



# ENGINE TIMING

**NTN** 



With You

# PRODUCTS

## The role of engine timing

The engine timing system synchronises the motion of the crankshaft and the camshafts. This in turn operates the valves in time with the pistons, making sure the pistons and the valves do not come into contact with each other. In some cases the engine timing system also drives the fuel injection pump and water pump. The timing system plays a critical role in the smooth running of a vehicles engine. The quality of the components used in the timing system must be of a very high standard to avoid serious engine failures.

The timing system is made up of several different components:

- Tensioners and/or idler rollers
- Timing belt(s) or synchronous belt(s)

### PERFORMANCE

An engine timing system equipped with quality parts is the key to optimal performances and customer satisfaction.

## Different types of tensioners

Tensioners are specifically designed to ensure reliable system operation. Their design guarantees the most compact configuration; the service life of these components is extremely good due to the use of specially designed bearings and greases.

**The tensioner** is designed to regulate and maintain belt tension, tensioners can be mechanical or automatic; see “Focus on hydraulic tensioners”.

**The idler roller** ensures the correct alignment of the belt and increases the winding angle of the belt on the drive pulleys.



## Focus on hydraulic tensioners

NTN-SNR is the leader in the development and production of OEM hydraulic tensioners. This type of tensioner can be used in both belt and chain tensioner systems. This type of tensioner uses a hydraulic cylinder system composed of several parts, including a spring and metal cover. The oil used in hydraulic tensioners can withstand large temperature variations.

The advantages of a hydraulic tensioner are:

- Perfect adjustment of belt tension
- Optimal absorption of tension variations
- Resistance to temperature variations
- Longer service life
- Reduced noise levels

**NOTE:** When installing an hydraulic tensioner the locking pin should only be removed at the end of the fitting process never before, hydraulic tensioner cannot be reset using a bench vice, the tensioner can only be reset on a press whilst in the vertical position, the piston must be pressed in slowly over several minutes.



## The timing belt

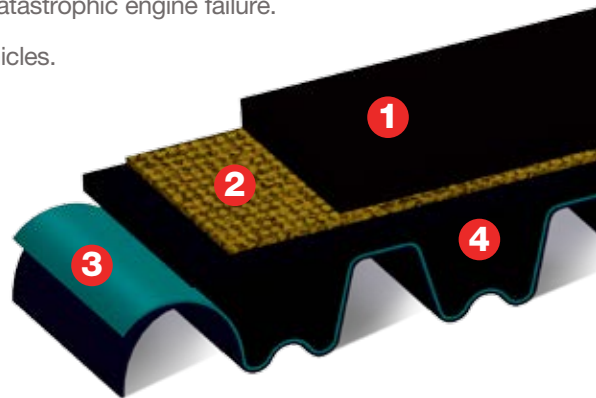
Most vehicles on the road today are equipped with a toothed timing belt. The timing belt is a critical component which controls the opening of the valves by the cam shaft while precisely synchronising the engine timing. A belt malfunction can cause the pistons to strike the valves and result in catastrophic engine failure.

The toothed timing belt system is the most commonly used on modern vehicles.

### STRUCTURE OF THE BELT:

The belt is composed of several different layers of materials:

1. Rubber blend for the back of the belt
2. Fiberglass cord for a greater resistance to stretching
3. Anti-abrasion coating
4. Rubber blend for the teeth



In order to withstand increasingly high stresses and to extend service life, reinforced or HT belts made of Teflon or Kevlar are used. The choice of NTN-SNR belts is determined by the technical solutions that the OEM requires. The belt must be handled carefully and should not be bent as this may cause the fiberglass cords within the belt to break.

## The water pump – a component which must never be overlooked

The water pump circulates coolant through the engine's cooling system, the coolant flows through the engine and into the radiator where it is cooled by the flow of air from the front of the vehicle, once cooled it is recirculated around the engine cooling system, a thermostat in the engine cooling system helps to keep the engine at its optimal operating temperature. The water pump can be driven either by the timing belt or by the auxiliary belt (in engines with a timing chain, for example) via the crankshaft pulley.

This is a component which is subject to wear; a failure of the water pump can cause catastrophic engine failures in several ways:

**Leakage:** Engine overheating

**Failure:** Broken timing belt (major engine damage)

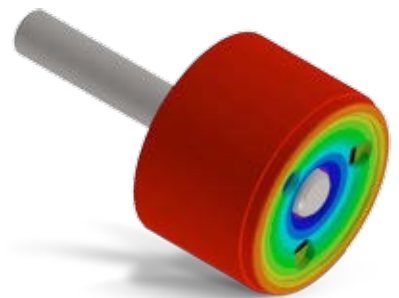
**Worn:** Excessive belt wear

### NTN-SNR has genuine OEM expertise:

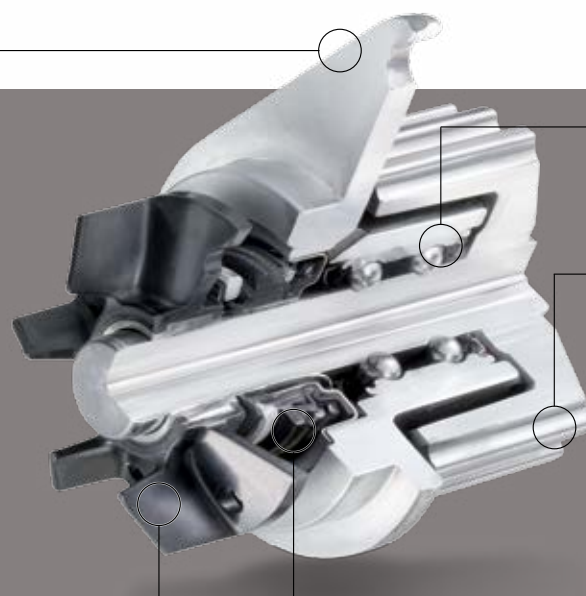
More than 1 million water pump bearings are manufactured in our factories each year.

The water pump bearings feature a specific NTN-SNR design.

NTN-SNR is the partner of the major vehicle and water pump manufacturers.



*The pump housing is made of aluminium, cast iron or composite.*



*The bearing has 2 rows of balls or 1 row of balls + 1 row of rollers depending on the load*

*A toothed pulley or smooth pulley can be used, this pulley is driven by the timing belt or accessories belt depending on the application.*

*The impeller is made of a composite of steel and cast metal. The cooling of the engine depends primarily on the diameter or the number of vanes on the impeller.*

*The seal  
The seal is the weak part of a water pump, as it provides the seal between the rotating shaft and the stationary body of the pump, this motion causes wear on the seal.*

## NTN-SNR engine product range

NTN-SNR offers its customers a range of nearly 3000 engine products one of the most comprehensive ranges on the OEM and OEM aftermarket. It comprises of individual roller units (tensioners, idler rollers, hydraulic) and kits covering a full range of vehicle applications.

## A Complete aftermarket range for all engine timing products

### Timing

Timing kits

Tensioners / idler rollers

Timing kits with water pump

### Auxiliary systems

Overrunning alternator pulleys

Belt (poly V/trapezoidal)

Air conditioner bearings

Tensioner / idler rollers

Crank shaft pulleys

## #PERFORMANCEINSIDE

The market for engine timing systems is a very well established and competitive market with 20 million rollers, tensioners' belts and kits sold in Europe each year.

NTN SNR's timing system range of products remains focused on performance and durability. This is exhibited in a number of different ways:

- The guarantee of optimal engine performance
- The durability of high quality gives the product a longer service life for greater customer satisfaction

### TRENDS:

- Greater service life means less service costs, e.g.: 1.6 HDI (DV6) 240000 km or 10 years
- Reduction in the average number of kilometres / miles driven per year: 12 000 km/ 7500 miles
- Slight increase in the car parc since 2008
- Increase in the number of timing chain systems now being used



### Tensioners and idler rollers (GT-GE)

As an established OEM manufacturer particularly well-known for its hydraulic tensioners, NTN-SNR uses all of its expertise and OE quality to offer the aftermarket a consistent and reliable product as part of its **#PERFORMANCEINSIDE** philosophy.

In accordance with vehicle manufacturers' specifications, the tensioners and idler rollers include their fasteners (nuts and bolts) whenever required by the application. Tensioners and idler rollers are wearable parts subjected to ever increasing stresses. For this reason, NTN-SNR recommends a regular inspection of these parts, a seized or defective tensioner or idler roller can cause the belt to wear prematurely or break causing significant damage to the engine.

Tensioners and idler rollers should always be replaced at the same time as the timing belt and the replacement of these parts should always be carried out by a professional mechanic in order to comply with the vehicle manufacturers' recommendations.

### Timing kit (KD)

In its timing belt kits NTN-SNR includes all of the components needed to carry out the correct replacement of the timing belt system: tensioners, idler rollers, belts and fasteners.

The NTN SNR timing belt kit range now covers around 98% of all vehicles in use today.

#### Why use a timing belt kit?

- It ensures that you have all of the parts needed for the repair and eliminates the risk of ordering incorrect parts.
- Storage space: all of the parts are stored in one box.
- It ensures that all of the parts come from the same supplier and have the same quality.

### Timing belt kits with water pumps (KDP)

As the water pump is a wearable part, mechanics sometimes replace it as a preventative measure when servicing the engine timing system. NTN-SNR now offers a range of timing belt kits with the water pump included.

The timing belt kits with water pumps (KDP) cover all of the main applications in which the water pump is driven by the engine timing system.



# MANUFACTURER'S KNOW-HOW

## NTN-SNR quality

NTN-SNR is extremely conscious and demanding regarding the product quality it offers to its customers. This is reflected in a number of different ways:

- Applying the same demanding standards to the automotive aftermarket as applied to its original equipment
- Supplying all of the components required (bolts, nuts washers, studs...) to service the engine timing system in accordance with the manufacturers guide lines and specifications
- Using its expertise and know-how to carry out expert analysis and testing of all its products
- Only supplying products which are OE or original quality

## WHY CHOOSE NTN-SNR PRODUCTS?

#**PERFORMANCE**INSIDE exists for our customers as part of the company promise:

- NTN-SNR is an OEM supplier to all the major European and Asian vehicle manufacturers. NTN manufactures its timing system tensioners and primarily parts in Japan and Germany. Since 2006, NTN has been producing an average of 12 million tensioners per year. NTN is therefore the undisputed specialist in mechanical and hydraulic tensioner
- A large aftermarket range comprising of original products or products of original quality. The range now covers 98% of all vehicles used on the road today
- Complete kits including all the components needed for a correct and reliable repair



Nagano Works (Nagano, Japan)

## Inspection and replacement

Replacement of the timing belt is normal part of a vehicles service schedule, the timing belt is normally changed at a set amount of kilometres / miles or a time period as recommended by the vehicle manufacturer. Changing the belt helps insure the correct operation of the engine and helps avoid any major damage arising from worn parts (timing belt breaking).

NTN SNR recommends:

- Follow the replacement intervals specified by the vehicle manufacturer
- Never reinstall a used timing belt
- Replace the auxiliary belts, never reinstall a used belt
- When carrying out this repair, take the opportunity to inspect the pulley alignment and the condition of the other components in the system (water pump, crankshaft pulley, alternator pulley etc.)

For the vehicle owner, the following will reduce:

- The cost of future labour and a vehicle being out of use
- The risk of a major engine failure due to worn or broken timing system parts

## Problems and failures that may occur

Replacing the timing belt is a technically complex operation, failure to follow the manufacturer's guidelines and fitting instructions may cause expensive engine damage. Most timing belt failures are the result of incorrect fitment.

Some important instructions:

- During installation procedure tighten the belt to the specified tension, check the belt tension by using a tension meter and not by twisting the belt.
- Use appropriate tools (locking rods...)
- Automatic tensioners should be checked for correct alignment and that the reference marks are in the correct position.

In order to achieve the correct fitment of the timing belt kit, NTN-SNR recommends the use of a universal timing system locking tool such as Hazet tool, part no. HAZET 4794/35. This tool can be used with both petrol and diesel engines.

### BROKEN TENSIONER

#### SYMPTOMS

- Insufficient tension = lower stop marked bent or broken
- Excessive tension = upper stop marked bent or broken

#### CAUSE

- Incorrect tension

#### NTN-SNR RECOMMENDATION

- Follow the manufacturer's fitting instructions and recommendations



## MAIN PROBLEMS AND FAILURES:

### ROLLER OVERHEATING

#### SYMPTOM

- The roller has separated and has become severely discoloured

#### CAUSES

- Excessive tension
- External components seized or broken (OAP or water pump)

#### NTN-SNR RECOMMENDATION

- Follow the manufacturer's fitting instructions and recommendations



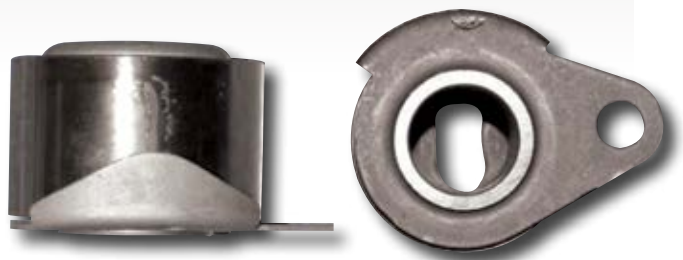
### INCORRECT POSITIONING OF THE PULLEYS

#### SYMPTOMS

- Poor indexing of the tensioner
- Circular marks on the back of the roller mount
- Discoloration of the pulley normally a violet colour
- Roller blockage and belt rubbing

#### CAUSES

- Incorrect tension, index improperly positioned relative to the engine crankcase
- Pulley plate crushed by the centring pin of the engine



#### NTN-SNR RECOMMENDATIONS

- Replace the belt, never refit a used belt
- Follow the manufacturer's fitting instructions and recommendations

### FRACTURED BOLT

#### SYMPTOM

- The bolt is sheared off

#### CAUSES

- Inadequate tightening torque
- Fatigue of the bolt caused by the up and down motion of the roller. Bolt subjected to shear

#### NTN-SNR RECOMMENDATIONS

- Tighten the bolt to the specified torque
- Oil the smooth part (seat) of the retaining bolt. Note oil must not be placed on the threads





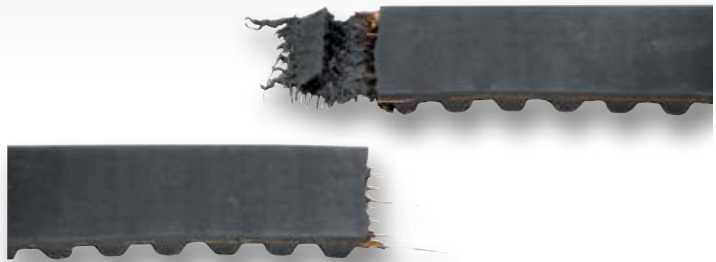
## CLEAN FRACTURE

### SYMPTOM

- Clean belt fractures

### CAUSES

- Defective materials
- Use of inappropriate tools when the belt was fitted (screwdriver)
- Bending of the belt before/during installation
- Solid or liquid contamination (Grease or oil)



### NTN-SNR RECOMMENDATIONS

- Replace the belt
- Check the transmission system
- Follow the vehicle manufacturer's installation recommendations
- Inspect engine pulleys for wear

## IRREGULAR BELT FRACTURE

### SYMPTOMS

- Belt torn at an angle
- Damage to the back of the belt may have small holes and fraying

### CAUSES

- Excessive belt tension
- External components seized or broken (OAP or water pump)
- Solid or liquid contamination (Grease or oil)



### NTN-SNR RECOMMENDATIONS

- Replace the belt
- Check the transmission system
- Follow the manufacturer's installation recommendations
- Inspect engine pulleys for wear

## JUMPED BELT/LOSS OF TEETH

### SYMPTOM

- Teeth stripped or broken of the belt

### CAUSES

- Complete or partial blockage of an engine timing system component
- The teeth are stripped from the base of the belt: insufficient belt tension or liquid contamination



### NTN-SNR RECOMMENDATIONS

- Replace the belt
- Check the transmission system and repair as necessary
- Make sure that the engine's timing belt covers are correctly installed and secure

# NTN-SNR AT YOUR SERVICE

NTN-SNR is offering a new generation of digital and online services to its dealers and garage owners.

## Smartphone application

In order to bring the information to the heart of the repair shops and to the dealers' shelves, NTN-SNR launched TechScaN'R, a smartphone/tablet application unlike any other in the industry. TechScaN'R provides online access to all technical information for any given product. It's useful for determining which parts have to be ordered together or accessing installation instructions!



Scan the reference on the box or the catalogue



Storage of favourites in offline mode and manual search function



You will receive the technical information



Display the product in 3D

