

The Miata Suspension - A Quest for Truth

Shaikh J. Ahmad,
CEO/Founder



"Where Innovation Drives Us!"



Presentation Overview

- Introduction
- Three short reviews from happy customers!
- The secret to suspension tuning
- Awards and distinctions
- History and philosophy
- The FCM Approach - How we can help you!
- Success stories
 - Doug C. - installation and driving impressions
 - John S. - compares FCM custom coilovers to others
- New FCM products (external reservoir, etc.)



Who am I and Why am I here?

- Fat Cat Motorsports (FCM) was the 'fictitious' sponsor I invented at my very first autocross event in '97
- I am a fellow Miata enthusiast, trained in science, passionate about music, nature and helping others, possessed by an insatiable

NEED to KNOW the TRUTH!

- To put my broad expertise to use in helping you make the best suspension buying decisions

*“We come to see the true nature of things
by seeing through the illusory nature of things”*

FCM – A few customer reviews

Rennkafer

Second gear

Join Date: Jun 2008
Location: Hayward, CA
Posts: 155

And yet another satisfied customer... I've had mine on about 6 months now and LOVE the suspension (550/350 FCM adjustables, FM 1" front bar and stock 11mm rear, 15x9 6ULs w/225/45 RS3's)

I get to drive a lot of interesting cars for work... like Ferrari/McLaren/Lamborghini interesting... and the FCM pieces are as top notch as anything supplied by those OEMs.

Bill J

'97 Miata STO, '67 International Travelall, Lotus Super 7 replica in progress (ad infinitum)



16th January 2010, 00:20

#10

Mazdajg94

Fourth gear

Join Date: Jan 2005
Location: Phoenix
Posts: 1,243

I also took the FCM plunge last year. Love my car now. 100% better in every way over the FM spring setup I had. Now at 13" F and 13.50" R.

For me, it's perfect. I keep kicking myself I didn't go this route the first time. Thanks Shaikh again for your help and great product.



15th January 2010, 07:34

#9

Bob Boyer

Fourth gear

Join Date: Nov 2003
Location: Chattanooga, TN
Posts: 1,125

Not that there's a damn bit of science in the comparison but late last fall on a nice warm Saturday, some friends of mine (one who has co-driven with me) who also own Miatas but are single and can afford other interesting vehicles as well took an **Elise**, my FCM'd Miata and a C5 Corvette out for some comparison driving.

After all was said and done (and it was fun) we came to a couple of conclusions. First, we needed to win the lottery so we could own one of each. Second, the Corvette didn't feel nearly as big as we had been led to believe. In fact, it's quite nimble for what it is. Third, and most important, even though in the Lotus I could scoot through turns driving one-handed that left my Miata panting, the FCM coilovers were rated by all of us as perhaps the finest dual-purpose suspension any of us have ever driven. And there's been some seat time in some good Porsches between us, as well.

I've been impressed with these FCM coilovers from the first drive. My friends were astounded.



FCM – The Secret To Suspensions

- At most, you've got 4 strips of rubber keeping you connected to the ground. Keep this in mind at all times when considering how a change will affect that tire/ground interface.
- An optimized suspension will take into account how each suspension components affects the vehicle in acceleration, braking, cornering, over rough terrain (even race tracks have berms) and especially at the limit of adhesion when encountering any combination these at the same time.
- **THREE KEY WORDS** to keep in mind when evaluating any suspension

FCM Awards and Distinctions



- 1996/1997 – Winner, “Achievement Rewards for College Scientists” Scholarship
- 1997 – Graduated San Jose State University (cum laude), B.S. Physics, minor Math
- 4/05 – First TTOD ever, Lockheed Sports Car Club.
- 9/10, 9/18/05 – TTOD, back to back weekends, Lotus Club and Lockheed
- 2005 Lockheed Class champion (vs S2000, 350Z, etc.)
- 2/06 – 2nd place, SCCA Dixie National Tour, SM2, Shaikh A
- 4/06 – Winner, SCCA Atwater National Tour, C/S, Shaikh A
- 3/08 – Winner, SCCA Dixie National Tour, CSP - Chris H
- **9/08 – Winner, SCCA Solo Nationals – E/S, Jerry Jenkins (FCM custom adjustable monotube shocks). His first Championship!**
- 11/08 – Winner, SCCA Pro Racing, ARRC 4-hour Enduro – ITA class, Mac Spikes
- **1/09 – Official supplier to SCCA and NASA Spec Miata series and Mazdaspeed Motorsports development**



FCM History – Fresh from School, Love Lost (and Found)

- 1995 – While owner of two Chrysler Neons (one from Paul Brown, former SCCA National-level driver), saw Miatas kicking butt at autocross and got curious
- 1997 – Graduated from university. During school I tutored math and science, worked front office at a garage door company, was a library assistant, then research assistant before interning with IBM for a year. My most challenging and rewarding job ever was waiting tables at Denny's first year out of high school. There is where I truly learned the meaning of customer service!
- Purchased my first Miata, a white '97, 'Jenny'. Bought Konis then GC coilovers, planned to go turbo but crashed her 3/1/02.
- Bought '91 BRG in great condition. Loved the low weight and nimble handling vs. my '97. Transferred 'Jenny's race bits to 'Roy' and boosted him mid '02.
- Enjoyed 'Roy' as a fun/fast daily driver and great autocrosser but wanted a car that would reliably start Monday mornings before work! Set 3 TTODs in '05.



FCM History – Bump stops, Bilsteins and Suspension Travel

- 2005 – began studying more about suspensions, realized monotube design was superior for handling. Curious about what made Penskes desirable.
- 7/05 – Purchased '93LE, 'Graham' as reliable daily-driven, partly due to R-pkg suspension. Kept engine stock but wanted to better understand why the car was responsive but rough.
- 8/05 – For '91BRG, obtained used R-pkg Bilsteins, had revalved and shortened for 450/350 springs (autoross/track). Added new FCM mount/bump stop to '91 and '93. '91 was definitely faster than on Konis but very harsh on the street.
- Surprisingly, the grip of the '93LE with stock springs was higher than the '91! The effect of spring rate reducing ultimate grip started to become apparent.



FCM History – New Ideas, The Black Box Opens, Jack was Right

- 11/05 – Formally launched FCM website. Introduced FCM bump stop and shock mount kit
- 12/05 – Via MF, Met Peter K (ME, race enthusiast and VW owner), Winston (Ivy League ME professor) and Phil Douglas, owner of Aftershocks Suspension, a motorcycle racer/tuner with 30+ years experience and many championships
- 1/06 – Opened the revalved/shortened R-pkg Bilsteins from Roy, also Koni Sport, KYB, Tokico Illumina, etc. to understand construction. The original R-pkg shocks had extreme amounts of rebound and almost zero compression. Jack French was right – the car was harsh because of the bump stops, and the rebound, not the compression!
- 4/06 –Atwater National Tour, first SCCA National Event in 10 years. Met Bill Schenker ('actor' on MF) in person at Atwater National Tour. His CSP car was so fast it was amazing. I asked him what his advice to most important mods were. He said 'suspension is #1 place to get the most gains.' It affirmed the path I was taking.



FCM History – The Winning Starts

- 10/06 – Tuned a local C/S '99 Sport with revalved Bilsteins. MUCH faster than previous Koni Sports. Owner is ecstatic!
- 1/07 – Began revalving for street and race customers. Traveled to Georgia and ran a customer's SM2 Miata in the Dixie National Tour – won second place, first SCCA National trophy
- 4/07 – Co-drive local customer's '99 Sport and won Atwater National Tour, my first SCCA National win. Car was unbelievably fast in the wet! Importance of maximizing grip becomes very apparent
- 7/07 – Met Mickey L, master suspension engineer for Big 3 automaker. Began collaborating on bump stops, shock valving and coilover refinements
- **1/08 – My biggest personal goal was to have FCM win a National Championship in '08. Jerry Jenkins made that dream happen. *We made him faster!***

FCM History – The Winning Continues

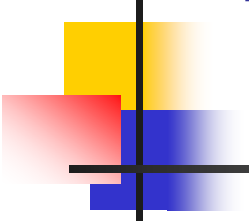
- 3/09 – Jerry Jenkins wins E/Stock, San Diego National Tour
- 7/09 – John Kimble wins C-Stock, Jerry and Kyra Jenkins win E/Stock and E/S-L at Packwood National Tour, Jerry wins E/S at Packwood ProSolo
- 8/09 – Barry Ott takes 2nd at Vail National Tour using newly installed FCM Variant 1 adjustable monotubes
- 9/09 – Jerry Jenkins WINS E/S at Solo Nationals again, in the wet! Barry Ott and Andy Howe trophy 7th and 10th out of 42 drivers in E/S at 2009 Solo Nationals
- 12/09 – Jarrett Tamayo season WINNER, NASA Norcal TTE class in his '96 Miata track car on FCM custom coilovers. Finishes 3rd at NASA Nationals



FCM Now – Efficiency and Expansion

- Revalves used to take upwards of 12 hours for a set due to my extreme perfectionism. Many, many long hours and weekends spent getting curves and forces to my satisfaction
- With more experience and some helpful tips my tech Paul can now finish a set in about 4 hours, and is even more detail-oriented than I am!
- We have numerous contractors and consultants for technical and mechanical design/engineering, helping us constantly develop and improve, plus expand into new markets. E.g. NC/RX-8, Hyundai Genesis, Ford Mustang, Nissan 350Z/Infiniti G35, Mitsubishi Evo, Subaru WRX, BMW, Audi, Corvette, Porsche





FCM Customers – What Type Are You?

- Grand Touring - Pure enjoyment of the convertible experience, some appreciation of handling though your desire for comfort is paramount. Mild suspension modifications are most appropriate, new shocks and improved ride quality with FCM bump stops and FCM shock mounts using MCU bushings
- Sport / Enthusiast - Enjoy the driving experience but want something fine-tuned. Perhaps having control over height is important due to road clearance, cargo weight, or adjusting the car for backroad, autocross or track conditions. Usually a daily driver that must remain somewhat comfortable but you don't mind a firmer ride for tighter handling
- Competition - Comfort isn't important, only winning is, be it track, autocross, time attack, hill climbs, or rally. You want the best performing components. You have done a lot of reading and probably have tested numerous setups. Most likely what you have now isn't quite to your liking or you're not as fast as you want to be. Owning a well-tuned monotube-based suspension (Penskes) is a dream. You know there is more grip, control and consistency and faster times with an ideal setup

FCM Approach – Time is Precious

Steps in the Buying Process	Piecemeal approach: Time=Money	FCM approach: Buy Once, Buy Right	Savings/Gains
Research, information gathering, test drives	2+days= \$400+	15 minute consultation	Avoid hours of confusion
Buying bump stops, shock mounts, new shocks	\$75, \$275, \$350-550	Perfectly matched components, spring rates / lengths calculated for your unique usage, the highest quality monotube shock customized for your unique needs	UN-MATCHED ride and handling experience for the driver, any passenger will love it. No sagging springs. Confidence in choosing an integrated, proven package
Decide to use stock, lowering springs or adjustable coilover	\$0, \$200, \$399		
Reading instructions/ assembling	1+ day= \$200+	Pre-assembled, ready to install	Save hours of your time and eliminate worry
How long can this setup meet my needs?	Minimal upgrade potential	Flexibility to change spring rate/height, add damping adjustments	Enjoy peace of mind in your suspension investment
Total Cost (Parts+Time)	\$1224 parts, 3+days(\$600)= \$1824+	\$2642	YOU DECIDE

FCM Approach – No Competition

Feature comparison	FCM custom coilover	FM AFCO	JIC Magic	Ohlins H/A	Tein Flex
Design	Monotube	Twin tube	Monotube	Monotube	Twin tube
Damping quality	Excellent, low hysteresis	Average, excess hysteresis	Poor, excessive damping	Good but limited travel	Average, excess h.s. damping
Ride quality	Excellent w/ FCM MCU mounts	Average to poor w/sph.mts	Poor w/ sph. mts	Above Average w/sph. Mts	Average w/sph. Mounts
Can be shortened for racing?	YES	NO	YES	YES	YES
Coaxial spring perch and Torrington bearing?	Yes, available with spherical mounts	NO	NO	NO	NO
Reliability	Excellent (Bilstein quality)	Unknown	Good	Good	Good
How long can this setup meet my needs?	Change spring rate +/-100lb, add external reservoirs	No upgrade potential	No upgrade potential	No upgrade potential	No upgrade potential
Total Cost	\$2642	\$1999	\$1930	\$2495	\$1549

FCM Truth – The Cult of Adjustability, Sins of Omission

- Fact: for handling, you want a low-speed damping adjustment and a shock that responds immediately to chassis movement. A twin tube (Koni/KYB/Tokico/Tein/GAZ) will always lag behind a monotube (Bilstein, Penske) due to less displaced volume.
- Fact: for overall vehicle control, mid and high-speed damping is crucial. This is where monotubes shine. They don't generate the high internal pressures that twin tubes have to for the same force. Monotubes dissipate heat better and stay more consistent mile after mile than twin tubes.
- Fact: Ohlins PCV has comfortable damping curves. DFV is unnecessarily aggressive. Both suffer from a lack of droop travel due to the unneeded body length adjuster.
- Fact: Adjusting a Koni, KYB or Tein to handle a stiffer spring will result in "jacking down" – very little downward resistance (compression damping) and lots of upward resistance so the shock has a tendency to stay compressed which makes the bump stops engage more often. This results in extremely poor ride quality and reduced grip on bumpy roads.
- Fact: Tokico Illuminas increase both rebound and compression symmetrically to better control a stiffer spring and prevent jacking down. However, at stiffer settings they generate higher pressures and show lots of hysteresis which leads to imprecise damping and a vague feeling.

FCM Truth – Adjustability when you need it



- For the past 3 years, I've exclusively driven my Miatas with custom-valved non-adjustable Bilstein shocks in conditions from dry track to rain, snow and ice. The responsiveness is better than any shock I've ever driven, dry grip is amazing, and the wet grip is shockingly good. In fact, I won a National Tour event in the rain because of this wet grip.
- Our new FCM Variant 1 (shock-only) and Variant 2 (shock + adjustable height coil-over) systems control rebound and compression together. Depending upon the application, the adjuster will emphasize rebound to make it more effective for tuning corner entry/exit behavior.
- A Variant 1 D/A and Variant 2 D/A (double-adjustable, using a custom designed remote reservoir) now offers fully independent adjustment of low-speed rebound and compression for complete tunability.



FCM Truth – ‘Sport’, Inigo vs. Vicini (The Princess Bride)

- For fans of this cult classic film, I offer you Inigo’s take on an overused word:
 - **‘Sport’ – you keep using that word.. I do not think it means what you think it means!**
- Often when a car maker offers a ‘Sport’ suspension you expect it to be firmer but faster than their standard. We accept the compromise of ‘it has to be rougher if it’s a real sports car!’
- In actuality, a Sport option is usually slower than the standard suspension, when you look only at the shock damping! The increase in low speed rebound/compression that makes a car ‘feel’ exciting is causing the suspension to jitter over anything but an ultra-smooth surface.
- Without some kind of visual reference, our bodies can’t determine speed - If you close your eyes on a plane, you have no idea how fast you’re going. But we do have acceleration sensors. Driving fast in a comfortable car is a more relevant example.
- Manufacturers are considering the average driver when they build cars and realize someone wanting ‘Sport’ may not really be ready for a terrific handling car, so they give you the ‘feel’ of what you expect a fast car is like, and that means lots of vertical acceleration (bumpity bump bump) but less lateral acceleration (what truly makes a suspension fun). A suspension that does not keep the tires in constant contact with the ground is not going to be comfortable OR fast!



FCM Truth – ‘Sport’, Inigo vs. Vicini (The Princess Bride), Part 2

- Manufacturers are considering the average driver when they build cars and realize someone wanting ‘Sport’ may not really be ready for a terrific handling car, so they give you the ‘feel’ of what you expect a fast car is like, and that means lots of vertical acceleration (bumpy bump bump) but less lateral acceleration (what truly makes a suspension fun). A suspension that does not keep the tires in constant contact with the ground is not going to be comfortable OR fast!
- Most manufacturers (including even the aftermarket Bilstein HD products) err on the side of providing too much low-speed rebound damping. The Hard S and Mazdaspeed Miata OE dampers are good examples of this, as is the ‘93LE and 94-97 R-pkg suspension. Tons of low-speed to give a sport feel but at a terrible expense of comfort and ultimate grip, esp. on broken or rough roads.
- It’s not just Mazda that does this, but Nissan, Honda, etc. The factory 350Z and G35 ‘sport’ suspension emphasizes low-speed, as does the Honda S2000. The idea is give the customer a sense of performance without making the car too capable.
- Vehicles like Porsche and BMW come with more gentle low-speed curves and more comfortable and better handling because of it. This is also how we tune an FCM coilover, just enough low-speed for control but not too much to cause excess movement.



FCM Truth – What's up with bump stops? Part 1

- OE bump stop tuning is designed to add to this 'Sport' experience.
- NA R-pkg rode on the bump stops – combined with excessive low-speed rebound and no compression, the car was much harsher than needed for street use.
- NB Hard S and MSM Bilsteins feature lots of low speed but little to no mid/high-speed. They never feel composed, and are actually underdamped at higher shock velocities even for stock springs.
- NC Miata has an initially softer front bump stop but it gets much harder much faster than the rear stop. Result is terminal understeer for an NC or RX-8 (same stops).
- Mazdaspeed 3 has same situation, stiffer front vs. rear and front engages within 1/2 " of wheel compression = poor ride quality and understeer!
- The Mini Cooper S actually rides on the front bump stops!
- VW uses the SAME springs on the GTi and normal Rabbit, only difference is = you guessed it, longer bump stops!

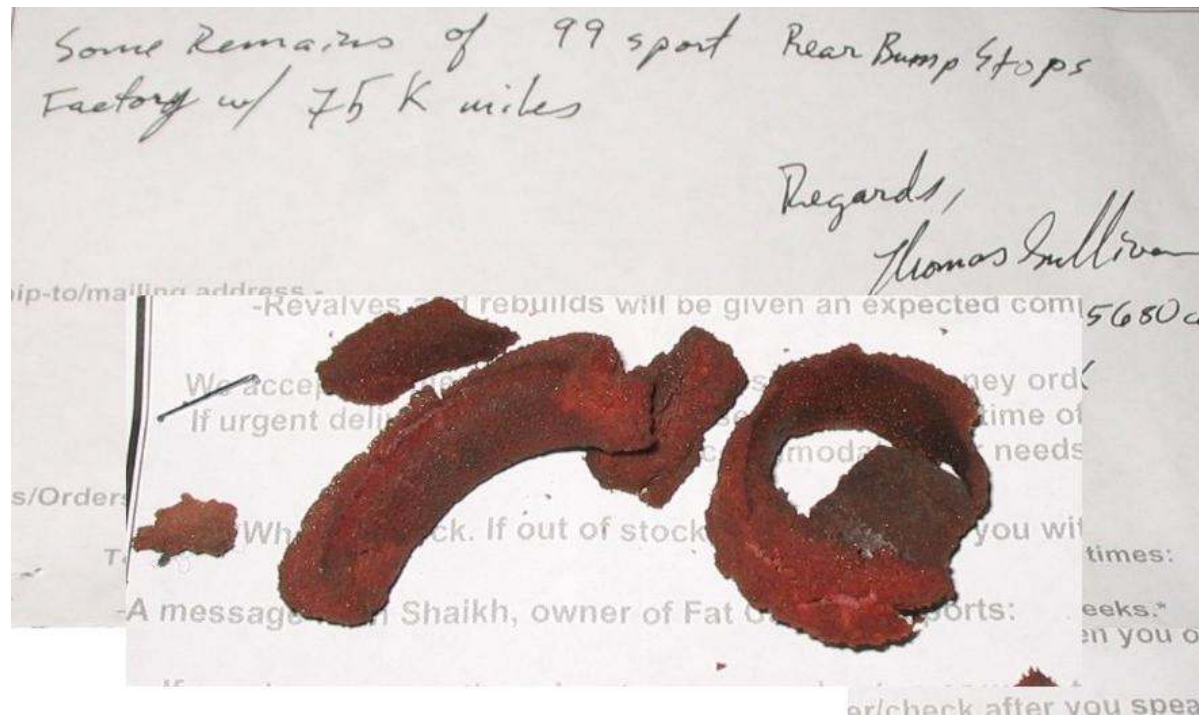


FCM Philosophy – What's up with bump stops? Part 2

- Bump stops are also key to proper suspension performance. Which is ironic since many people (including me at first) considered them a necessary evil or afterthought.
- Cutting stock bumpers has been and remains popular but such convenience comes at a price in terms of reliability, safety, and performance.
- We look at the entire suspension, from full droop to full bump, and knowing your intended usage, suggest ride heights, spring rates, sway bar size (usually front only, rear is left stock or taken off), and alignment settings to give you a one-stop option to get the best suspension for your needs.

FCM Philosophy – When bump stops fails - Part 3

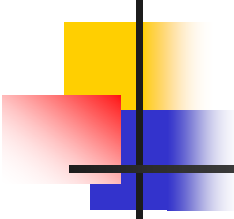
- Typical OE and aftermarket bump stop are made from cheaper and less durable MDI micro-cellular polyurethane (as pictured below on the 99-05 Miata), vs. the NDI and TODI our factory uses, same as higher-end luxury and sportscars. This means after a few years you will experience degraded ride not from the assumed failed shocks, but more likely from degraded or disintegrated bump stops! Some manufacturers still use rubber which is harsher but does not disintegrate like poor quality MCU can.





FCM Philosophy – Suspension tuning, Why monotube? Part 1

- “The job of a car suspension is to maximize the friction between the tires and the road surface, to provide steering stability with good handling”
HowStuffWorks.com
- Damping means producing a force to return a system back to rest. All dampers or shocks are velocity-sensitive devices, in that they only generate force when there is motion. Springs are displacement-sensitive devices; they generate a force anytime there is load on the suspension and that load varies with the amount of spring compression. So the springs and dampers (part of the suspension) respond to the vehicle’s mass to control the motion. This is described as a ‘spring-mass-damper’ system in mechanical engineering terms.
- A properly damped suspension will aim to bring the chassis back to rest as quickly as possible without amplifying the input motion (being too stiff) or allowing excessive oscillations (too soft). Stiff and soft are relative to the user which is why customization of spring rates AND damper profile is crucial to obtaining the proper vehicle performance, whether a pure track car, commuter vehicle or anything in between.



FCM Philosophy – Suspension tuning, Why monotube? Part 2

- Even with stiff vs soft being subjective, it's a matter of degree, not concept. A car with stiff springs and proper damping will ride better than one with soft springs and improper damping.
- So what is improper damping? First, let's talk about how the damping force is generated.
- As with combustion engines, the piston inside a shock (or damper) is responsible for generating the pressure which turns into a force – on the crankshaft for an engine, or on the shock shaft for a suspension. The goal is to return the suspension to its starting point. Piston size directly relates to the force a damper can produce and how well it can control chassis movements. Larger bore = more torque for less displacement (or faster rise in damping force). You need less revs (less damper stroke) to achieve the same road speed (damper force) with a V8 vs an I-4.
- Similarly, with dampers, the sentence would read: you need less damper stroke (body movement) to achieve the same required force with a larger diameter monotube vs. a smaller diameter twin tube. Larger bore and monotube design mean more surface area to generate the needed force. Commonly available twin tubes (Koni, Tokico, Tein Flex, AFCO) have a double-wall design which is cheaper to make because the tolerances are less critical than on monotubes. The downsides include slower response and greater heat build-up.



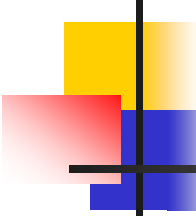
FCM Philosophy – Suspension tuning, Why monotube? Part 3

- Monotubes can produce the needed force to resist motion with lower internal pressure. Those high internal pressures cause hysteresis (a time-lag in the response of the shock to a road input, like getting a joke's punch line a minute late). Hysteresis is the basis of the vague, uncontrolled feeling a twin-tube gives vs. a monotube. Even at optimal tuning, a twin-tube will NEVER provide the ride quality, control and grip of an optimally tuned monotube. User reviews of FCM custom coilover vs. FM AFCO twin tube bears this out. **Don't pay more to get less!**
- John Song's FCM vs. various coilovers comparison is in the second appendix, or seen here:

Part 1 – http://www.fatcatmotorsports.com/JohnS_part1.JPG

Part 2 - http://www.fatcatmotorsports.com/JohnS_part2.JPG

- If the internal pressure is higher enough, the damper isn't designed properly or as the air bag degrades over time, the twin-tube stops functioning properly and begins to cavitate. This causes the damping to become unpredictable and reduce the driver's confidence in the vehicle and also the comfort. The damper becomes a blender, churning oil and air into a frothy foam.



FCM Philosophy – Suspension tuning, Monotubes, Grip (Part 4)

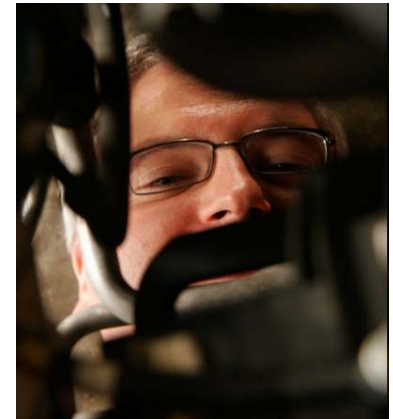
- Modern high-quality suspensions ONLY use monotubes and Bilsteins are OE on many luxury and sports car. Obviously, Mazda felt it was worthwhile to incorporate them on the Miata from the beginning! However, they are not simply for racing and don't let anyone convince you of that. Doug's testimonial is proof that with exceptional control comes amazing comfort. The key is in balancing all the ingredients together and we simply do that better than anyone else on the market.
- The beauty of a monotube and a Bilstein in particular is that the components are readily available and the shock can be tuned for casual daily-driving use or serious competition. The same shocks in our Miatas are used in NASCAR, dirt modified and off-road racing. The potential to upgrade a monotube is limited only by the imagination. We have already developed single and double-adjustable damping capability, with plans to develop three and four-way adjustable shocks, including semi-active electronic control.
- **Three Key words: GRIP is KING! A fast suspension needs to have some compliance, otherwise grip is reduced. This means it also needs to be somewhat comfortable for the driver to have confidence. Thus, ultimate grip is tied to having a degree of compliance (ie comfort). Therefore, handling and comfort MUST co-exist!**

FCM Success Stories – Doug C, 425/300 coilover

- This weekend, Shaikh delivered my FCM coilover package and supervised me installing them into my '94. We had agreed I wouldn't let him do the work - I had him teach me how to do it instead.

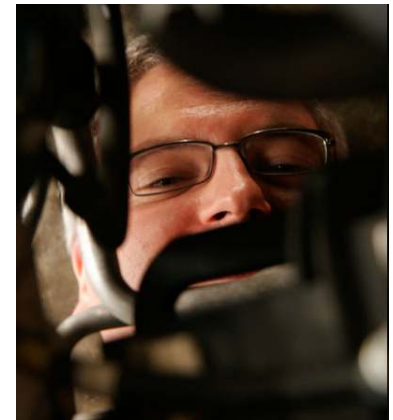
Shaikh is a great mentor, and I had a fantastic experience learning to work on my car. He spent 4 x the agreed upon hours with me as I kept interrupting with tons of questions. I feel like I got not just a new set of coilovers, but a good education on the Miata suspension system, and the knowledge to install and adjust my new system on my own.

- Seriously - I really feel I made a great choice with FCM. I don't doubt that FM has great products (hey, I'm using their end links - on Shaikh's recommendation), but the deal closer for me was the great personal relationship I got from speaking with Shaikh, and the knowledge that he was designing a system for my specific needs and the intended use of the car. The extra education I got from working with him personally was a major bonus that I hadn't anticipated, but was a huge win.



FCM Success Stories – Doug C, 425/300 coilover (2)

- I was completely blown away - compared to this, I have never driven a car that was setup properly. Even on my stock 14x6's, the grip and handling was phenomenal. Turn in was sharp and crisp, it stayed flat in the corners, and squat and dive was very controlled. Braking was confident and controlled - the wallowing my 14 year old suspension gave me on hard braking was completely eliminated. Even on freeways, the car cruised steady and solid over 90 mph without a hint of the uneasy "floaty" feeling I used to get. The car was very neutral in steering, and transition between over/under steer was easily controlled with the throttle - it was even very forgiving of rapid changes in the turns.
- Once I'd settled in and gotten a feel for what it could do, I found myself easing through the twisties far faster than I realized I was going when I glanced at the speedo. I was quickly at the limits of my comfort on public roads well before the handling gave out any complaints. I can't wait to take it to the track and really learn it's limits safely.



For me, the most incredible thing was the sense of confidence and control through every move - yet the ride was never harsh or jittery.

FCM Success Stories – John S, '00 450/300 coilover (1)

I've been doing the suspension search for a while and I believe FCM coilover is the best option for me. I've had a chance to drive/ride in the following:

1. FCM coilovers (450/400 with RB Tubular front and no rear)
2. FM AFco coilovers (450/300. Not sure about the sways. Either MSM stock or FM sway set)
3. My Stock 99 springs with koni yellows w/ FM sway set
4. Tein Flex (default 7/6 springs with RB tubular sway set)
5. Tein HA (default springs (6/5 or 5/4? Can't remember) with RB sway set)
6. Bilstein PSS (default springs, not sure about the sway)
7. Ground Control (default springs with KYB AGX springs with RB sway set on a M1)

The above is in the order of ride comfort with FCM being the most comfortable on the street and Ground Control being least comfortable. I really did like the FM AFco and that would be my close second choice. However, FCM coilover was more comfortable riding on the street, especially when things got rougher. I have no clue if one would be better than the other on the track or not, as that was not my criteria to check out on the street. But the Tein Flex, FM AFco and FCM Coilovers felt very confidence inspiring.

I originally wanted to Ohlins DFV, since everyone said it was really comfortable, but with the recent price being so high, and also with really short rear shock body (shorter than Tein Flex!) I decided to look for some other options.

I ended up ordering FCM coilover with 400/300 with FM 1" front sway with no rear sway as my setup from Shaikh. Shaikh reassured me that he will send me the suspension within the 3 week time frame, or else he will owe me his first born j/k 😊. Needless to say I am very excited, not the first born part, my new FCM coilover 😊. I will report back once I had a chance to install and ride on them for a bit.

99 LP. FMII Turbo. FM Sway. FM Butterfly. Hard Dog Sport DD. FCM Bilstein Coilovers 450/300

FCM Success Stories – John S, '00 450/300 coilover (2)

- **A follow-up after several months of ownership and some spring rate changes:**

I actually went up higher on the spring rates, and I find them better. 😊

I ran on 375/300 for a while, but being an eternal "fiddler", I had to fiddle with the settings to make it even better. I purchased some extra springs and played with the suspension, while Shaikh provided me different bump stops to try out as the height and the springs rates changed over time (Thanks Shaikh!).

I settled on 450/300. I think it actually ride better than 375/300. Plus it has less dive and squat. With 375 the front felt a bit soft to me while the back felt firmer. Now it is all around firm, but I find it more comfortable. (I also tried 375/250, 450/375, 500/375)

I am running full soft on the front FM 1" sway bar and running stock 11mm sway bar. With 375 I ran full stiff on the front sway bar to make it balanced.

It took me some time to fiddle with the settings/balance to my liking, but I really like it where it is now. The good news is that I didn't have to send the shocks back at all to get it revalved for the new springs. Front damps very well with 450 lbs/inch springs.

I think if I had 425 or 325 springs, I would have probably settled for 425/300 or 450/325. I think that would be even better balance. Perfect for dual purpose car.

Overall, I am very happy with my setup. I had another chance to compare it side by side to very well known Miata double and single adjustable systems (both twin tubes), and mine was better all around - dry lateral grip (slightly better), comfort and noise (much better) and traction in rain (moderately better).

99 LP. FMII Turbo. FM Sway. FM Butterfly. Hard Dog Sport DD. FCM Bilstein Coilovers 450/300

FCM – New products

