Gear Performance (FZG ASTM D-5182)

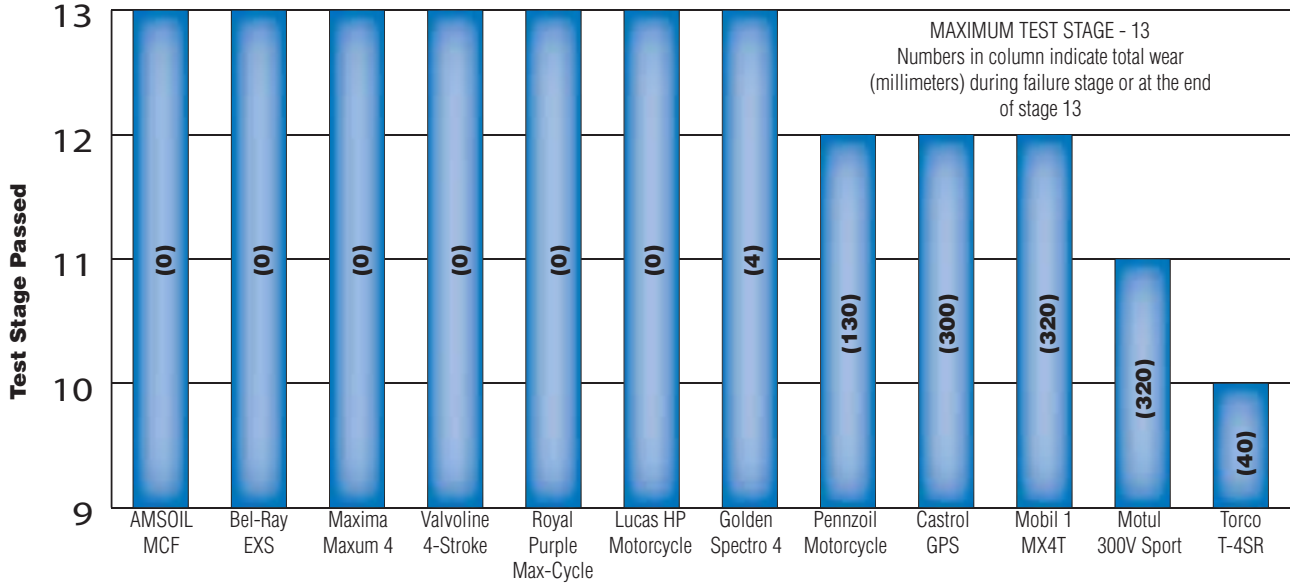
Wear protection is provided by both the oil's viscosity and its chemical additives. The greatest need for both is in the motorcycle transmission gear set. High sliding pressures, shock loading and the shearing forces applied by the gears demand a great deal from a lubricant. Motorcycle applications present a unique situation because many motorcycle engines share a common lubrication sump with the transmission. The same oil lubricates both assemblies, yet engines place different demands on the oil than do transmissions. What may work well for one may not work well for the other. In an attempt to meet both needs, a lubricant's performance can be compromised in both areas.

To examine gear oil performance, the ASTM test methodology D-5182 (FZG) is used. In this test, two hardened steel spur gears are partially immersed in the oil to be tested. The oil is maintained at a constant 90° C and a predetermined load is placed on the pinion gear. The gears are then rotated at 1,450 RPM for 21,700 revolutions. Finally, the gears are inspected for scuffing (adhesive wear). If the total width of wear on the pinion gear teeth exceeds 20 mm, the test is ended. If less than 20 mm of wear is noted, additional load is placed on the pinion gear and the test is run for another 21,700 revolutions. Each time additional load is added, the test oil advances to a higher stage. The highest stage is 13. Results indicate the stage passed by each oil. Wear is reported for the stage at which the oil failed.

Results, Gear Wear Test, SAE 40 Group

Pass Example:
AMSOIL MCF
Passed Stage 13,
Total Wear 0 mm

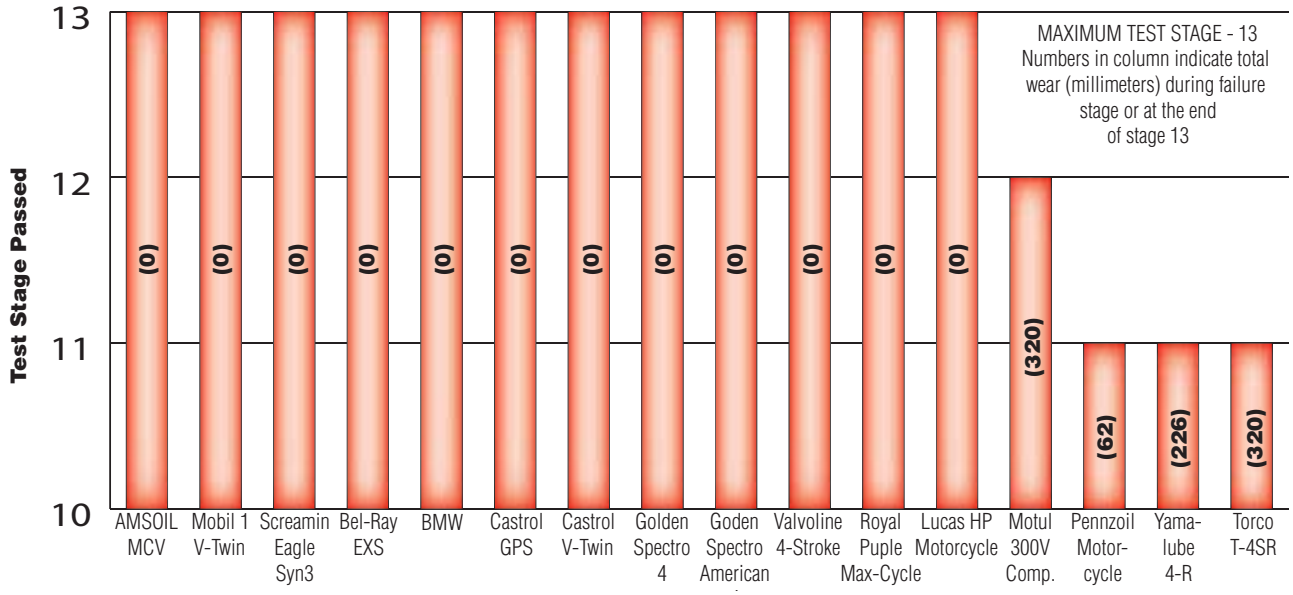
Failure Example:
Castrol GPS
Passed Stage 12,
Failed Stage 13,
Total Wear in
Stage 13, 300 mm



Results, Gear Wear Test, SAE 50 Group

Pass Example:
AMSOIL MCV
Passed Stage 13,
Total Wear 0 mm

Failure Example:
Motul 300 Comp.
Passed Stage 12,
Failed Stage 13,
Total Wear in
Stage 13, 320 mm



The test shows that 58.3% of the SAE 40 grade oils and 75% of the SAE 50 grade oils passed stage 13. Note that in the SAE 40 group, Mobil 1 MX4T, Motul 300V Sport and Torco T-4SR tied with AMSOIL MCF for the best 4-ball result but scored among the lowest in the FZG gear test. In the SAE 50 group, Motul 300V Competition and Torco T-4SR tied with AMSOIL MCV for the best 4-ball result, yet scored among the lowest in the remaining 25%. FZG and 4-ball wear tests measure wear protection differently. High scores in both tests indicate superior wear protection in a variety of applications and conditions. Only AMSOIL MCF (SAE 40) and MCV (SAE 50) placed on top in both wear tests.