

| SNR Suspension Bearings and Kits



Two brands, One group, One strategy



The Suspension :

Some technical points

The suspension plays a primary role in the vehicle safety and effective road holding. It connects the vehicle un-sprung weight (wheels, brakes, drive shafts...) and the sprung weight (the chassis, the engine and all parts fixed to the chassis).

Role of the suspension

The suspension links directly with the road. It influences the road holding, steering and handling of the vehicle. It is therefore important to understand its function and be able to test the parts in order to ensure the safety and comfort of the passengers.

Safety

The suspension maintains wheel contact with the road under all circumstances (acceleration, braking and steering). Faulty suspension components, result in poor road holding, and can induce serious accidents..

Comfort

The suspension isolates and absorbs the bumps and vibrations from irregular road surfaces. This is a function of the shock absorbers, and torsion bars or anti roll bars which reduce the vehicle roll whilst allowing flexibility between each side of the suspension.

Dynamics

Correct driving dynamics result in effective and satisfactory road holding, and is responsive to the driver's actions, particularly with regard to steering.

Axle
Load

*All these different aspects
make continual demands on
the suspension*

Braking

Turning

Road
Irregularities

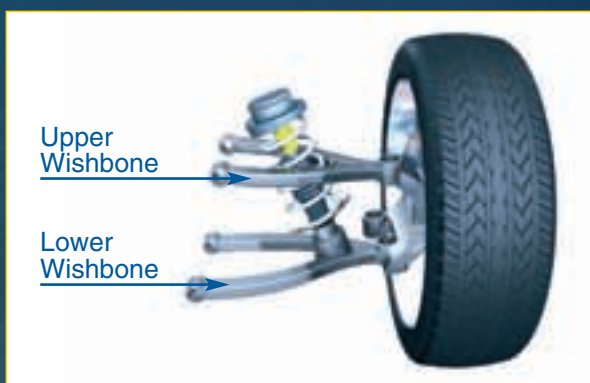


Different types of suspension

Originally independent suspensions were mostly of the double wishbone type. The growth of the automobile industry and the demands of the consumers forced manufacturers to simpler and less costly suspension systems. Today there are two main technologies in the market :

The double wishbone suspension

The double wishbone assembly offers a high level of comfort, dynamics and road holding. However its production cost is high. For this reason it is mainly fitted to top range models (such as Mercedes Class E and S, BMW 5 and 7, Audi A4...) and on competition vehicles.



Independent suspension

McPherson strut suspension

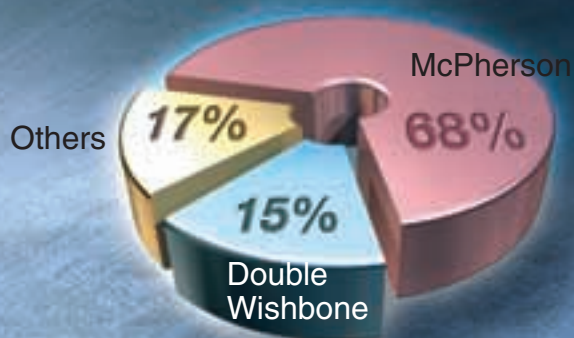
Having first appeared in the USA during the 1950's, this technology rapidly gained a monopoly over the former double wishbone systems.

This type of independent suspension offers a good level of stability and handling in all driving conditions. It reduces and minimizes any road shocks giving a better control and increased comfort.



Wheel control pivots on the suspension strut where there is a bearing

Suspension market



2007 Figures

For a World Market of 60 million vehicles

Acceleration

SNR Suspension : testing the design

Analysis of bearing failures is one of the means available to SNR for continuous improvement in the quality of its products.

However, well before launching products in the market place, SNR invests substantial resources and capabilities in the design of products.

Among the design tools used are :

- Finite element analysis : stiffness of shock absorber attachments, computer modelling of balls and raceway contact surfaces
- Calculation of axial deformations
- Analysis of mechanical limits

The suspension thrust bearing is designed with consideration for the interactions between all of the associated materials and components.

When the final design is selected, prototypes are made and the product is tested in the SNR test centre.

The suspension thrust bearings are submitted to tests which reciprocate the vehicle service conditions as determined by vehicle manufacturers.

Among these tests are :

- Life cycle test :
Tests are carried out on a bank of machines which apply radial and axial loads.
- Seals :
The same conditions apply as on the life cycle test, mud is directed at the inner and outer of the bearing.
Objectives : no rust, water ingress <5%, no deterioration.
- Friction load : : the tests depend on the manufacturer's requirements.
- Fatigue test : conducted on the FEB test bench under different loads.
Objective : change in torque < 30 %.
No deterioration.
- Life cycle test (as used on the vehicle) : life cycle test with all of the front axle components, and final development tests



A bank of Test Machines



Life cycle test bench

| Analysis of failures

The suspension plays an important role in the vehicle safety. The components have to function in extreme operating conditions ; vibrations, water spray, salt, stones and sand...

It is therefore essential to detect failures and to learn from them in order to continue improving product capability and meet the motorists' needs.

Suspension Thrust Bearings

Failure	Probable cause	Result
Corrosion on rolling element raceway	Entry/pollution : water, salt, sand...	Noisy on bad roads or when maouvering Increased steering effort
Destruction of a raceway	Driving condidtions are difficult, accident	Noisy on bad roads or when maouvering Increased steering effort
False Brinell effect	Micro-vibrations	Noise from road springs inside the vehicle

Les blocs filtrants

Failure	Probable cause	Result
Torn strut insulator	Difficult driving condidtions	Play in the front suspension and reduced efficiency
Change in material : Hardening or softening of the rubber	Very high or very low temperature Chemical pollution	Lifespan of the component and driver comfort reduced
Deterioraton of material	Entry/pollution : water salt, sand...	Reduction in lifespan



Corroded



Broken Bearing



False Brinell Effect



Torn





The SNR Aftermarket Suspension range

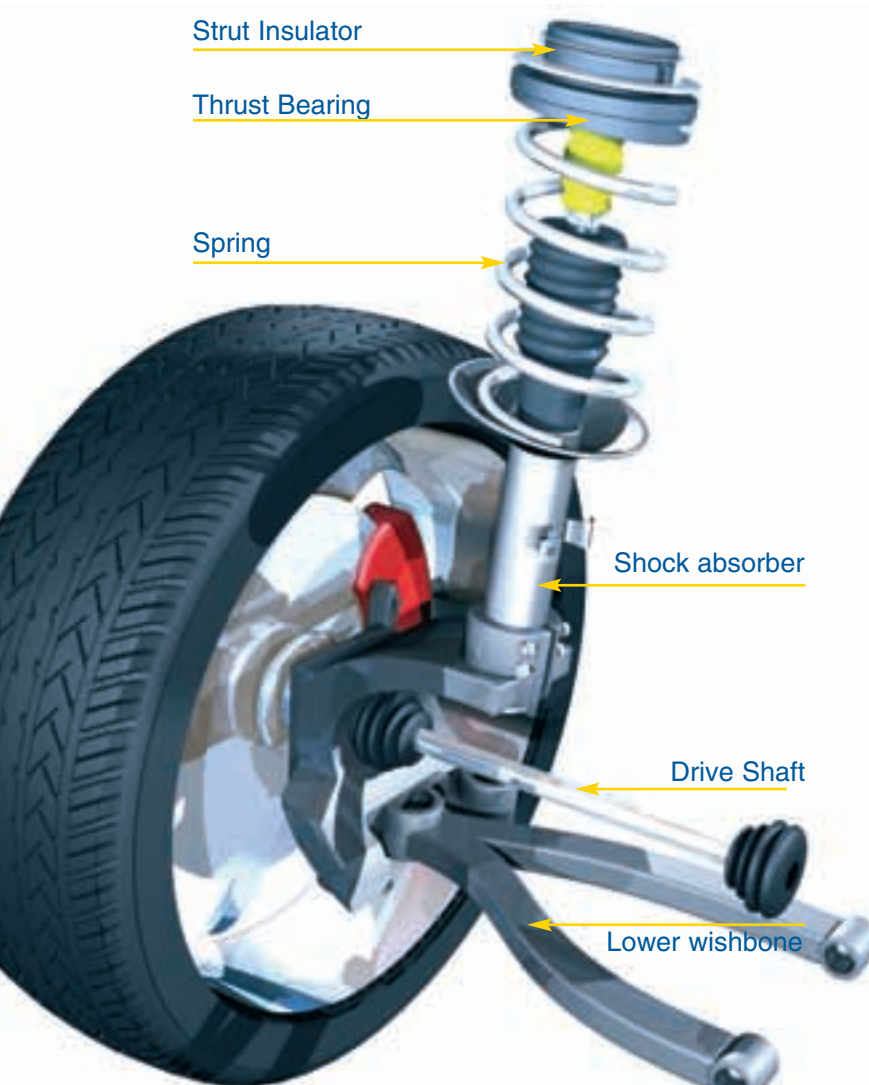
Today SNR offers one of the most complete ranges available in the market with more than 200 references :

- > Mac Pherson Strut suspension bearings
- > Suspension strut kits
- > Radius arm suspension kits
- > Rear suspension kits

Front Suspension

Components of a McPherson suspension

The Mac Pherson design of suspension consists of a strut, which integrates the spring and shock absorber, and connects at the top to the chassis and to the lower wishbone. The wheel is fixed to the lower part of the strut which pivots on the suspension bearing for steering.



Suspension Bearings

Leader in the OEM market, SNR makes all of its experience in developing OEM solutions for suspension systems available to the aftermarket and guarantees you approved "original quality" products (bearings and components)

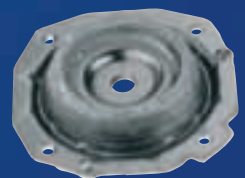
Suspension bearings operate in a very demanding and exposed environment. This is why all SNR Suspension thrust bearings are :

- > Designed, studied and optimised with respect to rigidity and sealing
- > Validated for each vehicle application
- > Tested, on SNR test beds and on manufacturers test vehicles

Suspension Kits

SNR includes all of the upper suspension parts in their kits (bearing, screws, bolts, insulating parts).

- > **Strut Insulator**



- > **Suspension Bearing**



- > **Fixing components**



Rear Suspension

Radius arm suspension Kits

Radius arm suspension Kits for the aftermarket include all of the parts required to complete a quick and efficient repair : bearings, seals, nuts, shields...etc



Rear suspension kits

The rear suspension kit consists of a strut insulator which absorbs vibrations and ensures the efficiency and safety of the suspension.

These kits do not include a bearing and are easy to remove (no special tools). Changing is easy since it is removed at the same time as the shock absorber. SNR recommends that the kit should be replaced at the same time as the shock absorber.

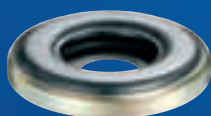
In order to meet your queries SNR Aftermarket offers :

- > A dedicated catalogue
- > A catalogue on line : www.snr-bearings.com/catalogue
- > A dedicated Internet site : www.snr-autoaftermarket.com

SNR, the leader in Original Equipment

Evolution of the Mc Pherson strut Suspension Bearing

The Mc Pherson strut suspension system is today fitted on a large number of vehicles. SNR has been developing its range to meet market demands with thrust bearings that incorporate more functions : e.g. support for the spring and seating for the shock absorber.



Generation 0
Suspension bearing in steel located on the shock absorber shaft



Generation 1
Suspension bearing in steel located against the upper or lower spring support



Generation 2
Suspension bearing incorporating the upper spring support



Generation 2.5
Suspension bearing incorporating the upper spring support and the seating for the shock absorber.

SNR ROULEMENTS : A major player and one of the leaders in McPherson Strut technology.

Thanks to its reactivity, potential for innovation, know how and with manufacturing sites throughout the world, SNR is in position at all of the largest vehicle manufacturers with regard to suspensions.

Brands and Models where SNR supply Mc Pherson strut bearings	
Renault	100% Renault
Nissan	N°1 Supplier Micra, March, Cube, Altima, Serena
Peugeot	106, 206, 307, 1007
Citroën	C2, C3, C4, Pluriel
Fiat	Stilo, Punto 2005, Grande Punto, New Palio, Linéa, Mini-Cargo
Opel	Corsa 2006, Vivaro
Rover	R25, R754
Kia	Ceed, New Rio
Mercedes	SLK
Porsche	911 Carrera 4 (type 996 et 997)

Questions & Answers

Did you know ?

The McPherson strut suspension bearing is a ball bearing, which like other bearings has evolved over time to meet the changing needs of the application.



What is the life span of a McPherson strut suspension bearing ?

The suspension components have all become more and more reliable but do have a limited life span. Dependant on the vehicle the parts should be changed between 75 000 km and 100 000 km.

Why replace the suspension bearings?

New set of suspension bearings ensures :

- A more precise and easier steering (reduced loads)
- A reduction in vibrations (up to 25% on bad roads)
- A better steering Remove ...
- An improvement in road holding

When do you change suspension bearings?

- When shock absorbers are replaced
- When the bearings or surrounding parts are worn
- When the steering becomes stiff or noisy

When do you change radius arm suspensions?

- When the seal, or the metal cap deteriorates.
- When loud metallic noises are heard when riding a bump
- When there is play in the rear axle.

Recommendations

A new French regulation and a tendency in Europe

From 1st January 2008 closer inspection of the shock absorber becomes part of the Contrôle Technique (French equivalent of the MOT test). Any vehicle with defective seals around the shock absorber (oil leaking) will be further examined and all visually defective shock absorbers (cracks, leaks, breaks) will have to be replaced. Today only one in three suspension bearings are changed when shock absorbers are replaced. However the bulk of distributors and auto centres are refusing to guarantee shock absorbers if the bearings and mating suspension parts are not also replaced at the same time.

SNR recommends that all suspension bearings are changed at the same time as replacing shock absorbers and this will not increase the time to finish the repair and you will be assured of complete customer satisfaction.



Precautions when fitting

1. Ensure that the parts are not dropped during storage transport and fitting.
2. Pay attention to the correct assembly order of the parts.
3. Any bearing which is immersed in liquid is unusable
4. Any bearing which is dropped on the ground is unusable.
5. Any bearing which has any of its components removed is unusable.

Examples of fitting errors



Bad fitting



Correct fitting



Outer damaged
Forced fitting





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