

Effects of Carbon Buildup on an Engine

A Guide to Understanding and Limiting Carbons Effects

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Audience, Purpose & Outcome

The audience for this type of presentation is engine builders, engine rebuilders, consumers, and general car enthusiasts. It is designed to explain to each of these groups the effects of Carbon Buildup on an engine as it goes through its life cycle of functioning.

The Purpose is to explain the how, why, and what if's revolving around Carbon Buildup on Automotive Engines. What affects its plays on a variety of engine functions (i.e Smoothness of engine idle), and how it can affect engine output (MPG, HP, Torque, etc).

An accomplishment of this presentation would be for those in the audience to gain a better understanding of Carbon Buildup on engines, and some of the ways that consumers, and mitigate some of the Carbon Buildup that can occur, and for those Builders and Rebuilders to help design ways to lessen the overall effects.



What Is Carbon Build Up?



Carbon Buildup is quite, simply Carbon Buildup inside the engine on the various components as it goes through its life cycle. The three main components that are in play when we are talking about a combustion engine are Fuel, Air, and Spark. These three are the keys to life for a combustion engine. And like the name suggests there is “Combustion” going on in what is called the Combustion Chamber. Fuel, Air, and Spark are “mixed” together here creating a controlled “explosion, that cause the pistons in an engine to rise and fall.



What Is Carbon Build Up? (Continued)

In the combustion chamber with this explosion happening, there is Carbon, since your typically fuel used in a Combustion Engine is Fossil Based Fuel, which is Carbon based. If you think of a campfire, or a fireplace, after you burn the fire, there is a thin black coating on anything that may have been around, or in line with the travel of the smoke from the fire. This is similar inside the combustion chamber. Since there is an “explosion” occurring inside the chamber, there is leftover carbon bits that get attached to the various surfaces inside the chamber, thus Carbon Buildup.



What Carbon Buildup Does?

As the lifecycle of an engine is going on, performing its day to day uses, Carbon is likely to build up inside the combustion Chamber. But what does it actually do? Over time this buildup in the engine will coat various surfaces inside the engine. It can cause the rotating mass of the engine to not see proper oil flow, because the tolerances are so tight in an engine that a large buildup of carbon can affect the path of oil traveling through the system to help with lubrication. This can cause metal on metal grinding and ultimately failure to major engine components.



How Buildup Occurs?



The Carbon Buildup occurs, as the oil drains through the various passages inside the motor (i.e Valves), which is a very normal engine function. The “explosion that is occurring, can heat the oil, and fuel, causing it to “cake” onto the components of the engine. And ultimately affect its performance, and functionality.



How Buildup Occurs? (Continued)

Another way build can occur is CrankCase gases. This is quite simply the ignition of the fuel in the combustion chamber. Like I previously mentioned about a fire, and the black coating from the smoke. CrankCase Gases are, in a way, the same variation, but in an engine. Again this causes coating on the components and affects the functionality and performance of the engine.



How Carbon Buildup Effects Engines?

Carbon Build can affect engines in a few ways. One of the biggest is simply coating the components of the engine. Thus, making the tolerances of the engine tighter, and limiting the effects of the motor oil that is there to lubricate and cool the rotating assembly of the engine. Engine tolerances are incredibly tight. The pistons moving up and down, are typically, hundredths of an inch away from “direct” contact with the engine block. Allowing just enough space for oil to slide passed and lubricate, as well as keep the friction from the piston moving up and down cooler. If there is even one-one-hundredth of an inch of buildup this can be a potential threat to a motors functionality.



How Quickly Does This Happen?

The short answer is right away, BUT with that said, looking at how long it takes for the effects to “take effect” is a little more complicated. Since the engine is ultimately a controlled explosion, carbon build will start occurring as the engine begins to see use. It does take quite a bit of time for enough Carbon to build up to cause potential issues (In some cases this can be 100,000+ Miles). It is not typically something that will occur in the short term life expectancy of a vehicle (i.e. When it is in warranty, or even shortly after). It happens over the course of the engine's lifespan, and is not likely to cause an immediate issue.



Why It Is Important to Understand?

Carbon Buildup is important to understand because unless, like the few percent of people in the world, you drive an electric car, the chances are you car run on Petrol. This is used in basically every single motor vehicle. And as a result each of these engines will have some amount of carbon buildup over the course of their lifetime.



Why It Is Important to Understand?

(Continued)

It is important that we take a look at this because it can have huge results on the functionality, and potential demise of an engine in an automobile. If more people know about it, and how and why it happens, then we can start to look at ways to lessen the effects, and resolve some of those issues caused by Carbon Buildup.



How Can You Tell If You Have BuildUp?

The best way to tell definitively if there is Carbon Build up in your engine is to take off the Spark Plugs, and use a tiny camera on a wire to peek inside the engine. This is the way most professionals will check inside the motor to see how it is performing, without having to take the engine out of a car.

Once the camera is inside the motors, one is simply looking for dark patches, of Carbon that have built up on various surfaces in the motor. A typical spot is the top of the pistons. If the top of the piston is a dark color, you would know that there is Carbon BuildUp on top of the piston.



Any Resolutions?

There are a few ways that Carbon Build can be resolved. The majority of them involve taking the motor out of the car. AND this is not practical for 99.99% of people. There are a couple of over the counter solutions that may be able to help. These are solutions that you pour in with oil, and it mixes together helping to knock off some of the Carbon BuildUp causing it to get burned off in the combustion cycle. This can help but it as of right now, it is not a guarantee fix.



Future Resolutions?

There are a few companies working on solutions that would have a better effect on the Buildup, trying to help break it down, as it builds up. Because ultimately there is no way to stop a combustion engine from building up Carbon, base it is a byproduct of the combustion process. But being able to lessen the overall build up would potentially be a viable option.



Options for Fuel Additives?

There are a few options in the realm of additives for fuel. One can add these to their fans, at the time of filling up their tank, and this can help knock some of the Carbon off as a result. It can also help stabilize the fuel to better burn the “full” amount of fuel as it is shot into the Combustion Chamber. This is more of a preventative solution as we are attempting to burn off all of the fuel, because if this can be done there is less overall build up.



Conciseness?

Carbon Build Up is a natural part of the Combustion Engines functionality. Simply because there is a controlled explosion going on using a Carbon Based Fuel. Build up is likely to occur, but knowing to watch for it, resolve it or even potentially “prevent” it from “rapidly” occurring can be the keys to better engine life cycles, as well as better engine performance.