FEATURE II

Alex Jarmusz, *Mistwood Golf Course*

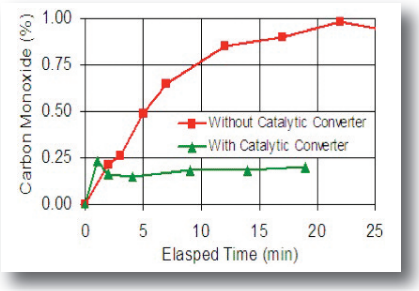
Cleaning up our Air, One Lawnmower at a Time

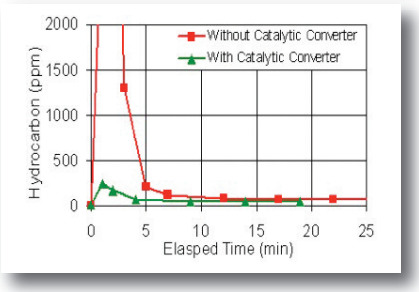
According to the California Air Resources Board (CARB), a 2006 lawnmower puts out 93 times more smog-forming emissions than a 2006 passenger automobile.

Smog is created when gasoline and methane are burned. The two dominant emissions are carbon dioxide (CO_2) and water vapor (H_2O). Other smog-producing vapors emitted from the exhaust of an internal combustion engine are incompletely combusted hydrocarbon vapors (HC) and carbon monoxide (CO). CO is also biologically harmful and in concentration, causes poisoning.

The catalytic converters used on automobile exhaust systems convert some of the smog-generating vapors into less-polluting gases. The chemical reactions that they catalyze can be categorized as oxidation and reduction reactions.

Recently, the United States Environmental Protection Agency (EPA) has set new standards for small-engine exhaust emissions. The majority of these regulations apply directly to the manufacturers.





What are the New EPA Exhaust Emission Standards?

The EPA is adopting new exhaust emission standards for marine spark-ignition engines and for small land-based non-road engines. The new requirements will vary depending on the type of engine or vehicle and will reduce the harmful health effects of ozone and carbon monoxide

In developing its requirements, the EPA considered the following factors: environmental impact, number of hours per year that each engine is used, the need for high-performance operation, and cost.

Small Non-Road Engines

The EPA expects manufacturers to meet these new standards by improving fuel systems, engine combustion, and in some cases, adding catalysts. These standards are consistent with the requirements recently adopted by CARB. When fully implemented, the new standards will result in a 35% reduction in HC + Nitrogen Oxide (NOx) emissions from new engine exhaust.

Why is EPA regulating these engines, equipment, and vessels?

The engines and vehicles covered by this rule are significant sources of air pollution and account for about 26% of mobile source hydrocarbon emissions and 23% of mobile source CO emissions. By 2030, with new controls, HC pollutants will be further reduced by 34% for small engines and CO pollutants will be further reduced by 9% for small engines.

The new standards continue the process of establishing non-road standards as required by the Clean Air Act. The EPA is required to study emissions from non-road engines and vehicles and to set emissions standards if the level of pollutants from these sources cause or significantly contribute to air pollution. More specifically, they must set standards if the emissions of CO, NOx, or HC contribute significantly to the formation of ozone and CO in more than one area of the country that currently does not meet standards. They determined that these sources contribute significantly to ozone or CO containment.

The EPA has already set emission standards for most non-road engines, including farm and construction equipment, locomotives, commercial marine, and recreational vehicles.

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Health and Environmental Benefits

According to the EPA, by 2030, the new standards will result in significant annual reductions of pollutant emissions, including approximately 600,000 tons of volatile organic HC emissions, 130,000 tons of NOx emissions, and 5,500 tons of direct particulate matter (PM2.5) emissions. These correspond to significant reductions in the formation of ground-level ozone and ambient PM2.5. We also expect annual reductions of 1.5 million tons of CO emissions, with the greatest reductions in situations where there have been problems with individual exposures.

This rule will result in substantial benefits to public health and the environment. We estimate that by 2030, on an annual basis, these emission reductions will prevent 230 particulate matter-related premature deaths, between 77 and 350 ozone-related premature deaths, approximately 1,700 hospitalizations and emergency room visits, 23,000 lost work days, 180,000 lost school days, 590,000 acute respiratory cases, and other quantifiable benefits each year.

Source: EPA420-F-08-013, September 2008

What does this all mean for you?

These new EPA regulations apply to mowers being produced after the regulations go into effect. You are not required to do anything to your existing mowers. Almost all the new regulations are directed at the small engine manufacturers. But this is a major signal that the government is finally recognizing the harmful pollution that small engines are producing.

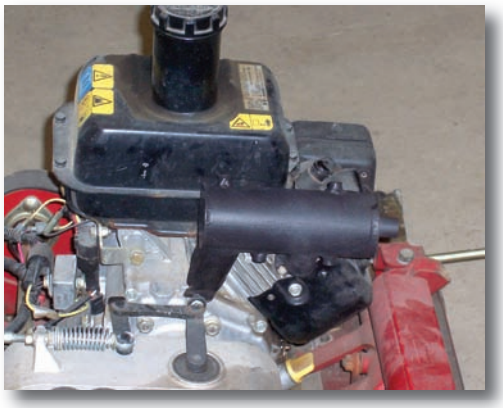
New developments/products in the line of catalytic converters are being produced to reduce harmful emissions. Installing new environmentally friendly products to your existing equipment is a great way to take proactive steps to cleaning up the environment.

Why lawn mowers?

When it comes to air pollution, lawnmowers have a surprisingly major impact. According to the Union of Concerned Scientists, one gasoline-powered, non-riding lawnmower emits the same amount of pollutants as eight new cars driving 55 mph for the same period of time. Product testing shows that smog forming gases can be reduced 3 to 5 times the expected levels.

The glow seen in the photo above is visual evidence that the catalytic converter is working at its optimal level.

The Image below is the Smog Avenger™ installed on a Toro Flex 21 mower at Mistwood Golf Course. Heat shield is removed for image.



Ben Kelnhofer (left), Assistant Superintendent and Brian Kolar (right), Lead Technician, Mistwood Golf Course check out the exhaust on a Toro Flex 21.

Note in the graphs, on previous page, that carbon monoxide suppression occurred once the lawnmower under test had warmed up, while the hydrocarbon emissions were suppressed in the very beginning when the engine was still cold. If every existing lawnmower had its muffler replaced with an environmentally friendly catalytic converter, a net reduction of roughly 3% in air pollution in the United States could be expected!

Source: Hbar Power

Golf Course Experience

Superintendent, Dave Drendel and Assistant Superintendent, Ben Kelnhofer of Mistwood Golf Course (Romeoville, IL) talk about their experiences with new catalytic converter technology.

According to Dave Drendel, "The golf course industry is sometimes viewed as an environmentally unfriendly business. I think this product has the potential to help the industry become more environmentally friendly." Ben Kelnhofer stated, "The first thing I noticed was the absence of the usual smell. We started it up in the shop and there wasn't that awful smell of exhaust. For me, that's a good sign that it's definitely cleaning up the emissions of the mower." Recently we have added this technology to gasoline maintenance carts.

Brian Kolar, Lead Technician, Mistwood Golf Course was initially skeptical, "At first I didn't think the catalytic converter would get hot enough to work, but after we fired up the cart I saw the glow of catalytic converter up the exhaust pipe. This was good visual evidence for me that the catalytic converter was hot enough to be doing its job."

Summary

Researching and trying new environmentally friendly technology is a great way to show the people in your community you are committed to making our environment a better place to live. We are all trying to do our part in cleaning up the air quality of our world. Please help out by doing your part as well.

About the Author

Alex Jarmusz is currently pursuing an Industrial and Systems Engineering degree at Virginia Tech and has worked on the Mistwood Golf Course Maintenance Staff during his summer breaks. ajarmusz@smogavenger.com **-OC**