CASE STUDY

3,469-Mile Case Study in Rotax® E-TEC® Engine

Overview

Since purchasing his 2011 Ski-Doo® TNT snowmobile new in December 2010, Jerry Springer of Ft. Wayne, Ind. has used AMSOIL INTERCEPTOR Synthetic 2-Stroke Oil exclusively. The snowmobile's Rotax® E-TEC® 800R engine uses targeted oil-injection technology that delivers a smaller amount of oil at exact times to specific locations in the engine. Because it uses a leaner gas-to-oil mixture than other engines, robust oils with increased lubricity and cleanliness properties are recommended. Bombardier Recreational Products (BRP®), the manufacturer of Ski-Doo snowmobiles, leads consumers to believe that only its more-expensive XPS-2 Synthetic 2-Cycle Oil is capable of providing the required level of protection. In fact, the snowmobile arrived from the factory with an attached notice recommending XPS-2 Synthetic 2-Cycle Oil exclusively. Personnel at the Ski-Doo dealership also notified Springer that BRP strongly recommends only its own oil be used. BRP alleges, through published advertisements showing scuffed pistons, that use of other oils, including INTERCEPTOR, will lead to engine failure. Springer, however, chose to use AMSOIL INTERCEPTOR Synthetic 2-Stroke Oil. "I have used AMSOIL for years with no issues," he said. "The snowmobile has not experienced one whisper of a problem."

Riding Conditions

Approximately 95 percent of the snowmobile's miles are accumulated on groomed trails throughout Michigan's Upper Peninsula. The remainder are accumulated in off-trail riding. High-speed, high-rpm driving is common, with frequent speeds of 50-80 mph. When conditions allow, Springer operates the snowmobile at speeds of 85-100+ mph. Trail rides routinely span 150-200 miles per day.

Maintenance Practices

Following each ride, the snowmobile is thoroughly washed and blown/wiped dry. A visual inspection is performed to verify overall mechanical integrity. The chaincase oil and motor oil reservoirs are checked and filled as needed. Depending on mileage, the primary clutch is removed, cleaned and inspected. All suspension components are greased as needed.

Recall Notice

In the fall of 2011, Ski-Doo recalled several of its snowmobiles, including the model owned by Springer, due to potential failure of the piston ring locating pins that prevent the rings from rotating. The recall required replacement of both pistons, providing the opportunity to test BRP's claim that INTERCEPTOR will fail to protect Rotax E-TEC engines and cause piston scuffing.

With 3,469 miles on the snowmobile, an authorized Ski-Doo dealer replaced both pistons as stipulated in the recall notice. Contrary to BRP's allegations, the pistons exhibited no scuffing. "The mechanic said the pistons looked brand new," said Springer. For additional confirmation, the pistons and rings were rated for scuffing, sticking and other distress by an independent ASTM-calibrated rater using the appropriate techniques and rating scales as defined in the Coordinating Research Council, Inc. *Deposit Rating Manual No. 20*. Components were assigned either a merit rating on a scale of 0-10, with 10 representing no distress, or a percentage rating, with 0.00 percent representing no distress.

2011 Ski-Doo TNT Rotax E-TEC 800R 3,469 Miles

MAG

Piston Scratching	2%
Piston Scuffing	0%
% Coating Removed, Exhaust Side	50%
% Coating Removed, Intake Side	15%
Ring Sticking	10
Crown Land	5.20

PTO

Piston Scratching	3%
Piston Scuffing	0%
% Coating Removed, Exhaust Side	40%
% Coating Removed, Intake Side	10%
Ring Sticking	10
Crown Land	4.20

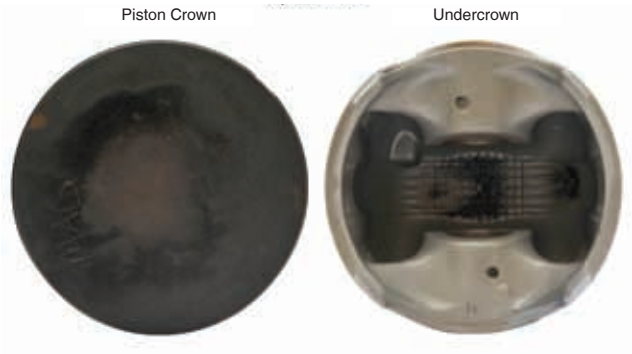
Results

Scratching, which is not lubricant-related, refers to the alteration of the skirt surface by fine particles suspended in the lubricant, fuel, air or embedded in a surface. Scuffing, which is lubricant-related, appears as a matte finish. INTERCEPTOR completely prevented piston skirt scuffing, demonstrating excellent lubricity. INTERCEPTOR effectively protected the pistons from wear and limited removal of the piston coating.

The piston rings earned perfect merit ratings of 10 and showed no signs of sticking, confirming the lubricant's strong cleanliness properties.

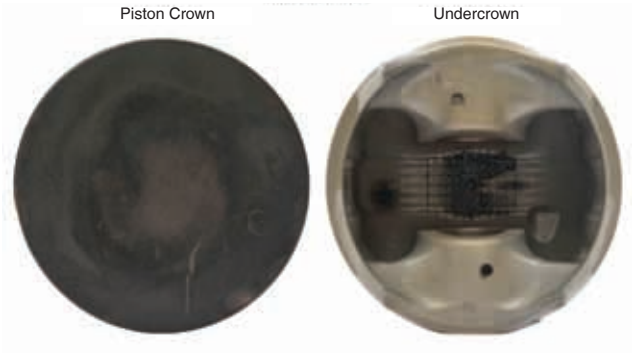
2011 Ski-Doo TNT Rotax E-TEC 800R 3,469 Miles

MAG



Piston Crown	8.31
Piston Undercrown	6.76

PTO



Piston Crown	8.23
Piston Undercrown	5.75

Results

To protect against preignition and poor performance, two-stroke oils must resist piston crown deposits caused by the elevated temperatures inside the combustion chamber. INTERCEPTOR Synthetic 2-Stroke Oil excelled at limiting deposit formation, with piston crowns earning high ratings.

Conclusion

Contrary to BRP's allegations, AMSOIL INTERCEPTOR Synthetic 2-Stroke Oil meets or exceeds the increased performance needs of Rotax E-TEC engines. In demanding, real-world conditions, the lubricant completely prevented piston skirt scuffing and ring sticking. The results can be extrapolated to conclude the wear protection and deposit control extends to Polaris®, Arctic Cat® and other makes and models of two-stroke snowmobile engines as well.

This case study also provides in-field confirmation of the results published in *A Study of INTERCEPTOR® Synthetic 2-Stroke Oil for Ski-Doo® Rotax® E-TEC® Engines* (G3039), in which INTERCEPTOR prevented piston skirt scuffing and piston ring sticking in a Rotax E-TEC 800R engine operated under extreme conditions for 50 hours (sufficient time to replicate an entire riding season). For details, visit www.amsoil.com/proof.

INTERCEPTOR is Warranty Secure™, keeping your factory warranty intact. INTERCEPTOR is a high-performance replacement for BRP's more-expensive XPS-2 Synthetic 2-Cycle Oil and is backed by the AMSOIL Limited Warranty (G1363). For details, visit www.amsoil.com/warrantysecure.

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Referral #_____

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