

Ethanol and Small Engines

Boats, motorcycles, lawn mowers, and a host of other products are experiencing mechanical damage, gasoline leaks, and fires.

The cause? Ethanol and it's probably in your gasoline now.

These and other problems with ethanol fuel are increasing as its use in American gasoline supplies increases.

You can prevent major problems with ethanol fuel mixes by taking action. Check your owner's manual and talk to the Service and Parts Professionals at Lakeland Equipment.

Action now can save hundreds and thousands in repair bills later.

The sale of ethanol blended fuel, commonly referred to as E-10 gas, is on the rise in the US as more states are mandating its use. Also promoting the growth of E-10 is the need to phase out the current additive MTBE which has been found to contaminate ground water supplies. E-10 gas has been in use for many years and, with smart fuel management, most of its negative issues can be resolved.

The first problems encountered with transitioning to E-10 is the loosening of sludge from the fuel tanks. Ethanol is a very effective solvent and it will attack varnish, gum, and resins - the sludge that can build up in fuel tanks. Once cleaned off the fuel tank walls this build-up leads to poor performance and frequently clogged fuel filters and injectors.

In addition to a loss of power and economy, E-10 can cause other problems. Ethanol is hygroscopic, meaning that it will attract water from the air, which is absorbed into the gas. The water bonds to the ethanol, becoming heavier than gas and the mixture sinks, lowering the octane level and causing performance problems. This is Phase Separation. Cold temperatures will accelerate this separation. Ethanol is also a potent solvent that will loosen old gum and varnish deposits, which can darken the fuel and foul filters and fuel injectors with large particles. The mixture of ethanol, water and particles can form a gelatinous sludge layer on the tank bottom that can block filters and damage your engine.

See Ethanol Damage UP CLOSE!

Crusty Deposits – Deterioration



Ethanol has a tendency to absorb water. The water moisture, along with ethanol, slowly **deteriorates the metal parts** of the fuel tank and carburetor.

The white crusty deposits you see collecting on this generator carburetor are the deteriorated metal particles.

Corrosion Buildup and Water in the Carburetor Bowl



As ethanol eats away at the metal parts, as well as the rubber and plastic parts of the fuel system and carburetor, it leaves those **corroded particles** in the carburetor bowl.

These particles can **clog the carburetor jets**, causing extremely poor engine performance. The particles can even enter your engines cylinder!

Gummy Varnish Deposits



Old, stale gas degrades and breaks down over time, forming **gummy varnish deposits** that eventually harden and clog the carburetor jets too. Notice the black varnish deposits forming on this lawn mower carburetor.

*If your fuel smells sour or smells like nail polish, itos stale! Dono use it.

What to do? Lakeland Equipment sells Star-Tron Fuel Additives which cures and prevents Ethanol problems.

Star-Tron Fuel Additive:

- Works in all 2 and 4 stroke engines
- Stabilizes gas for two years
- Improves fuel economy
- Removes gum, varnish and carbon

ETHANOL 101 • WHAT YOU NEED TO KNOW • ABOUT ETHANOL FUEL



4 MAIN PROBLEMS WITH ETHANOL FUEL

PROBLEM 1: DEBRIS IN FUEL

Gums rapidly form in the fuel tank and fuel delivery systems as ethanol fuels age. However, ethanol is also a powerful solvent that will strip away and disperse this build up back into the fuel as large, performance-robbing particles. This leads to clogged filters, injectors and carburetors.

STAR TRON® SOLUTION: Star Tron®'s enzymes break down debris into sub-micron sized particles that can be easily burned during the combustion process, restoring full performance.

PROBLEM 2: EXCESSIVE WATER IN THE FUEL AND PHASE SEPARATION

Ethanol attracts moisture from the atmosphere, forming an ethanol/water solution mixed in the gasoline. E-10 fuel will naturally hold .5% water in suspension, but when water levels exceed this threshold, or when the fuel cools significantly, the water/ethanol mix drops out of suspension. This is phase separation. Excessive water in the fuel tank causes engines to run rough, stall, and can lead to internal damage to engine components. Ethanol provides a significant amount of the fuel's octane, so when the ethanol/water solution separates and drops to the bottom of the tank, the remaining fuel is left without enough octane to properly operate the engine. Additionally, the ethanol/water solution can become partially combustible, which can lead to engine damage.

STAR TRON® SOLUTIONB Star Tron®'s enzyme formula reduces interfacial surface tension between fuel and water. The molecular cluster size is greatly reduced, allowing more water to be dispersed throughout the fuel. These sub-micron sized droplets are safely eliminated as the engine operates. Star Tron®-treated fuel helps prevent phase separation by allowing more water to be burned off than with untreated fuel, drying out the tank and preventing water buildup.

PROBLEM 3: ETHANOL FUELS BREAK DOWN QUICKLY

Over a short period of time ethanol fuel begins to break down. As ethanol and other components evaporate, the fuel loses octane and becomes "stale." This causes hard starts, pinging and engine knock, which robs your engine of power and can cause damage.

STAR TRON® SOLUTIONS Star Tron® is a powerful fuel stabilizer which helps prevent fuel breakdown for up to two years. This results in easier starts and prevents pinging and knocking. Star Tron® improves octane levels of sub-standard, non-spec or old fuel and in many cases can rejuvenate stale fuel, restoring it to serviceable condition.

PROBLEM 4: ETHANOL CAUSES LOST POWER, PERFORMANCE AND DECREASED FUEL ECONOMY

Ethanol fuel does not produce as much energy as traditional fuel. This results in inefficient combustion, decreased performance, reduced throttle response and poor fuel economy.

STAR TRON® SOLUTIONB Star Tron's® enzyme formula helps to break apart large clusters of fuel molecules, creating more surface area. This allows additional oxygen to react during combustion, which results in a more complete burn of the fuel, improved fuel economy, engine power, throttle response and reduced toxic emissions. Star Tron® removes carbon deposits, keeping your engine clean and operating at peak performance.

Star Tron[®] is a unique, multifunctional fuel additive that addresses all ethanol issues. Star Tron[®] has been solving fuel problems for boaters across the US since 2003. It will improve the performance of: boats, cars, trucks, motorcycles, snowmobiles, ATVs, PWCs, generators, lawn & garden equipment and all other gas-powered engines. Star Tron[®] is safe for use in all 2 and 4-cycle engines under all conditions, even in ethanol fuels. Star Tron[®] is an ideal all-season, all-purpose additive, and does all this at one of the lowest costs of any fuel additive.

Be careful of what additive you use – many contain alcohol. Adding more alcohol to ethanol fuels can lead to engine problems. Read the MSDS of any fuel additive before using it with ethanol fuel. Star Tron[®] does not contain any alcohol

and is 100% safe for use in all ethanol blends. Star Tron[®] is easy to use, effective and cannot be overdosed.



Today's Fuels Demand New Additive Technology To learn the entire Star Tron[®] story and to find the nearest retailer, log onto WWW.STARTRON.COM or call (800) 327-8583



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