

Drive & Control profile

Preparing for TIER 4 Final: 2014 starts now

In 2014, diesel systems will be required to operate emitting only 10 percent of currently permitted levels of soot particulates and nitrous oxide (N₂O)

In 2014, TIER 4 Final Regulations will be in effect, and diesel systems will be required to operate generating near-zero targeted emission levels. This significant reduction will force many mobile equipment manufacturers to fully redesign their systems. And those redesigns can have a large impact on the function of the machine through the drive and control hydraulics, as well as on the performance, flexibility and reliability of the mobile equipment.

Crucial engineering and design decisions must be made now. If not, manufacturers may be forced to make complex, last-minute changes to mobile equipment design that will increase costs and affect the competitive value of backhoes, cranes, tractors, drilling rigs and other mobile systems.

There are several technology challenges, highly inter-related, that will need to be addressed to meet TIER 4 final requirements:

Comprehensive exhaust gas aftertreatment: The combination of



exhaust gas treatment and particle filters will have to be optimized. This will increase development outlays and costs, both for components regarding the exhaust gas recirculation system and for additional aftertreatment catalytic reduction systems.

Expanded space requirements: TIER 4's drastic emission reductions are expected to compel system redesigns that may require 15 to 40 percent additional space on mobile machines—and for small to medium-size construction machinery, fitting it all in is a major engineering challenge.

Increased cooling requirements:

Diesel engines will need to operate in a narrow optimum temperature band to maintain emissions compliance; this places new burdens on diesel cooling systems, reducing peak combustion temperatures.

Changed dynamic response of

diesel engines: TIER 4 final could have an impact on overall machine performance if designers choose only to downsize the diesel engine to achieve compliance. However, by also optimizing the transfer of available power with the hydraulic system performance, it's possible to downsize



the diesel engine and still achieve identical machine performance.

Higher equipment and operating costs: While there is no question that the new exhaust cooling systems will require mobile equipment re-design, engineering and end-user costs can escalate if a piecemeal approach is taken to solving individual emissions and equipment re-design issues.

Bosch Rexroth has invested continuously in developing technologies to respond to the requirements of TIER 4 final. Rexroth has developed a state-of-the-art suite of systems, built on a whole-system approach to optimizing energy efficiency and environmental compliance in mobile machines:

- Reduced emissions—through intelligent networking and control of both diesel engines and hydraulics components.

- Increased efficiency—through optimized individual components that increase overall efficiency, delivering power to hydraulics systems while demanding less power from diesel systems.
- Enhanced energy efficiency—hydraulics components such as Green Valves that provide added functionality while simultaneously making reduced energy consumption possible throughout the system.



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Despite compliance challenges, manufacturers need to finish their system redesigns now so that there is sufficient time, after the prototype stage, to test TIER 4 final compliant systems and bring them to production readiness. The good news for partners and customers is that Rexroth's application know-how and comprehensive suite of hydraulics technology has been designed to answer many of the performance and space challenges associated with TIER 4 final, helping users reduce both the time and cost it will take their operations to be ready for 2014.

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