



Smoke Treatment for Petrol Engines

Description

STP Smoke Treatment, a mineral oil based additive, provides extra oil cushioning and improves motor oil viscosity at high temperatures, reducing oil consumption, burning, blow-by and smoking.

Benefits of Using STP Smoke Treatment

STP Smoke Treatment used regularly helps:

- Reduce engine wear
- Provide extra engine protection to the engine
- Reduce engine deposits, keeping vital engine parts cleaner
- Fight oil oxidation and breakdown at high temperatures
- Reduce corrosion
- Reduce exhaust smoke
- Lower oil consumption
- Cushion noisy valves and lifters



STP Smoke Treatment:

- Is recommended for use in all four cycle petrol engines including cars, trucks, vans, tractors, boats, motorcycles, marine engines
- Can be used in diesel engines, but only if it has been determined that oil burning is the cause of excessive exhaust smoke
- Mixes with regular and synthetic motor oils
- Can be used in a turbo charged vehicle
- Must not be used in a vehicle with a wet clutch: the friction reducing properties of STP Smoke Treatment will make the clutch slip
- Must not be used in a two stroke vehicle
- Is best added to a fresh oil change or in-between changes to boost or replenish key additives
- Can be used with other STP additives

How STP Smoke Treatment Works

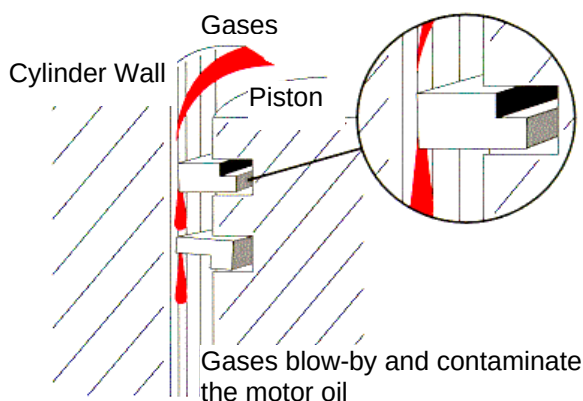
STP Smoke Treatment contains specially selected and formulated viscosity improvers to provide a thicker oil cushion. This can help to reduce the space between the cylinder walls, piston rings and valve guide oil seals which result from friction and metal-to-metal contact. This in turn reduces oil blow-by and smoking. It is specifically formulated for use with today's high quality motor oils to restore motor oil additives and provide extra

protection to new motor oils and, as such, contains four of the important components typically used in the formulation of these motor oils:

- 1 *A dispersant modified ethylene-propylene copolymer viscosity modifier (Viscosity Index Improver)*; used in the formulation of lubricants to provide greater resistance to thickening at low temperatures and thinning at high temperatures. The dispersant carries deposits away from the engine, preventing them from adhering to engine parts.
- 2 *An effective anti-wear/anti-oxidant compound (zinc dialkyldithiophosphate – ZDDP, the most highly recognised anti-wear agent used in today's motor oils)*; serves to protect vital engine parts from wear caused by metal to metal contact (cams, lifters, etc), and helps prevent thermal oil breakdown.
- 3 *An overbased calcium sulphonate detergent*; efficiently cleans deposits, varnish and sludge from the metal surfaces of the engine, neutralising acids formed by combustion and thus reducing corrosion. The dispersant then carries deposits away, preventing them from adhering to engine parts.
- 4 *A solvent refined mineral oil basestock.*

When incorporated into motor oils, each of these components assists in the maintenance of engine performance by either helping to increase oil viscosity at high temperatures, reduce oil consumption, reduce engine wear, and/or reduce the formation of varnish and sludge deposits on vital engine parts.

STP Smoke Treatment Boosts Protection, Reducing Smoke, Wear & “Oil Blow-by”



Excessive exhaust smoking (blue smoke) can be caused by oil making its way between worn cylinder walls and piston rings, and burning in the combustion chamber. This is called “oil blow-by”. When oil thins (ie shears down), wear between cylinder wall and piston ring can lead to reduced compression. Combustion chamber gases blow-by and contaminate the motor oil. The ZDDP in STP Smoke Treatment helps reduce smoking by providing a thick oil film to give better lubrication, prevent wear, and help reduce motor oil blow-by.

Fresh motor oil and motor oil additives can begin to break down after just 50 miles, and as a result may not provide protection between oil changes. STP Smoke Treatment restores motor oil additives between oil changes and provides extra protection to new motor oils. Its multi-additive formula helps maintain high viscosity properties. Viscosity Index (VI) Improvers are used in all multi-grade oils. (Oils such as SAE 10W-30 and SAE 10W-40 are typical examples.) STP’s scientifically created VI Improver gives the oil extra protection by adding extra viscosity when it is needed most. Its highly specialised ingredient resists breaking down under heat and pressure, so gives a heavier film of oil for superior lubrication when the oil is hot, yet allows the oil to flow properly to engine parts when it is cold, better than the less stable VI Improvers used in most multi-grade motor oils. Typically, STP Smoke Treatment will add approximately a full SAE grade to an oil (from SAE30 to SAE40, for example).

The anti-wear ability of ZDDP is very important in protecting sliding parts such as cams and followers, piston rings and cylinders against any loss of lubrication caused by a rupture (failure) of the oil film under the high pressures and temperatures found in today's engines. In these cases, when the oil film fails, the ZDDP forms a chemical coating that takes over to help keep the two metal parts from welding or scuffing as they rub together. The combined effects of the higher viscosity provided by the VI Improver and the higher ZDDP content give greater protection to these critical parts than that provided by the oil alone. In independent tests, STP Smoke Treatment reduced lifter wear by 63% versus API SH motor oil alone. In engine laboratory tests, STP reduced cam plus lifter wear by 81% with API SG motor oil. Image 1 shows a picture of a worn cam lobe.



Image 1: Worn Cam Lobe with Engine Oil Only

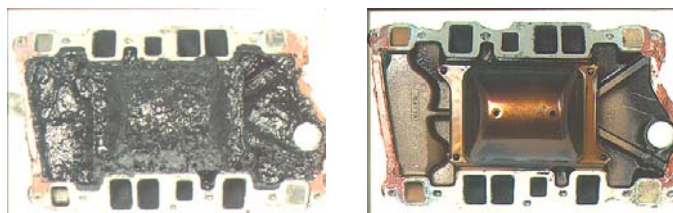
STP Smoke Treatment Fights Motor Oil Contamination, Cleaning Vital Engine Parts

Oxidation is a chemical reaction where, as a result of high operating temperatures, hydrocarbons in the motor oil and oxygen from the air form various complex chemicals. These substances are eventually baked by engine heat to a hard, resinous, varnish-like consistency, causing the oil to degrade, thicken and lose its ability to flow easily. Soot, carbon and unburned fuel that leak past crankcase rings will also contaminate and dilute motor oil, causing sludge to form. Cooling system leaks are another source of contaminants.

Overbased Calcium Sulphonate is a detergent which efficiently cleans varnish, deposits and sludge from the metal surfaces of the engine. The dispersant properties of the VI Improver keep the particles dispersed in the oil to reduce the possibility of oil passage blockages, helping to neutralise acids formed by combustion and thus reducing corrosion.

Oxidation combined with moisture also produces complex chemicals that can attack engine metals (main and connecting rod bearings, for example). The water and acid by-products condense on cylinder walls and mix with crankcase oil, resulting in sludge, rust and corrosion. STP Smoke Treatment contains alkaline-based acid inhibitors that help neutralise acids. STP's rust inhibitor also forms a film on metal parts that reduces corrosion and resists sludge formation. As the formation of harmful deposits (such as varnish and sludge) in the engine are reduced, oxidation is reduced, and the motor oil can flow freely throughout the engine.

Images 2 to 6 illustrate engine deposits and potential problems that can occur.



Engine Oil Only

Engine Oil + STP

Image 2: Engine Deposits - Intake Manifold

Potential Problems: Increased Wear
Reduced Engine Life
Higher Maintenance Costs
Higher Engine Temperatures



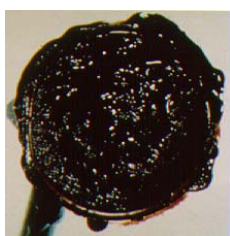
Engine Oil Only



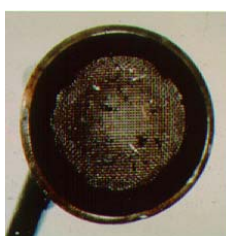
Engine Oil + STP

Image 3: Engine Deposits - Pistons

Potential Problems: High Oil Consumption
Increased Wear
Reduced Engine Life
Higher Maintenance Costs



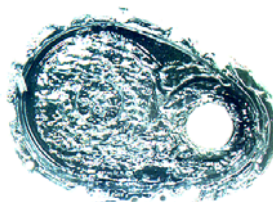
Engine Oil Only



Engine Oil + STP

Image 5: Engine Deposits – Oil Screen

Potential Problems: Reduced Oil Pressure
Lack of Lubrication
Increased Wear
Reduced Engine Life



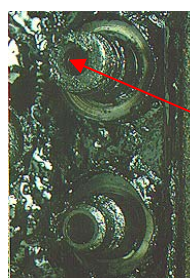
Engine Oil Only



Engine Oil + STP

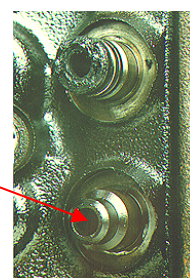
Image 4: Engine Deposits – Timing Gear Cover

Potential Problems: Timing Chain Jump
Increased Wear
Reduced Engine Life
Engine Failure



Engine Oil Only

Valve Guide



Engine Oil + STP

Image 6: Engine Deposits – Valve Deck

Potential Problems: Worn Valve Guides
Reduced Oil Pressure
Lack of Lubrication
Increased Wear
High Oil Consumption

Directions for Using STP Smoke Treatment

STP Smoke Treatment should be added to the engine oil at or between oil changes. One 450ml bottle will treat 4 or 5 litres of oil (10% treat rate). Do not overfill.

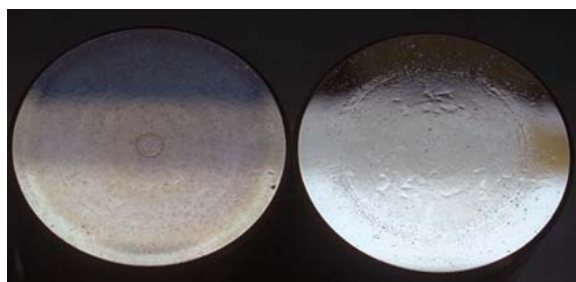
Test Results

New York City Taxi Test

The effectiveness and benefits of STP Smoke Treatment have been repeatedly demonstrated in extensive laboratory and field test applications. Among these tests was an evaluation of the benefits of STP Smoke Treatment's use in the severe stop and go driving environment experienced by New York City taxicabs.

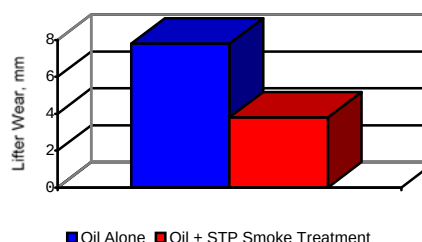
In these driving conditions, the NYC taxis tested the possibility of engine wear being increased due to the fact that the engine is likely to be operating in the "boundary layer" lubrication regime, where there exists a greater possibility of metal to metal contact due to a thinner lubricating film between moving metal surfaces. The use of STP Smoke Treatment under these conditions was shown to reduce ring wear and to significantly reduce cam and lifter wear (Image 7 and Graphs 2 to 4).

The tests showed that oil with STP reduced lifter wear by an average of 50%.

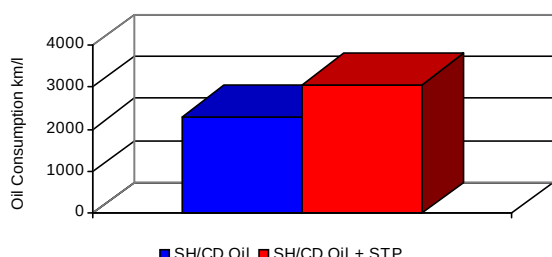


API SH/CD + STP ST API SH/CD
Image 7: 1995 NYC Taxi Test Lifter Wear

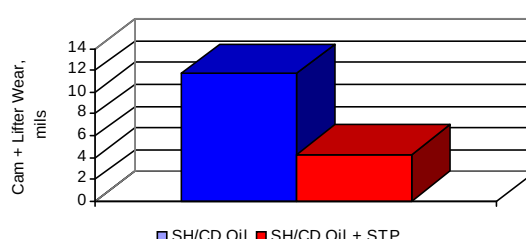
Graph 2: NYC Taxi Test
- STP Reduces Valve Lifter Wear



Graph 3: NYC Taxi Test - Oil Consumption (4.3L V-6 Chevrolets)



Graph 4: NYC Taxi Test - Valve Train Wear (4.3L V-6 Chevrolets after 96,000 km)

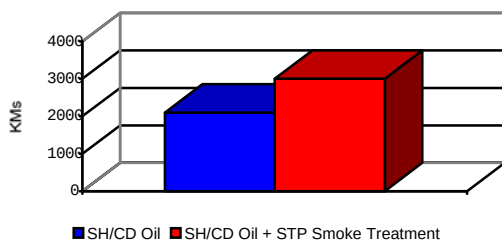


STP Smoke Treatment Reduces Oil Consumption

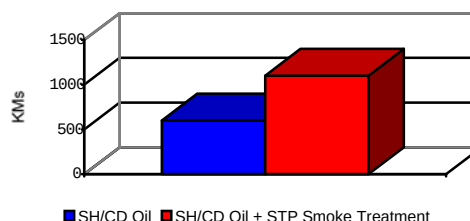
Engines that burn oil have reduced lubricating capacity and increased operating expense.

In independent tests, STP Smoke Treatment reduced oil consumption by 30% in API SH oils and 50% in API SG oils. This can be seen in Graphs 5 and 6, depicting the results of oil consumption tests in which a 4.3L V-6 Chevrolets and 5.0L V-8 Fords were both driven with and without STP Smoke Treatment added to the oil. The distances measured are kilometres travelled before the vehicle required 1 litre of oil.

Graph 5: Oil Consumption Reduction (4.3L V-6 Chevrolets)

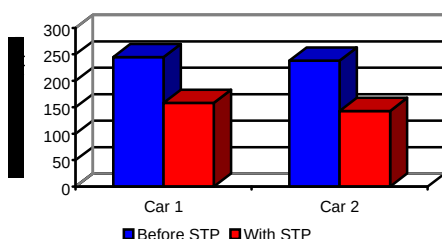


Graph 6: Oil Consumption Reduction (5L V-8 Fords)

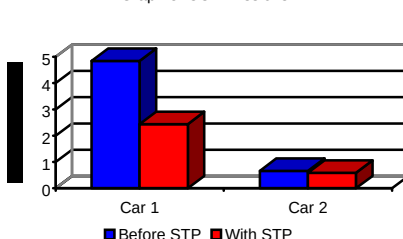


Engines that burn oil have increased carbon monoxide and hydrocarbon emissions. STP Smoke Treatment can help to reduce these harmful emissions, as shown in Graphs 7, 8 and 9.

Graph 7: HC Emissions



Graph 8: CO Emissions



Graph 9: Visible Smoke Emissions Reduction

