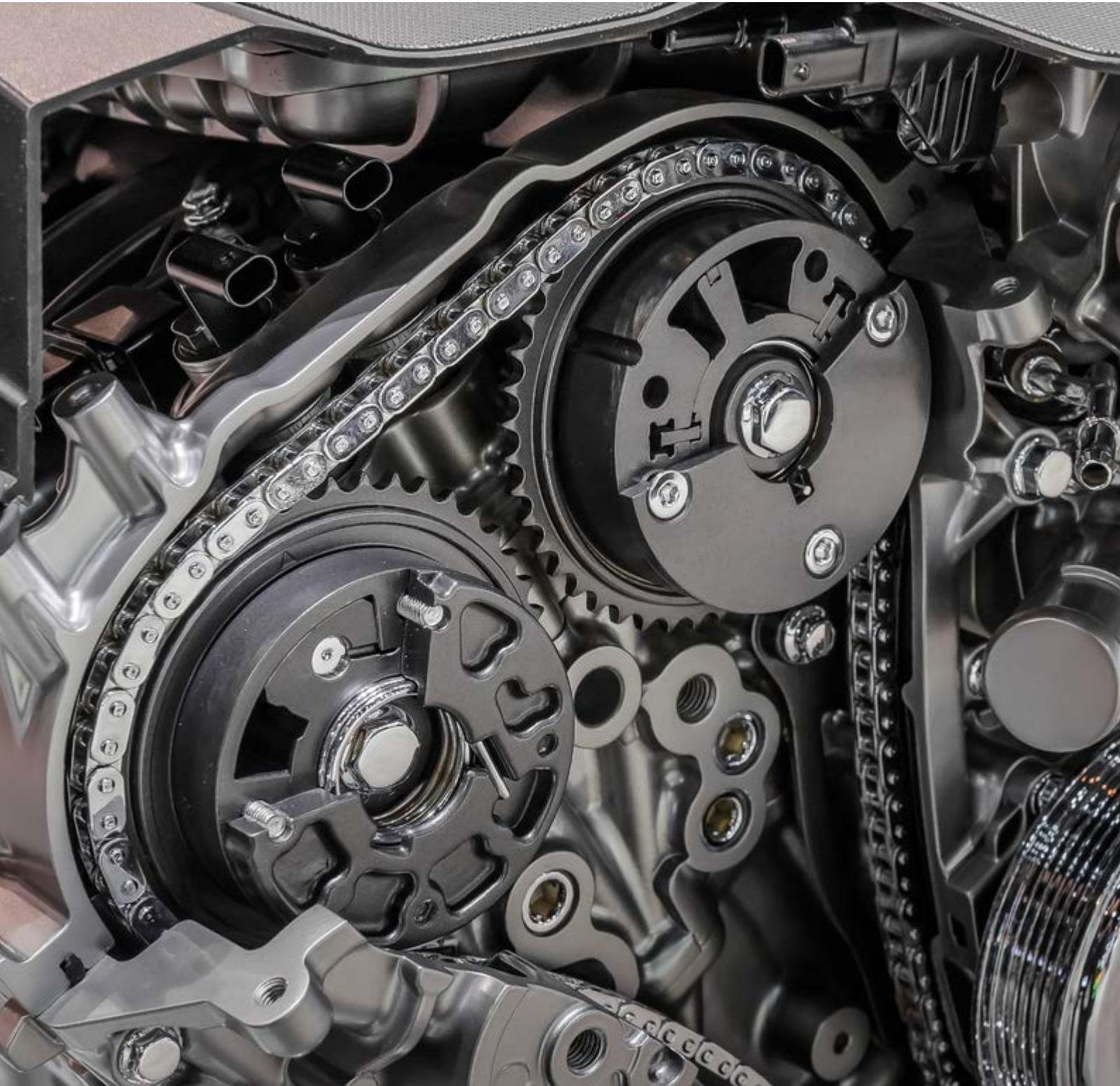


Timing Chain guide

Understanding Timing Chain system

Understanding the timing chain maintenance and alignment



Understanding the timing chain system

The timing chain is part of the car engine, and its role is to synchronize the rotation of the crankshaft and camshaft at the bottom and top of the engine. This helps the engine's intake and exhaust valves open and close synchronously at precisely defined intervals with each engine revolution.

The chain is located in the front of the engine and is engaged to a set of gears and pulleys that synchronize the crankshaft and camshaft and control the engine timing.

Timing chain system overview

- 1 Timing chain
- 2 Chain tensioner
- 3 Guiding elements
- 4 Camshaft sprocket
- 5 Camshaft sprocket with variable valve adjustment system
- 6 Crankshaft and oil pump sprocket



SKF aftermarket chains are manufactured accordingly to strict quality procedures in a carefully controlled process and SKF uses the same high strength materials as the Original Equipment Manufacturer (OEM). The design is also identical to the OEM and before a new chain kit is released, they must pass extensive tests in our laboratories to validate the performance. They are tested with respect to functionality, strength, and endurance.



Chains

Timing chains are made up of link plates, pins and rollers very much like a bicycle chain. They are made of hardened and coated steel to ensure strength and resistance to wear and tear. The links move on toothed sprockets which are located on the ends of the crankshaft and camshaft. Manufacturers primarily use two types of timing chain designs: silent chains or roller chains.



Tensioners

Metallic chain tensioners use a spring and an oil pressure chamber to maintain proper chain tension. These components also act as dampers allowing oil to seep through to reduce vibrations and noise coming from the engine and chain.



Levers and guides

Levers and guides come in a range of materials including steel, aluminium, plastic and glass reinforced plastic. They are located at certain points in the timing chain system to apply pressure and ensure the correct angle wrap of the chain.



Sprockets

Sprockets are toothed proiled wheels that drive the chain and allow the crankshaft and camshaft to transfer power to the engine.



Seals and gaskets

The gasket or static seal is the working seal between the timing cover and the engine block. This type of seal/gasket can come in various forms: a standard gasket, an O-ring style seal, or even a simple silicone-type sealant. A dynamic seal can also be found between the crankshaft and the timing cover.



Oil pump

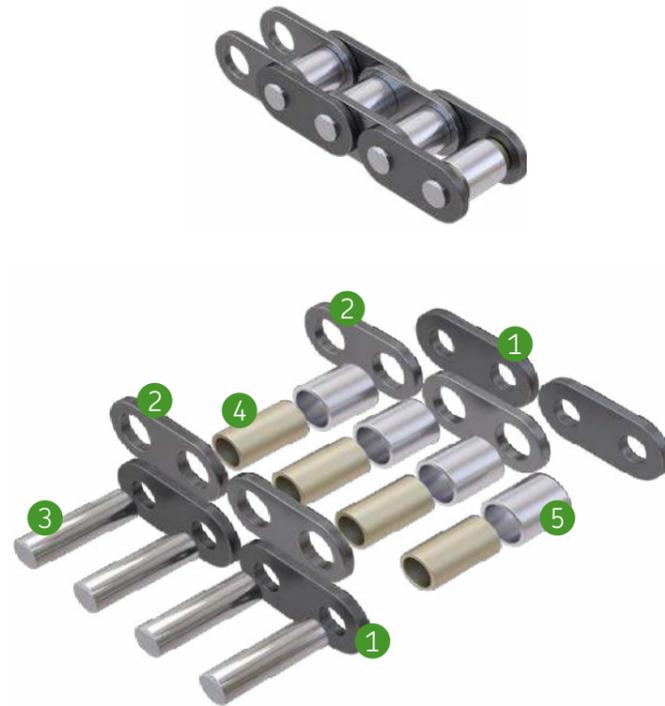
The oil pump ensures the chain and tensioner stay lubricated.

Timing chain designs

Roller chains

Roller chains can either be single or double. Rollers allow the chain to move over the gear teeth smoothly. This design helps reduce friction, wear on the sprockets and chain stretch. These types of chains are very dependent on proper lubrication and a clean working environment. Grit or debris, trapped in the rollers, will cause rapid wear. Roller chains also produce noise, especially if not properly dampened with guides and a tensioner.

- ① Outer link plates
- ② Inner link plate
- ③ Pin
- ④ Bushing
- ⑤ Roller



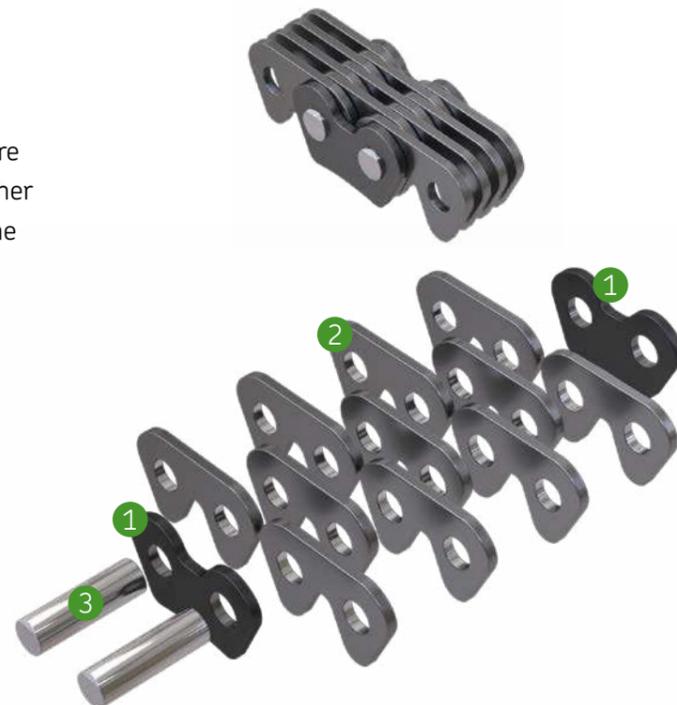
Roller timing chain and detail

Silent chains

Silent chains have a simpler design. They are constructed using multiple metal links, which are held in place by pins. The silent chain slides rather than rolls, which can generate more wear on the sprockets.

The advantages of this design include lower manufacturing costs and less noise during operation.

- ① Guide link
- ② Plate Pin link
- ③ Plate Pivot pin



Silent timing chain and detail

Timing Chain most common sources of failures

Although designed to last the lifetime of the vehicle, if manufacturer inspection procedures and maintenance intervals are not respected, premature wear and system failure will occur. There are two primary causes of premature wear: **inadequate lubrication management and misalignment due to incorrect installation.**

The importance of timing chain lubrication

A Timing Chain is a sensitive system that requires a good working environment to function well. Most problems can be avoided by assuring a good operating environment for the new chain. Lubrication, like with most parts of the modern combustion engine, is vitally important for the proper functioning and service life of the timing chain system. Oil is used to lubricate the chain and the tensioner that actuates the chain guide, maintaining the tension in the system.

Benefits of good lubrication for the timing chain system:

- Slows down wear of the pins and bushings on roller chains, and the pivot pins and links on silent chains.
- Flushes out debris and foreign materials as well as ensuring smooth engagement with the sprocket.
- Helps inhibit rust and corrosion, absorb heat, cushion impact forces and keep power consumption level.

Most chain drives will perform better and last longer when timely and adequate lubrication is provided.

Oil and oil filter

Fill the engine with new oil and a new oil filter after fitting. Select the oil according to the OEM recommendations. An incorrect oil quality can cause excessive wear and may shorten the chain service life. To get the best possible chain service life the recommended oil replacement interval must be followed.

Cleanliness

Clean and remove all residuals in the area you will fit the new chain. If there are wear residuals from the previous chain, oil residuals, sealing past, or corrosion that may cause premature wear of the chain drive.

Cooling liquid leakage

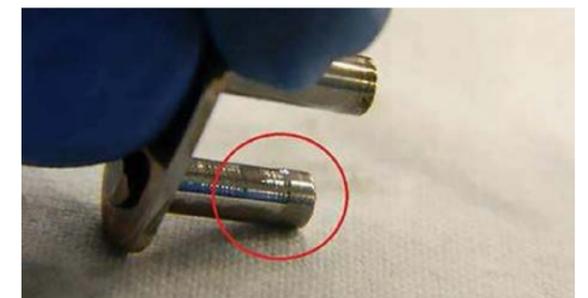
During dismounting look out for signs of cooling liquid in the oil.

Change engine oil and filters at vehicle manufacturer recommended intervals. Polluted oil will damage components.

Damage caused by inadequate lubrication



Excessive wear on plastic part of the guide. Inadequate lubrication has caused the chain to elongate and collide with the guides.



Excessive movement in the system will cause parts to wear and lead to broken chains, guides and engine damage.

How to avoid problems caused by inadequate lubrication

- **Change engine oil and filters** at vehicle manufacturer recommended intervals.
- Use **premium quality** engine oils and oil filters.
- **Ensure correct engine oil levels** according to vehicle manufacturer instructions
 - too much or too little oil will damage the engine.
- **Use the correct oil grade** according to vehicle manufacturer specifications (e.g. 5 W, 10 W). The wrong oil can cause extra load on the chain, increase wear and the engine will not be properly lubricated.
- **Do not mix** different types of oils.
- **Clean** the oil pump and the metal filter according to vehicle manufacturer instructions.
- Make sure the oil pump is **working correctly and replace** if worn.

The importance of correct gear alignment

One of the most common installation errors, according to timing chain suppliers, is misalignment. This can be caused by something as simple as installing the cam sprocket backwards, using the wrong thickness of washer under the sprocket, failing to press a cam gear all the way on or incorrect torque used on sprockets without a key slot (see Fig. 1 and 2).

If the cam and crank sprockets are not perfectly aligned, the result will be rapid chain and sprocket wear, or interference problems. When installing sprockets on the cam and crank, do not hammer directly on the sprockets or chain. Press both sprockets on evenly, keeping them parallel. This prevents stretching or damaging the chain or sprockets.

Always double check the alignment of all timing marks on every engine application to make sure they are correct, especially on engines with balance shafts.



Fig. 1 Sprocket without key slot



Fig. 2 Sprocket with key slot

The installation of the Timing Chain is the second most common mistake leading to premature wear or system failure. The correct fitting procedure is important to have a good result.

Timing chain installation tips

- Inspect any oil control devices for leaks before starting the procedure. Replace the component causing the leak during the replacement procedure.
- Before dismounting the chain, rotate the crankshaft manually to align the timing marks. ALWAYS use proper tools to prevent valve damage and secure a professional repair.
- Inspect chain, tensioner, levers, guides and sprockets to check any cracking, wear and damage before removing the parts according to manufacturer recommendations to understand the cause of the potential failure or issue.
- Replace chain, tensioner, levers, guides, sprockets using proper tools according to manufacturer recommendations.
- Always apply tightening torques according to manufacturer service procedures using a torque wrench only.
- Use all extra components included in SKF kits in order to avoid premature failure.
- Proper lubrication is key to prevent chain wear and elongation, resulting in significant longer service life and higher performance and reliability.
- SKF anti wear lubricant formula is designed to reach and protect from heavy loads and the contact areas between the chain elements; effectively reducing friction, noise and wear. Limited to specific car engine applications, its benefits are:
 - Reduces friction
 - Extends the chain life and reduces the risk of premature chain damage
 - Increased operational safety
 - Prevents early run-in wear of the chain
 - SKF unique and exclusive formulation
 - Compatible with all engine oils
- Always replace the oil filter and clean the engine block, engine cover, the oil pump and the metal oil filter.
- After timing chain replacement, always change the oil following manufacturer specifications and then, check oil level to ensure sufficient lubrication.



Use appropriate camshaft tool



Torque according to manufacturer guidelines



For more detailed fitting instructions watch the technical installation videos at [youtube.com/user/SKFAftermarket](https://www.youtube.com/user/SKFAftermarket)

⚠ WARNING

It is **essential** to follow the vehicle manufacturer instructions and specifications when working on the engine. SKF kits are designed for the automotive repair professional and must be fitted using the recommended tools. SKF disclaims all liability due to failure to follow instructions.

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