The ClearFlame technology involves increasing the temperature to make ethanol ignite as easily as diesel. It includes reengineering the fuel injection system for ethanol.

Retrofitted Diesel Engines Burn Ethanol

You can run your large diesel engines on 100 percent ethanol with a retrofit from ClearFlame Engine Technologies. Retrofits retain the high torque, efficiency and durability of diesel engines without the cost of diesel fuel. In 6 years, the company has gone from an idea to test-driving its concept and is close to bringing it to market. Not only have they proven it works, but they are also proving it pays. They estimate that retrofitting one truck that drives 100,000 miles a year would save $36,600 in fuel costs alone.

"Fleets driving 120,000 miles a year or more will see a 12 to 14-month payback," says B.J. Johnson, CEO and co-founder, ClearFlame Engine Technologies. "This payback is with retrofit trucks in general. It's even better with end-of-life trucks, and new OEM installed systems will be even more efficient."

The ClearFlame technology involves increasing the temperature to make ethanol ignite as easily as diesel. It includes reengineering the fuel injection system for ethanol.

"The ClearFlame system looks the same, but is engineered for the different fuel properties, including lower lubricity and a different flow rate," says Johnson.

The increased temperature comes from removing the EGR cooler and other components to cycle exhaust heat back to the engine. Other components designed around reducing pollution are also extraneous with 100 percent ethanol, notes Johnson.

"Ethanol combustion is low in CO2 and soot, so we don't need the particulate filters," he says. "This also reduces maintenance, as well as other cost factors."

ClearFlame is working with multiple OEMs on the potential adoption of their technologies. John Deere is one of their investors. ClearFlame has upfitted one of its engines to operate on 100 percent ethanol. Meanwhile, the company is moving ahead rapidly with retrofit systems.

"We started working with local fleets and are planning a broader range of pilot demonstrations with five of the biggest trucking firms in the country," says Johnson. "We plan to start selling retrofit systems late in the second quarter or early third quarter of 2023."

A big reason for the emphasis on retrofit is the ability to hit the market quickly. Introducing a new concept takes time for OEMs as they reconfigure product lines and vendor relationships. That's not the case with retrofits.

"There's a huge skillset of mechanics with the knowledge and experience of building and rebuilding diesel engines," says Johnson. "If you know how to rebuild a diesel traditionally, you can do it with ClearFlame technology. The supply chain for the components already exists."

What the retrofit kits won't do is eliminate the need for DEF. While that's a long-term goal, achieving it would delay reaching the market.

"There are so many savings with our technologies, we don't want to wait for requirements for DEF to be removed," says Johnson. "One of the benefits we offer is our technologies can minimize many of the headaches associated with the use of DEF."

Another advantage of ethanol-based versus biodiesel or other alternative fuels is availability. Johnson notes that E98 (denatured fuel ethanol) is at every fuel terminal in the country. This makes the delivery of ethanol to a public or private fuel depot as easy as taking delivery of diesel.

"Truck stops don't have E98 installed at their truck pumps yet, but the infrastructure is cheap and readily available," says Johnson. "Our initial strategy is to work with customers who can install ethanol tanks and pumps at their locations or a third party. We believe customer pull will expand infrastructure to public retail truck stops."

There's no technical limit on the size of engines to which ClearFlame technologies can be applied. However, on a practical level, Johnson rules out smaller diesels, such as car engines and some older engines.

"We're focused on engines being produced today and will focus on new engines as they are introduced," says Johnson.

Setting a price on the new technologies is a challenge, he admits. "We're looking at $50,000 to $60,000 for engines like the Cummins X15s or International LT625 trucks," says Johnson. "Payback is the bigger factor for fleets with high mileage. We're working on arrangements other than paying upfront for those with fewer miles each year who hold their assets longer."

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Lindemer's 1948 Farmall M uses an 11-hp. Honda engine and transmission from an old Crosley car.

His Super M Has 11 Hp., 30 Speeds

"I saw a story in a recent FARM SHOW where a fellow repowered an H with small engine power, so I thought I would share my Super M with an 11-hp. Honda motor," says Oliver Lindemer, who added a Crosley transmission to the tractor, all of which resulted in a low-power 30-speed Super M.

Lindemer's grandfather Richard gifted him the Super M in exchange for help during harvest. The tractor was missing an engine and had flat tires. The exchange included a box full of parts, but not all that was needed.

"I wanted something functional that would use all the gears," says Lindemer. "I looked around my shop and saw an old Honda GX340 I'd received for payment after cleaning gutters when I was in high school. I had rebuilt it with a new carburetor, but it had been sitting unused for about 10 years."

Lindemer mounted it to a steel plate he bolted to the Super M frame. He recognized he needed a gear reducer to hook it up to the Super M's transmission.

"Most repowers with smaller engines involve large chain drives or belt drives, but a neighbor had used another transmission," says Lindemer.

The tractor had previously been modified with an M&W adapter kit. It acted as a 2-speed for the first four gears**.** Combined with the OEM 5-speed, the Super M had nine forward gears, plus reverse.

Initially, Lindemer planned to use a 4-speed out of a Jeep Cherokee as a gear reducer. "My grandfather mentioned having an old Borg Warner 3-speed from an old Crosley," he says. "It had been sitting in his shop for years, and he thought it would fit better than the Jeep transmission."

Crosleys, built from 1939 to 1952, were subcompact cars bordering on microcars. The transmission was compact as well, half the size of the Jeep 4-speed. Fitting it in was no problem. He did move the engine about 3 in. forward. The challenge was making the connections.

"I didn't want to ruin any of the original parts, so I needed to machine pulleys to fit the output and input shafts," says Lindemer.

He mounted the Crosley on the input shaft of the IH transmission. The engine's mounting plate served as a mount for a pillow block bearing for the pulley shaft on the Crosley.

Lindemer uses the factory clutch pedal linked to a belt tensioner to change gears, just as the stock tractor would. The Crosley is underdriven by a belt and pulley setup from the Honda.

While technically the tractor does have 27 forward gears and three reverse, Lindemer admits he has yet to get it out of the Crosley's first gear. That hasn't stopped him from using it.

"I recently installed a Freeman 200 hydraulic loader, which is powered by the stock hydraulics on the Super M," says Lindemer. "It works fantastic."

Lindemer is an engineering technician at a local transportation research center, where he performs crash test simulations. When he gets home, he heads for the shop to build stuff. Often, he does so with the counsel of his grandfather before sharing the project on @Scrap Fab, his YouTube channel.

"My grandfather and I share the idea that everything around us is capable of being something with a little work," says Lindemer. "We believe in making do with a bit of ingenuity."

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Nifty Way To Till Garden Rows

"This photo shows how I till my garden when the plants are still small," says Norman Sleting, Rapid City, Mich.

He mounted a 2-in. receiver hitch on the front of his ATV and mounted a hitch tube on his York rake so the rake would be mounted facing forward in front of the ATV.

"I remove three tines from the center of the rake so there are still six tines on either side of the row. Works great to keep weeds down early in the season. I use it until the corn gets too stiff to stand back up and other plants get too bushy to drive over."

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