

Q&A: How do 'stop-start' systems work?

By [Chantal Fleischfresser](#) | April 10, 2012, 4:00 AM PDT



Following [last week's post](#) about the 'stop-start' feature to be offered on the 2013 Ford Fusion, many readers wrote back with questions about the technology. So I consulted an expert: Dan Squiller, CEO of PowerGenix, a San-Diego based company that develops nickel-zinc batteries that are ideally suited for stop-start systems.

SP: Why has the U.S. not embraced 'stop-start' technology, when it has been the norm for a while in Europe?

DS: There are three primary reasons; first are different driving patterns. Drivers who do a majority of their driving in high congestion areas see increased fuel economy savings from a stop-start system compared with those who drive longer distances at sustained highway speeds. Drivers in Europe tend to live in more urban areas with congested roads than American drivers. However, it's also important to recognize the changing nature of the US automotive driving environment. The US is approaching a critical mass of drivers in urban areas who are looking for improvements in fuel economy.

The second reason is higher fuel prices. Europeans pay at least twice what Americans do for fuel. As a result, Europeans have sought out ways to improve fuel efficiency much more aggressively than Americans, embracing incremental improvements including stop-start systems and weight reduction.

Lastly is emissions policy. Europe has historically had much more stringent CO2 emission and fuel economy mandates than the US, although the US is starting to catch up as the recent increase in CAFE [Corporate Average Fuel Economy] standards demonstrates.

SP: What happens to sound/AC systems when engine shuts off?

DS: Some systems like AC must be redesigned to function properly when an engine is turned off. In micro-hybrids (i.e., internal combustion engine powered with a stop-start system), an electric motor is used to power AC, which requires a more robust battery to power this and other loads. That's what PowerGenix does better than alternative technologies. Our batteries are extremely power dense compared with standard lead-acid and lithium-ion, which makes them ideally suited for uninterrupted operation of critical vehicle systems such as the engine control unit, entertainment system, navigation system, and AC when the engine restarts.

SP: Some people say that if you idle for short periods of time, you can actually end up burning more gas than you would otherwise in the stop-start process. Is there any truth to this?

DS: It is more fuel efficient to shut the engine off as a start-stop system does automatically than to have the engine idle when the car is at a stop.

SP: How does the technology work, exactly? How does the car turn on once again after it shuts off?

DS: A stop-start system automatically shuts down the engine when the vehicle comes to a stop and restarts the engine to reduce the amount of time a car spends idling. The vehicle employs a beefier starter that can withstand a significantly increased number of engine starts over the life of the vehicle. A more powerful and robust battery is crucial. A stop-start system requires a battery that is power dense and able to withstand multiple stop start events.

UPDATE: The questions keep coming! Here are some more explanations of the technology from Dan Squiller, CEO, of PowerGenix:

Q: How does a stop-start system interface with transmissions to prevent vehicle motion upon startup?

A: To ensure safety, optimum performance, and an uncompromised driving experience, the start-stop function is integrated into several vehicle systems. For example, if the clutch (in vehicles with a manual transmission) is not fully depressed, the engine will not restart. The same is true if a door is open or the driver's seat belt not fastened. Likewise, if the engine is not yet up to operating temperature or the battery does not have enough charge to restart the car, the start-stop function will not activate and the car will continue to idle when stopped.

Q: Does it require automatic transmission clutches to be disengaged?

A: In vehicles with automatic transmissions, the start-stop control unit monitors the status of the transmission, engine RPMs, vehicle speed, and braking status to control the start-stop function so it is seamless to the driver.

Q: Will stop-start systems be offered on manual transmission vehicles?

A: Start-stop systems first appeared in cars with manual transmissions (the predominant transmission just about everywhere other than the U.S.) and are only now being offered on vehicles equipped with automatic transmissions.