

**BOB BARNETT'S** experience in imagining, creating, developing, producing, wrenching and selling high-quality gear is stuff of legend. Whether it's in the high dollar worlds of aerospace and off-shore power boat racing, or the grit of motocross and mountain biking, one thing is for certain, Barnett has left a trail of components that are either new inventions or refinements to something that was already there. Now he is venturing into the world of road bikes with a set of calipers called Feather Brakes. Like with anything that moves, Barnett wasn't content with how current brake calipers worked, so he set out to make his own that would stop on par, or close to, the disc brakes on his mountain bike. In an industry that has somewhere in the range of 15 or so different companies making or branding brake calipers, it's going to be a struggle to reach the masses, but Barnett is used to this battle and he is convinced that the quality of his product will speak for itself. Barnett is that guy we don't see: the machinist, the dreamer, the doer who writes down ideas in the middle of the night, has a mind that is constantly racing and the knowledge and know-how to make a scribble on a napkin become a truly great product. If this were the post-war years of the 1940s and 1950s, it's likely Barnett would be working for Bell Labs during the day and tweaking his old Indian motorcycle at night to squeeze out a few extra horsepower or make the suspension a bit tighter.



# man behind the feather

## How did you get into “tinkering” with things?

When I was a kid my neighbor was always building stuff. Making street bikes into dirt bikes, building boat trailers, and rebuilding boats. So then I got a good idea, a first hand knowledge on how to make things. The thought process from start to finish and what you had to do to get the end result, as well as how to make something better than what you had to start with. My dad taught me aerodynamics and aircraft design at a young age from his experience flying in World War-II. This also helped later with designing other stuff.

## What were some of the early things you started tooling with?

The early stuff was like taking lawn mower engines, mini bikes, or go-karts and trying to Hot-Rod them and get a little more performance out of them. Basically, anything with an engine in it, or anything with wheels on it. My buddies and I didn't

start BMX, but we were of the age of all the guys that did start BMX. All the guys that were around when the Schwinn Stingray came out were the generation that started BMX.

**You must have always been taking stuff apart, right?** I was always taking stuff apart! My parents would always say, 'You'll never get that back together. Why did you take it apart in the first place?' I would say 'I want to see how it works.' Of course, when I was really young I wasn't as successful at putting the stuff back together but as I got older, about 6 or 7, I could pretty much fix anything around the house.

**You must have been doing some crazy “DaVinci” type drawings.** No not really. When I was a kid I was pretty much normal. I didn't have any good designs or any ideas then, but I did do some “Frankenstein” stuff like putting different wheels or

different forks on different bikes to see what the end result was, but none of that stuff really did anything. I would also cut forks, make them shorter or put two sets together and make them longer. It was just fun stuff to do as a kid.

**Did you have any cool tools as a kid?** Well it was my 12th birthday and I asked my folks for a dye grinder and a degree wheel and they no idea what any of that stuff was let alone what a 12-year-old boy was going to with this stuff. The degree wheel is for timing your crankshaft so you know where to mark your cylinder ports and the dye grinder is the tool to grind out the ports to make them bigger. I wanted to make my Yamaha 80 go faster. Sure enough, the thing went a lot faster. I cut the rotary valve and then I ported the cylinder and the thing went from like 5 horsepower to 8 or 9. It was amazing how much performance increase I got.

**In high school, did you have cars that you messed with, or were you toying with your friends' gear like bikes, etc?** I was like the fix-it guy in the neighborhood. If anybody had a problem with their car or lawnmower or some electrical thing, they would bring it over to me and I would rebuild it for them or figure out what was wrong with it and either fix it or tell them it was junk and to start over again. It was valuable because I learned a lot of the skills I have now though the stuff then was non-critical. The stuff I do now and especially the times when I was working on Indy cars where you sent someone out to do 240 miles-per-hour... That stuff has to be perfect and nothing can be out of place. The same with the work I did with offshore powerboats; that stuff was also pretty critical.

**Tell us about the off-shore powerboat years.** Well my neighbor was working on cabin cruisers doing the routine maintenance, and so in high school I saw that maybe I could do the same thing to support my college "habit" or whatever. So I got into working on boats and one thing led to another and after about a year and a half I ended up working on all of the high performance boats in the harbor. So I built up a good reputation because the owners of these boats would hang out at the bars and say 'Well my guy is doing this, and my guy's doing that', and eventually word spread and the next thing you know the top race team in the world (KAAMA Racing) contacted me and hired me. For 4 years I was on the road spinning the wrenches.

**What was your educational background like?** I was going to school to learn CNC programming and manufacturing because I knew I liked to make things and that was going to be my future. Instead of putting other people's parts together, I wanted to make my own parts whether it was airplane parts that I would get paid for, or coming up with my own products, if that's what it took.

**Back in the day, how primitive was the computer technology?** It was pretty primitive because back then to get a decent system it was \$250,000 to \$500,000. The stuff I could use at the college was at that level, but out in industry nobody had the high-end CAD technology. You were lucky to pay \$12,000 to \$20,000 for a very simple two-dimensional software package, which is where I started. Every dollar that I made I put back into software and equipment to help grow the business to where someday I could get to do all the high-end aerospace stuff, which is eventually what I evolved into. I did military and satellite parts, nuclear submarine stuff. I had to go through all this clearance stuff to get all the military parts.

**What type of aerospace stuff were you making?** I was just making other people's parts, but that's where I learned how to put radius's in the corners, how to put angles for triangulation for strength, and I learned a lot about seal technology and hydraulics.

**What's the relationship between aerospace and the bicycling industry?** In aerospace you see design. Someone really smart has already put



that particular piece through stress analysis on the computer and figured out the lightest, strongest way to make that part. By looking at all these blueprints and creating all these things and staring at all these parts over the years it starts sinking in. Start thinking about where you put radius's, and how things angulate together. It's helped with my ability to look at something the first time and see if someone else's product may be designed wrong or know right off the bat how to throw something together the first time.

**What was next after aerospace?** After aerospace stuff started drying up, my interest in mountain biking was growing and I realized that some of the equipment out there wasn't up to par. So I started working on some of my own projects such as the bicycle chain guide and the longer travel suspension.

**Where did the chain guide idea come from?** Well I was riding down the hill on an AMP Research mountain bike (he was making a lot of the prototype parts for them at the time) that they loaned to me to kind of get a feel of what the mountain bike industry was like and I noticed that the chain was always coming off. I wondered why it kept coming off. I thought maybe something was wrong but soon discovered that it's just the way the bikes are because the rear derailleur goes back and forth as you are going over bumps. So one

day I was looking at my drill press as I was drilling holes and noticed that the drill press has a guard that keeps the belt on, so I made the same kind of thing for the mountain bike and it worked out pretty good. What it did for me was it proved to me that if I tackle a problem with full force, I can come up with a solution.

**And today the chain guide is a necessity for most of the big mountain bikes, right?** You have to have some sort of chain guide on a mountain bike, in particular a downhill bike. I think in cross-country you really do need one, but it gets complicated because there are so many different chain ring combinations and bottom bracket offset lengths that it's almost impossible to make one product fit on everything. It never truly caught on because you had to assemble it. There was one thing by Bullet Brothers where you just loosened up your axle, put the plate on and it had a spring that pulled back on your derailleur. It was as hillbilly as you could get, but it "sort of did the job." It made it really hard to shift and it was essentially just a Band-Aid. My product didn't affect the shifting, was lightweight but was hard to install with all the different chain ring combinations.

The chain guide got me into working on the forks because that was the next weak link. With the chain guide on, you can pedal and be a little bit more aggressive, but then I am going at speeds where the

forks couldn't handle the pace I wanted to go without putting me on the ground. That's when I started the PBF Suspension fork.

**Was it your design or did you base it off some other suspension fork?** It was mine. I knew I wanted to go upside down because that's stronger and I could make a lighter configuration by doing so. I went through 4 variations of the fork before I had a full production model. Actually I was on the third generation when I was at the Cactus Cup in 1993, when Rock Shox introduced the Judy fork with like two and a half inches of travel. They thought they were cracking it out of the park. I was there at the same time with my four inch fork thinking 'You guys think that thing's cool? Look at this!' It wasn't well-received because I wasn't a mountain bike guy, so nobody knew who I was. Other stuff was going on and I was just lost in the mix.

**Eventually, how did it all play out?** Well it was the only upside down suspension fork and Dave Turner was a pretty well-known guy in the industry and suddenly people started looking at what we were doing. Then came Mammoth and people were trying the stuff out because it was strong. You needed to have steerage going the down the mountain at 50 miles-per-hour and my fork was the strongest fork on the market so guys started using my fork because of that strength. With the forks allowing the guys to go faster, then they needed a better chain guide. That's when guys started using different bikes for different events or disciplines. Then in 1996 we came out with the Fat fork, which went from a 1-inch diameter inner tube to 1 1/8. In tubing if you double the diameter it increases 4 times the strength, so by just going a little bit bigger on the tube size it increased the strength quite a bit. The first fork ran out of travel with 4 inches and as frames progressed, I needed to make a fork that would be compatible with the future generations. Originally the Fat fork had only 4 inches of travel as it was the same upper tubes. But I just put spacers in there and used shorter springs. Then the frames caught up to 6, then I just took the neck out and put another spring in. It didn't matter what the travel was, it would dampen the entire range anyway. It was originally designed as an 8-inch fork. I was just waiting for the industry to catch up. I didn't know if they would ever get there, but I got tired of waiting and re-engineering forks and then have to re-do it 6 months later.

**Where did the motocross stuff come in?** Ever since I was a 4-year-old I have been riding bikes or whatever had an engine in it. And later on it started with Lisa Sher (2002 NORBA National Downhill Champion). I had my own products and she needed some help so I helped her out with some chain guides and then some forks and then she started getting some pretty good results. Then she got a Kawasaki KX-250 that she would ride up in the Tahoe area where she was living at the time. She wanted to continue riding so we went riding and the first couple of times we went out and she was fighting the bike. It was too powerful for her, way too big, wasn't set up right, so I convinced her to get a 125 (cc). So she got a Pro Circuit replica, but she had real

tiny fingers and I have real big hands so I was always bending my levers out for me, and in closer for her. Since I'm a machinist, I figured I could make something that's adjustable for the both of us, and I didn't realize that the folding action of it would actually evolve into something. One thing led to another and I was trying to get the factory race teams to use it. They looked at it, thought it was interesting but they didn't really want to bite at it. Then at Factory Honda Sebastien Tortelli was the 1997-98 World Champion, and in 2000 he hosted a ride forum for Honda and he said 'I want a lever that's way out there. These things are too close to the handlebar!' I gave my products to all the teams and eventually the guys at Factory Honda said 'Well we got this funky lever from Bob the hippie... Let's try that on there.' And Tortelli says 'Yeah, that's what I want. Something way out there.' That was my first taste of factory sponsorship of getting on with Team Honda. Then I came up with the ball-bearing brakes so that at the contact point it had a smoother feel and better modulation. When I showed all the teams that, Roger DeCoster of Team Suzuki was the first guy to recognize that it was a technical advantage. He said to me 'If you can get a cover on that to match what we've got, then you can be a part of the team next year.' So I showed up with the right gear and that started the relationship that I had with Suzuki that lasted for another 5 years.

**You had some big names using your stuff.** At the start was Tortelli, then guys like Travis Pastrana, Brandon Justman (East Coast 125cc champ), down to anybody who is anybody in the industry like Gary Bailey. David Bailey used some go-kart stuff we created, and today, James "Bubba" Stewart is the top guy using our gear. Ricky Carmichael never used our products, but I made a lot of parts for his bike. I am still doing a bunch of motocross stuff to this day. Right now I am sizing up who I am going to support for next year.

### **Guys like Ricky Carmichael and James "Bubba" Stewart all cross-train on road bikes.**

Yeah they train on the road and I have always ridden mountain bikes, but I never really got into road bikes until recently when I got tendonitis in my arms from racing and in order to let that recover, I had to take time off the bike. But I still needed something to fill in that gap of high-energy, intense training and I found that mountain biking wasn't cuttin' it any more because I would ride for a while and then I would have a technical section, then ride and then technical section again, and on and on. With road bikes, the guys at Kawasaki ride every Tuesday and Thursday and they would try and get me to come out and ride and get me into it. So I thought while working on the development of this brake, that it was good timing to get back into a different type of cycling and try something different and be able to obviously have firsthand knowledge of how the brakes worked. Road guys are real technical and when someone calls I have to have the right answer for them. I have to give qualitative answers. That's something I have always done. I have always gotten to the bottom of things as to why something does or doesn't work.

### **So you weren't happy with the braking aspect of a road bike?**

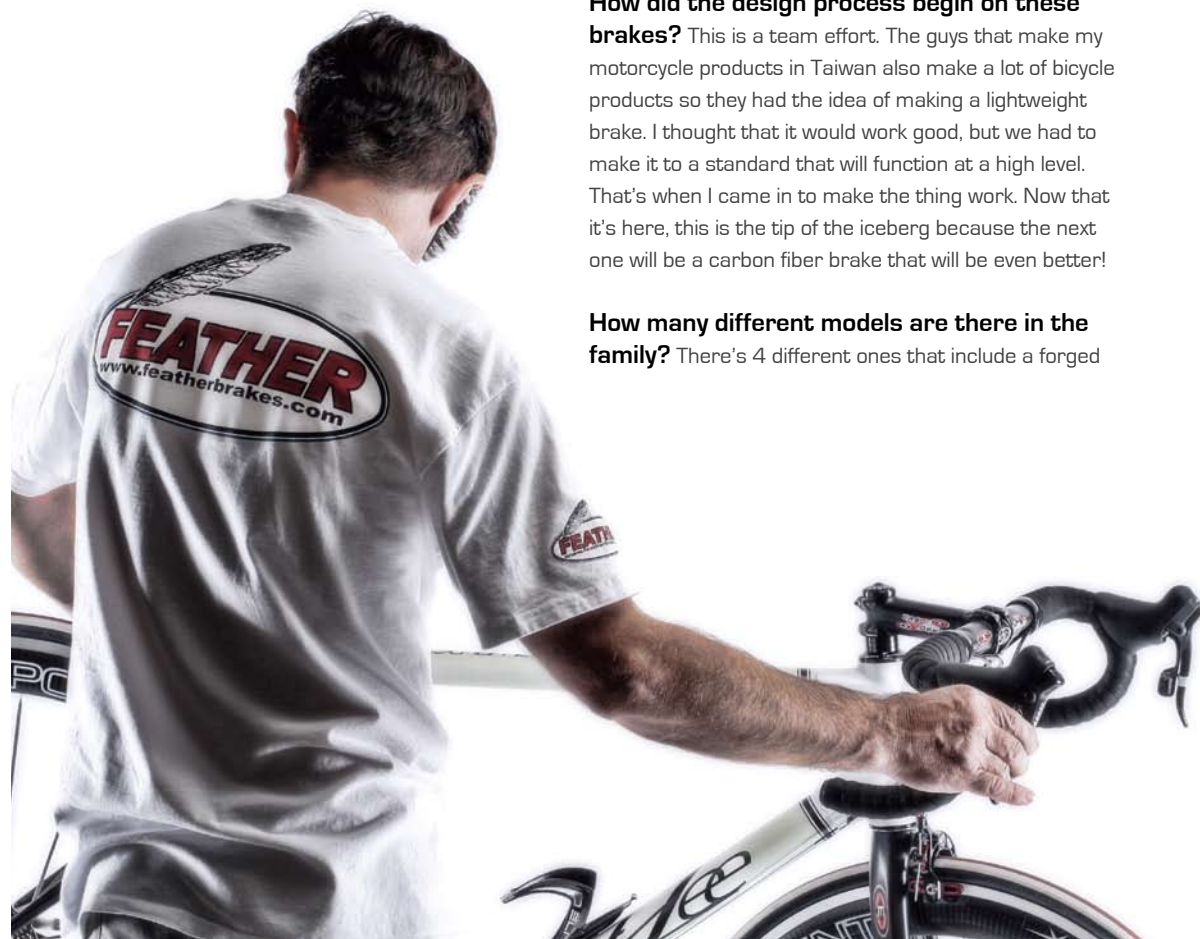
I wasn't happy because it was too mushy and just not enough there compared to the disc brakes on my mountain bike, and I knew something could be improved. So I sought to achieve similar power as a disc but with less weight. They are already making it light; that's easy to do. For example, if you have a golf ball size of material to make a brake out of and you have a ribbon of foil coming down each side to hold the pad, you have the metal there but the foil isn't strong enough to do the job. It's a good example of how the metal has been put in the wrong place. I think that this is where some of my competitors in the high-end brake business are missing it.

### **How did the design process begin on these brakes?**

This is a team effort. The guys that make my motorcycle products in Taiwan also make a lot of bicycle products so they had the idea of making a lightweight brake. I thought that it would work good, but we had to make it to a standard that will function at a high level. That's when I came in to make the thing work. Now that it's here, this is the tip of the iceberg because the next one will be a carbon fiber brake that will be even better!

### **How many different models are there in the family?**

There's 4 different ones that include a forged





straight arm that's like low OEM specification, there's a forged offset arm that's mid-range OEM, then there's the CNC'd straight arm that is nice aftermarket, and the Feather that is a CNC'd offset arm, all-exclusive titanium. It's the one with all the "bells and whistles."

**Some people may look at the brakes and think 'Where are these made? Is he just putting his name on a brake that's already been made, etc?'** I got to a point where I couldn't make my motorcycle products fast enough in my shop to supply people around the globe, so I had to start outsourcing the manufacturing. For 3 years I scoured the floor at Interbike trying to find somebody to make my stuff. If you want to make something cost-effective, you don't go to the aerospace or medical industry, you go the bicycle industry instead. I finally found the guys who I felt comfortable with and trusted them to make my motorcycle products to the high standard that I demanded. At the same time, they are involved with supplying many of the major bicycle brands with all the bits and trinkets that puts the bike together. They don't make the cranks or wheel sets, but they'll make the screws that go into the crank, or the spoke nipples, or the carbon spacers. So basically they are tied in to just about all the bicycle companies in some way or another.

**Have you always ridden bikes?** I have always ridden bikes. For years it was me and the homeless dudes keeping the dust off, but now it is like the 405 Freeway at rush hour with bikes since the price of gas has Americans rethinking their choice of transportation.

**What's another product on the road bike that you see could be refined or updated?** Well since they've been working on these things for 100 years with a lot of smart guys working on attention to detail like a hub or a crank or overall aerodynamics of a stem or something, I don't have a lot left to give. I want to specialize in one thing [brakes]. One thing that gets me

when I am riding my bike [a Felt F3] is that I would like to have some type of suspension on the seat or in the seat post. Something that could absorb the shock but then comes back slowly. Perhaps it's some type of deadening member in the seat or seat post. Or a suspension seat post like on a mountain bike but obviously done in a light way. You can't have a 10 pound bike and a 10 pound seat post! Maybe just use some rubber and some friction so that it allows the seat to move, but have a one-way friction deal on it. Maybe a little gadget that is at the rear of the seat or something that goes one way fast but slow the other.

**What's the ultimate, must-have tool for you?** It's my Pocket Leatherman because it has and does everything. It has scissors, tweezers, tiny screwdrivers and most of the time when you get in trouble somewhere, say like the airport and you need to cut a tag off or you need to scrape something out of a hole or tighten a screw... It will handle the job!

**Because you are who you are, you must think of ways to refine the Leatherman.** Yeah, I suppose I could put some bearings somewhere so it has less play or something.

**In your shop, what is the one tool you cannot live without?** I must have a CNC mill and my software because I can make anything with the CNC mill. Like a wood worker has to have chisels and the type of wood he likes to work with, for me it's aluminum and a CNC machine.

*Barnett has the equivalent of a two-and-a-half car garage storage shed that houses 17 motorcycles with the crown jewel being the 1947 Indian Chief that his uncle gave to him. His uncle bought it in May of 1948 when he got out of the military, and proceeded to "Hot Rod" the bike, so it's not the world's fastest Indian, but Barnett believes it's the second fastest. He took the "lawnmower-style" carburetor that was on the thing and turned it into basically a motocross type carb where it has the high- and low-speed circuit independent of each other and each is adjustable, and along with that it has an accelerator pump. Basically, it's a modern day carburetor that he made out of a tractor part. Barnett says that if you get on it hard enough it will snap the chain. Another area is a bicycle room where he houses all the bikes that he's had since the age of 16. He wishes he still had some of the Schwinn Stingrays he had as a kid. Those were modified, of course, with a cross bar spanning the traditional ape-hanger bar and other refinements. At the time, these bikes were limited and so that spawned the BMX scene. All the sudden, you could get aftermarket gear for your Stingray such as wheels and cranks and handlebars.*

*Barnett's main modes of transportation include a 2001 Turner Burner cross-country mountain bike; a 2007 Giant Anthem that he pieced together from parts he found in those mysterious cardboard boxes deep in the bowels of various bike shops. He turned it into a city bike with lights and luggage racks; and a 2008 Felt F3 road bike that is his primary brake test machine.*

*Check out the Feather Brakes on page 44.*

