



Technical Service Bulletin

Date: Rev. 1: 5/15/09

Product Description: **AMSOIL SAE 0W-20 (ASM) and XL 5W-20 (XLM) Engine Oil**

Subject: **Using AMSOIL ASM and XLM in the Mazda RENESIS Rotary Engine**

OBJECTIVE:

Provide information about the use of synthetic engine oil in the Mazda RENESIS rotary engine.

ISSUES:

According to Mazda Corporation Engineering bulletin #06010010 dated 10/27/2006, injecting synthetic engine oil into the combustion chamber of the RENESIS engine may lead to carbon buildup that adversely affects engine performance. Mazda conducted a case study with the use of synthetic engine oil in the rotary engine, finding it caused a large amount of viscous carbon buildup on the side housing. Mazda did not conclude that this carbon buildup contributed to adverse engine performance, but did state that if carbon buildup adheres near the spark plug hole, or to the seals in the combustion chamber, it may lead to adverse effects such as engine misfire or knocking.

At this time, AMSOIL does not have any test data to support this position. However, there is also no test data illustrating any long-term effects of using synthetic engine oil in the RENESIS engine.

Mazda Engineering did state that “not all synthetic oil is at a disadvantage in terms of carbon buildup, but use of untested, non-genuine oil should be avoided.”

TECHNICAL DISCUSSION:

Mazda has produced different versions of the rotary engine over the years. The design is comprised of a three-lobed rotor that rotates inside an oval-shaped chamber to create combustion. Because of this design, its lubricating requirements are slightly different than those of a typical piston design engine. To lubricate the rotor and seals, a metering oil pump injects a small amount of the engine oil into the rotor chamber.

Numerous articles and technical discussion boards claim synthetic engine oils do not burn completely in the rotary engine, leading to the formation of carbon deposits. Although this claim comes from several sources, there is no scientific evidence to support it.

OIL PROPERTIES:

Two physical properties should be taken into account regarding the burning potential of engine oil:

1. **Flash point:** The temperature at which engine oil will briefly ignite, but not sustain a flame.
2. **Fire point:** The temperature at which engine oil will sustain a flame.

There is speculation that synthetic engine oils will not burn in an engine combustion chamber based on the assumption that synthetic oils handle higher temperatures better than conventional petroleum-based engine oils.

For the RENESIS engine, Mazda recommends using SAE 5W-20 engine oil meeting API SM/SL and ILSAC specifications. The following is a comparison chart of the typical flash points of various SAE 5W-20 and SAE 0W-20 engine oils found in the marketplace:

FLASH POINT COMPARISON		(Celsius)
AMSOIL 0W-20 (ASM)		228
AMSOIL XL 5W-20 (XLM)		226
Mazda 5W-20		221
Mobil Clean 5000 5W-20		200
Mobil 1 5W-30		228
Mobil 1 Supersyn 0W-20		236
Motorcraft 5W-20		220
Castrol GTX 5W-20		228
Valvoline Conventional 5W-20		220
Valvoline Durablend 5W-20		236
Valvoline Synpower 5W-30		221
Pennzoil Conventional 5W-20		229
Pennzoil Synthetic 5W-20		224

As seen in the chart, the flash points between the petroleum and synthetic engine oils are very similar, meaning each should burn at about the same temperature in the combustion chamber of the RENESIS engine.

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CARBON DEPOSITS:

As noted in the Mazda bulletin, carbon formation in the RENESIS engine can lead to engine misfire and knocking. Carbon deposit formation may not be due to the type of base oil, but can also be related to the ash content of the oil additive package. Higher ash content oils can form more carbon deposits than lower ash content oils.

In recent years, API and ILSAC have reduced the ash content in engine oil to below 0.80% (max) by weight to meet API SM, ILSAC GF-4 specifications. Because all SAE xW-20 engine oils are required to have low ash, there is less tendency for carbon formation when they are burned in the combustion chamber.

MAZDA RECOMMENDATION:

Mazda Engineering recommends the use of designated genuine engine oil and the following guidelines:

- Engine oil should be changed regularly.
- Only designated genuine oil be recommended to customers.
- Under severe conditions, oil should be changed at 5,000 km or every 6 months.

The Mazda owner's manual for the RX8 models with the RENESIS engine calls for the use of SAE 5W-20 engine oil that meets API SM/SL and is ILSAC rated. However, it does not specify what type of oil to use or issue any warnings about the use of synthetic engine oil.

AMSOIL RECOMMENDATION:

AMSOIL recommends AMSOIL 0W-20 Synthetic Motor Oil (ASM) and 5W-20 XL Synthetic Motor Oil (XLM) for Mazda RENESIS engine applications. ASM and XLM are premium oils meeting API SM/SL requirements. AMSOIL recommends following Mazda recommended oil change intervals and closely monitoring engine performance.

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