

CorkSport Mazda 3 Mazdaspeed 3 Coilover Technical Whitepaper

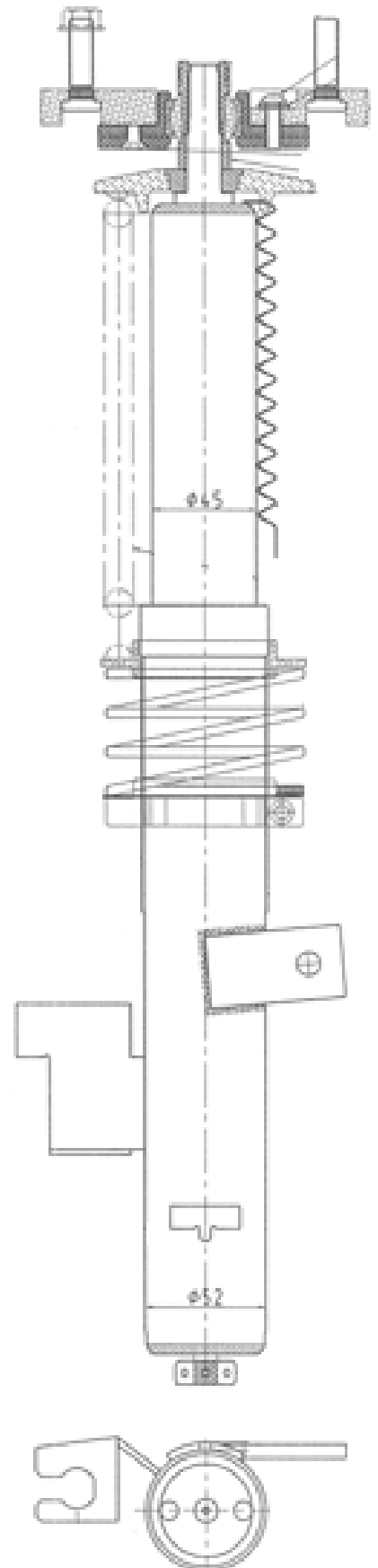
There are many features and design elements that can be incorporated into coilovers so when CorkSport decided to design new coilovers for the Mazda 3 and Mazdaspeed 3 we had to come up with priorities. We asked the Mazda community what features they wanted to see incorporated and what we came up with and will be releasing in the near future fulfills all of those wants and needs at a competitive price.

You told us you wanted inverted struts. We decided on a 45mm inverted strut body for the fronts and traditional strut bodies for the rear. Inverted refers to a strut that is built upside down. The shaft that moves actually holds the gas or oil in some cases. Traditionally this was held in the lower section of the strut and moved up and down as the control arm moved up and down.

There are some huge advantages to inverted struts. The first huge advantage to inverted struts is the unsprung weight. This refers to the weight that your suspension holds. If the weight is on a portion of the suspension that moves this is referred to sprung weight and you want to limit this. The idea is easy to understand with a 10lbs weight in your hand. Hold the weight in your hand and hold your arm straight out. Then, move your arm up and down. Next, take the weight and put it on your shoulder and again, put your arm out and move it up and down. You will notice how much easier it is to move your arm. Did you reduce the weight? No. You did however move it somewhere that made it easier to deal with. The same thing applies when you move the factory oil and strut body to a hard mounted body position and the only weight that has to move is a hollow body.

The second advantage of inverted strut is side loading. With Macpherson style struts in the front, your suspension is literally held together by the strut. Some cars use a multi-arm setup that increases weight but reduces side loading. By increasing surface area on the strut tubes we increase the rigidity of the structure and make a more stable suspension which is great if you like a good autocross day, track day or a drive through the twisties.

The rear of the Mazdaspeed and Mazda 3 uses a multilink suspension meaning the rear is tied together in a way that the suspension doesn't hold any load. There was little need to go to an inverted strut in the rear so we decided against it.





DAMPING FORCE TESTER

The only con I can come up with for a inverted strut is the seals sit upside down so if you have an oil filled strut that is inverted than the liquid sits on the seal at all times. For this reason and a few others we went to a gas filled strut. Oil often foams as well when put through its paces. Oil foaming reduces efficiency and can give you different dampening rates from strut to strut. Gas of course can't foam so this is another advantage over oil.

If you have ever tried to dig up data on coilovers you may have found that it is hard to actually get the compression and rebound on the settings. In order to ensure that these would be the best options on the market and out last the factory struts in everyway we tested all of the struts for rebound and compression on professional tooling.

The data below breaks down rebound and compression into six twists of the dampener knob. They are 15 way adjustable but by showing the six major steps the data is a little easier to absorb.

MAZDA3-FRT						
STEP	REB			COMP		
	0.05 m/s	0.1 m/s	0.3 m/s	0.05 m/s	0.1 m/s	0.3 m/s
15'	187.6	208.4	254.8	-65.1	-71.0	-101.0
12'	148.9	198.3	246.8	-66.1	-72.1	-101.8
09'	99.9	185.9	240.2	-63.3	-69.9	-98.8
06'	76.9	159.1	239.2	-52.1	-62.6	-91.3
03'	56.3	120.7	228.5	-44.4	-66.1	-94.8
01'	48.0	103.8	224.4	-37.7	-65.8	-94.4

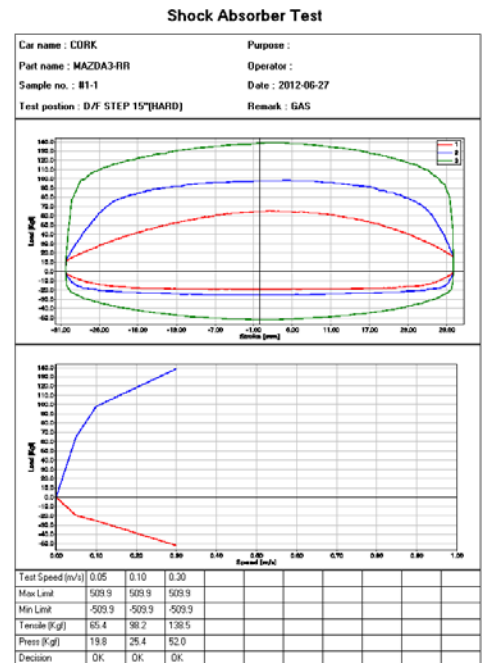
MAZDA3-RR						
STEP	REBOUND			COMPRESSION		
	0.05 m/s	0.1 m/s	0.3 m/s	0.05 m/s	0.1 m/s	0.3 m/s
15'	65.4	98.2	138.5	-19.8	-25.4	-52.0
12'	58.3	94.0	135.9	-19.4	-25.0	-51.1
09'	48.9	89.2	132.6	-19.1	-24.6	-49.7
06'	40.9	80.8	129.1	-18.2	-24.1	-48.4
03'	35.8	73.6	127.0	-16.9	-23.1	-47.2
01'	33.0	69.3	125.5	-16.4	-22.8	-46.8

Another important part about choosing coilovers is comfort. Yes, they will be stiffer than stock but there are ways to limit this so that the system is not undrivable on harsh roads.

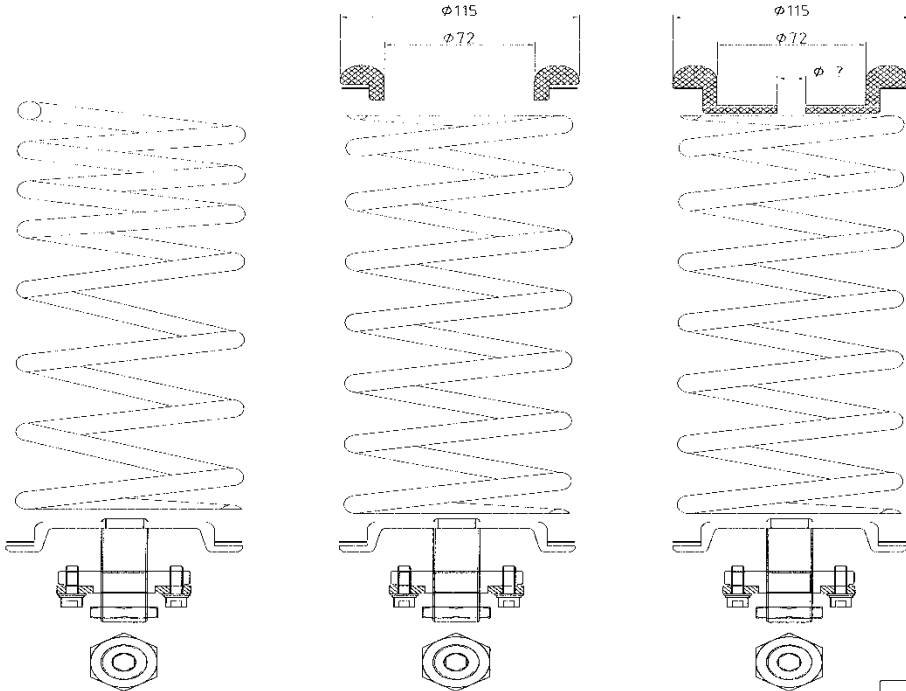
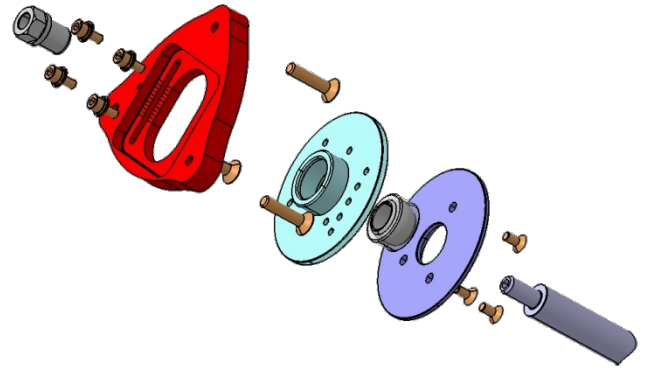
Up front we added helper springs to make those little bumps and potholes take less impact on your vehicle. It can also save those nice wheels from bends and dings. The 15-way adjustment front and rear also helps. With easy adjustment you can go soft for the weekdays and stiffer for the weekends.

If you have an aftermarket sway bar, you can also combine dampening and swaybar adjustment to make that perfect combination for your driving habits.

After you really get comfortable with the adjustments you can start changing endlink preload, sway bar adjustment, strut dampening, camber settings and toe settings.



CorkSport released camber plates awhile back. There are a lot of advantages over the factory camber plates other than the obvious ability to change camber. We decided to offer these on our coilovers as well. Using thick machined aluminum, high grade bolts, and tightly machined plates and bearings they will hold up to almost all abuse. They also get rid of the unwanted flex in the factory rubber mounts.



Now that we have covered the front coilovers we can learn a little about the rears.

Because the system is a multilink rear suspension we have a separate spring and strut combo. In order to maintain great ride quality with great handling, we went with a progressive spring and to provide ride height adjustability, we produced an adjustment device for the spring that is easily adjusted with an Allen wrench from the bottom of the spring.

The rear struts are 15-way adjustable just like the fronts and can be adjusted in length to match any setup of the coilover springs. We have also accommodated for the differences between the Gen1 and Gen2 struts so every one can enjoy these coilovers. For those people that like a little more camber in the rear, you don't have to worry because we will soon be producing camber adjusters for your vehicle. Even at the lowest settings we were able to dial camber into factory spec.

The coilovers that have been developed by CorkSport, while not the cheapest option on the market, have all of the features and benefits our customers requested and are the best option to satisfy a discerning buyer.

We hope you enjoy your CorkSport Mazdaspeed 3/Mazda 3 Coilovers and be on the look out for rear camber adjusters to compliment your coilovers in the coming months.

