The Power to Lead

CAT® Industrial Engines with

ACERT® Technology
Cat engines with ACERT Technology open a new era in diesel engine design. Using highly-advanced combustion technology to optimize performance, these revolutionary engines meet today’s most stringent emissions reduction standards. And they’re poised to take on tomorrow’s challenges.

ACERT combines proven systems with innovative new technologies to precisely shape the combustion process. It maintains engine performance, efficiency and durability while dramatically reducing emissions.

And looking ahead, ACERT is the only diesel emissions reduction technology currently available with a clear path to Tier 4/Stage IIIb compliance.

Only Cat engines have ACERT Technology. Because only Caterpillar has:

OUR DIRECTION IS CLEAR

ACERT TECHNOLOGY IS THE RIGHT SOLUTION TODAY…WITH THE POWER TO LEAD THE INDUSTRY INTO THE FUTURE.

THE POWER TO LEAD
So it’s no surprise that when the EPA and European Union passed a series of aggressive new diesel engine emissions standards in 1994, Caterpillar took a leading role in developing the technology to meet them.

Through a massive investment of time, expertise and capital (over $500 million so far and counting), Caterpillar worked to find and develop a long-term solution—a platform to meet current and future standards while delivering maximum performance and value.

First, Cat researchers explored a number of existing technologies. Most were rejected for excessive compromises in engine performance or for durability/reliability issues. Then Caterpillar made a breakthrough that pointed the way to an entirely new approach: ACERT Technology.
The core concept behind ACERT Technology is advanced combustion. ACERT carefully controls the combustion process to reduce pollutant levels while maintaining performance and efficiency.

Meeting emissions is one thing, doing it without compromising engine performance and reliability is quite another. ACERT Technology is the one solution that has allowed Caterpillar to meet both of these challenges.

Controlling combustion with a high degree of precision is extremely difficult—in fact, it has been a goal of engine designers for decades. The problem is, the combustion process inside a diesel engine is very complex, and it changes with variations in engine speed and load. ACERT provides deep integration and control of all operating systems, allowing performance control across a wide range of conditions.

ACERT is a unique combination of building block technologies that work together in a highly evolved way for optimum performance across all applications.
One of the key breakthroughs in ACERT Technology is multiple-injection fuel delivery. The multiple-injection process introduces fuel into the combustion chamber in a number of precisely-controlled “microbursts.” Injecting fuel in this way allows for precise shaping of the combustion cycle.

A Cat ADEM 4 controller directs either Cat HEUI, Cat Single Fluid or Cat MEUI injectors to deliver precise quantities of fuel at exactly the right time during combustion. These proprietary Cat injectors can deliver the control and pressure needed for complete combustion.

For optimum performance, the multiple injection process can be tailored for different applications and engine sizes.
**ELECTRONICS**

The “brain power” for ACERT Technology comes from Cat ADEM 4 electronic controllers.

The latest generation of the electronic engine control systems pioneered by Caterpillar in the mid-1980s, the Cat ADEM 4 can govern fuel delivery and other engine processes with incredible precision. And it can be programmed to optimize performance for different engines or specific applications. Cat ADEM 4 provides the ability to link machine performance directly with the engine.

**ACERT ADVANTAGES**

ACERT Technology offers a number of advantages over other emissions reduction solutions.

**Application Tailoring**

The ACERT “building blocks” approach means that each system can be tailored to match a specific engine or even a specific application. In all cases, these building block elements are selected to optimize performance in all engine classes.

**Performance**

Every Cat engine with ACERT Technology meets or exceeds the performance of the engine it replaces. By matching or exceeding the power and torque, we can insure machines with ACERT Technology meet customer needs.

**Wide Power Band Performance**

All engines with ACERT Technology provide full power even at 300 rpm below the engine’s maximum rating. This ability to operate efficiently at less than the maximum rpm rating significantly improves fuel efficiency, lowers heat rejection and reduces noise.

**Enhanced Combustion**

With ACERT Technology, the engine takes in only cool, clean, fresh air compared with other approaches that recycle dirty exhaust gases. Combustion temperatures are controlled by precise multiple injections of fuel.

The ACERT process actually enhances combustion rather than suppressing it (as in some competitive systems) to keep combustion temperatures down. As a result, enhanced engine performance and fuel efficiency are optimized.

**Service/Maintenance Continuity**

Because ACERT uses many existing systems and components, recommended service and maintenance routines are consistent with previous Cat engines.

**Long, Reliable Engine Life**

Engine life and wear are not affected by the advanced combustion process. ACERT won’t cause premature degradation of the combustion chamber as may happen with other emissions reduction solutions. And there are no bulky or unproven add-on components to worry about.

**AIR MANAGEMENT**

Advanced air management also plays a critical role in reducing emissions. Tier 3/Stage IIIa off-road engines include crossflow heads and wastegated turbochargers. Advantages of wastegated turbos include higher boost levels over the entire operating range resulting in better low-end performance and response. Crossflow heads improve breathing for optimized combustion.
C15/C18

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C11/C13

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C9

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Cat C-Series engines build on the strengths of the proven Cat engine line, often retaining many of the core elements of their predecessors—including the same installation size for easy changeover.

**ENGINES FOR INDUSTRIAL APPLICATIONS**

Plus, they take advantage of C-Series enhancements:

- ACERT Technology
- ADEM 4 electronic control
- HEUI, Single Fluid, MEUI fuel injectors
- Updated valve train components
- Crossflow cylinder heads
- New noise reduction technologies
- Increased compression ratio
- Increased peak cylinder pressure and/or increased displacement

With performance and proven reliability, Cat engines have a history of leadership in high power industrial applications. And the new Cat C-Series engines with ACERT Technology deliver even better performance—often with improved power density—along with the power to lead the industry into the future.

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**C7**

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**C6.6**

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Caterpillar’s competitors are pushing their technological limits to meet Tier 3/Stage IIIa standards. ACERT Technology meets today’s needs while also providing a clear line of sight to Tier 4/Stage IIIb compliance through a building block approach to emissions solutions. Caterpillar will use technologies already in use in on-highway applications to meet the off-road regulations in 2010. Advanced air management with variable valve actuation and series turbocharging, combined with aftertreatment, provides the key building blocks for tomorrow.

While some may have to abandon current efforts and look for entirely new technologies, ACERT gives Caterpillar a clear strategy for meeting all future regulatory standards.
WHAT ACERT MEANS FOR YOU

For all of its advanced technology, ACERT delivers some very easy-to-understand benefits that mean a lot to Cat engine customers:

**ACERT means** you deal with largely proven systems that your service people already understand.

**ACERT means** dependable engines with the reliability, low operating costs and long life you expect from Caterpillar.

**ACERT means** your engines and machines meet regulatory standards without trouble-prone complexity.

**ACERT means** your people need to adapt to only one new emissions reduction technology, a technology that won’t become obsolete in just a few years.

**ACERT means** you can count on your Cat dealer for a single solution that’s effective across all your diesel engine applications.
Thousands of Cat engines with ACERT Technology are currently in service in demanding on-highway applications. The technology is proving itself everyday, and customer response has been overwhelmingly positive.

See your Cat dealer to learn more about ACERT. He can show you which Cat engines with ACERT Technology will work best to optimize performance and reduce emissions in your applications…now and in the future.

Only Caterpillar has ACERT Technology—because only Caterpillar has the history of innovation, resources and dedication to make it a reality.

THAT’S THE POWER TO LEAD