Engine catalyst system cuts diesel consumption

Using the DC-100 Combustion Catalyst System leads to an 11.3 percent reduction in diesel fuel consumption (±1 percent), according to a test performed in conformity with Technology & Maintenance Council (TMC) and the Society of Automotive Engineers (SAE) standards. Conducted by **Arizona Materials, LLC** (AZM) and Emissions Products International (EPI), a test using the Joint TMC/SAE Type II protocol precisely measured the effect on fuel consumption of a patented diesel-engine catalyst system produced by Phoenix-based Emissions Technology, Inc.

Two concrete mixer trucks were employed, one as the test vehicle and the other as a control. Both diesel engines were evaluated under 'normal' and identical operating conditions, before and after the test vehicle was outfitted with the DC-100.

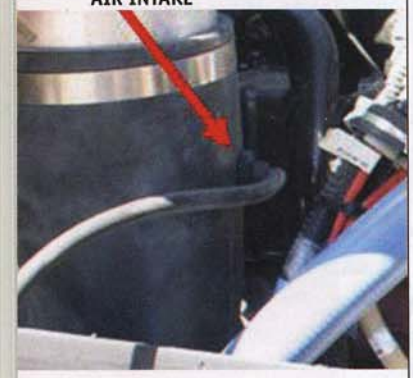
Widely regarded by the trucking/transportation industry as the only definitive method for testing the effect of products claiming to improve fuel economy in an operating environment, the Joint TMC/SAE J1321 Type II test (see page 46 for sample) requires tight tolerances over multiple repetitions of the designated route. Accordingly, test results are considered valid to within ±1 percentage point of the absolute value of 11.3 percent.

Strict procedures defined by the protocol were used to eliminate the effects of other factors on the test. Rigidly controlled variables included a series of same drivers and observers, load weight, route, speed, drive time and idle time. Additionally, no other alterations were made to either vehicle during the course of testing. A rural location was chosen to negate the impact of traffic variability on driving conditions. Consistent also with TMC/SAE Type II, the change in efficiency of the control truck was used to offset the efficiency increase of the test truck by the same amount.

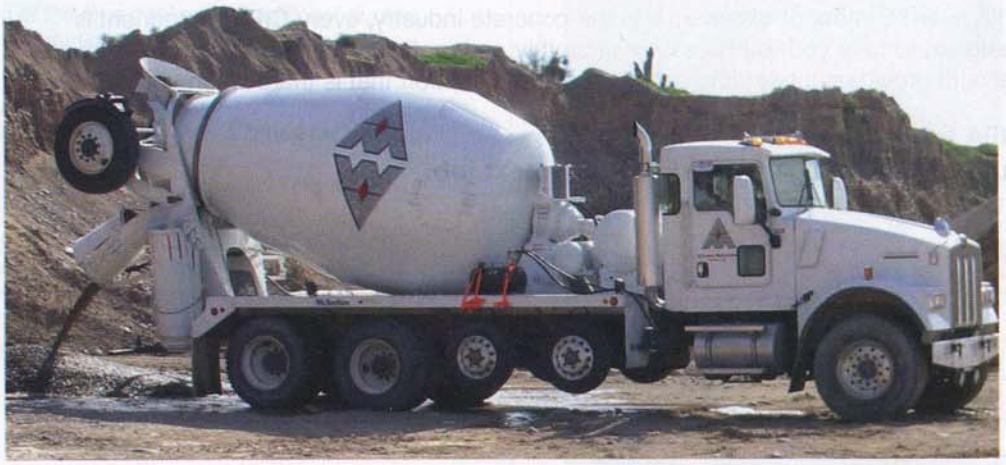
By introducing microscopic amounts of noble and non-noble catalysts in aerosol form into the engine's air intake, product engineers explain, the after-market DC-100 device facilitates more complete fuel combustion in the chamber where greatest benefit is derived. Thus, the chemistry of the catalytic converter is combined with aerosol catalyst technology to boost performance. Benefits of the DC-100 are said by the manufacturer to include pollution reduction, oil savings, increased horsepower, fuel savings, longer engine life, lower engine repair and replacement costs, increased productivity, elimination of pollution penalties, and potential pollution reduction incentives.

"This project proved important for us in our quest to combat higher fuel prices," says AZM's John Fowler. "The SAE test verified that fuel savings are significant. Furthermore, because the DC-100 helps our trucks run more efficiently, emissions are reduced. We are also optimistic about long-term benefits, since the DC-100 will keep our engines and oil cleaner." — *Emissions Products International, 877/EPI-INTL, www.epi-intl.com*

Test summary, page 46 ...



The DC-100 enables more complete fuel combustion by introducing catalysts in aerosol form into the engine's air intake.



To comply with TMC/SAE Type II protocol, the change in efficiency of the control truck was used to offset the efficiency increase of the test truck by the same amount.

SAE J1321 TEST

Performed by Emissions Products International, LLC in conjunction with Arizona Materials, Inc. February to March 2005

CONCLUSION

The percentage of fuel saved for AZM's mixer trucks will be approximately 11.3% under "normal operating conditions."

PURPOSE

Accurate and precise measurement of the DC-100 Combustion Catalyst System's effect on diesel consumption by concrete mixers under 'normal' operating conditions.

SCOPE

To effectively measure change in fuel efficiency on a single mixer by eliminating or controlling all variables contributing to variation in fuel consumption. The elimination of variables demonstrates that any change in fuel consumption is contributable to the added component, the DC-100.

TEST PROCEDURE USED

The highest standard of testing that accomplishes these objectives is the Society of Automotive Engineers' (SAE) SAE J1321, which is a joint TMC/SAE Fuel Consumption Testing Procedure. As specified in this protocol, an unchanging control vehicle is run in tandem with the test vehicle to provide reference fuel consumption data over representative routes. The SAE test specifies four basic rules that must be applied to ensure test result validity:

1. Test routes and operations should be representative of actual operation
2. A single test is inconclusive regardless of the results. Tests must be repeatable to have validity.
3. The more variables controlled the more conclusive the results.
4. All test procedures or methods are accurate within prescribed limits.

VARIABLES CONTROLLED

1. *Driver*—Same drivers and observers were used for both tests.
2. *Load*—Loads were the same within ±250 lbs.
3. *Route*—Routes driven were exactly the same for every test run.
4. *Speed*—Speeds were held as constant as possible 20/45/55 mpg.
5. *Drive Time*—Time to complete each test run was within ±15 sec.
6. *Idle Time*—Idle time did not vary more than ±5 sec. per test run.
7. *Fueling Quantity*—Removable fuel cells were used to weigh the fuel before and after each drive segment.

VEHICLES USED

The two trucks chosen for the test were 198 and 208, because they both have jumper seats to accommodate observers. The Hatfield Yard was chosen because it of its rural location, minimizing the impact of traffic variability on driving conditions.

'NORMAL OPERATING CONDITIONS' DEFINED

The request was made at the highest level of AZM to mimic normal operating conditions during the test. Through extensive discussions with AZM personnel, 'normal operating conditions' were determined, as follows:
Short Route: Between 10 and 20 miles to 'job site'
Speed: Not to exceed 65 mph
Idle Time:

- Approximately 5 min. idle before loading
- Approximately 70 revolutions after loading
- Approximately 5 min. slumping after revolutions
- Approximately 10 min. idle before unloading
- Approximately 5 min. wash-down after unloaded

CALCULATIONS

AVE. GALLONS USED PER TEST RUN

	Test Vehicle	Control Vehicle	T/C Ratio
Before	6.87	6.44	1.067
After	5.64	5.96	0.946
Difference			0.120
% Difference			11.3%

PURPOSE OF CONTROL TRUCK

The control truck was used to measure any normal changes that may have occurred due to road conditions, weather, etc. The control truck had an efficiency increase of 7%, which offset the efficiency increase of the test truck by the same amount. If the control truck were not used, the measured fuel savings for the test truck would have been over 18%.

ACCURACY

Each variable was carefully monitored to ensure testing protocol was followed for each test run.

- Driving distance within 0.5% of each other.
- Drive time within 0.5% of each other.
- Portable weigh tank method used for acute accuracy.
- Scale calibrated before each measurement taken.
- Vehicles checked before each test run for problems.
- Three valid T/C ratios tabulated for each segment (baseline and test data).
- Valid T/C ratios within 98% of each other.

SUMMATION

Because all variables were controlled within the confines of the SAE protocol and because no other alterations were made to either vehicle during the course of the test, it can be concluded that the test yielded 11.3% reduction in fuel consumption (±1%).