

Alan Pierce

perceaj@techtoday.us; follow on Twitter @TechToday\_us

## The Laser Automobile Ignition System

Most cars on the road today run on old-fashioned gasoline. The push toward hybrid, electric, and other drive systems has a long way to go before they become the majority of vehicles in use throughout the world.

Researchers and engineers are still working to improve the efficiency and environmental friendliness of the internal-combustion engine. The modern internal-combustion engine is very complex. If we were to compare it to a living organism, we might consider its spark plugs the source of energy that causes the heart of the

ing showed it greatly improved the efficiency of the car's engine, we can assume it would quickly be adopted by automobile manufacturers.

Takunori Taira and his associates at Japan's National Institute of Natural Sciences, working with Toyota Motors, Nippon Sokem Inc., and the Denso Corporation, have successfully built a fully functional laser ignition system. Their laser ignition plug is shown in Photo 1 and the test engine that they built is shown in Photo 2. They demonstrated the world's first gasoline engine micro laser ignition car in 2013.

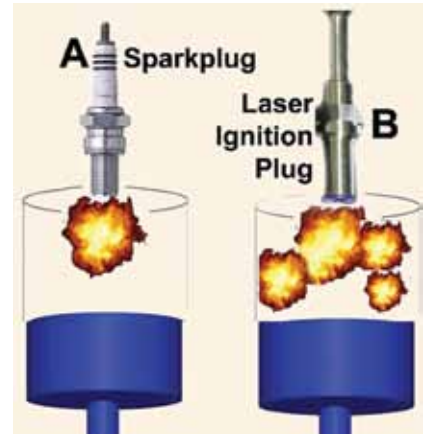
Their laser ignition plug splits its hot laser beam so that it will simultaneously ignite fuel in different locations of the compressed gas. In contrast, a spark plug has only one point of ignition. (See Fig. 1.) With this more powerful ignition, you improve the efficiency of the engine.

The laser ignition will allow auto engine manufacturers to improve the firing timing of the engine, switch to a leaner

improve the efficiency of the engine.

The other advantage of the laser ignition system is that it will lower pollutants that the car releases into the atmosphere. The PDF that Taira emailed me provides more insight into the laser ignition system than I can cover here. To read the full document online, go to [www.technologytoday.us/columnPDF/LIC3-1\\_Taira](http://www.technologytoday.us/columnPDF/LIC3-1_Taira).

The laser ignition plug has completed two years of in-car testing.



**Fig. 1—The spark plug (A) spark ignites the fuel at the top. The laser ignition plug (B) simultaneously lights the fuel in multiple locations.**

The 3rd Laser Ignition Conference is scheduled to take place in late April (after this issue goes to press). It is impossible for me to postulate what new developments will be shared at this conference. I can only wonder if a major announcement will be made telling the world how soon laser ignition cars will start to appear in automobile showrooms.

### Recalling the Facts

1. What is the most significant difference between a standard spark plug ignition and a laser plug ignition?
2. Research: This column compared a car engine to a living organism. Expand this description to include as many subsystems of an auto as possible. (Have fun with this—be as funny in your comparisons as possible.) ©

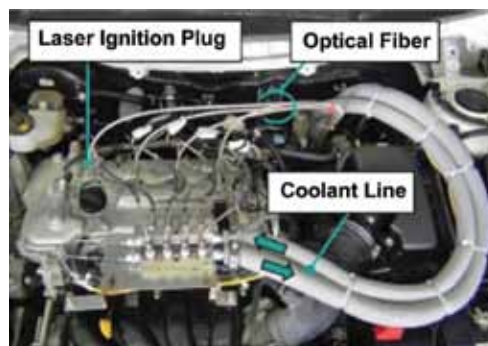
*Alan Pierce, Ed.D., CSIT, is a technology education consultant. Visit [www.technologytoday.us](http://www.technologytoday.us) for past columns and teacher resources.*



**Photo 1—The spark plug and the laser ignition plug look similar.**

engine to beat. The exploding air-gasoline mixture in the cylinders, which drives the car, can be compared to the pumping heart muscle that provides the energy needed for movement. Just as exercise can strengthen the heart of a living organism, a laser ignition plug that can simultaneously ignite the air-gas mixture in multiple locations would greatly improve the efficiency of the engine.

Building a workable laser ignition system that could replace spark plugs in an automobile engine would be a game changer. If such a system was cost effective and test-



**Photo 2—The first laser ignition test engine with the new components.**

air-gas mixture, and also increase the internal pressure in the engine cylinders. These tweaks will all improve how clean the fuel burns and further

Photos courtesy Takunori Taira