

Is Carbon Buildup a Problem With Direct-Injection Engines?

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By [Craig Cole](#) Jan 16, 2015
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Direct [injection](#) offers numerous benefits over [port](#) fuel delivery but could it be a bigger headache than it's worth?

The automotive industry has gradually switched to direct injection over the past decade or so and for good reason. Spraying a precisely controlled amount of fuel right into an engine's combustion chambers can result in improved efficiency and greater power density; tailpipe emissions are generally cleaner as well.

In spite of these advantages, this technology isn't perfect. DI has a handful of downsides including additional noise, particularly at idle and dramatically higher costs, though there are other concerns.

And a big one has to do with [carbon deposits](#). We've heard rumblings that blackened buildup on the backsides of intake valves is a major problem and something that could be disastrous for motorists in the coming years. To get to the bottom of this potential top-end issue we did some digging.

What's Really Going On?



Ford has been pushing its EcoBoost engines as a way of improving fuel economy without sacrificing performance. The real-world results of this strategy may be mixed, but one thing is not: all of these powerplants feature direct injection as well as turbochargers and advanced control software.

These engines have been on the market for a number of years now and to get some empirical evidence from the front lines about how they're holding up we reached out to Brian Laskowski, a [Ford](#) Factory Certified Technician. He also has a YouTube channel, [FordTechMakuloco](#) that highlights all sorts of automotive repairs.

Responding via e-mail Laskowski said, "Carbon deposits in Ford engines are not a widespread issue due to the advanced engine technology." But he also mentioned that it has happened in some low-mileage EcoBoost units.

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"As of today the issue seems to be isolated to certain markets with varying factors such as fuel quality," said Laskowski. If carbon buildup becomes severe he said it can result in all kinds of issues from drivability woes to misfires, turbocharger issues and even catalytic converter damage.

Survey Says...

Assuaging potential sky-is-falling fears, Michael Karesh, the developer of [TrueDelta.com](#) said carbon buildup is "not an issue for all direct-injected engines" based on the data he collects. His website surveys the owners of around 33,000 different vehicles to acquire relevant and timely data about vehicle reliability and fuel economy among other things.

But of course there are some instances of deposit-related issues that have popped up. Karesh said, "The only engines it's reported quite a bit is [with] the VW/Audi 2.0T and

then the Audi V6s.” He also said, “I know there are some [BMW](#)s that end up with carbon buildup as well.”

As for the frequency of reported problems with these [Volkswagen](#) cars he said his numbers indicate “it can be as high as one in six over the last two years,” which “is a high number” and one that he said is consistent across different models.



The 2008 [Audi A3](#), which offered a 2.0-liter turbocharged four-cylinder engine, also popped up in the *TrueDelta* data. Karesh said it’s puzzling why 2006 and 2007 models aren’t having similar carbon issues. Leaving us with more questions he said, “I’m not really seeing [GTIs](#) [popup],” which are mechanically similar to the A3.

“If there is a non-German car there might be something happening in the [[Cadillac](#)] CTS,” said Karesh, but once again he cautioned that it’s “too scattered and sporadic” to draw any definitive conclusions. Additionally he said, “I have one report of decarbonizing the engine in a [Chevrolet Equinox](#).” Unlike the other instances, he has

quite a large sample size for this particular vehicle, which clearly indicates that deposits are not a major problem at this time.

The Whys and the Hows



But how does this buildup occur?

“One of the biggest problems with direct injection is that the fuel is no longer being sprayed onto the backside of the intake valves,” Laskowski said.

This mist of gasoline actually helps keep the intake ports clean. In addition to fuel quality, he said things like valve and injection timing are key factors in carbon buildup.

Additionally software plays a huge role. “What I think is most overlooked is the PCM calibration itself,” the engine-control computer.

“I believe it’s the absolute key to preventing the bulk of this buildup by making the air and fuel burn as completely and cleanly as possible.” Laskowski also said a simple software update can yield dramatic results.

But if something does go awry with your EcoBoost engine and there are drivability issues associated with deposits, Laskowski said the only Ford-approved course of action at this time is to replace the cylinder head, though he also said, “Manual cleaning with a brush and various carbon dissolving products has been used with great success on vehicles out of warranty.”

Beyond outright replacement or lots of elbow-grease there are other ways of dealing with carbon buildup. Laskowski said there’s a media-blasting technique that can clean engine intake tracts but the method is currently not approved by Ford. Regrettably he said, “In any case the service to remove the carbon can be time consuming and expensive.”

Down the Road

As for the long-term reliability of engines with direct injection, only time will tell if carbon buildup is a serious issue. But for the most part it seems like an isolated problem, at least at this time.

When asked if he'd hesitate to purchase a vehicle with DI because of this issue Karesh said no. "I'm not seeing it for anything after 2010 or so."

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"I think even though direct-injection technology is far superior today compared to a decade ago that with varying fuel qualities, different driving techniques and overall aging of the engines it will be an issue for some," Laskowski said. Going on he said Ford should develop a cleaning process for EcoBoost powerplants so carbon can be addressed without completely tearing engines down.



Conventional induction-cleaning services aren't recommended with Ford's EcoBoost engines. Laskowski said turbochargers can be damaged and they ain't cheap to replace. "Again I believe the bulk of this problem can and will be eliminated with future PCM software-calibration updates."

For the time being Karesh said that according to his data, "Clearly it's a VW/[Audi](#) problem and not much else." Elaborating he also said, "We've got other direct-injected engines and it's not showing up for those."

Since carbon-related issues with direct injection seem to be sporadic at best Karesh said this is good news for drivers. "It means you don't have to plan on decarbonizing your engine every two years for \$800 a pop." When asked if deposits could become a nightmarish issue in the future he said, "I can't say. I don't have my crystal ball; it's in the shop," and hopefully not because of something related to carbon.

GALLERY: Ford 2.7-Liter EcoBoost Engine



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