

Excellence on Board

“Cat and MaK engines with ACERT technology deliver excellent performance, efficiency and durability, while offering a highly effective emissions reduction solution. ACERT combines proven systems with innovative new technologies to enhance the combustion process to such a high degree that it optimizes total engine performance. And it is flexible enough to apply across the entire Cat and MaK engine line. Only Caterpillar has ACERT technology – because only Caterpillar has the resources, dedication and history of excellence to make it a reality.”

– George Lustgarten, PhD Technology Manager, Caterpillar Inc.

THAT'S THE POWER TO LEAD.

LEADING THE WAY.

For more than 75 years, Caterpillar has been a global leader in marine engine manufacturing. A sales leader in every market we serve, Caterpillar is dedicated to putting excellence on board any vessel, anywhere in the world.

From propulsion engines to drive line and electronic control systems, from auxiliary power units to generator sets, Cat Marine Power offers a complete line of dependable, reliable systems that you can count on for the power you live by.

WORLDWIDE CAT DEALER NETWORK.

Caterpillar gives you access to more than 2,000 service locations worldwide – the best dealer coverage in the industry. Most parts are available within 24 hours, anywhere in the world.

Your Cat dealer offers complete sales and service support for all Cat products, with flexible financing for any engine or an entire vessel. With Cat representatives in every time zone, you'll have a service home in every port.

THE **POWER** TO LEAD



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INVESTING IN THE RIGHT SOLUTION.

ACERT technology is the product of a huge investment by Caterpillar. Initial development took well over two years and cost more than \$500 million. Caterpillar was dedicated to finding one solution that would deliver real value across all engine sizes and applications – from on-highway and off-road to industrial, marine and more.

ADVANCED COMBUSTION.

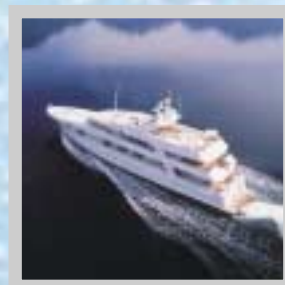
The investment paid off when Caterpillar made landmark breakthroughs in the science of fuel combustion. ACERT technology allows the combustion process to be shaped and managed with an extremely high degree of precision. And it offers the flexibility to optimize the performance of any engine in any application.

Advanced combustion has been a goal of engine researchers for decades. But only Caterpillar has the expertise, resources and technology base – with proprietary electronic controls, fuel systems and air management systems – to make it a reality.

WHAT MAKES ACERT TECHNOLOGY SO ADVANCED?

ACERT technology is not a single, add-on system. Instead, it's comprised of a number of "building block" technologies.

Each of these technologies can be tailored for a given engine or application. Likewise, different engines in different applications may use all or only some of the ACERT building blocks.



DEVELOPING ACERT TECHNOLOGY

WHAT MAKES ACERT TECHNOLOGY SO SIMPLE?

Because ACERT is primarily a combustion technology, there is no external plumbing to clutter cramped engine compartments. ACERT also avoids the complications and costs of water injection systems and urea-based catalysts.

And when you specify an engine, ACERT building block elements are included only as needed, so you get a solution optimized for your application.

PROVEN TECHNOLOGY.

Many of the individual elements that make ACERT work have seen decades of use and offer reliable performance with familiar maintenance and service routines. These elements work in combination with hundreds of innovations to dramatically improve total engine performance.

And ACERT is already proving itself in demanding applications. Thousands of Cat engines with ACERT technology are now logging miles in on-highway trucks or cruising the world's oceans, and customer reaction has been outstanding.

A CLEAR DIRECTION.

As worldwide emissions standards tighten, ACERT technology won't be left behind. Unlike lesser emissions solutions, ACERT offers a clear direction for future regulatory compliance.

ACERT building block technologies can be added as needed, and they're being constantly refined to enhance their effectiveness. Caterpillar is also developing new technologies that may be applied to ACERT in the coming years.

ACERT technology is the right solution for marine power today. And you can count on it to meet the challenges of tomorrow.

ACERT BUILDING BLOCKS

The building blocks that make up ACERT TECHNOLOGY fall into four categories:



FUEL DELIVERY

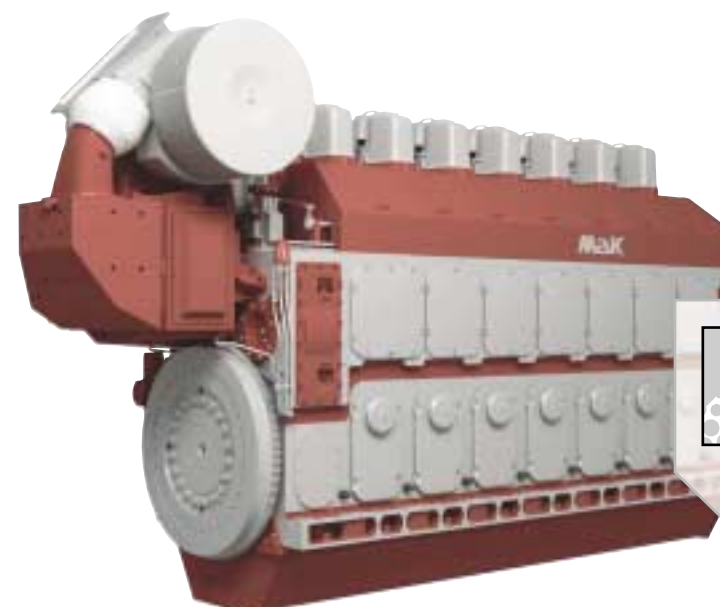
The heart of ACERT technology is multiple injection fuel delivery, which introduces fuel into the combustion chamber in a series of precisely-timed "microbursts."

This allows control over many more variables during the combustion process. The combustion cycle can be tailored to deliver maximum power and efficiency with minimum emissions for a wide range of engine speeds and loads.



ELECTRONICS

The Cat ADEM™ electronic control acts as the brains of ACERT. Pioneered by Caterpillar almost 20 years ago, an ADEM controller coordinates and enhances fuel delivery, air supply and other engine functions to maximize overall performance and reduce emissions output.



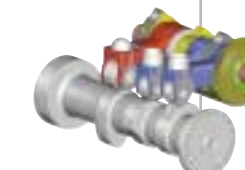
AIR MANAGEMENT

Cat engines with ACERT technology use a variety of refined air management technologies, including crossflow cylinder heads and wastegate turbochargers. They also take advantage of several new innovations:

Variable Valve Timing uses electronically-controlled hydraulic actuators to govern when valves open and close to let air in and exhaust out of the combustion chamber.

Series Turbocharging uses two smaller turbos together to reduce lag time while maintaining high airflows. Lower shaft speeds also enhance reliability and service life.

MaK Flex Cam technology offers another way to precisely control valve timing. This technology allows MaK engines to meet IMO emissions requirements using an easy-to-maintain internal solution.



AFTERTREATMENT

Currently, Cat marine engines do not require aftertreatment. However, it may be applied more widely in the future as emissions standards tighten, and Caterpillar is developing a range of industry-specific aftertreatment solutions.