Special Feature

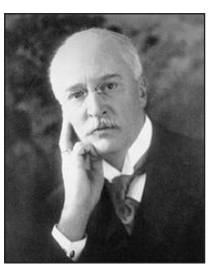
Enzyme Fuel Additive Improves Standard and Biodiesel Performance

Somewhere, Dr. Rudolph Diesel must be smiling. When he designed and perfected the internal combustion engine technology that continues to bear his name, he originally intended that his device would be powered by a variety of "locally available fuels." Long before the widespread availability of refined petroleum products, Diesel created an engine that would run well on peanut, soybean, and similar vegetable oils. Dr. Diesel successfully tested his invention in 1897 and turned the industrial world topsy-turvy in the process. Steam power was the backbone of manufacturing and transportation at the time, but the typical steam engine of that era converted only about 10 percent of the energy derived from fuel into mechanical propulsion. Dr. Diesel's engine, even in its earliest configurations, was more than 70 percent theoretically efficient and it rapidly began to supplant steam engines in most applications.

Diesel died in 1913, under some rather mysterious circumstances. He disappeared from a passenger steamer in the English Channel, and his body washed ashore a day later. A controversial inquest officially labeled his death a suicide, but rumors persisted that Diesel had been murdered at the behest of some powerful coal-mining tycoons. The diesel engine had rendered steam engines, and the massive amounts of coal required to heat their boilers, obsolete. After the death of Rudolph Diesel, most discussion of using vegetable oils for fuel was suppressed. Generations of people were conditioned to believe that fossil fuels were the only option for firing diesel engines, and some of the financially damaged coal barons made new fortunes drilling for oil.

Roughly 100 years later, we are once again at a point in history where a shift in fuel technologies is quite likely to occur. Ever increasing percentages of the world's remaining petroleum reserves are controlled by nations with dubious intentions toward Western society in general and the United States specifically. Talk of "growing our own fuel" is appealing to greater numbers of people. It may be tempting to dismiss the recent interest in biodiesel as just some off-the-wall environmentalist wackism, but doing so ignores the original design of the diesel engine. The engines that Dr. Diesel thought should be powered by renewable vegetable resources are now more commonly being fueled with the traditional "dead dino" diesel mixed with five percent, 10 percent, or 20 percent biodiesel. An increasing number of diesel engines will now run well on either fossil oil or 100 percent biodiesel.

Dr. Shinji Makino



Rudolph Diesel.

Many experts have expressed concern regarding certain characteristics of biodiesel. One of the more frequently mentioned is a tendency, in some tests, for biodiesel exhaust to contain slightly more nitrous oxide (NOx) than exhaust from fossil fuels. At a time when most of the world is concerned with the planetary effects of greenhouse gases and worried about man's role in the global warming phenomenon, additional nitrous oxide is an unwelcome byproduct regardless of how "green" the combusted fuel might be. Other studies have shown that biodiesel can become unstable when stored for prolonged periods of time (a situation many pleasure boaters might be likely to experience). The solutions to some of the concerns associated with biodiesel appear to have been discovered by yet another independent inventor, once again working with biological agents.

Generations of people were conditioned to believe that fossil fuels were the only option for firing diesel engines.

About 15 years ago, a team of Japanese scientists led by professor Shinji Makino was studying the properties of enzymes extracted from tree leaves and marine algae. Enzymes are among the world's most powerful catalysts, and the enzymes identified by

Makino were determined to be capable of affecting the molecular structure of hydrocarbons. Specifically, the enzymes increased the rate at which the molecules were able to absorb oxygen and more efficient combustion was the "natural" result. The enzymes developed by professor Makino have been distributed in increasing quantities around the world since 1995, offered by a firm called Xbee in Europe and as a product known as Soltron in North America.

Readers may recall when the editor of this publication tested Soltron in his diesel trawler a few years ago. After a discouraging period during which exhaust smoke seemed to visibly increase, it became obvious through a casual (but not scientifically verified) observation that the opacity of the exhaust smoke was dramatically reduced. (The original "smoky" operation for a short time following the initial introduction of Soltron was theoretically explained as evidence that the enzymes were dispersing sediments and contaminants that had collected in the fuel system.)

Additional independent scientific data measuring the effects of enzymes on diesel derived from fossil fuels, on biodiesel, and on various blends of the two fuels has been developed by the University of Berkeley, under the stringent observation of the State of California's Bay Area Air Quality Management District. The District awarded renowned biodiesel advocate Russell Teall a contract to demonstrate the viability of establishing specialized biodiesel refineries and distribution channels for the product in the San Francisco area. In a 67-page report summarizing the contract and the results of the study, the BAAQMD noted the test results from the University of Berkeley laboratory.

In a blend of fossil and biodiesel fuels, the addition of Soltron enzymes reduced NOx emissions by 13 percent. When added to ultra low sulfur fossil diesel fuel approved 100 percent by CARB (California Air Resources Board), Soltron reduced unburned hydrocarbon emissions by 54 percent, reduced carbon monoxide by 14 percent, and reduced particulate matter by 37 percent — all according to the tests conducted by the University of Berkeley.

The university study adds to a long list of anecdotal and documented reports from shipping companies, railroads, long-haul truckers, commercial fishermen, and others reporting improved fuel efficiency, visually cleaner exhaust, and fewer storage-related fuel problems after introducing Soltron to their fuel systems.

Somewhere Dr. Rudolph Diesel must be smiling. His dream of a world where internal combustion engines are powered by vegetable oils may be closer to fruition than he might have dared believe during his lifetime, and the discovery of a specialized enzyme in the laboratory of a Japanese professor may prove to be an important catalyst in the conversion. ■