



EMPIRE API



Craig Robertson and Chris Williams are two men on a mission, one of bringing proven technology from the motorbike and car world into mountain biking. There was an important word in that last sentence, it was 'proven'. Now for some reason there seems to have been a whole load of people on forums and the like saying that trying to cast a bike is pointless, it's just going to snap. The thing is though that they're talking out of their arses, if done correctly there's no reason why a cast part can't be as good, if not better, than any part produced using other production methods. If this wasn't the case then surely the likes of KTM etc wouldn't be casting the swingarms of their motorbikes, and surely our fork lowers would be breaking every five seconds. The point is that countless multi-million pound companies are switching over to casting for numerous products, resulting in rapid technological improvements, and Empire are keen to utilise this technology within a bicycle.

Despite being around since the bronze age casting has come on leaps and bounds (both in terms of processes and alloys) in recent years, with the automotive industry playing a large part in that development. Precision high strength castings are already relatively common place in a whole number of applications, but now you can add bike frames to that list. It hasn't been an easy process though for Empire, after coming up with the idea of a cast bike in the summer of '05 they then had to find somebody who was willing to make it. It wasn't until just over a year ago when they finally got a prototype made, but even then there was still a whole load of work to be done. Turning a prototype into something that is suitable for production is never easy, but then having a prototype meant that a casting company who previously weren't interested in taking on the job, suddenly were. This new company not only offered first class sand casting, they also offered other services that they needed like X-ray inspection in house, which greatly simplified the logistics of getting this bike made. The end result is that by the time you read this the first 20 or so frames should be ready for sale. It's worth pointing out at this stage that although Empire might strictly be described as a two-man band, the experience and knowledge that they are working with can be easily equated to that which you'll find at even the biggest bike manufacturers.

So, what's the point though in making an aluminium cast bike? Well, the cynical viewpoint is that it's just a good way of creating a 'unique selling point', but the reality is that it does have the potential to be both lighter and stronger than bikes produced in a more conventional manner. One of the main reasons for this is that with casting you have more control over where you put the material, for example if you have a hollow section the internal shape can be completely different to the external shape. The possibilities are almost endless, but tooling design is crucial as achieving a perfect flow of material and even cooling is paramount. It's difficult though to produce very thin sections because of the problems with flow, but Empire get around this by machining away excess after the casting. For example the rear end loses half its weight during machining. Another benefit of casting is that you obviously don't have to have any welds with their associated problems. This entire bike is just made up of three pieces (front end, seat tower, and swingarm) which simply bolt together, even the cable routing is inbuilt.

I said in the last paragraph that casting provides the potential for a lighter bike, but the thing is that Craig and Chris are all too aware that there's a huge line of people waiting to shoot them down if a bike breaks, and if those people got to pull the trigger that would bury the technology in the bike world for good. So, for this first offering they openly admit that they've completely overbuilt it, and yet they've still ended up with a frame that is in the same ballpark weight wise as your average DH frame. The next version will undoubtedly shed a

load of weight, but there are much bigger plans than just weight saving. Like me Craig is a firm believer that gearbox's have a big part to play in the future of our sport (once they're truly sorted) and he believes that a cast bike offers a far better integration of that technology, and so producing a gearbox bike is at the top of his list of things to do. Another possible future development may be the switch to a magnesium alloy rather than an aluminium one as this would immediately give a weight saving somewhere in the region of 40%, but the tooling costs involved are bigger than their wallet will currently allow.

Anyway, enough of how and why this bike is cast, what about the rest of it? There are a couple of major points to consider, the first of which is Craig's obsession with geometry and handling. He believes, and quite rightly so, that correct geometry for the job in hand is paramount, but he also acknowledges the importance of the sprung to un-sprung mass ratio in the way in which a bike handles, and its performance over rough ground. He's spent a large proportion of the time designing this bike getting it to what he believes to be 'spot on'. The next point to consider is the suspension with its high pivot point which produces a rearward axle path. This is again something which they believe is vitally important as it stops the bike stalling on square edged impacts. To get around the pedalling problems associated with the high pivot point they've gone down the route of the simple but highly effective idler wheel that we've seen before on some other designs.

Because of their MX background both Craig and Chris wanted to make sure that this bike was as maintenance free as possible, in particular the pivot bearings. So, somewhat logically they've effectively just made a mini version of an MX bike pivot complete with a full compliment needle roller bearing and twin seals. This thing is capable of taking immense loads and it's been designed to be jet washer proof. If only everyone made pivots like this. You'll also notice that there aren't any options when it comes to mounting the shock, the reason being that after extensive testing they found the optimum position and it makes little sense for you to be able to run the shock in a less effective position. The only adjustment that you get with the Empire is the ability to alter the length of the rear end (three different settings). This was a little fiddly to do on the bike that we had thanks to some slightly over precise engineering which made the toothed adjuster blocks a tight fit, but this problem has been addressed for the final production version.

There are a few other nice little touches which are worthy of a mention, firstly the neat integrated fork bump stops, secondly the inclusion of a Ti spring in the spec, and finally the rear hub arrangement which takes a standard 135mm hub but thanks to the brake spacer the rim is laced up offset which results in a stronger rear wheel. The only thing that that I'm not particularly keen on is the cable routing at the front end, it's just that both the gear cable and brake hose are placed right on the outside of one of the 'ribs' where they're just screaming out to be crushed in the event of a crash. It wouldn't be hard though to sort this out with a bit of DIY ingenuity.

I think my conclusion about this bike would be that if you want a bike that's designed and made in the UK, is most definitely that little bit different, and works well, then this is the bike for you. The thing that excites me most about this bike though is its future potential. On their first attempt at producing a cast bike Empire have managed to make a bike that can hold its head high in a highly competitive market, and yet unlike most other companies, which if the truth be told can only offer minor improvements from year to year, I really believe that with casting Empire have the capability of bringing us some further special creations in the not too distant future.

THE RIDE: EMPIRE SHOWS ITS AUTHORITY

With no surfeit of marketing to dodge the Empire was a simple task, after all, on the outside it is a bike based around very straightforward ideas. And yet like any other bike it's only when you swing a leg over that the real story begins. True, the precision sand cast aluminium frame does have an effect on the performance, but lets leave that for a minute, lets take a look at the very basics of this bike, the fundamental features that many others continue to get staggeringly way out, and vitally the effect these have on handling and performance.

FRAME GEOMETRY DETAIL: Head angle of 65° is a pretty standard measurement but it's how it is used in conjunction with the other dimensions that counts. Shade under 14" BB; shade under 46" WB of which an average of 17.5" (depending on position) is rear of the BB. Having spent years and years on various tracks and a wide range of bikes these are the figures that have been agonised over. As Robertson points out "I reckon it took 10 years of research to get those figures, then probably eighteen months of hard thinking. Production technique was only fifty percent of what Empire was going to be. To make the changes to tooling would have been very expensive, it forces you to question your own preferences."

Without doubt the geometry goes hand in hand with the suspension design on this bike plus the manufacturing technique, but Craig is keen to point out that he wants people to enjoy Empire for its geometry if not casting.

Having ridden the prototype just over a year ago the subtle changes that have taken place come as no surprise. This is version two and it's pretty much bang on. Craig continues, "I really don't feel a need to do a third one. We expected to not get everything correct first time. We were truly stoked that we seemed to have nailed it at that point. Proto to tooling was one degree slacker on head angle plus an eighth on BB".

CHASSIS DESIGN: This turned out to be a key feature of the Empire and later in the day we spent considerable time analysing the performance of this bike over that of some current theories. With some companies designing chassis over their chosen suspension linkage and not around the effect of the rider, which is THE critical component, many riders are forced into positions of overcompensation due to unstable chassis. "All the stats need to gel to put the rider in the right place", says Craig. "The motocross attack position is good for good reason, it's been analysed and the riders have a good neutral static position, the rider is able to change position quickly. A rider is able to maximise front and rear suspension because both tyres are weighted equally. If proof is needed that this position works look at Sam Hill, he is able to move a bike with a light touch, it's an efficient riding position and doesn't unsettle the chassis."

Such stability is of course vital, and in the Empire they have something very special, but there is an element of thorough suspension set up at work here too.

SINGLE PIVOT/PIVOT PLACEMENT: With almost half the top ten elite at the opening national race riding single pivot bikes there is still a big following in this school of thought. But surely this is not a design Robertson has been linked to very much previously? "I've never really ridden single pivot bikes a great deal. I am synonymous with the acclaimed linkage bikes. However when I assessed load transfer of bump to wheel to shock absorber I saw how a SP is capable of equalling the performance of multi link but with the advantage of weight, strength and maintenance." Interestingly the Empire has a slightly higher pivot than normal to give the desired axle path and hence utilises a chain idler to aid pedalling.

AXLE PATH: Obviously this depends on shape of bump but it is backwards. To factor in exactly the extent this has on the handling of the Empire would require a bike made identical apart from that variable. Difficult to pin down but it gets the nod because there is no doubt certain non-rearward designs tend to stall on certain hits. Theoretically it absorbs force in best possible way – I'm almost convinced...nearly.

SILENCE: Of this I am completely sold. How many times have you heard it, how seldom is it a feature of production bikes? This bike is as quiet if not quieter than any production bike I've ridden and unlike Hill's Horse (which has been agonisingly silenced) the Empire comes with a seal of silence as standard.

EMPIRE – ON THE MOUNTAIN

As I was to find out it is very difficult to fault this bike. To pin down some weak points I would focus attention on the unnecessary chainstay adjustability, I feel they could have made a firm decision on this, stuck to it and also had a simpler wheel removal process.

Weight wise, it could come down a couple of pounds to the 40lb mark but its pretty much an average figure. So with nothing else to report what really sets it apart from its rivals?

FAMILIARITY: Needs no explanation.

STABILITY: On cruel unrelenting conditions such as San Remo the hallmark stable chassis played a big part in lessening tiredness. Part suspension set up/part frame design.

MANOEUVRABLE: Not as light as some skinny 38 pounders currently kicking about but very much a fun bike to ride. Marginally less manoeuvrable than an Orange 224 it is still very, very good when you consider how incredibly strong it is when the going gets really difficult. I feel the very slight hesitancy in picking the bike up is partly a result of rearward axle plus suspension set up. However, when compared to multi link bikes that trade off their ability in tough places it's in a different league.

SUSPENSION: After much research this bike is stunningly set up. The best Fox shock and fork I have ever ridden simply because it has been designed for the bike in hand. After initial problems of blowing through its travel due to the design working in partnership with Mojo they have come up trumps (we also switched to the BoXXer and Cane Creek as an alternative set-up and were equally impressed).

WEIGHT DISTRIBUTION/BALANCE POINT: Faultless

CARRYING SPEED: It could be the axle path but his bike accelerates through hard terrain.

CHANGES TO GEOMETRY: Barely noticeable. The rider remains in a neutral position.

NOISE: What noise?

ENERGY ABSORPTION: The telling factor. You don't feel so affected by the energy being transferred from the ground up through the chassis as you would on a conventional hollow tube aluminium frame.

CONCLUSION

Without question I had felt a certain freedom testing this bike, almost devoid of contamination if you like from hype. It has been Robertson and Williams's project to create something complete in its performance, for Craig I feel he was been almost impelled into this action because of what he was seeing from other companies.

For whatever reasons the Empire isolates the rider from ground forces much more than traditional hollow tubed aluminium varieties. The benefit of this is less rider fatigue and more control. How it could be this way maybe due to two factors. Either the energy is dissipated in the frame because of its material composition or because of its shape and form. Suspension and tyres? Whilst the first set of Fox suspension performed better than any other we have tested the feeling was similar when we fitted RockShox and Cane Creek. Tubeless tyres were fitted before they holed and even with tubed versions the feeling was almost identical.

There is no faffing with the Empire because so many variables have been removed from the make up. The mix is right. In the real tough places this bike performs better than any other production bike I have ridden. The reason for this? Be guessing but, common sense would tell you that material composition as well as design and form (eg I beam shape as opposed to a tube) will produce different notes, pinpointing the elements that contribute to 'feel' in a bike frame is a massive question way beyond the boundaries of this test. Honda and Yamaha take years researching the same question. The Empire is comfortable and quiet and generates confidence and that's a good thing. Everywhere else it carries speed as well as any other bike. Ultimately it has a very different nature to a welded bike, and having become so used to a bit of flex that you might ache for a bit of hollow tube action. Those are the facts. The choice is yours.

Steve Jones

Price: £2100 (with a Fox or Marzocchi shock), £2400 (Cane Creek Double Barrel). All frames come complete with chain device and a Cane Creek zero stack headset. Sizes: Currently only one, but a larger one should be available sometime soon. Info@empire-cycles.com www.empire-cycles.com

