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## A new use for old idea creates a cleaner fuel

Front Royal company finds way for oil, water to mix efficiently

By Kevin Seabrooke  
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Front Royal — It's an old truism that oil and water don't mix but, in fact, they do combine in fuel mixtures called emulsions, usually with the help of chemical additives.

It's been known that diesel fuel burns a little better with some water in it and many companies use water-in-oil emulsions as fuel.

A new company called Cotefco is preparing to market a chemical-free emulsion system called "Emulsion to Combustion," or "E2C," for short.

The company's main research lab is in Front Royal, in the offices of the Front Royal-Warren County Economic Development Authority on the site of what used to be Avtex Fibers.

With concerns about global warming and industrial emissions, as well as the rising cost of oil, Cotefco president and CEO Charles P. Lickson felt the time was right for E2C. "Our main focus may be the environmental benefits," Lickson said, "but the big selling point is the potential economic savings."

The E2C unit can pay for itself Lickson said.

"We've had quantifiable success with diesel engines, which are far more complex than boilers," Lickson said. "I feel confident in saying that there is the potential for a 5 to 15 percent savings in fuel [using this device]."

Even without quantifying fuel savings for boilers, Lickson said that field tests show that a boiler will run cleaner and more efficiently on an emulsion fuel.

The first installment of an E2C was at the Massanutten Military Academy in Woodstock, in January 2007. Cotefco plans a gala reception and demonstration at the academy Friday.

Conceptually, the E2C works "like water being forced over a stationary propeller," said Charles Markert, Cotefco's senior vice president for engineering.



Cotefco engineer Charles Markert explains how the "Emulsion to Combustion" or E2C system combines water and fuel to produce an emulsion that burns cleaner, reducing emissions, using an ordinary home boiler to burn the mixture.

*(Photo by Kevin Seabrooke/Byrd*

*At*  
100  
pounds per square inch of pressure, the oil

and water mixture is forced into a special reinforced “hydrosonic chamber” whose exact design is proprietary, Markert said.

Small bubbles of ordinary tap water mixed into the fuel vaporize in the burning process, creating “micro-explosions” that Markert said cause further atomization — think of a super-fine mist — that results in a more complete combustion.

More complete combustion reduces exhaust gas temperatures and the formation of oxides of nitrogen and sulphur, Markert said.

The amount varies with different applications, but Markert said that the reduction in nitrogen and particulate emissions, or soot, is reduced by 15 to 90 percent.

The inventor of this new process, Eric W. Cottell, lives in Nassau, Bahamas, and completed the U.S. patent application earlier this year, according to Lickson.

Lickson, a lawyer, was involved in helping Cottell’s father, Eric C. “Jock” Cottell, patent similar technology in the 1970s that used a sonic probe to mix the water and fuel, but wasn’t really suitable for industrial applications.

Cottell has done extensive research in the Bahamas, running one diesel engine on a boat using the E2C technology to create an emulsion and another on conventional diesel fuel.

“When the ship is under way, you can see black smoke coming out of one stack and white smoke coming out of the other,” Markert said.

Markert said that the E2C system avoids some of the traditional problems with chemical emulsions such as storage tanks and separation of water and fuel during storage — which creates a potential for bacteria to form, ruining the emulsion.

Another factor, Markert pointed out, is that when an emulsion is shipped, the customer is also paying for the shipment of water.

“We provide the equipment that makes the mixture that’s burned,” Markert said. “And we do it as needed right at the point where it is used.”

For more information on Cotefco, call 800-967-4555 or go to [www.Cotefco.com](http://www.Cotefco.com).