FUTURE BIKES

CONSIDERING WE'VE JUST ENTERED A NEW DECADE, PUNDITS' PREDICTIONS FOR THE MOUNTAIN BIKE OF THE FUTURE WERE SURPRISINGLY THIN ON THE GROUND. BUT AS MOUNTAIN BIKER IS FAST GAINING A REPUTATION FOR EXPLORING NEW TERRITORY, WE DECIDED TO INDULGE IN A LITTLE SPECULATION AND BOLDLY LOOK AT WHAT THE FUTURE MAY HOLD IN STORE.

Built for an Industrial Design degree project, The Morrocan Roll features an inexpensive type of composite frame construction

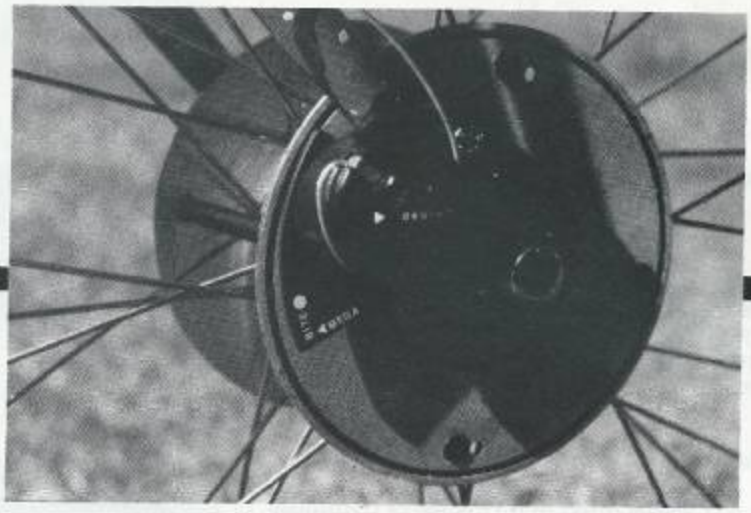
The background for this article started early in 1989 at a time when I was racking my brains to design a new - revolutionary even - composite mountain bike. That kind of mental obstacle course really makes you start to look at things in a different way. To relax after completing this project I visited the movers and shakers of the off-road scene on the West Coast of the States. What I saw there rapidly accelerated the 'what-if' process. So here's my predictions on what we might be riding in 1992 and 1996.

Starting with the frame, the main feature of the 90's will be the diversity of materials used, the methods chosen to join them and the shapes into which they are bent. Specialized have recently shown their remarkable 2.4lb carbon frame, but are also secretly working on a frame manufactured from MMCs, Metal Matrix Composites. MMCs are - in this case - silicon carbide rods encased in an aluminium matrix.

Using them had been discussed about 4 years ago but only now have problems in welding the material been solved. It is supplied to the States from Britain by aluminium producers, Alcan. I spotted a prototype frame in an exhibition at the National Exhibition Centre, Birmingham unrelated to the cycling industry.

The exact properties we can expect from such a frame material has not been revealed, but lightness must be one of them. Interestingly, Alcan believe that the material is too unproven to be trusted by the aerospace industry, and so the bike industry is a useful tool for development. This trait will be repeated during the 90's.

The use of carbon fibre is sure to increase over the next few years. It was rumoured that one major manufacturer was seriously



Brake to the future? Centre wheel braking is more powerful and less prone to mud clogging

considering carbon main tubes on bikes as inexpensive as £550 for 1990. The use of bonded tubes is something many custom and small manufacturers could very easily take on board.

Scot Nicol of Ibis Cycles, California, already has a three tube bonded carbon frame in production. His tubes are rolled to his own specification. Watching the construction of this and the similar Specialized Stumpjumper Epic has convinced me, that with a little push, custom builders in this country will soon begin to follow suit. Specialized's success in mass manufacturing the racing carbon Allez Epic in Taiwan strongly suggest similar frames will be available soon in mountain bike form.

Carbon composites, of course, lend themselves to use in monocoque - one piece - frames. Kestrel have been selling such frames for a while, although they admit the mountain bike model is less developed than their triathlon model. The problem with monocoque frames is that they require massively expensive moulds, and one for each frame size.

Hopefully, my own bike design, the Morrocan Roll, proved this kind of frame construction is ideally suited for small run production in cheap plastic moulds - by manufacturers of canoes and surfboards, for example. Another advantage would be the ability to adapt the damping or strength characteristics of each frame made. Monocoques will have a better chance when they are not restricted by the need to accommodate conventionally sized components. A good bet for the second half of the decade.

Steels will continue to be refined, but is there much further to go? May be there is, as Tange Prestige Concept and Columbus Max OR, have ably proved. Aluminium is looking a better bet for dramatic improvement in the capable hands of Klein and Cannondale. Klein has already bonded Boron fibre to the stays of his bikes for ultra-light reinforcement.

On the subject of bonding, using it as a method of joining tubes opens up many opportunities and closes just as many. Bonding tubes together means having to use pre-manufactured lugs, which have a fixed angle. Because these lugs often extend some way along the frame - because of the problems with transferring loads across dissimilar materials - they can make a bike heavier, even when lightweight tubes are employed. The use of fixed angle lugs is less of a problem nowadays, as I can't see frame angles altering dramatically in the future. Two piece pivoting lugs are not beyond anybody's capabilities and could be bonded into their final position, and so one set would suit all frame sizes and styles.

Judging by rave reviews, apart from enormously expensive titanium or monocoque machines, the most successful bikes recently have been made of mixed materials. The Fisher CR-7, Cunningham Mantis, and lately the Haro team Extreme and Nishiki Alien ACX are all constructed from aluminium with steel stays. The steel gives stiffness, the aluminium shock damping.

The Yeti C-26 uses carbon main tubes bonded into a one piece, computer bent, stay system. Special lugs were developed for it to keep the weight down to around 24lbs. So with Titanium and carbon monocoques providing the best ride, but more or less unsuitable for mass production, mixed material frames will become the mass production favourite.

Expect to see your new bike in 1992 and beyond, to have steel stays - possibly one piece bent - bonded into main tubes of aluminium, carbon fibre or MMCs. The move towards fat, straight forks will also open the way for them to be manufactured in aluminium or MMCs.

Finally, the question boils down as to elevate or not. One neat design has emerged leader so far, where the down tube runs straight through to the chainstays, with a separate tube bracing the bottom bracket. Although simple, it is not as simple as a standard frame. So watch out for specifically designed tubesets which will eliminate the need for separate bottom bracket bracing. Whether elevated stays will become the norm, I would hazard a guess and say yes, by about 1992.

COMPONENTS: FUTURE SHOCK.

A combination of guess work, the crystal ball approach and inside information has produced the following ideas.

Next year's Shimano groupsets will include 8 speed freehubs and low profile cantilever brakes. The 8 speed Hyperglide cluster will include improved upshifting, and will probably be the final fling of the conventional sprocket system in development terms.

The derailleur itself needs upgrading. I would like to see the tension arm attached to the underside of the chainstay. This would make the gear change far quicker and smoother, would prevent excessive chainslap and make the derailleur less vulnerable to damage. Other possibilities include electronic control via a solenoid and handle bar mounted push buttons. How about eliminating the spring tension for the down change and relying on a 'pull-pull' dual cable system?. By the second half of the decade we could be riding on hydraulically controlled expanding sprockets.

A massive revolution is probably about to hit the forward section of the transmission. A few people may have heard of the Shimano FM-5, an enclosed planetary gear system, giving five different ratios. Despite ▶

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denials, Shimano are field testing this product - originally designed for home market town bikes - at the moment. Greg Herbold used one to take second place in the Downhill at last year's World Championships. The FM-5 is truly compact (about the size of a 40 tooth chainwheel) and sealed against the elements. Will it arrive in 1992? In the meantime, the front derailleur should undergo a redesign. How about fitting sprung wheels in the middle of the cage, to allow the chain to keep running while the mech pushes it onto a larger cog?. The Browning electronic changer is a brillant system, but enclosed transmission could spell the end of the mulitple chainwheel.

For shifters, if the forthcoming Campagnolo twistgrip gear changers work as good as they look, Shimano might change direction altogether. They are likely to redesign the underbar shifters for the 1991 season after a generally ambivalent response from the press and public.

The Deore cantilever is showing its age now, and will be replaced. Although a low profile system is planned, Shimano would do well to include some form of mechanical advantage. They could do a lot worse to consider Weinnman's brilliant PBS brake. This small cylindrical unit could be accommodated within the width of the frame tubes and has a massive mechanical advantage of 4:1 (normal brakes are 1:1).

Further into the future, hydraulics look set to take centre stage. Whether we can convince the California led components industry to adopt centre wheel braking, is another matter. However hydraulics will gradually become prevalent, and various experimental disc brakes are showing up all the time.

Triathlon style bars will become more popular, especially if marathon off-road races such as the US Desert To The Sea 150 miler, become popular. Shimano is currently working to overcome the biggest problem associated with these bars by developing a dual control system for the transmission and brakes. The Metal Matrix Composites previously mentioned, will soon find their way into rims. Specialized have already produced prototype models, DX-23. In an unspoked state these were impossible to deflect. These incredibly strong rims will lead to 28 spoke wheels being the norm for competition bikes. A pedal cleat system which does not rely on a protrusion on the sole of the shoe should be another innovation for the early 90's.

Finally, suspension. Well it's only a question of patience before lightweight damping systems are fitted to top of the range bikes. A number are likely to appear as early as next year, though one leading industry figure was heard to comment that 'the marketing men want them on the bikes before we're ready'.

Based on this I have produced two speculative drawings of bikes for the '90s.

DRAWING ONE: This is based on a frame of carbon main tubes, steel stays and MMC forks, bonded together with adjustable lugs. The front forks incorporate a mini damping system, as does the rear end, which is enclosed within the wishbone (the stays form a hinge with the cast bottom bracket shell).The wheels are based around 28 spoked MMC rims. The front brake is a double sided mini-disc with cable operated units (the front rim has no braking surface, to save weight). The rear brake is similar but rim acting. The bike has Tri-style bars and dual controls. The seat post quick release is operated remotely by a lever mounted on the handle bars. A rear lamp is mounted on the seatpost, which contains rechargeable batteries to power it. The front derailleur has a wheel to keep the chain running while making a change. The armless rear derailluer makes for quicker smoother changes and is less vulnerable to damage. The tensioning arm on the stay reduces chainslap and increases wraparound on the block. Saddle rails have been replaced as the head of the seat post slides straight into a coupling moulded as part of the saddle structure. The last vestiges of the road bike disappear as the front hub spacing becomes wider and the pedal thread fatter. A bike for 1992?

Simply forward mounting the seat post release lets riders quickly adjust saddle height.

DRAWING TWO: This illustration shows a monocoque frameset - constructed in the UK - with a damping rear stay section, and ultra stiff, wide section MMC fork blades, offset by the front end damping system. The hydraulic damping system is connected front and rear by a tube inside the frame. The wheels are made of composite materials and include a hydraulic double sided disc at the front and single sided at the rear. The transmission consists of a six speed planetary unit at the front and a stepless expanding rear sprocket. This allows the used of a toothed belt in place of a chain. A bike for 1996? Neither of these proposals are inconceivable, as the technology exists now.

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