

# Engine evolution

CHANGES OFFER IMPROVEMENTS AND NEW CHALLENGES IN MATCHING POWERTRAIN SPECS.

Detroit Diesel's new DD15



**A**s engine makers transitioned to the 2007 technology that lowered emissions, they adopted varying approaches on horsepower and displacement. One common trend, though, is better torque curves that often help produce more peak torque.

For the owner-operator, this means that choosing the correct axle ratio for the tire size, transmission top gear ratio and engine torque curve is more vital than ever. "Torque does all the work, and horsepower

determines at what speed that amount of work will be done," says David McKenna, Mack's powertrain marketing manager.

"Some people with long experience in the industry still have not fully embraced 'gear fast, run slow,'" says Mike Powers, product development manager at Caterpillar. "Because of the fuel economy penalty related to meeting emission standards, the sweet spot is smaller than it was."

Powers says nothing changed for his company in 2007: Caterpillar owners should follow the same ACERT gearing recommendations that have been in place since 2004. In that year, Cat's 475-hp rating went from 1,650 lb.-ft. of torque to 1,850 lb.-ft., typical of the change that "allows a lower rpm at cruise,"

Powers says. Match carefully, and be prepared to use a faster axle ratio than you may be used to. C15 engines with less than 1,750 lb.-ft. of torque should cruise at 65 mph at 1,400 rpm, while those with 1,750 lb.-ft. and above should cruise at 65 mph at 1,325 rpm, Powers says.

Detroit Diesel standardized its Series 60 by using the 14-liter design at all horsepower ratings for 2007, while also improving the piston design and cylinder liner finish to minimize oil consumption. "We have not modified the torque characteristic

significantly for 2007 other than to extend the peak torque speed down to 1,100 rpm from 1,200 rpm," says Tim Tindall, director of component sales.

The Series 60, though, soon will be replaced. Detroit says its new DD15 platform offers:

- A stronger, stiffer, iron-alloy block with higher capacity oil and coolant flow and forged-steel crankshaft and pistons designed for larger-diameter, more durable main bearings.

- A lighter, stronger, one-piece cylinder head made of compacted graphite-iron, with two cams and four valves per cylinder on shortened intake and exhaust ports.

- An integrated engine brake, hydraulically operated and electronically controlled, that maintains downhill speed with up to 575 braking horsepower.

- A common-rail fuel injection system with amplified pressure that individually shapes each inner-cylinder spray pattern.

In a side-by-side 0-60 mph race, the DD15 bested the S60 by eight seconds, Detroit says. Its change intervals for oil, oil filters and fuel filters last up to 50,000 miles, and it can go up to 60,000 miles between overhead valve adjustments, Detroit says. Its oil, coolant, exhaust gas recirculation and fuel system components are above the frame rail and grouped close together for easy access.

Detroit will introduce the 12.8-liter DD13 in 2009 and the 15.6-liter DD16, with up to 600 hp and 2,050 lb.-ft. of torque, in 2010.

## EXTRA HELP

There's no such thing as a typical on-highway operation. An owner-operator regularly hauling along I-10 will have a far different set of needs from someone hauling across I-80, especially in winter. So it's often a good idea to use the manufacturers' spec'ing assistance to optimize the balance between torque and fuel economy.

Cummins' PowerSpec program offers a gearing/spec'ing calculator. Mack's Predictor program "guides our salesman and customer to the best specifications desired, whether for best fuel economy, best power, low-speed job-site operations, transmission matching, and so on," McKenna says.

Detroit Diesel offers Specification Manager, a simulation tool designed to evaluate various driveline options across a multitude of operational routes. "This tool allows us to evaluate gradeability

and fuel consumption differences in comparing one specification to another, as well as optimizing the number of gears required," Tindall says.

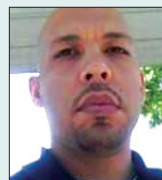
Caterpillar's DesignPro, available through the truck dealer, offers comparisons in miles per gallon. With this, a driver can change axle ratios or tire sizes and see the relative impact on fuel economy. DesignPro also shows how design, including aerodynamics, affects fuel economy.

Volvo's spec'ing assistance program offers a graphical representation of a tachometer and speedometer on a computer screen. Input the tire size and transmission top gear ratio, and the program then will help you choose the axle ratio that will keep the engine in the sweet spot. Horsepower at the wheels also is available, which helps determine gradeability.

Engine manufacturers know their products better than anyone. Let them help.

## OWNER-OPERATOR VIEW

### BARRY MCCAULEY Durham, N.C.



As a former teacher and radio producer, owner-operator Barry McCauley did not know much about trucking when he became a company driver in 2005. He knew even less about

engines. In the two years since, however, he has researched and discussed engines with fellow drivers to the point of being able to spec the engine for the 2007 Volvo 780 he purchased in 2006.

His choice: a 2006 Cummins ISX. "I like the Jake brake on it," McCauley says. "The engine's got a lot more control over how strong you can make it. Plus, it has a lot more pulling power in the mountains." Leased to Landstar, McCauley says he hauls in the lower 48 states, and often drives through mountainous regions. "Right now I'm averaging 7.7 miles per gallon."

McCauley says he loves life on the road and regrets not taking up his childhood dream of driving a truck sooner. "Had I known the job was what it is 15 years ago, I would have started right out of high school and skipped what I feel was a wasted financial investment by going to college," he says. "Most people I know with master's degrees, who have been working for 20 years, don't make as much as I do now." He estimates that amount to be \$80,000 per year.

International Truck and Engine revealed the power and torque ratings for its MaxxForce 11 and MaxxForce 13 Class 8 engines – new to the market this year – at the 2007 Mid-America Trucking Show. Now on the market, the six big-bore models offer ratings of 330 to 475 hp and 1,250 to 1,700 lb.-ft. torque. The high-pressure common rail injection system can produce its maximum 26,000 psi even at peak torque rpm, where other heavy-duty injection systems cannot deliver maximum injection pressure, says Jacob Thomas, vice president of International's Big Bore Business Unit.

The advanced fuel- and air-management systems of the MaxxForce engines provide instant response to reach peak torque at 1,000 rpm, which means earlier acceleration upshifts and fewer grade-climb downshifts, the company says.

Owners of Cummins ISX engines should cruise at 1,450 rpm at 65 mph, says Lou Wenzler, on-highway market communications director. "The 2007 ISX has a family of ratings that are similar, if not identical, to pre-'07 ratings," he says. "All ratings provide a robust power curve, which enables

great lugback performance. The ISX ratings are fully compatible with a full range of automated and fully automated transmissions."

In the Volvo D13, the sweet spot moved downward, says Ed Saxman, Volvo's product manager for drivetrains. On the D13, peak horsepower has increased from 465 to 485 while torque remains at 1,650 lb.-ft. But the sweet spot is 1,300 to 1,500 rpm, down from 1,400 to 1,600. "You get the best fuel economy by staying within that rpm band," Saxman says. "The torque is so good, a 1,450-rpm cruise will feel good even at 69 mph."

Mack says the match of available horse-



The International  
MaxxForce 13

power and torque on the Mack MP engines is better than ever. "We have managed to lower the cruise speed rpm settings with the MP series engines, with much improved horsepower ramps," McKenna says.

The American high-bore engine market will become more crowded in 2009 when Paccar begins producing heavy-duty engines for use in Peterbilt and Kenworth trucks.

**ENGINE SPECS.** The engines included in the spec listings represent the products from each manufacturer that are most popular with owner-operators. Consult a dealer for information on other models; contact information begins on Page 6. ■