TESTING RESULT REPORT FORM
Engines Laboratory, University Science Malaysia
Horizon Gitano
25-09-06

The USM Engines lab was contacted by Bio Energy of Nibong Tebal, Penang, Malaysia on 14-09-06 for the purpose of testing a fuel additive called "Green Oil". This report contains details of some extended time runs using computerized data acquisition of engine speed.

Test Overview

The purpose of the testing was to determine what effect the additive has on engine speed running unloaded at part-throttle. The engine was a two-stroke (Tokai TL36) from a grass cutter.

A significant difference in engine steady state speed was seen when burning running the Green Oil additive. The steady-state operational speed of then engine was approximately 3600 to 3800 rpm on the nominal petrol/two-stroke oil mixture, and increased to approximately 4500 to 4600 when using Green Oil.

Procedure Two-Stroke Testing

The two-stroke engine was fueled with gasoline and two-stroke oil (Enduro Fragrance in a 1:25 v/v concentration). The engine was warmed up on this standard fuel for approximately 45 minutes prior to the beginning of speed data recording. Once the baseline operation of the engine had been recorded, the fuel was switched to a Green Oil mixture. The engine stabilize to a higher speed during operation on the Green Oil mixture. The fuel was then switched back to the standard fuel (i.e. without Green Oil) and the speed of the engine dropped accordingly. This cycle was subsequently repeated, as shown in the engine speed recording below.

The run was performed according to the following:

1.0 START ENGINE burning gasoline only (or gasoline + two-stroke oil)
1.1 Warm up for 45 minutes.
1.2 Begin continuous measurement of engine speed on standard petrol/oil
2.0 Time = 8.40: Run 50 ml of Green Oil + standard fuel/oil mix
3.0 Time 25.30: Change fuel (back to standard fuel/oil mix without Green Oil)
3.1 Run for 40 ml of standard fuel
4.0 Time = 38.30: Run 20 ml of Green Oil + standard fuel/oil mix
5.0 Time = 44.20: Change fuel (back to standard fuel/oil mix without Green Oil)
5.1 Run for 60 ml of standard fuel
5.2 Shut down engine

Results Two-Stroke Engine

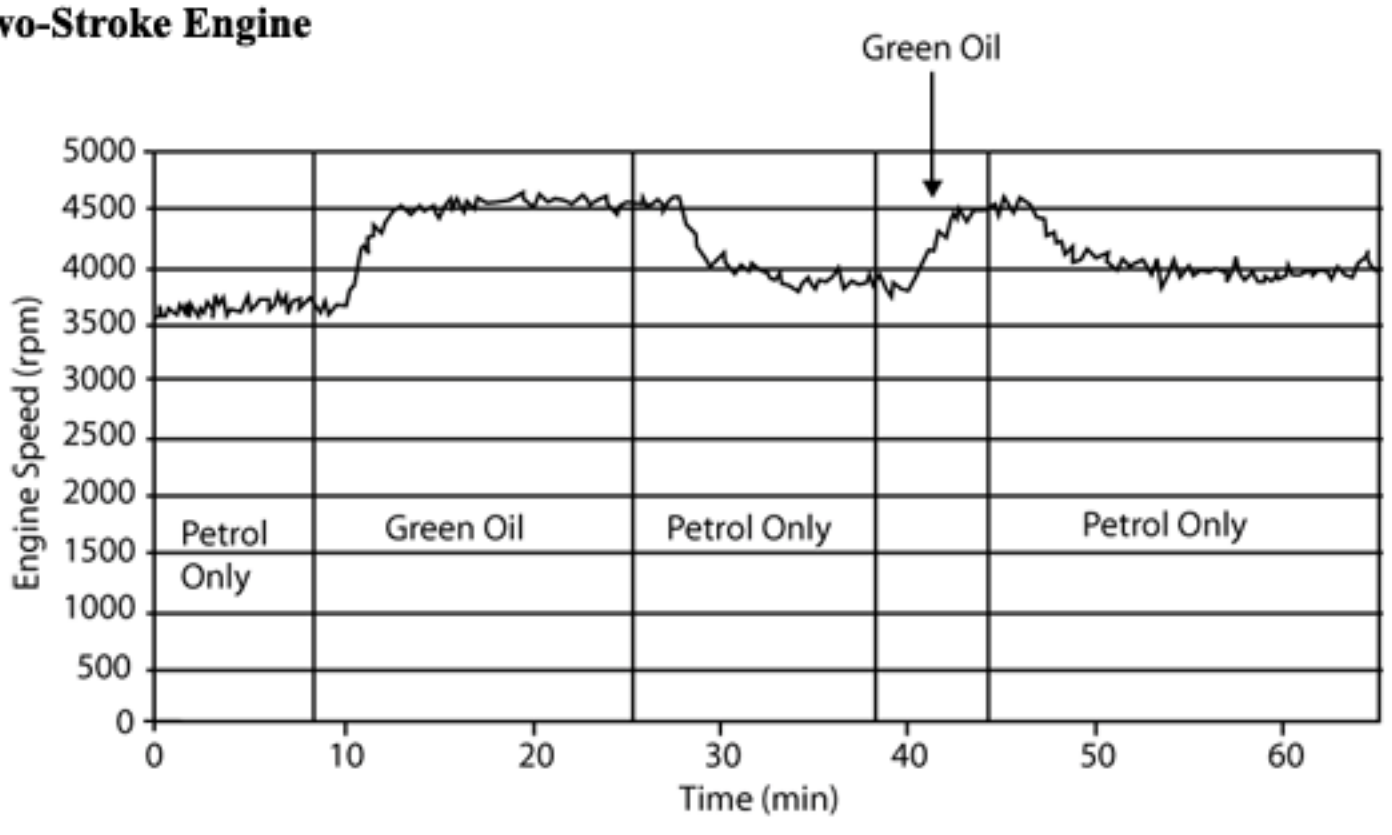

Figure 1: Engine speed versus time. Vertical lines indicate changes of fuel

It was observed that the engine required approximately two minutes of operation before the change of fuel took effect. Within about 5 minutes of a fuel change the engine would begin to stabilize at its new steady state operating condition, though it took more like 15 minutes to completely stabilize.

Conclusions

The usage of Green Oil fuel additive in a two-stroke engine gave a significant and repeatable increase in the steady state operational speed of an unloaded engine.

Two-stroke engines are very sensitive combustion chamber and bearing lubrication variations, so it is possible that there is a different in the results when used on a four-stroke engine. More sensitive tests are required to further quantify the effects of the Green Oil additive on four-stroke engines. Further, it is recommended that a controlled speed, loaded test be performed in order to get better resolution on the effects of the additive on the engine performance. An optimized test might incorporate the following changes:

1) Apply a load to engine
2) Control the engine speed
3) Instrument the engine with automated torque measurements

For further information about this or other testing at the USM Engines Laboratory please contact me directly.

Professor Horizon Gitano-Briggs
Director, Engines Lab
University Science Malaysia
Seri Ampangan
14300, Nibong Tebal
Penang, Malaysia