

What Causes Backfire In An Engine?

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There are a variety of factors that can cause your car to backfire, but the most common ones are having a poor air-to-fuel ratio, a misfiring spark plug, or good old-fashioned bad timing. This explosive sound is scary by itself, but it's even more alarming when followed by a loss of vehicle power. If you're wondering, "what causes backfire in an engine," read on to learn how to deal with it.

If too much fuel is added to the engine, it may not all burn up before the exhaust valves open — letting unburned gasoline into the red-hot exhaust headers, where it can combust and lead to a backfire. Too much fuel could be getting into your engine due to damaged and leaking fuel injectors or bad engine sensors.

What Is Backfire?

A backfire or afterburn is a combustion or explosion produced by a running internal combustion engine that occurs in the exhaust system, rather than inside the combustion chamber. A visible flame may momentarily shoot out of the exhaust pipe. A backfire is often a sign that the engine is improperly tuned.

An engine backfire occurs whenever the air-fuel mixture in your car combusts somewhere outside the engine's cylinders. This can cause damage to your car's exhaust or intake if left unchecked, and it also means that your car's engine isn't making as much power as it should, and is wasting lots of fuel.

It is also sometimes referred to as a fire, especially in cases where the word backfire is used to mean a fuel burn that occurs while an intake value is open,

causing the fire to move backward through the system and out through the intake instead of the exhaust.

When the flame moves backward it may also be called a "pop-back." A backfire can be caused either by ignition that happens with an exhaust valve open or unburnt fuel making its way in the hot exhaust system.



What Causes A Backfire In An Engine?

A backfire is caused by a combustion or explosion that occurs when unburned fuel in the exhaust system is ignited even when there is no flame in the exhaust pipe itself. Sometimes a flame can be seen when a car backfires, but most of the time all you hear is a loud pop, followed by loss of power and forward motion.

Typically, a backfire occurs when one of the above explosions occurs outside of your fuel cylinders. Some backfire travels back to the intake valve, while others exit through the exhaust system – causing a type of backfire known as "afterfire". Afterfire can sometimes result in visible flames shooting out of the tailpipe. Oops!

Backfire and afterfire should be considered as they can cause engine damage, loss of power, and reduced fuel efficiency. There are a variety of factors that can cause your car to backfire, but the most common are a bad air/fuel ratio, a misfiring spark plug, or good old-fashioned bad timing.

That unburnt fuel can be caused by a variety of mechanical problems, and here are some of the most common reasons for a backfire:

1. Rich Air/Fuel Mixture

Not only must your **engine** fire its spark and close its valves at the right time, it must also burn the correct air-to-fuel ratio. If too much fuel is added to the engine, all of it may not burn before the exhaust valves open, allowing unburned gasoline to enter the red-hot exhaust manifolds where it can burn and cause a backfire.

Too much fuel could be getting into your engine due to damaged and leaking injectors or bad engine sensors. If the engine sensors are sending incorrect information to the computer, it may try to compensate by adding more fuel than necessary. To fix this you may need to clean the fuel system, replace some O2 sensors, or replace the mass air flow sensor on your vehicle.

2. Lean Air/Fuel Mixture

Not only can a rich air/fuel ratio cause a backfire, an insufficient mixture of fuel can also cause a backfire. A "lean" mixture is one that doesn't have enough fuel and too much air.

Such a mixture could be caused by low fuel pressure due to a faulty fuel pump, a clogged fuel filter, or clogged fuel injectors. When a lean mixture burns, it burns more slowly, meaning there's still some air and fuel that isn't being used when the exhaust valves open – causing a backfire.

3. Bent Valve Or Valves

What Causes Backfire In An Engine?

In each cylinder of your engine, you will find at least one intake valve and one exhaust valve. They are designed to allow air and fuel into the cylinders and then close as combustion occurs. Once the air and fuel are combusted, the exhaust valves open to release the exhaust gases from the tailpipe.

However, if the valves are bent, they will not form a proper seal. This allows air and fuel to flow back into the intake or into the exhaust where they burn. Fortunately, this is a very unusual reason for a modern car to backfire. Replacing bent valves and/or bad valve seals can be a costly procedure as it means disassembling the entire engine.

4. Incorrect Spark Firing Order

Today's electronically controlled engines with coil-on-plug ignition systems essentially eliminate this problem – but on older models with ignition distributors and plug wires, it's possible that your spark plugs are connected to the distributor in the wrong order.

If the spark ignites in the wrong cylinder at the wrong time, this leads to backfire, among other things! This problem can also occur when the spark plug leads are crossed, for example after you've replaced your spark plugs – but again, modern cars have largely eliminated this problem.

5. Bad Ignition Timing

Engine backfire occurs when the combustion event occurs outside of the engine's combustion cylinders. In each cylinder, fuel and air are mixed in a precise ratio at exactly the right time. A spark ignites the entire mixture, and the resulting explosions are what power your car.

If the spark timing is slightly late in the engine cycle, unburned fuel and air can flow through the exhaust. When this ultra-hot fuel reaches the tailpipe, it mixes with the highly flammable oxygen present in the outside air. This causes the unused fuel to be burned in the exhaust rather than the engine – resulting in a loud bang and sometimes even visible flames from the exhaust tip.

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Modern engine timing is computer controlled and can even vary on the fly. This means that most engines burn 100% of the fuel in each combustion chamber every time. This type of backfire is more common on older carbureted engines with distributor caps.



Why Do Cars Backfire When Shifting?

Not all backfires occur when you start the engine. Sometimes one can happen when you shift gears. However, that loud pop that you hear when shifting is, in fact, an after fire.

Most of these occur on manual vehicles where a clutch is used to shift gears. As you press in your clutch and go from one gear to the next, fuel can continue to enter the cylinders, especially if you switch gears at higher RPMs.

All this unburnt fuel builds up in the exhaust and ignites when you release the clutch. Though this might sound alarming when it happens, and after a fire when shifting isn't necessarily damaging your vehicle.

Is Backfire Bad For A Car?

What Causes Backfire In An Engine?

Backfires and after fires are worth paying attention to since they can cause engine damage, power loss, and decreased fuel efficiency. There are a variety of factors that can cause your car to backfire, but the most common ones are having a poor air-to-fuel ratio, a misfiring spark plug, or good old-fashioned bad timing.

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