp bars have been polished and then hard anodised, to give them the best possible protection against corrosion. Materials experts have told me that Al 7050 is the best possible alloy, for making a bar, with a long service life, that can survive big knocks.
At 330g, these bars are certainly not light weight but I've done everything that I can do, to make them the most bombproof Expedition Touring bars available.

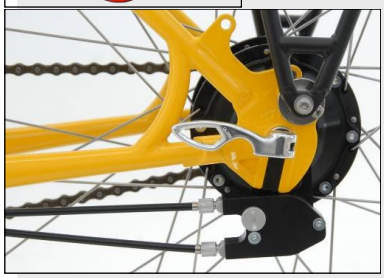
Wheels.

Rohloff EX box Hub

The Raven Twin frames are designed to have the perfect cable routing for the Rohloff EX hub.

The EX hub uses continuous outer casing from the shifter to the external cable box (EX box) at the hub. The most direct line, with the fewest bends, runs from the shifter under the bottom bracket (BB), along the underside of the left chainstay, to the EX box. This is the route that I have chosen for the





gear cables on the Raven Twin frames. The standard frame uses 9 of our own cast stainless double cable guides (4 under the down tube, 3 under the base tube and 2 under the chainstay) to route the cables in a tidy manner. The S&S option uses 3 sets of 3 "J" shaped guides, in place of the 2 double guides under the chainstay and the 3 guides under the down tube, these allow quick and easy detachment of the cables, when uncoupling the frame. Tidy routing prolongs the service life of the cables and provides a smoother shift. I insisted that we use stainless, because it is inevitable that the cables will chafe through the paint in the guides. Plain steel guides will rust and the rust will then spread under the paint, beyond the guides. We expect some Raven Twins to spend many nights outside.

We got Rohloff to make us a special axle plate for our tandems, which allows the EX box to point slightly downwards, when used with our dropouts. This means that water does not run down the outer casing of the cables, into the box and, if the box is submerged, water can run out. This axle plate also enhances cable routing.

All Rohloff hubs are now hard anodised to architectural quality - this is an expensive process. We offer 3 colours:-

SILVER ANODISED,
BLACK ANODISED and
RED ANODISED.

The EX box is also available with 4 threaded bosses to mount a disc brake's rotor. These add slightly to the weight and also to the cost, when you purchase your bike. Even if you don't plan on having a disc right away, choosing this option now may save £££'s in the future.

All 6 combinations are offered and they can be found on page 21 of this brochure.

Rims

We've decided upon 3 different rims to offer with the Raven Twin.

Rigida have changed their name to Ride.
[1] Expedition quality **Ride Andra 30** 735g
[2] Middleweight **Ride Zac 19** 560g
[3] Lighter-weight **Ride Grizzly** 470g
All these rims are black anodised and the Andra and the Grizzly both have the option of having a super hard tungsten carbide brake surface (**CSS**).

Andra 30 rims

These are our preferred choice for most Raven Twin bike specifications, they build into the strongest wheels that we've ever sold. They certainly stand up to tandem expeditions. The Rohloff hub has a very large flange diameter, which means that the spokes are at a more acute angle to the rim. Most builders do nothing to prevent the spokes from bending as they enter the nipple, at the rim. In time spokes in these wheels will certainly break. We have the rear rim specially drilled for Rohloff hubs, the spoke holes are angled, so that the nipple protrudes through the rim in perfect line with the spokes.
The Andra 30 is not as heavy as our, previously favoured, expedition rim, the Sun Rhyno but the alloy is tougher and even the non CSS rims last a long time.

ZAC 19 rims

Lighter weight rims can make a huge difference to how quickly you can accelerate a wheel.
The ZAC 19 rims have the advantage of having double eyelets, which means that they build into exceptionally strong wheels. For some applications these rims would be the preferred option, if you don't use your brakes much, you ought to get good service from the ZAC 19 rims.

Grizzly rims

Grizzly rims save even more weight than the ZAC rims and offer the possibility of a quicker machine but at the expense of overall wheel strength.

The CSS brake surface

CSS stands for carbide super sonic; tungsten carbide is (apparently) fired at the rim, in a plasma jet at 5 times the speed of sound! At this speed of impact, it fuses with the aluminium. The brake surface is ground smooth and the rim is ready for a really long and hard life. There is only one downside, apart from the extra cost; these rims, particularly the front, can make the brakes squeal loudly. **In a short time, this will diminish and then disappear, provided you continue to use the brakes!** I tell you this now, so that you can decide for yourself whether or not, you can cope with this noise. Not all the rims squeal but it is best to assume that yours will. A paste of sandy mud, applied to the brake surfaces and some steep hills, will hasten the return of harmony.
You need specific brake pads for CSS rims. These are included in the upgrade price if you choose this option.

A downside to CSS rims is that eventually the brake surface becomes polished smooth. This still gives awesome brake performance in the dry, with almost zero pad and rim wear but in severe wet conditions, braking performance can be drastically impaired. Our most recommended rim options are therefore to have a CSS rear rim and a plain front rim. This means that the Rohloff rear wheel won't need rebuilding for ages and it also means that you will always have front brake which works in severe weather and doesn't squeal when new.

NOTE:- CSS rims need special brake pads, which are only available in cartridge format - this means that you'll need XT brake upgrade.

If you've chosen to have a disc rear brake, it makes sense to have either a pair of CSS rims, or a CSS rim at the front and a plain rear if you have the disc as your main rear brake.

Sapim stainless DB spokes.

We only use the finest double butted spokes when we build your Rohloff wheels

The most important ingredient in a wheel.

The "best" hub, the "best" rim and the "best" spokes are items which are often talked about by cyclists. The most important "best" ingredient in a wheel, is the person who built it! Top quality builders cannot make a superb wheel out of dodgy components but they can make a sound wheel, which would last well. However a dodgy builder can make rubbish, out of top quality components. **We have the exclusive services of a master wheel builder and that's why many of our customers have travelled continuously, for years, without ever needing a spoke key.**

Tubes

We only use top quality tubes in our bikes. There are 2 valves which are used on modern bikes. The Presta valve was designed especially for bicycles and it is much easier to inflate tyres, using a hand pump with this valve. The Schrader valve was designed for motor vehicles. It is always more difficult to inflate a tube with this valve, using a hand pump and sometimes it becomes impossible to do so without a compressor. It is dangerous in the extreme to use a compressor to inflate cycle tyres - you could loose your eyes.
The trouble is that in some countries only tubes with a Schrader valve are available. This fact has lead to some very bad advice on forums. The quality of tubes available in these countries is invariably very poor - the rubber does not stretch enough and the valves often pull out. You really do not want to rely on using such tubes. The best advice is to take 2 spare high quality presta tubes, plenty of patches and 2 tubes of rubber solution. Fiona and I get almost no punctures and when we do, I always mend the tube and replace it, unless it is dark or severe weather has closed in, in which case I use one of the spare tubes and mend the punctured tube later, when it is more convenient to do so. I believe that you will have few problems, if you take my advice. I am equally sure you will have problems with Schrader valves, if you don't. If you are cursed by bad luck, you can always have your rims drilled locally for locally available tubes

Tyre pressures PLEASE READ THIS!

Tyres have a maximum and a minimum recommended pressure; you should consider the implications of different pressures.
Please look at our tyre pressure matrix above. Pressure is in pounds per square inch and there are lots of square inches in a fat carcass!
The REAR pressures are the maximum pressures that you should ever put into various width tyres. I've found that my bikes handle best, when the front tyre is at a slightly lower pressure than the rear.

PLEASE NOTE: For reasons, known only to themselves, tyre manufacturers often quote higher maximum pressures, for fat tyres, than any rim can withstand.

SUCH PRESSURES WILL CAUSE THE RIM TO FAIL - YOU'VE BEEN WARNED!

At the above maximum pressure, the tyre is less able to squirm around on the rim and consequently quicker changes in direction can be made and big, out of the saddle efforts, result in more immediate forward propulsion.
At lower pressures, tyres roll more easily on uneven surfaces, this fact comes as a shock to many cyclists - perhaps the more uncomfortable the ride, the faster they think that they are going? Tyres running lower pressures are usually much more comfortable to ride.

WARNING!

IMPORTANT NOTES on TYRE PRESSURES

Pressures are in psi.
It may be necessary to over-inflate the tyres, in order to get the tyre beads to seat correctly on the rim.
Once seated, the pressure should be immediately dropped to suit.
Tyres must not be ridden when inflated to higher than MAX pressure - otherwise the rims may be permanently damaged, or fail catastrophically.
The MIN pressures are the lowest pressures that the tyres ought to be run at. Such pressures may be used to enhance comfort or for improved grip on tricky surfaces.
When running at the MIN pressures, extra care must be taken to avoid large stones, and potholes - this is especially important if heavy loads are being carried.
At my recommended pressures, you should find the perfect balance, for most road conditions, between comfort, efficiency and reliability.

Andy Blance Aug 2014

26" TYRE SIZE	TANDEM			
	Recommended Pressure		ABSOLUTE Pressures	
	FRONT	REAR	MAX	MIN
1.35"	72	80	85	50
1.60"	64	70	75	44
1.75"	60	66	70	41
2.00"	55	60	66	38
2.10"	50	55	62	36
2.25"	45	50	55	34

Tyres

Tyres make more difference to the way a bike goes and feels, than anything that I can do with frame tubes or frame geometry. There is no "best tyre", just best for a specific purpose. During my years of cycling I have used many different tyres for different purposes.

8

Schwalbe Mondial

In my opinion the new **Schwalbe Marathon Mondial** is almost as good an expedition tyre as the excellent but now discontinued Marathon XR.

The Mondial is quite simply the best expedition tyre currently available.

The Mondial needs rough roads and heavy loads to enable its unique qualities to shine through...otherwise it is just too much tyre (865g) and ruins the feel of a lightly loaded bike. **Don't have Mondials fitted, unless you really are going on a big trip.**

Fiona and I have used **1.75" Panaracer Pasela Tourguard** tyres on our tandem and we still have them on our heavy touring bikes (see pages 14 and15). They are lightweight tyres, which excel on smooth tarmac and bumpy country lanes. They are deceptively quick. Thanks to their really supple sidewalls they are very comfortable. They have even been on some dry tracks over the Quantocks, which are normally the preserve of MTBs. I would certainly use them on an extended tour of Europe or the USA, as long as I planned to stick to the tarmac. We did use them on a tour of Western Australia, which involved hundreds of miles on gravel roads. We managed to avoid falling off, even when the "gravel" was marble sized pebbles but that was despite the tyres, not because of them!
The Paselas would be hell on the ripio and I'd never take them to Africa or the Himalayas.

We also use the **1.5" Panaracer Pasela** tyres on our Sport Tours, which we use as Audax bikes. We get some benefit from the reduced weight but the Raven twin frames are necessarily stiff and rigid and these tyres would be less comfortable and efficient on all but the smoothest surfaces.

Fi and I have been using the **1.6" Marathon Supreme** on our tandem for Audax rides and we find it very quick and adequately comfortable.
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We've used **2.0" Schwalbe Marathon Supreme** tyres in India, on tarmac which varied from smooth to very broken and they were truly excellent. They were remarkably quick, comfortable and grippy but they could be deadly in any loose, or slippery, off road situation. If you only cycle on sealed roads, these are probably the ultimate tyre for heavy loads and long distances.

Schwalbe Folding Marathon Dureme

This tyre really could take you anywhere. The 26 x 2.0" Dureme rolls really well, it grips really well, it has a little bit of off road capability, it's exceptionally comfortable and it doesn't take too much energy to accelerate. It's one of the most puncture resistant tyres ever made.

It's also a very durable tyre - 12,000 mile (20,000Km) rides have been covered by several of our customers on a single pair of 26 x 2.0" Duremes.
Along with the 700 x 35c Dureme; this is my favourite tyre of all time. It's an excellent tyre for pottering around the lanes, looking over the hedges, on a Summer's evening. It's an excellent tyre for heavy cycle camping and it will do anything in between.

I'm not a fan of the 1.75" Schwalbe Marathon Plus Smart guard tyre...it isn't fat enough to be comfortable and simply feels dead and heavy. It has its uses though. I had to concede that if I was travelling on glass strewn routes, through dodgy areas of certain cities, I may feel that risking a puncture, was also risking a mugging. There is no more reliable tyre than the Marathon Plus but faced with the situation above, I'd look for another route, even if it was an extended loop!

Conventional steel bead or folding?

All of my tyres have folding beads, they save 70g per wheel. I'd never worry about carrying an extra 140g of water but I do notice rotating weight and the steel bead offers no advantage at all, except to my bank account.

I used to hate seeing any new bike leave the shop, with the heavy (890g) Marathon XR tyres on it, even though these were the best tyres we'd ever used on our big trips. I knew how much they sap performance on a smooth road, without a load, which is where the bike was about to make a first impression on its new owner (s). That impression would be entirely different if the bike had 1.6 Schwalbe Supreme tyres. First impressions count and it takes time (or a rough road and a heavy load!) to create a better one.

Spare tyres

All the tyres that we recommend are highly reliable, for most trips you should not need to carry a spare.
If your trip is an epic adventure, you may wish to consider what you will do when you wear your tyres out. Swapping front to rear, every few thousand miles, will help get the maximum life from the tyres. Some trips may be so long that even this will not suffice. You must then decide whether you will carry your next tyres with you, whether you can purchase new tyres, of suitable quality, en-route or whether it is best to rendezvous with new tyres at a pre-arranged point.
26" tyres, to fit the Raven twin, will be available in every country in the world but some of the tyres you will find will not last long with heavy loads...they will enable you to keep cycling until you can arrange something better though.
Unforeseen events can occur and then we all have 20:20 hindsight.
A 1.75" folding Pasela tyre weighs 430g and takes up little space...it makes an excellent spare for most situations - you'll find it for sale in the accessory pages.
If your bike is equipped with 2.15 tyres you may wish to carry a Schwalbe Furious Fred 2.25" folding racing MTB tyre. This only weighs 395g! It packs down to an exceptionally small size and I'd feel confident that it would give me 1000+ miles of service, as a front tyre, this could mean swapping your undamaged front tyre to the rear. I consider this tyre to be the ultimate emergency spare, for use when you really don't expect to need a spare but would be in serious trouble if you didn't have one. This tyre is also in the accessory pages.

My recommendation for tyres.

Unless I knew about a specific trip you were contemplating, I'd recommend that you purchase your Raven Twin with 2.0" Supreme tyres and choose 55mm mudguards.

For using a Raven Twin for faster road work on tarmac, in between big trips, my very best advice is to have your Raven Twin supplied with 1.6" supreme tyres and 45mm mudguards and have us supply you with a pair of 2.15" Marathon Mondial tyres.
You can then fit the Mondials for big trips, after removing the mudguards.

Mudguards don't travel well. They also mean that it is difficult to reduce the size of the bike. When on big trips, I've used an Ortlieb dry bag fitted along the length of the carrier as a very effective rear mudguard, which has invariably kept the insert in my shorts dry. The combination of "Crud Catcher" and that necessary evil, the bar bag ,has always prevented muck from getting in my eyes or teeth.

In very specific situations, where only sealed tarmac roads are to be used, the 1.6 Marathon Supreme could be the ultimate tyre for your Raven twin.

"V" brakes *Vs* Hydraulic discs.

There's no doubt that hydraulic disc brakes are preferable to V brakes in the deep, muddy conditions often found in UK mountainbiking. They are, however, very easily damaged (especially in transit) and a bent rotor is much more difficult to straighten than an "out of true" wheel. Indeed, if the rotor is warped enough, the wheel won't even turn! Don't compare the 8 to 10mm thick, cast rotors, found on modern cars and motorcycles, with the 2mm thick, stainless steel plate, rotors found on bicycles.

For every day use and for touring, we prefer the simplicity, ruggedness and ease of maintenance of V brakes. We even prefer the "feel" of top quality V brakes. We have rims available, with a tungsten carbide braking surface, which provides fantastic braking combined with exceptional longevity.

We use raked blades, these are exceptionally comfortable, they will withstand the forces of cycling (and have done so for generations) but raked forks will not withstand the forces generated by a disc brake, which are very different to the forces generated by V brakes, even at the same rate of retardation. We have seen 2 ways that other manufacturers have "accomplished" this.

(1) We've had customers complain that a well known custom builder's raked steel forks have permanently bent under braking.
(2) We've seen hideously uncomfortable, thick walled, straight blades used by another manufacturer, these forks don't fail, but I expect that an owner's hands and elbows soon would!

Isn't hitting bumps comfortably and safely the main function of a bicycle's fork?

Why compromise comfort and safety, in order to fit a brake, which is not the most suitable choice, in the conditions that the steel fork will be used in?

V Brakes

Choosing your brakes with "straight" bars is easy Shimano Deore V brakes have nice levers and they are very powerful. They are also very well made. I wish we had brakes like this 20 years ago!

The modestly priced upgrade to front **XT** V brake and **XT** levers is worth considering. They come with cartridge shoes - **which are essential for CSS rim upgrades.**
The **XT** V brake pivots in bronze bushings and has longer, forged arms to provide more mudguard clearance.

XT levers have a superb feel.

We fit the front brake to the RHS, in the UK, if you want it on the LHS, make certain we know this!

Brakes for drop bar options.

If you choose to have drop bars, you must choose the Tektro drop bar V brake levers...these levers pull the necessary amount of cable, to enable V brakes to be fully applied, before the lever touches the bars.

Ordinary drop bar levers will hit the bar, before maximum brake force can be applied.

Disc Rear Brake for tandems.

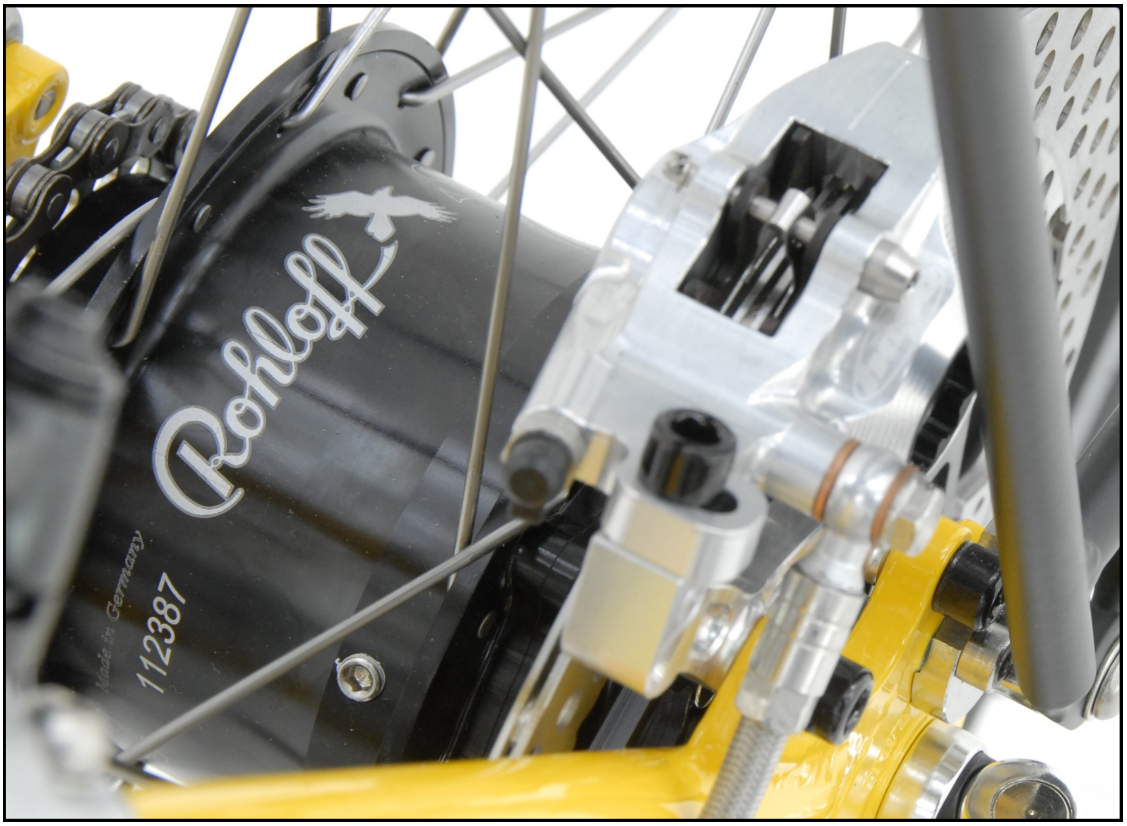
Tandems weigh more than solo bikes! Consequently they will reach a much higher speed than a solo, when descending steep hills. We've spent much time evaluating various disc brakes on Crowcombe Hill, which is local to us and is 25% for most of its 1Km length. If you didn't brake, until the bottom, you'd reach over 65mph. I know this because I have done it! As long as they are adjusted correctly, the standard Deore V brakes will bring you to a stop from this speed and your rims will be merely "quite hot".
If you decided that you wanted to descend at a more cautious 15mph, you would generate so much heat, that you are very likely to melt the seam in your inner tubes, which would cause a blowout. (Instant deflation of the tyre, which may lead to catastrophic loss of control). The safest way to descend this hill, on a tandem, is to let the machine roll up to around 40mph, brake hard down to 10mph and let it roll up to 40 again, which will cool the rims. You must be prepared to repeat this procedure, as often as is necessary.
If this sounds scary and you are unwilling to adopt this procedure, or if you are a particularly heavy crew, you need to do one of the following:-

[1] Avoid hilly terrain and be prepared to walk down any steep hills, that you fail to avoid.

[2] Stop frequently, to let the rims cool.

[3] Dig deep into your pockets and fit a supplementary rear disc brake.

We spent a lot of time evaluating various disc brakes. All bicycle disc brakes are (or have been) developed from disc brakes, designed for mountainbiking racing. The very essence of racing, is to go faster than others - you don't



win races with unnecessary heavy braking! MTB brakes are designed to loose a lot of speed, in a short time. They do this well. We set fire to rear MTB disc brakes inside 200m, when using them as the sole means of holding our tandem at 10mph, down Crowcombe Hill. We tried every brake that we could lay our hands on. Every manufacturer said "No worries, our brake will do the job." None ever did. Even the 6pot, 203mm Hope world class downhill MTB racing brake burned out, within 400m and I was having to use both hands on the lever after 300m. If the brake burns out, it is almost useless, even when it has cooled - what do you do then, if you're riding in Mountains? Walk down everything? Sometimes, when a brake overheats and you release the lever, the fluid boils inside the line, turning to a gas. Gasses compress, whereas brake fluid doesn't - so the transition, from poor brake, to no brake at all, is almost instant - do you continue overheating the brake, risking burnout, or do you release the lever, risking total rear brake loss? **This is a serious dilemma and one which is best avoided!**

The tandem market is too small for any disc brake manufacturer to be interested in and for years the 6pot Hope was the best we could offer. However Alpine MTB events became really popular in Europe (some of them are 3 day events and require camping kit to be carried) and guess what? **As soon as mountainbikers tried to hold loaded MTBs back, on exceptionally long, steep descents, they too burned out their brakes!**

Hope were quick to develop brakes for this market. Their V2 brakes have massive ceramic pistons, which help to prevent the fluid behind them, from boiling. The biggest improvement however, is that Hope have made a ventilated rotor available, this has a double skin rotor (look closely at the pic) which presents a much larger surface area to cooling air.

With this brake only, we're able to hold 10mph for almost 800m down Crowcombe Hill, on just the rear brake. I believe that this brake is good enough for us to withdraw our previous caveat:- that we would not supply a tandem, which only had a disc for a rear brake. However we're still cautious and this is the only combination of calliper and rotor that we're prepared to fit, to one of our new tandems, as an upgrade to rear disc.

The open guides, on our new frames, allow the whole system - lever, brake line, fluid and calliper to be detached as a unit. This can be sent back to Hope, for a full service, at a very reasonable price. This includes, new seals, pads, fluid etc. Hope make every part of their brakes themselves. They produce them remotely, from a keyboard, using CNC machines. Because of this, they will always have spare parts, for every disc brake they have ever made, or will ever make. The Hope Disc upgrade is very expensive but it really is top quality kit, which is designed to last and is designed to be serviced either by themselves or by the customer which, in my view, makes it genuine value for money. (They have excellent video clips on their website)

There are many permutations and combinations, regarding the positioning of the brake levers, when 3 brakes are being used. These can be read about briefly on page 22.

Be warned, the disc brake we supply, needs to be so big and powerful in order to be able to dissipate heat. It is much more powerful than could ever be needed, simply for stopping. It can lock the rear wheel, at any speed, if too much force is applied.

Most crews are advised to have straight handlebars and our favourite methods for straight bars are:-

For stokers with sight, we recommend that they don't have control of a brake at all! This is not sexist or elitist, it is common sense. **You don't let somebody else have a brake, when you're driving, why should it suddenly be a good idea on a tandem?**

There are some situations, which a pilot must be trusted to have been monitoring, where suddenly losing the ability to get beyond a hazard may prove fatal - imagine the following scenario:-

You're descending a steep hill and there's a vehicle parked on your side of the road, which will require you to pass it on the other side of the road.

We fit the front brake to the RHS, in the UK. If you want it on the LHS, please make certain that we know this!

This is our recommendation for most tandem crews, who wish to employ 3 brakes. (See page 22)

There's a stream of traffic coming towards you. You've made the calculations and you know that you'll be back on your side of the road before the traffic reaches you. The oncoming drivers see what you're doing and make their own calculations. You all know what you and the other parties are doing and there's no danger. You've passed the point, where you could stop behind the parked vehicle, when your stoker suddenly looks up and, seeing a vehicle heading for you, panics and brakes hard. You may crash immediately as a result of the rear wheel locking up. If the oncoming vehicle slams on their brakes and, if your stoker releases their death grip on the rear brake, you may somehow manage regain your side of the road, without hitting the stationary vehicle, or the oncoming vehicle. You may still be doomed, because one of the following cars may swerve into you, to avoid the sudden pile up, on their side of the road.

Still not convinced? You're braver than me!

Feel free to choose one of the other options.

Our preferred option, with sighted stokers, is to have the pilot operate the front brake, on the side they normally have it - have the shifter on that side too. Then have the rear disc, operated by the pilot, on the other side of the bars and finally, have an emergency rear V brake, operated via a thumbshifter, on the same side as the disc brake.

An emergency brake may be useful, if you damage your disc, wear through the pads, or whatever. You may need to employ 3 brakes, in rotation, on a really steep and tricky descent, when heavily loaded - you can still use the thumbie for this. On a long tour, you may wish to carry the spare V brake lever (you have to buy them in pairs, so we supply you with it in any case!) this'll allow you to have two conventionally operated V brakes, if the disc packs up. The ratchet thumbie must never be applied and forgotten, as it will overheat the rim - believe me, some hills are steep enough to make you unaware that this brake is partially on!

You may never require the emergency brake but the thumbie does have one really useful function, which you will use most times you ride - it makes an excellent parking brake and ensures that the bike will stay put, whenever you lean the stoker's handlebar against any immovable object.

In the case of a blind stoker, there's absolutely no problem in letting them have the hydraulic disc, if they are experienced stokers or cyclists. As they're seated above the disc, they almost certainly have a finer degree of control, than you could have. You just need to ask them to apply as much, or as little brake as you deem necessary. **You'll always be able to execute an emergency stop with the 2 rim brakes that you control.**

Suspension seat posts

If the stoker needs a suspension seat post, the **Cane Creek Thudbuster LT** is the best suss post ever made, It's parallelogram movement means that the distance between the Stoker's saddle and the pedals, does not vary much, even when the post takes out a really big bump. We supply them with the neoprene cover, which keeps muck out of the pivots.

The tandem below, the highly popular size #8A, has most but not all, of the recommended upgrades, to produce the ultimate Touring Tandem...Perhaps you would prefer a more sporty build?

Perhaps you'd like to have all the upgrades?
It could have another bottle cage, and computer
(Many stokers would also want a suspension seat post).

We'll build **your** Raven Twin the way that **you** want it!

There's no standard specification of Raven Twin.

Even at the start price, there are many different choices you must make.

(With the exception of the size #8 and with the exception of pump bar ends and pedals - the machines, shown on page 19, have specifications which are available at the start price.)

Helpful advice is always available from our bike sales team - if you require it.

There are no duff components anywhere on a Raven twin, we supply a very high quality headset, good quality bottom brackets and reliable chains. You couldn't find higher quality chain rings anywhere. We use only the finest cables and we don't skimp on the tyres, tubes or rim tapes either. Mudguards are included at the start price - pedals, pumps bar ends and carriers are not. You may choose your own personal specification, from the items on pages 21, 22 and 23 of this brochure.

I hope the information, given in this brochure is helpful.

Your Raven Twin will last you a lifetime and it will bring you untold pleasure. Whilst it's less expensive to upgrade, or change, components, when you buy the bike, than it is afterwards - you can always upgrade components later, if you wish, or if you decide to focus it differently -
or when you have more money!

Most of the cost of a Raven Twin, is in the frame and the Rohloff hub - you'll get excellent value for money from these items!

Cranks and Crank lengths.

A crank is simply a lever. A lever to which you attach the chainring and the pedals. The ideal length of the crank depends upon the length of your legs. If your cranks are too long - your knees will have more of a bend in them, when the crank is vertical and you're more likely to suffer injury. If the cranks are too short, you may not be making power as efficiently as possible.

A trick for tandem crews of mixed ability

Often the pilot is a more experienced cyclist than the stoker. Stokers often complain that the cadence (crank revs per minute) is too high for them and ask the pilot to change up a gear. This may not suit the pilot, who may then fear for their knees. We've found, in these circumstances, that if the pilot chooses cranks which are 5mm longer than they'd normally use and if the stoker has cranks which are 5 to 10mm shorter, than would normally be suggested, the problem is diminished considerably. The longer cranks maintain a higher leg speed, at the same rpm and the shorter cranks reduce the stokers leg speed, at the same rpm.

On easy, flat terrain, a touring solo cyclist may perform 300 reps, with each leg, for every mile covered. (about 190 per kilometre) That's a lot of reps over a lifetime of cycling - it's important to make sure that you look after your knees!
The old "rule of thumb" was that the length of your cranks should be around 20% of the length of your legs. Some rules of thumb are more helpful than others - unfortunately this isn't one of them.

Men of above average height, or with above average length legs, should use 175mm cranks, as should women with, legs this long.

Men of average height, with average length legs, should use 170mm cranks, as should women, with legs this long.

Women of average height and leg length (and men with shorter than average length legs) will benefit from using 165mm cranks.
Unfortunately this length is only manufactured for the premium end of the market (Ultegra or XT and above, Ultegra cranks won't fit on our tandem frames and Mr. Shimano has given the latest XT cranks a unique spider, which won't allow the fitting of other manufacturer's rings) You may never have tried 165mm cranks. Off the shelf derailleur bikes, which do have a premium chainset rarely offer 165mm cranks. They use the premium chainset either because of:- fashion, the need to hit a "price point" or, because they really need the complicated shaped teeth, cut outs and ramps found on expensive chainrings, in order to change gear slickly, with a chain which has become too narrow to perform this task properly, because it now needs to operate on a 10 or 11 sp cassette!

With Rohloff gears, you can sidestep this madness altogether, you simply need one long lasting chainring! This means that we've been able to have some fairly nice quality cranks made for us and we've been able to have these drilled in 150, 155, 160, 170 and 175mm lengths. We've never been able to get 180mm cranks made. If you have exceptionally long legs, you'll benefit greatly from using this length.
Customers with short legs should choose 160mm cranks.

Our cranks use a "conventional square taper" BB unit. Once upon a time, fantastic quality BB units were available at reasonable prices. Nowadays we can only get "good quality" at a reasonable price. There are still some fantastic quality BB units available but they are now fantastic in price too.
When a BB unit become worn out, it creaks and squeaks, I've never heard of one failing in the sense that it stops working. Believe me, your BB will let you know when it needs replacing. If that's in the third world, don't worry, the 2 degree square taper design has been around for years and has made it across the globe.
Of course we also offer Shimano's external bearing cranks and you may choose these if you prefer. Hope BB bearings may be fitted, which offer a really long service life.
Crank choices can be seen on page 22.

Stop Press!

We now fit KMC Rohloff specific chain throughout the transmission of Raven Twins.

Chainrings.

We've had chainrings made especially for us. These rings are exclusively for hub or single geared bikes. They have very special shaped teeth - long deep teeth, designed for maximum service life! These rings would be useless on a derailleur bike.
We have 104bcd which fits our own Thorn cranks and Shimano 104 MTB cranks.

Our chainrings are made from 7075 series aerospace alloy - you couldn't find better!
They're also double sided, that is, you can wear them into a hook shape, then turn the ring around and get some more wear out of them. You'll see that we offer a huge range of sizes, you can choose the range of gears that will suit you and your cycling.

GEARING

The advice given to a tandem crew is different, to the advice given to solo riders.

For the majority of riders, it's not possible to have a gear which is too low on a tandem! Unfortunately it's also not possible to have a gear which is too high either! Regrettably, it's not possible to have both and a compromise needs to be struck. There are 2 reasons for this:-
[1] Tandems are much more efficient than solos - almost twice the power, with less than twice the weight, combined with aerodynamics which are only slightly poorer than a solo. This makes tandems very quick. We can maintain a speed on the flat which is around 5mph quicker than either of us can manage on a solo. Downhill, the difference is much bigger than that!
[2] It's not possible to maintain the same high cadences on a tandem, as it is with a solo. Fiona and I can pedal comfortably at 100rpm on our solos but we max out at about 80 rpm, on our tandem.
Fiona and I like to ride tandem for the sheer pleasure of going quickly. We're prepared to freewheel down hill but we want gears which allow us to go as quickly as possible on the flat, with a favourable wind. We've compromised with gears that are about 12% higher than the gears we use on lightweight sporty solos. This does make steep hills a bit of an issue for us but that's our choice!

I've written a lot about gearing, which you can read in our "Living with a Rohloff" brochure.
The Rohloff hub has an overall range of 526%. That is, the bottom gear gives more than 5 times the leverage of the top gear.
Or think of it like this, at the same speed you have to pedal more than 5 times faster in bottom gear than you do in top.
The old "Ordinary" bikes (Penny Farthings) used to have the cranks connected to the front wheel, without gearing - one rotation of the cranks was one revolution of the wheel. Riders use to talk of the size of the wheels in inches (taller riders could pedal a bigger wheel). The single geared safety bicycle was invented when chain technology allowed a chain ring to drive a sprocket. The safety aspect was that the rider was not way up in the air and now had brakes which worked. Riders used to calculate the gearing and refer to it as if was the actual size of a wheel. i.e. a 2:1 gear ratio on a 26" wheel produced the same gear as a 52" Penny Farthing. In much of the native English speaking world, we use this system today.

11th gear on the Rohloff is 1:1 direct drive. Therefore if you divide chainring teeth by sprocket teeth and multiply by the wheel size you get **11th gear in inches**.
If you multiply this by 0.279 you'll get **bottom gear in inches**.
If you multiply this by 5.26 you'll get **top gear in inches.**

With tandems, the lowest gear Rohloff say that you are permitted to use with a 17t sprocket is 43t
43t chainring and a 17t sprocket with 26" wheel gives:-
11th gear = 43/17 x 26 = 65.8"
Bottom gear is 65.8 x 0.279 =18.4"
Top gear is 18.4 x 5.26 = 96.6

With a 19t sprocket you could use a 48t sprocket, which gives almost identical gears to those above but gives longer chain life.

This should allow you to climb just about anything. The gearing will not be high enough, if you want to go as quickly as possible, especially when prevailing conditions and terrain are favourable to you.

Purely for reference, I've given 2 examples of the gears used on a modern derailleur bike.
The first is a modern MTB with an 11-34 cassette and 22/32/44 chainrings.
It therefore has a bottom gear of, 22/34 x 26 = 16.8"
and a top gear of, 44/11 x 26 = 104"
A modern sports bike may have a 34/50 chainset and a 12-27 cassette with a 700c wheel, it therefore has a bottom gear of, 34/27 x 27 = 34"
and a top gear of, 50/12 x 27 = 112.5"

With a Rohloff hub, you can have pretty much whatever gearing you require but top will always be 526% higher than bottom.

Recommended gearing.

I frequently get asked by customers, what I'd recommend. I then ask if the customer is happy with their current gearing, they say "yes" or no, they'd like it to be different in some way. (Higher or lower)
I then ask what gears they are currently using and most people just don't know.
I do know that cyclists' ideal choice of gearing varies hugely, from person to person, how am I supposed to know what would suit this customer?

It's simple to work out what gears you currently have, turn the bike upside down, be prepared to get your fingers dirty and count the teeth, then check again.

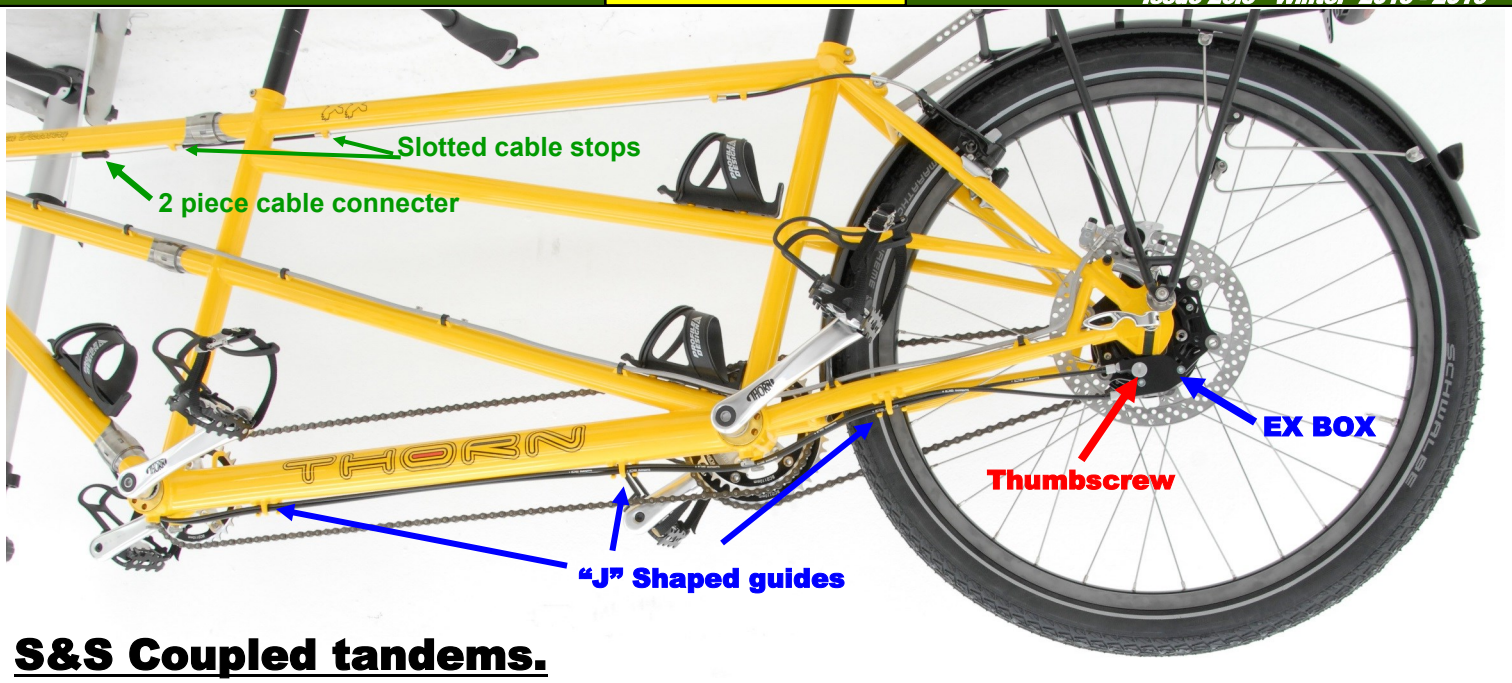
Sometimes customers don't have bikes, so here are my rules of thumb. For Rohloff tandems.

A crew comprising experienced fit cyclists, seeking to make the absolute most of a tandem's potential to go quickly, avoiding carrying loads and also avoiding cycling up really steep hills but are prepared to walk up them if necessary, who also want to pedal down hills but are prepared to freewheel down really steep hills,
50 x 16 should be a good gear.
Bottom =22.6", Top = 119"

If you are fit cyclists and you're seeking to enjoy a tandem's potential to go quickly, you avoid carrying loads and you also generally avoid cycling up really steep hills but are prepared to walk up them if necessary.
If you're prepared to freewheel down steep hills,
50 x 17 should be a good gear for you.
Bottom = 21.3", Top = 112"

If you are looking to cycle over, whatever hills you come across and you cycle in hilly areas and you wish to try and do this, with whatever kit you have on the bike and you are prepared to freewheel down any noticeable hills, my advice is - **gear as low as possible 43 x 17**
Bottom = 18.4", Top = 96.6"

It really doesn't matter if you get the gearing wrong, when you buy the bike; it's very easy and relatively inexpensive to raise or lower the gearing.
We like to send our bikes out with a 17t sprocket because the chain will last longer than if you use a 16t sprocket and much longer than if you choose a 15t sprocket!

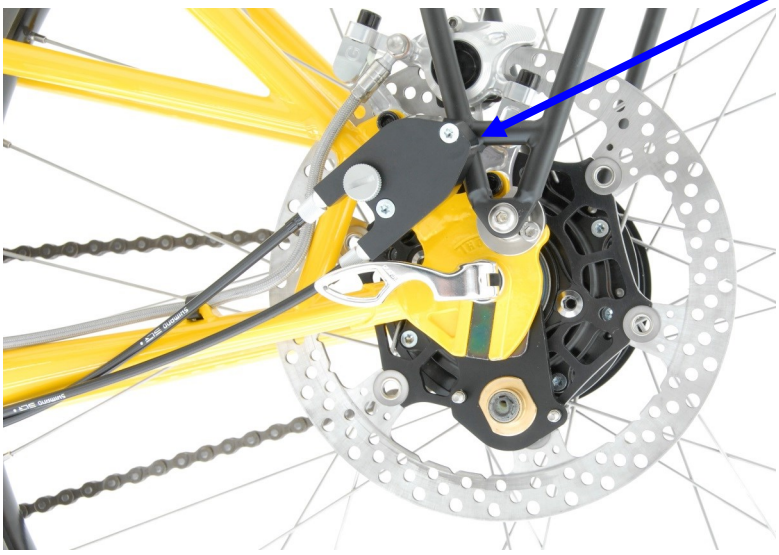


S&S Coupled tandems.

It can be handy to have an S&S coupled tandem. We think that it makes the most sense to make the frames so that the front comes off, rather than have 2 equal size sections. With a ***front off*** set up you can leave the dirty, messy chain on the dirty messy chainrings. With 2 equal sections, you certainly have to handle the chain at least twice and find a way of stopping it from dragging in the muck, or over clean things. You can have any colour you like, when you specify the S&S option. **Please allow a 10 week lead time.**

To get the gear cables out of the way, you simply have to undo the thumbscrew, remove the EX box and untwist the cables from the stainless "J" shaped guides.

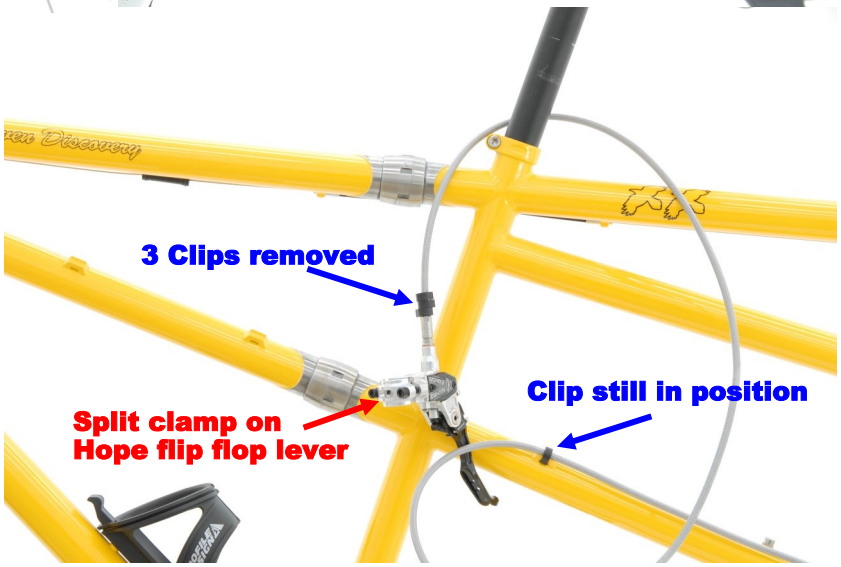
The gear cables can then be coiled together and remain with the front section.



To separate a hydraulic line, if a disc option has been chosen, requires a very expensive 100% dry hydraulic coupling. However, I have specified stainless open guides and clips for the hydraulic line's run. It is simplicity itself to unclip the hydraulic line from the first 3 clips. Removing the Hope flip flop lever from the bars is also easy as it utilises a split clamp.

With the hydraulic line peeled back and the gear cables peeled forward, it only remains to separate the rear brake wire (if a rear V brake is fitted). This is easy because the rear brake wire runs in a clean part of the frame and it uses bare wire and slotted stops for parts of its run. We use a 2 piece cable connecter to achieve this.

Once the cables are out of the way, it is easy to unscrew the couplings with the supplied tool. **(Please see the next page.)**



You've an important decision to make - should you have your Raven Twin

with S&S couplings, or without?

(As you can see, I've used the pics from our Nomad Mk2 brochure to illustrate the couplings)

Our tandems are very long - up to 2550mm but, with the front removed, they're all shorter than a solo bike!

Please note that there is no way that the Raven Twin could ever fit into a pair of S&S boxes or backpacks.

There are many upsides to having S&S couplings and only 3 downsides to them, as far as I can see, these are:-

(1) You have to check them every day, which is no big deal.

(2) They add about 650g to the frame, including the special cable guides and joiners.

(3) They do considerably more damage to your bank account, compared to the uncoupled Raven Twin

One day it may be absolutely necessary to make your tandem into as small a package, as the couplings allow, in order to avoid surcharges, or fit into a small vehicle.

This will certainly save you money and may, in extreme cases,

allow you to save the bike!

We've never had, or heard of, a single failure of S&S couplings. The frame is stronger with them, than without and they'll outlast even one of our frames!

Close up of the "J" shaped guides

Look at the extreme high quality of the machining of the S&S couplings.

SADDLES

There's one question that I can never answer, "Which is the most comfortable saddle?"

This would be an easy question to answer - if only somebody made a saddle which was the most comfortable for everybody - but nobody does - and nobody could! Our anatomies are unique to us. Customers come to the showroom and press their thumb down into saddles and suck their teeth. If that was a valid test, most cyclists would choose a gel saddle. In fact I believe that almost everybody would find a gel saddle very comfortable, for a short period of time. I've yet to meet the person, who's happy to ride on one, for any great distance.

We sit on our "sit bones" which are a part of our pelvis called the **ischial tuberosities**. To protect the overlying muscle and skin from pressure, the tuberosities are covered by a fat pad, the "bursa".

By supporting the weight of our bodies on these bones, we protect the delicate structures between and in front of them (our perineum) from pressure, which could cause bruising, numbness, pain and could possibly lead to problems of swelling and infections.

Men's Velo

Women's Velo

The bursie can be conditioned to become used to supporting weight, on a bicycle saddle, by gradually increasing the duration of the exercise. If too much is done too quickly, the bursas can become painfully inflamed, (bursitis).

With a gel saddle, your bones sink further and further into the gel and you end up supporting your weight on the soft tissue. Add to that the absence of fresh air and you get sweaty too, which does nothing to alleviate the problem. With a firm saddle your sit bones take your weight and prevent it from being borne, by the area of your anatomy least capable of doing so.

Our **Thorn Velo saddles** have a firm, but yielding plastic base and dense padding, you don't sink too far into them. We think that they are excellent saddles to find as original equipment on any bike.

Many cyclists find the **San Marco Rolls** saddle very comfortable, it is beautifully made with leather "upholstery" over dense foam. The Rolls is one of a small number of saddles which have remained fundamentally unchanged for decades. We buy the Classic saddle for use as OEM on our bikes. This means that the Classic finish costs you considerably less than the myriad of other finishes available on the San Marco Rolls.

If you get on with a Rolls - you'll have a good friend for a very long time.

Why are women's saddles shorter than men's?

Neither Fiona, who's a senior physiotherapist, nor anyone else I asked, could offer an anatomical reason. Shortened ladies saddles first appeared in Holland, where it was commonplace for women to ride in cycling skirts. Dutch ladies bikes have a very short reach and, upon dismounting, cycling skirts often became hitched up on the saddles.

Obviously women needed shorter saddles!

Few women now ride in skirts. But designers have remembered that women need short saddles, without remembering why and so the myth persists.

Does it matter? Yes - the rails of top quality saddles are actually springs. Springs provide comfort.

Short springs are stiffer than long springs.

Short saddles are therefore far less comfortable than regular saddles.

Ladies, don't assume you need a short saddle. Female sit bones are generally further apart than male sit bones - in all probability, you simply need a wider one.

Brooks leather saddles.

Brooks saddles have two reputations:- they're famous for being extremely comfortable - they're also infamous for being excruciatingly uncomfortable - I find them very comfortable!

The firm hide supports the sit bones, gradually you break the saddle in, to your shape and you gently condition your bursie to the shape of the saddle.

A great many people find their dream saddle with a Brooks - but usually only once it's broken in.

Why try a Brooks?

If you like your Brooks saddle, you'll not only be very comfortable, you'll also have the most robust saddle possible and it'll last ages. If you bond with your Brooks, I advise breaking in a second one, on short journeys, because even Brooks saddles don't last for ever. With a back up Brooks saddle, you'll never be faced with the prospect of a big ride, on an unbroken saddle. Once you're happy with your first Brooks, you could consider a lighter Brooks saddle, with **titanium rails**; which have even more spring.

Brooks B17 Honey

We can sell you a bike, equipped with a Brooks B17 saddle upgrade, for significantly less, than it would cost you to buy a B17 later. Ride it only for short trips to start with and see if it suits - you can't know unless you try - if you waste money, sorry, but at least you tried one.

If you can't get on with a Brooks but you manage to find a saddle that you really like **- if you take my advice -** you'll buy a load of them immediately. These days, very few products remain unchanged for long, very soon there will be a "new super whizz bang version", which may not be as good for **YOU** and the long search for a comfortable saddle will begin again.

Upgrades and Accessories

Front hub

The standard front hub on all of our bikes is a Shimano Deore front hub. This is a nice piece of kit and does the job well. But please note that our wheels are so well built, that we would expect the majority of our bikes to wear out the front hub before the wheel needed to be rebuilt. This is especially true if the tungsten carbide rims are chosen. Hope front hubs are available in silver, black or red and it has a 7075 machined body and uses superb quality bearings. We recommend this upgrade very highly.

Dynohubs

For many cyclists it is probably more useful to upgrade the front hub to a dyno hub. Schmidt are the only manufacturer that I'd recommend, as a hub, they are top quality and run on top quality sealed bearings. They are the most efficient and reliable dyno hub on the market. Unlike other dyno hubs, the wheel spins almost as freely as a "normal" front hub, when it is not generating electricity and it is difficult to notice the drag, from the hub, when it is generating power. The **Schmidt SON 28** is slightly heavier than the SON deluxe. If you wish to use halogen bulbs the New SON 28 is the only option. It is the best choice if you wish to use it to recharge GPS batteries. As a front for a Rohloff bike it makes sense to have 32 holes. **The New SON 28 is available in polished (silver), anodised silver, anodised black or, from mid June 2012, anodised red.**

The new, more compact, lighter weight, SON Deluxe will only work with one of the new LED headlamps. It is a choice which many cyclists will make, if they want to use such a head lamp, for MTB 24 hour racing or for long distance Audax rides. The Deluxe will also charge batteries but it takes longer to do so...even with LED head lamps, the Deluxe does not produce power as well as the 28, at low speeds.
The SON Deluxe is available in polished (silver), anodised black or anodised red.

Dynamo lighting.

There's now a budget LED front light, which has made every halogen dynamo headlight obsolete... **the Busch & Muller Lumotec Lyt N Plus.** Whilst the performance of this light falls far short of the superlative Edelux, it costs a fraction of the price. The plus version also features a "standlight"

The Schmidt Edelux LED front light is simply awesome! It is awesome in terms of the quality of light output, it is awesome to think that one is producing such a light, without batteries and without noticeable effort! It is also awesome to consider how much it costs! But it is very well made. The casing is CNC machined from "the solid". The Edelux has a magnetic switch with 3 positions; on, off and sensor. The sensor position automatically switches on the light when light levels fall. The Edelux has a built in capacitor, which will produce several minutes of good light after the wheel stops turning. The LED itself has a copper heat sink to ensure a very long life and the lens is a superb example of optical technology.
I have used 15W halogen rechargeable systems which give inferior illumination. **The Edelux is available in silver, black or red** and is supplied fully installed and

Brooks leather saddles

We can't guarantee that you will find a Brooks comfortable, although very many cyclists swear by them. Now is your best chance to try a Brooks.

Brooks B17 Standard Honey

This saddle is available at a really super price because we buy lots as original equipment.

Brooks B17 Standard Black

This saddle is available at a really super price because we buy lots as original equipment.

Pedals

It's hard to advise what pedals to use on tour, it depends upon many factors. I have used SPD pedals for almost 2 decades now, I'd hate to use anything else. I feel really safe in them - my feet can't accidentally get bumped off the pedals. So far, I've always been happy with MTB racing shoes, the areas we like to cycle in are only cold at night! MTB racing shoes transfer power really well and they are exceptionally comfortable to cycle in. I always take another pair of shoes; either Gore-Tex walking shoes or sandals - depending upon where we are. I'd hate to only have one pair of shoes and so it doesn't matter if my cycling shoes look weird when I'm off the bike. You can try real Shimano PD M520 SPD pedals for very little money.

The PDM540 pedals are the next level up, they cost about twice as much. The very best of the SPD pedals, the XTR pedals are not suitable for touring, as you need a 10mm Allen Key to take them off the cranks. A 10mm key is a heavy bit of kit, with no other use on the bike.

If you've never ridden with SPD pedals, whether I'd recommend trying them really depends upon how old you are. You'll never have your feet still locked into them when you do but you will fall off once or twice, when you forget that you have them on. Getting used to SPD pedals, away from traffic is a good idea!

There is a nice pedal on the market, which I have used for several tours, the PD A530. This has SPD on one side and a flat platform on the other.

I can see the attraction for using flat pedals and walking shoes or sandals. The very best of these pedals, on the market are Shimano PD-MX30 DX. The large surface area reduces pressure, when using flexible soled shoes. The stainless set screws help to grip slippery shoes.

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The old favourite of using toe clips and straps would be my least favoured option. The straps get caught on things and the clips can kill your toes but that's just my opinion, based on past experience. If you get on with them, you'll find it hard to better the MKS GR9 with steel clips and nylon straps.

Rixen Kaul Mini map holder

Holds maps securely. Super tough Plexiglas. Quick release bracket, fits on either bars or stem

(Fittings for both options are supplied)

I

Regarding rear lights, I can see no logical argument for choosing anything other than the brightest, most visible light on the market - especially when this light is so reasonably priced. The Cateye TL-LD1100LED is **the rear light** to choose. It has 10 super bright LEDs, it is highly water resistant and reliable and each bank of 5 LEDs can be set in 4 different modes, this means that you can have 5 LEDs on constantly and 5 LEDs flashing! Run time 50 hours constant and 100 hours flashing.

Thorn 105mm Accessory bar. This useful device clamps directly to the steerer tube of the bike's fork, in place of some spacers. It can be used to mount various accessories, including lights and computers. The accessory bar is strong enough to accept a handlebar bag. The lower a bar bag is mounted, the less detrimental effect it will have on the bike's handling. Many bikes have their bars high enough to allow a handlebar mounted light, to shine over the top of a bar bag, that is mounted on one of our accessory bars.

There is no point in wearing a sweaty hydration pack on a touring bike!
The original "profile cage" of the early nineties was great - so great in fact that we got more made especially for us. It is very durable and comes very highly recommended, you should consider having as many as possible fitted.

You can see pics of our own heat treated, tubular Cro-Mo, front and rear expedition carriers (above) these are the undoubtedly the strongest carriers on the market. They are designed to work with M5 or M6 screws.

Topeak mountain morph mini track pump (right)
This is a superb piece of kit to take on tour. It fits easily into a rear pannier or large saddlebag and makes short work of inflating tyres to the desired pressure for the prevailing conditions.

FRAME SIZING

The New Raven Twin frames are produced in 5 different sizes. These sizes have the suffix "A". Each of these options, may be available in a choice of 3 different colour powder coat finishes. You'll see that the matrix groups the sizes into 3 types of frame; the direct lateral designs, Raven Dynamic and Adventure and the double marathon design, Raven Discovery.
The original Raven Twins were made in 2 childback sizes and 9 adult/adult sizes. With the experience we've gained, from fitting hundreds of customers to these machines, I've been able to reduce the number of sizes.
You'll see some information, on child back tandems, sizes# 1 and #2 on the back page.

The Raven Adventure.

These frames are built, in the very popular direct lateral style and are suitable for all types of uses, from fast touring (Audax) to fairly heavy touring. These frames suit many female stokers. The front top tubes give room for the pilot to use comfort bars, provided a long stem is used. Although the bias has been shifted to favour flat track bars, dropped bars could still be fitted, if you insist upon having them, by using a short stem and leaving the steerer long.

Size #3 (S/XS) SELL OUT SIZE.
This size has the lowest front and rear stand over heights that we can provide, with this style of double adult tandem. This size would suit much shorter than average male (or slightly shorter than average female) pilots and shorter than average female stokers. There weren't as many crews, who wanted this size tandem as we'd thought!
Once they're gone - there won't be any more.

Size #4A (Small Medium/Small). This was a very popular size and we sold out of the original frames in size #4, very quickly. Size #4A will suit shorter than average male (or average sized female) pilots and slightly shorter than average female stokers.

Size #5 (M/M) SELL OUT SIZE.
This size will suit average size male (or taller than average female) pilots and female stokers of average height.
You can save £300 if you have this size instead of a size 8A, either size should fit you both. The Size #5 frame would produce a lighter, tighter machine.
Your stoker may not want or need the considerably longer rear of the #8?

Size #6A (L/S) This size will suit a fairly commonly seen pairing, where the pilot is taller than the average male and the stoker is shorter than the average female. We've sold lots of these size #6A tandems for sporty use.
Many but not all crews, who require this size, can also ride size #12A.

The Raven Discovery.

We've taken the opportunity to have longer, butted base tubes, produced. This means, for the first time, that we can actually recommend a frame's use for male stokers too. Discovery frames also have longer front top tubes. These sizes are not really suitable for dropped bars - unless the pilot is used to a very aggressive position on a solo bike. The double marathon frame is still suitable for very athletic use, by virtue of the frame's ability to allow strenuous "out of the saddle" sprinting and climbing. These frames are particularly suited to heavy loads (heavily built crew, massive luggage weight, or both!), and have consequently become the benchmark expedition tandem.

Size #7A (S/M) This size suits a tandem crew, where the pilot is not only short but possibly shorter than the stoker. It's usual for the partner, with the greatest upper body strength, to be on the front, but we've also sold many of this size to (or for) average size female pilots with blind male stokers. This size is perfect for an average size female pilot and an average size male stoker.

Size #8 (M/S+) SELL OUT SIZE.
We still have a few size #8 frames, **you can save £300 if you have this size.**

Size #9 (M/M) SELL OUT SIZE.
Like size #5, this size is also suitable for average size male (or taller than average female) pilots and female stokers of average height. **You can save £300 if you have this size instead of a size 8A - either size would almost certainly fit you both.** The Size #9 frame would produce a slightly shorter machine than the #8A.
Your stoker may not want or need the slightly longer rear of the #8 or #8A?

Size #11 (L/L+) SELL OUT SIZE.
Pilot and stoker both need to be tall, to ride this size.
The front top tube and the base tube, are both really long. They're long enough even for an average sized male stoker to be really comfortable.
When you're both tall (which you need to be, to ride this size!) frame stiffness is really important. Consequently this size is especially suitable for high performance cycling, as well as obviously being suitable for expedition use.
If this size will suit you, you can save £300 compared to the cost of a size #12A

Size #12A (L/M). **This is the new size, to replace the size #11. I can't think of any crew, who could ride a size #11, who couldn't have this size - but I can think of several pairings, who could ride this size who would NOT be able to ride the size #11.**
The pilot needs to be taller than the average size male and the stoker needs to be at least as tall, as the average size female, to ride this size. The front top tube and the base tube are both really long - certainly long enough for even the average sized male stoker to be comfortable.

MODEL Type of frame	Frame Code Number	SIZE FRONT/ REAR	Virtual FRONT SIZE C to Cmm	Virtual FRONT TOP TUBE C to Cmm	BB Height FRONT	Stand Over Height FRONT	S/0 Height FRONT middle of top tube	BASE TUBE (This is effectively the length of the rear top tube)	REAR Seat Tube C to C	BB Height REAR	S/O Height REAR Middle of top tube	Bottle cages on non-coupled frames	Bottle cages on S&S frames
Dynamic Direct lateral Child back	#1	S/XXS	510	560	275	770	720	581	280	260	610	3	3
Dynamic Direct lateral Child back	#2	L/XXS	600	600	285	840	780	581	280	260	630	4	3
Adventure Direct lateral	SELL OUT #3	S/XS	510	560	275	760	744	632	370	275	678	4	3
Adventure Direct lateral	#4A	SM/S	530	570	280	777	755	683	400	275	712	4	3
Adventure Direct lateral	SELL OUT #5	M/M	555	580	280	820	800	632	370	280	755	4	4
Adventure Direct lateral	#6A	L/S	600	595	285	865	815	683	400	275	717	4	3
Discovery Double marathon	#7A	S/M	510	565	280	770	762	759	440	280	746	5	4
Discovery Double marathon	SELL OUT #9	M/M	555	600	280	820	800	720	460	280	755	5	4
Discovery Double marathon	#12A	L/M	600	605	285	863	835	784	460	285	769	5	4
Discovery Double marathon	SELL OUT #11	L/L	600	625	285	863	850	784	520	285	814	5	5

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Further notes on sizing.

Please understand that we've seen many, many different tandem pairings. I've tried to sketch briefly, the profiles of some of the many hundreds of customers we've successfully fitted to their machines. We always try to avoid causing offence but we must often make some very personal observations about sizing, we hope no offence is taken.

We believe that this new range of sizes will still provide over 88% of tandem crews with an elegant looking machine, which functions perfectly. We think that we'll be able to provide perfectly fitting, perfectly functional machines for most of the remaining 10% -they just may not look quite as elegant, as we both would have liked. We would like to say sincerely to the remaining 2%

"Sorry, we can't help and thank you for contacting us."

Please be realistic about what is "average height" for your gender (ask a friend) and please remember we're talking of averages for the UK - if you're from the USA for example, you'll find that we, in the UK, are on average, shorter than you.

Also please remember that, not only does our national average height increase as the years pass, our actual height decreases in our autumn years - thank goodness our ability to enjoy cycling remains constant!

Always check your stand over heights the way we ask for them, as explained on the order page - then we should get it right first time - if we don't, please be assured that we consider it's our responsibility to correct matters, to your complete satisfaction, this is in addition to your statutory rights and runs parallel with our 100 days trial period.

The amount of clearance you should have, over the top tube, depends upon how tall you are. Very tall people may have more than 100mm clearance; very short people may be almost touching the tubes.

Most pilots are advised to have 25-50mm clearance at the very front of the machine; this will give much more clearance at the mid-tube position, where they are most likely to stand, whilst straddling the machine (except on size #7A, which only has a very small slope). Sometimes it is impossible to achieve this clearance at the very front - but we say that you must have clearance at the mid-tube!

Most stokers should have at least 25mm of clearance at the mid tube (the stokers bars prevent them from standing much further forward than this). As long as they can sit at the right height, with a 400mm seat post, it really doesn't matter if they have **significantly more** clearance than this. Sometimes it's necessary to accept 1mm of clearance, if you have really short legs - but this can mean that there's no room to fit a suspension seat post. Some pilots say that, as they hold the machine upright, their stoker doesn't need any clearance at all! This is a personal choice.

In my opinion, aesthetics are not the most important things in life - but, provided they don't interfere with function, I believe that they should be considered! For example, a whole stack of spacers under the pilot's stem may be necessary for some people - but if a larger frame could've been chosen instead, the machine's appearance would be enhanced considerably. A prominent slope to the frame always looks (and is) better than a stack of spacers, on a more gently sloping frame.

The correct reach to their bars, will be shorter for stokers, than on their solo bike. This is because, on a solo, when travelling at speed, a cyclist gets a "lift" from the air. At the back of a tandem, stokers are sitting in comparatively still air and consequently, more weight is borne by their arms, there's no need for most stokers to adopt a racing crouch in order to be very aerodynamic!

The further behind the pilot the stoker sits, the more they can see to the front. This should be balanced by the fact that conversation can become difficult, if they sit too far away!

In the past, it was true that the shorter a tandem was, the stiffer it was. A tandem can not be too stiff laterally. Our double marathon Discovery tandems frames are very stiff, a stoker can have more room than they've been used to, if they wish. A short stiff tandem may be slightly better through tight bends but a long stiff tandem is more stable. If we were to make super-mega-long tandems, then perhaps this could have a significant effect upon aerodynamic efficiency and handling - but our tandems are simply "long" and that's fine!

Size #4A
Small-med/Small

Size #6A
Large/Small

Size 7#A
Small/Medium

With the exception of the size #8A and with the exception of pump, bar ends and pedals…
...the machines, shown on this page, have specifications which are available at the start price.

Size #12A
Large/ Medium

Raven Twin order form

Frame + fork only .....£1150 ☐
S&S Frame and fork only.....£2150 ☐
Frame & Rohloff hub built into a wheel.....from £2145 ☐
Complete bike (without pedals) **Start Price.....£3099** ☐

S&S option **ANY** colour you like...(add) £1000 ☐
NOTE: S&S option has a 10 week lead time

Discount for old sizes, subject to availability (subtract)...£300 ☐

Size and colour
(please write)

Please choose:-
Front brake lever on RIGHT? ☐
Front brake lever on LEFT? ☐

THORN

Raven Twin

frames in common with those on all our cycles, have our "Original owner, lifetime warranty" against faulty materials or faulty workmanship.

THORN

To get the total cost of your ideal bike,

add the cost S&S couplings (if reqd) and the cost of chosen options on pages 21, 22 & 23 to the

Start Price

(See above)

Please remember all our prices include VAT...
...but carriage is not included.

Buy a **Raven Twin,** ride it for 100 days and, if not totally delighted, return it to us either in person or safely packaged in a Thorn bike box, we will refund you the purchase price of the bike including any or all items from the Raven Twin bike build menu. This offer does not include pedals or accessories. This offer applies to complete bikes and to EU customers only.

MONEY BACK 100 DAY PLEDGE

Invoice No

Male ☐
Female ☐
Title_____

First name_____
Surname_____
Address_____
Town_____
County_____
Postcode
Country _____

Telephone numbers.
Home_____
Mobile _____
Work _____
Email address_____@_____

THORN

Call on 01278 441 505
Email sales@thorncycles.co.uk
Online www.thorncycles.co.uk

St John St Cycles,
Thorn Cycles Ltd,
91-93 St John St,
BRIDGWATER,
Somerset
TA6 5HX

PLEASE NOTE:- Occasionally some items become unavailable for long periods of time. We reserve the right to substitute items of similar (or greater) value, where there will be no adverse affect on function. No surcharge will be made for this

St John St Cycles is a trading style of Thorn Cycles Ltd (Incorporated in England 4121096 - registered office: St John St Cycles, 91-93 St John St, Bridgwater, TA6 5HX)

Please fill in one of the set up dimension forms for each pilot... ...and another for each stoker.

Why have we said "each"?
Several tandems are sold each year, for use by different pilots and different stokers.
If that's what you require, it will help us to make certain that you get the most appropriate size, if we have as much information as possible, on all those who will ride the machine.
On the other hand, if that was not your plan, please don't try and think who *may* want to ride the bike because it will be better for you and for your stoker...if we *simply* build the bike perfectly...for the two of you!

MOST IMPORTANT PLEASE READ THIS!

SET UP DIMENSIONS

In order to make something as special as your next THORN bike, we must have very specific and perhaps to some people, very personal information.
We need every bit of the information requested in table 1 on the right.

Alternatively, you may be able to complete the set up details requested in table 2 on the far right.

You will find details of both sets of measurements in our document:-

"HOW TO GET THE PERFECT SET UP ON YOUR THORN BIKE"...
...CLICK HERE for link to pdf file.

Or, of course, you can come and visit us and we will measure you.

Without one of these 3 options being complied with, we are unable to guarantee the results and only your statutory rights will apply.

1 DATA FOR THE PERSON THE BIKE IS FOR:
Name
PILOT or STOKER? Please delete

DIMENSIONS AND OTHER DATA. We must have an answer in every box.	GENDER M OR F	
	WEIGHT (Kg)	
	AGE	
	HEIGHT (bare feet in mm.)	
	BFSO (Bare foot stand over height in mm.)	
	SHOE SIZE (Continental)	
	ARM SPAN (mm)	
POSITION REQD. Please tick one box, or 2 boxes. If you tick 2 boxes, we will aim for a position between them.	VERY RELAXED	
	RELAXED	
	FAIRLY RELAXED	
	FAIRLY SPORTY	
	SPORTY	
CHOICE of SADDLE and TYPE of HANDLEBARS REQUIRED. Please tick one State width required if Flat Track bars are chosen.	SADDLE LENGTH (mm) Or NAME and MODEL	
	CONVENTIONAL DROPS	
	STRAIGHT	
	FLAT TRACK width (mm)	
	COMFORT	
OTHER ESSENTIAL INFORMATION Please tick one box.	Experienced, fit and confident cyclist.	
	Less experienced but keen and reasonably fit cyclist.	
	Casual and/or nervous cyclist.	

2 The dimensions we need to duplicate your position.

N	Overall saddle length in mm. And/or name of saddle.	
S	The distance in mm. from the UPPER SURFACE of LOWER pedal to the top of the saddle, measured along the seat tube.	
B	The distance that a plumb line falls behind the BB, when suspended from the nose of the saddle.	
L	On a straight bar bike, this is the distance that tops of the GRIPS are lower than saddle. On a drop bar bike, it is the distance that the top of the stem is lower than the saddle.	
H	On a straight bar bike, this is the distance that tops of the GRIPS are higher than saddle. On a drop bar bike, it is the distance that the top of the stem is higher than the saddle.	
DS	This is the distance from the nose of the saddle to the centre of the stem on a bike with 3-5° STRAIGHT BARS.	
DD	This is the distance from the nose of the saddle to the centre of the stem on a bike with DROP BARS	
DF	This is the distance from the nose of the saddle to the centre of the stem on a bike with THORN FLAT TRACK BARS	
DC	This is the distance from the nose of the saddle to the centre of the stem on a bike with THORN COMFORT BARS	
DX	This is the distance from the nose of the saddle to the centre of the stem on a bike with ANY OTHER BAR BUT YOU MUST TELL US EXACTLY WHAT THIS BAS IS	

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Choice *(Please circle your choice)*	Cost
Handlebars please note we generally recommend having the same bars, bar ends and grips for both Pilot and stoker...please make clear notes if this is not what is required.	
Thorn Straight bar. 580mm wide. A dependable high quality bar with a 5 degree bend, black.	£0
Thorn Straight bar. As above but polished (silver)	£0
Thorn Narrow bar. 550mm wide, 5 deg bend, our own special design, with a short centre swell, and laser etched marks to allow them to be easily cut down to 540, 530, 520 or 510mm if required.	£0
Thorn Flat Track bar. 580mm wide, short centre swell. Scale markings allow bars to be easily cut to 550mm if required.10 degree pull back gives natural position. **These are THE BEST CHOICE for most crews and for most applications. Write width in notes.**	£0
THORN **eXp** Bars 31.8 Black 12.5° 680mm. Long 31.8 centre swell. Etched scale markings allow bars to be easily cut to 590mm if required. 12.5° bend gives natural position. REQUIRES 31.8 STEM.	£25
Thorn Mk2 comfort bar. 620mm wide. Not everybody's choice but considered absolutely brilliant, by those who like them **silver.**	£0
Thorn Mk2 comfort bar. As above but black.	£0
Thorn Comfort MTB bar. 645mm wide. As above but extra width and extra rise, best option on rough tracks black only	£0
THORN SPECIAL DROP BARS for ROHLOFF **440mm wide top quality drop bars, with Gilles Berthoud shifter (see page 5) and black cork tape.**	£120
Grips and Bar ends.	
Herrmans DD08B Dual Density ergonomic grips. Supplied with **SJSC Ergo control bar ends.** A comfortable, rubber covered, anatomical "T" shaped bar end. These are nice but nowhere near as nice as the GP5 grips. This combination is not for comfort bars.	£0
Ergon GP1-L Anatomic grips large black. The most comfortable grip we have ever used very highly rec'd. Suitable for straight bars, comfort bars or, if you must have them, trekking bars.	£0
Ergon GP5L Anatomic grips with built in bar ends. Long "L" shaped bar end incorporated. 4 distinct positions. Ideal choice for PILOT with flat track bars.	£25
Ergon GP3 Anatomic grips with built in bar ends. Shorter bar ends, without the "L" bend. Ideal choice for STOKER, especially with narrow/medium width bars, which could cause "L" bend to collide with the pilot's thighs. Please see pic below.	£18
SJSC Ergo control bar ends. Short rubber covered bar ends work best with straight bars. Fit with Ergon GP1-L above. We used to recommend these but the GP5 is much better and now only costs an extra £9.	£10
Zoom Ski bends. Traditional ski bends, work with straight or flat track bars. Ideal for extended touring, as they are very resistant to transit damage. Fit with Ergon GP1-L above **Black.**	£7
Grab-On closed cell sleeve for Ski bar ends.	£10

Ergon GP3
Ideal for stoker, especially when Pilot has chosen GP5L grips

Choice *(Please circle your choice)*	Cost
Rohloff hub choices & upgrades Hub includes shifter, 17t sprocket	
6 SPARE POLISHED SPOKES. If you order these now, our wheel builder will pick them, when he builds the wheels...they will then be from the same batch.	£5
Pitlock silver F&R skewer set NOTE: just because they're an option doesn't mean that we like them, or would have them on our own bikes!	£35
BLACK Ti Skewers (pair) Also possible with Son upgrades.	£20
Silver anodised Rohloff hub...architectural quality anodising is highly resistant to corrosion and oxidation.	£0
Black anodised Rohloff hub...architectural quality anodising is highly resistant to corrosion and oxidation.	£0
Red anodised Rohloff hub...architectural quality anodising is highly resistant to corrosion and oxidation.	£0
Silver anodised Rohloff DISC hub...as above but for disc brakes.	£20
Black anodised Rohloff DISC hub...as above but for disc brakes.	£20
Red anodised Rohloff DISC hub...as above but for disc brakes.	£20
Front hub upgrades	
Silver Deore front hub,	£0
Black Deore front hub,	£0
Silver HOPE front hub,	£65
Black HOPE front hub,	£65
Red HOPE front hub,	£65
Silver polished NEW Son 28 front dyno hub,	£160
Silver anodised NEW Son 28 front dyno hub,	£170
Black NEW Son 28 front dyno hub,	£170
RED NEW Son 28 front dyno hub,	£180
Andra 30 32h An exceptionally heavy duty rim suitable for the longest toughest trips.	£0
Andra 30 CSS 32h Andra rim with tungsten carbide brake track for extra long life. Inc Blue Swissstop pads. Ideal for heavy touring but not in extreme wet weather.	£85
Andra 30 CSS 32h FRONT and **Andra 30 plain REAR** complete with a pair of spare front and also rear pads. Our recommendation for USE WITH REAR HYDRAULIC DISC BRAKE.	£56
Andra 30 CSS 32h rear and **Andra 30 plain front** complete with a pair of spare front and also rear pads. Our recommendation for general and heavy touring.	£56
Rigida Grizzly 32h lightweight 490g double eyelet rims . These are not recommended for expedition touring.	£20
Rigida Grizzly CSS 32h Strong, lightweight, long lasting rims! Inc Blue Swissstop pads, Ideal for light crews with little luggage but not in extreme wet weather.	£105
Grizzly CSS 32h FRONT and **Grizzly plain REAR** complete with a pair of spare front and also rear pads. Could be the perfect sporty rims for light crews with little luggage. IF USED with REAR HYDRAULIC DISC BRAKE.	£75
Grizzly CSS 32h rear and **Grizzly plain front** complete with a pair of spare front and also rear pads. Could be the perfect sporty rims for light crews with little luggage.	£75
Rigida ZAC 19 32h rim. A middle weight 560g, double eyelet rim for use on smooth sealed roads for sporty, lightweight European touring/ lightweight camping.	£0
LED Head lamps for dyno-hub	
The Busch & Muller Lumotec Lyt N Plus. A brilliant budget headlamp!	£35
Schmidt Edelux Mk2 LED headlamp The best and brightest LED headlamp available. Polished (silver).	£120
Schmidt Edelux Mk2 LED headlamp The best and brightest LED headlamp available. Architectural quality Black	£120
Schmidt Edelux Mk2 LED headlamp The best and brightest LED headlamp available. Red anodised.	£130

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Choice *(Please circle your choice)*	Cost
Tyres	
Panaracer Pasela Tourguard 1.5" Lighter weight but too narrow to really be recommended for tandems.	£0
Panaracer Pasela Tourguard 1.75" Recommended for sealed roads and excellent or occasional dirt roads.	£0
Schwalbe Marathon Supreme 1.6" **folding** reflex. The definitive tyre for fast touring on B roads, even with heavy loads over long distances. Not the best choice for slippery muddy roads.	£34
Schwalbe Marathon Supreme 2,0" **folding** reflex. The definitive tyre for brisk riding on smooth + broken roads, with heavy loads over long distances. Not ideal for unsealed roads. NOT the best choice for slippery muddy roads.	£34
Schwalbe Marathon Dureme 2,0" **folding** reflex. A superb 4 season tyre. Quick, comfortable, grippy, lasts for ages and has excellent resistance to punctures. Now being made specially for us.	£50
Schwalbe Marathon Mondial 2.15" Evo reflex folding tyre. An expedition tyre...fantastic on expeditions...too slow and heavy for brisk everyday use. Looks just like the original and much missed Marathon XR	£42
Bike supplied fitted with 1.6" Marathon folding Supreme tyres and a pair of 2.15" Marathon Mondial folding tyres supplied ready to fit, when you **need** them. See recommendation on page 9 (please choose 45mm mudguards)	£110
Schwalbe Marathon plus 1.75 smart guard. The best puncture protection available but we find them hard work.	£14
Crank lengths & Gearing. **Choose for pilot, then choose again for stoker. Always choose Thorn front and rear or Shimano front and rear. We always assume that longer cranks are to go at the front - unless written in notes.**	
Thorn conventional square taper silver chainset, for **110 bcd** rings, not a high tech item but it does the job nicely. Available in the following lengths:- **140, 145, 160, 165, 170** and **175**mm (Please circle the length required)	£0
110 bcd 7075 series alloy ring. Designed for hub gear and single speed. You could never find better! **Available rings: 43, 44, 46, 48 and 50 chainring** for above Chainsets Our own double sided	£0
110 bcd "chainguard" a 7075 alloy chain ring without teeth. Protect trousers? Or simply adds weight? You decide. For use with chain rings up to **44** or up to **50**	£20
Thorn conventional square taper black chainset, for **104 bcd** rings, not a high tech item but it does the job nicely. Available in the following lengths:- **150, 155, 160, 165, 170** and **175**mm (Please circle the length required)	£0
170mm Shimano Deore **silver** 2 pc design with integral BB axle & external bearings for 104 bcd rings	£30
As above Shimano Deore **170mm but black.**	£30
As above Shimano Deore **but 175mm and silver.**	£30
As above Shimano Deore **175mm but black.**	£30
104 bcd 7075 series alloy ring. Designed for hub gear and single speed. You could never find better! **Available rings: 43, 44, 46, 48 and 50 chainring** for above Chainsets Our own double sided	£0
104 bcd "chainguard" a 7075 alloy chain ring without teeth. Protect trousers? Or simply adds weight? You decide. For use with chain rings up to **44** or up to **50**	£20

Choice *(Please circle your choice)*	Cost
Sprockets	
Rohloff 17t sprocket, fitted as original equipment to all our Rohloff hubs to enhance chain life. You can swap to 15 or 16 if you wish to change the gearing later.	£0
Rohloff 15t sprocket. Note: If you require higher gears, a larger chainring is a better option when buying the bike.	£5
Rohloff 16t sprocket. Ideal if you know that you want high gears, with a smaller chain ring, at the time of purchase.	£5
BRAKE OPTIONS	
Shimano Deore V brakes and levers These are super brakes! **Note;** as these don't have cartridge pads, they aren't suitable for use with CSS rims. Don't tick this box if choosing a disc brake option.	£0
Shimano Deore XT V brakes with cartridge pads, complete with **Shimano XT levers** These are superb brakes with really nice levers. The forged arms are longer for better mudguard clearance, these brakes pivot in a bronze bushing and are highly recommended!	£50
Disc rear brake options **All the options below use the Hope Tech V4 rear hydraulic brake, 203mm ventilated floating Rohloff fitting rotor and Hope Tech lever, to save repetition we have called this simply "disc lever" see page 11** **Disc can not be fitted to steel fork, see pages 4, 10 &11**	
[1] Disc lever, operated by **PILOT**. Shimano Deore front V brake and lever **2 BRAKES ONLY** (Unused Deore LHS lever supplied as a spare) Not the best Disc option for heavy loads/ heavy Crews in very hilly terrain, we assume you are buying this expensive brake to be as safe as possible? **see page 11**	£272
[2] Disc lever operated by **PILOT** Shimano Deore front V brake and lever, stoker operation of rear V brake**...3 BRAKES but we don't like sighted stokers to have control of a brake see page 11**	£283
[3] Disc lever operated by **STOKER** Shimano Deore front and rear V brakes and levers operated by PILOT**...3 BRAKES but, in our opinion, this is only suitable for HIGHLY EXPERIENCED BLIND STOKERS...in which case this is probably an excellent solution. see page 11**	£283
[4] Disc lever operated by **PILOT** Shimano Deore front V brake and lever. Rear V brake operated by pilot on a thumbshifter**...3 BRAKES** (Unused Deore LHS lever supplied as a spare) **A GOOD CHOICE FOR MOST CREWS RIDING IN HILLY TERRAIN. See page 11**	£338
[6] Real Drop bar Option. When the drop bar option has been chosen on page 21, the only possibility of fitting the disc lever is if the **STOKER** operates it. Make sure you read page 11 before opting for this. This option also works on drop bar, bar ends. **3 BRAKES**	£243
100% dry hydraulic coupling for separating hydraulic rear disc equipped **S&S** frames more quickly. No longer essential on the new S&S Raven Twins.	£200

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Choice *(Please circle your choice)*	Cost
Mudguards	
SKS P45 mudguards. Ideal for 1.75" will cope with 2.0" tyres with minimal clearance silver.	£0
SKS P45 mudguards. Ideal for 1.75" will cope with 2.0" tyres with minimal clearance black.	£0
SKS P55 mudguards. Ideal for 2.0" will cope with 2.25" tyres with minimal clearance silver.	£0
SKS P55 mudguards. Ideal for 2.0" will cope with 2.25" tyres with minimal clearance black.	£0
SKS P65 mudguards. Ideal for 2.25" looks odd with 1.75" tyres (excessive clearance) silver.	£0
SKS P65 mudguards. Ideal for 2.25" looks odd with 1.75" tyres (excessive clearance) black.	£0
Rear Seat posts **Pilot must use supplied post**	
Thorn **28.6mm** black alloy seatpost and appropriate shim	
Cane Creek LT Thudbuster suspension seat post. With Neoprene cover. The best you can get. **STOKER ONLY** Do they need it?	£180
Saddles **Enter 2 saddles, be certain to write in notes where each saddle goes.**	
Thorn Velo **MEN'S** saddle nice quality, firm padding. Could be perfect for you, if you don't want a Brooks. Men's default option	£0
Thorn Velo **WOMEN'S** saddle nice quality, firm padding. Could be perfect for you, if you don't want a Brooks. Women's default option	£0
Selle Royal MEN'S Travel Lite Gel saddle. We've never met anyone who was uncomfortable on a good gel saddle for short periods of time, or anyone who was **comfortable** on one for long periods!	£0
Selle Royal WOMEN'S Gel saddle. The comments above also apply here.	£0
Brooks BLACK B17 Standard saddle. Suits Men and Women. How do you know it won't be bliss, when broken in, unless you try it? But you may hate it and it may never suit you. **Black steel rails. This is a real bargain because we buy B17 Standard in quantity to fit as original equipment.**	£30
Brooks HONEY B17 Standard saddle, as above but **Honey**	£30
No saddle...deduct £15	-£15 (MINUS £15)
Any saddle currently in stock at SJSC at £15 off SJSC retail price.	£'s Vary

Choice *(Please circle your choice)*	Cost
Pedals **Choose 0,1 or 2 pairs,** When we despatch bikes we don't fit pedals, therefore we don't need to know who's having what.	
MKS GR9 pedal a classic **platform** pedal. Single side, so no use without toe clips. Supplied with S, M, L or XL chromed steel clips and nylon toe straps.	£40
Shimano **Saint PD-MX 80** double sided BMX pedal. Large flat platform, excellent grip. High quality, super tough, durable. Ideal for walking boots, trainers or flip flops.	£50
Shimano PD **A530** SPD one side and concave platform the other. Ideal for touring. You can use MTB racing shoes or "ordinary footwear" without changing pedals.	£50
Shimano PD **M520** SPD pedals. A bargain. You can try SPD pedals without great expense. Silver.	£27
Carriers and Accessories	
Thorn Expedition carrier. Heat treated Cro-Mo tubes. Super strong and rigid. Durable black powder coat finish. 6mm fittings. Could carry more than you can!	£90
Thorn Mk5 Lo-Loader. Heat treated Cro-Mo tubes. Super strong and rigid. Durable black powder coat finish. 6mm fittings. Could carry 15Kg per side!	£80
One of each of the above - special price	£150
Profile Design Kage. The best bottle cage ever. Will carry std bottles, Sigg type 1litre aluminium bottles or up to 1.25litre plastic "Coke" bottles (Other carbonated drinks are available.) Some sizes of Raven Twin will carry 5 cages.	£7
Profile Design Kage. As above but 2 cages	£14
Profile Design Kage. As above but 3 cages	£21
Cat eye TL-LD 1100 10 LED Opticube rear light. Fits bracket on our carrier. Exceptionally bright and visible.	£30
Thorn accessory bar Mk2 105mm extension. Fits in place of some spacers on steerer tube. Allows bar bag to be fitted lower than would otherwise be possible, frees up space on the bars.	£20
Topeak mountain morph mini track pump. Superb piece of kit quickly reaches reqd. pressure	£28
Zefal HPX silver pump size 4. This fits on the base tube.	£20
Rixen Kaul Mini map holder A super, well made compact bit of kit.	£20
Other accessories can be fitted.	£'s Vary
Spares, Rohloff spares and tools	
Rohloff full oil change kit	£17
Rohloff special chain lubricant	£6
Rohloff sprocket removal tool	£26
Rohloff spare sprocket 15t	£30
Rohloff spare sprocket 16t	£30
Rohloff spare sprocket 17t	£30
Thorn spare sprocket 19t	£30
Rohloff Torx T20 T grip	£8
Panaracer Pasela 1.75" folding tyre...430g...an ideal spare	£35
Schwalbe SV13 Presta Inner tube 26 x 1.5"—2.5" Original equipment on our 26" wheel bikes. The best tube on the market in this size.	£4
Schwalbe **AV13 Schrader valve** tube 26 x 1.5"—2.5" Only applicable if you requested us to drill your rims	£4
Schwalbe SV13D Schrader valve tube 26 x 2.1"—3.0" Very thick walls extra 100g of rubber why??????	£5

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The Raven Dynamic
Child back tandem
Sizes #1 and #2.

These frames are direct lateral child back tandems; that is to say that they are designed for very small stokers. The two sizes are to accommodate either a short or a tall pilot (Mum front and Dad front?) I have designed these frames to keep the overall length as compact as possible, whilst providing sufficient "growing room", to allow most children to be able to enjoy riding tandem up to an age, where they are old enough (and hopefully, sensible enough, having learned road craft from an early age) to be allowed to keep up with the rest of the family on their own solo bikes. They will certainly be fit enough! It is difficult to give an age range... we all know 6 feet plus eleven year olds and sub-5 feet adults. Whilst the base tubes are short, compared with the other sizes in the range, they are no shorter than some of yesteryear's double adult racing machines!

The compact, stiff frame, enables these machines to be ridden solo... making the "school run" a very attractive proposition! Indeed, it is reported that such lucky children, are considered by their peers, to be very "cool".
Please remember that these are high quality frames, this combined with the super durable Rohloff hub, will ensure a very strong resale, or trade-in value; the inevitable capital outlay, is more than offset by savings on fuel, servicing and time, compared with driving to school. If it is to be used for leisure only, it is a very small price to pay for your shared experiences, whilst giving a child the best possible opportunity to become a cyclist, in their own right.

The above pics are courtesy of Lisa and her son Henry, of them on their Raven Dynamic. Lisa and Henry rode tandem frequently and you'd certainly have needed to be very fit to keep up with them! Henry now rides his own solo bike and is a very accomplished and keen cyclist. Robin (Thorn) rode various child back tandems with his 3 children, who are now all grown up.
(Unfortunately, there are no photos we can use.)

Depending upon spec, Robin ought to be able to help you specify a suitable machine - for somewhere around £2500.

Ring 01278 441505 and ask to speak to Robin Thorn

A much better course of action is to email him directly robin@sjscycles.com

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