SOUTHWEST RESEARCH INSTITUTE®
Fuels and Lubricants Research Division

Sequence IVB Engine Test
(ASTM D8350)

Specifications
- ILSAC GF-6, API SP

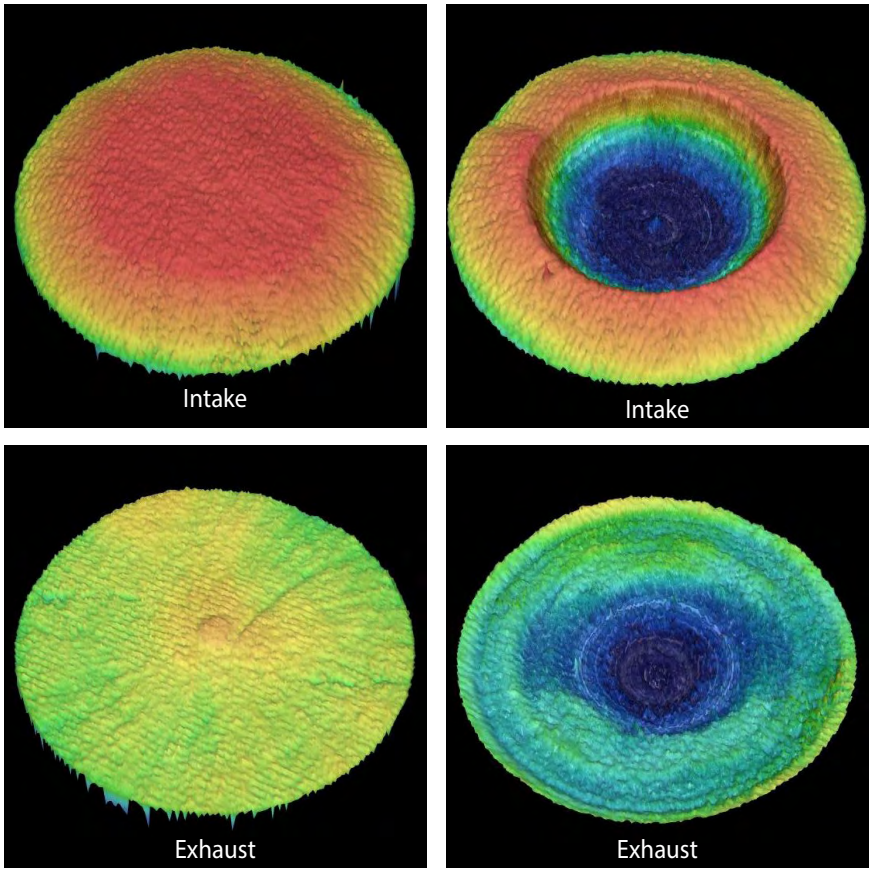
Objective
- Evaluate the effect of an automotive lubricant on tappet wear for engines with direct-acting overhead cam valvetrains.

Test Fixture
- Toyota 2NRFE 1.5L fuel-injected, inline four-cylinder engine with dual overhead cam shafts and four valves per cylinder.

Test Parameters
- The test duration is 200 hours involving 24,000 thirty- second cycles, each cycle consisting of four stages: two steady-state stages with transition ramp stages between them.
- Unleaded Haltermann KA24E Green fuel is used.

Test Parts Evaluation
- The volume loss due to wear on each of the 16 bucket lifters is measured using a 3D macroscope. The mass loss of each lifter is also recorded.
- Average intake lifter wear volume and end-of-test oil iron concentration are the primary evaluated parameters.

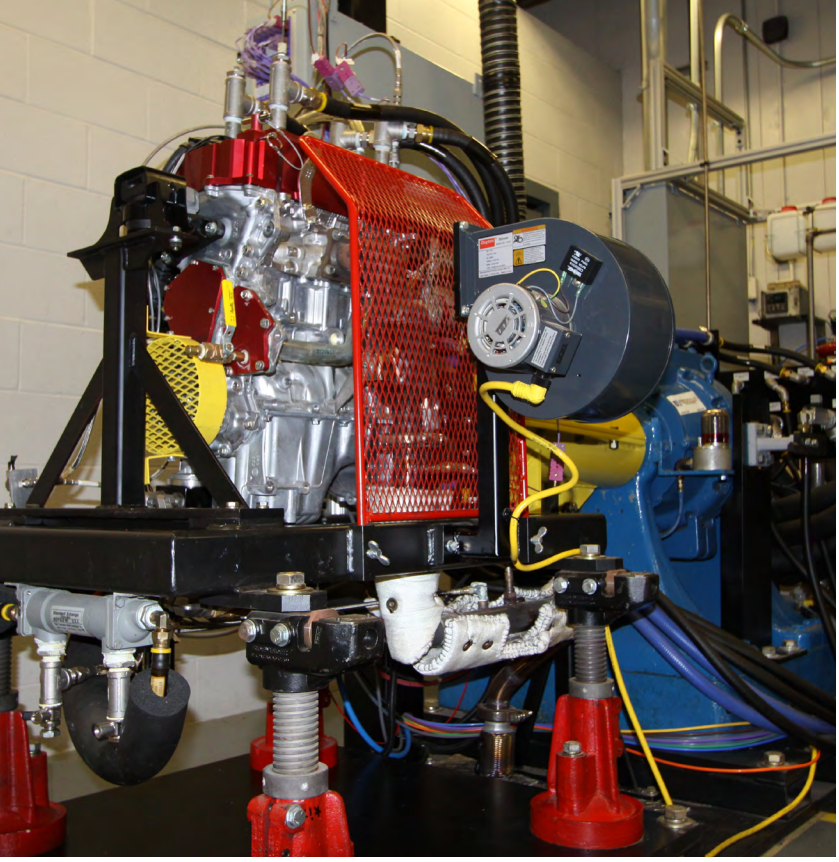
Pre-test Volume | Post-test Volume



Used lubricant Analysis
- Karl Fischer water content (ASTM D6304)
- Viscosity @ 40°C (ASTM D445)
- Acid number (ASTM D664)
- Fuel dilution (ASTM D3525)
- Base number (ASTM 4739)
- Wear metals (ASTM D5185)
- Oxidation and nitration (FTIR peak area)

Test Condition	Stage 1	Ramp 1 to 2	Stage 2	Ramp 2 to 1
Time, seconds	7	8	7	8
Engine speed, rpm	800	800 to 4300	4300	4300 to 800
Engine torque, Nm	25	25	25	25
Engine coolant-in temp, °C	49	49	49	49

Pass/Fail Criteria
- Maximum average intake lifter volum loss of 2.7 mm^3
- Maximum end-of-test iron of 400 ppm



We welcome your inquiries.
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