

# Market Forces

The burgeoning DEF industry

BY TOM STONE



*Doug (left) and Jerry Brenner, owners of Brenner Oil, Holland, MI, stand next to the company's new diesel exhaust fluid (DEF) transport. The first-of-its-kind DEF trailer was built by Liquid Haulers Maintenance, Moline, MI, and features a Blackmer® STX3-DEF sliding vane pump.*

**T**HERE'S NO QUESTION THAT THE DIESEL FUEL MARKET IN the United States has undergone some significant changes in the past five years. One of the chief adjustments occurred in 2006 when the U.S. Environmental Protection Agency's new ultra-low-sulfur diesel (ULSD) standard went into effect. This regulation lowered the allowable sulfur content in on-road diesel fuel to 15 parts per million (ppm), which was much lower than the previous standard of 500 ppm. The thinking behind this new standard was that a reduction in the sulfur content found in diesel fuel would reduce emissions of sulfur compounds into the atmosphere, where they had been shown to cause acid rain and pose other environmental dangers.

In 2005, the future of alternative fuels received a boost when the Energy Policy Act (EPA 2005) established the Renewable Fuel

Standard (RFS) program. The RFS created legislated use levels of alternative fuels in the U.S. that would increase on an annual basis. In January 2010, the alternative-fuel thresholds were increased in an updated program called Renewable Fuel Standard 2 (RFS-2), with 12.95 billion gallons of alternative fuels now expected to be consumed in 2010 and increasing to 36 billion gallons consumed in 2022. Benefiting from this program is biodiesel, which is a renewable fuel for diesel engines derived from natural renewable feedstocks like soybean oil, vegetable oils, animal fats and recycled greases. Biodiesel is generally added to diesel fuel in amounts of 5 percent to 20 percent (B5 to B20) and, in fact, the National Biodiesel Board has a goal of seeing various levels of biodiesel blends replace 5 percent of total diesel demand by 2015.

In addition to the regulations that affect diesel fuel itself, on Jan. 1, 2010, a new EPA emissions mandate went into effect that requires

all new cars and trucks with diesel engines that are sold in the U.S. to include equipment and fluids that will be used to treat the exhaust emitted by diesel-powered vehicles, thereby lowering the amount of potentially harmful nitrogen oxides (NOx) that are released into the atmosphere. One of the technologies used by automotive manufacturers to meet these regulations is Selective Catalytic Reduction (SCR). The SCR process converts NOx into nitrogen and water vapor, two components that are found naturally in the air we breathe. The three main components of the SCR system are diesel exhaust fluids (DEF), hot exhaust and a catalytic converter.

### A NEW MARKET

While the initial reaction of many in the motor-fuel production, storage, delivery and retailing industries to even the hint of new federal regulation may be an exasperated "What now?," the simple truth is that changes in fuel standards, whether in regards to production or regulation of emissions, usually create opportunities for savvy operators to create a new niche market for their businesses. That is definitely the case with DEF.

DEF is a colorless, odorless and non-toxic solution consisting of 67.5 percent water and 32.5 percent automotive-grade urea. Urea is a compound of nitrogen that turns to ammonia when heated. During the SCR process, the DEF is injected as a fine mist into the hot exhaust gases. The heat turns the urea into ammonia that breaks down the NOx into harmless nitrogen gas and water vapor.

DEF is stored in a tank located on the car or truck, and in order to get the DEF from the storage tank into the exhaust stream, special DEF lines run from the tank to a series of DEF injectors that introduce the DEF solution into the exhaust. Coolant lines near the DEF injectors ensure that they run at the optimal temperature for the ideal chemical reaction.

In order for the DEF to perform its role in breaking down the NOx in diesel exhaust it must meet one main requirement: It must be on the vehicle. That means that it must be produced, shipped, stored and transferred onto the vehicle. Voila, new market. In the months leading up to the 2010 launch date, DEF was made available to the market through bulk producers, blenders and distributors, and could be found at some car and light-truck dealerships. A system has also been put in place that has been designed to ensure that DEF will eventually be made available in bulk at all truck stops in the U.S., with 1,000-gallon bulk filling stations also cropping up across the country.

### MEETING A NEED

Brenner Oil, Holland, Mich., was founded in 1930 by Leonard Brenner when he began hauling and delivering home-heating oil in the back of his pick-up truck. The company is now run by the third generation of Brenners with Doug and Jerry following in the footsteps of their grandfather Leonard and father Arlen. Brenner Oil didn't grow into the largest independent oil company in west-

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ern Michigan, one that hauls more than 1.3 million gallons of product a day to a delivery area that covers all of Michigan and parts of northern Indiana and eastern Illinois, by sitting back on its heels. So, when the deadline for the new EPA diesel-exhaust emissions mandate was announced, Brenner instantly knew that a new business opportunity had presented itself.

“We saw that these new standards would present an opportunity to haul some DEF so we decided to look into what it would take to get the job done,” said J.C. Sikora, maintenance coordinator for Brenner Oil.

What Sikora and the folks at Brenner found was that DEF is highly corrosive to materials such as copper and brass. That meant that any tank trailer that would be used to haul DEF, as well as all of the trailer’s wetted components, would need to be made of stainless steel or approved plastics such as high-density polyethylene.

Brenner took all of this information and turned to the experts at Liquid Haulers Maintenance (LHM). LHM, headquartered in Moline, Mich., builds tank trucks and

transport trailers for a wide variety of liquid-handling operations, primarily refined fuels and motor oils. LHM has built a number of tank trucks and trailers for Brenner Oil over the years. This time, Brenner required a stainless-steel 5,500-gallon trailer that could meet all of the unique characteristics inherent in the hauling and delivery of DEF.

“It was a unique application and the first time we had built one of these trailers, so there were a lot of challenges,” explained Tom Bouwma, LHM’s director of manufacturing. “No one’s really dealt with DEF, so we did a lot of homework on this one, for sure. For example, if DEF gets below 12°F it tends to turn to a solid or slush. We had to install a heating system in the cabinet where the delivery equipment is located to keep it warm. Also, if the urea sits in one area too long it crystallizes, so we designed the tank and delivery system with no pockets where product can sit. We made areas where the system could be flushed out, if need be, or cleaned out with deionized water.”

As the project—which took around two months to complete from initial order to

final delivery to Brenner on Feb. 19—began taking shape, Bouwma noticed similarities to food-grade trailers that LHM had built.

“We just had to keep it very clean, so everything had to be stainless,” said Bouwma. “You might think it’s only urea, but there are so many conditions that have to be met to ensure quality standards and avoid contamination.”

## A HELPING HAND

When it came to selecting a transport pump that would interact positively with the DEF during the loading and unloading process, LHM turned to Grand Rapids-based Blackmer®.

The decision was to install a new Blackmer 3-inch STX3-DEF Series Sliding Vane Pump, which was just recently introduced by the company, on the trailer. The pump features 316 stainless-steel construction with external ball bearings, chemical-duty mechanical seals and non-metallic vanes, making it the ideal choice to handle DEF and its corrosive nature. STX3-DEF pumps offer flow rates up to 250 gpm (946 lpm) with differential pressures up to 125

psi (8.6 bar) and maximum speeds of 800 rpm. With those parameters, Brenner's DEF trailer can be offloaded in as little as 24 minutes.

Also playing a pivotal role in the operation of the trailer is a Blackmer Hydrive 2-2010 Hydraulic Cooler. This compact, lightweight unit is a fully integrated hydraulic drive system that has been designed for use with transfer pumps and other types of rotating equipment.

"Air elimination is a concern for products like DEF, especially if it crystallizes it can be a huge problem," said Bouwma. "So we decided not to run a traditional air-eliminator and instead used an optic eye with a Mid-Com electronic register and hydraulics to ensure the tank was empty and no air would get metered."

## CONCLUSION

When opportunity knocked, Brenner Oil certainly listened and capitalized on the new opportunities in front of them. With the valued assistance of LHM and Blackmer, Brenner Oil has quickly developed a new DEF-hauling program for this emerging market.

"This DEF trailer is the only one in the state of Michigan that we know of, and we're preparing to build another one," said Sikora. "Liquid Haulers took all of the challenges we presented them and they delivered on those challenges. Now, we have a finished product that's ready to work. They put a trailer together that fit our needs and did a wonderful job."

It's also true that those projects that are the most challenging to complete also offer the most satisfaction in return.

"When you put so many variables together that are kind of untested, you just wonder what you're going to end up with, but the customer is very happy with it," said Bouwma. "Brenner said, 'Do it right; this is what we're getting into, this is what we want built and give us something that we don't have to worry about and make it easy for the driver to operate,' and I think we did."

Bouwma and LHM, with a big assist from Blackmer, also can rest assured that they are now ahead of the curve when it comes to creating tanks and trailers for hauling a commodity whose use will likely continue to grow in the years ahead.

"It's such a new market that we're waiting to see how it works out, but with the mandate on it, unless the government changes its mind, which never happens, hopefully it takes off like they say it should," said Bouwma. "We have a lot of time invested in the first trailer and we're ready to do some more. This is good for us, it's a good niche, and with the help of people like Blackmer

and Brenner Oil, after doing the first one we've got a lot of the bugs figured out."

Tom Stone is the director of marketing for Grand Rapids, MI-based Blackmer, an operating company within Dover Corporation's Pump Solutions Group (PSG™). He can be reached at (616) 241-1611 or stone@blackmer.com. Redlands, CA-based PSG is comprised of six leading pump companies—Wilden®, Blackmer®, Griswold™, Neptune™, Almatec® and Mouvex®. You can find more information about Blackmer pumps and compressors at www.blackmer.com and PSG at www.pumpspsg.com.

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[www.ureadispeningsystems.com](http://www.ureadispeningsystems.com)

**Contact name:** Bob Taylor

**E-mail:** [bobt@americont.com](mailto:bobt@americont.com)



## BENECOR, INC.

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and barrel pumps for open applications and has launched a new line of Centrifugal pumps for the close product application. In addition to these pumps Benecor also offers submersible DEF pumps for bulk storage applications. In 2010 Benecor will be introducing several above ground storage and dispensing solution for commercial and retail applications.

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**Web:** [www.benecor.com](http://www.benecor.com)

**Contact name:** Brendan Foster

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**Contact name:** Alan Levine

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## BLACKMER®



announces that its new STX3-DEF Sliding Vane Pumps are ideal for the loading and unloading of Diesel Exhaust Fluid (DEF). EPA 2010 vehicles equipped with Selective Catalytic Reduction (SCR) technology use DEF. DEF is a solution made up of purified water and 32.5 percent automotive-grade urea used as a carrying agent for the ammonia needed to reduce nitrogen oxide (NOx) emissions from vehicles into nitrogen, water and carbon dioxide (CO2). STX3-DEF pumps are made from 316 stainless steel with external ball bearing construction, non-metallic Duravanes, FKM elastomers and Blackmer chemical mechanical seals to provide longer transport pump life with liquids such as DEF. The STX offers high capacity flow rates up to 250 gpm (946 lpm), differential pressures up to 125 psi (8.6 Bar) and

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**Contact name:** Tom Stone

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## BLUE1USA

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Colonial Chemical Company has partnered with Yara North America Inc., in the Diesel Exhaust Fluid (DEF) market. Colonial will operate as Yara's Sales Agent in the Northeast & Mid-Atlantic regions of the US and also perform DEF packaging, warehousing and bulk haul-

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