



# Every™ Result. Better.

Tier 4 Interim/Stage IIIB Customer Field Tests



# Field Test Success.

## **The Challenge.**

Meeting the emissions standards for EPA Tier 4 Interim and EU Stage IIIB in 2011 is a requirement for all engine manufacturers and has been the industry challenge. Cummins has achieved these very low emissions standards while creating better products, providing greater productivity, reliability and fit within the packaging requirements. Cummins has devoted significant engineering and technical resources, along with real-world customer testing, to validate our next-generation off-highway engines.

## **Getting A Head Start.**

Cummins advanced planning put our field test program into effect in 2008 – three years in advance of the regulatory changes. We built upon a legacy of proven technology, including over 750,000 cooled Exhaust Gas Recirculation (EGR) engines and over 450,000 Cummins Particulate Filters in operation. Our experience and success with on-highway engines contributed greatly to this experience base. We've engaged in such an extensive validation process with our customers because we know that off-highway equipment requires different load factors and work environments.

## **100 Installations By 2010.**

Cummins has now placed over 100 concept, field test and OEM prototype Tier 4 units. We expect to have 50,000 hours of actual field use and 100,000 test cell hours before the Tier 4 Interim/Stage IIIB regulations take effect in 2011.

Cummins has field-tested its prototype engines across a wide range of machine types and duty cycles. These include machines such as a hydraulic excavator, mud drill/pump, forestry feller buncher, front-end loader, snow groomer, compressor, heavy forklift, yard spotter truck/terminal tractor, rock drill and a four-wheel-drive tractor. Our field tests specifically targeted the toughest installation and operational challenges so we could gain broad experience and have total confidence in our engines' abilities to handle every application.

These Tier 4 machines have been monitored using remote data download via a cellular network, and on-site customer visits have been conducted to get user reactions.



**“The machine is more responsive and provides better performance now than it had before with the Tier 3.”**

**Roy Cordova**

**Tier 4 Interim/Stage IIIB  
field test operator**



**Operating in the Alps, a snow groomer on a field test with a Tier 4 Interim/ Stage IIIB QSL9 engine performs more effectively at high altitude than the previous Tier 3/Stage IIIA engine.**

### **Benefits By The Numbers.**

To date, our Tier 4 Interim and EU Stage IIIB engines are achieving our goal of delivering cleaner, higher performance and adding significant value for the customer. The statistical data show:

- Up to 5% better fuel efficiency vs. Tier 3 engines
- Very high uptime availability (up to 99%), equivalent to Tier 3 levels of reliability
- Very low levels of active regeneration required (less than 1% operating time)
- Enhanced equipment productivity with reduced cycle times
- Quicker engine response due to Cummins VGT™ Turbocharger and enhanced fuel system performance
- Service requirements virtually identical to Tier 3
- Significantly quieter operation
- Reduced greenhouse gas emissions (CO<sub>2</sub>) per year because of lower fuel consumption

**A field test drill proves the durability of the Tier 4 Interim/Stage IIIB Cummins engine and aftertreatment system working under tough conditions and high vibration.**

### **Better Reliability.**

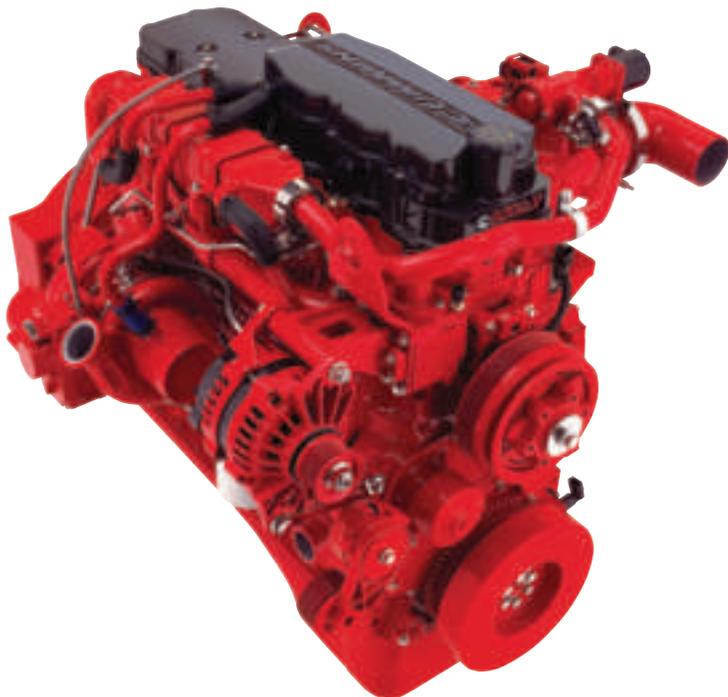
Cummins Tier 4 engines use the same Cummins Filtration lube oil filters and change intervals as Tier 3 engines. A new Fleetguard® Direct Flow™ air cleaner is up to 35% smaller and more efficient, so it is easier to access and offers the opportunity for extended filter change intervals. The highly efficient coalescing filter lowers emissions by filtering blowby gases, and needs only a simple filter element change at 2,500-hour intervals.

The Cummins Particulate Filter is service-free other than an ash cleaning at 5,000-hour intervals. The Cummins VGT Turbocharger has only one moving part, resulting in industry-leading simplicity and reliability. Every one of these technologies has been developed as part of a totally integrated package by Cummins for the industrial markets.



## Customers Respond.

While the results speak for themselves, nothing can replace the comments we've received from the operators and owners of equipment repowered with Cummins Tier 4 engines.



## Concrete Results.

Alamo Concrete Products in Austin, Texas, is running a front-end loader repowered with a Tier 4 QSB6.7. The 193-hp rating is identical to that of the engine it replaced. George Howell, Operations Manager, and Roy Cordova, the equipment operator, had this to say:

### ■ Installation Ease.

The repowering was simple and straightforward. There was “very little difference in the engine compartment.”

### ■ Product Integration.

“The fact that you don’t have to do anything to make the Tier 4 system function is the best integration.”

### ■ Performance And Productivity.

The operator noted “the performance is better, and that gives us an advantage...when you start stockpiling, you can really tell the Tier 4 is better than the Tier 3. It is more responsive and provides better performance. I can push material easier, and the fuel efficiency is better.

“I can tell a large difference between Tier 3 and Tier 4 noise levels...the Tier 4 is quieter and has improved my work conditions.”

### ■ Reliability.

The Tier 4 engine has proven to be reliable – 99% uptime in 3,150 hours of operation.

“No downtime is very beneficial. The engine uses hardly any oil...the system operates automatically and is self-sufficient.”



### **A Clear-Cut Advantage.**

Quality Enterprises has a government contract to keep canals in Long Beach, Mississippi, clear of brush. They use an excavator with an extended boom to get into hard-to-reach places. The original Tier 3 QSB6.7 engine was rated at 220 hp and was replaced with similar Tier 4 power. Project Superintendent Barry Blankenship has this to say about the field test results:

#### **■ Flawless Performance.**

“The machine has operated flawlessly as far as the engine is concerned. It picks up faster with better turnaround cycles and returns to full rpm quicker. And we’ve never had to stop the machine to do a stationary regeneration.”

#### **■ Every Dollar. Saved.**

“The savings because of zero downtime are significant for us. Fuel efficiency has improved by at least 5%.”

#### **■ Clean And Quiet.**

“The Tier 4 is definitely quieter. Less noise means more comfort for the operator and fewer complaints from the neighbors, which is important since we work in residential areas.”

#### **■ Tier 4 Vs. Tier 3.**

“We’d prefer to use the Tier 4 because it is quieter with more response, no downtime and no problems.”

### **Making Short Work Of Yard Work.**

Chicago is a major hub for trailers, intermodal containers and more. Rail Terminal Services handles the movement of trailers within its yard using a yard spotter/terminal tractor. The original Tier 3 QSB6.7 engine has been replaced with a Tier 4 QSB6.7 of similar horsepower. Ken Kohs, Maintenance Manager, and Rail Terminal Services equipment operators report the following results:

#### **■ Stronger. Faster. Better.**

The operator is thrilled. “It’s amazingly better. A lot stronger, a lot faster, a lot quicker – everything. Quieter too. You can keep working when the engine is regenerating.”

#### **■ A Clean Install.**

“In spite of limited space for the air cleaner under the cab, the installation is clean and allows easy access for maintenance.”

#### **■ Lower Operating Costs.**

“The old air filters lasted about 800 hours, while the new style gets over 1,400 hours. There’s a lot less downtime, a lot less maintenance.”





## **Drilling For Dollars.**

Stewart Brothers Drilling Company is a contractor that drills all types of wells all across the Western United States. They installed a Tier 4 QSL9 with the same 350-hp rating as their outgoing engine in a mobile mud pump/drill rig. Drilling Superintendent and co-owner Randy Stewart, together with Field Supervisor Don Ward, has the following to say about their Cummins repower experience:

### **■ A Powerful Surprise.**

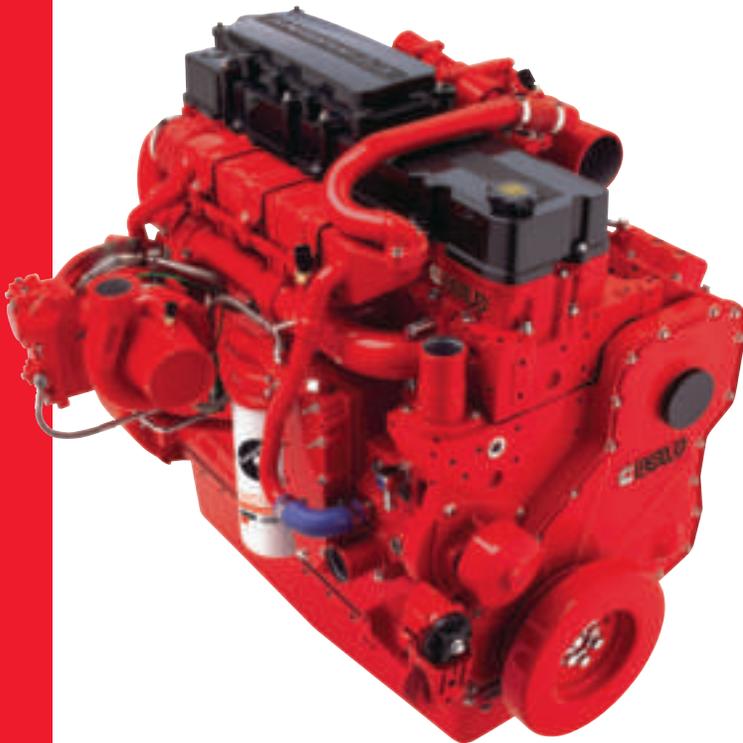
“We have more power than we thought we were going to have when we first put the engine in. You notice that on climbing hills and drilling. We’ve noticed more lifting power whenever we accelerate. And there’s a lot more smoothness. I’m thoroughly impressed with its ability to deliver the power when the demand is there. I am very impressed with the ramp-up speed of this engine.”

### **■ 99% Uptime.**

“With 5,500 hours as of January 2010, this rig has been running at 99% uptime. There have been no shutdowns. Other than regularly scheduled oil changes, it has been a maintenance-free engine. Hasn’t even needed a stationary regen. We figure every hour of downtime costs us \$400, so having a reliable piece of equipment really impacts the bottom line.”

### **■ Turning A Profit.**

“We see significantly less downtime...there’s been a noticeable improvement in fuel economy. Tier 3 was nice – and now this one is a whole lot better engine.”





### **Breaking New Ground.**

The 4WD Versatile High-Horsepower Tractor (HHT) is built to handle large-scale farming. When Cummins and Versatile replaced a Tier 3 535-hp QSX with a Tier 4 model, we broke new ground in terms of installation ease and performance.

Comments from Versatile personnel include the following:

“Performance results from the field have surpassed our initial expectations...”

“The HHT program provides a basis to rapidly move ahead with other Cummins Tier 4 prototype installations.”

### **■ Better Performance Is No Shock.**

“We know the QSX15 engine is inherently strong...and we have proved that the Cummins Particulate Filter in the exhaust stream can also meet the highest shock load and vibration levels out in the field.”



### **■ Faster, Easier Installation.**

“Using virtual installation techniques, we can identify opportunities to improve packaging efficiency before working on the prototype installations, so we can fast-track our Tier 4 installation work.”

### **■ Making Fuel Economy Grow.**

“We’ve used virtual fuel-consumption analysis to fine-tune tractor and engine features to lower fuel consumption. The result is an HHT that meets high engine load factors with heavy-duty field and drawbar demands while running cleaner, quieter and with more fuel efficiency.”

### **Every Question. Answered.**



As our field test program continues and expands, Cummins will be working closely with OEMs in all

off-highway markets to ensure a smooth transition to our proven Tier 4 Interim and Stage IIIB engines in your equipment. For additional details about our technology solutions, please visit [everytime.cummins.com](http://everytime.cummins.com) for product information and click on the Contact Us link for additional inquiries.



**Cummins Inc.**  
**Box 3005**  
**Columbus, IN 47202-3005**  
**U.S.A.**

Phone: 1-800-DIESELS (1-800-343-7357)  
Fax: 1-800-232-6393  
Internet: [everytime.cummins.com](http://everytime.cummins.com)

**Cummins Ltd.**  
**Yarm Road, Darlington**  
**County Durham DL1 4PW**  
**UK**

Phone: +44 (0) 1327 886464  
Fax: +44 (0) 870 2413180  
Internet: [cabo.customerassistance@cummins.com](mailto:cabo.customerassistance@cummins.com)

Bulletin 4087166 Printed in U.S.A. 4/10  
©2010 Cummins Inc.