

# Screenshot of *Why Cars Backfire - Afterfire - Explained*<sup>1</sup>

M&G Why Cars Backfire - Afterfire - Explained

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Why do cars backfire?  
Part 2: Afterfire

Answer

- o Rich A/F mixture
- o Ignition Delay
- o Lean A/F mixture
  - o Vacuum leak
  - o Fuel injectors
  - o Fuel pump

Intake Valve Spark Plug Exhaust Valve Throttle Body Air Intake Exhaust

Why Cars Backfire - Afterfire - Explained

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Why do cars backfire? What is afterfire? Flames coming out your exhaust? Backfiring can be used to describe combustion occurring through the intake (traveling backwards) or through the exhaust, although this is also called afterfire. In this video we'll take a look at how an engine could have combustion travel out the exhaust.

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Key moments

0:01 A Rich Air Fuel Mixture

1:11 Ignition Delay

1:42 Lean Air Fuel Mixture

1:58 How Could a Lean Air Fuel Mixture Cause It

Transcript

Follow along using the transcript.

<sup>1</sup> Engineering Explained, *Why Cars Backfire - Afterfire - Explained*, YouTube (Feb. 13, 2013), <https://www.youtube.com/watch?v=bgS3PA5r0vY>.

## **Transcript of *Why Cars Backfire – Afterfire - Explained***

[0:00] Hello everyone and welcome to this week's video.

[0:03] Today I'm going to be explaining a second part of why cars backfire, more specifically what causes an afterfire or ignition in the exhaust and you could have flames coming out the back.

[0:14] So there are several answers to this question.

[0:17] Um so here we've got our setup.

[0:19] We've got our air intake, our throttle body, we've got air coming in, we've got our port fuel injection, we've got our intake and exhaust valves, our spark plug, and our piston cylinder device, here's our exhaust.

[0:30] And so our first answer: a rich air fuel mixture.

[0:34] So you're putting in too much fuel and you're not getting enough air and so with that rich mixture when you don't burn all of that fuel some of that fuel gets sent into the exhaust.

[0:47] Now at the point where this fuel comes into contact with oxygen, which obviously the outside air is all full of oxygen, then if it's hot enough when these two combine they can have ignition, and so that could occur pretty much anywhere in here and then you'll have a flame spit out the back because you've got that combustion occurring in the exhaust pipe.

[1:11] Another thing that could cause that is ignition delay.

[1:13] So let's say you've got your four strokes, intake, compression, power, so you think that it's going to fire around here but you delay your ignition so it doesn't fire until your piston is down here.

[1:25] So once that explosion goes off your piston keeps going, and now it's into your exhaust stroke and your explosion is still occurring, you're still having combustion, and your exhaust valve is open so that combustion is going to continue to occur out into the exhaust manifold.

[1:40] And that's actually what anti-lag systems—some anti-ag systems—use to, uh, to keep boost.

[1:46] So what's going to happen with that is you'll force that fire and it'll just keep going out the exhaust.

[1:52] The other thing that could cause this is a lean air fuel mixture.

[1:56] So lean air fuel mixture—okay now I've said rich causes it how could a lean air fuel mixture cause it?

[2:01] Well a lean air fuel mixture burns more slowly than a rich air fuel mixture.

[2:06] So once you have ignition, once you light that spark and ignite this mixture in here, you're going to have that power stroke where these, uh, this mixture is combusting and it's going to continue to occur even until your exhaust valve opens up, and then it will keep occurring through the exhaust and you could spit a little fire out the back.

[2:27] So what would cause a lean air fuel mixture besides the ECU telling it to do that?

[2:33] Uh well if you had a vacuum leak—for example if you had a hole in here or let's go -- let's go past the throttle body—and then you're sucking in this air, um that would be -- you'd have excess air and you wouldn't compensate for it and so you wouldn't spray enough fuel.

[2:52] Also if your fuel injector uh was faulty or kind of clogged up and it couldn't inject enough fuel like it was supposed to then you'd have a lean air fuel mixture and also if you had a faulty fuel pump that couldn't pump the necessary amount in.

[3:06] So there's many things that could cause a lean or a rich air fuel mixture, um those being some of them.

[3:12] You can just kind of reverse them for -- for the rich air fuel mixture.

[3:15] For example if, uh, your fuel injector just is acting up and it squirts too much or if your ECU is telling, uh, you to inject a rich air fuel mixture then that could cause it as well.

[3:29] So those are the different reasons of what could cause a afterfire or detonation of, uh, the air fuel mixture within your exhaust.